Potterne 1982-5

Animal Husbandry in Later Prehistoric Wiltshire



Andrew J. Lawson

Wessex Archaeology

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Potterne 1982–5: Animal Husbandry in Later Prehistoric Wiltshire

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Front cover: A selection of finds from Potterne, providing an indication of the density and range of material present in the Deposit (cover photographs: Elaine A. Wakefield)

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Summary

A programme of field investigations and subsequent analysis has defined an extensive and prolific later prehistoric site at Potterne, near Devizes, in Wiltshire. Fieldwork was initiated in 1982 following the chance discovery of a Late Bronze Age gold bracelet in the parish cemetery, an area which had previously yielded Early Iron Age pottery. A series of limited excavations, largely conducted between 1983 and 1985 and augmented by an extensive auger survey with accompanying geophysical and geochemical sampling, established the extent, profile, and topography of the archaeological remains. The application of soil micromorphology, and detailed analysis of a range of ecofacts and artefacts have led to the characterisation of a previously unrecognised major form of site.

The site at Potterne covered *c.* 3.5 ha and was largely composed of dark, anthropogenic deposits up to 2 m thick. It contained prodigious quantities of artefacts; the excavated area represented less than 1% of the established extent of the site and produced, for instance, 1 tonne of pottery and 135,000 animal bones. Most unusually, plant remains were extensively preserved in both mineralised and charred form.

The so-called 'Deposit' resulted from the keeping of stock both in roofed buildings and in pounds where the addition of waste material and refuse led to the gradual increase in ground level and conditions suitable for mineralisation. Although subtle variations in soil micromorphology existed, the site formation process remained broadly consistent for some 500 years, a period in which the material culture of the site's users gradually changed.

The keeping of cattle on the site in close proximity to an (unlocated) Deverel-Rimbury settlement appears to have commenced by c.1200 BC. The area was subsequently overwhelmed by dumped material while stock continued to trample the accumulating material. Posts, presumably from settlement structures, penetrated the deposits, at least in the early parts of the sequence. Accumulation continued until c. 600 BC by which time iron was in use on the site.

Viewed from an environmental point of view the site might be regarded as a large heap of manure, or as a midden, but the archaeological remains indicate a substantial human imput. The favoured interpretation is that of a place where stock, predominantly cattle, were regularly pounded, maintained by a relatively small resident population. The numbers of people on the site were periodically but often greatly increased by others who used it as an exchange or meeting place, the visitors stimulating a range of productive industries and consumptive practices at the site. Potterne thus fulfilled one, specialised, function in the network of a broader community.

A range of sites with potentially similar characteristics and of similar date has been identified both locally within the Vale of Pewsey and, elsewhere in Southern England.

Résumé

Un programme d'études de terrain et les analyses qui en ont découlé ont déterminé un site du préhistorique tardif, étendu et prolifique, à Potterne, près de Devizes, dans le comté de Wiltshire. On a entamé la prospection en 1982, à la suite de la découverte fortuite d'un bracelet en or de la fin de l'âge du bronze dans le cimetière paroissial, endroit où l'on avait précédemment trouvé de la poterie du début de l'âge du fer. Une série de fouilles restreintes, entreprises surtout entre 1983 et 1985, à laquelle s'ajoute une étude avec sondages extensive accompagnée de carottages géophysiques et géochimiques a mis en évidence l'étendue, le profil et la topographie des vestiges archéologiques. L'application de la micromorphologie des sols, et une analyse détaillée d'une gamme d'éléments écologiques et d'objets manufacturés ont conduit à la caractérisation d'un type majeur de site non répertorié jusqu'à présent.

Le site de Potterne couvrait environ 3,5ha et était en grande partie composé de dépôts anthropogéniques sombres qui atteignaient jusqu'à 2 m d'épaisseur. Il contenait de prodigieuses quantités d'objets manufacturés; la partie fouillée, qui représente moins d'1% de l'étendue établie du site, a livré, par exemple, une tonne de poterie et 135 000 os d'animaux. Fait tout à fait inhabituel, les restes végétaux étaient extensivement préservés à la fois sous forme minéralisée et calcinée.

Ce que l'on a appelé 'Dépôt' était le résultat de l'élevage d'animaux, à la fois dans des bâtiments couverts et dans des parcs, où l'adjonction de matières rejetées et de détritus avait entrainé une hausse progressive du niveau du sol et des conditions propices à la minéralisation. Bien qu'il existe de subtiles variations dans la micromorphologie du sol, le processus de formation du site est en gros resté uniforme pendant 500 ans, période pendant laquelle la structure matérielle des utilisateurs du site a progressivement évolué.

L'élevage de bétail sur le site, très proche d'une occupation de type Deverel-Rimbury (non encore localisée), semble avoir commencé vers environ 1200 av. J.-C. Cette zone a été ensevelie plus tard sous des matériaux qu'on avait rejetés là tandis que le bétail continuait à piétiner les matériaux accumulés. Des poteaux, provenant probablement de structures de l'occupation, avaient pénétré dans les dépôts, au moins au cours des premières parties de la séquence. L'acumulation a continué jusqu'à environ 600 av. J.-C. date à laquelle le fer était utilisé sur le site.

D'un point de vue environnemental, on peut considérer le site comme un gros tas de fumier, ou un dépotoir, mais les vestiges archéologiques attestent d'un apport humain substantiel. L'interprétation privilégiée est celle d'un endroit où le cheptel, essentiellement des bovins, était régulièrement parqué, il était gardé par une population sédentaire relativement peu nombreuse. Une augmentation, périodique mais importante, du nombre de personnes résidant sur le site résulterait de la présence d'individus qui l'utilisaient comme lieu d'échanges ou de rencontres, les visiteurs stimulant diverses industries productives et pratiques de consommation sur le site. Potterne a ainsi rempli une fonction, spécialisée, à l'intérieur du réseau qui couvrait une communauté plus étendue.

On a identifié un certain nombre de sites offrant peut-être des caractéristiques et une datation similaires à la fois dans la région, dans la vallée de Pewsey, et ailleurs dans le sud de l'Angleterre.
Annie Pritchard

Zussamenfassung

Mit Hilfe eines Programms aus Geländeforschungen und anschlieflender Analyse konnte in Potterne bei Devizes in Wiltshire eine ausgedehnte und ergiebige Fundstelle der späteren Vorgeschichte bestimmt werden. Nachdem der Zufallsfund eines Goldarmreif aus der späten Bronzezeit im Gemeindefriedhof gemacht worden war, und dieses Gebiet schon Scherben der frühen Eisenzeit hervorgebracht hatte, wurden 1982 die Arbeiten im Gelände begonnen. Besonders zwischen 1983 und 1985 wurden mehrere, kleinere Ausgrabungen unternommen. Sie wurden ergänzt durch einen umfangreichen Bohrungssurvey und geophysikalische und geochemische Probeentnahmen. Durch diese Untersuchungen konnte schlieflich die genaue Ausdehnung, das Profil und die Topographie der archäologischen Hinterlassenschaften bestimmt werden. Unter Verwendung eine Mikromorphologie des Bodens und einer detaillierten Analyse unterschiedlichster Eco- und Artefakten wurde die Beschreibung einer bisher noch unbekannten wichtigen Fundstellenform erreicht.

Die Fundstelle in Potterne erstreckte sich über eine Fläche von ca. 3.5 ha, und bestand überwiegend aus schwarzen, anthropogenen Ablagerungen, die eine Dicke von bis zu 2 m aufwiesen. Die Fläche enthielt eine erstaunlich hohe Anzahl an Artefakten; obwohl die ausgegrabene Fläche weniger als 1% der festgestellten Ausdehnung der Fundstelle darstellt, lieferte sie z.B. 1 Tonne Keramikscherben und 135,000 Tierknochen. Ungewöhnlich waren auch die Pflanzenreste, die weitgehend sowohl in mineralisierter als auch in verkohlter Form erhalten waren.

Die sogenannte 'Ablagerung' stammte von der Viehhaltung in überdachten Bauten als auch Stellplätzen, wo die Rückstände und Abfälle zum graduellen Anwachsen der Gehhorizont und zu den für eine Mineralisierung günstigen Bedingungen führte. Obwohl es feine Unterschiede in der Mikromorphologie des Bodens gab, blieb der Formationsprozefl der Fundstelle für ca. 500 Jahre konsistent. Während dieses Zeitraums veränderte sich die materielle Kultur der Benutzer dieses Fundortes nur allmählich.

Die Rindviehhaltung am Fundplatz, der in nächster Nähe zu einer (noch nicht lokalisierten) Deverel-Rimbury Siedlung liegt, scheint um ca. 1200 BC begonnen zu haben. Die Stelle wurde immer wieder von Abfall überschüttet, der aber von der Herde fortwährend nieder getrampelt wurde. Pfosten, die wahrscheinlich von Siedlungsstrukturen stammen, durchdrangen zumindest die frühen Sequenzen der Ablagerungen. Die Akkumulation setzte sich bis ca. 600 BC fort, wobei zu diesem Zeitpunkt hier bereits Eisen in Gebrauch war.

Aus einer ökologischen Perspektive könnte man die Fundstelle als einen riesigen Düngehaufen oder Abfallhaufen betrachten, allerdings geben die archäologischen Hinterlassenschaften einen substantiellen menschlichen Aufwand zu erkennen. Die bevorzugte Interpretation ist, dass es sich um einen Platz handelt, an dem Vieh, und zwar vorwiegend Rindvieh regelmäflig gehalten wurde, und der von einer relativ kleinen Bewohnerschaft unterhalten wurde. Die Anzahl der Personen an dem Fundort wurde periodisch und z.T. in groflem Umfang durch auswärtige Personen vergröflert, die ihn als Umtausch- und Versammlungsplatz nutzten, und dabei an Ort und Stelle zahlreiche Produktionsindustrien und den Konsum förderten. Auf diese Weise erfüllte Potterne eine spezialisierte Funktion innerhalb eines Netzwerk einer gröfleren Gemeinschaft.

Eine Reihe weiterer Fundstellen, die möglicherweise ähnliche Charakteristika aufweisen und aus der gleichen Zeit stammen, wurden bereits im Vale of Pewsey und an anderen Stellen Südenglands identifiziert.
Peter Biehl

Section 1. Site Investigations

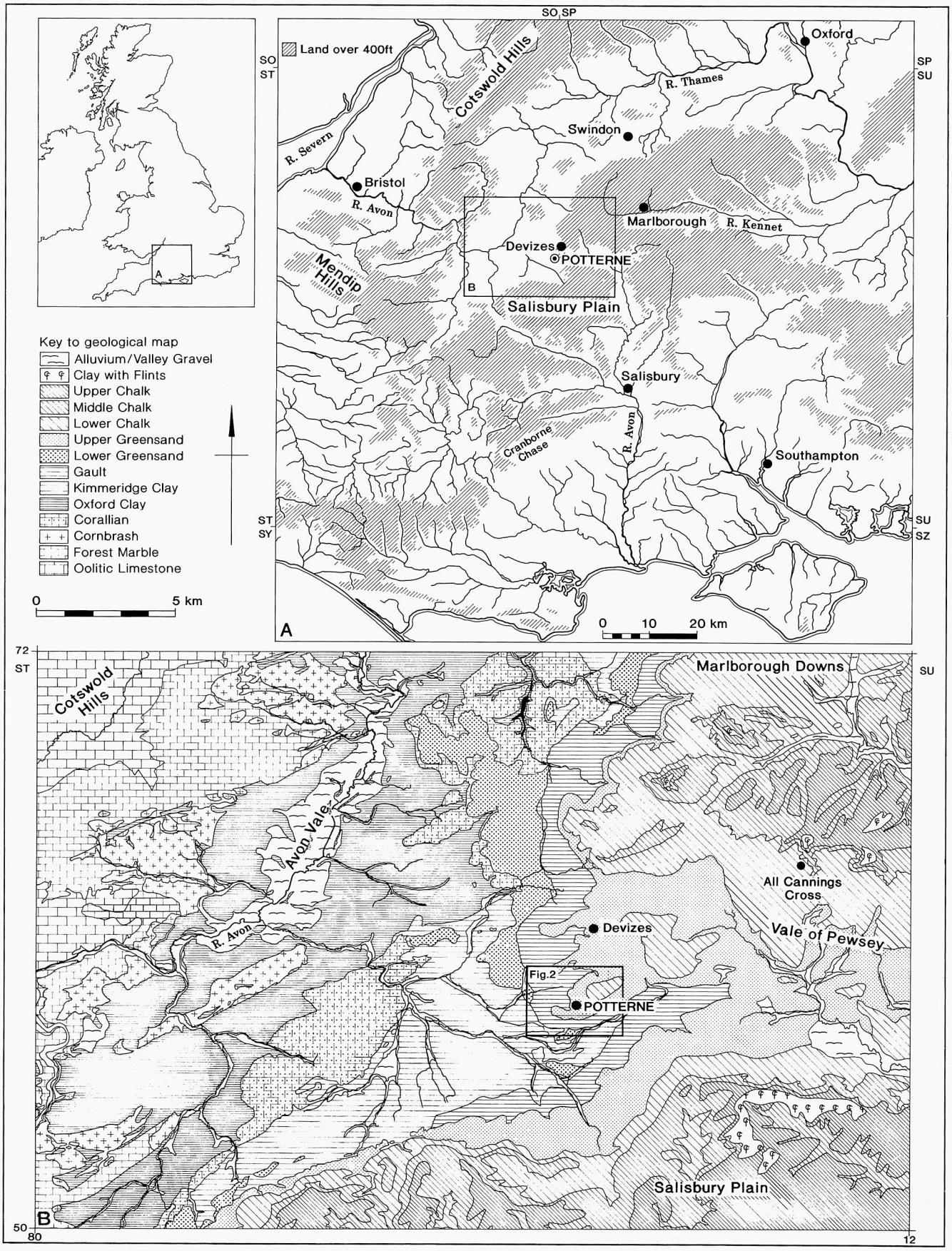


Fig. 1 Site location and geology of the surrounding area

1. Introduction

1 Introduction

The extraordinary archaeological site at Potterne in north-west Wiltshire first came to light entirely by chance when, as in all the best stories, a gold bracelet was discovered during the digging of a grave in the village cemetery. This was followed by the recovery of more artefacts: pottery, bone, a bronze knife, and other evidence of ancient activity, until a proper evaluation of the archaeological potential of the graveyard revealed the presence of a prehistoric site of previously unknown type and enormous extent (*c.* 3.5 ha). In fact, pottery had been recovered from the site as early as 1894, but the significance of these finds had not been appreciated.

The relatively small scale excavations and related investigations undertaken between 1982 and 1985 identified the site as, in essence, a vast rubbish heap with an apparently unbroken sequence of Late Bronze Age and Early Iron Age deposits of unprecedented richness. This *Deposit*, as it quickly became known and is referred to throughout this report, was crammed with artefacts and animal bone, all in an exceptional state of preservation. Detailed sequences of charred plant remains were obtained and, most unusually, mineralised plant remains were also present in quantity. This was the first opportunity on which the processes and products of mineralisation could be examined in a prehistoric and non-urban context. Soil micromorphology was undertaken, providing the most significant contribution towards the understanding of how the Deposit formed and its complex character.

The artefact assemblage included an enormous quantity of Late Bronze Age and Early Iron Age pottery, analysis of which has provided invaluable evidence for the changing trends in pottery production and distribution in the region at this time. This has been achieved through very detailed consideration of fabrics, forms, and decorations and makes the Potterne assemblage one of the most important of the period so far examined in England. The metalwork and worked bone assemblages are also of great importance.

This report describes the results of the programme of fieldwork and subsequent analysis undertaken in order to evaluate the Potterne Deposit. It is important to remember that, at the time of excavation, there were no obvious parallels for it so that what started as a relatively routine inquiry rapidly became a complex investigation of an increasingly difficult site. As excavation progressed both the developing interpretation of the archaeological deposits and the methods by which they were being investigated had to be modified, and this continued through the extended post-excavation and reporting stages. The development of the programme of work was, of necessity, evolutionary and flexible, the strategies employed at each stage involving the refinement of those methods used during previous stages.

These methodological considerations are important in understanding the manner in which this report has come to fruition. With hindsight, and in the light of major advances in computing technology which have occurred since the fieldwork was completed, it is possible to suggest that some of the methods employed in the excavation and sampling of the Deposit, and in post-excavation analysis, may not have been the most appropriate for maximising the information which could have been recovered. But such comments can only be made after the event and result, in particular, from analysis of the soil micromorphology and other environmental data which have indicated an even greater complexity to the Deposit than was apparent in the field. In attempting to establish the nature and extent of the Deposit a number of techniques were employed which, today, are relatively routine but which, at the time, were novel if not pioneering, including, for the time, a huge programme of magnetic susceptibility and computer analysis of the pottery distributions.

The unprecedented nature of the site and quantity of recovered data led, perhaps inevitably, to a rather introspective view. Effort concentrated on attempting to understand what, physically, the Deposit represented, how it was formed, and what taphonomic processes were at work, and on a study of the mineralised remains and the processes by which these had come to be. Later in the post-excavation programme, once some of these parameters had been established and a chronological and cultural framework provided by the finds, emphasis shifted towards the characterisation and definition of the structure and content of the Deposit and, later still, on the identification of the activities which had generated it and its cultural and economic background.

An important element of this report is, therefore, the explanation of the methods employed on site and in post-excavation analysis, together with the evolution of the research strategy, and an evaluation of their contributions to the overall results of the exercise or potential under similar circumstances. Should the opportunity ever arise for further work at Potterne, or on another similar deposit, the methodological approach to fieldwork and the framework established for the interpretation of the results will need to be carefully considered in the light of the work reported here.



Plate 1 General view of the site looking south from Furze Hill across the valley of the Rangebourne stream with the northern edge of Salisbury Plain in the far distance. The site occupies the lozengic field below the near horizon, centre left

2 Site Location, Geology and Topography

The site, centred on NGR ST 996 591, is located on the northern edge of the village of Potterne, 3 km south of Devizes in Wiltshire (Figs 1, 2; Pls 1, 2). It occupies an elevated position overlooking the Avon Vale, being situated on the lower slopes of the steep Upper Greensand escarpment which forms the western end of the Vale of Pewsey, and which represents the watershed between the Bristol and Hampshire Avons, two of the principal drainage systems of southern England.

The Vale of Pewsey formed as a breached anticline, its floor comprising chiefly extensive exposures of Cretaceous Upper Greensand (Fig. 1). These deposits have been eroded at the western end of the Vale to reveal Gault Clay and localised exposures of Lower Greensand. At the lowest point of the Greensand scarp, immediately south of Potterne, erosion has exposed the Portland Sands overlying Kimmeridge Clay, of Jurassic date. The site lies wholly on the Upper Greensand, just above the boundary with Gault Clay (British Geological Survey, Sheet 282). The soils are typical Argillic Brown Earths of the Ardington Association (Soil Survey of England and Wales 1983, Sheet 5).

With its back to the scarp, the site has uninterrupted views towards the west, with the wide flat expanse of the Avon Vale stretching out in front of it and, visible at a distance of some 50 km, the Oolitic Limestone of the Mendips to the west and the Cotswolds to the north-west. The vista from the site is framed on the south side by Court Hill and, in the middle distance at around 15 km, by the steep edge of Salisbury Plain at Summer Down, and to the north by Furze Hill. To the east, though not directly visible, the Vale of Pewsey lies between two large blocks of Upper and Middle Chalk downland, the Marlborough Downs to the north, and Salisbury Plain to the south, many of the crests of which are capped by clay-with-flints. At the base of the downs are heavier soils derived from Lower Chalk or developed on deep colluvial marl. Towards the east end of the Vale of Pewsey there is a second watershed, with streams feeding the River Kennet which flows eastwards from Swallowhead Springs, near Avebury, to the Thames.

The site lies between 85 m and 100 m OD on the shallow north-west facing slope of a Greensand ridge forming the lower western slopes of Potterne Field, an outlying Lower Chalk hill, the summit of which is at 145 m OD (Fig. 2). To the north-west, the ground falls to *c.* 65 m OD onto the flat valley floor of the Rangebourne river, one of a series of tributaries of the Bristol Avon which have eroded the western edge of the Greensand scarp. The ground rises again to the north of the Rangebourne onto Furze Hill. To the east, the river valley narrows into a steep-sided coombe at the head of which the spring-line in the Greensand pro-



Plate 2 General view looking north across Potterne cemetery towards Furze Hill. Cutting 1 was excavated beside the shed (right) and the main cuttings beyond it.

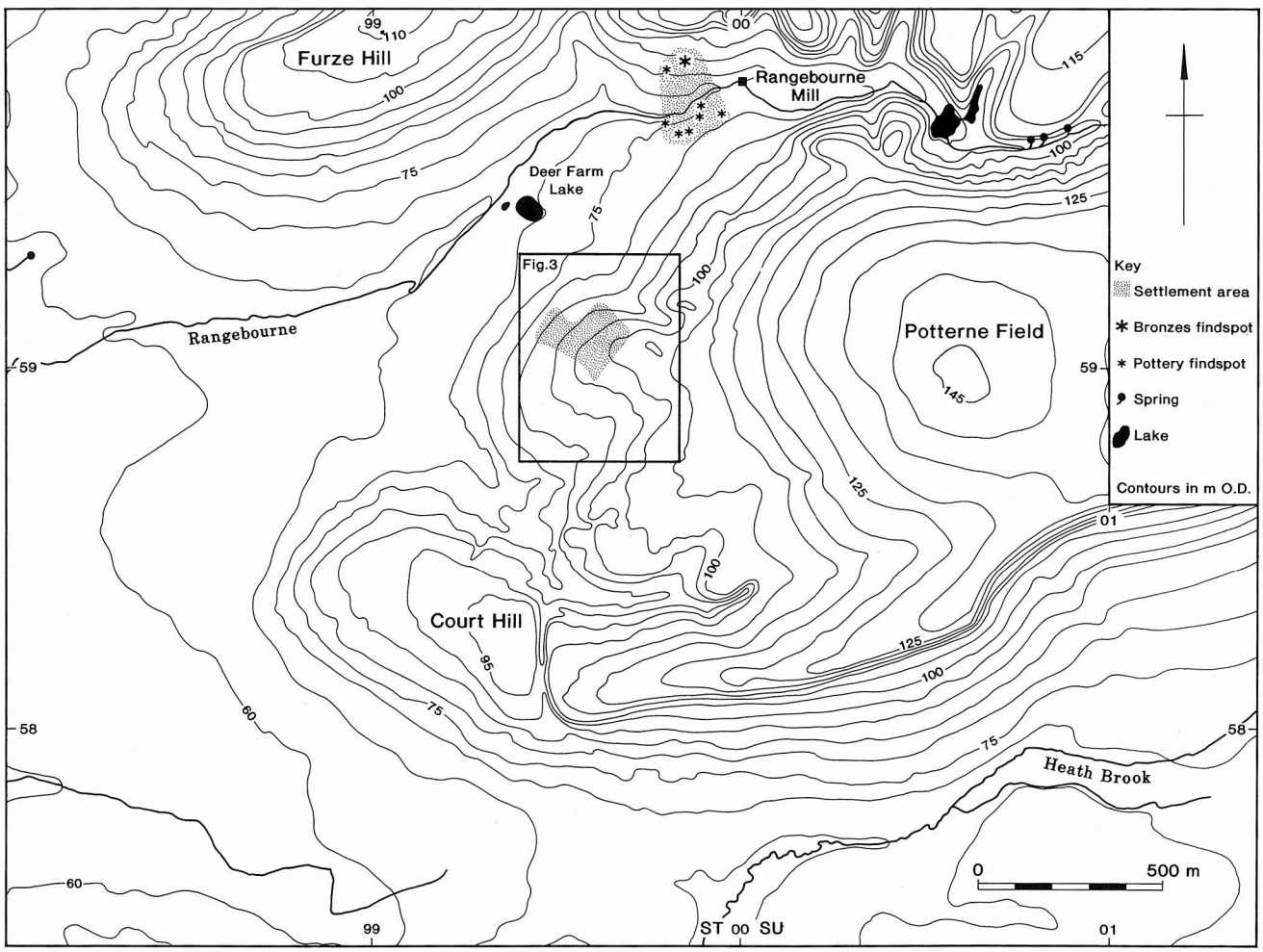


Fig. 2 Topography of the site and surrounding area

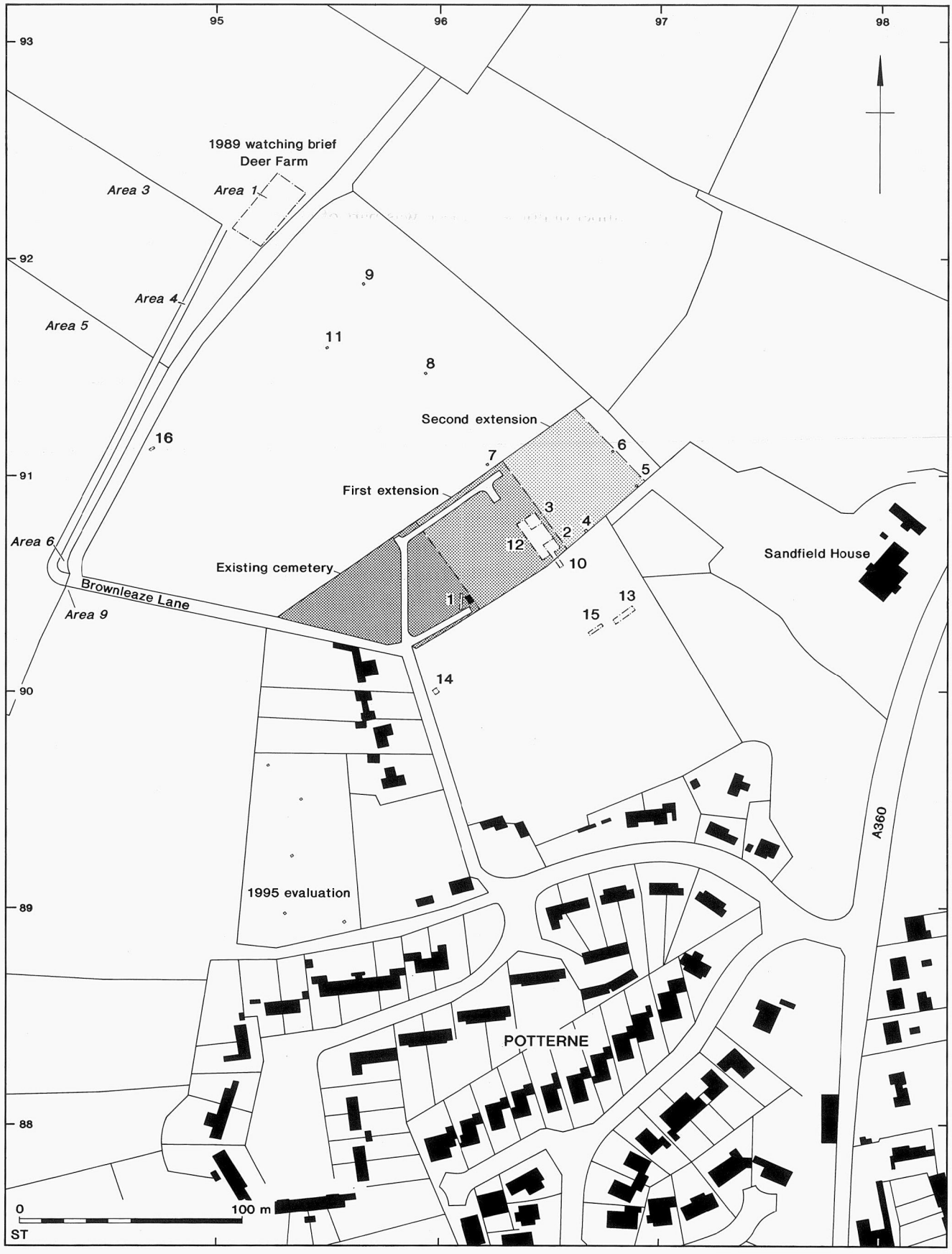


Fig. 3 Location of 1982-85 evaluation trenches (Cuttings 1-15) and subsequent work, in relation to Potterne cemetery and the surrounding area

vides permanent water supplies. The steep slopes at the head of the Rangebourne valley, and on the north and south sides of Potterne Field, mean that the ridge represents one of the easier routes of access from the valley floor onto the top of the scarp.

The summit of the ridge on which the site lies is occupied by Sandfield House, the ridge itself running west through the field between Potterne cemetery and the village (Fig. 3). The site is reached from the south along Brownleaze Lane, there being a number of houses on the west side of the road representing the northern limit of the settlement in the village, the lane continuing as an unmetalled track around the south and west sides of the site. The surrounding countryside consists mainly of pasture fields bounded by well established hedgerows, with a deer farm on the valley floor below the site.

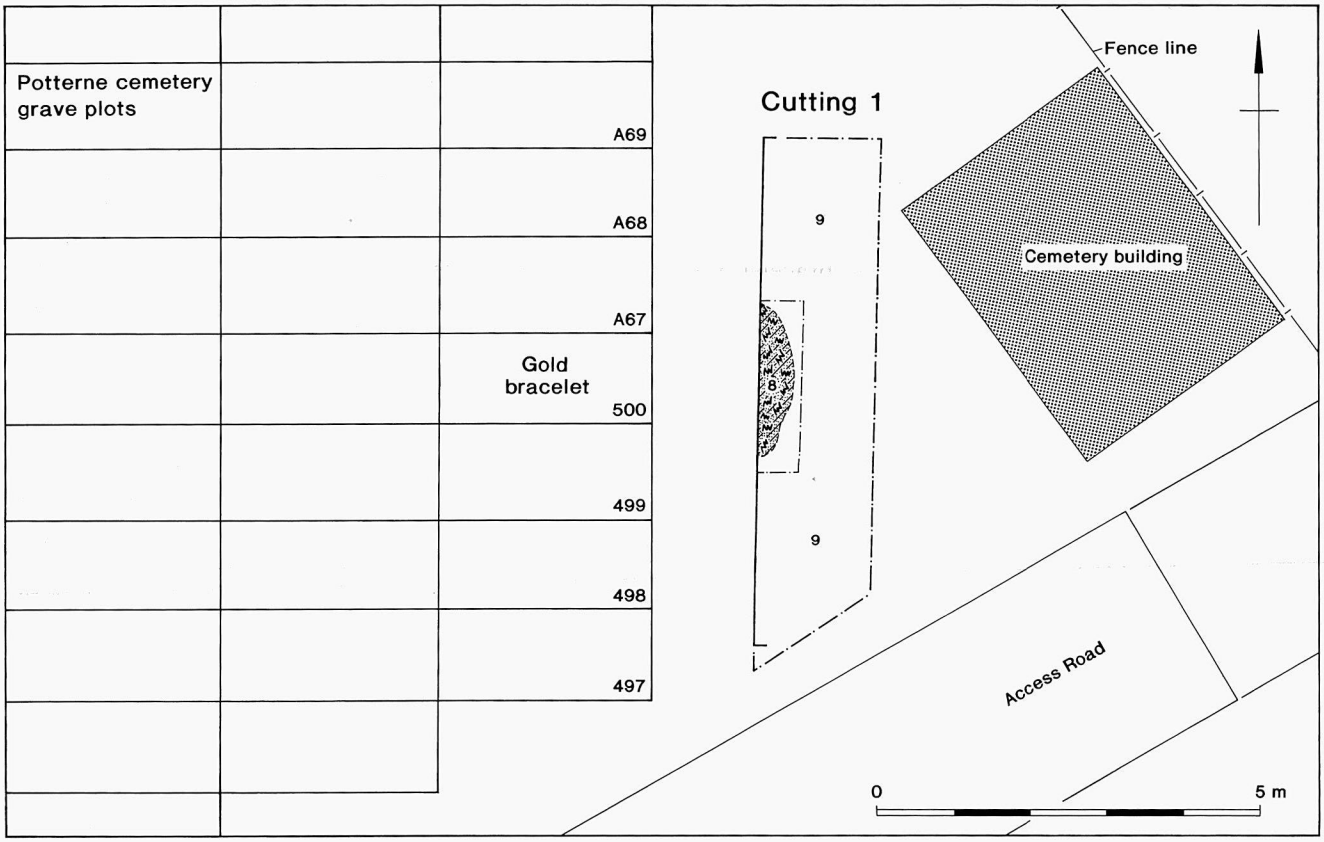
3 Other Finds in the Area

The record of later Bronze Age and Early Iron Age activity in the Potterne area is heavily biased towards the chalk where extensive field systems survive on both Salisbury Plain and the Marlbrough Downs. Major sites of Middle Bronze Age to Early Iron Age date are known, most famously at Bishops Canning Down (Gingell 1992) and All Cannings Cross (Cunnington 1923) and most recently (and pertinently) at East Chisenbury (Brown *et al.* 1994). The place of Potterne in its wider regional context is addressed in the Discussion, below. Around Potterne village itself, relevant material has been recovered from two areas.

In 1980 and 1981 a collection of Late Bronze Age/Early Iron Age pottery was made by Paul Flett 600 m north-north-east of Potterne cemetery, near Rangebourne Mill. The finds, from surface collection, mole hills, and drainage trenches, were distributed over some 150 m immediately south of the Rangebourne (Fig. 2). Also in 1981, three pieces of bronze metalwork were discovered with a metal detector in the same general area, but on the opposite side of the river on the lower slopes valley. They included a fragment of an awl/tracer and a curved length of square-sectioned, spiral-twisted rod, probably part of a neckring. Both have Late Bronze Age parallels (Turnbull 1982). The third piece was part of an Iron Age bossed bracelet. There was no further information as to the context in which these artefacts and further potsherds, were found. More recently, in 1995, Late Bronze Age pottery, as well as flint and stone, has been recovered in the same area as the bronzes during the construction of a barn at Cherry Court.

The site itself is located in an area of Potterne known, from 1656 at least, as Blackberry (archive). After 1834 the field became allotments, known as Blackberries, and remained as such until the part of the site was consecrated as the new cemetery in 1922. Pottery was first collected from the field in 1894 by the Rev. E. L. Goddard who sought the views of Lt Gen. Pitt Rivers on the date of the recovered pottery. Pitt Rivers' reply (a typed letter of 5 December 1894) included a number of astute comments on the fabrics of the pottery but he was misled by its hard (mineralised) state into thinking it to be Norman or medieval (Wiltshire Archaeol. Soc. Library). Further finds were gathered on at least six occasions between 1960-76 during the digging of graves in Potterne cemetery. All these finds are now in Devizes Museum.

Thus there was a hint of Late Bronze Age to Early Iron Age activity around Potterne village prior to the discovery of the gold bracelet, but nothing to suggest the scale and importance of the site which was subsequently evaluated.



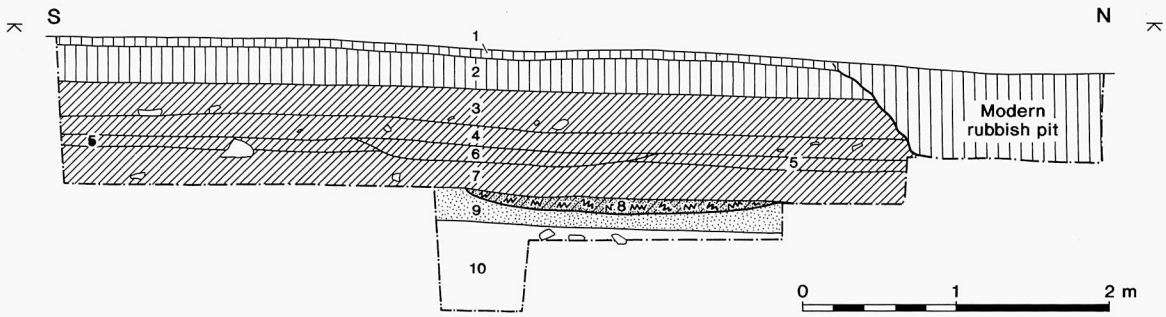




Fig. 4 Site of the discovery of the gold bracelet and location of Cutting 1 (above); west section of Cutting 1 (below) with key to plans and sections

2. Survey, Excavation History and Methods

1 The Gold Bracelet and Subsequent Finds

The project reported upon here was initiated following the discovery on 23 June 1982 of a gold bracelet during the digging of a grave (no. 500) at the (then) eastern limit of the Potterne cemetery (Figs 3, 4). No archaeological observation of the grave was made at the time, but at the subsequent Treasure Trove inquest the grave digger, Mr William Simms of Wootton Bassett, described how he had dug down to about 5 ft (1.5 m) when he found animal bones and pieces of pottery, and then the bracelet. In August of that year Chris Gingell watched the digging of an adjacent grave (no. A67) 0.3 m to the north of that which produced the bracelet and recovered from it a copper alloy socketed knife, whetstones, 255 sherds of pottery, and 4.5 kg of animal bone. This quantity of material from such a small hole in the ground clearly indicated that the bracelet had been no isolated find. As a consequence of these finds proposals were put forward for the further investigation of the area to establish the archaeological context of the gold bracelet and other artefacts.

2 The Investigation Strategy and Changing Interpretative Model

The 1982 Sondage and its Implications

Four seasons of fieldwork followed the initial finds of 1982. These began with a very small scale operation later that year, consisting of a watching brief on further grave digging and a very limited excavation, followed by the excavation of several small cuttings and test pits in 1983, open area excavation in 1984, and smaller scale intervention in 1985.

Throughout this period the basic aim of the work – to establish the archaeological context of the bracelet – did not alter but as the unusual and prolific character of that context emerged the scale and strategy of the operations necessary for its interpretation became increasingly complex and subject to modification.

A superficial examination of the first finds indicated that they belonged to the later Bronze Age and Early Iron Age. Apart from the bracelet itself, which would be an exceptional find in almost any archaeological context, the finds appeared to be of an essentially domestic nature. On the basis of the preliminary dating, the anticipated character of the site was based on models of settlement previously established both nationally and locally. It was expected that a later Bronze Age settlement might be present which would be similar to well-known, small, enclosed 'homesteads' such as Plumpton Plain (Holleyman and Curwen 1935) or Itford Hill in Sussex (Burstow and Holleyman 1957). Thus the settlement might be expected to produce evidence for a limited number of post-built round-houses within a confining earthwork. It might contain elements of the various settlements recorded on the Marlborough Downs. At the latter Chris Gingell's own fieldwork had augmented the earlier work of Owen Meyrick (1946) and Mrs Piggott (1942) demonstrating that the integrated system of settlements and fields which was established by the Middle Bronze Age continued into the 'Post-Deverel Rimbury' phase towards the end of the 1st millennium BC.

Similarly, the anticipated form of Iron Age settlement was based on the knowledge accrued from the excavation of occupation sites since the end of the 19th century, notably Highfield, near Salisbury, Pitt-Rivers' sites on Cranborne Chase, and Little Woodbury (Cunliffe 1991). More locally, the excavations of Benjamin and Maud Cunnington, especially at All Cannings Cross Farm, 10 km east of Devizes, had established the range of features likely to be encountered on an unenclosed 'inhabited site'. The limits of that site had not been established (Cunnington 1923, 13), although an area some 130 m by 75 m was examined. Here, as elsewhere, were recorded a number of cut features, including pits and post-holes containing a wide range of artefacts, as well as floors, hearths, and ovens.

When the Potterne gold bracelet was recovered at depth and observations of other graves in the modern cemetery were first made it was assumed, on the basis of these prevailing models, that modest numbers of finds would be recovered from infilled cut features, such as pits, post-holes and ditches. It was further anticipated that the extent of such features would be restricted in area, even if the evidence for structures was contiguous with more extensive elements of formalised land management such as field boundaries.

In October and November 1982, an initial sondage was made so as to provide information for the Treasure Trove inquest into the discovery of the gold bracelet. A single trench measuring 7 m by 1.5 m (Cutting 1), orientated approximately north–south, was excavated at the eastern corner of the existing cemetery, close to the location at which the bracelet had been found (Fig. 4). The turf and topsoil (contexts 1 and 2) were removed by picking to a depth of 0.3 m, and successive deposits (contexts 3–10) were excavated by trowelling. A sounding measuring 0.3 m by 0.5 m was excavated

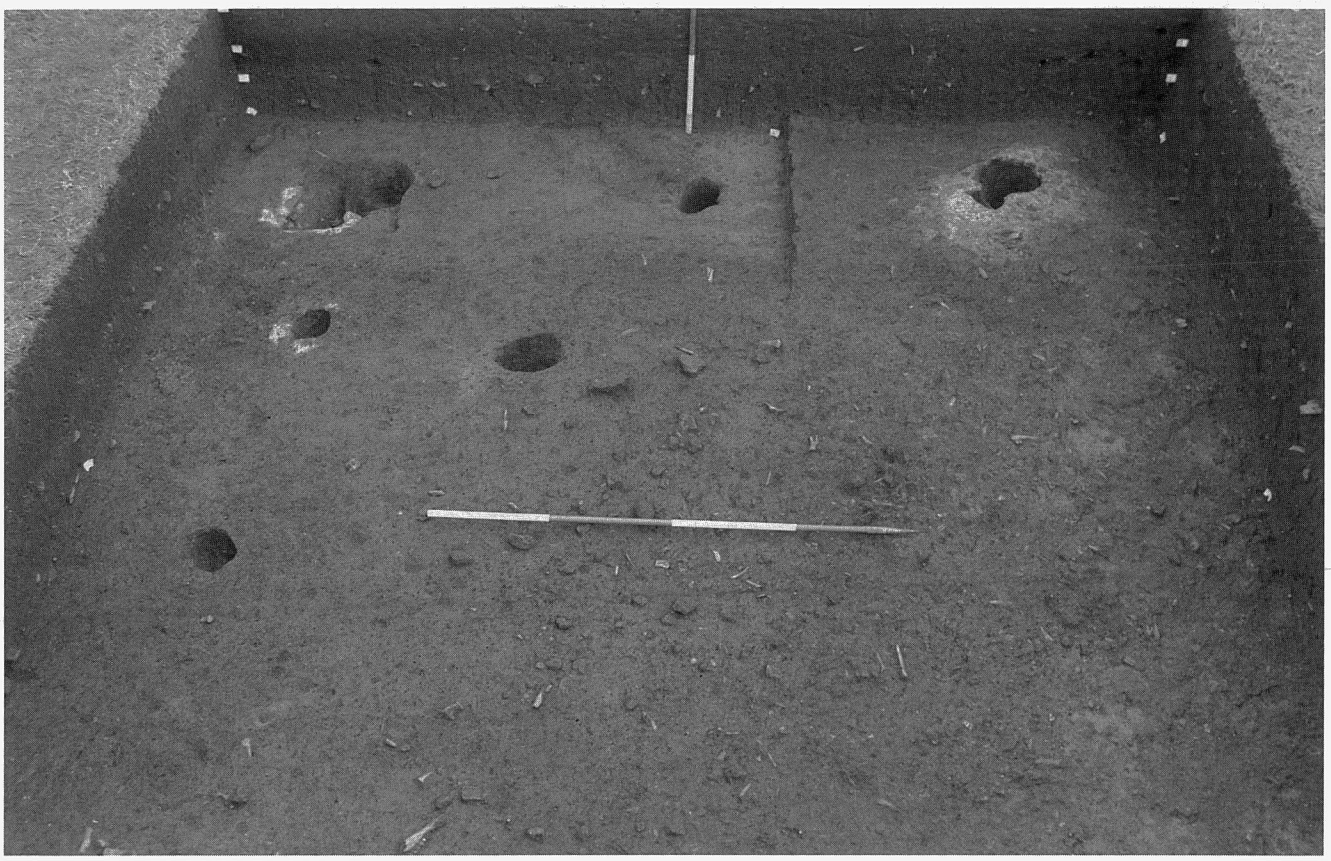


Plate 3 View looking east, of Cutting 3 under excavation in 1983. Note the chalk packing of some of the post-holes while basal layers of the Deposit seal other features in the foreground.



Plate 4 General view of Cuttings 2 and 10, looking south, at the end of the 1983 excavation. Note the 'terrace' and fencelines 497 and 499 in the foreground, pit 235 centre left, and, centre hearth 472 on an unexcavated block

to a maximum depth of 1.75 m against the western section of the trench. The trench was backfilled after the excavation.

Surprisingly, the excavation revealed archaeological deposits extending throughout the length and depth of the cutting, indicating that the gold bracelet had not been recovered from a pit or grave, as might have been expected. Instead it was contained in an above-ground deposit of accumulated material up to 1 m thick. This archaeological deposit was rich in finds which appeared, unusually, to be in a hard, mineralised state. Well-preserved and unabraded Late Bronze Age and Early Iron Age pottery (3770 sherds weighing over 37 kg) were recovered and animal bone.

The upper layer (context 3) had been disturbed by later plough activity and also contained Romano-British pottery. Although a number of soil changes were observable during damp digging conditions, the underlying deposit appeared to be largely homogeneous, and it was not clear whether the observed 'layers' reflected broad stratigraphic changes or merely a number of smaller lenses within the deposits. These included context 6, described as consisting of 'cess' and lime, at a depth of *c.* 0.4 m within the archaeological deposit. This cut what appeared to be a trodden surface (context 5) containing generally smaller and more abraded finds, but with large animal bones, including an ox skull, protruding through from the underlying layer of what appeared to be accumulated refuse (context 7). Context 8 was a lens of charcoal, ash, and burnt soil filling a shallow depression in the upper levels of a lighter brown layer (context 9), interpreted as a buried soil. This in turn overlay a clean weathered Greensand subsoil (context 10).

The excavation therefore revealed what appeared to be an unbroken sequence of Late Bronze Age and Early Iron Age stratified deposits covering much of the first half of the 1st millennium BC. An earlier phase of occupation was indicated by the fact that, during the observation of grave digging nearby, post-holes associated with the buried soil were seen to cut the Greensand beneath the archaeological deposits. The deposits appeared to cover much of the cemetery, the total stratigraphy being as much as 2.08 m deep.

This archaeologically-rich and largely homogeneous deposit was interpreted, from the end of the 1982 season, as a 'midden', a term used consistently both in the primary field records of subsequent years' excavations and in published reports. However, in order to avoid premature assumptions as to the nature of the site formation processes and the site's functions implied by the term, the build-up of material is hereafter referred to as the Deposit.

The realisation that most of the archaeological material did not derive from cut features but from a positive feature of very substantial proportions radically altered the perception of the nature of the site and the way it could best be examined. This, clearly, was not a 'typical' settlement of the later Bronze Age–Early Iron Age. At the time no comparable sites were known locally and there was an urgent academic need for further exploration. Innovative techniques would have to be devised to recover sufficient information to substantiate the new working hypothesis. In essence, the strategy for further work would be to establish the character, dimensions, and date range of the site.

Establishing the Dimensions of the Site

Fears that the close digging of graves within the cemetery was progressively destroying the Deposit to the depth required for the graves were compounded by the fact that planning consent had been granted to Potterne Parish Council in December 1981 for the extension of the cemetery in two stages as far as the field boundary 100 m to the north-east (Fig. 3). The need to evaluate the potential impact of these developments on the archaeological deposits led to the formulation of new excavation proposals and an approach to the Inspectorate of Ancient Monuments (now English Heritage) for the necessary funds. The Inspectorate discussed possible alternative cemetery sites with the Parish Council, so as to avert damage to the site, but no suitable alternative could be found. In the meantime, they and many others supported fieldwork on three successive seasons between 1983 and 1985 (see Acknowledgements).

It was presumed, on the basis of the scale of other local unenclosed settlements, some of which are as small as 0.04 ha (Piggott 1973) that the deposits encountered in 1982 would be relatively small in lateral extent. Consequently, in 1983 it was decided that four small cuttings would be excavated, two at the eastern limits of each of the proposed cemetery extensions to establish the eastern limit of the site. However, the unexpected continuation of the deposits in the cuttings at the edge of the first extension (Cuttings 2 and 3, below) led to a revision of the strategy, and the augmentation of the two eastern cuttings (Cuttings 5 and 6) by a series of widely spaced smaller test pits (Cuttings 7–11, below) and the instigation of a large-scale auger survey (below). Furthermore, the revised interpretation of the site as a 'midden' had raised questions about the source of the archaeological material. It had been noticed that the southern limit of the cemetery was marked by a wide bank which ran along the contours of the ridge below Sandfield House, and the possibility was considered that this feature formed part of a defensive earthwork around a ridge-top settlement, the Deposit consisting of refuse material dumped outside the enclosure's perimeter. The evaluation strategy therefore proposed a further trench (Cutting 10) through this feature.

A site grid was established, with site north running almost straight down the slope of the hill, 36° west of due north. Cuttings 2 and 3 were located at the

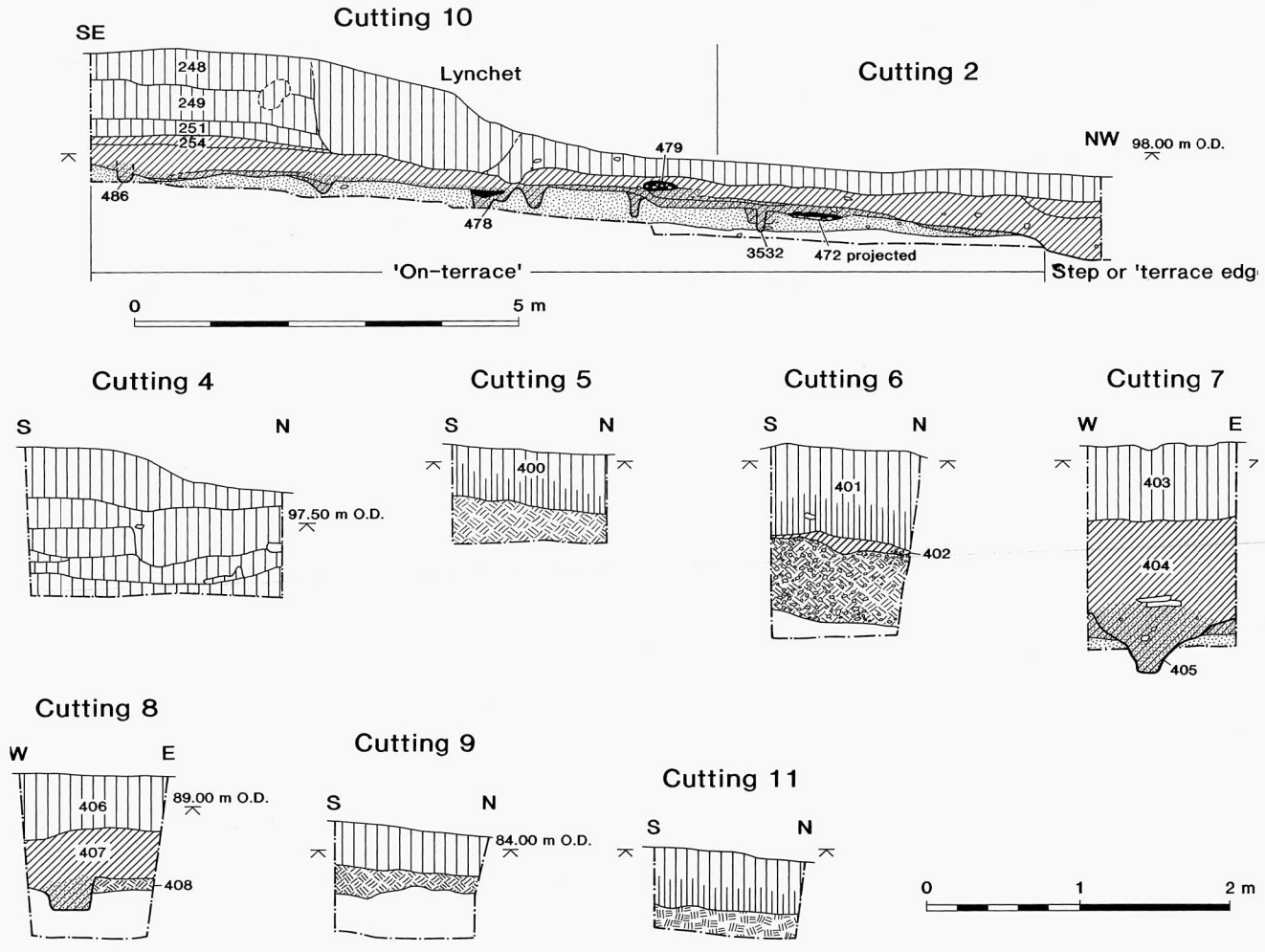


Fig. 5 West section (schematic) of Cuttings 2/10; selected sections of Cuttings 4-9 and 11

planned limit of the first extension of the cemetery, 50 m to the north-east of Cutting 1 (Fig. 3). They were each 5 m square and aligned on the grid, with Cutting 3 (Pl. 3) being 10 m north-east of Cutting 2. Cutting 10, an 8 m by 1.5 m trench, was extended south-east from Cutting 2, in order to investigate the relationship between the Deposit and the wide bank (Pl. 4).

Other test pits were opened at a distance from the main Cuttings to provide some indication of the extent of the site. Two 1 m square test pits, Cuttings 5 and 6, spaced 20 m apart, were positioned 50 m to the north-east of Cutting 3, and a further three, Cuttings 7, 8, and 9, were excavated in a line downslope to the north-west, spaced at *c.* 50 m intervals. Cutting 11 lay *c.* 30 m south-west of Cutting 9. (In addition, a shallow trench 1.5 m square, Cutting 4, was opened but was not excavated through the Deposit (Fig. 5)).

Based on the results of the 1983 season, the excavation strategy was revised for further evaluation between July and September 1984. Cutting 12, its long axis running down the slope of the hill, incorporated Cuttings 2 and 3 in its east and north corners, the backfill of the earlier cuttings being removed by machine (Figs 3 and 8). The total area of these combined cuttings was 200 m^2.

In order to determine the full extent of the Deposit and to record any variations in it, an extensive augering programme was undertaken, covering both the cemetery extensions and the surrounding fields. Subsequently, a trench measuring 12 m by 1.5 m (Cutting 13) was excavated in the field to the south in order to investigate a series of anomalous auger results, which were found to indicate the position of a substantial Romano-British ditch (Fig. 3; Pl. 15).

Finally, in 1985, two test pits were excavated to examine the periphery of the site as defined by the previous year's auger survey. Cutting 14, measuring 1 m by 2 m, was positioned at the south-western edge of the site, and Cutting 16, measuring 2 m square, at the west (Fig. 3). In addition, Cutting 15, which measured 8 m by 1 m, was excavated outside the limits of the Deposit, immediately west of 1984 Cutting 13, in order to further investigate anomalies identified by the auger survey (Fig. 3).

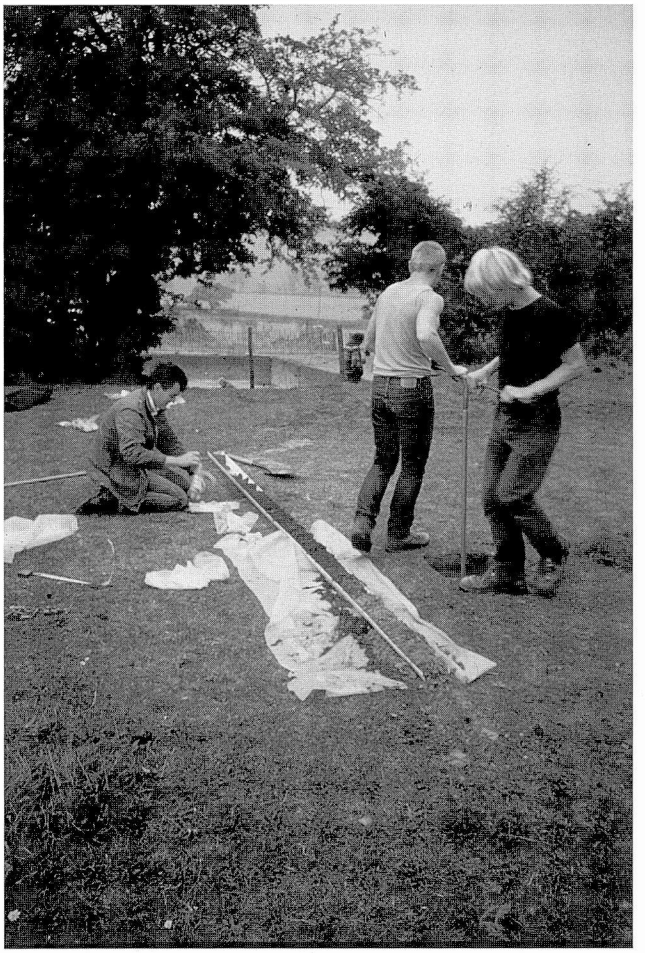


Plate 5 Auger survey being conducted south of Cutting 12. The changes in colour (tone) of the core that is laid out in the tray are obvious. Each core was sampled at 0.10 m intervals

Auger survey

Following the promising results of trial augering during 1983, a full auger survey of the fields adjacent to the cemetery was undertaken in 1984, extending over 460 m north-east to south-west and 360 m north-west to south-east. The aim was to map the extent and thickness of the Deposit (and any other related archaeological deposits) and to record any soil variations across the site.

Methods

Ground surface contours were measured at 1 m intervals. The grid for the auger survey was on the same axis as the excavation grid, and the survey was undertaken using a 10 cm Jarrett-type bucket auger. The holes immediately adjacent to the excavation, where the clearest definition was required so that the results of the augering could be compared with the excavated section, were bored at 10 m intervals, with those more distant being spaced every 20 m (Fig. 6; Pl. 5). Anomalies revealed by the survey, most of them from deep boreholes in the field south of the main excavation, were further examined with more closely spaced auger holes, usually at 2 m intervals. A total of 321 auger holes was recorded (detail in archive).

The soil material extracted from the auger were laid out on a 4 m long graduated tray and the resulting sediment profiles described. Samples were taken at 0.1 m vertical intervals through each profile for determination of magnetic susceptibility, phosphate, and Munsell soil colours, and any artefacts were retained. The soil descriptions from the large number of auger holes (321) enabled the extent of the Deposit to be mapped (Fig. 6). The results of augering through the area of Cutting 12, were entirely confirmed by the subsequent excavation through this area (see archive and Figs 7 and 10). The auger profile from the Romano-British ditch (details in archive) compared with the subsequent section drawing from the machine-cut trench (Cutting 13), further demonstrates the reliability of the auger survey.

Extent and nature of the archaeological deposits

The survey identified the eastern, northern, and western limits of the Deposit but, because of the location of the cemetery and the houses on Brownleaze Lane, the south-western limit could not be ascertained. Nevertheless, the augering demonstrated that the Deposit, which had augmented and rounded the original profile of the hill, covered an area of at least 3.5 ha (Fig. 9). A schematic south-east to north-west profile (Fig. 7), based on a transect running across the centre of the site 15 m west of the main excavation, shows both the site stratigraphy and the considerable variation in the thickness of the Deposit from the ridge to the foot of the slope. The Deposit was thickest immediately below the northern edge of the ridge, despite the fact that its upper levels had been removed by cultivation in this area. The Deposit, and its indistinguishable topsoil, which here lay directly over Greensand, reached a thickness of 1.3 m (auger holes 72 and 75). By coincidence, therefore, the main excavation was positioned in that part of the transect with greatest depth of Deposit, but in one of the few areas with no 'subsoil'.

On the spine of the ridge, up-slope from the excavation (auger hole 16), the Deposit thinned to 0.25 m, but 20 m further to the south, where it was sealed by up to 0.65 m of lynchet soil, it increased to 0.35 m (auger hole 47) before petering out completely. It also thinned down the slope to the north of the excavation, where it was overlain by an accumulation of ploughsoil which was largely derived from it. Transects running across the slope show a similar picture, with the Deposit thinning towards the north-east and south-west margins of the investigated area and a layer of sandy subsoil of varying thickness lying between it and the Greensand.

Phosphate analysis

Fifty-eight phosphate samples from five auger holes (Fig. 6) were analysed by David Gurney (Chapter 5). Three of the samples were taken from locations clearly within the Deposit, two where it was deepest just below the ridge, and one further down the slope where it was

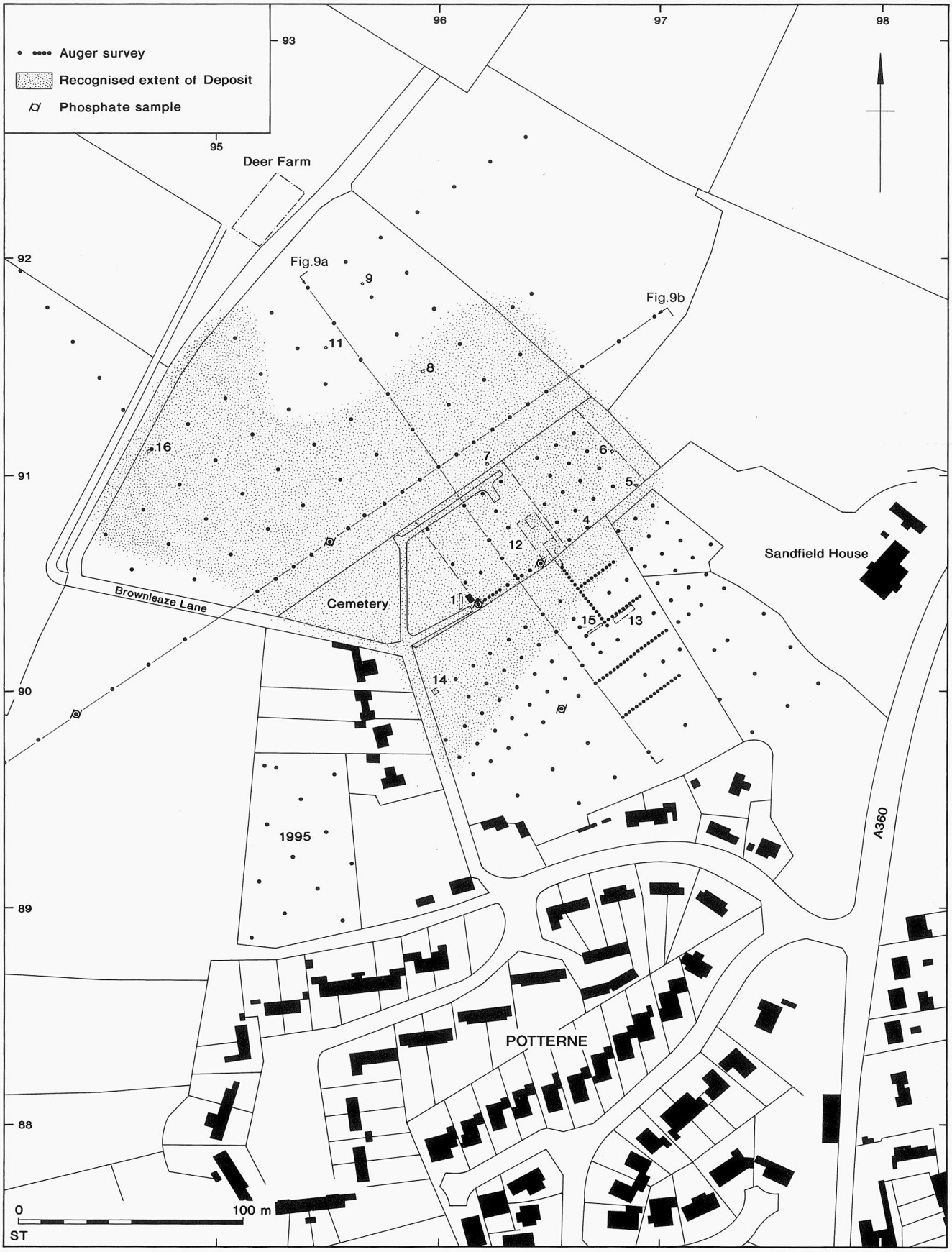


Fig. 6 Plan showing the auger and phosphate survey locations and recognised extent of the Deposit

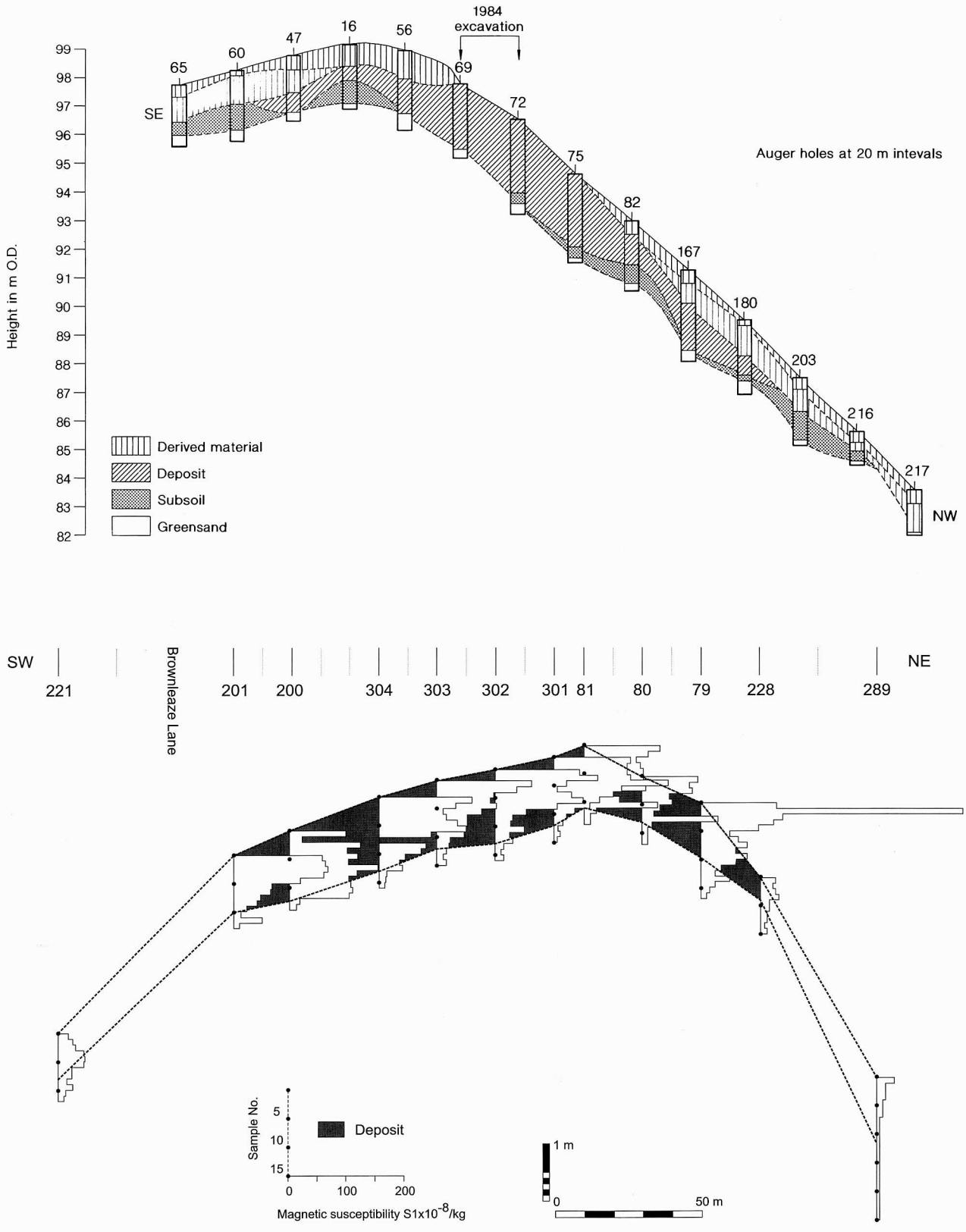


Fig. 7 a) Schematic (north-south) auger profile through the Deposit; b) schematic (east-west) profile of magnetic susceptibility values from selected auger cores on grid line 260N

covered by ploughsoil. The two remaining samples were from auger holes positioned beyond the margins of the Deposit. The results showed a clear discrimination between archaeologically rich and sterile areas, but did not suggest that phosphate levels would show significant variations within the Deposit, or between it and the ploughsoil derived from it (Macphail, Chapter 5, on the movement of organo-phosphate complexes.)

Magnetic susceptibility (and geophysical survey)
Trial investigations using a number of geophysical techniques (including fluxgate gradiometer, resistivity, conductivity, and magnetic susceptibility) were carried out by the Department of the Environment Ancient Monuments Laboratory (now English Heritage) in July 1983. These preliminary investigations were undertaken to select the most appropriate method for aiding definition of the extent of the site. The findings from the magnetometer survey and from a series of resistivity transects across the site were both comparatively constant, probably because of the depth and uniformity of the Deposit. Measurement of magnetic susceptibility values carried out on topsoil samples, did, however, show a very distinct contrast between surrounding background values in the centre of the site (these gave mass susceptibility readings in the range 22–163 ($x10^{-8}$ SI/kg)).

Susceptibility measurements therefore appeared to offer a means of delimiting the Deposit with considerable clarity. It was, therefore, proposed to attempt to map the extent of the Deposit using magnetic susceptibility; at the time (1983) this was one of the first occasions on which magnetic susceptibility had been deployed in this way. Further trials conducted by the late Dr Tony Clark demonstrated that stratigraphic divisions within auger sample columns might also be more reliably indicated by the measurement of magnetic susceptibility levels. Tests showed that, with standard compensation factors for variations in sample moisture levels, the simplicity of measurement procedures would allow large numbers of samples to be analysed.

A comprehensive sampling and analysis programme was carried out as apart of the auger survey and some 2500 measurements were made on 100 g samples from all the auger borehole locations using a Bartington meter. An average of 10 or 11 samples was taken from each auger hole from topsoil and from samples at 0.1 m vertical intervals through each profile. The topsoil data was graphically plotted by IBM in 1987 and clearly demonstrated the extent of the Deposit. The extent of the Deposit using this method broadly corresponds with that mapped by auger descriptions (Fig. 6; Fig. 7b). The first exercises in plotting the vertical magnetic susceptibility profiles clearly demonstrated the utility of magnetic susceptibly in distinguishing between some horizons within the Deposit and the natural subsoils, and in identifying naturally developed soil profiles beyond the edges of the extent of the Deposit.

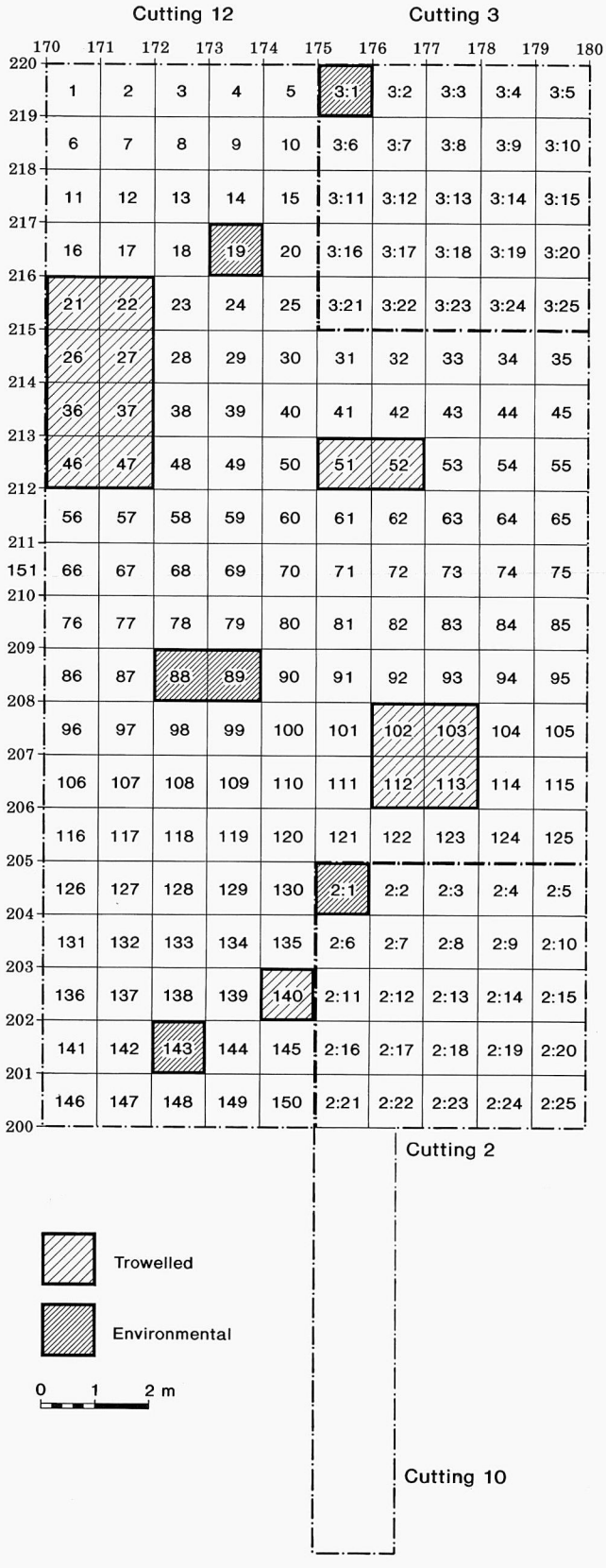


Fig. 8 Plan of main excavation area (Cuttings 2, 3, 10 and 12) showing the numbering of m^2 sample columns

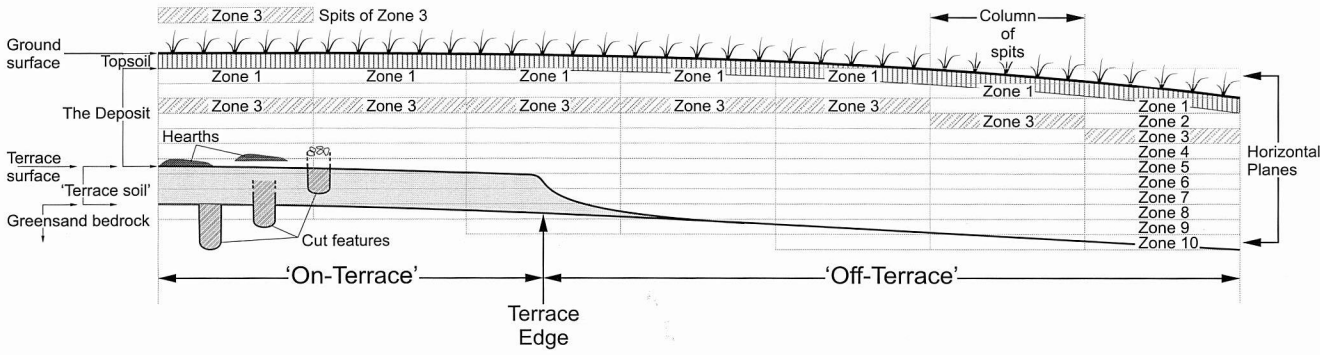
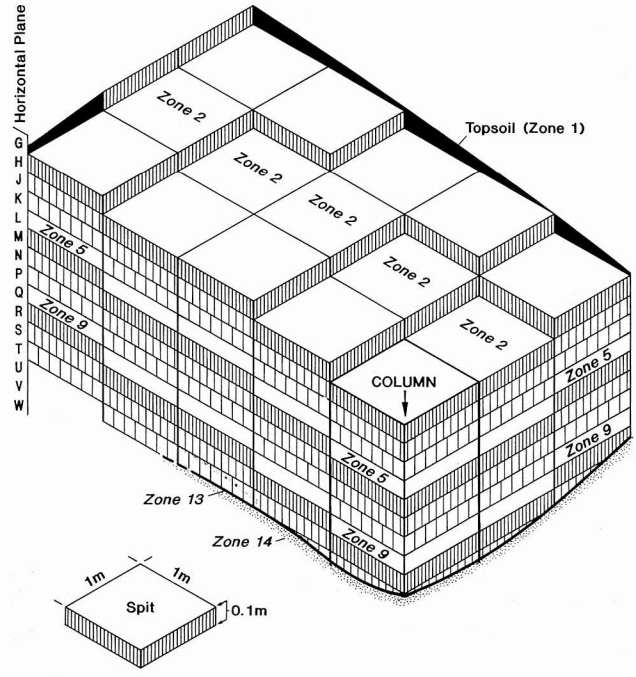


Fig. 9 a) Schematic section and b) isometric block diagram showing the method of excavation and terminology used in this report



The analysis of the 2500 samples through the Deposit enabled the creation a series of vertical magnetic susceptibility profiles to aid in characterising the Deposit and also to confirm some of the physical records (colour and description) from soils recorded in the auger survey. The vertical magnetic susceptibility profiles are summarily reported upon later (Chapter 5).

This project remains one of the most comprehensive three dimensional investigations of susceptibility variation so far undertaken, and further examination of the results and comparison with other soil properties as indicated by the augering could clarify the extent to which this technique can contribute to the survey and study of sites of this kind.

Soil descriptions and Munsell colour

The soil samples obtained from augering were too disturbed and texturally too similar to observe pedological and horizon variation in the Greensand-derived soils using standard pedological notation (Hodgson 1976). Munsell soil colour variations, however, were relatively marked. Part of each sample was dried and then wetted to a standard moisture level before comparison with the colour chart. Vertical magnetic susceptibility variation, in general, confirmed the broad variation recorded by colour and texture changes (details in archive).

Establishing an Excavation Recording Framework

The homogeneous nature of the Deposit and lack of observable stratigraphy within it meant that a system for the three-dimensional recording of finds would need to be imposed during the excavations to permit any analysis of changes in the composition of the assemblages of artefacts and ecofacts. This was necessary because, from the outset, changes in the assemblages through the vertical extent of the Deposit were apparent, yet the volume of finds was such that the individual recording of each item would be too time consuming and beyond the capability of available computer technology to process. Although certain special finds were individually recorded, this was otherwise achieved by dividing the excavation trenches into one metre squares which were dug horizontally in spits of controlled thickness. As the excavation progressed and greater depth control was considered necessary, the thickness of the spits was more rigidly controlled and decreased from *c.* 0.25 m (in 1983) to 0.10 m (in 1984–5). The division of the excavation areas into squares created, in effect, a series of regular columns (which were individually numbered) each comprising a vertical series of individual spits, each of which was also individually numbered (Figs 8 and 9).

During excavation all the spits in a particular horizontal plane were assigned to a 'Layer' with an identifying letter. (The individual spit records in the site archive continue to be organised in this order). However, for the purposes of subsequent analysis, artificial layering of the Deposit was created by assigning laterally contiguous spits to a series of 'Zones', the form of which reflected the topography of the modern ground surface rather than occurring at a set distance below a site datum (Fig. 9). The Zones thus followed each other rather like the successive skins of an onion.



Plate 6 General view of Cutting 12, looking south, at the start of excavation in 1984, showing the method of spit digging. Cutting 3, foreground, and Cutting 2, top left, have been re-excavated. The horizontal strings on the sections of Cutting 3 indicate the number of spits still to be excavated



Plate 7 General view of Cutting 12, looking south-east, during excavation in 1984

In the absence of observable layering within the Deposit, the zones would be used to demonstrate general trends in the assemblage, the standard volume of each spit facilitating quantitative as well as qualitative comparisons. In general, the main part of the Deposit was contained within Zones 2–10. Zone 13 was allocated entirely to 'concreted' surfaces (contexts 3503 and 3514) encountered beneath the Deposit in the centre of the cutting and Zone 14 was allocated to the discontinuous soils beneath the concretion.

3 Methods

Excavation

The turf layer was removed with picks in 1983 and by machine in 1984. Each year the main area of excavation (comprising Cuttings 2, 3, 10, and 12) was sub-divided into one metre squares to be excavated in spits (Fig. 8; Pl. 6). Each spit was related to site datum (97 m OD) and excavation was controlled using specially designed surveying aids (archive). The first spit in each column was wedge-shaped in order to establish the horizontal planes (Fig. 9). These first spits in each column were subsequently grouped as Zone 1, the next contexts were grouped into Zone 2, and so forth (above).

At the outset, excavation of the spits was totally by trowelling. It soon became evident that this method would be too slow so, in 1983, careful picking with mattocks was substituted. Trowels were still used for cleaning the base of each square, and for the excavation of recognised deposits.

For the 1984 season it was obvious that to trowel the whole of Cutting 12 would be uneconomical and therefore impractical, and it was decided to test the effectiveness of three different excavation techniques. Fifteen columns, amounting to 10% of the area (Fig. 8), were to be carefully trowelled so as to recover as many artefacts as possible and to identify any significant surfaces or features. In the hope of establishing whether there were significant differences in the yield depending on the size of the area trowelled, one column was isolated (Column 140), two were adjacent (51–2), and there were two blocks of four columns (102–3, 112–3) and eight columns (21–2, 26–7, 36–7, 46–7) respectively. The entire contents of a further four columns (2.7% of the area) were selected for environmental and artefact sampling (below). Initially seven columns (4.7%) were to be examined in this way, but the need to disaggregate the soil so slowed the process that a smaller sample was taken for this fine level of control (Columns 19, 88–9, and 143).

The rest of the Deposit within the excavation area was excavated by careful picking, the minimum target rate for excavation being five spits per operator per day. Doubtless a certain proportion of finds, especially the smaller pieces, was not recovered by this method. However, this loss was considered acceptable in view of the presence of the control columns. Although technically most of the spits towards the base of the Deposit were excavated by pick, there was much discretionary trowelling within each designated one metre square spit as visible layers only a few centimetres thick were encountered (Pl. 7). One aspect of the site revealed by trowelling but not by picking, was the presence of concentrated spreads of pottery (Pl. 8). When these were encountered, adjacent squares were trowelled down to the spread, even if they had been designated as squares to be picked. The finds from these squares were still recorded in their correct spit but were given separate context numbers. These groups were planned and the sherds individually numbered so that pre- and post-depositional processes affecting the composition and structure of the spread could be analysed subsequently.

When discernible stratigraphic layers, including some hard surfaces, were reached towards the base of the Deposit (ie in Zones 11–14) excavation by controlled thickness spits was discontinued, and the layers were excavated to their observable depth, although finds were still recorded in the appropriate one metre square. Because of the resulting variations in Zone depths, caution should be employed when comparing the quantities of the finds from these lowest Zones with those from the uniform Zones above.

Features such as post-holes and pits, which were encountered in the lower parts of the Deposit, were fully excavated and assigned context numbers in the traditional manner.

Because the 1983 excavations had revealed evidence of structural features at the base of the Deposit, the base of each spit was examined to see if any anomalies could be detected so that features could be noted and levelled-in. In addition, large areas were frequently excavated to the same horizontal plane and then cleaned in an attempt to detect groups of features. However, even where features were identified by anomalies, for example from the position of packing stones, it was seldom possible to detect any difference between the soil in their fills and that of the surrounding area. For this reason, many of the basal spits were continued down into the top of the Greensand.

The same excavation and recording methods were used for the peripheral cuttings in 1985. In Cuttings 14 and 16 Zones 1–3 were removed in one unit by spade because of the presence of a considerable depth of colluvial ploughsoil. Starting at Zone 4, which was still at some height above the Deposit, one metre square spits, 0.10 m in depth, were excavated by pick and trowel and recorded, as in 1984. When Cutting 16 became too deep for the use of picks, a combination of careful spadework and trowelling was used. As the summer had been wetter than in 1984 the soil was less dry, so this method proved relatively quick and convenient for the control of spit depths and produced an acceptable standard of finds recovery with little damage to finds.

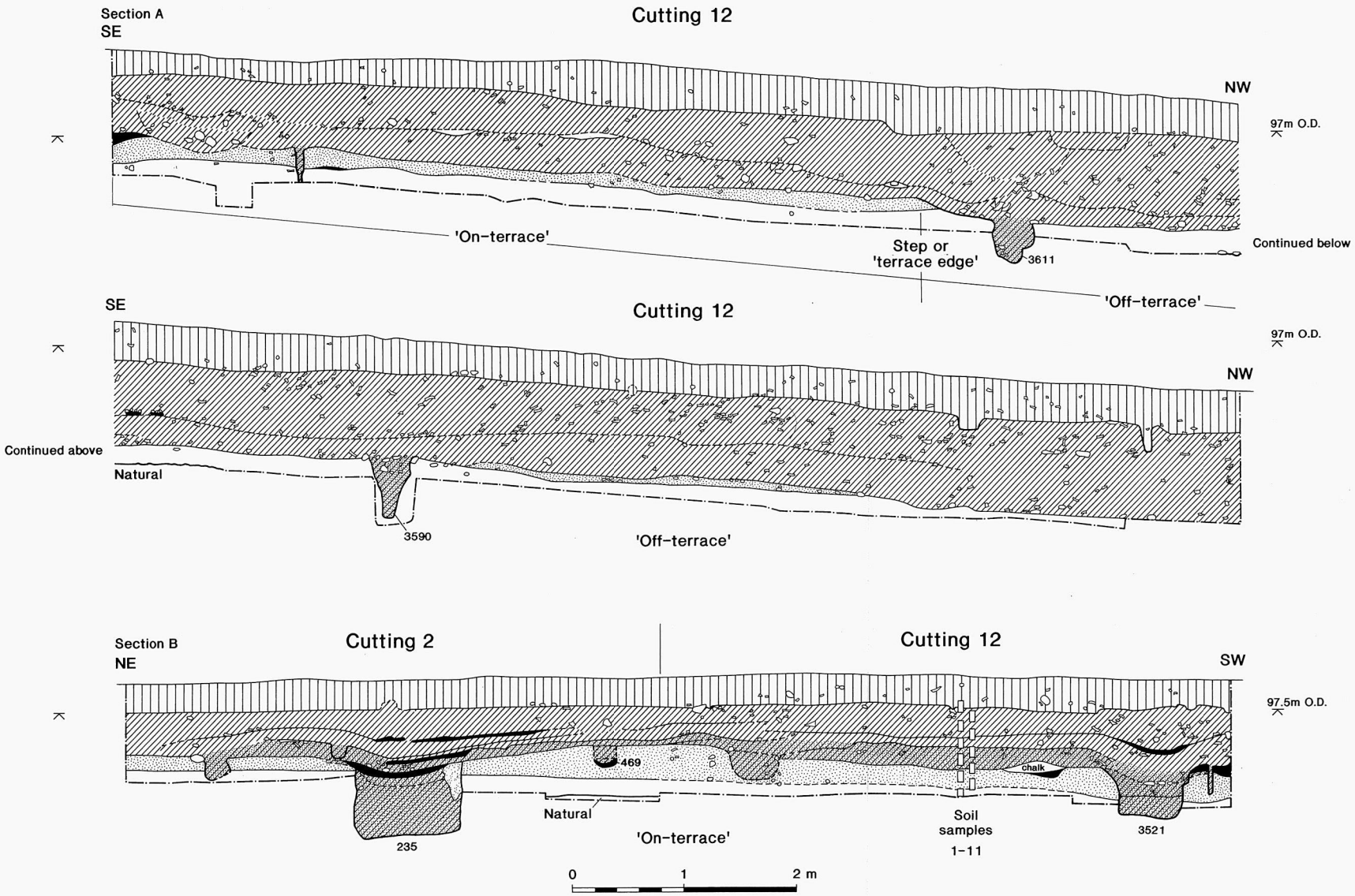


Fig. 10 West section of Cutting 12 (above); south section of Cuttings 2/12 (below)

In 1984, a single 0.5 m square column (Column 151; context 3480) was excavated into the section, halfway along the western edge of Cutting 12 (Fig. 8) in order to obtain pottery samples for thermoluminescence dating (below), and to provide information on soil colour, consistency, and texture which could be applied to the site generally. A Romano-British ditch identified in Cutting 13 (see below) was excavated by machine. A one metre square column was hand excavated on the south-east side of the trench for sampling purposes.

Environmental and Artefact Sampling and Processing Programme

A coherent strategy of bulk sampling and processing involving flotation and wet sieving was established and modified in order to retrieve ecofacts and small artefacts, and to act as a control against other excavation techniques. Sampling was primarily concentrated on obtaining a tightly controlled stratigraphic sequence through the Deposit which could be directly related to the excavated evidence. A more limited programme to examine the spatial variation of the assemblages was also undertaken in an attempt to aid in the characterisation of the Deposit.

The 1982 excavation had produced artefacts with mineralised surface concretions, suggesting that mineralised as well as charred plant remains might be present in the Deposit. A strategy of sampling and processing to recover both types of remains from the same sample suites was devised by Wendy Carruthers, the on-site environmental archaeologist. The sampling strategy was basically the same throughout the excavation campaign, the details of which are summarised below.

1983 (Cuttings 2 and 3)
In 1983, two columns of one metre square, one each from Cuttings 2 and 3 (2.1 and 3.1, Fig. 8) were selected for sampling because of the convenience of their location through representative sequences of the Deposit. Bulk soil samples totalling 30 litres (three 10 litre sub-samples) were taken from each spit during excavation and thus, effectively, two complete sample columns at *c.*0.2 m intervals (representing 0.015% by volume of the deposits) were examined through the Deposit. Most of the features cutting the bedrock (but excluding the smallest post-holes and stake-holes) were also sampled and, where possible, the entire fill was processed.

1984 (Cutting 12 and 13)
As described above, during the excavation of Cutting 12 in 1984, four columns of spits (19, 88, 89, and 143) were selected for environmental sampling. These were distributed widely across the cutting and were positioned in relation to the extrapolated 'terrace' edge (see below) and other anticipated features at the base of the Deposit. Two of the columns (88 and 89) were adjacent so as to investigate the variation in species over a small distance, and to see if there were advantages in doubling the sample size. Most of the features cut into the bedrock were sampled in the same manner as the previous year (above), and *c.* 50% of the samples from all features were examined.

A single column through a feature in Cutting 13 was also sampled. This feature proved to be a Romano-British ditch (below) and, as it was believed that it would not be possible to separate out residual material from Romano-British remains, it was considered not to be worthwhile examining further samples from this feature.

On-site bulk sample processing methods
In view of the mineralised surface concretions on artefacts recovered in the 1982 excavations (Cutting 1), the recovery of both mineralised and charred plant remains was attempted from a single bulk sample strategy. It was insufficient to examine only the flots from flotation since mineralised seeds rarely float. While it was recognised that the microscopic sorting of the residues for the recovery of mineralised remains would be very time consuming, it had the added advantage of facilitating the recovery of small bones and artefacts from the residues.

During the processing of the 1983 samples it became clear that larger samples were required in order to recover sufficient charred material for analysis. During 1984, therefore, the entire contents of each 0.1 m spit (normally 100 litres before excavation) within the selected sample columns were processed by flotation for the recovery of charred remains. Thus, samples of consistent and recorded volume were processed, all flots being retained on 250 μm sieves and residues on 600 μm sieves. The entire flots from the 30 litre (1983) and 100 litre (the volume before excavation in 1984) samples were sorted (primarily for the recovery of charred remains).

Because of the cohesive nature of the soil, the flotation process was complicated and staged. All samples were soaked overnight in a solution of Calgon prior to manual on-site flotation in a basic Siraf flotation tank. The flots were decanted onto a 250 μm meshed sieve and the soil, silt, and stone 'residues' were retained on 600 μm mesh sieves. In order to break up the small lumps of silt that formed on the first sieving, the residue was dried and re-sieved. The dried residue was mixed with water and the remaining floating material decanted (250 μm) before the clean residues were fractionated and retained on to a 600 μm mesh sieve.

All flots and residues were slowly air dried before being sorted under a low power binocular microscope. The majority of the charred remains were recovered from the flots, but only a few of the lighter, hollow mineralised remains. The residues contained most of the mineralised seeds, root fragments, arthropod fragments, snails, and worm cocoons. They also contained small bones and artefacts.

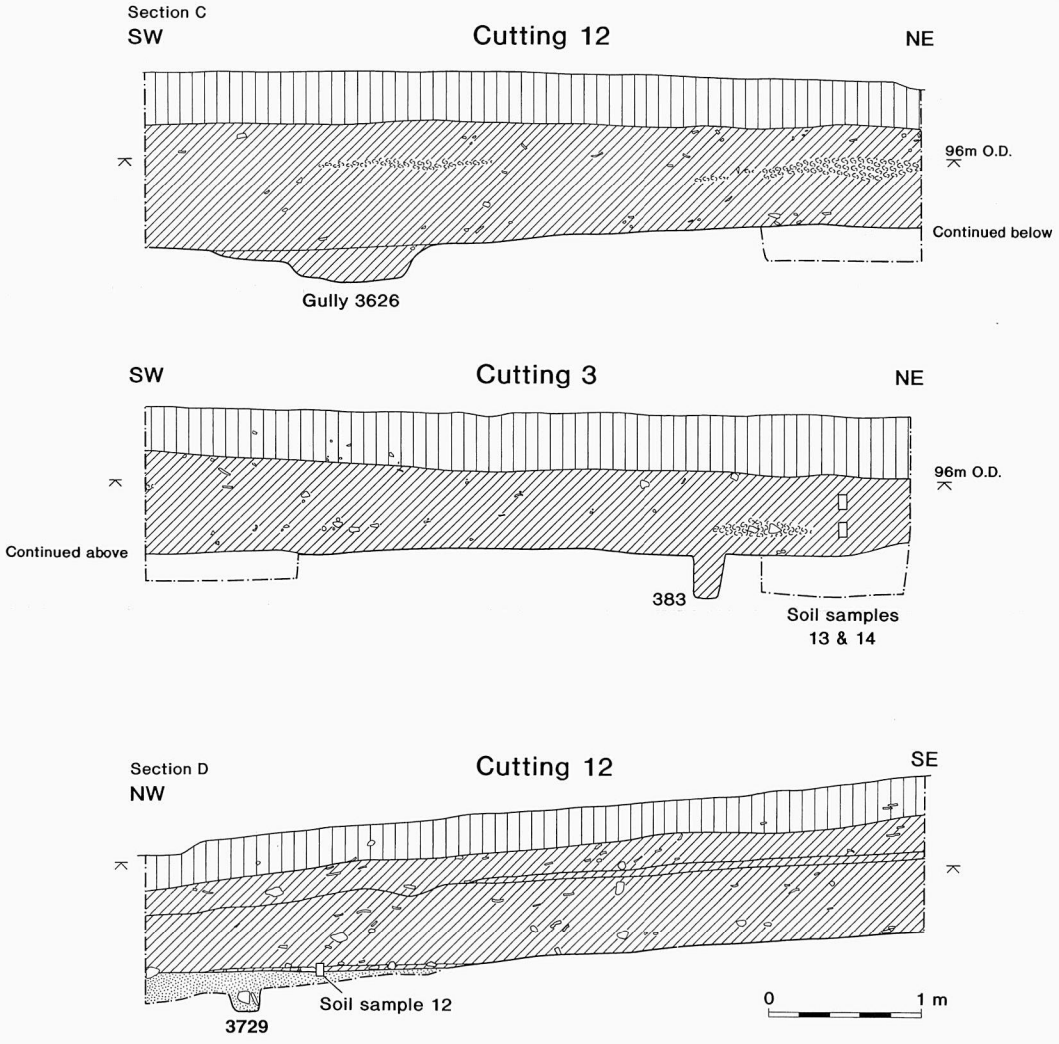


Fig. 11 North section of Cuttings 3 and 12; east section of northern half of Cutting 12

Mineralised remains from the 1983 10 litre sub-samples were retained on the 600 μm sieve. Residues from a few 10 litre sub-samples were passed through a stack of sieves to determine whether mineralised seeds smaller than 600 μm were being lost in the processing. No new taxa were recovered and the time taken to process them was greatly increased, so the 600 (μm sieve was deemed appropriate. Residues from the larger 1984 samples (the entire 0.1cu m spit) were considered to be too big to sort in their entirety. Species lists were compiled from successive 10 litre sub-samples to determine the appropriate and representative proportion to sort. The increase in the number of taxa recorded was found to vary greatly, but on average there were 23% more taxa in the second 10 litres of soil than in the first, and a further 15% in the third. Since the microscopic sorting of sieving residues was so time consuming, it was considered that it would be sufficient to sieve and sort only 10 litres of soil from each spit from the 1984 excavation for the recovery of mineralised remains. In order to allow the direct comparison of data from both years' excavations, the results from only 10 litres of soil from the 1983 samples were used, although the presence of taxa in the rest of the sample was noted.

In summary, samples of consistant and recorded volume were processed and all flots retained on 250 μm sieves and residues on 600 μm sieves. The entire flots from 30 litre (1983) and 100 litre (unexcavated volume, in 1984) samples were sorted (primarily for the recovery of charred remains) and the residue from a 10 litre sub-sample of each sorted (primarily for the recovery of mineralised plant remains).

Soil micromorphology sampling

A strategy of limited soil micromorphology sampling was introduced in the hope of illucidating the nature of the Deposit and to test whether changes not visible to the naked eye could be detected in its composition under laboratory conditions.

Three areas of Cutting 12 (including the reopened Cutting 3) were sampled towards the close of the excavation in 1984. A continuous series of Kubiena samples was taken from the southern section (samples 1–11; Figs 10 and 12) through the full depth of the trench from topsoil to bedrock. Additional samples were taken from specific locations, one (sample 12; Figs 11 and 12) through the 'cobbled surface' sectioned at the base of the northern part of Cutting 12, and two (samples 13 and 14; Figs 11 and 12) from the

median part of the Deposit in the north section of Cutting 3. In 1985, two Kubiena samples (15 and 16) were taken from the lower part of Cutting 14 and two (17 and 18) from Romano-British layers in Cutting 15 (Figs 3 and 17).

Thin section samples were subsequently prepared from the field samples, as well as from a dog coprolite (sample 19), and apparently ashy and fused matter (samples 20 and 21).

Bulk soil samples (numbers 22–42) were taken from 1983 onwards and were used to provide data on grain size, organic carbon, pH, and calcium carbonate (details in archive). Some are from the same Zones sampled for thin section analysis (above).

The soil micromorphology proved to be crucial during the post-excavation interpretation of the site, since a principal conclusion of the analysis was that, with the exception of the Greensand bedrock, the entire soil matrix of the site is anthropogenic in origin (Macphail, below).

Metal Detecting

Metal detectors were employed in a controlled and limited experiment to test their usefulness during excavation on a site of this nature, and to evaluate the object recovery rates of different digging techniques. This experiment was introduced during the excavation of Zones 7 and 8, and was continued systematically until the lowest levels were reached. As an area of the cutting was scanned, all indications of finds were marked and plotted, and the operator's views on the possible nature of each object noted. In some instances markers were left in the ground for the excavator, but in others they were removed prior to excavation. In the latter case all spoil, as well as the finds tray, were scanned to check the finds recovery rate. Initially the detector users had to learn to discriminate between the responses to mineralised sherds and those to metal, and which instrument was most suitable. However, the technique proved most valuable in detecting small objects, especially metal droplets such as those of lead, which were recovered at a very low rate by traditional excavation methods. It is likely that in the higher zones, which were excavated without the aid of the metal detectors, a significant proportion of small metallic objects were missed, and this should be borne in mind in assessing the metalwork assemblage (below).

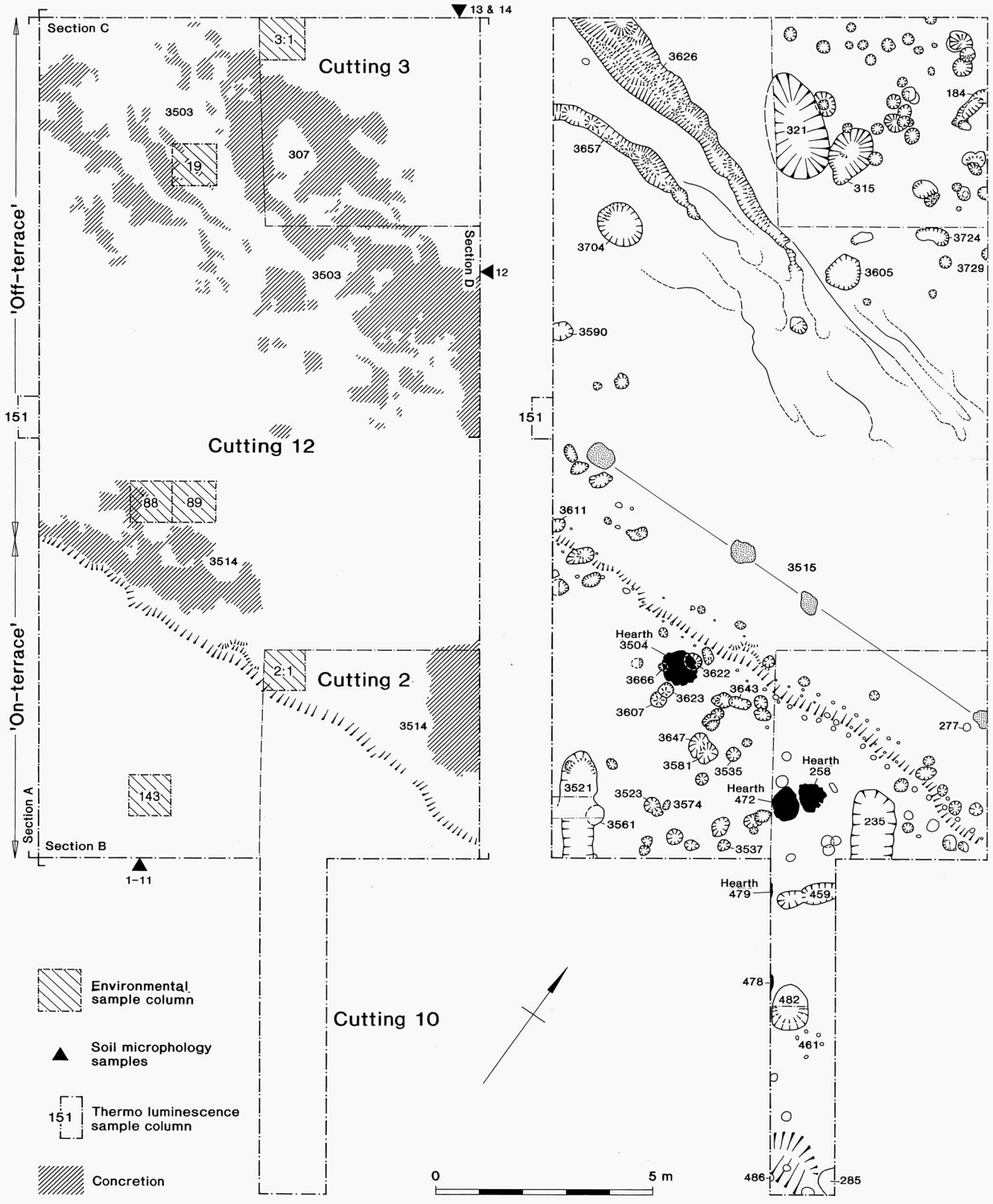


Fig. 12 Plans of main excavation area showing left 'terrace' edge, areas of concretion (heavily mineralised surface), and (right) excavated features

3. Excavation Results

1 The Deposit

The main excavation trench, incorporating Cuttings 2, 3, 10, and 12 (Fig. 8), contained rich archaeological deposits which varied in depth from 1.8 m at the southern end, on the line of a positive lynchet, to 0.5 m where they were eroded by the accompanying negative lynchet, and 1.0 m at the northern end (Figs 5 and 10). Although the site was under permanent grassland at the time of excavation, the first layer excavated (Zone 1) was characterised by an unsorted ploughsoil with very little stonefree topsoil. The ploughsoil was of a slightly more sandy, friable texture than the Deposit below it, but no clear division between the two was apparent. This ploughsoil was derived from the archaeological deposits and contained finds of later prehistoric date, as well as small quantities of Romano-British artefacts, medieval, post-medieval and recent pottery, and metalwork. It reached its maximum depth of 0.5 m on the line of the positive lynchet, thinning to 0.25 m immediately to the north where it had been truncated by the negative lynchet.

Contexts below the ploughsoil, both within the Deposit and in the underlying soil and subsoil, were assigned to a total of 13 zones (Zones 2–14), of which Zones 2–10 were recorded in virtually all the columns (correlation of contexts and zones in archive). They contained a profusion of finds from most levels, including large amounts of pottery and animal remains, and artefacts of iron, copper alloy, bone, shale, and stone, as well as plant remains in the form of charcoal, carbonised, and mineralised seeds. The soil itself contained flecks and lumps of charcoal, granules of chalk or marl, and sandstone.

There was also a number of spreads of pottery, each apparently representing single, or at least closely related, events in which artefactual material was dumped onto a contemporaneous ground surface. For example, context 1698, *c.* 0.7 m above the base of the Deposit in columns 27 and 37, was a group of over 60 sherds spread over an area of about one square metre. The spread also included a stone rubber at its centre, and there were other small pieces of bone and stone associated with the group. At a lower level, Context 1666, 0.2–0.3 m above the base of the Deposit in columns 47, 56–7, and 67, consisted of some 240 pieces of pottery, bone and stone spread over an area of *c.* 2 square metres (Pl. 8).

There was an almost imperceptible change in colour through the Deposit, the lower levels being slightly more yellowish, although this was only visible as the exposed sections at the side of the cutting weathered over a period of time. A more extensive variation appeared about halfway through the Deposit, although this might have been a product of differential drying rather than a distinct change in soil structure. There were no visible features or structures within the upper part of the Deposit, although faint colour changes and divisions could be seen in the sections, again after they had weathered, especially in the southern section.

In the lower levels of the deposit and those below it (Zones 11–14), finds continued to be recorded in the appropriate 1 m square, albeit that the volume of each spit context in these zones was no longer constant as in Zones 2-10 (see Chapter 2). Evidence of structures and occupation, in the form of hearths, pits, and post-holes occurred towards the base of the Deposit in each Cutting. In a few instances features were recorded at higher levels, indicating that some of the activities associated with structural activity continued after material had started to accumulate. Within the lower part of the stratigraphic sequence there were many ashy lenses and dumps of ash and chalk marl, and in the southern part of the trench it was difficult to distinguish the basal layers of the Deposit from the underlying layers of lighter soil. Figure 10 shows the divisions between ploughsoil, the Deposit, and the underlying soil as they were recorded at the end of the 1984 excavation.

2 The Empty Strip and the Terrace Edge

The lowest contexts, including the basal layers of the Deposit, a range of features within and below those layers, and pre-Deposit layers, varied in terms of their distribution and nature and were affected to a large degree by the clear spatial patterning of early structural activity. Running east to west on a slope diagonally across the trench, a strip of ground, *c.* 10m wide, divided two concentrations of structural features, the centre of the strip being largely empty (Fig. 12; Pl. 9). On the southern (uphill) side of this strip, a step up to 0.4 m high had formed, creating a terrace-like effect (Figs 10 and 12). Since the discovery of this step in 1983 (Cutting 3, above), the surface to its south, punctuated by post-holes and pits, was referred to as the 'on-terrace' area, while the area to the north (downhill) was referred to as 'off-terrace' (Fig. 12; Pl. 10).

It was not possible to determine during the excavation whether the step or terrace edge was deliberately cut to provide a more level surface downhill from it, or whether it resulted from erosion caused by some other activity, such as ploughing or the passage of traffic, the line of the empty strip which had been lost in the process of its formation. While the centre of the strip

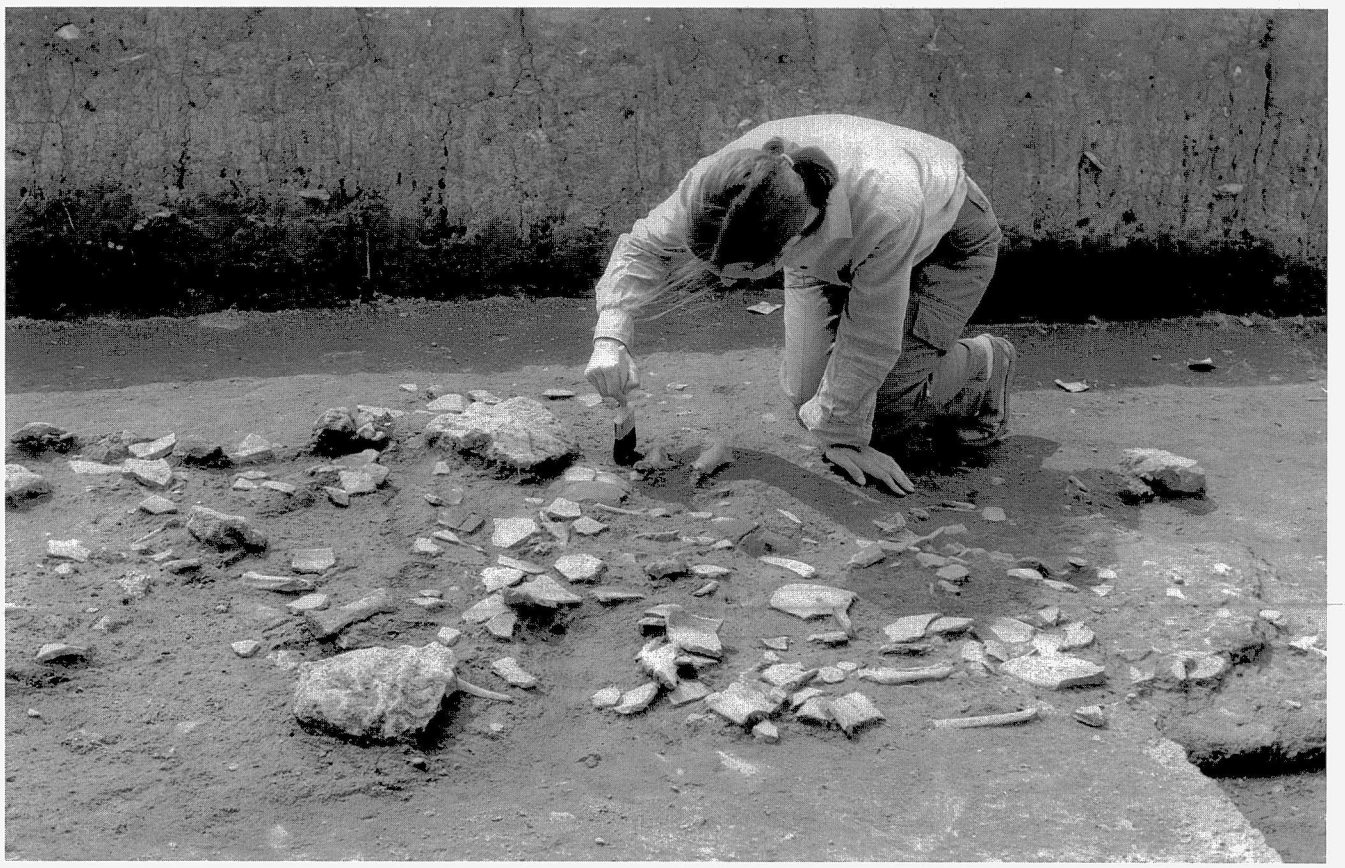


Plate 8 Concentration of finds ('pottery spread' 1666) on the west side of Cutting 12, looking west, during excavation in 1984



Plate 9 Cutting 12 at the end of excavation in 1984, looking south-east. Note the shallow gullies, 3626 and 3657, possibly wheel-ruts, running diagonally across the trench, foreground, and the blank area interpreted as a road beyond

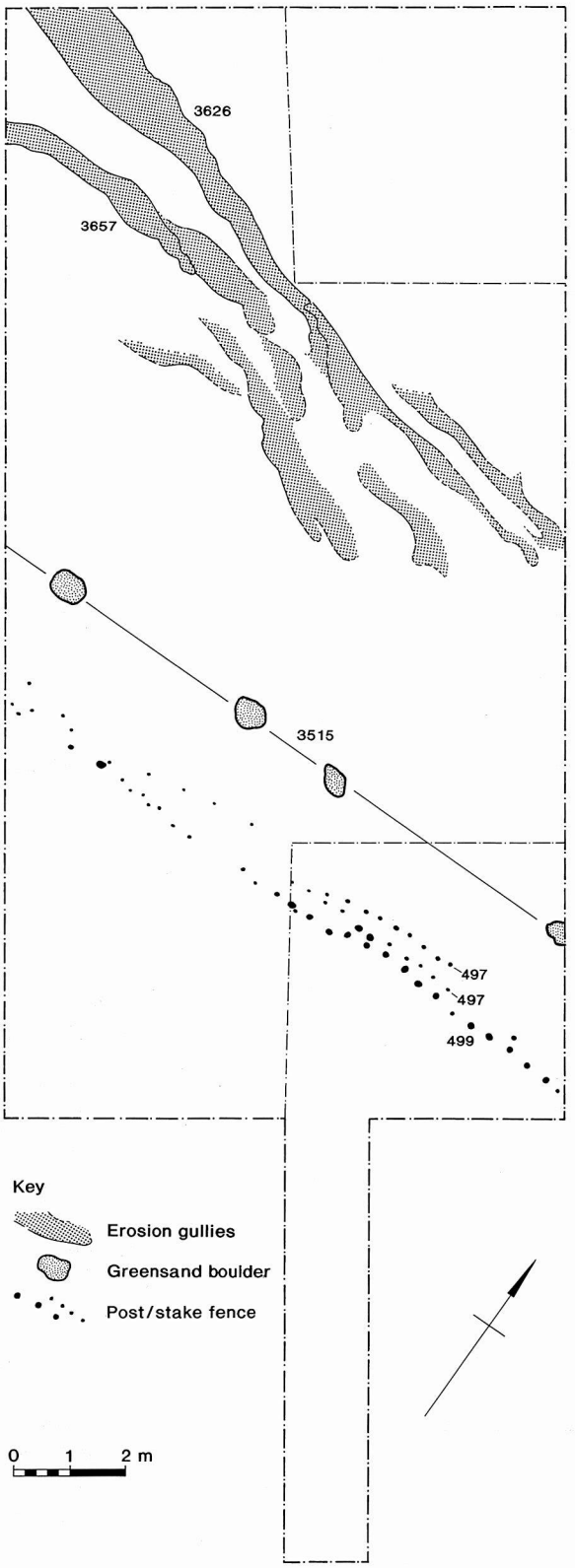


Fig. 13 Interpretative plan of main excavation area showing the relationship of the erosion gullies, fencelines and Greensand boulders flanking the trackway

was largely empty of features, some of those along its margins could conceivably have been earlier (as well as later) than the formation of the step. The maximum depth of the step of around 0.4 m was greater than the average recorded depth of 0.32 m for the post-holes both north and south of the empty strip, indicating that earlier post-holes could have been wholly removed.

The north side of the strip, and the edge of the area of features adjacent to it, was partly covered by a concretion (context 3503), up to 7 m wide, consisting of a thin layer of hard-pan (Fig. 12), incorporating small fragments of sandstone and flint, animal bone, and sherds of pottery, resting on the natural sandy subsoil (below). The layer was largely unbroken along its north-east side, but elsewhere was patchy, fading away towards the centre of the strip. There was, however, a similar concreted surface (context 3514) on the southern side of the strip, although it was not as hard and contained fewer coarse and artefactual components.

The hard-pan, initially referred to as a 'cobbled surface' (Macphail below), was almost completely absent from above two slight gullies or ruts (Fig. 12, contexts 3626 and 3657) running along the northern edge of the empty strip. Analysis of the concreted layer indicates that the hard-pan component was formed primarily by rapid mineralisation at the interface of the Deposit and the underlying 'natural', caused by the leaching of phosphates from above, but that it tended not to form over the fills of the gullies, which may therefore also be of earlier origin. Although the fills of the gullies contained flecks of charcoal, they were predominantly sandy in nature, significantly different from the basal layer of the Deposit.

The most obvious interpretation of the empty strip is as the line of a track, with heavy traffic causing the formation of the gullies, and the terrace edge by erosion of the 'Terrace' soil.

There were small numbers of other features along the edges and in the centre of the strip. These included features 3605 and 3704, both small pits or large postholes, averaging 1 m in diameter and 0.3 m in depth (Fig. 14). Feature 3704 was covered by the hard-pan layer only around its edge. However, because the hard pan probably formed by the later leaching of phosphates, this may have little stratigraphic significance. The fill of 3605 was partly covered by a compact layer of small stones, within which a roughly circular void had the appearance of a post-pipe suggesting that the stony layer had formed, or been laid down, around an *in situ* post (Pl. 11). It is not possible to say, however, whether traces of concretion around the stones also formed when the post was still standing or later, and whether they formed only over that part of the pit fill which had a stony surface. A lens of concretion was also found within the soil below the stones, dipping down from the edge of the cut, indicating that the localised contexts within the soil below the stones, dipping down from the edge of the cut, indicating that the localised contexts within which the hard pan could form.



Plate 10 View of the south end of Cuttings 2 and 12, the 'on-terrace' area, looking south-west, near the end of the excavation in 1984

On the southern side of the strip, 2 m north of the terrace edge, there was an alignment of four large greensand boulders (3515), the two in the centre of the cutting spaced *c.* 1.4 m apart, the others 3.4 m to the west and 5.5 m to the east (Figs 12 and 13; Pl. 12). The stones were not resting directly on the eroded natural but had a thin layer of soil between them and the underlying hard-pan. Their alignment and position indicate a clear relationship to the terrace edge (below).

3 The Southern Group of Features

Up to three roughly parallel rows of evenly spaced stake-holes were recorded running along the terrace edge and delineating the northern edge of the southern group of features. The southern line, 499, spanned the entire width of the cutting (Fig. 13). These lines of stake-holes were most readily visible towards the east, in Cutting 2. One ran largely along the top of the terrace edge, another at the base *c.* 0.06 m to the north, with one between. In the central and most northerly lines, 497, the stake-holes were spaced approximately 0.3 m apart, measured between 0.05 m and 0.08 m in diameter, and up to 0.12 m in depth, with clear V-shaped profiles. The fact that the stakes in these two lines appear to have been driven into the ground to an approximately standard depth, irrespective of their position in relation to the terrace edge, suggests that they post-date the formation of the terrace. The stake-holes in the southern line were more widely spaced at *c.* 0.4 m intervals, and were significantly larger, measuring on average 0.1 m in diameter and 0.3m in depth. They also had different profiles, being V-shaped only at the base. These lines of stake-holes presumably formed a fence which had been repaired or partially replaced during its lifetime. It is possible that the greensand boulders to the north (above) were to secure the bases of raking shores used to support the fence. A similar task may have been performed by additional posts, indicated by a series of post-holes spaced at roughly equal intervals between the fence line and the boulders (Fig. 12).

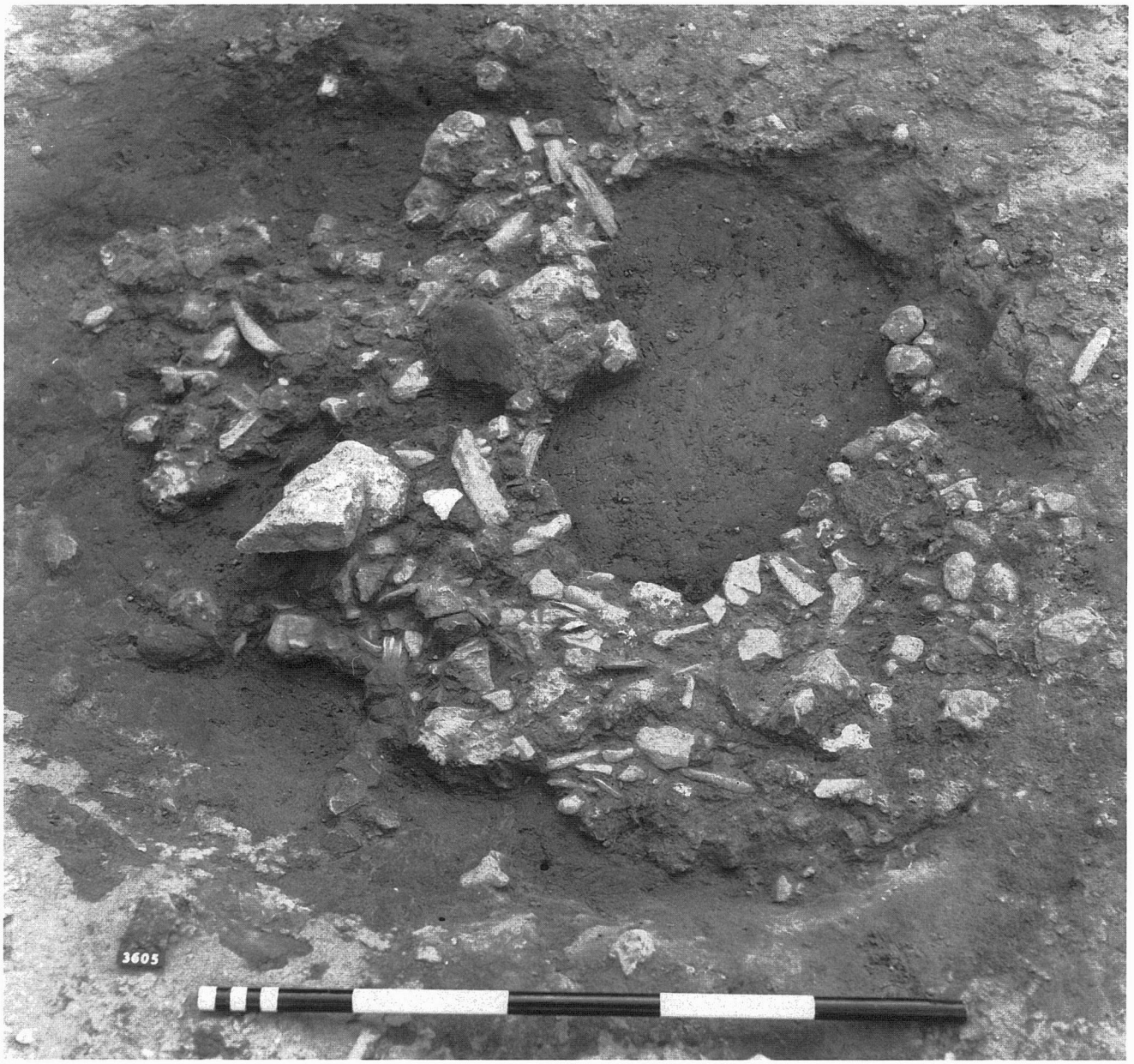


Plate 11 Pit 3605 in Cutting 3, looking south-west. Note the cemented material apparently dipping into the pit fill

At the base of the terrace edge the Greensand bedrock was eroded to a depth of *c.* 0.10 m. The terrace itself comprised a clean, light brown, fine sandy soil (Macphail's 'terrace soil', see Chapter 5). The upper part of the soil contained, to varying depths, artefacts and large quantities of charcoal.

Hearths and structural features were associated with the surface of the terrace. In 1983, two adjacent hearths, 258 and 472 were recorded at the same level (*c.*97.1 m OD), the areas around them being covered with ash and charcoal (Figs 12 and 14). Hearth 258, consisted of a circular bowl-shaped depression measuring 0.64 m in diameter and 0.1 m deep, lined with pieces of sandstone and tufa. These were sealed by a layer of chalk marl fired hard at the edges, over which was a thin layer of burnt soil. The upper surface in the centre of the hearth consisted of a hard flat surface of heat-crazed Gault clay. Hearth 472 was similar in construction and was probably also originally circular, but was more truncated (Pl. 13). Both of these features cut context 443, the upper part of the terrace soil, and were overlain by contexts 250 and 140, layers at the base of the Deposit. Samples were taken from both hearths for archaeomagnetic dates which lay in the range 800–650 BC at the 68% confidence level (below).

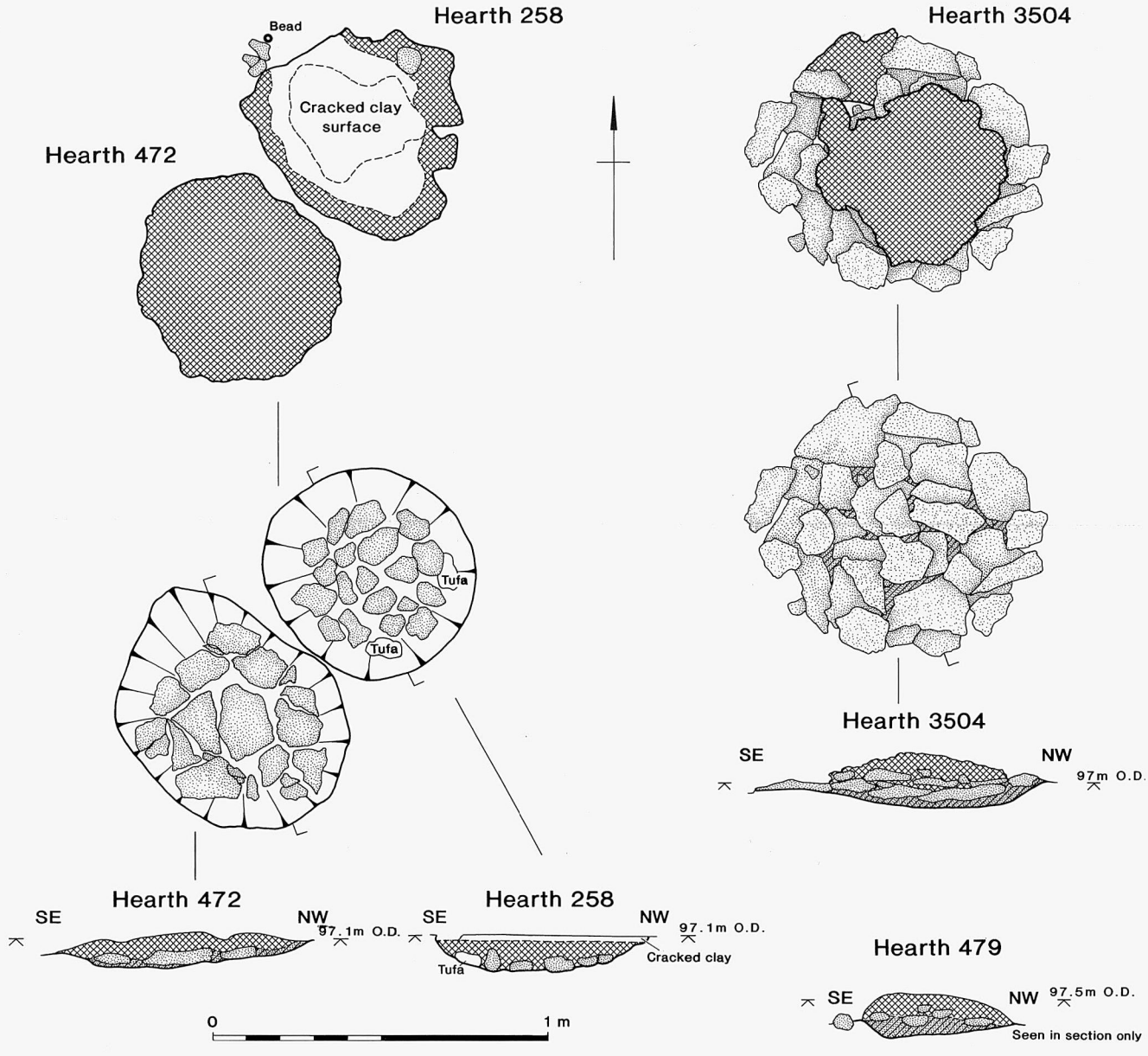


Fig. 14 Plans and sections of selected hearths

Hearth 3504 was recorded in 1984, in columns 128–9, at a height of 97.00 m OD. However, although it was recorded at approximately the same height as hearths 258 and 472, it was observed to have had a fine brown soil (3603) beneath it and was, hence, probably of a slightly later date. Although it was severely truncated it had a similar form to the other hearths, with marl-capped stone lining, two courses thick (Figs 12 and 14; Pl. 14). Its location within 0.25m of the fence line at the edge of the terrace suggests that the fence was probably not in place when this hearth was in use. The fine brown soil beneath the hearth sealed post-holes 3622 and 3666.

Feature 479, which was recorded at 97.44 m OD in section at the north-west end of Cutting 10 (Figs 5 and 12), consisted of a layer of stones covered by chalk marl, and so appears to be similar to the excavated hearths. The feature was at a significantly higher level than hearths 258 and 472 (above), being situated above contexts 250 and 140, the soils sealing those hearths, and context 425 which represents the basal layer of the Deposit in this area. Feature 285 at the south-east corner of Cutting 10 (Fig. 12), was a bowl-shaped hollow, measuring at least 0.68 m wide and 0.13 m deep, and cutting the Deposit some 0.4 m above the pre-Deposit surface. The hollow contained a mix of burnt chalk and soil, black ash and charcoal and so may represent a dump of burnt material rather than an *in situ* hearth, but there was no evidence of the stone lining characteristic of the earlier hearths.



Plate 12 Line of greensand boulders, 3515, in Cuttings 2 and 12, looking east, during excavation in 1984. Note that the boulders occur on top of a small depth of Deposit

Two linear features (235 and 3521; Fig. 12), both of which extended south-east beyond the limits of the excavation, were also cut from this level. They both ran at an angle to the terrace, down the slope of the hill. Feature 235 was at least 1.5 m long, and 0.9 m wide at the edge of the cutting, expanding to 1.1 m at its rounded end less than 1.0 m from the edge of the terrace. It was at least 0.65 m deep with vertical sides and a flat base and appeared to have been deliberately backfilled, containing mixed brown soil and Greensand with very few finds. Dipping into the top of the feature were thin layers of soil with increasing quantities of charcoal deriving from the activity on the adjacent original ground surface (Fig. 10). The overlying layers also dipped above this feature, indicating that its fill continued to be compacted as the Deposit accumulated above it. Feature 3521, approximately 6 m to the south-west, was 2.5 m long, 0.8 m wide, and 0.45 m deep, with a similar profile and fill, although with less regular sides and base. As with feature 235, the overlying fills dipped above it. The feature was cut on its eastern edge by post-hole 3561.

There was a third linear feature, 459, at the same level in Cutting 10. It was situated close to feature 235, almost at a right angle to it, although any relationship between them was beneath the baulk at the junction of Cuttings 2 and 10. The feature was at least 1.3 m long by 0.3 m wide, with straight sides, near vertical on the south-eastern side and moderately steep to the north-west. The base, which was up to 0.2 m deep was made up of two elongated hollows. The feature was filled with mixed brown soil, and was sealed by a black ashy layer. The function of these linear features is unclear.

The remaining features cutting the terrace consisted of some 65 post-holes (excluding the stake-holes forming the fence line), some with visible post-pipes and with stone or crushed chalk packing (Figs 15 and 16). Most of the post-holes were of a roughly equivalent size, ranging from 0.25 m to 0.4 m wide (details in archive). A single possible post-hole, 482, stood out as being significantly larger than the rest, measuring 0.54 m in diameter but widening to 1.1 m at the top, and was 0.66 m deep (Fig. 16). There was also, some 7 m south of the terrace edge in Cutting 10, a group of five stake-holes, feature 461 (Fig. 12), arranged in a rough circle *c.* 0.6 m in diameter, the holes measuring on average 0.07 m in diameter and 0.3 m deep.

Most of the post-holes were evident from the surface of the terrace. Yet, because of the similar nature of the matrix of the overlying Deposit, it is possible that some of them were dug from a higher level (Fig. 15), through the basal layers of the Deposit. In some instances, packing stones were recorded at a higher level than any post-hole was evident. Similarly, because of the similarity of the fills of some post-holes to the terrace soil a few were not detected until the terrace soil was removed to expose the underlying Greensand. Unlike the linear features, few of the post-holes were located on section lines at the edges of the cuttings, and even where they were, such as feature 486 in Cutting 10 (Fig. 5), it was not always possible to identify with certainty their true stratigraphical position.

A number of post-excavation phasing exercises were undertaken in an attempt to seriate the features on the terrace. Figure 15 is based upon the heights at which postholes were first observed relative to the surface of the terrace, or the interface between the Deposit and Greensand where the 'terrace soil' did not exist. Those features first observed well below the interface are clearly likely to be the earliest, but the fact that most contained later Bronze Age finds, including pottery, means that they do not belong to an earlier period of site use. It was not possible either to assign post-holes to particular phases with any degree of certainty, or to identify contemporary groups of post-holes which might indicate the position or form of individual structures. Nonetheless, it is certain that the features and the formation of the terrace represent activity over a period of some time, activity which continued after the basal layers of the Deposit had started to accumulate.

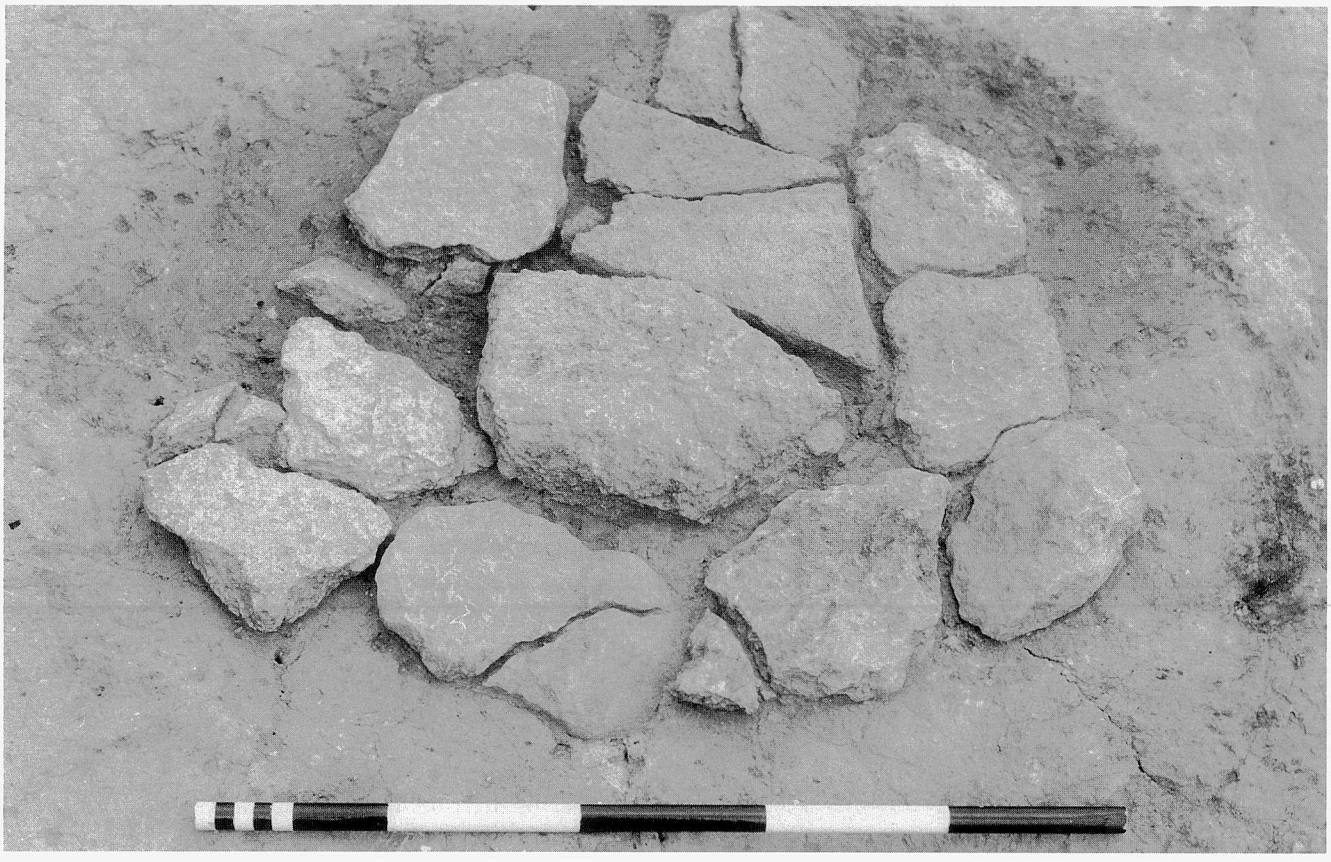


Plate 13 Stone base of hearth 472 in Cutting 2, with its clay base removed, looking south-west

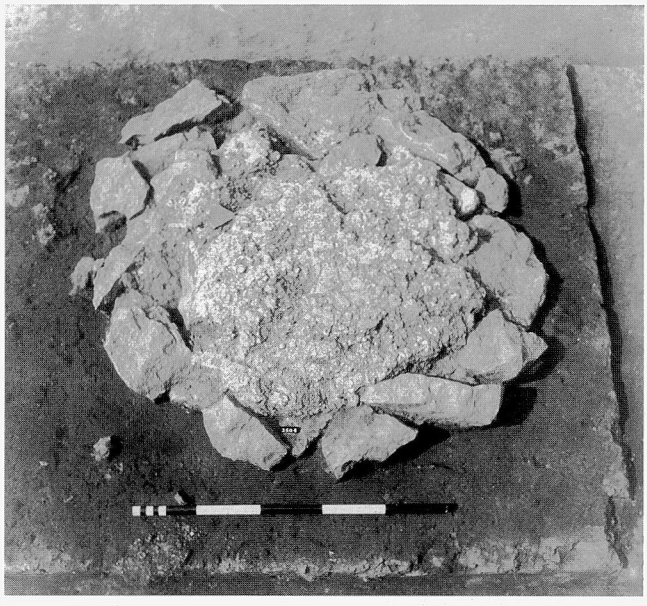


Plate 14 Hearth 3540 in Cutting 12 with its marl surface in place, looking north-east

4 The Northern Group of Features

Most of the northern group of features was uncovered in Cutting 3 during 1983. Although there was no clear demarcation of this group, the main concentration lay to the north of gully 3626 (Fig. 12). The area which contained the features was small but, as with the southern group, their density was high. With the exception of two shallow hollows (315 and 321), possibly representing areas of wear, and two short linear features of unknown function (184 and 3724), all the features were post-holes.

Over most of the area, the basal layer of the Deposit (context 195 in Cutting 3) and, in places, the concreted layer at its base (context 307) lay directly over a 'subsoil' which increased in thickness to a maximum of 0.15 m in the north-eastern corner of Cutting 3. It was excavated as three successive layers (314, 330, and 355), each containing fragmentary artefacts and charcoal in quantities which decreased with depth. They were not subject to micromorphological examination and hence it is not possible to compare them precisely with the 'terrace soil' to the south.

Twenty-eight of the 39 post-holes in Cutting 3 were sealed by one or other of these basal layers. The remaining 11 post-holes were first detected at the top of the layers, primarily because of the rammed chalk

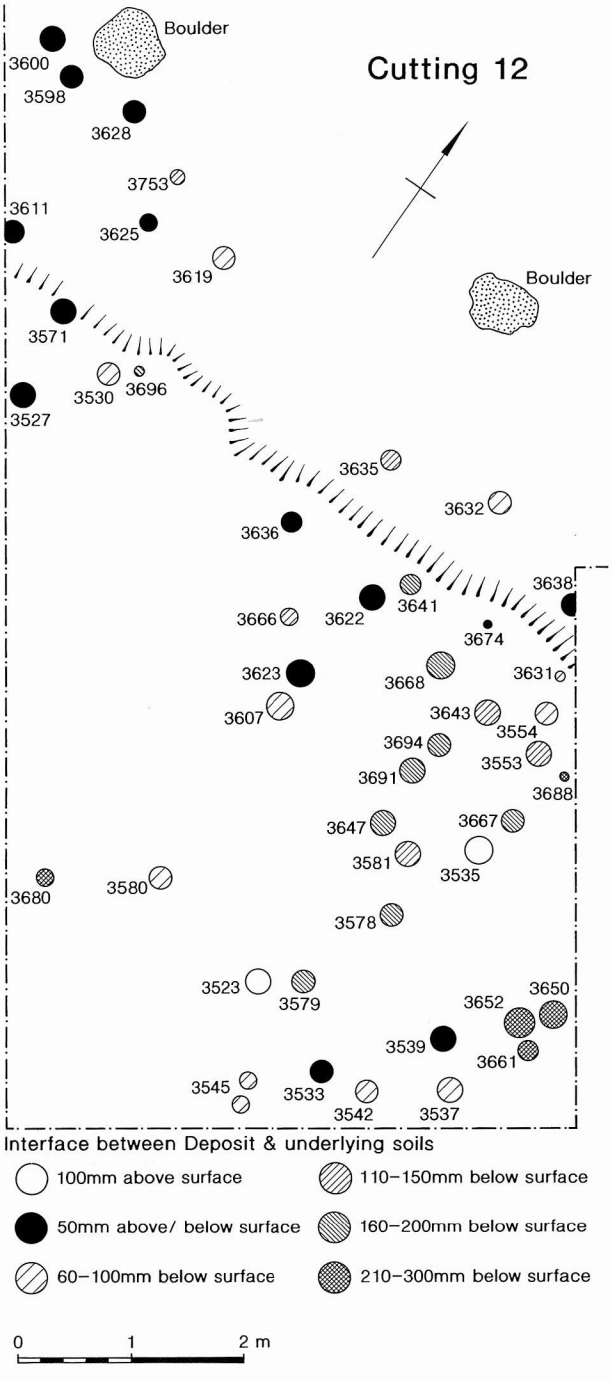


Fig. 15 Phasing of post-holes in the southern part of Cutting 12

rubble, Gault Clay and other stone packing in their fills (Pl. 3, above). The post-holes were similar in dimensions to those in the southern group and many were intercut (details in archive). As with the southern complex, no structural patterns could be recognised, nor were any definite associated surfaces, such as floors, found.

5 Preliminary Interpretation of the Main Cutting

Observation at the time of excavation clearly recognised two principal components of the site: a range of structural features and the Deposit (Gingell and Lawson 1984; 1985). Prior to a fuller explanation based on the results of post-excavation analysis (below), it seemed clear that the structural features represented a range of post supported buildings and fences; parts of a substantial settlement. This settlement was well organised, with a road and bordering fence traversing it, and was occasionally reconfigured, thus making the resulting palimpsest of post-holes difficult to disentangle. Early activity had stripped the bedrock of its natural soil cover but throughout the subsequent life of the settlement soil had accumulated. Consequently, the earliest post-holes were apparently sealed by the accumulating soil while later post-holes punctured it. The process of accumulation continued to such an extent that pits and post-holes no longer penetrated the basal Greensand and they became impossible to detect in the overlying Deposit. Yet, considerable activity must have continued on the site to account for the prodigious quantities of the accumulating soil that represented the Deposit and for the very considerable quantities of finds discarded. The volume and range of finds and their general condition suggested that they were refuse from various activities which at different times overwhelmed the positions of former structures in the site. Intra-site cycles of habitation, temporary abandonment, midden formation, and later reuse could be envisaged, albeit that any structures which may have been built during the latest reuses of the site could only be conjectured.

The vast majority of the finds were clearly of later Bronze Age and Early Iron Age date. A few finds of the Middle Bronze Age in the deepest layers suggested that the origin of the site lay towards the end of the 2nd millennium BC. However, it seemed that, thereafter, accumulation of the Deposit, and the activities which had caused it, had continued throughout the Late Bronze Age. The highly decorated pottery at the top of the Deposit, familiar from other sites such as All Cannings Cross (Cunnington 1923), suggested that the use of the site terminated in the Early Iron Age before the middle of the 1st millennium BC.

6 Other Cuttings

The Deposit was recorded in all but the most northerly of the test pits (Cuttings 9 and 11), but became progressively thinner down the slope towards its northern limit at the margin of the Upper Greensand and Gault clay and towards its eastern limit in the vicinity of Cuttings 5 and 6.

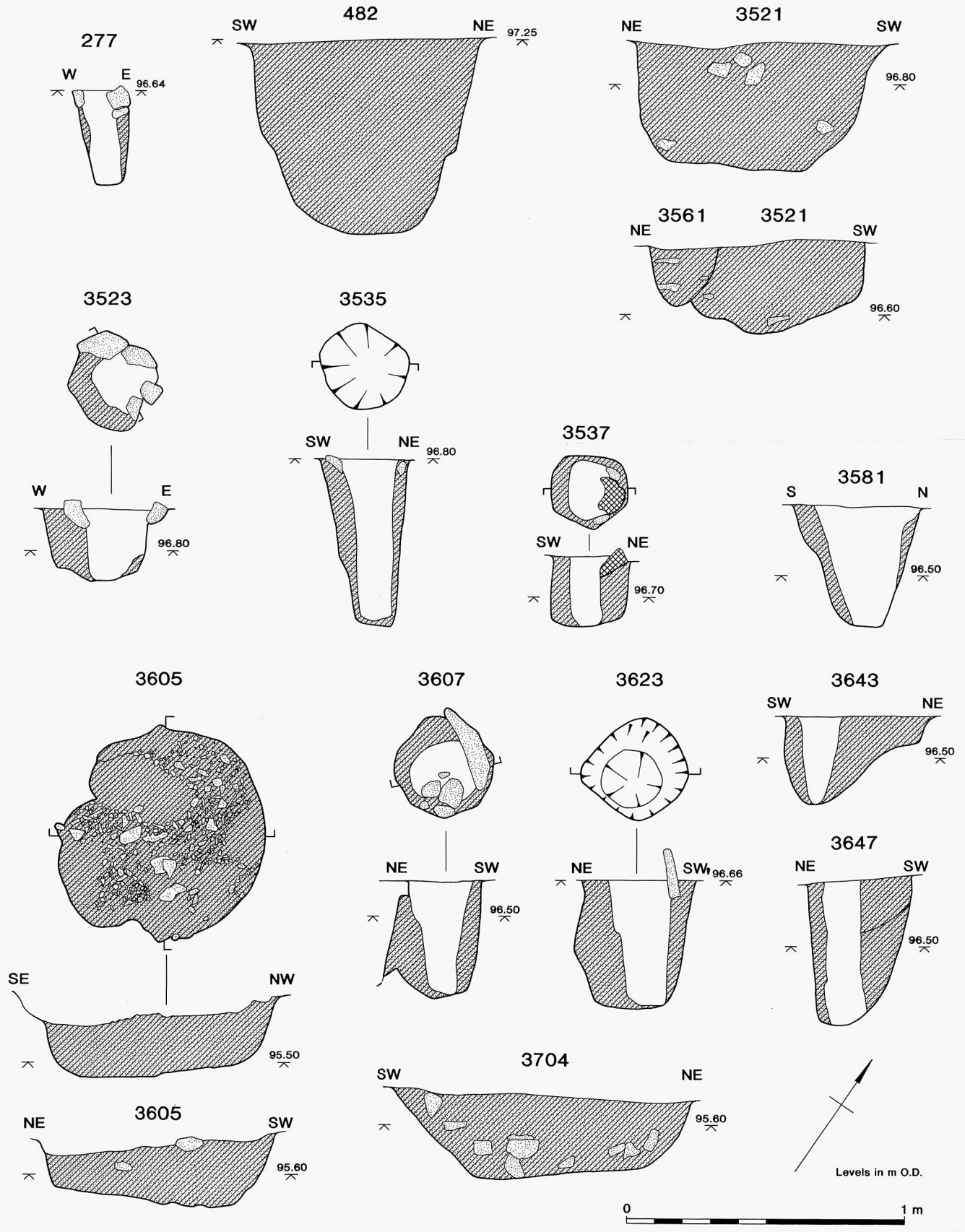


Fig. 16 Plans and sections of selected post-holes and pits

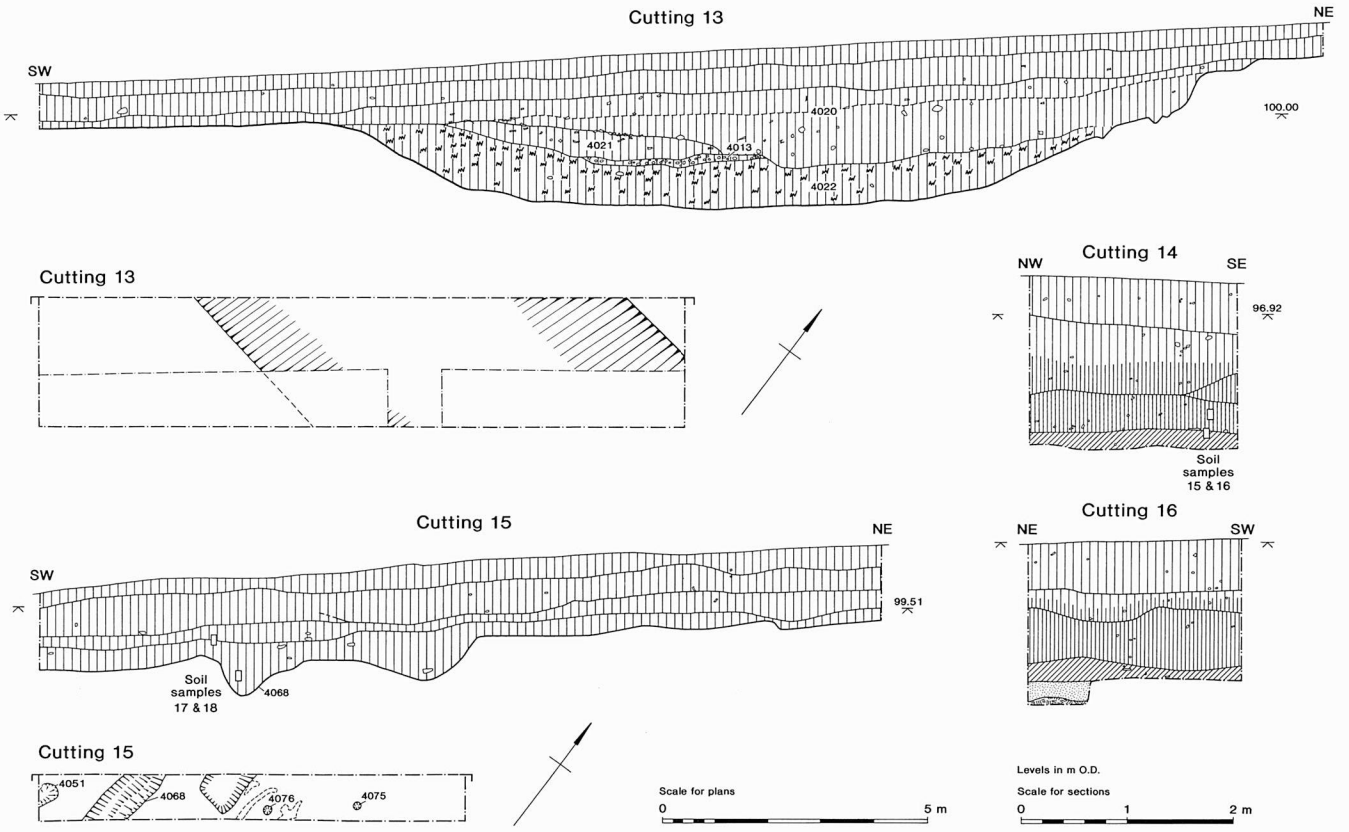


Fig. 17 Plans and sections, Cuttings 13 and 15; sections, Cuttings 14 and 16 (not to the same scale)

A circular feature (405) was recorded in Cutting 7, penetrating the Greensand (Fig. 5). It was approximately 1 m in diameter, extending beyond the north-west section of the test pit, being 0.42 m deep with moderately steep irregular sides and a narrow flat base. A small circular feature, possibly a post-hole *c.* 0.3 m in diameter and 0.2 m deep with near vertical sides and a flat base, was recorded in Cutting 8 (Fig. 5). The presence of these features suggested that evidence of structural activity was much more extensive than the area of the principal cuttings in the modern cemetery.

Two test pits confirmed the presence of the Deposit at the periphery of the site. Cutting 14 showed a considerable depth of ploughsoil above the Deposit (Fig. 17). Two post-holes, one (4081) identified by a group of stones, as well as a spread of bone, were recorded close to the base of the Deposit. Two further post-holes of later prehistoric date were identified with other features in Cutting 15 (below). No features were identified in Cutting 16.

7 Roman and Later Activity

The field bank which marked the southern boundary of the cemetery and which was sectioned in 1983 in Cutting 10 proved to be a well-formed lynchet partly made up of deposits of archaeological material derived from further up the slope. The lynchet reached a depth of 1.2 m, as indicated by the lowest soil level (context 254) in which Romano-British material appeared. This layer marked the earliest reworking of the upper part of the Deposit, with subsequent accumulations of ploughsoil which contained both redeposited prehistoric and Romano-British pottery above it (contexts 251, 249, and 248).

At its northern edge, where it was at its maximum depth on the line of the modern field boundary, the positive lynchet was disturbed through its full depth (to the top of the Deposit), and for a width of 2.7 m, possibly by the grubbing out of a hedge in recent times. To the north of the bank cultivation had created a negative lynchet which had truncated the upper layers of the Deposit. As a result of the positive and negative lynchets and the terrace beneath the Deposit, the depth of stratigraphy varied from a minimum of 0.5 m to a maximum of 1.8 m.

A number of boreholes, recorded during the Auger Survey (above), from the field to the south of Cutting 12, were substantially deeper than those from across the rest of the site. These anomalous results were subsequently investigated by the machine excavation of a trench measuring 12 m by 1.5 m, Cutting 13, positioned *c.* 45 m south-east of the main excavation area (Fig. 3). This revealed a flat bottomed ditch of Romano-British date, 6 m wide and 1.6 m deep, which cut obliquely across the trench (Fig. 17; Pl. 15). It was aligned approximately east–west, following the brow of

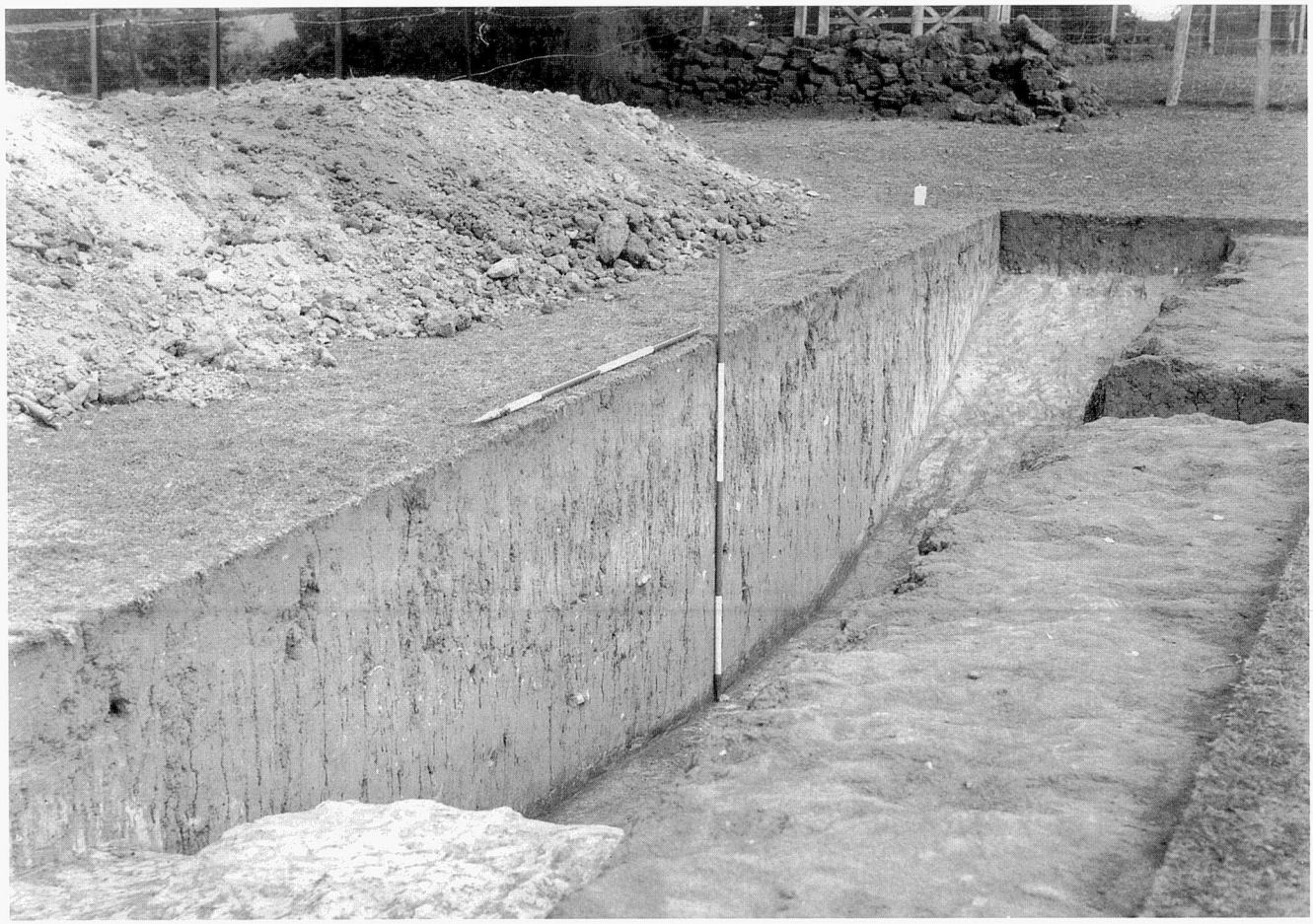


Plate 15 Oblique section through Romano-British ditch in Cutting 13, looking north-east, 1984

the ridge beyond the south-eastern limit of the Deposit.

The weathered Greensand at the base of the ditch was covered with a primary fill (context 4022) which consisted of a greenish–grey/brown clayey silt, up to 0.5 m thick, containing occasional fragments of chalk and charcoal in the upper part. This was overlain in the centre of the ditch by a layer of mottled greenish–grey clayey silt (context 4013) containing frequent small pieces of Greensand. Above this lay a 0.5 m thick layer of greyish–brown silty clay (4021) containing pottery, bone, large lumps of Greensand, fragments of chalk, and charcoal, which was sealed by a layer of dark silty loam (4020); this in turn lay beneath the ploughsoil. A one metre square column was hand excavated on the south-east side of the trench for sampling purposes.

A number of features were recorded in Cutting 15, positioned to the west of Cutting 13 (Fig. 17). A ditch (4068), 0.8 m wide and containing Iron Age and Romano-British pottery, crossed the western end of the trench on a north–south alignment that would place it at a right-angle to the larger Romano-British ditch recorded in Cutting 13. Three post-holes were recorded, two (4051 and 4076) containing sherds of Bronze Age and Iron Age pottery and a third containing post-medieval pottery. There was also a probably rectangular feature which extended north beyond the trench on a similar alignment to the ditch.

The widespread recovery of medieval pottery from the uppermost levels of the main cutting (12) and the detection of faint traces of ridge-and-furrow earthworks throughout the pasture to the north of the cemetery suggest that the area formed arable fields prior to its documented modern use.

8 Other Finds and Subsequent Observations

Finds from Grave Digging

A number of other finds of archaeological material have been made during grave digging. In subsequent years, in particular during the years of the excavation, a regular watching brief organised by Devizes Museum was maintained during grave digging with the result that finds were recovered from some 37 graves (details in archive). Finds included pottery, copper alloy objects including part of a bowl and a bugle shaped harness ornament, worked shale, antler bone, quern fragments, an amber bead and fired clay objects. In addition to the artefacts, the reporting of human skeletal remains and of concentrations of stone slabs suggested the presence of a range of possible features, such as graves and flag floors, not encountered under controlled recording conditions.

Potterne Deer Farm

In September 1989 a watching brief was carried out during the construction of a deer farm in fields below the excavation site, on the edge and floor of the Rangebourne valley (Wessex Archaeology 1989). The development included the erection of a barn, the construction of a lake and small pond close to the stream, and the realignment of an access road, as well as the recutting of two ditches and the excavation of postholes for deer-proof fencing. Ten areas were examined.

The barn (Fig. 3, Area 1) was situated just above the edge of the valley floor, *c.* 170 m north-west of the 1984 excavation in Cutting 12, and on approximately the same line as 1983 Cuttings 7–9 (Fig. 3). Its construction, which involved the cutting of a terrace into the hillside to form a platform measuring 32 m by 17 m, provided an opportunity to confirm earlier findings that the edge of the Deposit lay between Test Pits 8 and 9 and did not extend further towards the valley floor.

Examination of soil profiles along the south-east and north-east sides of the terrace revealed a 0.9 m thick layer of fine sandy loam overlying the Greensand, from which Late Bronze Age/Early Iron Age pottery was recovered. The layer also yielded material of Romano-British and medieval dates, confirming the evidence recovered earlier of activity during these periods. Examination of topsoil and subsoil removed during construction of the terrace produced further quantities of similar finds.

Terracing for the new trackway (Fig. 3, Area 4), which ran south-west from the barn and parallel to the northern section of Brownleaze Lane, showed that the sandy loam gradually reduced in depth in that direction. Finds were collected from two further locations (Fig. 3, Areas 6 and 9), close to the junction of the track with Brownleaze Lane, but soil profiles at these points were not exposed to any depth. The recutting of two ditches (Fig. 3, Areas 3 and 5), running north-west from the track towards the river, revealed that the depth of the sandy loam decreased from 0.9 m at the track to 0.3 m at the edge of the valley floor, and that the distribution of finds from it also ended at the edge of the valley floor. The apparent absence of finds from the valley floor was confirmed by the fact that none were recovered from dumped material derived from the excavation of the lake further to the north.

These observations indicated the presence of an archaeologically rich layer which extended towards the base of the hill and to the edge of the valley floor but not onto it. Since no distinction could be recognised between contexts from which finds of different periods were found, it was not possible to confirm whether this layer represented *in situ* soil comparable to that of the Deposit, nor, therefore, whether the 1983–5 excavations and auger survey had revealed the full north-westward limits of the Deposit.

The sandy loam may, however, more probably represent accumulated and/or redeposited ploughsoil in the form of a positive lynchet, similar to that recorded in Cutting 10, containing material derived from the Deposit further up the slope. In order to answer this question, a further evaluation of the deer farm site was proposed which was, inter alia, to involve augering both to investigate whether the layer was a positive lynchet, and to further determine the extent of the Deposit to the west and south. Funding arrangements could not be concluded, however, and this work was not undertaken.

A copper alloy chisel was subsequently found towards the valley floor to the north-west of the cemetery and in the vicinity of the deer farm, but the precise location and context of the find are not known.

1995 Evaluation in Brownleaze Lane

A programme of archaeological evaluation on the land to the rear of 1 Brownleaze Lane, 150 m south-east of Cutting 12, was conducted in 1995 (Fig. 3). An auger and test pit survey confirmed that neither the Deposit nor other traces of contemporaneous activity occurred in the area.

4. Post-excavation Programme

1 Aims and Objectives of the Post-excavation Programme

The overall aim of the post-excavation programme has simply been to create a publishable account of the limited field evaluation of the site at Potterne. In common with other evaluations this has sought to determine the location, extent, date, character, condition, quality, and significance of surviving remains. Preliminary analysis of the results of the fieldwork had identified the location and extent of the site, and allowed its provisional interpretation as comprising some form of settlement or occupation with evidence of structures, hearths, and a trackway, subsequently sealed by a deep and extensive accumulation of domestic material. Changes in the ceramic assemblage through the Deposit indicated a date occupying much of the first half of the 1st millennium BC, commencing in the Late Bronze Age and continuing into the Early Iron Age. However, many questions remained which it was hoped would be resolved by further post-excavation analyses.

The exceptional nature of the site meant that some very basic questions needed to be addressed of its origins, character, duration, and the taphonomic processes which had led to its accumulation in the first place and its unprecedented post-depositional survival. The apparent homogeneity of the Deposit on excavation belied its complexity and the major objective was to define the nature and function of this new category of prehistoric site and arrive at an overall interpretation of the excavation results.

In order to meet these aims and objectives, some of the questions which needed to be resolved were:

- What was the origin of the Deposit; what processes led to its formation?
- What were the circumstances and causes of the mineralisation of the artefacts and ecofacts within it?
- What taphonomic and post-depositional processes had acted upon it and what were the effects of these?
- Did it accumulate uniformly?
- What was its overall composition and structure and how did these change through time?
- What did it represent in terms of settlement location and function?
- How did the accumulation of the Deposit relate to the features identified beneath it and within its lower levels?
- Over what period of time and at what rate did the Deposit accumulate?
- What specific activities did it represent and were these *in situ*?
- What was the economic and cultural milieu within which the Deposit formed?

The on-site interpretation of the site as a midden engendered much debate during the initial stages of post-excavation over the first three of these points and much of the original analysis was focused on establishing the origins and formation of the Deposit and on the mineralisation of the plant remains. It was only once this basic framework had been set up that the more incisive and wide ranging questions could be addressed. The extent to which these various questions could be adequately answered varied considerably and the methods used for analysis of each major category of artefact and ecofact are presented in Chapters 5 and 6 below. Some further specific analyses were also undertaken, to greater or lesser effect, as outlined below and described in more detail in Chapters 5 and 6. Both radiocarbon and archaeomagnetic dating techniques were applied; thermoluminescence proved unsuitable.

2 Post-excavation History and Analyses

By the time of the completion of the 1984 excavation a Manpower Services Commission Scheme (1984–87) employing up to ten people and two supervisors had been arranged through the Community Council for Wiltshire to sort and catalogue the huge collection of finds at Devizes Museum. The work was to be funded by The Historic Buildings and Monuments Commission for England (HBMC, now English Heritage) with specialist input arranged through the Ancient Monuments Laboratory. Conservation of the finds was undertaken at the expense of the Wiltshire Libraries and Museums Service through its Conservation Laboratory in Salisbury.

Initial assessment of a sample of the vast pottery assemblage by Elaine Morris demonstrated not only that there were marked changes in the nature of the ceramic assemblage through the depth of the Deposit, but also that there had been no significant vertical mixing and that it had accumulated progressively. A more detailed analysis was therefore initiated. The generation of large quantities of recorded data meant that the only sensible means of undertaking statistical analysis of them was through the use of computers, which up to that point were not widely used for processing archaeological data and had not previously been employed by Wessex Archaeology. Various aspects of ceramic analysis, including a refitting exercise, and analysis of the animal bone assemblage were conducted using dBase III Plus. The methods and results of these analyses are described in Chapters 5 (animal bone) and 6 (pottery).

At the same time a series of data visualisation experiments was conducted by IBM in an attempt to display three-dimensionally any patterning in the distributions of artefacts and bones which might indicate site formation processes and changes in material culture through time. The IBM system created a three-dimensional model of the Deposit which could then be rotated on the screen allowing it to be viewed from any direction. Individual or groups of contexts, defined by the presence/absence of specified artefact types, could be displayed in their correct positions within the Deposit. These distributions could be reorientated so that any trends in deposition could be visually identified, or shown in sequence, providing an animated representation of depositional processes. Today, such visual presentation is easily accomplished on almost any desktop PC through a variety of commercial graphics packages but, in 1985, this was an innovative experiment and a mainframe computer was required! Details of the visualisation experiments are in archive (see also Reilly *et al.* 1988).

Specialist analysis on the various categories of artefacts and environmental data were undertaken during the period 1986 to 1991, with additional soil micromorphology in 1997. A preliminary draft of this report was submitted to English Heritage and various academic readers in 1996 and the final draft completed in July 1998.

"On-terrace" and "Off-terrace" Zones Used in the Post-excavation Analyses

While the stratigraphic integrity of the Deposit appeared to have been demonstrated by the excavation records, the pottery refitting exercise, the preliminary analysis of the ceramic assemblage, and the IBM data visualisation exercises, the actual stratigraphy employed during post-excavation analysis was based on artificial layers or "zones". Zones 1–12 were defined in relation to the pre-excavation ground surface, and maintained that profile down through the Deposit. It was soon recognised, however, that certain features of the archaeology undermined the correspondence between the real and the artificial stratigraphy.

Firstly, the Deposit over the southern group of features had been truncated to variable depths by the negative lynchet resulting from Romano-British and later cultivation, so that the pre-excavation ground surface profile, and the zones defined by it, would have cut across the stratigraphy of the Deposit in that area. Secondly, the creation in antiquity of a terrace up to 0.4 m deep at the base of the sequence meant that the Deposit north of the terrace edge was considerably deeper than it was to the south. The profile of the real stratigraphy at the base of the Deposit, therefore, would have reflected an uneven surface, whereas the zones, even at this depth were based on the profile of the pre-excavation ground surface.

The combined effect of these factors was to create a significant disjunction between the zones and the stratigraphy on the southern side of the terrace edge. While the basal layer of the Deposit north of the terrace occurred relatively consistently within Zone 10 occasionally dipping into Zones 11 and 12, to the south it occurred irregularly between Zones 5 and 10 (Fig. 19). At its extreme, Zone 5, for instance, included material from the top of the terrace, the basal and median layers of the Deposit.

In order to avoid the analytical problems that this disjunction would lead to, all the finds assemblages (with the exception of the animal bone) were divided on the basis of whether the material derived from contexts north or south of the terrace-edge. Contexts south of the terrace-edge were designated as "on-terrace", those straddling it as "intermediate" and those to the north as "off-terrace", with finds from each area then being analysed separately (Fig. 12). Only the "off-terrace" zones can be relied on to reflect broadly the stratigraphy of the Deposit.

In order to measure temporal changes in the artefact assemblage, comparisons between zones have been limited, therefore, to finds from "off-terrace" contexts. While in the upper part of the Deposit each zone was represented in almost every vertical column, towards its base, particularly in Zones 11, 12 and 14, the variable depth of the Deposit meant that natural was reached earlier in some columns than in others and, therefore, these zones do not cover the whole of the excavation area. Furthermore, it should be recognised, that some of the contexts in the lowest zones, in particular Zone 13 which was allocated solely to the two concreted surfaces beneath the Deposit, were defined in relation to recognisable stratigraphy (above), rather than by spits of uniform 0.1 m depth, and so have variable volumes. For this reason caution should be exercised when comparing the numbers of finds from different zones.

3 Dating

Radiocarbon dating

Although it was originally envisaged that a comprehensive programme of radiocarbon dating would be undertaken by obtaining about 30 determinations, a series of only seven samples (POTT1–6, 16) was agreed with the Ancient Monuments Laboratory (AML) and these were submitted to the Harwell Isotope Measurements Laboratory.

The chronology of the Deposit, therefore, relies on seven determinations on charcoal recovered by the flotation programme for Cutting 12. These were collected as pairs from the top, middle, and base of the Deposit in adjacent one metre squares from sampling

Table 1: Radiocarbon determinations
a) with calibrated BC date ranges

Zone	*column/*	*context*	*reference feature*	*Charcoal species*	*lab ref*	*Result BP*	*Calibration (2 sig) cal BC*
4	88	1617	POTT1	*Quercus* sp., Pomoideae, *Corylus avellana*, *Ulmus* sp., Prunus sp. and *cf. spinosa*	HAR-6978	2590 ± 80	910-510
4	89	1608	POTT2	*Quercus* sp., Pomoideae, *Corylus avellana*, *Ulmus* sp., Prunus sp, *Fraxinus excelsior*, *cf. Acer campestre*, *Ilex aquifolium*	HAR-6979	2490 ± 70	810-400
7	88	2209	POTT3	*Quercus* sp., Pomoideae, *Ulmus* sp., *Prunus* sp. and *cf. spinosa*, *Fraxinus excelsior*, *cf. Tilia* sp.	HAR-6980	2650 ± 80	990-560
7	89	2208	POTT4	*Quercus* sp., Pomoideae, *Corylus avellana*, *Ulmus* sp., *Prunus* sp. and *cf. spinosa*, *Acer campestre*, *cf. Tilia* sp.	HAR-6981	2630 ± 70	920-560
11	88	2988	POTT5	*Quercus* sp., Pomoideae, *Corylus avellana*	HAR-6982	3130 ± 100	1630-1130
11	89	2984	POTT6	*Quercus* sp., Pomoideae, *Corylus avellana*, *Prunus* sp. and *cf. spinosa*, *cf. Tilia* sp.	HAR-6983	3430 ± 110	2040-1510
	F3605	3716	POTT16	*Quercus* sp., Pomoideae, *Ulmus* sp.	HAR-8938	3000 ± 90	1460-990

b) Comparison of radiocarbon results by zone

Zone	*column 88*		*column 89*		*reference*
4	2590 ± 80 BP,	910-510 cal BC	2490 ± 70 BP,	810-400 cal BC	POTT1 and POTT2
7	2650 ± 80 BP,	990-560 cal BC	2630 ± 70 BP,	920-560 cal BC	POTT3 and POTT4
11	3130 ± 100 BP,	1630-1130 cal BC	3430 ± 110 BP,	2040-1510 cal BC	POTT5 and POTT6
	3000 ± 90 BP,	1460-990 cal BC			POTT16

columns 88 and 89 (Fig. 8), and supplemented by a single determination from Feature 3605 at the northern edge of the empty strip in Cutting 12 (Fig. 12).

Each pair of samples should be directly comparable as they were taken from contexts in the same zone. However, the taphonomy and functional relationship of the charcoal to the Deposit (see below) is crucial here.

	Col 88	Col 89	Col 42
Zone 4	POTT1	POTT2	
Zone 7	POTT3	POTT4	
Zone 11	POTT5	POTT6	
Feature 3605			POTT16

Taphonomy and species of the samples, by Michael J Allen

Charcoal fragments were identified by Vanessa Straker (Tables 1 and 8). The submitted charcoal included a range of up to nine species in each sample and included roundwood (twigs) and larger (heartwood) fragments. However, the functional relationship between the charcoal and the Deposit from which they were recovered is not immediately clear. The archaeological interpretation of the derivation of this material is crucial for the acceptance of the stratigraphic relationship between the samples, and thus the constrained calibration of the radiocarbon results. We need to demonstrate that the date of the burning of the charcoal (the activity), is likely to be closely related to the time of deposition in the Deposit (ie the event we wish to date). Some of the key questions to consider, are therefore:

i) what activities do the charcoal represent?

ii) how does this activity relate to its deposition in the Deposit (ie the event)

iii) how did the charcoal become incorporated into the Deposit?

iv) how old was the charcoal when carbonised (burning of old wood)?

v) how comparable are the results from adjacent squares, physically and taphonomically?

The analysis of the charred plant remains and charcoals by Straker (Chapter 5), shows that the species represented are all those that probably grew locally to the site, and thus probably represent the firing of domestic hearths or the burning of cuttings and clearance of local overgrown trees and shrubs. The residence time of much of the material before it reached the Deposit does not seem to have been great; indeed much of the other archaeological material seems to have been exposed to the elements and scavenging longer on the Deposit than prior to its abandonment there. This is shown by the lack of the weathering on bones which is recorded on many other sites, and by the presence both of articulated bones and conjoinable pottery sherds.

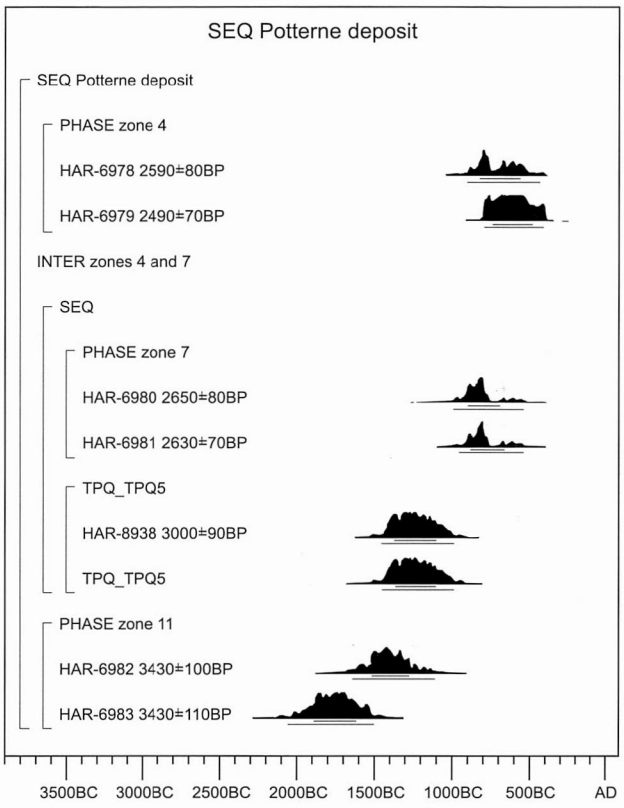


Fig. 18 Diagram of probability distributions of the radiocarbon dates from the Deposit

It is also assumed (Chapter 5) that the charcoal was incorporated into the Deposit along with much of the cultural debris (pottery, animal bones, etc), or farm debris (dung, stabling material, etc) as only limited burning *in situ* is evident, and where that is proven (soil micromorphology: Chapter 5) it seems to be of dry vegetation rather than woody elements. Thus the event of deposition relates chronologically relatively well to the activity which created the material in question. On this basis we can be assured that the results from the charcoal in general relate to the act of their deposition and thus to the formation of the Deposit.

A more significant problem is the possibility of "old wood" offsets, because a relatively high proportion of the charcoal was oak (Table 8) which may have been old wood of possibly centuries in age when burnt. As the samples come from adjacent sample columns, ie, the fragments of charcoal could not be more than a maximum of 2 m apart, we can be more confident in the reliability of their relative dating than if they had been more widely separated. Any statistically significant difference between results of adjacent samples from the same zone is, therefore, likely to reflect the presence of old wood.

These taphonomic arguments are, unfortunately, not as clear for the material from Zone 11 at the base of the Deposit which may contain charcoal fragments derived from earlier activity. Some of the early pottery recorded from the site (of Middle Bronze Age character) came from the lowest Zones of the Deposit. The origin of this charcoal is less certain and there is the possibility both of residuality and mixing with charcoal associated with the pre-Deposit activity. We cannot, therefore, be as sure of the reliability of the results from this Zone, and indeed they show greater differences between them, than between two results within any other Zone. In no case, however, was there significant difference between couplets of dates at the 95% confidence level (Ward and Wilson 1978). On this basis, and with the taphonomic uncertainties of the determinations from Zone 11, it is impossible to attempt to identify from the radiocarbon evidence any hiatus between the Deposit and the earlier episodes of activity.

Results, by Alex Bayliss

The radiocarbon determinations were calibrated using the 20 year atmospheric curve using the maximum intercept method of Stuiver and Reimer (1993) and are expressed at the 95% level of confidence. Dates are quoted in the form recommended by Mook (1986) with the end points rounded out to 10 years. The calibrations were calculated using the data published by Stuiver and Pearson (1986) and Pearson and Stuiver (1986) and are quoted in Table 1.

The stratigraphical positions of the samples offer a relative dating sequence which can be used to constrain the calibration of the radiocarbon results to provide a more precise estimate of the dates in which the samples were found. Probability distributions have been calculated using OxCal (v2.1) (Bronk Ramsey 1994). In Figure 18 the plots have been calculated on the basis that Zones 4, 7, and 11 form a stratigraphic series which increases in age with depth, and that the sample from the pit (POTT16) is not necessarily earlier than Zone 11.

In considering whether it is possible to use the results to separate the dates of activity in Zones 4 and 7 it can be calculated (Ward and Wilson 1978) that POTT1 and POTT4 are not statistically significantly different at the 95% level of confidence. This means that they may all be of the same date, although this cannot be demonstrated. If, as seems reasonable, the stratigraphy is assumed to have chronological significance, then the interval between the two phases can be calculated. The range for the amount of time between Zones 4 and 7 would be 0–160 years (68% confidence) or 0–280 years (95% confidence).

The data available from these six determinations is inadequate to resolve sophisticated questions of site chronology, and a further radiocarbon series (even more complex than that originally proposed) would be required to answer them. Nevertheless the archaeological implications of the available dates are discussed below. If we were to date this site today, it would be better to take multiple samples from stratigraphically

related articulated animal bone deposits and use Bayesian methodology to constrain calibration of the results in an attempt to produce calibrated dates of sufficient resolution to address more detailed questions of the site's chronology. This was not possible in the mid-1980s when the dating programme was originally discussed and agreed.

Archaeomagnetic dating, by the late A. J. Clark

Archaeomagnetic measurements were made on samples from three flat clay hearths or oven floors in Cuttings 2 and 12. The floors were well constructed on beds of stones set in bowl-shaped hollows (above). The material used appeared to be a mixture of clay and chalk. Samples were taken by the disc method and orientated by gyro theodolite (Clark *et al.* 1988).

Most of the samples were taken from the surfaces of the hearths, or just below. These were extensively cracked and affected by minor disturbance. Therefore, in the case of hearth 258 (Fig. 14), eight samples were taken from the underlying stones, on the assumption that these would have remained stable in their protected position. However, they proved to be very weakly magnetised and of highly variable magnetic orientation, probably at least in part because they had not been sufficiently heated. They were therefore rejected.

In the light of this, samples from the hearth 3504 (Fig. 14) were taken from the surface, supplemented by some from a few millimetres deeper into the structure. The cracking was deep seated, and no systematic improvement was observed in the quality of results from the deeper samples.

The hearth material was not very strongly magnetised. It gave scattered readings, partly because of the cracking already mentioned, but this was reduced by partial demagnetisation in alternating field of 5 microtesla peak value for hearth 258, and 7.5 microtesla peak value for hearth 3504, which showed that it was also partly due to viscous magnetism. The third hearth, hearth 472 (Fig. 14), gave weak and very scattered readings, and no result could be obtained from it.

Final results for hearths 258 and 3504 were quite widely separated (central values respectively of Dec = 53.6°E, Inc = 66.0°, based on 15 samples, and Dec = 27.5°E, Inc = 73.4°, based on 15 samples). Bearing in mind that they were broadly contemporary, this disparity revealed that there had been settlement of the underlying occupation deposits, leading to some tilting of the hearths. The only way of compensating for this was to take an overall mean of the 29 samples, which gave the following result:

Measurement ref. AML-873706/8

Based on 29 samples

Dec = 42.9°E: Inc = 70.2°: alpha-95 = 2.7°

Date: 800–650 cal BC at the 68% confidence level.

Good dating is unfortunately difficult to achieve in this part of the curve, which is slow moving, especially with the material exhibiting the problems described here.

This result is technically interesting in that it is the first to lie at the extreme limit of the most dramatic easterly excursion of the geomagnetic field in Britain during at least the last 10,000 years. The existence of the excursion was established from measurement of the detrital remnant magnetism of lake sediments (Turner and Thompson 1982)

Thermoluminescence (TL) dating

Samples of pottery, for TL dating, were obtained from a column specially excavated through the western edge of Cutting 12 (Column 151; Fig. 12). Eleven soil samples were taken at 0.1 m intervals, from the topsoil, through the Deposit and into the underlying ground surface (contexts 3481–3491). Pottery from three of these contexts (3485 and 3488 at the top and in the middle of the Deposit, and context 3491 from the underlying soil) was tested by Durham University TL Laboratory, using both quartz inclusion and fine-grain techniques, with an additional sample (context 3489) also being tested with the quartz inclusion technique.

The pottery from context 3485 produced a date of 760±550 BC at the 68% level of confidence (DurTL 51-1AS), but the remaining samples were found to have unsatisfactory TL properties and it was not possible to make any age determination from them. The lack of suitable fabrics for further work and the large standard deviation in the single date obtained led, therefore, to plans for more detailed TL analysis to be abandoned.

Section 2.
Environmental and Scientific Analyses

5. The Physical Environment and Farming Economy

1 Introduction to the Environmental Analyses, by Michael J. Allen

The occurrence and preservation of a diverse range of palaeo-environmental remains at Potterne was unparalleled at the time of excavation. This evidence takes the form of included remains (such as mineralised and charred plant remains, animal bones, and charcoal) and the Deposit itself (studied via soil micromorphology, soil chemistry, and magnetic properties). The potential of the environmental data was considerable, and the analysis of each of these forms of evidence has contributed substantially to our understanding of site formation processes and the characterisation and physical composition of the Deposit.

The quantity and diversity of preserved palaeo-environmental remains (as with the artefacts) was unprecedented. It has enabled, in the first instance, the understanding of the Potterne Deposit, and subsequently has provided a unique insight to elements of Late Bronze Age and Early Iron Age animal husbandry and farming economy. The faunal remains comprise one of the largest known assemblages of this period in southern England. Two of the most significant analyses were based on the mineralised seed assemblages, which are rarely recovered from prehistoric rural locations, and on the soils, which helped to define many of the activities that occurred both off-site and on-site.

The environmental evidence has provided the basis for site taphonomy, the reason for the on-site preservation by mineralisation (principally Carruthers), and characterisation of the matrix of the Deposit (principally Macphail), and thus interpretation of the physical composition of the Deposit. Only recently have we been able to turn our attention from these questions of 'on-site' taphonomy, to ones of the ecological and economic importance of these data within the wider context of the later Bronze Age and Early Iron Age environment locally, and to its implication for our understanding of farming and economic systems in the area generally.

Sampling Strategy

Once the environmental programme had commenced it was reviewed and modified as the excavation campaign progressed (Chapter 2). Processing of samples on-site under the supervision of Wendy Carruthers ensured a continued dialogue between the excavation, recording, and sampling programmes, and was made all the more relevant because the initial results of some of her analysis were generated during the excavation.

Mineralised and charred plant remains and charcoal were recovered from bulk soil samples. Larger extrinsic materials (animal and human bones) were recovered and recorded as artefacts (see Mepham, Chapter 6), and intrinsic data (soil micromorphology, soil chemistry, and magnetic susceptibility) were collected from specific samples for the specialists.

Field Interpretation

Normally, interpretation and understanding of site and sediment formation can be largely determined during fieldwork; that is to say we can recognise alluvium, hillwash, dark earth etc in the field and understand its basic processes of formation. This recognition provides a conceptual framework for the understanding of site formation processes at the outset, and for all specialists working on contextual, artefactual and ecofactual data. This framework is then normally refined during the post-excavation phase. At Potterne, however, the novelty of the Deposit did not allow these basic constructs to be made; it was not immediately obvious what the formation processes consisted of. Thus, the site was termed a 'midden' during the excavation phase. Questions such as: 'What was the Deposit?', 'What was the basis of its accumulation?' and, more fundamentally, 'What did the Deposit represent?' were addressed, but could not be resolved on site. No more satisfactory explanation for the Deposit, or reinforcement from suitable parallels, could be proposed at the time of excavation, other than that it was a 'midden' of some sort.

The soil analysis has, therefore, been crucial in determining these rather fundamental questions. It now provides the basis for understanding of this type of deposit elsewhere, and when it is recognised in the field on other sites (eg East Chisenbury) the results of analysis here provide the basis for our understanding of its formation elsewhere. Thus, despite the detailed scientific and analytical programme of soil study, the basic interpretational results are, in the first instance, really an extension of the fieldwork record. They are crucial to our understanding of the site and have resulted in the re-ascription/designation of the sequence within the Deposit.

Phasing/Zoning and Designation of the Deposit

The system of excavation in horizontal spits was defined during the excavation (Chapter 2; Fig. 9) specifically to aid the recording and subsequent

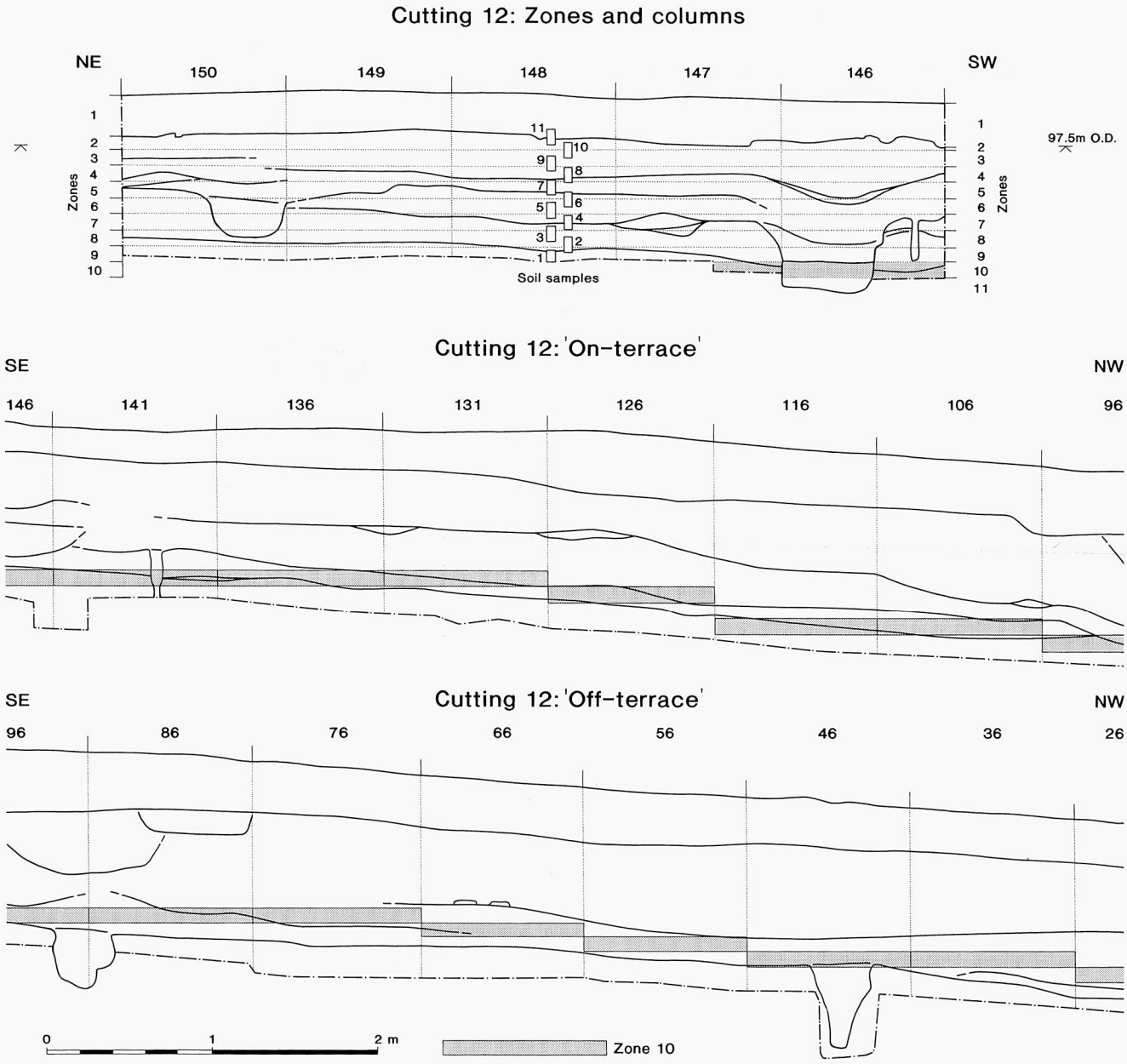


Fig. 19 Schematic diagrams of the south and west sections of Cutting 12, showing the relationship between the observed stratigraphy, the zonation applied and the location of soil samples 1-11

analysis of the artefacts. Subsequently the successive 'zones' were defined during post-excavation based on the number of spits below the current ground surface. Each zone comprised a series of one metre squares which were not necessarily in the same horizontal plane because of the fall in the land surface (Fig. 9) and which related to each other topographically, but not stratigraphically. Analysis has shown that the Deposit was neither uniform nor completely homogeneous, and it is, therefore not possible to accurately extrapolate laterally across the site between 'on-terrace' and 'off-terrace' locations.

During the soil micromorphological analysis, however, a different series of broader sub-divisions were defined on the basis of soil characteristics. Beneath the Deposit the subsoil, 'terrace soil' and 'primary Deposit' were distinguished. More significantly the Deposit was sub-divided into three phases, hereafter referred to as Lower Deposit, Middle Deposit and Upper Deposit facies.

These facies can only be directly related to the sequence of Deposit sampled for the soil micromorphology 'on-terrace'; samples 1–11. Therefore, unfortunately, it is only possible to definitely correlate these facies with other artefactual and ecofactual data from the 'on-terrace' Deposit in Cutting 12 within close proximity to this key stratigraphic sequence (Fig. 19, top). It is not possible to accurately correlate this with zones 'off-terrace', which include the majority of the sample columns for plant and charcoal

remains (Carruthers and Straker, below) which were taken through the 'off-terrace' Deposit (Figs 8 and 12). We can anticipate that these facies might be represented in the lowest seven zones off-terrace and elsewhere; more general correlations and comparisons are, therefore, possible.

Format and Structure of the Main Environmental Reports

The post-excavation programme was discussed at open seminars with all the specialists, but no overall post-excavation project design was formulated for the environmetal analysis as we would expect today (MAP 2; English Heritage 1991). Analysis was undertaken by individual specialists initially with relatively little reference to the analytical data of others and the interpretative framework which slowly evolved during, and was ultimately generated by, the artefact analyses.

All the main environmental reports were drafted between 1984 and 1987. Although subsequent revisions were made by the authors between then and 1995, the texts in all but one case were essentially revisions or modifications of those original texts, structured and framed in the early post-excavation research ethos. Only the soil micromorphology (Macphail) was substantially reworked by more detailed analysis as a result of improved methodologies in that discipline.

Between the completion of many of the environmental reports and the final preparation of this report, the archaeological research agenda had moved on and the emphasis of the reports needed adjustment accordingly. One of the main archaeological questions now posed in the report is not solely that of how to characterise the site, but of how to determine what the evidence can tell us of the communities who produced it, and who lived in the vicinity. During the final stage of report preparation (1998) these pertinent points were stressed within each environmental report as were questions more specifically relating to the activities the Deposit represented and what this by-product could tell us of the economy and communities who created it.

The most recent stage of editing has, therefore, concentrated, with the benefit of hindsight and over a decade of development in field studies and analytical techniques, on placing the site into its wider archaeological and economic context (Chapter 7) and illustrating the importance of this excellent evidence for understanding the human populations associated with the production of the Deposit.

Throughout the final editing stage the following major themes have been addressed of the main environmental reports:

- the character of the site
- site formation, taphonomy and accumulation
- what did the Deposit represent?
- activities on site vs those represented by the evidence which occurred off the site
- farming economy of the community who produced the Deposit

2 Soils and Microstratigraphy: a Soil Micromorphological and Micro-chemical Approach, by Richard I. Macphail

Introduction

A preliminary study (Macphail 1987) of the soils (including soil micromorphology) encountered during the 1983–4 excavations concluded that there were few archaeological analogues with which to compare the 'Graminae ash residue' which formed the principal component of the Deposit. Reinvestigation in 1996 of these samples enhanced the original approach by the application of the methodologies and enlarged database available in the 1990s. This included the opportunity to compare the Deposit with newly-discovered deposits of a similar age and character at East Chisenbury, Wiltshire (Brown *et al.* 1994; McOmish 1996; Macphail 1996a). The soil contents of such deposits have rarely been reported upon and many of the included anthropogenic components have been little investigated before, especially in Britain. It is now possible to report upon these types of deposits from a soil perspective.

A semi-quantitative approach to the study of microstratigraphy was developed in order to assess more accurately the deposits found at Potterne and East Chisenbury. Many microfabrics and components characterised using the light microscope in the 1987 report (Macphail 1987) were further analysed by higher resolution microscopy (SEM/EDXR) (below). This enhanced understanding of the sediment's matrix (microfabric) and its components, and has now permitted the use of semi-quantitative counting of the Deposit's microstratigraphic composition. This was carried out at all the sampled areas, a continuously sampled vertical sequence acting as the control stratigraphy (below). Only a small sample of the Deposit was studied and thus the results cannot be fully guaranteed to be representative of such a large deposit as a whole. Nonetheless, these methods allow comparison between other areas of the Deposit and other similar sites. Expert colleagues in the fields of diatom, macrobotanical, and pollen analyses have also contributed to the more accurate characterisation of the microstratigraphy (see acknowledgements). As a consequence of this improved database, the Deposit can be interpreted with increasing confidence, although its ultimate origins remain somewhat enigmatic.

Table 2: Thin section samples studied by soil micromorphology and other methods

Sample No.	*OD height (top) (m)*	*Stratigraphy*	*Other associated methods of study; bulk data (BD), SEM/EDXRA (XR), Microprobe (Probe) and Elemental Mapping (EM); (SEM sample number)*
		Cutting 12; 'On- terrace', soil column 3326	
		Topsoil/Deposit III	
11	97.58		
10	97.52	Upper Deposit	BD; XR, Probe and EM (SEM3; including areas 3a and 3b)
9	97.44	Upper Deposit	BD; XR and Probe (SEM2)
8	97.36	Upper/Middle Deposit	
7	97.26	Middle Deposit	
6	97.18	Middle\Lower Deposit	XR, Probe and EM (SEM4; including areas 4a, 4b and 4d)
5	97.12	Lower Deposit	BD
4	97.06	Lower Deposit /'terrace soil'	
3	96.98	'Terrace soil'	
2	96.90	Subsoil	XR and Probe (SEM1)
1	96.82	Subsoil	
		'off-terrace' (blank area)	
12	95.96	lower Deposit (over "cobbling")	BD
		'off-terrace'	
14	95.92	upper Deposit?	BD
13	95.74	lower Deposit?	BD
		Cutting 14	
16	*95.98*	*Colluvial Topsoil/Deposit*	
15	95.82	Lower/upper Deposit?	
		Cutting 15	
18	99.32	Romano-British colluvium	
17	99.02	Romano-British ditch fill	
		Reference	
19	-	Dog coprolite (212, 1132)	
20	-	Fused ash (116,1035)	
21a		Fused amorphous material (pale nodule) (2672, 3710)	Probe transects (macrofossil and pollen analysis by W. Carruthers and P. Wiltshire).
21b	-	Fused amorphous material (fused ash) (2673, 2227)	" "
21c	-	Fused amorphous material (burned cemented soil) (2568, 2604)	" "

Sampling

Three areas of Cutting 12 (including the earlier Cutting 3) were sampled with Kubiena tins (undisturbed soil samples for soil micromorphology) in 1984 by the field team. A complete exposed stratigraphic sequence was sampled in a continuous series of Kubiena samples (samples 1–11) in the southern section of Cutting 12 taken from the natural subsoil to the topsoil through the 'on-terrace' deposits (Figs 10 and 19). This was augmented by more specific samples taken by the writer from a cemented ('cobbled') area at the base of the Deposit (Figs 11 and 12) from the east section (Kubiena sample 12), and two further Kubiena samples (13 and 14) from the middle of the Deposit within Cutting 3 (Figs 11 and 12).

Other Kubiena samples were taken from some of the 'outlying' Cuttings in 1985 (Table 2). Cutting 14, 80 m to the south-west of Cutting 12, was sampled in two places; the junction of the Deposit with the lower part of the overlying 'colluvial deposit' (sample 15), and the 'colluvial deposit' itself (sample 16) having Kubiena boxes inserted into them (Fig. 17). Similarly, in Cutting 15, 40 m to the south-east and upslope of Cutting 12, a Romano-British ditch fill (sample 17) and overlying Romano-British colluvium (sample 18) were sampled (Fig. 17).

A series of 21 complementary bulk samples (22–42) was used to provide data on grain size, organic carbon, pH, and calcium carbonate (Macphail 1987). Some of these samples were from the subsoil and overlying Deposit to match those zones in Cutting 12 which were sampled for thin section analysis (samples 1–11). Other samples were taken from the subsoil and the Deposit in other cuttings. Single thin section samples taken elsewhere (samples 12–17, Table 2) were each complemented by an immediately adjacent bulk sample. Further details can be found in archive.

In total, therefore, 18 Kubiena samples were taken and, in addition, a reference dog coprolite (sample 19) and a piece of reference 'ashed organic matter' (sample 20) were sectioned. Subsequently, three pieces of 'fused amorphous material' (samples 21a–c) recovered during excavation were also studied; sub-samples being passed to Wendy Carruthers (below) for examination of any contained plant macrofossils.

Analytical Methods

The primary analytical method was examination of the soil micromorphology. Characterisation of the Deposit was achieved employing this technique in combination with analysis of grain size, organic carbon, pH, and calcium carbonate, the results of which are in archive (Macphail 1987).

Further analysis to assist in the characterisation and interpretation of the composition and nature of the Deposit included microchemistry and semi-quantitative records of microfabric, microscopic inclusions, and of the pedofeatures. Soil micromorphology (optical analyses) was combined with Scanning Electron Microscope (SEM)/Energy Dispersive X-Ray (EDXR) and microprobe analyses to enhance the understanding of the unusual matrix of the Deposit and included anthropogenic components.

Soil Micromorphology

Eighteen samples from the Deposit, together with four samples of 'ashed organic matter/fused amorphous materials' and a reference dog coprolite were thin sectioned. All were impregnated with crystic resin and either manufactured at the University of Reading (samples 3–12) or made by the Institut National Agronomique, Paris-Grignon (Murphy 1986; Guilloré 1985). These are described in Macphail (1987) using the terminology of Bullock *et al.* (1985). The three 'fused amorphous material' samples were also embedded and sectioned. A total of 23 thin section samples was produced (Table 2).

Microchemistry

After a review of the thin sections, microchemical analyses were carried out in four successive stages to produce increasingly higher chemical definition of the materials under study.

1. Four soil blocks from different horizons were examined under a microscope and small areas were selected for slicing. Fourteen areas of different microfabric types (below) and inclusions were identified in 4 SEM samples before sputter coating with carbon (from sample 2, Subsoil; sample 6, Middle/Upper Deposit; and samples 9 and 10, Upper Deposit; Table 2). The 14 selected inclusions and microfabric types were then characterised chemically by 29 SEM/EDXRA examinations using a Link EDXRA system (detail in archive).
2. Following the SEM/EDXRA results, four microfabric types (3, 4, 5/6, and 6; Appendix 1) and 'fused amorphous material' in the Lower/Middle Deposit (SEM4d) were selected to be further characterised by quantitative microchemical analysis through 1–5 electron probe micro-analyses of 100 μm square areas using a Jeol JXA8600 EPMA.
3. Microprobe elemental mapping of P, Ca, Fe, and K was conducted by Kevin Reeves of the Institute of Archaeology on the four targeted microfabric types, the included 'fused amorphous material' (SEM4d) and additionally upon an included piece of greensand (SEM4a) (Table 2). Areas 1.4 x 1.4 mm were mapped by analysing 2 μm size squares. The resulting colour maps of P, Ca, Fe, and K and a map combining P, Ca, and K were scrutinised on a VDU screen and photographed for future reference.
4. In the case of the three 'fused amorphous materials' (samples 21a–c; Table 2), which had been clearly differentiated on the basis of their micromorphology, single large representative fragments from the original collected samples were selected. A small piece was then cut out from each and embedded in resin, polished, and subjected to microprobe analysis. Mg, Fe, Al, Si, Ti, S, Ca, Mn, P, and K were measured from 100 x 100 μm areas across the samples. The reported average and maximum measurements from 9–11 readings are in archive.

The remaining samples were first ground to pass through a 500 μm sieve for chemical and magnetic susceptibility analysis (detail in archive) at the Institute of Archaeology and Umeå University, Sweden (Engelmark and Linderholm 1996) and then dissolved in HCl for chemical procedures and pollen analysis (below). The citric acid extraction method used at Umeå University was not designed for such phosphate-rich materials, however, and total P was not measured (Linderholm, pers. comm.). Nevertheless, the citric acid method provides important data on loss on ignition and the proportions of inorganic to organic P. As

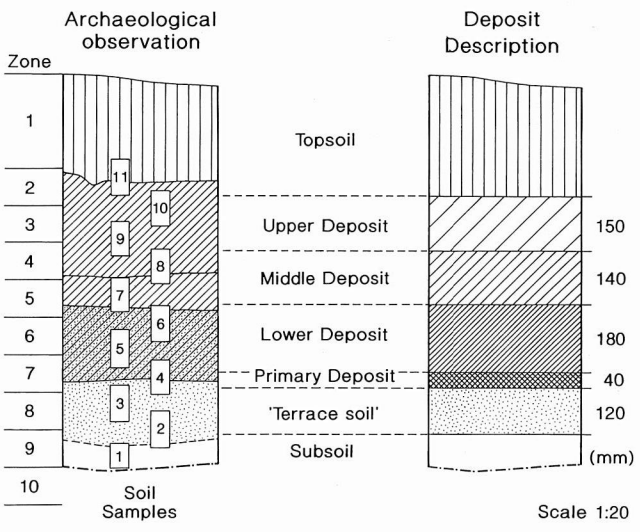


Fig. 20 Summary of soil microstratigraphy correlated with Zones and samples (see also Fig.10 and Tables 3-4)

noted above, these three enigmatic materials had also been investigated by macrobotanical techniques (Carruthers, below).

Optical microscopy

In order to improve sample representation, thin section samples 3–12 were remade at the University of Stirling from existing blocks, enabling the continuous vertical sequence though the Deposit to be duplicated. This duplication was also carried out because of the imperfect nature of some of the thin sections utilised in the 1987 study. Thin sections (Table 2) were viewed at a number of magnifications from x1, up to x400 under a polarising microscope using plane polarised light (PPL), crossed polarised light (XPL), oblique incident light (OIL), and ultra violet light (UVL). The combined use of these different forms of illumination permitted a large number of optical tests, enabling more precise identifications of the materials under study. For instance, phytoliths and diatoms are dark or non-birefringent under XPL, whereas calcitic ashes are highly birefringent. OIL is useful in identifying reddened and blackened burned materials. The propensity of some materials to be autofluorescent under UVL (van Vliet *et al.* 1983; Courty *et al.* 1989; Jenkins 1994) was used to identify the presence of non-birefringent probable calcium phosphate materials that form the cement of coprolites, for example. Such assertions have been confirmed by SEM/EDXRA and microprobe (Wattez *et al.* 1990; see below). All the thin sections were scanned under UVL and autofluorescent materials were recorded.

These procedures permitted the characterisation of not only the Upper Greensand parent material, but also the distinctive microfabrics (*sensu* Courty *et al.* 1989) of the Deposit. In addition, a large variety of components of anthropogenic origin, that had been identified previously and illustrated in many cases (Macphail 1987), were differentiated more accurately. Eight microfabric types, three enigmatic components of anthropogenic origin peculiar to Potterne, and coprolites are defined (Appendix 1). In the case of human coprolite material, this has only been cited as such where its identification is supported by comparison with other sites: where the identity has not been confirmed it is recorded as probable human material (see below).

Ubiquitous and well-understood inclusions, such as daub, burned daub, burned soil, bone, burned bone, shell, charcoal, and pottery are not described here, having been described in detail elsewhere (Macphail 1987; 1990; 1991a; Courty *et al.* 1989). Many of the anthropogenic materials found at Potterne, the reference materials employed in their identification and their chemical and microchemical composition have been the subject of discussion at meetings of an international group of soil scientists (the Archaeological Soil Micromorphology Working Group). Colour images and the chemistry of some components and associated reference materials are also to be published on a CD-ROM in order to further extend the breadth of the scientific audience (Goldberg and Macphail in prep).

Semi-quantitative data

Pedofeatures reflect pedological processes (weathering, biological activity, cultivation, etc) and, thus, contemporaneous conditions and post-depositional transformations of the Deposit can also be 'measured' for each unit of stratigraphy. Microfabric types, anthropogenic components, and pedofeatures (the last *sensu* Bullock *et al.* 1985) were semi-quantitatively counted and results checked against duplicate thin sections. These estimations were carried out primarily to characterise the continuously sampled vertical stratigraphy of the Deposit at the southern end of Cutting 12, so as to identify the presence of any microstratigraphy within it. This would then permit a more accurate comparison of the Deposit across the rest of Cutting 12 and in other sampled areas. Each thin section was between 6 cm and 8 cm in length. The usable width was some 5.5 cm and, hence, once divided into 1 cm squares, permitted some 30–40 squares per slide to be scanned or 'counted'. In all, 670 squares on the slides were 'counted'. The dominant microfabric type and all noticeable anthropogenic components and pedofeatures in each square were noted and recorded on a count sheet. A pilot study on samples from the experimental earthwork on Overton Down found such 'counts' to give a reasonably accurate estimation of microfabric area (for example Crowther *et al.* 1996; Macphail and Cruise 1996). When tested against digital image analysis data, a thin section 'count' from Overton Down was found to differ by only 0–5% along a 130 x 5mm coverage (Acott *et al.* 1997).

The Soils

The site is in an area of Cretaceous Upper Greensand and Gault, the excavated area being on a Greensand ridge. Soils developed on the Upper Greensand here are mapped as the Ardington soil association, Typical Argillic Brown Earths (Findlay *et al.* 1983). The Greensand derives its name from the inclusion of frequent sand-size glauconite, a dark green iron-rich mineral which locally eventually weathers to a brown plasma of ferruginous (goethite or lepidocrite) smectitic clay (Loveland 1981; Loveland and Findlay 1982; Soil Survey of England and Wales thin section collection).

At Potterne, the subsoils beneath the Deposit are very fine to fine sandy loams but have no argillic microfabrics *sensu stricto* (McKeague 1983) as seen by the author in the reference Greensand soil thin sections or

in other Greensand argillic brown earth soils (eg, Selmeston, West Sussex; Scaife and Macphail 1983) (Appendix 1; detail in archive). Close to the site, chalk, chalky soils (eg, Upton soil association) and gley soils formed on clay (eg, Denchworth and Wickham 3 soil association) are present (Findlay *et al.* 1983) and occur as elements in the Deposit's microfabric as inclusions (Macphail 1987). Poorly drained gley soils occur to the south, north and west of the site.

The Deposit itself varies. In general it contains low amounts of organic matter and calcium carbonate, being weakly to moderately humic and weakly to moderately calcareous (Appendix 1; detail in archive). It varies from a fine sandy silt loam to a clay loam and either has a neutral or an alkaline pH. However, where the Deposit seems to have been altered by ploughing, it appears to be most clay-rich, but least calcareous and alkaline (microfabric type 7, Appendix 1). This variation is shown in Tables 3 and 4 which detail the microfabrics and components counted in thin sections from a number of locations across the site.

Characterising the Deposit Sequence

The stratigraphy of the Deposit profile was sampled by a continuous vertical sequence 'on-terrace' at the southern end of Cutting 12 (samples 1–11; Figs 19 and 20). This sequence was augmented by a further single sample (sample 12) from the 'cobbled surface' 'off-terrace' (Figs 5, 11, 12). Seven microfabric types were identified and described according to their micromorphology and associated bulk analyses, SEM/EDXRA and in some cases their elemental chemistry. Included components were similarly fully characterised. Details are presented in Appendix 1. The sequence is described stratigraphically from the base upwards. Each unit is described and characterised, and discussed in terms of the microstratigraphic sequence.

Distinct microfabric types were identified and define the different 'soil' phases or facies of the Deposit, these are discussed below together with the microstratigraphy. Inclusions such as coarse fragments of Greensand soil, sandstone, flint, chalk, and cultural materials such as coarse wood charcoal, burned soil, daub, and burned daub and pottery can be typical of Bronze Age and Iron Age occupation deposits (eg, Bell 1990; Sharples 1991). Similar suites of materials are also common to prehistoric occupation deposits in general (Courty *et al.* 1989; 1994; French 1990; Matthews and Postgate 1994; Matthews 1995). On the other hand, coprolitic residues, fused ash and pale nodules, probable herbivore/omnivore coprolites, and cemented soil (referred to as fused-soil in archive), although not unknown from other sites, are specific components of the Potterne Deposit and are, therefore, dealt with here in more detail, and their significance discussed later. A series of facies or pedological units could be defined as a result of the soil analyses and these are stratigraphically summarised in Figure 20.

The subsoil and 'terrace soil'

As shown in Table 3, the natural subsoil is a glauconite-dominated quartz sand at its base and exhibits a sparse pale grey matrix with low-order interference colours (sample 1; microfabric type 1). Upwards (sample 2) it becomes more contaminated by inwash and biological mixing from the overlying 'terrace soil' (microfabric type 2) receiving increasing amounts of anthropogenic components such as coarse charcoal (component F) and coprolitic fragments (component G; Appendix 1).

The 'terrace soil', *c* 0.12 m thick, continues to be quartz and glauconite-dominated but has a more calcareous and humic fine fabric (microfabric 2; samples 3 and the lower part of 4). The latter is an extremely dusty, dark greyish colour because of included fine charred and amorphous organic matter (Pl. 16a). It also has dark low-order interference colours and contains many phytoliths and occasional whole and fragmented diatoms (see below). This layer is characterised by many to abundant dark and poorly birefringent, dusty clay void coatings (component O) implying a trampled weakly coherent soil (cf. Macphail 1991b; 1994b). These are sometimes autofluorescent under UVL suggesting a phosphatic nature (see below). A wide variety of included anthropogenic components is present, such as many coarse charcoal and coprolitic fragments, with rare to occasional natural soil fragments (greensand, chalk, flint etc; component B) and miscellaneous cultural materials (burned soil, burned bone, pottery, daub; component C), including 'fused ash' (component D, see below). The layer also features the inclusion of 100–400 μm size fragments of amorphous organic matter that commonly stain the fine soil (component I) and rarely 'burned and cemented soil' (component K, see below). Major pedological features are the occasional to many iron and manganese staining and nodules (component L) that are commonly associated with areas of amorphous organic matter. The layer has also been extensively burrowed by earthworms (component M).

Microstratigraphic sequence

The lack of an argillic fabric, which is typical of natural argillic brown earths formed on the Greensand, indicates that the landscape had been deeply eroded at Cutting 12 (Loveland 1981; Loveland and Findlay 1982; Findlay *et al.* 1983).

The 'terrace soil' is characterised by a phytolith-diatom associated, humic, fine fabric (microfabric type 2; Pl. 16a) and contains many of the components present in the Deposit above, such as coarse charcoal and coprolitic residues (components F and G; Tables 3 and 4). Still, the fine fabric is essentially greensand-dominated and such components as pale nodules, fused ash, patches of ash, cemented soil, and burned soil, are either absent or present only in small quantities. In addition, some of these anthropogenic components have clearly been worked down-profile by

Key to Tables 3 and 4

Frequency (after Bullock *et al.* 1985)

* - rare (<2%) to occasional (<5%) presence
** - many (5-10%) presence
*** - abundant (10-20%) presence
• • - very abundant (>20%) presence

Microfabrics and Components

Microfabrics
A - Dominant microfabrics 1-7 - see Appendix 1

Ubiquitous included components
B - Soil fragments: Greensand soil (see Appendix 1) and related sandstone; chalk, flint etc.

Components relic of domestic activity I (constructions, hearths, burnt crop processing debris etc.)
C - Burned soil, burned bone, burned daub, pottery, calcareous daub, 'brickearth daub', etc (see Macphail 1987)
D - Fused ash (see Appendix 1)
E - Coarse fragments of (sometimes woody) ash residues
F - Coarse charcoal

Components relic of domestic activity II (human waste); human and dog coprolites, undifferentiated coprolites; possible cess indicators; stained bone from possible scavenging/scat)
G - Coprolites: human and dog coprolites, undifferentiated coprolites, bone (see Appendix 1)
H - Pale nodules (possibly from cess-pits; see Appendix 1)

Components relic of animal husbandry (?) and organic matter dumping
I - Fragments of amorphous organic matter
J - Probable organic omnivore/herbivore coprolites
K - Cemented soil (calcium phosphate cemented soil; see Appendix 1)

Pedofeatures
L - Iron and manganese staining and nodules
M - Obvious earthworm burrowing and mixing
N - Biogenic calcite (earthworm and slug granules)
O - Dark, (and sometimes autofluorescent under UVL) very dusty clay void coatings and infills with low-order interference colours
P – Yellowish-brown dusty clay void coatings and infills with bright interference colours
Q - Secondary minerals (calcite, vivianite)

Table 3: Semi-quantitative microstratigraphy of main vertical sequence in Cutting 12

	Soil		Domesitc activity				Waste		Animal waste			Pedofeatures						
Sample	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**	**Q**	Comments
11	6				*	**	**		***		**		***	*				TOPSOIL
	6	*	*			*	*		*				*	*				(A well-aerated, earthworm-worked
	6	*					*		**		*		**	*				and weathered soil formed out of the
	5/6					**	*		**		*		**		*			Deposit)
	5/6	*	*	*		**	*		**				**	*	*			
	5/6+6	*	*			**	*		*				*	*				
	5/6		*			*	*		*	*	*		*	*				
	5/6						*				*							
10	6				*		*		*	**	*		**	*	*			
	5/6+6		***		*	*	*		*	*	*		**		*			THE UPPER DEPOSIT (PHASE III)
	5/6+6	*	***			*	**		*		*		**	*	*			(Evident earthworm mixing of
	5+6				*	*	***		*		***		**	*				differentially weathered Deposit
	5/6+6				*	*	*		**		*		**	**				materials, with diatoms, cemented soil,
	5+5/6		*		*	*	***		**		**		**	*	*		*	fused ash and amorphous organic
	5+5/6		*			**	**		**		*		*	*				matter.)
	5+5/6					**	*		**		**		*					
9	5					**	*		**			*	*	*	**			
	5/6		*	*	*	*	*	*	**		**	*	***	**	**			
	5	*	**			..	**		**		***	*	**		**			
	5/6	*				..	***		**		***	*	*		**			
	5	*				**	***		**		***		*	*	***			
	5					*	**	*	**		***		*	*	**			
	4+5		*			**	***		**		**		**		*			
	4+5		*			***	**		*		***	*	**		*			

Table 3 (continued)

Sample	Soil		Domesitc activity				Waste		Animal waste			Pedofeatures						Comments
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	
8	4	**	*	***		*	*		*	*		*	*		**			THE MIDDLE DEPOSIT (PHASE II)
	4			***		*			*	*		*	*		*			(Weathered ashy phytolith-rich
	4	***	*	***		**	***		**	*	*		*		*			Deposit, with diatoms, fused ash,
	4		*	***		**	*		*	*	*				**			cemented soil, coprolitic residues
	4	*	*	*		*	**		*	*	*		*		**			amorphous organic matter and
	4	*				**	***		**		*	*	*		**			occasional probable herbivore
	4	**	*	*		*	*		***			*	*		**			coprolites; locally anaerobic
	4	*				*	*		***		*	*	*		**			weathering; dusty textural features.)
7	4	*				*	*		*	*						*		
	4	*				*	*		*	*			*		*	*		
	4	*				**	*	*	**						*			
	4	*	*			*			*	*	*				*			
	4	*	*			*			*	*		*	*		*			
	3+4	*				*	***		*			*			*			
	3+4					*	*	*	*				*					THE LOWER DEPOSIT (PHASE I)
	3					*	**		*						**		*	(Ashy phytolith-rich Deposit,
6	-	••			*	*	***				*	*			*			with fused ash, ash, diatoms, cemented soil
	-	••			*	*	**				*	*			**			and coprolitic residues; locally
	3	**				*	*		*			*			*			anaerobic weathering; dusty textural
	3	*	**			*			*		*	*			*			features.)
	3	*			*	**	**		*		*	*			***			
	3	*			*	**	*						*		**			
	3					***	***		*			*	*		**		*	
	3				*	*	**		*		*	*						
5	3	**	***	**		**	**		*				*		*			
	3	*	*			*	***	*	*		*		**		**			
	3	**	*			*	**						*		**			
	3	*	*	*		**	***		*				*		***			
	3			*		••	**		*		*		*		*			
	3	*	*			**	*	*	*				*		*			
	3+4	*		*		**	**		**		**		*		**			
	3	*				••	*		**		*				*			

Table 3 (continued)

Sample	Soil		Domesitc activity				Waste		Animal waste			Pedofeatures						Comments
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	
4	3	***	..	***		*	**				*	*	***		*			PRIMARY DEPOSIT
	3	***	..	..		***	***						**		*			(Almost totally composed of dumped
	3	***	..	..		**	*											soil, burned soil, phytolith-rich cemented
		*	**	..		..	..				*							ash, coarse charcoal and coprolites)
	2	*		*		**	***		*				*		*			TERRACE SOIL
	2			**		*	**		**			*	*		**			(Phytolith-rich, humic soil, with
	2	**	*	**		*	**		*		*		*		**			diatoms, amorphous organic matter and
	2					*	**					*	*		***			coprolitic residues; dusty textural
3	2	*	*			**	**					*	**		**			features)
	2		*			*	**					*	*		**			
	2	*				*	**					*	**		**			
	2	*				*	**					**	**		***			
	2	*		*		*	**		*			**	*		***			
	2	*		*		*	**		**			*	*		***			
	2	*				**	*		*			*	*		**			
	1+2	*				*	*		**			*			**			
2	1+2	**		*		*						*	*		*			STRONGLY CONTAMINATED
	2					*	*						*					SUBSOIL
	2					*	**					*						(Many earthworm burrows and fine
	2		*			*	*											soil inwash and mixing from above)
	1+2			*		*												
	1					*							**					WEAKLY CONTAMINATED
1	1					*						*	*					SUBSOIL
	1																	(Occasional earthworm burrows and
	1																	fine soil inwash.)
	1											*						
	1																	
	1																	

Table 4: Semi-quantitative microstratigraphy of centre and eastern end of Cutting 12/3 and Cuttings 14 and 15

	Soil		Domestic activity				Waste		Animal waste			Pedofeatures						
Sample	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**	**Q**	Comments
12	5/6				*	*			*		*		*					COBBLED SURFACE WITHIN
Cutting	5/6		*		*	*					*		*					DEPOSIT (LOWER/MIDDLE?)
12	4+3		*		*	**	*		*			*	*					(Large clasts and inclusions in
East	4+5/6			*	**		**	*			***		**		*			cobbled surface, with much ash,
section	3	*	**			***	*		..		*		*		*	*	*	organic matter staining, dusty clay
	3	*	**	*	**	**	*		..		*	*	*		*	*		coatings and rare vivianite present)
	3+4	*	..		**	..	*		**		*		*					
14	5		*			*	*		**		*	*	*	*	*	*		THE UPPER DEPOSIT ?
Cutting	5		*			***	**		*						*			(Moderately weathered and still
3	5		**		*	*	*		*			*	*	*	**			ashy phytolith-rich Deposit
North	5			*	*	**	**		*				*	*	*			with diatoms, amorphous organic
section	5			*		*	**		*		*		*	*	**			matter, fused ash, ash, coprolitic
	5			*		*	*		*		*	*	*		**			residues and biogenic calcite; dusty
				*		*	**				**		*					textural features)
13	3																	
Cutting	3+5/6	*	*		*		*	***	*				**					THE LOWER DEPOSIT ?
3	3+5/6	*	*	**	*	*	*		*		*	*		*				(Ashy phytolith-rich Deposit,
North	3	**	*	*	*	*	*	*	*				*		*	*		with diatoms, amorphous organic
section	3	*				*	*		**		..	*		*	*			matter, *in situ* cemented soil, coprolitic
	3	*			*		*		**		*	**	*	*				residues, fused ash and pale nodules;
	3+5/6	*			*	*	*		*		*	*	*	*				dusty textural features, locally
																		anaerobic weathering)

Table 4 (continued)

Sample	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	Comments
16	6		*				*	*					*		*			TOPSOIL /THE DEPOSIT (Relic
Cutting	3+6			*		*	*				***		**	*	**			Lower Deposit ?)
14	3+6			*	*	**	*				*		*	*	*			(A well-aerated, earthworm worked,
	3+6	*		*	*	*	*				*		*		*			weathered and coarsely mixed
	6	*				*	*						**	*	**			topsoil formed out of the
	6	*	*			*	*	*			*		**		**			Deposit which also occurs as coarse
	6					*	**				*		*	*	**			inclusions)
15	5/6		**			**	*		*		*	*	*		*			THE DEPOSIT (LOWER/UPPER)?
Cutting	5/6				*	*	**	*	**		*	*	*	*	*			(Ashy phytolith-rich Deposit
14	3	*	*	*	*	*	***				*		**		*			with coprolitic residues, pale nodules,
	3	*	*		**	*	*		*		***				*			diatoms, cemented soil; earthworm
	3	*	*	*	*	*	**				**		*		*			working, biogenic calcite and
	3+5/6					**	***	*	**			*	*	*	*			textural features) (Partially aerated)
	3+5/6	***			*	*	**	**	*			*	*		*			
18	7	*					*				**		*			*		ROMANO-BRITISH PLOUGHSOIL
Cutting	7		*				*				**					**		COLLUVIUM
15	7		*				*				*		*			***		(A well-aerated, earthworm-worked
	7	***	**				*						*			***		strongly weathered and intensively
	7	*	*					*								***		cultivated soil, with few relic
	7		**			*	*						*			***		inclusions from the Deposit.
	7						*						*			**		
	7						*						*					
17	7	*	*	*		*	*				*		**	*		***		ROMANO-BRITISH PLOUGHSOIL
Cutting	7		*			*	**						*			***		COLLUVIUM (in R-B ditch)
15	7	*	*		*		*				*		*	*		***		(A well-aerated, earthworm worked
	7+1		*			*	**				*		**	*		***		strongly weathered and intensively
	7		*		*						**		*	*		**		cultivated soil, with eroded fragments
	7				*	*							*	*		**		from the Greensand subsoil and a
	7+1	*	*		*		*				*		*	**		***	*	few more inclusions from the
	7	*		*			*				*			*		***		Deposit compared with sample **18**;
																		rare secondary calcite)



Plate 16 a) Soil micromorphology: sample 4; junction of the 'terrace soil' and primary Deposit; 'terrace soil' is composed of fine Greensand soil with a dusty, dark greyish matrix (microfabric type 2) that also forms dusty clay void coatings; above, the primary Deposit consists of dark yellowish-brown, non-birefringent, coprolitic material that is autoflourescent under ultra violet light; the last is probably a calcium phosphate-rich material, which here has a human coprolite-like character of convoluted tissue remains (bone-rich dog-like coprolites also occur at this level); it contaminates the top of the 'Terrace' material below (middle right). Plane polarised light (PPL), frame length 5.56mm

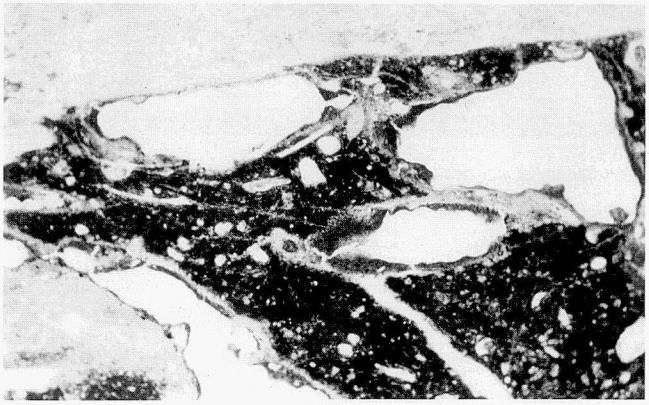


Plate 16 b) Sample 19, reference dog coprolite; interior; large angular grey relic bone fragments probably cemented by blackish calcium phosphate; note vesicular-like pores. PPL, frame length 5.56mm



Plate 16 c) As b), but illuminated by ultra violet light (UVL); note strong autofluorescene of probable calcium phosphate cement.

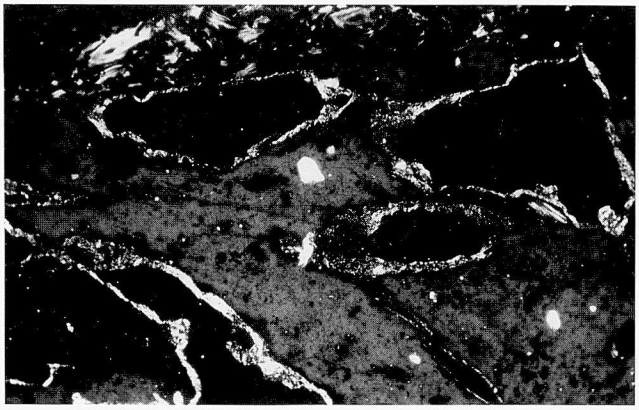


Plate 16 d) as b) but under cross polarised light (XPL); some of the relic bone fragments still retain typical fibrous birefringence pattern indicating incomplete digestion; silt and very fine sand can be seen as ingested mineral inclusions, whereas the high interference colours of the pore coatings probably relate to soil inwash into the coprolite.

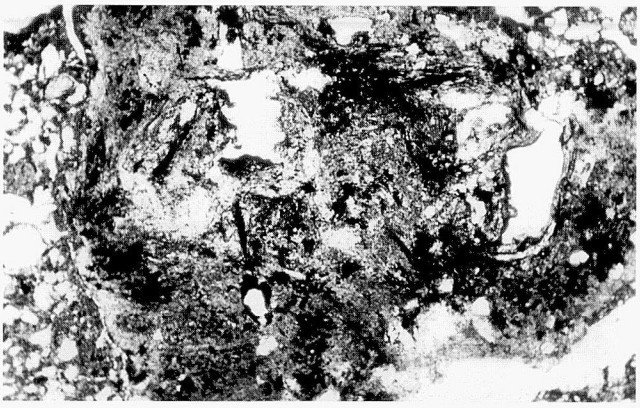


Plate 16 e) Sample 10, the Deposit, Upper Deposit; human-like coprolitic material, composed of a yellowish-brown, non-birefringent, matrix that is autoflourescent under ultra violet light, in which are embedded reddish brown tissue shreds. PPL, frame length 5.56 mm.

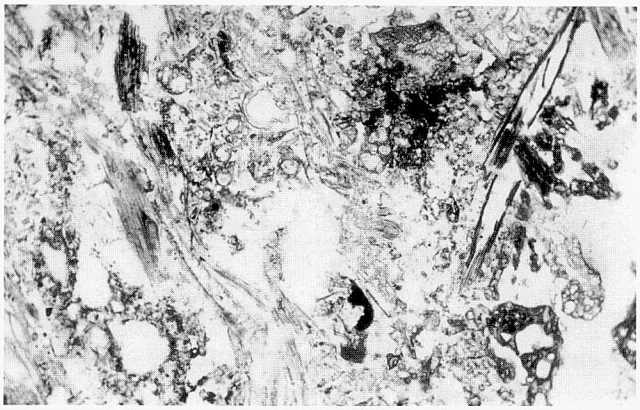


Plate 16 f) sample 21c, reference fused amorphous material; fused ash, composed of a colourless to dark grey non-birefringent, but ultra violet light utofluoreseent cement of a siliceous and clacium phosphate character (microprobe); inclusions include vesicular silica (from melted phytoliths) slag (left hand corner), residual phytoliths (centre) blackish (rubified under oblique incident light) burned soil and charred cereal awn fragements (right); PPL, frame length 0.33 mm.

earthworm action, some reaching the strongly and weakly contaminated subsoil layers (Table 3). Apparently *in situ* characteristics are soil inclusions, fragments of amorphous organic matter, iron and manganese staining, and, most importantly, the many to abundant dark, dusty, clay textural features (void coatings and infills) with low-order interference colours. Some are autofluorescent under UVL, which elsewhere at Potterne has been shown to indicate an enhanced phosphate content. In fact, this 'terrace soil' appears to be anomalously organic, with around 4.5% organic matter (3.2% organic carbon) compared with the Deposit and topsoil (1.5–4.0% organic matter). There are no micromorphological indicators of it being simply a buried topsoil (cf. Crowther *et al.* 1996; Macphail and Cruise 1996).

The 'terrace soil' thus apparently includes the ubiquitous indicators of human activity and settlement in the form of coarse wood charcoal and coprolitic residues which occur together with features suggesting high inputs of organic matter (phytoliths and amorphous organic matter fragments). The abundance of dark textural features with low-order interference colours also indicates that the 'terrace soil' was strongly disturbed. However, these features have occurred alongside large additions of solutions to the soil that were probably organic (dark colour) and in places, phosphatic (cf. Nørnberg and Courty 1985; Macphail and Cruise in press). The resulting soil has remained poorly aerated, as evidenced by the common presence of relic organic matter and iron and manganese staining (cf. Crowther *et al.* 1996).

In general, prehistorically cultivated soils can develop many dusty clay textural features as the result of tillage (Jongerius 1970; 1983; Macphail *et al.* 1990b). However, there are a number of reasons here for suggesting that cultivation may not be the main cause of these features in the Potterne 'terrace soil'. For instance, arable soils need to be well-aerated to encourage plant growth, and consequently can show enhanced levels of biological activity that in fact can often lead to reduced soil organic matter where there is no, or insufficient, manuring (Macphail 1992; Guerra 1994). Furthermore, such dark features are not typical of cultivated soils. In comparison, the Romano-British ploughsoil colluvium at Potterne is dominated by a typical suite of yellowish–brown textural features with bright interference colours that clearly contrast with those in this 'terrace' soil (cf. Components O and P; Appendix 1; Tables 3 and 4) (see ploughsoil below). Dark and probably humic textural features in prehistoric soils with an enhanced phosphate content, have been interpreted as resulting from animal (?cattle) herding (Courty *et al.* 1994, pl. 6; Macphail and Cruise in press).

It can be suggested that these probably humic and phosphatic textural features are likely to have formed from the concentration of large herbivores trampling a soil that is poorly coherent, because it has been saturated by their liquid waste. Such slurry-affected soils and their resulting structural features have been recorded from experiments and areas of modern animal concentrations, where the term 'poaching' has been commonly used (Beckman and Smith 1974; Patto *et al.* 1974; Valentin 1983; Schofield and Hall 1985). Although as yet at an early stage, experimental soil micromorphological and chemical analyses of surfaces affected by animal herding are showing features akin to those at Potterne (Heathcote in prep.). It is also quite clear that these features are inconsistent with 'roof-covered' animal stabling or domestic floors, because horizontally laminated and compacted layers (or fragments of these) that commonly form under such conditions, even in byres, are apparently absent (Courty *et al.* 1992; Davidson *et al.* 1992; Matthews 1995; Macphail and Goldberg 1995; Macphail *et al.* 1990). The lack of phosphate cemented fused soil is a further indication that this 'terrace soil' does not relate to the *in situ* stabling, *sensu stricto*, of herbivores (see above; component K; Table 3). The inclusion of domestic detritus such as coprolitic residues and coarse charcoal is also indicative of human activities here, but the accumulated depth (12+ cm), organic character, and slurry-like nature of the textural features, may argue more strongly for major disturbance by hoofed herbivores rather than by the feet of humans.

If the main soil micromorphological features present in the 'terrace soil' do result from animal herding, it is likely that some of the included soil fragments which can be regarded broadly as 'colluvial' features (cf. Mücher 1974), may have been brought in on animal hooves. Similarly, the fragments of amorphous organic matter, the many phytoliths, and the ubiquitous presence of whole and fragmented diatoms are likely to be relic of dung. A grass diet and the ingestion of soil diatoms and the occasional probable freshwater diatom through drinking (see below), is apparently quite usual in sediments believed to contain herbivore dung (Macphail 1994a; Macphail *et al.* in press; Courty, pers. comm.). Moreover, this signature of animal activity in open air locations, is consistent with soil micromorphological findings at sites where chemistry, field features (eg, drove ways, water holes) and microfossils (pollen and diatoms) indicate animal concentrations (eg, West Heslerton, North Yorkshire; Haynes Park, Bedfordshire; Folly Lane, St Albans; Macphail and Cruise, pers. obs.). Unfortunately, the presence of diatoms in dung has not been studied systematically (N. Cameron, pers. comm.).

In short, the 'terrace soil' area appears to have been strongly affected by trampling, rather than being, for example, a pre-Deposit cultivation horizon. The accumulated 'terrace soil' may well have had a colluvial input, there being higher ground to the west and south-

west. The suggested activity of animals here also has to be reconciled with the presence of many archaeological features of domestic activity cut into this seemingly in-part colluvially-formed terrace, whereas the 'blank' area to the north-east has been eroded down to bedrock in places, possibly by its use as a trackway. In comparison, a 0.2–0.3 m thick occupation soil of a similarly humic and slurry-like character seems to have accreted around prehistoric (Bronze Age–Iron Age) huts at Salford, Bedfordshire (Macphail 1997). The role of animals in the domestic areas of prehistoric occupations has been little studied, but developing evidence from early medieval (Guildhall Yard East, London; Macphail and Cruise 1995) and historic (Irish) rural occupation has shown the ubiquity of dung in such environments (Evans 1957; Macphail and Cruise 1996). On the other hand, archaeological phasing may be able to clarify the changing land use of this area, from possible animal pounding with inputs of local domestic waste, through to a more clearly structural and domestic occupation phase that was eventually buried by the Deposit.

'Primary Deposit'

The first identifiable episode of deposition, the 'primary Deposit', is only some 0.04 m thick at the sampled profile. The upper half of thin section 4 is dominated by a greyish microfabric with high-order interference colours and an overwhelming abundance of burnt cultural material (Table 3). The microfabric is generally calcareous and the presence of calcitic ash crystals, together with EDXRA data on Ca and K indicate the importance of ashy materials here (see below for ashy associations of Ca-K revealed by elemental mapping). The thin section shows the 'terrace soil' to be sealed by an initial deposit composed of coarse wood charcoal, 'fused ash', heavily burned bone, and coprolitic material (Pl. 16b). The last appears to include large fragments of both probable human- and dog-like coprolitic materials (for differentiation see Appendix 1). The burned bone deposit seems to have been so heavily burned that it has become whitened and has lost its natural autofluorescence under UVL, perhaps indicating hearth temperatures exceeding 500–650°C (Courty *et al.* 1989, 109–10). Similarly high temperatures are required to form the large amounts of 'fused ash' (see below) that are present. The horizon also contains very abundant strongly burned soil and daub as additional possible relic hearth material. Other included soil fragments are abundant. The fine fabric also contains very abundant phytoliths and occasional diatoms. It can be noted that clay coatings and earthworm burrows are absent from the lowermost few centimetres of the deposit. On the other hand, some of the burned bone appears to have become subsequently cemented and impregnated by a colourless, non-birefringent material that is strongly autofluorescent under UVL material and is probably phosphatic (see 'cemented soil' below). This could be an immediately post-depositional phenomenon (see Discussion).

Coprolitic residues

Instances of probable dog, human, and undifferentiated coprolitic residues have been grouped as component G in Table 3. Dog coprolitic material (Pl. 16b–d), as described from reference material from Potterne (sample 19) and Maiden Castle, Dorset, is a speckled, greyish bone and transformed bone-dominated material with specific micromorphological characteristics (Appendix 1; Courty *et al.* 1989, pl. ivb; Macphail 1987; 1990a, chapter 5 fiche). At Potterne, pollen (Scaife, this volume) and preliminary biochemical analyses (Mayes and Ottaway in archive) show evidence of dogs probably ingesting Poaceae (grasses and cereals). Cereal matter, in the form of articulated sheets of phytoliths, was not visible in the reference dog coprolite thin section (three slices), although the occasional phytolith was visible. In contrast, reference human coprolites and herbivore/omnivore coprolites at Potterne (see below and Appendix 1), can contain well-preserved phytoliths. One explanation for this lack of visible cereal material in the Potterne dog coprolite, apart from a sampling quirk, may be that dog digestive acids are too strong to allow articulated phytoliths to survive. In fact, it is well proven that carnivores have extremely strong digestive tracts, bone for example being transformed totally into amber coloured phosphate by hyenas, although again individual phytoliths may persist (Horwitz and Goldberg 1989).

What are identified as probable human coprolites at Potterne differ by often being a more brownish–yellow in colour (Pl. 16e). They commonly contain plant fragments and articulated phytoliths with possible pollen and nematode eggs being present (Cruise pers. comm., and see Scaife this volume; Jones, this volume) (Appendix 1; cf. Courty *et al.* 1989, pl. iva; 1994, table 2; Macphail *et al.* 1990a, fig. 3). Bone was not commonly a noticeable inclusion. Like dog coprolitic material, their non-birefringent but autofluorescent character under UVL probably relates to their calcium phosphate composition as shown from microprobe analysis of reference human coprolitic material (Appendix 1). The latter was identified on the basis of the size of their nematode eggs (eg, Middle Saxon, Maiden Lane, London; de Rouffignac 1992). Other coprolitic material that is autofluorescent under UVL may also possibly derive from mineral-replaced cess (Macphail 1995; Macphail *et al.* 1996), bird guano (Wattez *et al.* 1990) or small carnivore scat in general (Macphail 1999).

Probable human coprolites occur as fine fragments throughout the Deposit, although dog coprolitic material was only clearly recognised in the 'primary Deposit'. As dog coprolites were recovered throughout the excavation of the Deposit and as dogs and other scavengers may well have ingested human excrement, many of the fine coprolitic materials remain undifferentiated (Appendix 1). Thus, all these types of coprolitic material have been grouped as component G

(see below for probable organic herbivore/omnivore coprolites and pale nodules).

Fused ash

Detailed analysis of this material, both from the thin sections of the Deposit and reference material (Pl. 16f) collected during excavation shows it to contain very high amounts of siliceous (Si), phytolith-rich Poaceae (grass and cereals) material, in part possibly latterly cemented by calcium phosphate (Appendix 1, component D; detail in archive). The presence of awn fragments of *Triticum* sp. indicate it is composed of cereal material (Carruthers pers. comm.) with a moderate loss on ignition value also showing incomplete combustion of organic matter (detail in archive). Such fused ash is not an uncommon anthropogenic component on archaeological sites (Straker pers. comm.). The inclusion of fine reddened silt and sand, the vesicular, slag-like nature of the material in places and the black specks of possible pure carbon may be indicative of high temperature combustion (eg, Courty *et al.* 1989, 106–7). This fused ash is highly resilient, especially when cemented by calcium phosphate and is a common residual component within the Deposit.

'Cobbled surface'

The 0.02–0.03 m thick 'cobbled surface' observed extensively in Cutting 12 at the base of the Deposit was examined in sample 12 (Table 4; Fig. 12). The surface cannot be directly related to the main sampled sequence in the southern section of Cutting 12 but because it clearly lies at the base of the Deposit it is discussed here. This surface is composed of soil lumps, stones, burned soil, pottery, and coarse charcoal, with abundant ash in places. Pieces of fused ash and many coprolites also occur. An ashy microfabric (type 3) is present. Both dark, dusty clay coatings and dusty clay coatings with high-order interference colours (component P; see below) occur alongside instances of vivianite. The 'cobbled' layer and overlying soil is also characterised by yellowish, amorphous organic matter staining (component I). Above, mixed and earthworm-worked microfabrics 4 and 5/6 are present, with some concentrations of cemented soil and an example of a pale nodule.

The sampled profile of the southern end of Cutting 12 shows a clear primary Deposit superimposed on the 'terrace soil' (see above; Tables 3 and 4; Pl. 16a). In the blank area in the central portion of Cutting 12 patches of 'cobbling' were recorded in this possible roadway (thin section 12). The coincidental occurrence of ash-rich microfabric type 3 material (Appendix 1) alongside a full suite of anthropogenic components typical of the Deposit in both areas may imply a linked phase of 'primary Deposit' formation. Although later buried by the Deposit, the concentrated amorphous staining over the 'cobbling' and the presence of textural features and secondary vivianite within it, may testify to its continued use for animal traffic, at least in the short term.

The Deposit

The continuously-sampled section of the Deposit has been divided into three facies (Fig. 20). However, it must be remembered that where sampled through the 'on-terrace' sequence in the south of Cutting 12, the section is only representative of the lower part of the Deposit as a result of truncation and the 'phasing' may not provide chronologically-significant divisions throughout the site.

Lower Deposit

The Lower Deposit, some 0.18 m thick and represented in samples 5, 6, and the lower part of 7, continues to be dominated by the ashy and phytolith-rich microfabric type 3 (Table 3). Diatoms continue to be present. Included soil fragments, coarse charcoal, and coprolitic residues are ubiquitously present in large amounts throughout. On the other hand, fused ash and burned soil materials are only present in the lower portion of the Lower Deposit, whereas coarse patches of unweathered ash appear to be mainly present in the upper part. Many dark, dusty clay coatings occur throughout, whilst earthworms appear to have been more active in the lower part. Iron and manganese staining more strongly affects the upper part of this Lower Deposit. This may indicate further layering, although ubiquitous amorphous organic matter is present throughout. Of particular interest are 1–4 mm long plant remains that occur in sample 5. In one instance a 4 mm long articulated phytolith occurs horizontally in the Deposit (Courty *et al.* 1989, pl. ivc). A single instance of secondary calcium carbonate formation as a sparitic infill was noted (component Q). Occasional 'burned and cemented soil' and rare 'pale nodules' also occur.

Phosphate cemented (burned) soil

This is Greensand soil (Pl. 17a) that has become cemented by a colourless, non-birefringent, but highly UVL autofluorescent material that infills voids (component K; Appendix 1). It contains high amounts of Ca, a significant amount of P (1.3–3.3% elemental P) and high amounts of Mg, Fe, Al, Mn, and K relative to the other fused materials, for example (samples 2a and 2b; detail in archive). The measure of inorganic phosphate by citric acid extraction at 4691 ppm units (P°) is also high and loss on ignition also demonstrates a humic character. The reference material also appeared to be burned in places and parts of sample 21c were non-autofluorescent under UVL. One thin section contained a 3 mm long piece of charred stem tissue from a small herbaceous plant (Hather pers. comm.). The macro-remains study of the reference sample, however, found no plant fragments other than fragments of charcoal, whereas a pollen preparation extracted microscopic structured plant elements and fungal material (Carruthers this volume; Wiltshire pers. comm.). Fragments of the soil diatoms *Hantzschia* sp. and *Pinnularia sp.* are present (N. Cameron, pers.

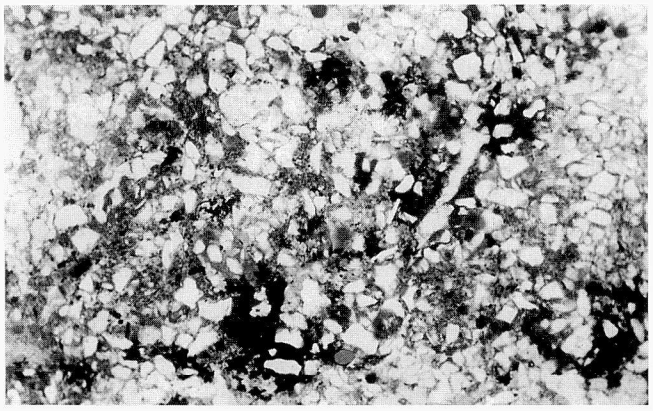


Plate 17 Soil micromorphology thin sections: a) Sample 21c. reference fused amorphous material; cemented (and burned) soil, composed of fine sand-size quartz set in a speckled and dotted matrix typical of the Deposit; black areas are probable iron and manganese replaced amorphous organic matter staining; matrix and colourless void infilling (centre right) is autofluorescent under ultra violet light indicating probable cementation by calcium phosphate; PPL, frame length 3.35 mm.

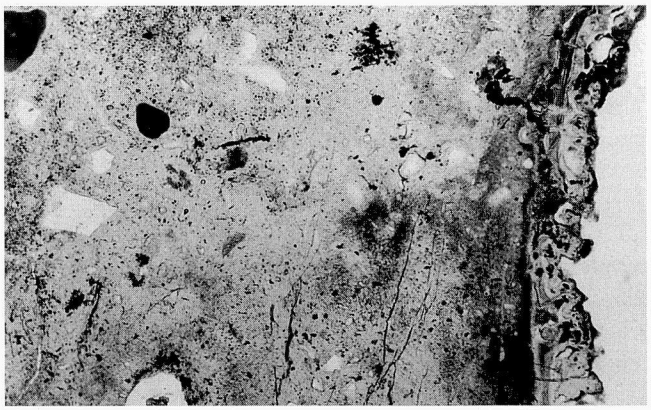


Plate 17 b) Sample 21a; reference fused amorphous material; edge of pale nodule; this enigmatic material is autofluorscent under ultra violet pale grey with dark greyish margins; it has a dominant calcium phosphate chemistry and contains few pollen , and a scatter of fine quartz (cf. Plates 16f and 17a). PPL, frame length 3.35 mm.

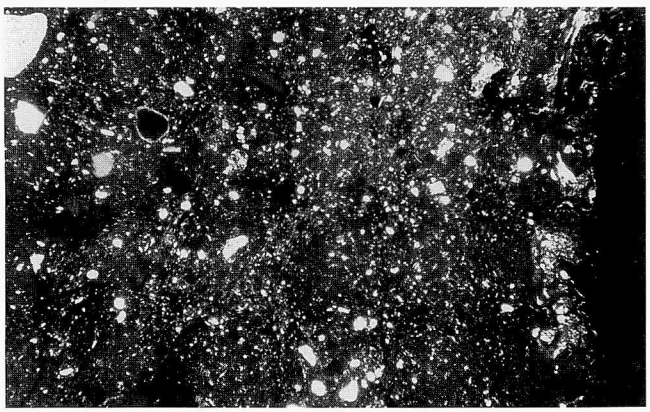


Plate 17c) As b), but under crossed polarised light, which shows the small amount of included silt size quartz.

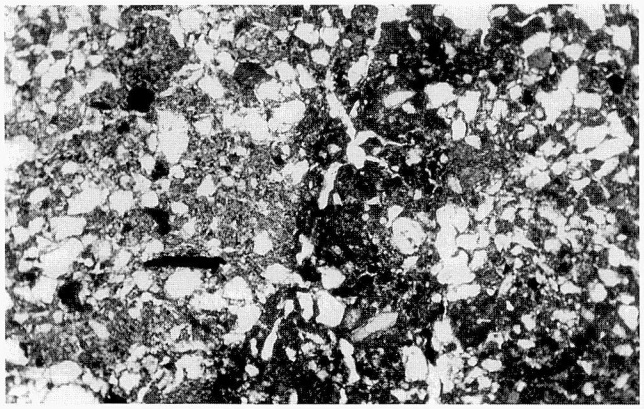


Plate 17d) Sample 11, the Deposit, Upper Deposit/topsoil; juxtaposed dusty dark grey microfabric type 5/6 (right) and highly dusty, very dark grey microfabric type 6 (left); soil microfabric types are juxtaposed because of mixing due to earthworm burrowing; elemental mapping by microbe showed marked differences in chemical organisation between these two soil types (see text). PPL, frame length 5.56 mm.

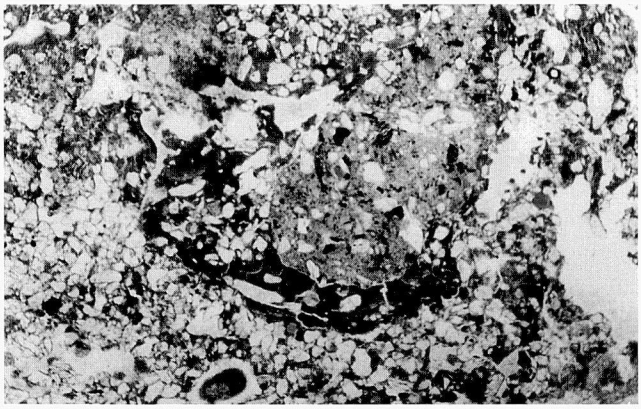


Plate 17e) Sample 18; Romano-British ploughsoil colluvium; soil is composed of fine Greensand and a highly dusty greyish brown, matrix with moderate interference colours of microfabric type 7 material; this clay loam also contains dark, very thick dusty, but bright (XPL), clay void infills (across lower centre of photo); above this major textural feature is a rounded sand-size fragment of fused soil (centre) relic of the deposit; dusty clay coatings and rounded fragments from the Deposit testify to the colluvial ploughsoil nature of this sample. PPL, frame length 5.56 mm.

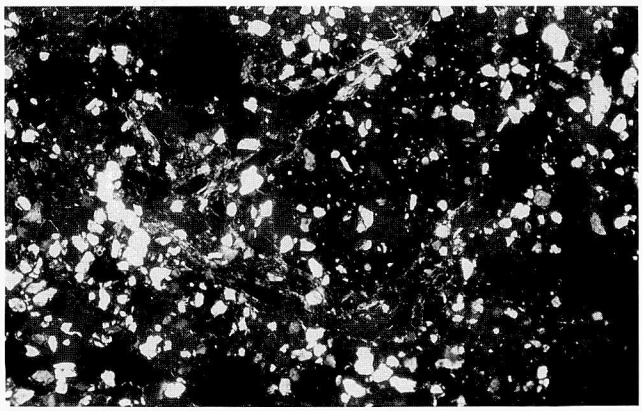


Plate 17f) As Plate 16a), but under crossed polarised light; note bright interference colours of clay.

comm.). The interpretation of cemented soil is discussed more fully later.

Pale nodules

These pale, non-birefringent nodules that are strongly autofluorescent under UVL (Pl. 17b, c) contain very few inclusions of phytoliths or silt, for example, compared to cemented soil and fused ash (component H; Appendix 1). Also in contrast with cemented soil and fused ash, the pale nodule contains pollen (seen in a pollen preparation and in thin section: Wiltshire and Cruise, pers. comm.) and other fine organic matter contributing to a moderately high loss on ignition (detail in archive). Pale nodules can be explained chemically as a calcium phosphate concretion (high levels of Ca and P; in archive). The presence of silica (Si) may relate both to the few phytoliths and silt present and to quartz material that is no longer visible because of phosphatisation (Courty *et al.* 1989, 188–9). Similar probable calcium phosphate material replaces whole plant tissues at East Chisenbury and mineral replaced plant macrofossils such as seeds and roots are relatively frequent at Potterne (Macphail 1996a; Hather, pers. comm.; Carruthers this volume). Pale nodules, on the other hand, were found to be rare in Potterne's microfabrics (Tables 3 and 4). The interpretation of pale nodules is discussed later.

The ?Lower Deposit in Cutting 14

Sample 15 was taken across the boundary between the Deposit and overlying colluvial material, which was sampled by thin section 16 (Fig. 19; Table 4). Again the Deposit is characterised by the full suite of anthropogenic inclusions and pedofeatures found in the main sequence at Cutting 12 (Tables 3 and 4). Most of the lower sample (15) is dominated by microfabric type 3 which is typical of the Lower Deposit in Cutting 12, although microfabric type 5/6 becomes dominant at the junction with the colluvial deposit. Microfabric type 5/6 material has also been worked down-profile by earthworms whose presence is also recorded by biogenic calcite.

Above (sample 16), there appears to be coarse relic areas of microfabric type 3 material in a microfabric type 6 dominated soil (Table 4). The last is typical of the topsoil present in Cutting 12. This upper layer has a notable absence of amorphous organic matter and iron and manganese staining, in contrast to sample 15 below. The upper sample also features more evidence of earthworm activity and dark dusty clay coatings.

Middle Deposit

The approximately 0.14 m thick portion of the Deposit, represented in most of sample 7 and throughout sample 8 (Figs 19 and 20; Table 3), is characterised by a poorly birefringent matrix containing extremely abundant phytoliths and occasional diatoms (microfabric type 4). Although ashes are still present, there are fewer than in the Lower Deposit as reflected by its lower calcium carbonate and Ca content (Appendix 1; detail in archive). Elemental mapping also showed it to contain generally more Fe and P which is often concentrated into coarse patches. Cemented soil, iron and manganese staining and amorphous organic matter are all present alongside instances of small (<1 mm) preserved fragments of organic coprolites of probable herbivore/omnivore origin (component J, in archive; see below). Charcoal and coprolitic residues in general are ubiquitous, whereas fused ash and burned soil, are only important in the upper half of this Middle Deposit where dark dusty clay coatings also become more common. In sample 8 charred herbaceous stems occur as approximately horizontally layered 5–8 mm lengths, some having a diameter of *c.* 1 mm (Hather, pers. comm.).

Probable herbivore/omnivore coprolites

These occur preserved as <1 mm size agglomerations of amorphous organic matter and plant remains, in which are embedded silt, fine sand, abundant phytoliths and occasional diatoms. The latter include soil types that occur as reasonably preserved linked valves (N. Cameron, pers. comm.). Sometimes parts of these coprolites are autofluorescent under UVL, which from the elemental mapping of this part of the Deposit where they occur (SEM4a), may well imply an enhanced phosphate content. These coprolites may also be charred.

Upper Deposit

This layer, *c.* 0.15 m thick, represented in samples 9 and 10 (Figs 19 and 20; Table 3) is less well-defined compared to the underlying units, because of increasingly abundant earthworm working in the upper levels of the Deposit, which is also reflected in the new presence of biogenic calcite granules (components M and N; Appendix 1, Tables 3 and 4). Thus, although the main matrix material is very poorly calcareous (microfabric type 5), there is nevertheless, in many places, in-mixing of fine soil containing more ash residues (Ca, K) (microfabric type 5/6), especially towards the top of this Upper Deposit (Pl. 17d). Also in the lower half of the Upper Deposit there is very abundant burned and cemented soil, much amorphous organic matter, and iron and manganese staining, the latter also shown up by the elemental mapping of Fe. The upper half of the Upper Deposit contains increased quantities of burned soil, with fused ash and patches of ash. These latter were absent from the lower half. As the ash can contain coarse calcite ash crystals and does not contain phytoliths, these patches may be relic of wood ash. The last were also noted in the elemental maps (Ca, K, Ca-K). Lastly, a single occurrence of the secondary iron-phosphate mineral vivianite was noted (component Q)

The Deposit in Cutting 3

Two samples (nos 13 and 14) from lower and median parts of the Deposit respectively, taken from the north section of Cutting 3, were studied (Table 4; Fig. 11). Here the Deposit appeared to be some 0.65 m thick, beneath 0.30 m of topsoil and above the subsoil cut by pits and post-holes. Sample 13 is dominated by ashy microfabric type 3, which with the presence of anthropogenic inclusions and pedofeatures typical of the lower part of the Deposit, suggest Lower Deposit-like deposition. Higher up, the dominance of microfabric type 5 and more frequent occurrence of earthworm activity indicate that thin section 14 sampled a sediment similar to the Upper Deposit in the southern section of Cutting 12 (for example, sample 9, Table 3).

Topsoil

The calcareous microfabric type 5/6 seen primarily in samples 10 and 11 (Table 3), remains dominant until the top of the sampled sequence, where a much more dark and dusty fine soil is present. This much more humic microfabric type 6 (Pl. 17d) also deeply penetrates the Deposit in the form of earthworm burrow infills that markedly affect the uppermost few centimetres of the Upper Deposit (sample 10, Table 3; Appendix 1). This topsoil is less rich in easily recognisable anthropogenic inclusions, with coarse charcoal declining to only rare and occasional occurrences. On the other hand, patches of amorphous organic matter occur throughout with instances of preserved probable herbivore/omnivore coprolites towards the junction with Upper Deposit. Iron and manganese staining is absent. Elemental mapping of microfabric type 6 shows this to have a general phosphatic character.

Microstratigraphic sequence

The base of the topsoil (sample 11), still contains a large number of anthropogenic components similar to the underlying Upper Deposit but these are slightly less frequent and the amount of coarse charcoal has diminished. General weathering and biological fragmentation can account for this (Courty and Fedoroff 1982). The topsoil mainly differs from the underlying Deposit by having an absence of iron and manganese staining, far fewer dark, dusty textural features, but increasing evidence for earthworm activity (Pl. 17d). This is a trend affecting the upper part of the Upper Deposit which is also characterised by the presence of biogenic calcite formed by earthworms and slugs probably in recent times. These were absent from the underlying units of the Deposit. The lack of iron and manganese staining is a further reflection of the far higher biological activity at this depth, because better aeration has resulted.

Weathering is, however, incomplete because fragments of amorphous organic matter and microfabric type 5/6 that typify much of the Upper Deposit persist to this level. Microfabric type 6, which is also typical of the topsoil at Cutting 14 (sample 16), is humic and dark coloured because of the large amounts of fine amorphous and charred organic matter. Again this may reflect biological breakdown and integration of the organic components of the Deposit as part of the soil formation processes. At this depth, the Deposit has been moderately weathered and strongly homogenised, with, for example, elemental mapping showing the even distribution of P rather than as small concentrations, as found in the Deposit. Dark, dusty clay textural features have been biologically worked and earthworm burrows carry topsoil well into the Upper Deposit. Although there are no textural features which could indicate ploughing of the overlying 0.30 m of topsoil, included coarse fragments of microfabric type 3 indicate physical mixing and the high biological activity is consistent with the upper soil being turned over for horticultural purposes, for example (eg, Courty *et al.* 1989, fig. 7.8; Gebhardt 1992; Macphail 1994a). This is consistent with the known recent history of the site which served as allotments between 1834 and 1922.

Romano-British Ditch, Ploughsoil and Colluvium

Samples 17 and 18 are from the fill of the Romano-British ditch identified during the auger survey and sectioned in Cutting 15 and the overlying ploughsoil respectively (Fig. 17). Generally, only the more resistant anthropogenic inclusions, such as coprolitic residues, burned soil, and pottery are present, with fused ash, coarse charcoal, and patches of ash occurring in the ditch fill (Table 4). Although coarse fragments of the natural Greensand subsoil (microfabric type 1) occur infrequently in the ditch, these Romano-British soils are almost totally dominated by microfabric type 7. This moderately humic but often poorly calcareous soil is clay-rich (20–28% clay) compared with the Deposit as a whole (Appendix 1). Amorphous organic matter and iron and manganese staining is absent (components I and L) and dusty clay coatings with bright interference colours (Pls 17e, f) and other textural features (component P) have seemingly totally replaced the dark, dusty clay coatings with low-order interference colours found ubiquitously in the main deposit at Cutting 12. It can be noted also that biogenic calcite and an instance of secondary sparitic calcite formation are only found in the ditch fill.

Microstratigraphic sequence

This material infills and buries a Romano-British ditch investigated in Cutting 15. Some anthropogenic components have survived in the protected environment of the ditch fill, but in the overlying colluvium all but the most residual materials have become dispersed and lost, presumably through the effects of tillage.

More clay is present here than in the Deposit generally, forming microfabric type 7 which is characterised by moderately bright interference colours. It seems plausible to suggest that the weathering of alkali earths

such as potassium (K), for example from the abundant plant and ash residues, could have led to this increased clay content through neoformation (Slager and van der Wetering 1977; Courty and Fedoroff 1982). Such weathering effects on the uppermost part of the Deposit probably began during the Late Iron Age but were probably accelerated by exposure caused by Romano-British ploughing, because the topsoil at Cuttings 12 and 14 is not so clay rich (Tables 3 and 4).

The soil appears to have been well-oxidised, fragments of amorphous organic matter and iron and manganese staining being totally absent from a soil that has measurably less organic matter (1.5–2.1%) than the topsoil (4.1%). It is also less calcareous (cf. 0.7–1.9% and 3.0% $CaCO_3$, respectively), with weathering and physical attrition probably leading to an absence of biogenic calcite, except in the ditch fill where there is also an instance of preserved secondary sparitic calcite formation. In addition, the ditch fill contains more relic evidence of earthworm activity and an accumulated abundance of well-orientated textural features with bright interference colours (component P; Tables 3 and 4). Plough disturbance and related clay translocation which generated well-oriented, micro-laminated dusty clay infills up to 400 μm thick in the colluvium (Pls 17e, f), produced these accumulations of textural features in the ditch fill (cf. Jongerius 1970; 1983; Romans and Robertson 1983). The abundance of these textural features and the colluvial deposition of some 0.60–0.70 m of soil also relate to the highly unstable nature of the Romano-British ploughsoil (Imeson and Jungerius 1976; Macphail 1992). Part of this instability may relate to the lowering of the organic content through cultivation (Voroney *et al.* 1981; Macphail 1992; Guerra 1994). The paucity of earthworm working in comparison to the abundance of textural features also argues for a rapid history of soil erosion and colluviation.

Discussion

Characteristics of the Deposit: microfabric types and components

The Deposit has been described and the microfabrics largely interpreted above. Major components of the Deposit which were seen in varying quantities through the Deposit (Table 3), are discussed separately below. These inclusions largely characterise the Deposit and indicate the types of direct and indirect activities associated with its accumulation.

Coprolitic residues

Numerous typical whitish, bone-rich coprolites, from dogs (Pls 16b–d), were recovered during the excavation at Potterne (Gingell and Lawson 1984; Macphail 1987; Scaife below), while at East Chisenbury both dog and human coprolites were recorded (McOmish 1996). In the Potterne thin sections numerous coprolitic residues were apparent, some of which appeared to be of human origin (Pl. 16e) because of their highly phosphatic character and inclusion of plant fragments, including phytolith remains of cereal origin, parasite eggs and only occasional bone (Appendix 1; cf. Courty *et al.* 1989; Macphail *et al.* 1990). One bone-rich, dog coprolite was examined from the base of the Deposit. The majority of these phosphatic coprolitic residues, autofluorescent under UVL are small, however, and could be of dog, human, bird, small carnivore, or cesspit waste origin and thus remain undifferentiated (Courty *et al.* 1989; 1994, table 2; Macphail 1987; 1995, 1999; Macphail *et al.* 1990a; 1996; unpublished; Wattez *et al.* 1990; Goldberg and Macphail in prep.). Although the human-type coprolites appear to imply a cereal-rich omnivorous diet in comparison to the dog-like coprolites, the sample is far too small to be reliable. Future analyses may wish to extract dietary information from such material using a variety of methods.

Probable herbivore/omnivore coprolites

The Deposit contains many small patches of amorphous organic matter of unknown origin, but because of the general oxidation of the organic remains (see below), very few examples of this possible coprolitic material are preserved, even as small fragments. A few, however, have better resisted total decay by being charred, whereas others have been preserved because they appear to be in part phosphatised (Appendix 1). At Deansway, Worcester a small (<2 mm) probable herbivore/omnivore coprolite was similarly preserved in an oxidising environment (Macphail 1994a), while several examples have been found in medieval garden soils at Berkhamstead where historic records inform us of pig pounding (pers. obs.).

On morphological grounds these amorphous organic matter-rich coprolites are unlikely to be sheep/goat (Macphail and Goldberg 1995, pl. 5) while cattle/horse coprolites would be expected to have a more coarse layered structure of preserved plant fragments (reference material from Butser Ancient Farm; see also Courty *et al.* 1992; 1994, table 2; Cruise *et al.* in prep.). The author has examined a reference thin section of modern wild boar excrement, which in comparison to the Potterne material is similarly rich in amorphous organic matter, suggesting with analogues from other sites that these herbivore/omnivore coprolites could be from pigs (Courty *et al.* 1989, 114).

Pale nodules

These are rare inclusions in the Deposit, but highly visible under ultra violet light illumination. They can be differentiated easily from fused ash, cemented soil, and the coprolitic residues described above, by their pale colour and paucity of visible inclusions (Pls 17b, c). Although containing Si, they are clearly calcium phosphate concretions (see above; Appendix 1) that appear to resemble amorphous 'cesspit nodules' (reference thin sections of Canti, Ancient Monuments Laboratory).

Organic matter (see loss on ignition; detail in archive), including pollen, is included. On the other hand, no recognisable cellular material, that is pseudomorphic seeds and other plant materials, was noted. The pale nodules may form through the phosphatisation (Courty *et al.* 1989, 186–9) of soil, forming a concretion. However, the exact microbiological and microchemical origin of the nodules remains enigmatic. In contrast, at East Chisenbury, instances of mineral-replaced soft-tissued plant matter have been found in thin section, with recovered mineral-replaced seeds more strongly indicating a greater input of cesspit material there than at Potterne (Carruthers, this volume; Macphail 1996a; Hather, pers. comm.). At the 12th century cesspit at Monkton, Kent, probable calcium phosphate-replaced cess that is autofluorescent under UVL, is associated with mineral-replaced fly pupae (M. Robinson, pers. comm.).

Fused ash

The large amount of fine shreds of charred plant remains, fine ash crystals and abundant phytoliths present in such crystallitic soils as microfabric type 3 argues for the contribution of much Poaceae (grass) ash to the Deposit. Fused ash contains coarse layered and articulated phytoliths and charred awns that were both visible in thin section and recoverable by macrobotanical techniques (Pl. 16f). As described above and detailed in Appendix 1, this material appears to be a result of occasional high temperatures affecting burning cereal material and is quite common on domestic occupation sites (eg, Brean Down; Macphail 1990; Straker, this volume). In contrast to the pale nodules, which are soil nodules which have been mineral-replaced *sensu stricto* by calcium phosphate, fused ash is melted cereal material that has been cemented by calcium phosphate.

Phosphate cemented (burned) soil

This soil inclusion is calcium phosphate cemented soil (Pl. 17a) and clearly differs from pale nodules which have been formed probably through calcium phosphate replacement (ie actual phosphatisation) of soil, rather than just its cementation (Appendix 1). The amount of elemental P also clearly differs (detail in archive). Some examples have been burned, which contributes to their coherence. The colourless, non-birefringent, and autofluorescent under UVL cement that is visible in thin sections can be found in a variety of environments. This includes caves, herbivore stabling crusts and buried soils, while phosphate itself can be derived from decaying bone, bird and bat guano, and herbivore liquid waste (Courty *et al.* 1989, pl. viid; Jenkins 1994; Macphail and Goldberg 1995, pls 3, 4).

Phosphatic mineralisation

Phosphatic materials are common at Potterne and the mineral replacement of inclusions within the Deposit is frequent. For example, *in situ* mineral-replaced dicotyledonous plant roots are reported by Carruthers (this volume). Bone and coprolites appear to have been little decomposed in the neutral to alkaline conditions of the Deposit. On the other hand, it is likely that some ash, which does yield P on dissolution, has been weathered (eg Triticum generates 6–8% P_2O_3; Wattez and Courty 1987). As it appears that ash was only one of the many components of the Deposit (see below), it seems unlikely that ash alone – and much appears to be unweathered – would have generated enough P to produce the large quantities of cemented soil and secondary mineral replacement reported by Carruthers.

Herbivores, especially cattle and horses, produce very large quantities of liquid waste, cattle requiring some 75 litres of water per animal per day (Reynolds 1981). At Butser Ancient Farm, Hampshire, phosphate analysis of a the floor of a roofed cattle stabling house found the following: cemented bedding crust (0.6% P), partially cemented soil (0.3% P), and subsoil (<0.2% P) (Macphail and Goldberg 1995). In addition, just as cattle stabling produced a phosphate cemented crust at Butser, stabling of a horse resulted in the formation of a similar stable crust of layered plant fragments cemented by a non-birefringent matrix that is autofluorescent under UVL (Cruise *et al.* in prep; Courty, pers. comm.). Again, long plant fragments became cemented by phosphate, that at this experiment accumulated over a concrete floor.

Cemented soil at Potterne contains 1.3–3.3% elemental P. In addition, the amount and dominance of inorganic phosphorous (P) as measured by citric acid extraction (detail in archive), is closely comparable to that measured from the experimental Moel-y-Gaer stable floor crust at Butser Ancient Farm, Hampshire (4735 ppm P°; Macphail *et al.* in press). Such phosphate cemented crusts are common to many experimental stables, forming during a single stabling episode (Bakels, Bottema and Reynolds, pers. comm., Butser Ancient Farm). In the archaeological record, stabling areas, which for example contain shed milk teeth, repeatedly feature herbivore waste-stained and phosphatised floors (eg, Arene Candide, Italy; Rowley-Conwy 1992; Courty *et al.* 1992: Macphail *et al.* 1997). One possible formation process for cemented soil is therefore the *in situ* stabling (ie in roofed buildings) or long term pounding of large herbivores that produce large amounts of liquid, phosphate-rich waste (see below for impact of possible pigs).

Sheep and goats, on the other hand, drink far less and produce far drier droppings compared to cattle and horses, and only may produce dark humic soils when particularly concentrated, for instance in a trackway or the gateway to a fold (Courty *et al.* 1994; Macphail *et al.* 1996; Heathcote, in prep.; pers. obs, West Heslerton).

Summary

Identified elements therefore include phosphate-rich faecal remains (coporolitic residues, probable herbivore/omnivore coprolites), calcium rich ash (fused ash) and evidence of calcium phosphate mineralisation and

replacement (pale nodules, phosphate cemented soil). The latter also includes the mineralisation of seeds from plants growing on the site (see Carruthers). These are largely elements of domestic and animal waste and complement other evidence in the soil microfabrics of domestic activity (see Table 3).

Site formation and taphonomy

Having characterised the nature and components of the Deposit we are now able to discuss the taphonomy of the Deposit, sources of the material and processes of formation, accumulation, and post-burial changes.

Sources of organic matter and phosphate

What has yet to be fully explained is the phosphatic cementation of the base of the 'primary Deposit' because, for example, material that is autofluorescent under UVL impregnates the heavily burned bone and coprolitic residues. The possible origin of cemented soil has been discussed above, but all sources of calcium phosphate mineralisation still need to be debated in the context of the stratigraphy. The 'primary Deposit' is a dense spread of anthropogenic materials and as such formed a partial barrier to earthworm activity (Component M; Tables 3 and 4). It also probably acted as a partial hydraulic barrier. Thus any mineral-rich solutions reaching this layer would have become concentrated, just as in the cited examples of present day and experimental stables.

The major coarse components of the Deposit have been described, but the constituents of the fine fabric have yet to be fully discussed. In places, probable relic wood ash (component E, Lower and Upper Deposit; Table 3 and 4) and dominant Poaceae ash (microfabric type 3) with associated fused cereal ash (component D) (eg, primary Deposit, Lower Deposit, and Middle Deposit) form an important part of the Deposit overall. Some organic remains may come from the waste disposal of such materials as floor matting which could have given rise, for example, to relic fragments of long articulated phytoliths (Matthews 1994; Macphail *et al.* 1990a, figs 7, 8). On the other hand, a major constituent of the Deposit is phytolith-rich Poaceae material, that appears to be associated with diatoms and fragments of amorphous organic matter. It is thought, therefore, highly unlikely that the only source of organic matter, ash and phytoliths is from cereal processing waste (see separate evidence from Straker, this volume). More likely is the input of charred dung.

Additionally, some amorphous organic matter may be at least in part relic of herbivore/omnivore coprolites which, as argued above, could relate to the on-site presence of pigs. The large number of dark, probably humic, textural features, fragments of organic matter, and iron and manganese staining may indicate disturbance by animals that also produce large amounts of liquid waste (see 'terrace soil'). Pigs produce phosphate-rich coprolites (Courty *et al.* 1992, table 1), but the Deposit as a whole does not appear to show the highly disturbed and mini-colluvial soils that would likely to have been induced if pigs alone were responsible for all the proposed dung within it (eg, Gebhardt 1995). Nor did the pig pasture soils studied by Gebhardt show such concentrations of humic textural features but the experiment was in its early stages. Unfortunately the author has no knowledge of experimental pig stabling.

Another possibility is that stabling-like surfaces/floors (phosphate cemented crusts – cemented soil), bedding, and dung from cattle/horses are a significant contributor to the Deposit. Cattle produce large amounts of dung (3–4 tons a year earlier this century; Barker 1985, 52) and usually byres have to be cleared out at least once during the winter as the heads of the animals reach the roof (Bakels, Bottema, Reynolds, pers. comm., Butser Ancient Farm). If charred byre waste was being dumped as a component of the Deposit, then the large amount of included Poaceae ash residues and fragments of cemented soil (see above) could also be accounted for. In addition, it is also a possibility that large herbivores were pounded at times, their presence contributing to the dark textural features and to the calcium phosphate cementation that can be shown to be an *in situ* phenomenon. It is also a possibility that the *in situ* hearths (Chapter 3; Fig. 12) at the base of the Deposit were animal trampled leading to the spread of hearth debris locally. The cause for the phosphatic cementation of some of this material, as questioned above, could thus relate to this presence of pounded herbivores.

No unequivocal cattle, horse or sheep/goat coprolites were recognised in the Deposit, nor do Carruthers or Straker (this volume) indicate the presence of any charred or mineral-replaced seed remains that could indicate a concentration of fodder materials. Nevertheless, the super-abundance of phytoliths can only be explained by large inputs of Poaceae and instances of cemented soil with associated charred dicotyledonous material (see above) also imply the inclusion of herbs. Continued trampling alone, animal scavenging, and evident earthworm burrowing, as in modern manure heaps, may have led to the comminution of most large organic fragments. Further, with biological decomposition affecting manure heaps (Mücher *et al.* 1990), seeds typical of fodder may well have also been lost in this way (Wiltshire, pers. comm.) and these may then not have been available to be preserved by charring or phosphate mineralisation at a later date. Lastly, if green fodder was cut for feed this is less likely to contain many seeds anyway, even from the second cut of the season (Wiltshire, pers. comm.) and Greig (1984) has discussed the under-representation of grassland seeds compared to weed seeds and the poor preservation of grassland seeds themselves.

Animals, such as cattle and horses, which may have been mainly grazed upon damp grasslands on the poorly drained soils to the north and west of the site, may have been pounded (and stabled) at Potterne,

their organic dung and its included phytoliths, diatoms, and silt thus being trampled into the sandy soils of the 'settlement'. In comparison, the charred and/or phosphate impregnated pig-like coprolites and the cemented soil itself have proved to be more strongly residual. As has been noted, sheep/goat produce dry pellets and very little liquid waste compared to cattle and horses, and so it seems unlikely that these animals were involved in any large numbers (Courty *et al.* 1992, table 1; Macphail and Goldberg 1995, pl. 5). Further, spherulites (Courty *et al.* 1989, pl. 3f) which are believed to be another strong indication of sheep/goat stabling (Brochier 1983; Brochier *et al.* 1992) were not observed in thin sections from Potterne. It is therefore noteworthy that they occur in large numbers in the samples from East Chisenbury (Macphail 1996a), where presumably a different herding economy was practised. Similarly at West Heslerton, where large numbers of sheep were present, rare ashed sheep/goat coprolites and spherulitic microfabrics persist. At Potterne, the obvious way to complement the soil findings, and its arguments for animal husbandry, is via the faunal evidence for herding and stabling (Locker, this volume). This evidence shows that during the earlier part of the Deposit formation (the part sampled for soil micromorphology) pig, sheep, cattle, and horse are all represented. Whereas ovicaprids are numerically most common, large numbers of cattle, a few pigs, and occasional horses were also present (Fig. 29).

In situ mineral replacement of organic remains, such as roots growing within the Deposit, indicate the continued movement of phosphatic solutions, probably under semi-reducing conditions at times (Carruthers, this volume). Both the counted instances of amorphous organic matter and iron and manganese nodules in the microstratigraphy of the Deposit also testify to periodic reducing conditions, a requirement noted for the iron and manganese chemistry of the dog coprolites assessed by Mayes and Ottaway (in archive). These three separate lines of evidence therefore indicate that the Deposit, as it was forming, was probably organic, wet, smelly, and slurry-like. This would be consistent with areas of Potterne acting as badly drained farmyards. It is likely, however, that specific components such as the rare pale nodules owe their origins to being trampled-in from other phosphate-rich environments such as 'cesspits' or related features dug into the Greensand (see above), whereas human and dog coprolitic residues are ubiquitous in domestic occupation areas. Hypothetically, additions of ash and burned cultural material would have alleviated some of the wet and smelly characteristics of the Deposit.

Mineralisation and post-burial changes

At Potterne mineralisation is the calcium phosphate replacement of organic remains and the phosphatisation of soil (pale nodules). The presence of high quantities of calcium and phosphorous to enable mineralistion is plainly evident. The sources of these elements are also clear; weathering ash, dung residues, feacal material, and liquid animal waste are obvious sources. In addition, fused cereal ash and soil were cemented by calcium phosphate. Mineralisation and cementation undoubtedly occurred *in situ* and is therefore both a semi-contemporaneous and a post-depositional phenomenon relating to the nature of the Deposit itself.

Mineralised elements, in terms of calcium phosphate mineral replacement (pale nodules) and stabilisation crusts (roofed areas), were probably largely facilitated by the high input of liquid animal waste which must largely have occurred direct; ie, with the animals standing in roofed barns or in the Deposit. It has already been suggested that the 'primary Deposit', comprising largely wood ash and fused cereal ash (see above), acted as a hydrological barrier and this is consistent with the majority of the calcium phosphate related elements (pale nodules (H) and fused soil (K)) in the microstratigraphy, being concentrated within the Deposit (elements H and K; Table 3). Mineralised zones such as the 'cobbled surface' occur at the base of the Deposit at the interface with the natural and pre-Deposit soils. Mineralisation has led to the preservation of elements that otherwise would not normally be recorded in the archaeological record and, in particular, of seeds that would not normally be recorded in non-waterlogged, *sensu stricto*, contexts.

Phasing and internal integrity of the Deposit

The spread of dumped soil, phytolith-rich ash, burned soil, fused ash, charcoal, burned bone, and coprolitic residues clearly marks the beginning of the Deposit but may also relate to the spread of hearth debris at this time, as reported from the field evidence.

From the study of the continuous 'on-terrace' section in the southern end of Cutting 12, schematically represented in Table 3, it is possible to see indications of an originally finer stratified Deposit, although this is not reflected in the computerised assessment of ceramics from the excavated zones of this area (Chapter 6). The Deposit in the north-eastern part of the excavated area, although only sampled from two places, also appears to be stratified. For instance, the investigation of the lower samples (12 and 13; Table 4) found dominantly microfabric type 3 whereas microfabric type 5, for example in sample 4 (Table 3), characterised the Upper Deposit. Above the 'cobbled' area (thin section 12; Table 3) a possibly telescoped or mixed sequence of microfabrics 3, 4, and 5/6 is present. Although only these three samples (12, 13, and 14) were taken and studied, they imply internal integrity for the broad stratigraphy across Cutting 12, ie, deposits typical of the Lower Deposit continue to occur at the base of the Deposit and deposits typical of the Upper Deposit are consistently found towards the top. At Cutting 14 the lowermost Deposit sampled (sample

15) again appears to be composed of the basal (Lower Deposit) microfabric type 3, but may have been truncated and hence does not contain Upper Deposit microfabric type 5/6 material. This may further imply internal integrity of the Deposit from Cutting 12 to Cutting 14, over a distance of some 80 m, although this would obviously need to be tested further.

Although a broad soil-stratigraphy zoning can be demonstrated to exist within the deposits, and localised finer stratigraphy can also be recognised, the defined Lower, Middle, and Upper Deposit facies cannot necessary be accurately correlated across the site. They do, however, generally exist widely across the areas of the intact Deposit studied in other dispersed cuttings. There is no obvious hiatus in deposition, but general changes through the deposit are characterised, to an extent, by the semi-quantitative data of the microstratigraphy (Table 3). As discussed above, some of these, such as mineralised elements, are a post-depositional phenomenon, although still relating to the deposition of the Deposit.

Activities represented by the formation of the Deposit

A model of process and site formation (ie, what do the soil components tell us?), is presented in the environmental discussion/overview, below, where questions of changes through time and of possible hiatuses are examined.

General

Although related to (Late Bronze Age–Early Iron Age) occupation generally, the type of deposits found at Potterne (and East Chisenbury) have not previously been thought to be the result of purely *in situ* 'occupation' *sensu stricto*, as for example studied by soil micromorphology at Late Bronze Age Brean Down and Early Iron Age Maiden Castle, Dorset (Bell 1990; Macphail 1990; 1991a; Sharples 1991). At Potterne many anthropogenic components such as burned soil, pot, daub, burned daub, burned bone, coarse wood charcoal, fused ash, fragments of probable wood ash residues, pale nodules, and probably some of the coprolitic residues can all be regarded as domestic by-products. Some of the coprolitic residues (eg, from dogs) and probable herbivore/omnivore coprolites (from pigs?) may be regarded as the result of contemporaneous scavenging. On the other hand, the abundant evidence for probable residues of herbivore dung, bedding, and phosphatised stabling crust materials contributing to the Deposit also has to be considered. There is the additional possibility that herbivores were pounded and their dung and phosphatic liquid waste contributed to the *in situ* formation of the Deposit at times.

Long term seasonal stabling of herbivores in rock shelters and caves in the Mediterranean during prehistory produced metres of dung residues even after the dung was burned following every stabling episode (eg, Arene Candide; Courty *et al.* 1992). Charcoal, bones, and artefacts all varied according to whether the cave was predominantly used for stabling or domestic activity, as also indicated by the soil micromorphology (Macphail *et al.* 1997; Maggi 1997). Less well-stratified cave sediments have yielded evidence of the probable stabling of sheep/goats, in the form of the relic concentrations of easily weatherable spherulites, which only survive about one year on exposure (Brochier 1983; Brochier *et al.* 1992). At Butser it was found that spherulites can be abundant in sheep and goat dung, but are less common in cattle excrement. No spherulites were found at Potterne, but many occur in a relic ash-rich Middle Saxon 'farm mound' deposit alongside ashed coprolites at West Heslerton, a site with sheep-dominated animal husbandry (Macphail 1996b). As Potterne is not a strongly decalcified deposit this suggests the possibility that sheep dung contributed little to the Deposit, as far as the micromorphological evidence suggests. It is therefore all the more interesting to find the test samples from East Chisenbury being dominated by spherulites (Macphail 1996a).

East Chisenbury is the only comparable site to Potterne that has had any soil micromorphological studies. Although this work is only at the assessment stage, it seems likely that the calcareous nature of this similarly Poaceae ash dominated deposit was originally much higher or has been better preserved than at Potterne. The quantity of anthropogenic domestic material, such as fused ash, appears much less, but highly calcareous phytolith-rich grass ash, spherulites, and coprolitic residues are abundant. Coarse fragments of mineral-replaced organic tissues occur (cf. pale nodules) and diatoms which are generally present in low numbers, can dominate some layers. Some microfabrics appear to be impregnated by probable phosphatic material that is autofluorescent under UVL. Again the contribution to the deposit by animal dung and the possibility of herbivores being present is implied by these findings. The presence of foetal and neonatal sheep and cattle bones, in addition to the construction of surfaces, may support these views (McOmish 1996).

Speculatively, although only one test pit has been assessed, it seems possible that East Chisenbury, while strongly similar to Potterne, was constructed in a different way and may have been dominated by a sheep-based economy. Lastly, it may be worth noting that, unlike cattle, sheep have sharp hooves that penetrate and deeply mix their bedding material and so their herding on the deposits at East Chisenbury may have required surfaces to be constructed, again, unlike Potterne if cattle were mainly involved (cf. Macphail and Goldberg 1995, fig. 2, pl. 6). It is quite clear, however, that unlike Mediterranean practices of using leaf hay for fodder, the animals at Potterne were sustained by a grass and herb-based diet (phytoliths and charred herbaceous tissues; cf. Robinson and Rasmussen 1989; Courty *et al.* 1992). The lack of macrobotanical remains that would indicate *in situ*

stabling (Carruthers, this volume; Straker, this volume) is difficult to reconcile with the full scenario as indicated by the soil microstratigraphy.

Nevertheless, such a deposit as found at Potterne could have provided an enormous source of manure, and there is evidence for Bronze Age manuring, albeit equivocal at times (Bell 1981; Blume and Kalk 1986; Macphail 1992). As no arable soils contemporary with the Deposit have been found or investigated the use or non-use of the Deposit as a source of manure must remain speculative. The Deposit provided an enormously fertile, if unstable, substrate for cultivation during the Romano-British period.

The Deposit

There is no single site formation process that fits the Deposit. For instance, the probable pig coprolitic remains can be present as amorphous organic matter fragments and as phosphatised and burned versions of this. This implies occasional burning on the Deposit and, at such times, the incidental firing of faeces from scavanging animals. On the other hand, the author has argued for the deposition of partly burned herbivore stabling waste. In addition, whereas much cemented soil appears to have been phosphate cemented (and burned) prior to deposition, other areas of cemented soil and some dark, dusty clay textural features clearly appear to have formed *in situ*. The probable animal trampling and mixing of the Deposit has made identification of any *in situ* stabling crusts and relic cattle coprolites difficult, if not impossible. The present working hypothesis for Deposit formation, however, suggests the following:

a) Stabling: the periodic (possibly seasonal) dumping of large quantities of mainly charred herbivore (?cattle) stabling waste – possibly after it had undergone partial decomposition on dung heaps, alongside waste from domestic activities, with subsequent and related activities (b and c, below)

b) Stocking: animal (cattle/horse) stocking on the Deposit for management reasons related to cultural/husbandry practices, and

c) Scavenging: semi-continuous dog and pig scavenging, coeval with the general weathering of the Deposit.

Although this present study has greatly enhanced our understanding of the character of the Deposit, the exact nature of its site formation processes and the cultural reasoning behind its origins remain enigmatic and the above hypothesis must remain speculative. It is envisaged, however, that future workers on this and comparable sites will be able to use this database to help them solve such riddles of past human behaviour.

Major Conclusions

1. The microstratigraphic and microchemical approach to the study of the Deposit and soils at Potterne has both improved the understanding of enigmatic components and provided a reproducible method for studying other, as yet unexcavated, areas of the Deposit and related deposits at other sites.

2. The natural soils were deeply eroded prior to the development of the 'terrace soil' and the Deposit.

3. The 'terrace soil' seems to have accreted, in part, through colluviation and, in part, through the addition of large quantities of organic matter, the latter either as dung from a pounded herbivore population or as residues from the use of dung, possibly as a constructional material, during the occupation.

4. The Deposit is microstratified. It apparently began as a dense spread of coarse anthropogenic materials of a dominantly hearth and domestic waste origin. This was mainly accompanied by a Poaceae ash soil as evidence of charred dung. Organic materials, such as herbivore (eg, cattle/horse) dung residues, associated phosphatic and sometimes charred stabling floor debris, and amorphous organic fragments, are another major component. Some 'amorphous organic matter' coprolites could relate to pigs also being present. Other scavengers such as dogs and small carnivores were also probably active. Much of the Deposit is also characterised by evidence of trampling, allied to the deposition of phosphatic and humic liquid waste and this may indicate the possible periodic pounding of cattle and/or pigs actually on the Deposit. The Deposit, although regularly burrowed by earthworms, remained essentially moist and poorly aerobic, probably because of the high input of organic matter and liquid waste.

5. Site formation processes are complex, but a primary cause of sediment accretion may entail the episodic dumping of burned herbivore stabling residues, perhaps after undergoing partial decomposition on a dung heap, alongside domestic waste and the actual penning and pounding of cattle on the Deposit at times. This theory remains speculative.

6. The Deposit, although similar in many ways to that at East Chisenbury, may differ from it because, at East Chisenbury, sheep dung may possibly have been a much more important component in this generally more oxidised and calcareous deposit, and the site being situated on a different bedrock, namely Chalk.

7. The Deposit became moderately weathered through topsoil formation, but exposure and

working through arable activity led to its more rapid weathering during the Romano-British period when it acted as a highly fertile, if unstable, arable soil.

8. This soil micromorphological and microchemical study has also shown the potential for highly focused macrobotanical, pollen and diatom studies of such deposits.

3 Coprolites: Microfossil Examination and Potential *by Robert G. Scaife*

The large number of coprolites (palaeofaeces) recovered from throughout the Deposit represents an almost unique assemblage, possibly only paralleled by those obtained from the cave shelters of the arid south-western United States. Many of these were complete or near complete stools which had been deposited directly onto the Deposit. Of 739 samples, 222 are described as 'coprolites', 30 are described as 'animal waste products' or 'waste products', and 487 are described as 'refuse' or 'waste deposits' (archive).

Analyses of the plant macrofossil content of coprolites have a long history, with interest in human palaeofaeces having been shown by Harshenberger (1896), Young (1910), and Lord and Harrington (1929 in Bryant 1974). Although as long ago as 1938, Laudermilk and Munz recognised the existence of pollen in animal droppings, the work of Martin *et al.* (1961) marked the start of systematic microfossil studies of human and animal faeces. Subsequently, there have been many pollen studies of coprolites, especially from the United States where aridity in the dry south-west has facilitated preservation of human and animal faeces through desiccation. In contrast, Europe, with its damper climate, does not generally allow such preservation and coprolites are relatively rare because of more rapid biological decay.

However, coprolites have been recovered from a number of archaeological sites of different periods. These, in general, have been preserved on terrestrial sites because their high mineral bone content. There has been debate as to the origin of such palaeofaeces based upon shape and, while there is a similarity between pig, human, and dog, the presence of a high calcium and bone content in many specimens, such as those described here from Potterne, suggests the latter. This is obviously the result of scavenging by dogs in human occupation areas. A number of analyses of canine coprolites have been made from the Neolithic (Scaife unpublished), at Etton, Cambridgeshire; the Iron Age, at Ivinghoe Beacon, Buckinghamshire (Dimbleby 1968); the Romano-British period, from Ditches, Gloucestershire (Scaife 1988); and the medieval period, Oxford (Greig unpublished).

Examination of the Potterne coprolites was undertaken to see if human faeces were present from which diet might be determined. Most specimens appear, from their high mineral/bone content, to be of canine origin. However, pigs are not necessarily ruled out, while the presence of certain nematode ova and absence of included bone suggest that some coprolitic material may be human.

Table 5: Macrofossil content of coprolites

	Count	*%TP*
Trees/shrubs		
Quercus	2	1
Corylus avellana type	5	2.5
Herbs		
Ranunculus type	3	1.5
Chenopodium type	2	1
Trifolium type	2	0.5
Plantago lanceolata	1	0.5
Scabiosa	1	0.5
Bidens type	1	0.5
Anthemis type	1	0.5
Centaurea nigra type	1	0.5
Lactucae	31	15.6
Liliaceae	1	0.5
Poaceae	76	38.2
Cereal	73	36.7
Spores		**%TP+sporesS**
Pteridium aquilinum	4	2
Miscellaneous		**%TP+misc.**
Palynomorphs	12	5.5
Unidentified/degraded	2	0.9
cf *Trichuris*	4	1.8
Ascaris	1	0.5
Animal Hairs	1	0.5
Totals		
Trees	2	1
Shrubs	5	2.5
Herbs	93	96.5
Spores	4	2
Miscellaneous	20	9.1
Overall total	202	

A single specimen/coprolite has been examined for microfossil content with the principal aim of extracting pollen/spores. The external surface of the coprolite was scrupulously cleaned to remove soil which might contain pollen from non-faecal sources. Bone content comprised 60–70% and thus the sample (24 g) was dissolved in 5% HCl. Further deflocculation was carried out with 10% NaOH. The remaining residue was examined under a Zeiss biological, high power binocular microscope. This resulted in the identification of pollen, spores, plant phytoliths, animal hair, intestinal parasite cysts, and inorganic charcoal and silica. A pollen count of 201 grains plus 16 spores was made. These data are presented in Table 5.

Pollen was generally well preserved with only two unidentifiable/degraded grains. A total of 16 taxa was recorded, of which the dominant taxa were Poaceae (38%), cerealia (37%) and Lactucae (15%). Other herb taxa were also present in small numbers and include *Ranunculus* type, *Chenopodium* type, *Trifolium* type, *Plantago lanceolata,* Asteraceae types and Liliaceae. Tree and shrub pollen are only represented

by *Quercus* (1%) and *Corylus avellana* type (3%). Spores comprise pre-Quaternary (Cretaceous) palynomorphs and *Pteridium aquilinum*.

The unusual diversity of this pollen spectrum is mirrored in other analyses carried out on canine coprolites. However, it poses the question of the pollen taphonomy. This is especially interesting since cereal pollen is one of the principal constituents and occurs in far greater numbers than is generally encountered in 'natural' sediment sequences. Cereal pollen and associated weed flora have been recovered from other canine coprolites (Greig unpublished; Scaife 1988; Dickson 1989). While Dimbleby (1968) in one of the earliest of such analyses questions how pollen of herb taxa can be found in the faeces of carnivores, subsequent work seems to view this apparent anomaly as resulting from scavenging by the dogs (Greig unpublished; Scaife 1988). This would have been particularly likely at Potterne, given the extent of the Deposit and the amounts of domestic waste deposited on this site. Bread remains, and animal viscera and faeces may all contain residual pollen which will have survived passage through the animal, as similarly occurs in human digestion (Greig 1982; Scaife 1986). A further possibility is that the pollen derives from soil material adhering to bones which were being scavenged by the animal, or from drinking water from puddles or ponds. However, unless a water source was near to a cereal processing area, the substantial numbers of cereal grains are more likely to have derived from the sources noted earlier. If this was the origin, it is plausible that tree and shrub pollen would have been more abundant than was recovered.

The presence of mineral matter including charcoal fragments, sediment, opaline phytoliths, and Cretaceous palynomorphs does, however, indicate that soil mineral matter was ingested. Since the coprolite was carefully cleaned prior to microfossil extraction, this minerogenic content is not from contamination (Macphail, this volume). It is possible that this may also be the source of some or all of the Poaceae and Lactucae pollen and sporadic records of grassland taxa.

Although pollen analysis was the principal aim of this study, all residues were examined for other evidence. Phytoliths were present and included straight, ornamented (wavy and fine spiny) rods (Twiss *et al.* 1969) attributed to Poaceae. No diagnostic types were found (eg, dumbbells). The presence of silica and charcoal has already been noted. A small number of animal hairs was also noted. Small numbers of the eggs (parasite ova) of *Trichuris* and *Ascaris* were present. The occurrence of these has also been noted in other canine coprolite studies (Dimbleby 1968; Scaife 1988; Bell and Dickson 1989; Jones 1990) and their presence is not unexpected. It is also likely that these may also have been digested in human and or animal faeces. In addition, Mayes and Ottoway (archive) have undertaken a preliminary study of four samples from Potterne and have demonstrated the potential of using organic molecules (long-chain *n*-alkanes) and inorganic (heavy metal) ions to identify the source of the coprolites.

The interpretation and value of such analyses remain problematic, other than by providing information on dietary character and the secondary information that cereal products were clearly of relevance to the adjacent Bronze Age communities. This preliminary pollen investigation along with other studies noted, illustrates that well preserved pollen can be recovered from what, at first sight, seems to be a highly unfavourable preserving medium. The 'unusual' occurrence of pollen in such a highly calcareous matrix has previously been noted by Greig in his analysis of the Oxford (Church Street) specimen and at Ditches, Gloucs. (Scaife 1988). At the latter, Romano-British, site comparative material from the context in which the coprolite was found failed to produce any pollen, even using the most rigorous techniques available. This seems to indicate that pollen, once incorporated into a coprolite, although alkaline, is in a more suitable preserving medium than that pollen which falls directly onto a land surface, especially if the latter is on limestone as at Ditches. A single specimen only was examined from Potterne. However, it was felt that this is an extremely important assemblage which could be used at a future date to examine some of the taphonomic problems only hinted at in this study.

4 Mineralised Plant Remains, by Wendy J. Carruthers

Prologue, by Michael J. Allen

When Wendy Carruthers first identified the presence of mineralised seeds at Potterne in 1983, they provided an almost unparalleled find in Britain on two counts. First, by far the majority of mineralised plant remains previously recovered had been from medieval and post-medieval sites, and mainly urban sites at that. Secondly, in almost all cases they had been recovered from cess-pits and latrines, where a causal relationship between human faecal remains and the process of mineralisation leading to preservation could be demonstrated.

At Potterne, however, the site was neither medieval/post-medieval nor urban, and one of the major questions initially addressed of the mineralised remains in 1983–5 was that of process. How could it be that these were mineralised? Were there Late Bronze Age/Early Iron Age cess-pits that had been emptied here? Had mineralisation occurred elsewhere, and already mineralised/partially mineralised remains been disposed of on the Deposit, or did mineralisation occur *in situ* within the Deposit as a consequence of the nature of the materials disposed of thereon? At the time of inquiry, these introspective questions were of importance to the environmental community as well as to the understanding of the Deposit and activities associated

with it at Potterne. Carruthers' research (below) has clearly established the location of, and a mechanism for, mineralisation which has proven crucial to interpreting the assemblages and understanding the origin of the remains. Carruthers' research demonstrates these mechanisms, and having had the opportunity to digest their implications, we are now, in a position to re-examine more specifically the archaeological interpretation of the assemblages which are discussed below.

Introduction

One of the most notable features of the deposits at Potterne was the widespread occurrence of mineralisation. This was initially observed as early as 1982 during the first season's excavations (Cutting 1) as concretions on pottery and bone, amorphous clinker-like lumps in the sieving residue, and coprolites. Microscopic examination of environmental sample residues revealed brittle, amber coloured fruits and seeds, root fragments, arthropod remains, molluscs and earthworm cocoons, all of which retained distinctive surface characters.

In subsequent seasons samples were taken from six 1 m^2 columns through Deposit and pre-Deposit layers in Cuttings 2, 3, and 12, and most features cutting the natural were also sampled. The environmental sample columns included 'on-terrace' (143) and 'off-terrace' deposits (19, 3:1/501 and 2:1/500) and two adjacent columns 'off-terrace' (columns 88 and 89) to examine variation over small distances (Fig. 12). Charred plant remains were recovered from the same sample sequences (Straker, below).

The presence of mineralisation at Potterne required the adoption of suitable methods for retrieving plant macrofossils. Bulk samples of 30 litres (1983) and *c.* 100 litres (1984) were processed by flotation for the recovery of (primarily) charred plant remains. A proportion of the residues (resulting from 10 litres subsamples) was microscopically sorted for mineralised plant remains; the details of the sampling and sieving program are given in Chapter 2. This was necessary because the majority of mineralised plant remains are too dense to be recovered in the flots.

This section reviews the results, occurrence, and processes of mineralisation and the interpretation of the mineralised plant assemblages represented. Because the identification and interpretation of the assemblages are biased by mineralisation, this mode of preservation is examined in detail.

The aims of the this work are summarised below:

1. Taphonomy:

- to examine and discuss the process of mineralisation;
- to determine whether mineralisation occurred *in situ*, or whether the remains were already mineralised when disposed of in or on the Deposit.

2. Character:

- to understand the character of the Deposit, and of the mineralised plant assemblages;
- to study the vertical and lateral variation of plant remains within the Deposit.

3. Economy and activities:

- to investigate the physical processes and human activities that resulted in the mineralised plant assemblages.

Archaeological Significance of Mineralised Remains

Preservation by mineralisation shows some similarities to preservation by waterlogging. The value of these types of assemblage lies partly in the fact that the preservation of taxa has been largely unaffected by human intervention, so providing a less biased picture of the habitat represented. Charred remains are usually preserved as a direct result of human activities and are therefore strongly biased in their species composition, usually consisting primarily of cereals and cereal processing waste. The archaeological significance of preservation by mineralisation is that this preserves a large range of non-economic and natural species that may have been growing *in situ* or have been discarded (in this case on the Deposit) and which would not otherwise be preserved in archaeological, especially prehistoric, contexts. At Potterne the formation of the habitat itself was the result of human activities but the mode of preservation was primarily unselective. Some selectivity may have operated in the ability of different seeds to become mineralised (see below). The preservation of both mineralised and charred remains on a prehistoric site is highly significant and, at the time of excavation and recovery, was virtually unprecedented in England.

Terminology and Identification

For the sake of convenience, the term 'seed' will be used throughout this report, although in some cases, such as *Ranunculus* sp., the correct botanical term is fruit. Seeds consist of an embryo, variable amounts of endosperm (sometimes none), and a seed coat or testa. For the purpose of this report the term 'embryo' will be used to describe the contents of the seed coat although, anatomically speaking, this will often include some endosperm.

Seed coats are made up of varying numbers of distinct cell layers which possess differing amounts of thickening in their cell walls, depending on the species. These differences mean that when a seed is preserved by mineralisation the subfossil may possess an intact seed coat, or only the lower cell layers of its seed coat, or it may be a bare embryo. Some taxa are always found as bare embryos, eg Chenopodiaceae, whilst

others may be recovered both with and without seed coats, for instance, *Sambucus nigra*. Therefore the seed coats of the modern reference specimens had to be removed to facilitate identification, and it was also necessary to examine many of the taxa that came close to that particular morphological range after removal of their seed coats to ensure correct identification. The seeds of some genera were very similar after removal, making identification to species level, using a light microscope, not always possible. Closer examination of seed embryo cells under a Scanning Electron Microscope may enable further separation to be made in the future.

Notes on identification for some of the taxa are given in archive. Identifications were given as 'cf.' if the characters were considered to be sufficiently distinctive but a degree of uncertainty remained as to whether morphological or size variations in other species could produce an overlap with the given taxa. Where identifications were given as a 'type', a number of genera may be included and details are given in archive. Habitat information and nomenclature has primarily been taken from Clapham *et al.* (1962).

Presentation of the Data

The variation in seed numbers between samples was considerable and in order to make comparisons between the zones and sample columns, each taxon is expressed as a percentage of the total seed number (Appendix 2a–b). Therefore, where seed numbers were very low, high percentages may have been obtained for some taxa which could be misleading if the seed total is not taken into account.

The data in Figures 21–3 are presented in the form of bar diagrams with each diagram representing a series of zones through the Deposit, effectively making up a column. Appendix 2a–b lists the taxa recovered, giving total numbers of seeds for each Zone of the Deposit. However, it should be remembered that, despite being given the same numbers across the site, the zones in each of the sample columns are not necessarily equivalents. Therefore, some of the changes in taxa through the Deposit may have been blurred by summarising the data in this way.

Discussion of Mineralisation

Because the composition of the plant assemblages is inextricably tied to the method of preservation at Potterne, it is necessary first to try to establish how, why, and where mineralisation has taken place before attempting to interpret the remains.

The process and conditions of mineralisation

This method of preservation has previously been found to occur primarily in deposits containing human faecal

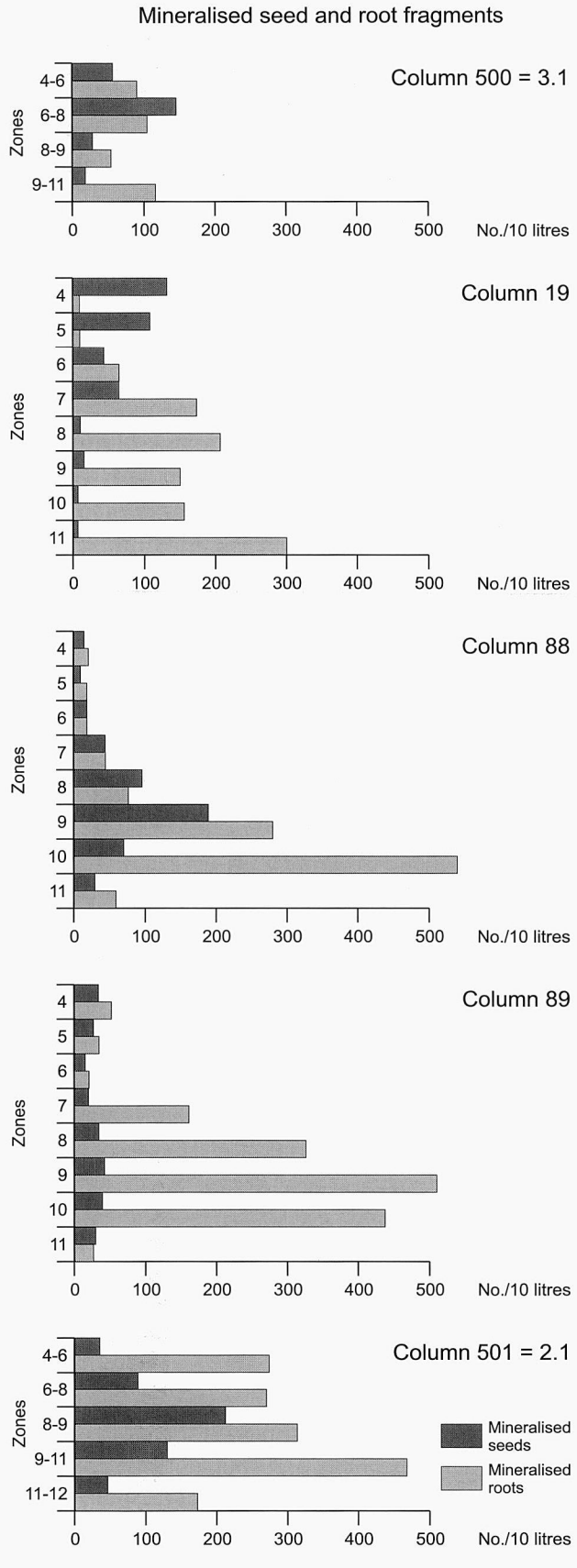


Fig. 21 Distribution by Zone through the Deposit of mineralised seed and root fragments recovered by wet sieving from 'off-terrace' column 143

waste, such as cess-pits and garderobes (Green 1979a). X-ray diffraction and partial chemical analysis of remains by Green (*ibid.*) showed that the main constituent was calcium phosphate in the form of a poorly crystalline apatite. Electron milliprobe analyses of a mineralised seed and insect pupa from Potterne demonstrated that these tissues had also been replaced by a form of calcium phosphate (M. Robinson, pers. comm. and archive).

For phosphate mineralisation to occur, soluble phosphates must be highly concentrated in the matrix surrounding the biological remains (Allison and Briggs 1991). At present the precise conditions under which mineralisation occurs, and how long the process of plant tissue replacement takes, are not fully understood. The most relevant research is probably that currently carried out by palaeobiologists on the fossilisation of soft-bodied marine animals (eg, Briggs 1991; Allison and Briggs 1991). This has shown that a prerequisite for mineralisation in aquatic systems is rapid burial, since this excludes scavengers and oxygen (promotes anoxia) from the carcass. Anaerobic decay of the organic matter then prompts early diagenetic mineralisation. Where phosphate ions are highly concentrated, for example as a result of the decomposition of large amounts of organic material, authigenic phosphate may form, facilitating preservation by phosphate mineralisation. Phosphate is the most rapidly formed authigenic mineral, so it can result in the most spectacular and rapid preservation, for example, preserving complete octopus outlines including fine details of the tentacles (Briggs 1991). Experimental work by Allison (1988) using aquatic invertebrates has shown that mineralisation can be very rapid, the process starting within days.

Although no experimental work has been conducted using plant material in a terrestrial situation (to the author's knowledge) some of the basic principles of the marine research may be applicable to mineralisation in archaeological deposits. Kenward and Hall (1995) suggest, from their examination of the relatively small amount of mineralisation found in the Anglo-Scandinavian Coppergate samples, that 'mineralisation is rare in barely decomposed organic deposits', and this fits with the hypothesis that organic decay plays a part in the onset of mineralisation. It also concurs with findings by the author in two adjacent medieval faecal deposits at Jennings Yard, Windsor, Berkshire (Carruthers 1993b, 90), where one had been preserved by waterlogging and contained no mineralised remains, and the other was dry when excavated and contained only charred and mineralised material.

The types of contexts from which mineralised remains can be recovered, the parts of the seed which are preserved, and the range of species in which mineralisation occurred can all aid in understanding the mineralisation at Potterne.

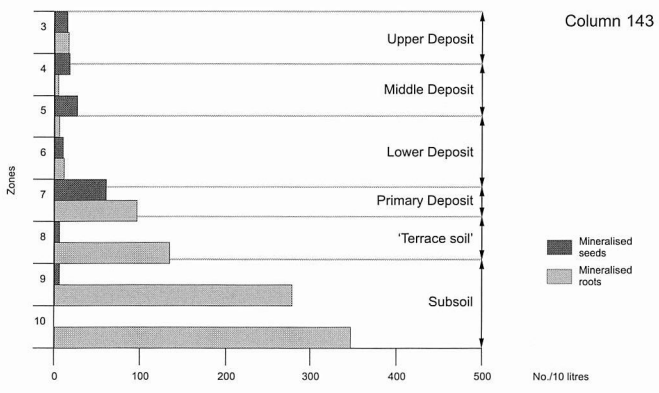


Fig. 22 Distribution by Zone of mineralised seeds and root fragments 'on-terrace'

The types of tissues preserved

It is frequently only the softer tissues of the seed that become preserved by mineralisation (Green 1979a). Thus, many seeds are recovered without their seed coats, but with the endosperm and embryo in a perfect state of preservation. Taxa preserved with intact seed coats are mainly those with thin, undifferentiated layers to their seed coats, eg stinging nettle (*Urtica dioica*), while those with more complex, specialised structures, such as *Ranunculus* sp. (described as a testal seed coat), tend to be preserved as bare embryos. Several taxa may be under-represented in mineralised assemblages because they possess complex seed coats and hilums which regulate water uptake. Legumes, for instance, seem to be more often preserved when fragmented, as in a Saxon cess deposit at Abbots Worthy, near Winchester (Carruthers 1991a). Cereal caryposes are also rarely preserved by the process of mineralisation. Thin-walled root fragments were also mineralised at Potterne, and occasional mineralised stem fragments of straw and rush can sometimes be preserved (eg East Chisenbury; Carruthers, unpublished). Bracken (*Pteridium aquilinum*) pinnules can be preserved and a few were recovered from the Deposit at Potterne, but no other identifiable fragments of vegetative plant material were recorded. A fuller understanding of these properties may provide further information concerning the process of mineralisation.

Preserved animal remains appear to be mainly soft tissued invertebrates such as insect pupae, earthworm cocoons (sometimes complete with embryonic earthworms, see Pearce *et al.* 1990 and Allen, below), isopods, and myriapod segments. As suggested by Briggs (1991) for marine invertebrates, the more rapid decay of these softer tissues may be a factor in their becoming replaced by calcium phosphates. Adult insects, such as beetles, are rarely preserved, although an adult fly emerging from a pupa was recovered from Bristol (J. Jones, pers. comm.). This selectivity is significant in relation to the mechanism of mineralisation, and Girling (1979) has demonstrated that calcium carbonate replacement operates with the same biases as

calcium phosphate preservation. She proposed that the determining factor in whether or not an arthropod becomes preserved is the presence or absence of a waxy epicuticle; insects possess waxy cuticles which are responsible for controlling water loss, but in millipedes and centipedes this is much less well developed. Girling (*ibid*) suggested that mineralisation occurs in arthropods with softer cuticles because their greater permeability allows the entry of water charged with calcium carbonate. This permeability may help to explain why the softer tissues of fruits and seeds are more likely to become mineralised with calcium phosphates and indicates the importance of fluids in this process.

Mineralisation at Potterne

As previous records of mineralised remains elsewhere had mostly been from faecal deposits, it was at first unclear whether the mineralised remains at Potterne had been derived from redeposited faecal material, or could have formed *in situ*. This question is of prime importance because it affects all aspects of interpretation.
Arguments against the redeposition of faecal waste are:

- Primary disposal of faecal remains in the Late Bronze Age was not in cess-pits (as in medieval and post-medieval urban contexts).
- No parasite ova were found in the two coporolite samples sent to Andrew Jones (below), although small numbers of parasite ova of both *Trichuris* and *Ascaris* were found during pollen preparation and analysis within the coprolites by Scaife (above)
- There are very few edible species such as are characteristic of faecal deposits, and those present were found almost exclusively in pre-Deposit levels. No cereal bran was present.
- The taxa represented are largely weeds of disturbed land, many of which are typical of the type of habitat that a highly organic, midden-like deposit may provide.

If the presence of mineralised remains was entirely due to the redeposition of vegetation and weedings whose seeds had become mineralised elsewhere, the dumping would have had to have been fairly uniform and continuous. Changes in species composition, which were constant across the sample columns, argue against this type of deposition. In addition, plants would have to have been in seed at the time of disposal. Weeding needs to be carried out before plants go to seed in order to be effective.

A further point in support of predominantly *in situ* mineralisation is the abrupt fall off in seed numbers 'on-terrace' (column 143) in samples from what is considered to be undisturbed natural sediments, in comparison with the high numbers of mineralised root fragments in all three samples from the natural (Figs 21 and 22). The roots appear to have originated from plants rooting into the otherwise undisturbed subsoil, becoming mineralised *in situ*. The examination of thin sections of mineralised concretions from Potterne has also shown that soils have become mineralised *in situ*. It is clearly possible, however, that some of the plant remains had become mineralised prior to being deposited, although it is impossible to determine to what extent this occurred, since none of the assemblages stand out as obviously different.

Formation of mineralised remains at Potterne

The soil micromorphology and soil chemistry (Macphail, above) indicates that domestic and farm waste had been a major source of calcium phosphates. Macphail suggests that some probable human coprolitic material occurs throughout the Deposit, but that this is not a major component; a view supported by the mineralised plant remains (see above). Other sources of organic matter and phosphates are suggested by the soil analysis; relic wood ash, Poaceae (= Gramineae) ash, fused cereal ash, charred dung, liquid animal waste, herbivore/omnivore coprolites and byre waste, and dog coprolites. Unfortunately, there were no large concentrations of either charred (Straker, below) or mineralised plant macrofossils to clearly corroborate these suggestions. The second important factor in the formation of mineralised remains is likely to be the availability of fluids/liquids. Kenward and Hall (1995) suggest that mineralisation occurs as a consequence of the combination of decay and groundwater movement, but that full waterlogging appears to prevent mineralisation. At Potterne there is the likelihood of the addition of liquid animal waste direct to the Deposit, and the deposition of large quantities of highly organic waste may have periodically increased the water-retention capacity of the Deposit. On present evidence we cannot draw any more certain conclusions, but the fact that preservation has occurred is proof that conditions for mineralisation persisted through the formation of the Deposit and that further research is needed to resolve these questions.

A mineralised surface (context 3503) was observed in the central area of Cutting 12 beneath the Deposit, and this hard-pan may have impeded drainage in the area to some extent. Kenward and Hall (1995) note that mineralised concretion is often seen to have taken place 'at the interface of layers of different porosity within the fills of a pit, or where the fill meets the deposits into which the pit was cut'. The pre-Deposit occupation of the site may have caused compaction of the soil in this area (it is proposed that this area was used as a trackway), and this could have interrupted the drainage sufficiently to cause the formation of the hard-pan layer.

The origin and range of taxa preserved at Potterne

Most of the deposits previously analysed for mineralised plant remains have been cess-pits or garderobes

containing human faecal material. These produced a limited range of taxa and the assemblages have been dominated by the remains of edible taxa such as fruit stones. A comparative study by Green (1979b) showed that over 90% of the taxa preserved by mineralisation in medieval urban deposits in southern England were orchard crops. A wider range of taxa (at least 64) was recorded from the samples at Potterne and the remains of obviously edible plants (in the human diet) were rare. As mineralisation seems to have occurred *in situ*, an alternative source for the seeds to that of concentrated human faecal material is implied.

Worm disturbance and the modern soil

Samples were taken in Cutting 12 (1984) from the 'environmental squares' beginning at the topsoil, Zone 1. The uppermost samples were examined in order to determine the extent to which the upper part of the Deposit had been reworked, and the level at which properly stratified deposits began. These samples were included in the initial analysis of columns 88 and 89. It was found that an average of 14 mineralised seeds per 10 litre sample was present in Zone 1 compared with 54 mineralised seeds in lower samples. The species composition matched that of the top half of the Deposit quite well, but it was not considered worthwhile including these disturbed levels in the final analysis. Zones 1–3, therefore, are omitted from all further analysis and discussion.

It was clear from observations in the field and from the presence of small numbers of modern seeds throughout the samples from the Deposit that some mixing of material had taken place, probably mostly due to worm action (see Macphail; esp. Upper Deposit). For a number of reasons it is thought that this is unlikely to have seriously affected the mineralised assemblages, although some blurring of changes in species composition may have occurred. First, modern seeds were largely confined to the modern topsoil (Zone 1–3). Thereafter, only a few modern seeds had been transported down the soil profile. In addition, some abrupt changes in the occurrence of species were observed for the mineralised seeds (see below), and the fall-off in mineralised seed numbers in the 'terrace soil' and undisturbed subsoil 'on-terrace' was marked (Fig. 22). In the pre-Deposit features, clear differences between the numbers of mineralised seeds per sample (see below) in the features and in the post-holes suggest that remains had been mineralised *in situ* rather than having been transported down from the Deposit.

Macphail's soil micromorphological studies confirm that modern earthworm burrowing has affected the topsoil and uppermost few centimetres of the Deposit, but that burrowing contemporaneous with earlier facies of the Deposit is also detectable. Mineralised worm cocoons (Piearce *et al.* 1990; Allen, below) within the Deposit and earlier levels indicate that worm disturbance also occurred in the Late Bronze Age.

Mineralised roots

Some of the roots from the equivalent of Zone 8/9 (column 2:1, 'off-terrace') in Cutting 2/12 (context 202) were sent to the Jodrell Laboratory, Kew Gardens, for identification. They were identified as dicotyledon roots, all of the specimens appearing to be very similar but not identifiable to species (T. Lawrence, pers. comm.). Although monocotyledonous roots (primarily grasses – Gramineae/Poacaea) could have been present in other samples, none appeared to be notably different to those examined at Kew when examined by the author. As it seems highly unlikely that grasses were not growing locally, it is possible that these roots do not readily become mineralised. The question of which types of plant are more susceptible to mineralisation is another area that could be worthy of further investigation.

'Fused amorphous material'

Three small samples of mineralised concreted material were examined by the author to see whether they contained plant macrofossils. No plant remains were observed on the surfaces of the concretions, so the samples were immersed in dilute sulphuric acid for several hours, until they were soft enough to break apart. The following few remains were observed:

Feature 3704 context 3710 (s.671)
a few very small fragments of charcoal
Zone 7, 'on-terrace' context 2227 (s. 682)
a small amount of compacted, layered silicified material; a few small fragments of silicified cf. straw and a couple of frags of *Triticum* sp. awn. = burnt crop processing waste or dung?
Zone 9, 'off-terrace' context 2604
a few small fragments of charcoal only

Subsamples of these concretions were thin sectioned by Macphail and are discussed further in his report (above).

Results

1 Subsoil and 'Terrace soil'

Mineralisation of plant and animal material was observed in pre-Deposit levels. In order for calcium phosphate mineralisation to have taken place in these earlier levels, minerals must have been washed down from above bringing about the preservation of any seeds present in the 'terrace soil'. Initially it was thought that this came from the accumulating Deposit, however, Macphail (above) reports that the 'terrace soil' appears to be anomalously organic, and suggests that animal herding, in addition to the deposition of domestic waste and in particular liquid animal waste, could have been the origin of calcium phosphate. A few of the nutrient-rich indicator species were present (eg, *Urtica urens* and Chenopodiaceae), although these would need to have

grown in places where they would have avoided being trampled (such as the margins of a droveway).

The 'terrace soil' beneath the Deposit in the southern area of Cutting 12 contained an average of only 9 seeds per sample. Seeds falling onto occupation surfaces are much more likely to have been consumed by birds and small mammals, or to have rotted or washed away, than those rapidly buried by the Deposit. Some of the seeds in the surface levels of the pre-Deposit layers (context 2436, Zone 8) may represent waste ground and long and unkempt vegetation that had grown up on the edge of the settlement, or certainly away from the focus of activity.

A mineralised spikelet fork, probably from emmer wheat (*Triticum* cf. *dicoccum*) was recovered from the primary Deposit (Zone 7). These remains were frequent in a charred form in both Deposit and earlier occupation samples (Straker, below). The presence of mineralised arable weed seeds suggests that unburnt crop processing waste was being dumped, and that more cereal chaff was probably originally present but has not survived as these remains are not readily preserved by mineralisation (see above).

Mineralised roots are frequent in these lower layers (Fig. 22), and Macphail notes that the 'cobbled surface' is a hydrological barrier and is, itself, a direct result of mineralisation. The types of taxa present were similar to those from the Deposit, with nettles (*Urtica urens* and *U. dioica*) and Chenopodiaceae often predominant, but also arable-type weeds such as *Lithospermum arvense* frequently being present.

2 Features, pits, post-holes, ditches

Mineralised plant remains were recovered from all the features sampled. Although seed numbers were variable ranging from 1 (post-hole) to 104 (pit), mineralised rootlet fragments were consistently high (ranging from 120, post-hole to *c.* 800, 'cobbled surface'). This suggests that differences in seed numbers were due to depositional variations rather than limits on preservation.

Differences in the species composition between the various types of features and pre-Deposit layers can also be seen. The layers and post-holes 'on-terrace' contained mainly weeds of arable, some fruits and a few general ruderals. The larger features contained weeds of humic waste, fewer arable weeds and some fruit remains. This reflects the kind of waste that was being deposited in the pits and perhaps also the nature of the vegetation growing on or around them.

A large number of mineralised fly eggs and 61 worm cocoons were recovered from feature 3605 (Figs 12 and 16), providing evidence of the organic nature of the fill of this feature and suggesting that the pits were open for a while.

Some of the post-holes in the north-east corner of the trench also contained weeds of humic waste, which may indicate differences in the activities taking place on and off the terrace.

The number of root fragments was found to be more or less the same in the large features, post-holes and layers suggesting a fairly even cover of vegetation. How much of this grew up after the abandonment of the settlement is difficult to determine, but the numbers of fragments varied little from the top to the bottom of the deeper features.

The significant difference from the Deposit was that the edible and economically useful taxa such as apple (cf. *Malus sylvestris*), sloe (*Prunus* sp.), blackberry (*Rubus* sp.) and flax (*Linum usitatissimum*) were more in evidence. These were recovered from post-holes (4 of 18 examined), a linear feature and a pit (see below for further details).

Twelve seeds of cultivated flax were found in the features, mostly 'on-terrace'. *Prunus* sp., apple and blackberry pips were found almost exclusively in features 'on-terrace'. Of the other taxa restricted to earlier contexts, mallow (*Malva sylvestris*) may have been consumed as a vegetable or used medicinally. The leaves are said to make a good soup (Mabey 1972) and the plant has anti-inflammatory properties.

3 The Deposit

Species composition

A wide range of taxa was recorded from the samples (see Appendix 2a–b). Those taxa recovered from the Deposit samples can be arranged in five main groups according to their habitat preferences:

1. The predominant group is the 'weeds of disturbed ground and wasteland'. These are frequently efficient colonisers which may produce large numbers of seeds after a rapid period of growth. Some of the taxa are indicative of nitrogenous soils, eg henbane (*Hyoscyamus niger*) and others, such as stinging nettle (*Urtica dioica*), grow on soils rich in phosphorous (Piggott and Taylor 1964). These taxa reflect the organic nature of the waste being deposited.
2. The second most prominent group is the 'weeds of arable/cultivated land', eg corn gromwell (*Lithospermum arvense*), field pennycress (*Thlaspi arvense*). Plants of this group are often adapted to the frequent disturbances of cultivation and grow rapidly in order to produce seed before the harvest. For this reason they are all annuals and are commonly recovered in charred assemblages, as was the case on this site (Straker, below). Arable-type weed seeds may have been deposited in crop cleaning waste or crop weedings. The plants may also have found the disturbed habitat that the Deposit presented similar to that of cultivated land and become established in some areas.

Both of the first two groups contain plants which are adapted to some sort of disturbance and so many of the taxa could be placed in either group.

3. Some grassland taxa were present, including

buttercup (*Ranunculus acris/bulbosus/repens*), plantains (*Plantago lanceolata, P. major, P. media*) and grasses (*Poa* type). As with any of the seeds, these remains may have been deposited in waste, in this case perhaps in animal litter or fodder, or may have grown in some areas of the Deposit. Grasses such as annual poa (*Poa annua*) and plantains are also effective colonisers of waste land, particularly in trampled and abraded areas (Darlington 1969).

4. A number of plants of seasonally damp to wet places were represented in the seed assemblage, for example spike rush (*Eleocharis* sp.), blinks (*Montia fontana*), and sedges (*Carex* sp.). Some of the sedges may have been dry grassland species, but, as previously suggested, areas that were at least seasonally wet may have existed on the Deposit. Seeds may also have been transported from the river in the valley bottom amongst hay, dung, or in mud on the feet of animals and people.
5. Plants of economic importance. The few remains from plants that were almost certainly eaten or of economic importance, such as blackberry (*Rubus fruticosus*), apple (*Malus sylvestris*) and cultivated flax (*Linum usitatissimum*), were all recovered from Zone 7 'on terrace' (primary Deposit) and earlier pre-Deposit levels and features on the terrace. Other species, such as elderberry (*Sambucus nigra*), brassicas (*Brassica/Sinapsis* sp.) and wild carrot (*Daucus carota*) which were present throughout the overlying Deposit may have been consumed, but could have grown naturally in such a habitat. Similarly, it is possible that plants from any of the habitat groups were used medicinally, for example, henbane; for fibre, for example, nettle and flax; as dye plants, for example, elderberry and blackberry; or for bedding, for example, bracken and grasses.

Within the five groups, some of the species show preferences for calcareous or basic soils, and some for more acidic soils. Chalk soils are available within a few hundred metres of the site but present day measurements of the site pH show that it is weakly to moderately calcareous (Macphail, above) so that species such as wild carrot and self-heal (*Prunella vulgaris*) may have grown locally. Patches of organic waste could have created localised acidic areas on the Deposit on which species such as blinks and sheep's sorrel (*Rumex acetosella*) may have grown. Alternatively, weeds of acidic soils might have been gathered amongst bracken which was being brought into the site for some purpose, such as for animal bedding. There are brown sandy soils within a kilometre of the site that may have been acidic at the time of Deposit formation, and areas of Greensand outside the site may well have been decalcified by the Bronze Age (R. Macphail, pers. comm.). Most of the seeds from plants of acid soils occurred in the lower half of the Deposit (ie Zones 11–8) or in features. Since these low levels are associated with a higher degree of mineralisation, these factors could be linked. The seeds from plants of basic soils were more generally distributed.

In order to determine what kinds of plant communities were represented, taxa were arranged in phytosociological groups used by Silverside (1977). Numerically the most dominant group (*c.* 58% of the total seeds) was the 'Chenopodio-Urticetum urentis' community of the order 'Sisymbrietalia' which is said to be characteristic of compost heaps and other nitrogenous situations. Some of the other groups that were represented were typical for arable weeds of sandy or acidic soils ('Spergulo-oxalidion' alliance) or damp, heavy, and often peaty soils ('Galeopsis speciosa' association) of the order 'Polygono-Chenopodietalia'. It may be worthwhile using phytosociological groupings in statistical analyses should further excavations take place at Potterne.

The Deposit; distribution of mineralised plant remains

It is not possible here to provide conclusive explanations for the complicated changes in seed number and species composition either vertically and laterally through the Deposit – far more detailed sampling is required (see Chapter 7, below). The six columns examined for this evaluation represent 3% of the main excavation, which in turn probably represents a minute fraction of the Deposit and pre-Deposit occupation, so it is not known whether the results are representative of the site as a whole. Wide variations in seed numbers made difficult comparisons between the columns, and statistical analysis was, for the most part, not possible due to the small amount of data. These factors should be taken into account when examining the figures, which are presented only as rough illustrations of the types of variation that may exist, and not as a definitive interpretation. This analysis does, however, provide some basis for suggestions as to the nature and origin of the Deposit, and indicates the potential for future work on the mineralised plant remains (below).

Mineralised plant remains were recovered from all of the samples taken at different points through the Deposit, and from all of the underlying features examined to date. The number of seeds and root fragments recovered varied considerably from sample to sample (Figs 21–2). The average number of seeds per 10 litre sample from the Deposit was 54, ranging from 1 to 222. Although large differences were found in the numbers of seeds in samples even from the two adjacent columns, 88 and 89, the general trends in species composition were found to be similar. The number of root fragments varied independently from the seeds, and was generally found to increase towards the bottom of the Deposit.

The evidence suggests that most mineralised seeds recovered from the Deposit represent part of the seed bank produced by vegetation growing on that disturbed habitat. The total number of seeds recovered from the samples may have been affected by any of the following factors:

- The density of vegetation growing on the Deposit and whether or not the plants were producing seeds. Frequent disturbance by being smothered under waste, being heavily shaded or being grazed by animals may have affected the production of seeds.

- Whether the seeds remained in the soil long enough to become preserved. Experiments have shown that 50% of the seeds shed may be eaten by rodents within the first 6 months in the soil (Sarukhan 1974) and many of the seeds found at Potterne are readily eaten by carabid beetles when they fall to the ground (M. Robinson, pers. comm.). A further percentage will germinate providing that conditions are suitable. If the soil had been partially waterlogged, fewer seeds may have been able to germinate and plant tissues would have been preserved longer allowing time for mineralisation to take place.

- Whether the conditions necessary for preservation to take place were met in different areas of the Deposit. These conditions are not yet fully understood (but see discussion of mineralisation, above).

- Whether seeds (already mineralised or uncharred) were present in the waste being deposited. The extent to which this had occurred could only be determined if the taxa deposited in waste were sufficiently different from those growing on the Deposit, for example, if large numbers of fruit seeds and cereal remains were recovered. This was not the case at Potterne, so the question remains unanswered.

Factors affecting the numbers of seeds recovered from each taxon have already been mentioned with respect to differential preservation, and are also discussed below. Where both the seed number and root number were low, as at the top of column 143 (Fig. 22), the degree of mineralisation is likely to have been the limiting factor. However, where there were few seeds but many root fragments, as at the bottom of columns 19 and 143, any of the other factors given above may have applied.

For column 143, located 'on-terrace', excavation and the absence of artefacts indicated that the lower three or four zones were composed of subsoils and weathered natural (see pre-Deposit layers). The presence of a concentration of seeds at Zone 7 (the primary Deposit), and many root fragments but very few seeds in the lowest three zones suggested that a vegetation surface had existed at around Zone 7 'on-terrace' (Fig. 22). Worm and root action may have been responsible for the presence of the few mineralised seeds recovered from the truncated soil profile in Zones 9 and 10.

To examine further the relationship between seed number and degree of mineralisation, the percentage of pot sherds possessing mineralised encrustations was calculated. The results were compared with the seed and root numbers for two columns 'off-terrace' (19 and 88), as these columns showed opposite trends in the number of seeds per sample. Both columns showed similar trends in percentage pot encrustation, rising from *c.* 12% in the top three zones of the Deposit (4–6), increasing suddenly to around 40% in Zones 7–9, and falling once more at the bottom of the Deposit to *c.* 12%. This follows the pattern of root preservation, demonstrating that the conditions were more favourable for mineralisation to take place in these zones. The numbers of seeds recovered, however, did not follow this pattern in every column, which suggests that other factors, such as seed productivity, were coming into play.

Changes in species composition within the Deposit

Although the amount of data assembled is small, some changes can be detected both laterally and vertically through the Deposit. As previously noted, comparisons between zones and columns have been made difficult by the wide variations in seed numbers between samples (especially columns 88 and 89 which are contiguous), so that interpretations regarding the changes in the Deposit cannot be given with any confidence. The following suggested trends should be seen as hypotheses awaiting more detailed investigation.

In Appendix 2a–b, raw numbers of seeds are presented, and in Figures 21–4, the number of seeds from each taxon expressed as a percentage of the total number. It should be noted, however, that the number of seeds in the soil may bear little relationship to the number of plants of each species growing in that area. Some taxa produce large numbers of seeds, especially early successional plants, arable weeds, and grassland annuals (Silvertown 1982). Nettles and Chenopodiaceae shed large numbers of seeds directly into the soil beneath the plants, and these seeds were most numerous in the Potterne samples. Plants with efficient dispersal mechanisms would have fewer seeds falling into the soil beneath them, so are less likely to occur in the archaeological samples and were not recovered in large numbers, although some of these taxa are prevalent weeds on wasteland. Of course preservation of a taxon also depends on its susceptibility to mineralisation. It is thus, not possible to accurately reconstruct the past environment, but some indication of the type of vegetation that existed can be acquired, and major changes observed.

Changes in species composition across and through the Deposit have been examined by comparing the percentages of specific key taxa from two main species groups; weeds of damp, humic waste and weeds of arable. These were henbane, blinks, spike-rush, sheep's sorrel and bracken from the former group, and corn gromwell, poppy, field penny cress and brassicas from the latter. Useful habitat information provided by other

taxa that were always associated with these specific species was then considered, even though the numbers of these were always low. This is the reverse of the usual method of interpretation – usually the habitat information is used to group the taxa, rather than the taxa being used to describe the habitat. However, the insufficiency of data meant that it was not possible to use more objective methods, and the aims of this report are to draw attention to the potential of the assemblages rather than to provide a definitive interpretation.

Spatial variation

Obviously vertical variation is difficult to demonstrate in view of the considerable horizontal variation and because only six full columns were examined. At the base of the Deposit (Zone 8–11) in the main 'off-terrace' Deposit (columns 88 and 89) species of damp and highly nitrogenous conditions (henbane and blinks) often occurred together. A close association was observed between these two species and both were restricted to these lower zones of the Deposit. These two species are not particularly common in archaeobotanical assemblages from other sites and they are of interest because they occupy distinctive (but not identical) habitats. Although some wetland taxa, such as blinks and spike-rush, were predominant at the base, others such as the sedges showed no obvious pattern of distribution. In the top of the Deposit arable-weeds were predominant. Grassland taxa, particularly plants of trampled areas, were also possibly slightly more numerous in the top half of the Deposit than in the bottom half.

The selected weeds of arable (corn gromwell, poppy, field pennycress, and brassicas) fall more naturally into a habitat group, although they may inhabit other areas of disturbance. Figure 23 shows the results of this analysis. It can be seen that, beginning at the bottom of the sequence in Zone 10, there appears to be a concentration of weeds of humic waste just 'off-terrace' in the centre of the trench (columns 88, 89 and 3:1). To the north, the more arable-type of weeds predominate in the lower zones (columns 19 and 2:1). Moving up the columns, the humic waste weeds appear to have spread northwards, as they now occur in columns 19 and 2:1 but disappear from columns 88, 89 and 3:1. Towards the top, and throughout column 143 'on-terrace', all of the weeds were arable-type. The trends shown in Figure 23 for the humic waste group were to some extent also found independently in the nettles (*Urtica urens* and *U. dioica*) and chenopods (*Atriplex* sp./*Chenopodium* sp.). These are also taxa of nitrogen-rich soils but were not included in the group as they can grow in a wider range of habitats and are much more widespread in archaeological deposits.

These changes could be reflecting the patchy distribution of the dumping of water-retentive organic waste. In general, it can be said that the plants of nutrient-rich soils were more numerous in the bottom half of the Deposit, and annual weeds primarily of lighter, cultivated soils predominated in the top half. This fits in with the observed increase in mineralisation at the bottom of the Deposit. It is possible that, as the Deposit built up, the effects of impeded drainage by the hard-pan layer at the bottom decreased, and this may have contributed towards the observed changes.

The distribution of annuals and perennials was examined (archive) to try to detect areas of disturbance and areas of vegetation stabilisation. The data was insufficient to draw any conclusions, although there were indications that a period of stability may have occurred in the Middle Deposit, followed by renewed disturbance.

Comparison between species composition of the earliest occupation levels and the Deposit

No major differences were observed between the species composition of the Deposit and that of the earlier, pre-Deposit, levels; the taxa represented in both cases being primarily ruderal weeds. Six taxa occurred exclusively in the Deposit, but these were present in low numbers. Very few seeds were present and no new taxa were found only in the earlier levels, again in most cases only as occasional occurrences. However, some plants of economic importance were included in this group (see above).

4 Roman

One sample from the Roman ditch column in Cutting 13 was examined. This was found to contain 3 mineralised seeds. As this probably represents reworked remains from the Deposit it was not considered worthwhile looking at further samples from this column. Macphail (above) reports that, in contrast with the Deposit, this was a well-aerated topsoil.

Discussion

Plants growing *in situ* or redeposited

One of the most important factors in interpreting the mineralised plant remains is to attempt to determine as far as possible the extent to which the remains were growing on site; ie *in situ*, and which may have been brought in and discarded on the Deposit among a variety of possible waste materials. An important element in understanding the assemblages and interpreting the on-site and off-site environments is, therefore, to consider items that we might expect to find but which do not occur in any quantity in the mineralised assemblages. These include cess, cereals, and human edible plant food stuffs and food waste.

Mineralised cereal caryopses were not recovered, although grains are likely to have been present in some numbers around an occupation site and among domestic rubbish, as the charred assemblage attests (Straker, below). Cereal bran fragments that are frequently present in cess-pit deposits, were not recov-

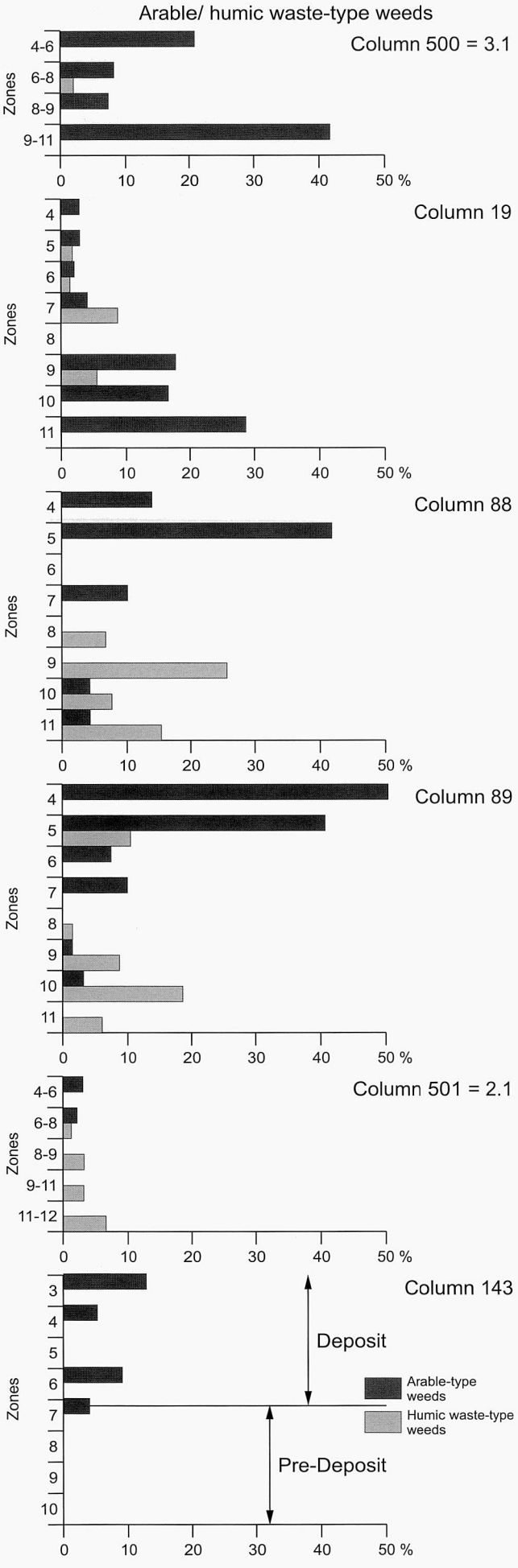


Fig. 23 Relative frequency of arable-type and humic waste-type mineralised seeds from sample columns by zone through the Deposit

ered from Potterne. Leguminous seeds are also infrequent; only three were found, even though charred vetch/tare seeds were quite frequent in the flots (Straker, below). Some of these absences are, however, likely to be due to differential preservation as discussed earlier.

The most persuasive arguments for *in situ* preservation are to be found in the distribution and character of the mineralised Deposit assemblages. All of the samples examined produced mineralised remains, and although the numbers of seeds varied, the distribution was not as patchy as might be expected if dumps of already mineralised plant material had sporadically been redeposited. Instead, the numbers of remains and species distribution followed distinct trends, as described earlier (and see Fig. 23). In addition, by far the most dominant taxa throughout the Deposit were nettles and chenopods (fat hen, etc), with other nutrient-loving taxa such as henbane being frequent in some levels. The fact that these taxa dominate consistently across and through the Deposit means that either

- the dumping always originated from the same type of primary deposit, or,
- (in the author's opinion, much more likely), that the remains primarily represent vegetation growing on the Deposit that was disturbed and rich in nutrients during the period of rubbish disposal. Seeds from this vegetation had become preserved because of the highly organic, moist nature of the deposit into which they were shed. Rapid burial due to frequent dumping episodes probably played a part in the preservation, although not so rapid as to prevent vegetated areas from persisting.

The argument for *in situ* mineralisation is further supported by the abrupt fall off in seed numbers 'on-terrace' in samples from the 'terrace soil' and subsoil in comparison with the high numbers of mineralised root fragments in the subsoil, as described above.

Evidence for disposal of organic waste on the Deposit

Macphail (above) suggests the possible *in situ* stabling or long-term pounding of herbivores on the Deposit, citing experimental evidence of the rapid build-up of phosphate-rich cemented bedding crusts under such conditions. This practice would provide the type of phosphate-rich, liquid waste that is presumed to be ideal for mineralisation to take place, but plant macrofossil evidence for either stabling or pounding is, so far, lacking from Potterne. Mineralised concretions of matted straw have, however, been recovered from the small number of samples taken from East Chisenbury

(Carruthers, unpublished), indicating that either better conditions for mineralisation existed at East Chisenbury, or that they were not present/preserved in the sampled areas at Potterne.

Possible evidence for the deposition of large quantities of highly organic waste and increased water-retention capacity of the soil is found in the recovery of relatively large numbers of seeds of taxa such as blinks (*Montia fontana*) and sedges (*Carex* sp.), suggesting that seasonal waterlogging may have occurred in some areas. Semi-waterlogged conditions may also have been responsible for the fact that the seeds failed to germinate or be predated, but were preserved long enough for mineralisation to take place. It is notable that mineralised seed embryos are generally preserved in a swollen state, and not in the dried and shrivelled condition in which many modern seed embryos are found in aerobic soils.

Redeposition and trampling could have destroyed some of the charred evidence, and decomposition in a compost-heap type of environment might account for the loss of some uncharred seeds. In addition, if fodder had been cut green, prior to the setting of seeds, the stable waste might not have contained large quantities of plant macrofossils before composting (Macphail, above), to become mineralised.

As already indicated, a number of species may have been brought into the site and discarded. Arable-type weed seeds may have been deposited in crop cleaning waste or crop weeding. Some seeds of wet ground species may have been transported from the river in the valley bottom amongst hay, dung, or in mud on the feet of animals and people. Bracken and grasses may have been used for animal bedding and for fodder. Other plants may represent discard from human food waste (blackberry, elderberry, apple) or medicinally (henbane) and others from use in textile and fibre production (flax and nettles) and dyes (elderberry and blackberry). It is, however, not possible to determine the extent to which these activities are represented because most of the taxa could also have grown on the Deposit.

Despite possible loss of material by lack of preservation, or destruction by trampling, it might be expected that some undecomposed dumps would be detected and that remains such as charred and mineralised culm nodes and grassland weed seeds might be more frequent in the assemblages. Since the sampling for both plant macrofossils and soils has so far been limited (considering the vast size of the Deposit as a whole), these problems may have to be resolved at a later date.

Comparisons with other sites

Mineralised seeds have been recovered from very few prehistoric sites, for instance, Iron Age features in calcareous areas of southern England such as Maiden Castle, Dorset (Palmer and Jones 1991), Winchester (F. Green, pers. comm.), Andover, (Carruthers 1991b), and Basingstoke, Hampshire (Carruthers 1995); and Halfpenny Lane, Oxfordshire (Carruthers 1990), but these assemblages have generally been small and very limited in the range of taxa present.

The only site comparable to Potterne was recently discovered 15 km to the south-east at East Chisenbury on Salisbury Plain. This appears to be of a similar date to Potterne and is situated on a prominent chalk spur overlooking the Avon valley floor (D. Field, pers. comm.). Stratigraphic changes are more visible at this site, possibly because of the differences in the geology, with thick, ashy layers alternating with chalky dumps. Evaluation samples taken by the author in 1992 produced similar (or possibly greater) quantities of mineralised seeds although, from the preliminary results, there seems to be more evidence of remains from edible plants (eg apple/pear seeds, cereal bran fragments), perhaps indicating a greater input of human faecal waste. In addition, mineralised concretions containing matted straw or hay suggest the deposition of stable waste, for which there was no plant macrofossil evidence at Potterne. However, this might be a matter of chance, since deposition is likely to have been patchy at both sites and relatively few samples have been examined from either. The range of 'humic waste' and 'arable' weed seeds at East Chisenbury was similar to that at Potterne. Further work at this site would be of great interest as a comparison with Potterne, particularly because the remains can be more easily tied in with stratigraphic changes. It is also of importance because the site may produce more dietary evidence than Potterne.

Conclusions

The distribution and species composition of the calcium phosphate replaced plant remains from Potterne indicate that mineralisation had taken place *in situ* in the accumulating Deposit. The taxa represented are largely weeds of disturbed land, many of which are typical of the type of habitat that a highly organic, midden-like deposit may provide. Thus, this author concludes that most of the taxa represented are plants growing on the Deposit itself, and an indication as to the nature of the habitat can be obtained. A typical wasteland vegetation appears to have been present.

Changes in the species composition of the assemblages suggest that the lower half of the Deposit provided a more organic, damp and acidic habitat than the top half. The degree of mineralisation was also greater. Taxa in the upper half of the Deposit indicate that lighter, possibly more trampled soils existed. Here, the seeds were primarily from weeds of cultivated soils with some grassland species represented. There is generally little plant macrofossil evidence to indicate that human faecal material or unburnt household waste had been deposited, since few remains from edible

plants were found. The absence of mineralised grain, straw and chaff suggests that the arable weeds recovered might have mainly been present because of the disturbed nature of the habitat rather than as waste from crop processing, although some differential preservation may have occurred. It has not been possible to determine what proportion of the seeds were deposited in waste.

Archaeological features first observed below the accumulating Deposit also contained mineralised plant and animal remains. The seeds recovered may represent waste deposited in the features, plants growing around the area, or vegetation that grew up after its abandonment. A similar range of ruderal taxa was present, but hedgerow fruits and cultivated flax remains were also recovered.

5 Charred Cereals and Weed Seeds, *by Vanessa Straker*

The plant remains discussed below, like the mineralised remains (Carruthers above), were recovered from four 1 m square sample columns excavated in Cutting 12 during 1984 through the Deposit and from early layers and features. As described above, the squares were positioned to cover as wide an area of the trench as possible. Two columns on the edge of the 'off-terrace' Deposit (columns 88 and 89) were adjacent in order to examine variation in a small area and the effect of doubling the sample size (Figs 8 and 12). The other squares were to the north ('off-terrace', column 19) and south ('on-terrace', column 143). Two smaller columns that were sampled during excavation in 1983 are not included in this report as the assemblages were too small to be useful.

The aims of the work are set out below. While the results contribute to the overall question of how the Deposit formed it should be understood that the information obtained relates to the sampled area and not necessarily to the Deposit as a whole, only a small percentage of which formed the basis of the 1982–5 excavations.

The Deposit was excavated in 10 cm spits (related spatially as zones) and for the purposes of this report Zones 4–11 only are discussed; 1–3 were regarded as having been disturbed (see Carruthers, above). The data for Zones 1–3 do, however, form part of the site archive.

Aims

The aims of the analysis were:

- To identify the crop plants preserved in the Deposit and in the occupation features (pits, post holes, gullies and linear features) beneath and within it and to consider the results in the light of other contemporary records.
- To study the vertical distribution of the crop plants within the Deposit.
- To investigate the nature of the crop processing activities that resulted in the charred assemblage.
- To examine the composition of the weed flora at different levels within the Deposit for evidence of crop cultivation on different soils.
- To compare the concentration of plant remains and nature of the assemblages in the different types of pre-Deposit features.

The taxa identified are listed in Appendix 2 (c–e) and the numbers refer to the numbers of items per 10 litre sample in order to facilitate comparison with the mineralised assemblage (above). The numbers per 10 litre sample were generally very low throughout the Deposit, but increased towards the base of the 'off-terrace' Deposit (in columns 88, 89) (Fig. 26) and in the pre-Deposit features (Fig. 27). Column 143 sampled the 'on-terrace' Deposits at the southern end of the site and, below Zone 7, the deposits are regarded as 'terrace soil' and subsoil (Macphail, above). The assemblages of seeds/fruits, cereals and chaff from the four columns are of reasonable size, but this is because very large quantities of soil were processed. The comments in the following report relate to both 'on-terrace' and 'off-terrace' samples unless otherwise stated.

The Crops

The criteria for the identification of the cereals were those published by Jacomet (1987). Wheat (*Triticum* spp.), barley (*Hordeum* sp.) and possibly oats (*Avena* sp.) were all present within and below the Deposit. Rye (*Secale cereale*) was not identified with certainty. Caryopses with characteristics in common with both wheat and rye were scored as *Triticum/Secale*, though they are more likely to be abnormal wheat grains than rye, the status of which in the Late Bronze Age either as a crop or crop weed is unclear.

Examination of the edge of the 'off-terrace' Deposit (columns 88 and 89) suggested that wheat dominated the cereal assemblage, but once the data from the four columns were added together, wheat and barley were more or less equally abundant, emphasising the variability of the Deposit.

Wheat (*Triticum* spp.)

Grains with the morphological characteristics of emmer (*T. dicoccum*), such as a humped dorsal surface, were present in small amounts throughout the Deposit. Glume bases of emmer, which are usually more reliably identified to species level than grains, were present throughout though both grains and chaff increased in concentration towards the base of the Deposit. Grains with a more flattened dorsal surface were scored as comparable with spelt wheat (*T. spelta*); these were

found throughout the Deposit. The presence of spelt chaff in the form of spikelet forks and glume bases confirmed the identification. As mentioned below, spelt wheat, a hardy, long-strawed species, is not found as a major contributor to the prehistoric crop repertoire until the Bronze Age, and most examples are Late Bronze Age in date. Figure 24 shows the distribution of emmer and spelt glume bases throughout the Deposit and it is clear that spelt is at least as common as emmer at most levels. It also occurs in the pre-Deposit features.

Many other glume bases of hulled wheat too badly preserved to identify further (Appendix 2c–d) are probably also of emmer and spelt but are excluded from the figure. The variability of the Deposit is clear, with a greater concentration of emmer and spelt towards the top of the column 'on-terrace', than in the 'off-terrace' columns. There was no chaff in Zones 10–9 in the 'on-terrace' column, interpreted by Macphail (above) as a subsoil, though (see below) there are other macrofossils, possibly from a cut feature (post-hole 3523) below the column.

Some grains with a rounded dorsal surface and steeply angled embryo are suggestive of free threshing wheat. These were found in small amounts but at all levels in the Deposit. Very small numbers of tough rachis internodes characteristic of free threshing wheat were recorded in Zone 7 and below the Deposit, and these confirm the presence of free threshing wheat in the assemblage. Free threshing wheat has been identified in small quantities on prehistoric sites from the Neolithic onwards (Hillman 1981a), but rachis internodes are not commonly found.

Two types of free threshing wheat are known to have been grown in the British Isles in the past; bread wheat (*T. aestivum* sl.), a hexaploid form and *T. turgidum* or *T. durum*, a tetraploid form. *T. aestivum* sl. is the group commonly grown today in this country. Of the tetraploid forms, the most likely of the two species to have been grown is rivet wheat (*T. turgidum*), but in the British Isles this has only been identified on sites of Saxon/medieval date (eg Campbell 1994). The tetraploid and hexaploid forms can only be distinguished from each other on the basis of the morphology of the rachis internodes as grain morphology is unreliable, but unfortunately preservation of the Potterne internodes was not good enough for this distinction to be made.

Free threshing cereals may be under-represented on archaeological sites. The structure differs from that in hulled wheat as the grain is easily released during threshing and does not remain enclosed by the glumes. Thus, the crop processing stages involving heat which assist in freeing hulled grain from the glumes are not normally required, reducing the chance of accidental charring of the grain (see below).

Various intermediate categories are listed in Appendix 2c–e where the grains have characteristics in common with more than one species. The *T. monococcum/dicoccum* category indicates the presence of einkorn or single grained or terminal emmer; but unfortunately the chaff is not well enough preserved for einkorn to be identified with certainty. Einkorn was probably only ever a minor, perhaps weedy element in prehistoric cereal fields in the British Isles, but was an

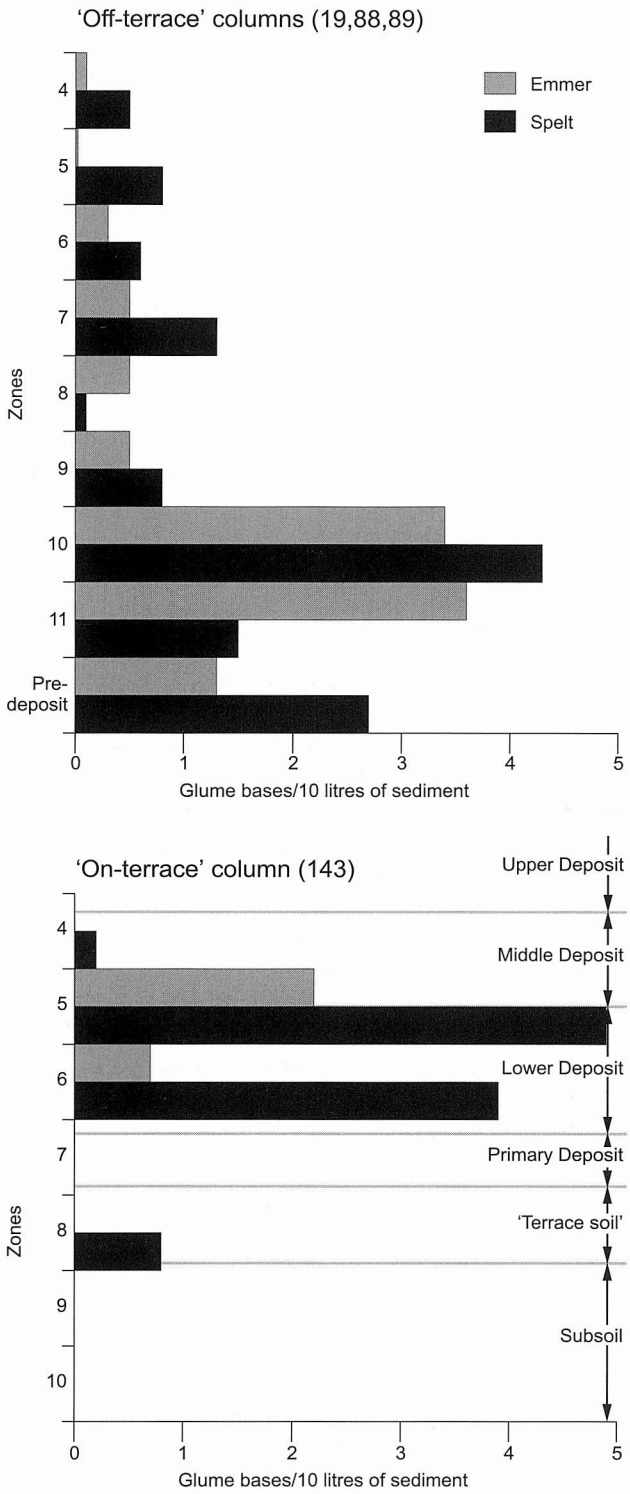


Fig. 24 Relative frequency of charred emmer and spelt glume bases from sample columns by Zone through the Deposit

important crop in its own right in, for example the central European Bandkeramik culture (Willerding 1980).

Barley (*Hordeum* sp.)
Barley is present throughout the Deposit. Some is hulled, but no naked grains were observed, though this could be due to poor preservation. The presence of some twisted grains suggests that the barley is either six-rowed or a mixture of six-row and two-row varieties. Occasional rachis internodes of varying lengths were recorded, but the small numbers involved do not allow the use of the internodes to suggest whether the barley was of a lax-eared or erect spike variety, a mixture of the two or a genetically broad strain.

Oats (*Avena* sp.)
Oats, mainly in the form of caryopses, were present in small quantities throughout, and below, the Deposit. Unfortunately, the few floret bases that were preserved were not intact and it is not possible to tell whether wild (weed) oats (eg, *A. fatua*) or domesticated plants (*A. sativa* or *strigosa*) are represented. The only other chaff consists of fragments of twisted awns. However, in view of the small amount of oats and the generally small size of the caryopses it is probable that oats were an arable weed; wild oats are still regarded as a troublesome weed of cereal fields today. There is no conclusive evidence that domesticated oats were a crop in the British Bronze Age and they were probably not an established part of the crop repertoire until the late Iron Age or Roman period.

Brome (*Bromus*)
This has been classified only as far as *B. mollis/secalinus* and is present at all levels in the Deposit and in the occupation deposits. These grasses are commonly found in association with cereal crops and arable weeds and are generally regarded as an additional weed contaminant. It is possible that on occasion brome was cultivated deliberately as it is edible and the caryopses are quite large, similar in size to some oats. It may also have been collected as a 'famine food' and fed to humans or animals. At Potterne in the two columns examined initially (88 and 89), brome appeared to be at least as common as barley and slightly more frequent than oats, however in the other columns it was rare though generally it remains slightly more abundant than oats.

The Origin of the Charred Remains

There were no large concentrations of charred plant material in the columns sampled and this suggests that, in these areas, much of the material is unlikely to have been burnt *in situ*. The likelihood is that it was dumped as waste from the local settlement, but as discussed below, small scale burning *in situ* cannot be excluded.

There are several reasons why cereals, chaff and weeds might become charred and dumped as waste:

1. In the case of hulled cereals, drying accidents prior to dehusking could result in burning and the debris being dumped on a rubbish tip. In hulled cereals, drying (parching) is necessary to release grain from chaff and would not normally be done except when drying grain for consumption as too much heat would kill the germ and prevent germination of seed corn. Weed seeds could also become accidentally burnt at this stage.

2. During malting. Although most archaeological information on malting is confined to Roman and later sites, the possibility that it was taking place in the Bronze Age should not be discounted. Brewing in some form is likely to have been commonplace, but direct evidence for this is elusive. A variety of cereals can be used in brewing, and roasting of the grain takes place after it has sprouted. As virtually none of the grain had sprouted, a malting accident can be discounted.

3. As a result of crop processing where chaff, weed seeds and inevitably some grain are removed from the harvest by a variety of processes including sieving and winnowing (Hillman 1981b; 1984). The residues could be disposed of in a number of ways. Crop processing waste was a common fuel source for drying ovens and has been recovered from such contexts on Roman sites (eg, Welton Wold, Humberside; Straker unpublished; van der Veen 1989).This could then have been dumped as ash and charcoal onto the Deposit. Crop processing residues could also have been dumped unburnt onto the Deposit and set fire to *in situ* (see below). Likewise, floor and hearth sweepings consisting of waste from crop cleaning or preparation for food could also have been dumped onto the Deposit.

4. By means of an accidental fire in a building or store containing a cereal harvest. In this instance we might expect rather more grain than the scatter found throughout the Deposit. Unless unthreshed sheaves were destroyed, a lot more grain than chaff and weeds would be expected in a store, and if whole sheaves or a roof thatched with cereal straw were burnt, more culm nodes than have been recovered would be expected. If grain was stored in spikelet form, roughly equal numbers of grain and glume bases could be expected, unless conditions of burning had resulted in differential preservation.

Of these possible routes for the origin of the charred material, 1 and 3 are the most likely, although the occasional accidental small scale burning of stored crops cannot be discounted.

On an assemblage of this nature it is not possible to make detailed suggestions about crop processing or agricultural practice. Proportions of grain, chaff and

weeds vary from zone to zone and between columns. Culm nodes and large-seeded weeds, typical waste from the early stages of crop processing, are uncommon. However, the presence of glume bases, spikelet forks and small arable weed seeds makes it clear that at least some of the final stages of the processing of glume wheats were being carried out by the communities responsible for the accumulation of the Deposit.

Dennell (1976), in his reassessment of Helbaek's early conclusions about the nature of Bronze Age crop husbandry (Helbaek 1952), suggested that wheat and barley were staple crops on the chalklands, the areas from which most evidence was available. Since the late 1970s, new data on Bronze Age crop husbandry has been published from many sites, but comparable assemblages of Late Bronze Age/Early Iron Age data are very rare, one such being that at Runnymede Bridge (Greig 1991).

Both emmer and spelt wheats as well as barley, flax and a small amount of rye were the domesticates identified at Runnymede (Greig 1991). The identification of rye, which Greig suggests may have been a weed rather than a crop in its own right, is of particular significance as, to this author's knowledge, macrofossils have not been previously recovered from a Late Bronze Age/Early Iron Age context. Preservation at Runnymede was particularly good with contemporaneous charred and waterlogged plant remains preserved in Late Bronze Age river silts.

Precisely when spelt wheat first became established as a crop in Britain is not clear. It was, as the evidence from Potterne and other sites from all over the British Isles shows, established by the Late Bronze Age but, as in the pre-Deposit features at Potterne, it also occurs on Middle Bronze Age settlements such as that at Trethellan Farm in Cornwall (Straker 1991).

Evidence for the use of pulses (protein-rich leguminous plants) in the Bronze Age is consistent, though slight. Pulses are often under-represented in the archaeological record (and were not found at Potterne) as they are less likely to become accidentally burnt than, for example, hulled cereals are, as they do not require parching. However, *Vicia faba* (Celtic bean) are known from, for example, Middle Bronze Age settlements at Trethellan Farm (Straker 1991) and Rowden, Dorset (Carruthers 1990), and Late Bronze Age deposits at Brean Down, Somerset (Straker 1990).

At present, it is not possible to say much about the importance of different crops in the Late Bronze Age\Early Iron Age as so few large assemblages have been studied. In general, the assemblage from Potterne is similar to a number of Middle and Late Bronze Age ones from the British Isles. Sites with waterlogged deposits such as Runnymede are particularly important as a wide range of biological material survived including insects and other arthropods. Beetles such as weevils may give indirect evidence for the exploitation and storage of crops although the remains of cereals and pulses themselves may be elusive.

Composition of the Weed Flora

Appendix 2c–e lists the wild plants identified from the charred assemblage. Taxonomy and habitat information is taken from Clapham *et al.* (1962). The density of fruits and seeds is low, particularly bearing in mind the large volume of soil processed. Although the number of unidentified items appears to be large, many were in a very poor state of preservation, precluding identification. Although some of the taxa will readily colonise more than one type of habitat, most are associated with disturbed or cultivated ground and were presumably harvested with the crops and then removed during the various stages of crop processing. Some of the more commonly found plants include corn spurrey, knotgrass, corn gromwell, scentless mayweed, brome, black bindweed and vetches. Most of the seeds are fairly small (max. dimension *c.* 2–4 mm) suggesting that fine sieving was responsible for the waste, which was then burnt either at the settlement and then dumped on the Deposit or dumped on the Deposit and burnt *in situ*. It is possible that at least some crop processing waste was dumped unburnt on the Deposit as some arable weeds were among the taxa identified in the mineralised assemblage (Carruthers, above).

Although numbers of weed seeds were low, an attempt was made to see if plants of disturbed/cultivated land, grassland, wet or damp conditions and woodland/scrub situations were distributed equally throughout the columns. The habitat groups used are those in Table 6. As Figure 25 shows, taxa characteristic of damp or wet conditions were present throughout the Deposit, though in small amounts, and their concentration does not seem to alter significantly between zones. This suggests that at least some of the cereal cultivation was taking place on the stagnogley soils of the Gault as well as the better-drained local Greensand soils, though an alternative source of wetland vegetation used as roofing or flooring material is also a possibility. After the 'off-terrace' Deposit (columns 88 and 89) had been examined there appeared to be a concentration of the seeds of plants with a preference for damp conditions towards the base of the Deposit. Most of the wetland plants found at Potterne, however, are typical of shallow fresh water and not of temporary nitrogen/phosphorous enriched deposit that may, indeed, have formed temporary pools on the surface of the Deposit from time to time. However, work on the various sample columns indicates that this was merely the result of a limited sample and demonstrates again the extent of lateral variation within the Deposit.

Plants associated with scrub, woodland or perhaps hedgerows were also present in extremely low quanti-

ties throughout the Deposit and include hazel, hawthorn, rose and sloe. The hazel and sloe could have been eaten and the refuse burnt with waste from cereal cleaning. As it is likely that some of the cultivated land was bordered by scrub, woodland or even hedges, it is to be expected that occasional seeds of these plants would become incorporated into a cereal crop and become associated with arable weeds.

The vertical distribution of the taxa which here are considered to be arable weeds is shown on Figure 25. There are peaks in the concentration of arable weeds in Zones 9 and 8 within the Deposit although the overall numbers remain relatively low. The increases (largely due to the presence of more grasses (Gramineae), black bindweed (*Polygonum convolvulus*), knotgrass (*Polygonum aviculare* agg) and sorrel (*Rumex* sp.) at these levels) do not coincide with the increase or decrease of any other groups of plants and at present cannot be explained. It is worth noting, however, that the pre-Deposit samples do contain a higher density of arable taxa than the Deposit as a whole.

An attempt was made to isolate groups of taxa using a phytosociological approach, as suggested by Silverside (1977). The aim was to see whether groups characteristic of different soils could be distinguished to establish whether the crops were grown on Greensand, Gault Clay, Chalk soils or a range of soil types. In the event, the associations were not found to be particularly diagnostic. General habitat information (Clapham *et al* 1962) suggests that *Odontites verna* (red bartsia) is indicative of heavier soils, such as those of the Gault, whereas *Spergula arvensis* (corn spurrey) and *Rumex acetosella* (sheep's sorrel) would have grown in light, sandy soils such as on the Greensand. No taxa particularly indicative of Chalk soils were identified, but many could have tolerated a range of soil conditions.

However, using Silverside's approach it was possible to recognise groups of taxa characteristic of the Orders Polygono-Chenopodietalia and Centauretalia cyani, the former characteristic of root crops, spring sown cereals and nitrogenous disturbed ground and the latter of winter cereals. This is discussed more fully below (Carruthers and Straker).

Crops could have been both spring and autumn sown, barley being well suited to spring sowing. *Galium aparine* (cleavers) is often regarded as indicative of autumn sowing and *Veronica hederifolia* (ivy-leaved speedwell) of autumn or early spring sowing.

Another plant of interest is the onion couch (*Arrhenatherum tuberosum*). This variety develops underground bulbils and it is these that are sometimes preserved on archaeological sites. Onion couch has been found in association with Bronze Age cremation burials (eg Godwin 1975; Jones 1978) and also in Neolithic contexts (Straker 1990). It has been suggested that this grass, which is a common weed of arable or abandoned arable land, would make useful

Table 6: Charred plant macrofossils: habitat preferences of wild taxa

Column	*88*	*89*	*19*	*143*	*Pre-Deposit*
Disturbed/arable/cultivated land					
*Agrimonia eupatoria**	•				
Aphanes arvensis agg.*	•				
Atriplex/Chenopodium sp.	•	•		•	
Atriplex sp.	•	•	•		
Brassica/Sinapis sp.	•			•	•
Brassica rapa ssp. *campestris*					•
Bromus mollis/secalinus	•	•	•	•	•
Capsella bursa-pastoris					•
Cerastium sp.	•				
Chenopodium spp.	•	•	•	•	•
Euphorbia helioscopia		•			
Euphrasia sp./*Odontites verna*	•				•
Galium cf. *aparine*	•	•	•	•	•
Hyoscyamus niger f	•	•		•	•
*Lapsana communis**				•	
Lithospermum arvense		•	•	•	•
Papaver argemone				•	
Polygonum convolvulus	•	•	•	•	•
Polygonum lapathifolium / nodosum	•				•
P. persicaria	•				•
Plantago lanceolata *b	•	•	•	•	•
Polygonum aviculare agg.	•	•	•	•	•
*Ranunculus acris/repens/bulbosus**				•	
Rumex acetosella	•	•	•	•	•
Solanum nigrum	•				
Spergula arvensis	•	•	•		
Stellaria media		•	•	•	•
Tripleurospermum maritimum	•	•		•	•
Urtica dioica *p	•	•			•
Urtica urens				•	
Valerianella dentata	•	•		•	•
Veronica hederifolia	•	•		•	
Vicia/Lathyrus sp.*	•	•	•	•	•
Viola sp.*	•	•			
*Arrhenatherum tuberosum**	•	•			
Grassland					
Aphanes arvensis agg.*	•				
*Arrhenatherum tuberosum**	•	•			
Daucus carota b				•	
Plantago lanceolata *b	•	•	•	•	•
*Ranunculus acris/repens/bulbosus**					•
Rumex acetosella agg.					•
Urtica dioica *p					•
Vicia/Lathyrus sp.*	•	•	•	•	•
Wet/damp ground					
Berula erecta				•	•
Carex spp.	•	•	•	•	
Cyperaceae	•	•	•	•	
Eleocharis uniglumis/palustris	•	•			
Luzula sp.				•	
Montia fontana a	•	•		•	
Myosoton aquaticum					
Sparganium erectum shallow water				•	
Woodlands, scrub. hedgerow					
*Agrimonia eupatoria**		•			
Corylus avellana	•	•	•	•	
Crataegus sp.		•	•		
P. spinosa / avium	•				
Prunus spinosa	•	•		•	•
Pteridium aquilinium *				•	•
Rosa sp.	•		•		
Heath					
Pteridium aquilinium *				•	
Various					
Galium sp.	•	•	•	•	•
Galium cf.*aparine*	•	•	•	•	•
Gramineae	•	•	•	•	•
Rumex sp.	•	•	•	•	•
Sambucus nigra	•	•	•		

Key: * taxon in more than one group; a: acid soils;
b: basic /neutral soils; f: farmyards; p: phosphate-rich soils

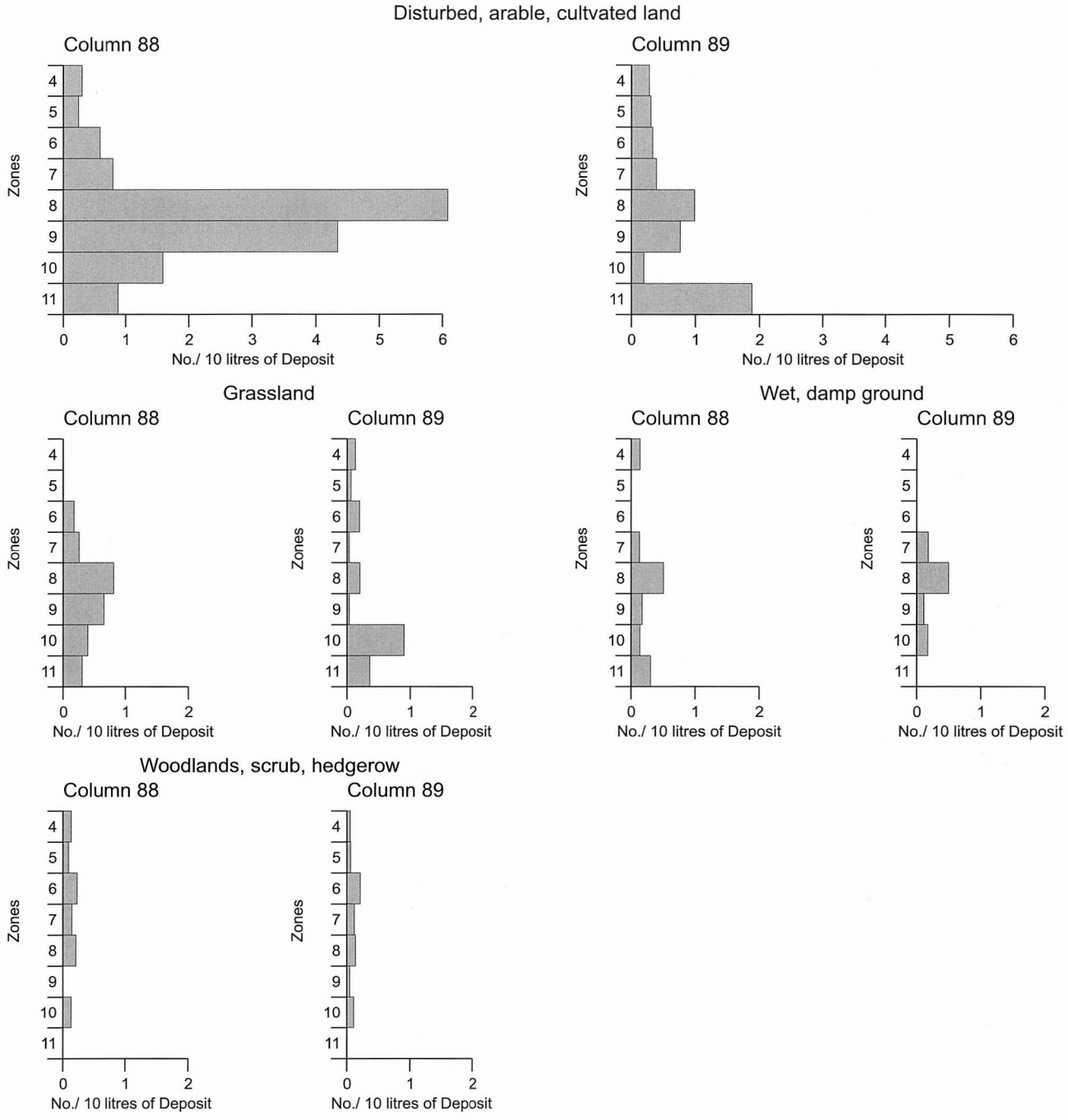


Fig. 25 Habitat representation among charred plant macrofossils from sample columns by Zone through the Deposit

tinder for starting fires, but it could also have grown on the Deposit at Potterne or been collected as food.

Macphail (above) has noted the presence of burnt manure or animal bedding at various levels in the Deposit. However, as mentioned above, the seeds of plants of grassland or pasture are rare and do not appear to have found their way into the charred assemblage in any quantity via the burning of manure. These plants may be under-represented, as seeds that have been eaten, passed through the gut and then burnt could well be fragmentary and difficult to identify. However, components such as grass and cereal culm nodes should survive better and would be expected if animal bedding containing straw was being burnt in any quantity.

The Origin of the Macrofossils in the Subsoil (Zones 10–9) from 'On-terrace' Samples

Microscope sorting of sieved residues and flots has revealed that modern seeds (mostly Chenopodiaceae, fat hen family, and *Fumaria* sp., fumitory) were present at all levels in the Deposit including the subsoil (Zones 10–9) in the 'on-terrace' column (column 143). The

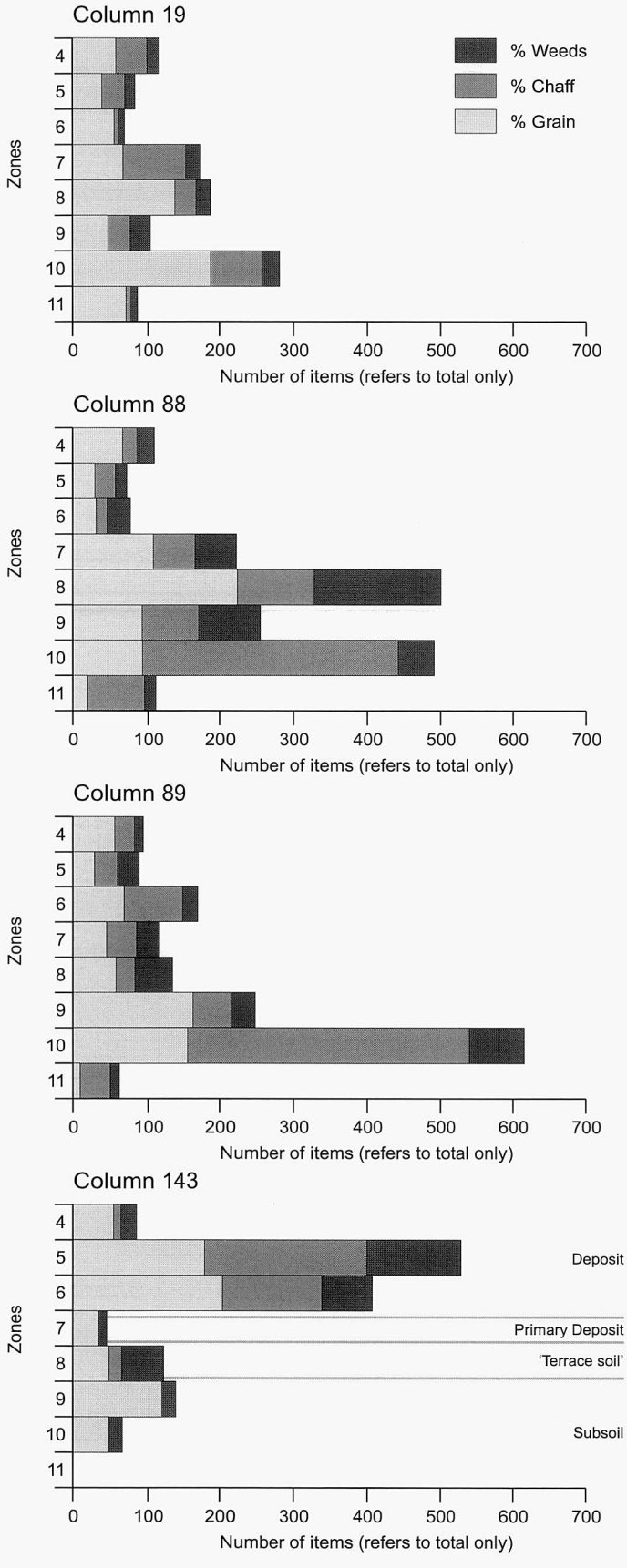


Fig. 26 Relative frequency of charred plant macrofossils from sample columns by Zone through the Deposit

movement of material is due, presumably, to worm action and the effect of roots in the upper levels. If modern seeds can be moved down the stratigraphy, the same could be true of small macrofossils such as seeds and chaff. The macrofossils in the subsoil 'on-terrace' could therefore have been derived from above. Figure 26 shows that grain and weed seeds were present in the subsoil but much less abundant in zones higher up the Deposit. Chaff is absent altogether in the subsoil.

It is much more likely, however, that most of the charred remains were contained within the fill of a feature which cut the 'terrace soil' but was not fully recognised during excavation. The base of column 143 contained a post hole (3523), first recognised as a small patch of sandstone pebbles, some burnt. The feature was only visible as a post hole more than 0.1 m below this, when it was also found to intercept a second feature (3574; Fig. 12). This clearly demonstrates the problem caused by the difficulty in recognising features within the Deposit.

Pre-Deposit Features

Figure 27 shows the proportions of grain, chaff and weed macrofossils identified from selected pre-Deposit features. As a group, the post holes contain most seeds per litre of soil but the assemblages vary greatly in size and nature. It is difficult to account for the relative abundance of plant remains in the post holes. Posts were sometimes removed during demolition of buildings and the post pipes could have become filled, either accidentally or deliberately, with material lying on the surface, presumably relating to the latest phase of occupation of a building (Van Vilsteren 1984). Areas most likely to contribute material would be stores, rubbish heaps, and possibly hearths. If a post decayed *in situ*, it could leave a void into which material could gradually be worked.

Gullies, pits and linear features could have been left open and charred material accumulated gradually or they could have been deliberately infilled with domestic rubbish, or a combination of the two.

Figure 27 illustrates the composition from a linear feature (235) identified at the southern end of the site (Fig. 12) which was very rich in plant remains, particularly weed seeds. Three contexts within this feature were examined, of which context 129 was the richest. It contained emmer and spelt wheats (grain and chaff) and hulled barley and a wide range of common arable weeds such as vetches, fat hen, chickweed and brome. There were also a very large number of the seeds of wild turnip (see below).

In general, the composition of the assemblages in the pre-Deposit contexts was similar to those in the Deposit, suggesting that similar activities were taking place, but the density of macrofossils was greater in the pre-Deposit samples. This may be because they were the result of primary dumping, rather than being in a

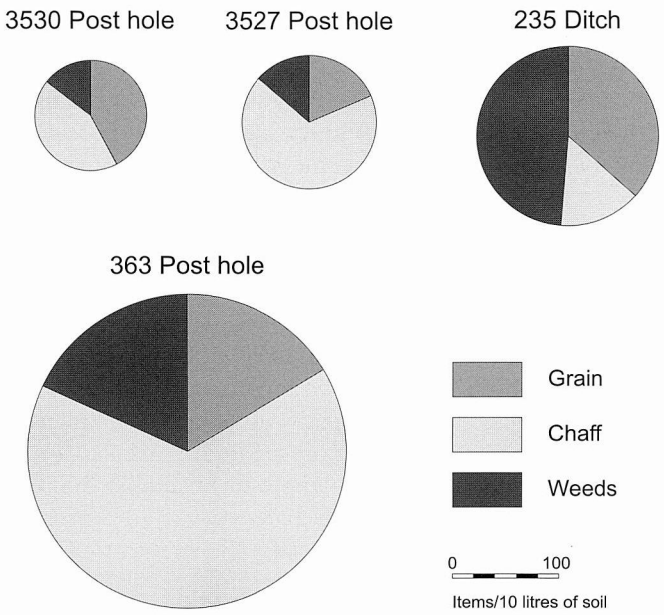


Fig. 27 Assemblage composition of charred plant macrofossils from selected pre-Deposit features and layers

secondary location in a rubbish dump.

The only taxon which is much more common in the pre-Deposit features than in the Deposit is *Brassica rapa* ssp. *campestris* (wild turnip), particularly in feature 235. It is common on field borders, waste ground, roadsides and on stream banks (Grose 1957). Although wild turnip is a common weed, it might also have been exploited for its edible foliage or oily seeds. Other members of the genus are well known for their oil-containing seeds, some of which (such as mustard) are also used as a spice. The question of the exploitation of oil crops in prehistory in general has not been fully explored. Linseed (flax) (*Linum usitatissimum*) is known in Britain from the Neolithic and is present in the mineralised remains from Potterne (Carruthers above), but other plants with oily seeds are known from several sites from the Bronze Age onwards. Examples include the Cornish Middle Bronze Age settlement at Trethellan Farm where hedge mustard (*Sisymbrium officinale*) might possibly have been exploited for its oily seeds (Straker 1991). In his report on the Wilsford Shaft, Robinson (1989) suggested that opium poppy (*Papaver somniferum*) could have been useful for oil, food or medicinal purposes. So far, however, opium poppy has only occurred as a trace in Bronze Age deposits.

Comments

The examination of charred plant material from four sample columns through the Deposit shows that there is considerable lateral variation in the nature of the assemblages. The changes in concentration of different taxa serve to emphasise the patchy nature of deposition, as might be expected on a rubbish heap. This means that further samples from a greater percentage of the Deposit are required before any changes in the crop record throughout the use of the Deposit can be observed. From the samples examined in this evaluation, hulled barley and wheat appeared to be of roughly equal importance. Spelt wheat was common and was found in roughly the same proportions as emmer; free-threshing wheat being a minor component. Waste from at least the later stages of crop processing is represented in the form of chaff and weeds of cultivated land. The cereals were most probably grown on the local Greensand and possibly the damper stagnogley soils of the Gault, but it did not prove possible to isolate communities of arable weeds from the nearby chalk soils.

The analysis of the charred plant macrofossils suggests that they were dumped as rubbish and contributed to the build-up of the Deposit, as once charred they suffered no decomposition. The assemblages from the pre-Deposit features are potentially of great interest as they may relate more directly to settlement. If further work takes place at Potterne the understanding of the origin of these features and the recovery of charred plant assemblages from them should be a priority.

6 Comparison Between the Charred and Mineralised Plant Assemblages, by Wendy J. Carruthers and Vanessa Straker

Because of the specific circumstances leading to charring and to mineralisation of plant remains, the two types of assemblages provided different information concerning the economy and environment of the site. A comparison between the assemblages at Potterne provides further insights into the formation of the Deposit, as well as revealing the limitations of interpretation which result from the means of preservation.

Plant remains usually become charred as a direct result of human activities, and the range of taxa preserved in this way is generally restricted by the nature of these activities. Cereal grains, chaff fragments and weeds of cultivation typically dominate charred assemblages. The calcium phosphate mineralisation at Potterne appears to have been brought about by human activities creating the conditions necessary for preservation to occur. For the most part, however, these activities were not directly responsible for determining *which* taxa became mineralised. Thus, the mineralised remains reflect the nature of the vegetation growing on the accumulating Deposit and also, to an unknown extent, dumped waste material.

The following comments are made as a result of comparison between the charred and mineralised assemblages in all the sample columns. The data for the 'off-terrace' columns is presented in Table 7.

Distribution

Comparing the distribution of the two types of plant remains within the Deposit reveals some differences. The concentration of mineralised remains was greater than that of charred fragments, with an average of 54 mineralised seeds per 10 litre sample having been recovered, compared with the average of 18 charred remains. The number of mineralised seeds per sample was far more variable. This distribution relates to conditions of preservation, while that of the charred remains, which were more numerous in the earlier 'occupation' levels and at the base of the Deposit, relates to patterns of deposition.

In the pre-Deposit levels, the mineralised remains were far more numerous in the larger features (average of 69 seeds per 10 litre sample) than in the post holes (average of 13). The reverse was true for the charred remains (av. 40 and 52 seeds respectively), and this may reflect differences in the deposition of burnt and unburnt waste. It may also be because the larger features were probably left open for a greater length of time, allowing seeds from the surrounding vegetation to fall in and become mineralised.

Species Composition

It can be seen from a comparison between the species compositions of the two assemblages that the majority of taxa occur in both lists (Table 7). As might be expected, weeds of cultivation and disturbed soils predominate. The number of arable weeds preserved as mineralised seeds in the Deposit, as well as occurring in the charred assemblage, presumably as a waste product of crop processing activities, is perhaps surprising. This suggests that mineralisation of some unburnt crop processing waste took place, although the accompanying chaff and cereal fragments have not been preserved. It appears that cereal remains do not readily become mineralised, although they are sometimes recovered in small numbers from medieval cess pits. Only one mineralised cf. emmer glume base was recovered from this site, from a pre-Deposit sample. The seeds probably also represent weedings and plants that had become established on disturbed areas of the Deposit.

Sixteen taxa were present as mineralised remains but not as charred seeds in the Deposit and earlier levels. Of these, some were only single records and some, such as fool's parsley (*Aethusa cynapium*) and forget-me-not (*Myosotis* sp.) may not often survive burning in a recognisable form, since they are not often found in charred assemblages but are common in waterlogged deposits. Others, such as the mineralised fruit seeds and flax seeds, are not likely to come into contact with fire very often. Several are general weeds of cultivation rather than being strictly arable weeds and are commonly found on allotments today.

Ten taxa were recorded as charred but not mineralised remains. Again, most of these were sporadic occurrences and others, such as onion couch bulbils (*Arrhenatherum tuberosum*) and hazel nut shell (*Corylus avellana*) are unlikely to become mineralised because of the low water content of their tissues. In addition to these ten taxa are the cereal remains, which largely did not occur in the mineralised form. As suggested earlier, this is more likely to be due to the limitations of preservation than the total absence of these unburnt remains from the Deposit.

The proportions of the various taxa found in the two assemblages varied greatly, reflecting the differences in the method of preservation. Whilst the mineralised remains were composed of almost 100% weed taxa in the Deposit, only an average of 14% of the charred remains were weed seeds, the majority being cereal remains. The mineralised assemblage was dominated in most of the samples by two taxa: small nettle (*Urtica urens*) and Chenopodiaceae. These taxa were recorded in much smaller numbers among the charred remains. Where a concentration of charred seeds occurred and very few mineralised, such as with wild turnip (*Brassica rapa* ssp. *campestris*) in the pre-Deposit levels, it is likely that a crop plant is represented.

The changes in habitat groups observed in the mineralised seeds were not reflected in the charred assemblage, as is to be expected considering the differences in derivation of the assemblages. However, taxa of the 'damp organic-rich' habitat group, such as henbane (*Hyoscyamus niger*) and blinks (cf. *Montia* sp.) were present in small numbers among the charred seeds at the top of the Deposit as well as the bottom, suggesting that this type of habitat continued to exist in the locality, though, perhaps, not in the immediate area sampled.

Using Silverside's (1977) phytosociological groups (see Straker, above), attempts were made to determine whether the Orders and Alliances which best described the charred and mineralised assemblages reflected their different origins. Within the charred assemblage a number of species were characteristic of the Order Polygono-Chenopodietalia, which is found throughout Britain in root crops, spring sown cereals and nitrogenous disturbed ground. This group includes *Spergula arvensis, Urtica urens, Solanum nigrum, Veronica hederifolia, Brassica campestris, Rumex acetosella* and *Daucus carota*. Within the group, *S. arvensis*, *R. acetosella* and *V. hederifolia* are particularly characteristic of the Alliance Spergulo-Oxalidion which is found generally on heavy or loamy soils and also on sand where it is sufficiently base-rich.

There are also species characteristic of the Order Centauretalia cyani, which is found in winter cereals and is characterised by winter annuals. These include *Odontites verna*, *Aphanes arvensis* and *Lapsana communis*. Of these species, *A. arvensis* is found within the Aphanion, an Alliance of weeds in winter cereals on loamy soils, and *O. verna* and *L. communis* are common within the Arnoseridion which is found on base-poor

Table 7: Plant macrofossils preserved by both mineralisation and charring; concentration per 10 litre sample

Taxa 'off-terrace'		*Common name*	*Zone 4* C [M]	*5* C [M]	*6* C [M]	*7* C [M]	*8* C [M]	*9* C [M]	*10* C [M]	*11* C [M]
BORAGINACEAE										
Lithospermum arvense L.	nutlets	corn gromwell	+ [1.65]	.06 [1.35]	0 [.33]	0 [.16]	.02 [.08]	0 [.63]	0 [1.59]	0 [2.05]
CAPRIFOLIACEAE										
Sambucus nigra L.	seeds	elder	0 [.66]	0 [.33]	0 [1]	.08 [1.17]	0 [.82]	.02 [.15]	.03 [2.28]	0 [.42]
CARYOPHYLLACEAE										
Spergula arvensis L.	seeds	corn spurrey	-	.03 [0]	-	.03 [0]	.09 [0]	.02 [0]	-	-
Stellaria sp.	seeds		0 [.66]	0 [1]	0 [1]	0 [.33]	-	0 [2.67]	.03 [1.90]	-
CHENOPODIACEAE										
Atriplex sp./ *Chenopodium* sp	seeds	orache/fat hen	0 [6.46]	0 [2.09]	0 [8.67]	0 [17.31]	.21 [19.55]	.08 [43.14]	.11 [12.31]	0 [10.67]
COMPOSITAE										
Lapsana communis L.	cypselas	nipplewort	0 [.33]	-	-	-	-	0 [.33]	-	-
Tripleurospermum maritimum (L.) Koch.	cypselas	scentless mayweed	-	-	-	.03 [0]	.02 [0]	.02 [0]	-	-
CRUCIFERAE										
Brassica sp./ *Sinapis* sp.	seeds	turnip/rape/mustard	+ [6.99]	0.1 [5.35]	+ [.50]	0 [1]	0 [.08]	0 [.67]	0 [.33]	-
CYPERACEAE										
Carex spp.	nuts	sedges	0 [2.65]	0 [3.18]	0 [1.54]	0 [3.65]	.14 [4.44]	.1 [4.74]	.02 [.67]	0.2 [2.96]
Eleocharis uniglumis/palustris	nuts	spike-rush	-	0 [.33]	-	.03 [0]	.05 [0]	-	0 [.33]	-
LEGUMINOSAE										
cf. *Trifolium* sp.	seeds	clover	-	-	-	-	-	-	-	-
Vicia sp./Lathyrus sp.	seeds	vetch/tare	.04 [0]	.03 [0]	.2 [0]	.28 [0]	.44 [0]	.38 [0]	.76 [0]	0.3 [0]
PLANTAGINACEAE										
Plantago lanceolata L.	seeds	ribwort plantain	-	-	0 [.33]	.08 [0]	.05 [0]	.02 [0]	.03 [0]	-
POLYGONACEAE										
Polygonum aviculare agg.	nutlets	knotgrass	-	-	-	.15 [.16]	.51 [1.33]	.23 [.67]	.11 [.67]	-
Polygonum convolvulus L.	nutlets	black bindweed	-	0 [.09]	.03 [.33]	.10 [.40]	.49 [0]	.29 [.08]	.19 [0]	.1 [0]
P. lapathifolium / L. nodosum Pers.	nutlets	pale persicaria	-	-	-	-	.12 [0]	-	-	-
Rumex acetosella agg.	nutlets	sheep's sorrel	.02 [0]	.03 [0]	-	-	.07 [0]	.13 [0]	-	-

Table 7 (continued)

Taxa 'off-terrace'		*Common name*	*Zone 4* C [M]	*5* C [M]	*6* C [M]	*7* C [M]	*8* C [M]	*9* C [M]	*10* C [M]	*11* C [M]
PORTULACACEAE										
cf. *Montia fontana* subsp.*chondrosperma*	seeds	blinks	.04 [0]	0 [.33]	0 [.33]	0 [.33]	.46 [.67]	0 [9.41]	.03 [.67]	0 [1.33]
RANUNCULACEAE										
Ranunculus acris/bulbosus/repens L.	achenes	buttercup	0 [.67]	0 [2.42]	0 [2.33]	0 [2]	0 [.67]	0 [1]	0 [1]	0 [.67]
ROSEACEAE										
Agrimonia sp.	achenes	agrimony	-	-	.03 [0]	-	-	-	-	-
Prunus spinosa L.	seed	blackthorn, sloe	-	-	-	-	.02 [.33]	-	.03 [0]	-
RUBIACEAE				-	-	-	-	-	-	-
Galium cf. *aparine* L.	mericarps	cleavers	.1 [0]	.08 [0]	.08 [0]	.08 [.07]	.16 [0]	.02 [.33]	.14 [0]	.1 [0]
SCROPHULARIACEAE										
Euphrasia sp./*Odontites verna* (Bell.) Dum.	seeds	eyebright / red bartsia	0 [.33]	-	-	-	.05 [0]	.13 [.07]	-	-
Veronica hederifolia L.	seeds	ivy-leaved speedwell	.02 [0]	0 [.33]	-	-	.02 [0]	.04 [0]	.03 [0]	-
SOLANACEAE										
Hyoscyamus niger L.	seeds	henbane	-	-	-	0 [1]	.02 [1.97]	0 [8.99]	0 [3.93]	0 [1.09]
Solanum nigrum L.	seeds	black nightshade	-	0 [1]	0 [+]	0 [.33]	.02 [0]	0 [.33]	-	-
UMBELLIFERAE										
Daucus carota L.	mericarps	wild carrot	-	-		-	-	-	0 [.33]	-
URTICACEAE										
Urtica dioica L	achenes	stinging nettle	0 [1.06]	0 [.42]	0 [2.67]	0 [4.81]	.02 [2.81]	0 [3]	.05 [2.65]	.1 [1.96]
Urtica urens L.	achenes	small nettle	0 [36.87]	0 [25.1]	0 [5.75]	0 [7]	0 [10.4]	0 [6.73]	0 [1.67]	0 [1.33]
VIOLACEAE										
Viola sp.	seeds	violet, pansy	0 [.33]	-	.05 [0]	-	.4 [0]	-	+ [0]	-
sample size (litres)			493 [30]	358 [30]	398 [30]	393 [30]	432 [30]	479 [30]	368 [30]	113 [30]

C = charred [M] = mineralised

sandy soils. The situation is complicated, however, by the fact that certain species can be found in more than one Alliance. *S. arvensis* can also be found in the Aphanion and *R. acetosella* in the Arnoseridion. While it is likely that the crops, probably both spring and winter sown, were grown on the Greensand and possibly the heavier soils of the Gault Clay, there is no conclusive evidence that cereals recovered from the sample columns were grown on the nearby Chalk soils. However, many of the weed seeds recovered will grow on a wide variety of soils, including those of a calcareous nature.

The numerically-dominant taxa within the mineralised assemblages, when grouped together, were characteristic of the Order Sisymbrietalia, Chenopodio-Urticetum community. This plant community is characteristic of compost heaps, farmyards and other nitrogen-rich habitats. It includes *Urtica urens* and *Chenopodium* sp. which predominated in most of the mineralised samples. Only a small proportion of the mineralised taxa could be placed in various Alliances within the Order Polygono-Chenopodietalia, the Order into which fell the majority of charred seeds. Although the phytosociological potential of the data has not been fully explored, the analyses have demonstrated the value of this approach in separating the charred and mineralised plant assemblages to some extent, so illustrating the differences in their origins. More detailed analyses employing these methods are likely to be useful in future studies of plant remains from Potterne.

7 **Charcoal** by Vanessa Straker

Charcoal was examined from samples selected for radiocarbon dating. Six contexts were selected from within the Deposit and from one of the basal features. It was obtained from the bulk sieving of Columns 88 and 89 and the contents of basal features in Cutting 12.

	Column 88	Column 89
Zone 4	context 1617	context 1608
Zone 7	context 2209	context 2208
Zone 11	context 2988	context 2984
Pit fill	Feature 3605	context 3716

As Table 8 shows, much of the charcoal was not identified as this material consisted of very small fragments but the weights may be slightly over-represented as some fine sand was not separated out but would have been removed in the pre-treatment for radiocarbon dating. It is very unlikely that the small unidentified fragments are those of taxa which were not found in the rest of the samples. As far as the Deposit is concerned, the upper zones contained much more charcoal than the lower zones (170 g for Zone 4 as compared with 6.99 g for Zone 11), with similar amounts in the same Zone in adjacent columns. This contrasts with the mineralised and charred seeds which varied greatly between adjacent columns at the same Zone (Carruthers above).

Not all the taxa identified are present in all the zones sampled and this is likely to be the result of lateral variation within the Deposit. The main species present are oak, Pomoidae and hazel. As only one sample from a feature has been identified much comment would be inappropriate except to note that the species composition overlaps with that from the overlying Deposit.

Without local pollen diagrams to provide some indication of the presence and distribution of woody vegetation it is not possible from the charcoal alone to state with certainty if the species were growing locally or were collected from some distance. All the trees and shrubs represented by the charcoal, however, could have been growing locally on the variety of soil types within the vicinity of the site. None had specific requirements not found locally. Oak will flourish in woodland or hedgerow conditions and is a good source of timber for building. Pomoidae (a complex group including hawthorn, apple, pear, whitebeam, and rowan), *Prunus* (cherry or sloe) and hazel are efficient secondary colonisers after woodland has been cleared and are often dominant in scrub vegetation. Grose (1957, 679—704) has described woodland, scrub, and hedges established in a variety of conditions in Wiltshire and states that oak (*Quercus robur*) is dominant in much of our present day woodland on non-calcareous soils with hazel the most important component of the shrub layer. Hawthorn and sloe are characteristic of scrub vegetation where bushes and small trees are dominant and are common on both calcareous and non-calcareous soils. The wood used at Potterne could have been collected from surviving stands of woodland, scrub vegetation or hedgerows established in the vicinity of the settlement.

8 **Human Bone,** by Jacqueline I. McKinley

Human bone fragments examined included those from excavation (Table 9) and the burial of a foetus, recovered by staff from Devizes Museum in 1989 during grave digging within Potterne cemetery. The latter was reported as having been located below the Deposit, although there is no evidence of whether it was intrusive, or indeed considerably earlier.

The majority of the human remains (87.8%) were recovered from within the Deposit, with a further 7.1% being found within cut features below the Deposit, and 5.1% from cleaning layers above or below it. Only *c.* 23% of the human bone was recognised as such during excavation, most of which comprised skull vault fragments. The majority of the human remains were extracted during analysis of the animal bone by Alison Locker, which indicates the thorough mixing of human and animal bone.

Table 8: Identification of charcoal for radiocarbon dating (weight in gm)

	Context	*1617*	*1608*	*2209*	*2208*	*2988*	*2984*	*3716*
	Column/zone	*88/4*	*89/4*	*88/7*	*89/7*	*88/11*	*89/11*	*F3605*
	C14 Ref numbers	*POTT1*	*POTT2*	*POTT3*	*POTT4*	*POTT5*	*POTT6*	*POTT16*
Quercus sp.	oak	3.4	6.5	3.1	14	1.4	0.2	3.0
Pomoidae	hawthorn/apple/pear/rowan	1.7	6.4	12.1	11.3	0.7	-	1.3
Corylus avellana	hazel	0.6	1.0	1.9	1.2	0.1	0.1	-
Ulmus sp.	elm	0.1	0.8	0.4	0.1	-	-	0.7
Prunus sp.	cherry/sloe	0.7	0.8	0.7	2.5	0.4	0.2	-
P. cf. *spinosa*	cf sloe	1.0	-	0.4	0.1	0.2	0.1	-
Prunus/Pomoidae		-	0.3	-	-	-	-	-
Fraxinus excelsior	ash	-	0.2	0.5	-	-	-	-
Acer campestre	field maple	-	-	-	0.1	-	-	-
cf. *Acer campestre*	cf. field maple	-	0.5	-	0.3	-	-	-
Acer/Pomoidae		-	-	0.1	-	-	-	-
cf. *Tilia* sp.	cf. lime	-	-	0.2	0.4	-	<.01	-
Ilex aquifolium	holly	-	0.2	-	-	-	-	-
total identified		7.5	16.7	19.4	30	2.8	0.6	5.0
not identified (mostly <2mm fragments)		79.8	67.0	30.2	26.4	0.2	3.2	2.4

Methods

With the exception of the single burial, all the human bone recovered comprised disarticulated bones or fragments of bones. The bone from each 0.1 m deep one metre square spit (hereafter 'spits') was analysed individually, but, given the nature of the site and the deposits, minimum numbers were assessed in the first instance from the assemblage as a whole. An attempt was made to ascertain any links between bones from different Zones and one metre square spits within the Deposit.

Age was assessed from the stage of tooth development and eruption (van Beek 1983); the length of immature long bones (Bass 1987); the stage of ossification and epiphyseal bone fusion (Gray 1977; McMinn and Hutchings 1985; Webb *et al.*1985); tooth wear patterns (Brothwell 1972); and the general degree of cranial suture fusion and degenerative changes to the bone. The material was assigned to the following age categories:

foetus/neonate	< 6 months	
infant	6 months–4 years	
juvenile	5–12 years	(young 5–8 yr, older 9–12 yr)
subadult	13–18 years	(young 13–15 yr, older 16–18 yr)
young adult	19–25 years	
mature adult	26–45 years	(younger 26–30 yr, older 31–45 yr)
older adult	45 years +	(old adult >50 yr)

Sex was assessed from the sexually dimorphic traits of the skeleton (Bass 1987) which, because the bone from many of the one metre square spits comprised fragments of skull vault, included the maximum cranial vault thicknesses '1a' and '1b' according with Gejvall (1981). Platymeric and platycnemic indices were calculated where possible (Bass 1987). Pathological lesions and morphological variations/non-metric traits were recorded, and diagnoses suggested where appropriate. Full details, including Skeletal Record Sheets and Dental/metrical Data Sheets, are available in archive.

Results

One hundred and thirty-nine fragments of human bone were examined from 97 one metre spits, which represents about 0.1% of the quantity of animal bone recovered from the same spits (see Locker). Where more than one bone fragment was present in a spit, usually elements of skull or long bone shaft, the fragments generally joined. In three spits bone fragments from two individuals were recovered. Approximately 60% of the skeleton unearthed during grave digging was recovered. A summary of the results is presented in Table 9.

Stratigraphic and spatial distribution

The total area excavated at Potterne amounts to only *c.* 0.75% of the known site as revealed by the auger survey but human bone was clearly widely distributed across the site, being recovered in Cuttings 1–3, 8, 10, 12, 14 and 16. It cannot be assumed that there was an even distribution of human bone across the Deposit (concentrated clusters of certain archaeological components have been noted, for example, at Runnymede Bridge (Needham and Sørensen 1988)).

The date range for the Deposit covers as much as 500 years. Only material from 'off-terrace' Zones in Cutting 12 (37.4% of the spits containing human bone), could be more safely analysed stratigraphically (above). Within this assemblage there is a peak in the incidence of human bone in Zone 11 (ie the base of the Deposit), followed by a general decrease in frequency in the overlying zones (Fig. 28).

Condition of bone

The basic fabric of the bone was in good condition,

Table 9: Summary of all human bone by Cutting and zone

Cutting	*Feature or Zone*	*Skeletal element*	*Age*	*Sex*	*Pathology*	*Comment*
?	SF12	s.	young/mature adult	??male		worn
1		l. (r)	neonate			
2		s.	older subadult-mature adult			
2		u.	adult			
2		s.	subadult/adult			
2		s.	adult			
2		l.	adult			fresh appearance
2		u. (l)	adult			worn
3		l. (l)	adult			slightly worn
3		u. (r)	older subadult/adult			slightly worn
3		u. (l)	subadult/adult			fresh appearance; old scar
3		s.	older subadult/adult			slightly worn
3		u.	subadult/adult			slightly worn
?		l.	mature/older adult			
3		s.	adult			slightly worn
3	PH 187	s.	adult			slightly worn
3	PH187	s.	adult	??male		
3		s.	adult			pale colour
3		l. (l)	adult			
3	layer	u. (l)	adult			adhering concretion
3	layer	s.	1) young juvenile (c. 6yr.) 2) older adult		vault worn	
3	layer	s.	adult	male		
8		u.l.	neonate-3 months		p.n.b. – tibiae	
10	layer	u.	adult			
10	layer	s.	mature/older adult	?male	m.v. – sagittal crest, wormian bone	
12	'off' 3	s.	?immature			
12	'off' 3	l. (r)	adult			cut mark
12	'off' 3	s.	older subadult/young adult		calculus; hypoplasia – root	
12	'off' 4	l. (l)	neonate-6 months			
12	'off' 4	u. (r)	adult	??male		
?		l. (r)	adult			
12	'off' 5	l.	adult			abraded
12	'off' 5	s.	old adult		p.d.; caries; abscesses	
12	'off' 5	s.	adult	??male		slightly polished appearance
12	'off' 5	s.	young/younger mature adult	male	p.d.	
12	'off' 5	s.	older subadult/adult			
12	Inter. 5	s.	adult			worn
12	'on' 5	s.	subadult/adult			burnt
12	'on' 5	s.	adult	male		

even the foetal and neonatal bone being well consolidated. With the exception of some foetal and neonatal long bone diaphyses (Cutting 8; Cutting 12; 'off-terrace' Zone 4, 'on-terrace' Zone 8 and Zone 9, post-hole 3664, and burial 185.1) and one frontal bone (Cutting 12, 'off-terrace' Zone 10), no complete bones were recovered. The skeletal elements recovered from 16% of the individual spits were broken (half skull fragments, half long bone shaft fragments with breaks across the shaft), with about equal numbers of old and fresh breaks.

Although the majority of the human bone was recovered from undisturbed zones (Fig. 28), *c.* 17% of the bone fragments showed varying degrees of abrasion both to the broken edges and the cortex. In one instance (Cutting 12 'off-terrace' Zone 13) two fragments of very worn ulna shaft with abraded broken edges still demonstrated a clear union. This inconsistent level of abrasion cannot have been sustained while within the Deposit and it is significant that no comparable degree of wear was evident in the animal bone (Locker pers. comm. and below). In contrast, c 4% of the human bone had a very 'fresh' appearance, and bones in both abraded and fresh condition were found within the same zones.

Two fragments of skull vault appeared to have a slightly polished exocranial surface. The cause of this effect is unclear, possibly resulting from some variation in the microenvironment either within the Deposit or in the location of the fragments prior to the final deposition, or from some form of human manipulation. This condition appears similar to that described for some of the animal bone as 'ivoried' (Locker below).

Bones from three spits at varying depths within the Deposit had a mineralised concretion adhering to them. This was also noted in relation to some of the animal bone (Locker, below), seeds (Carruthers, above) and pottery (Chapter 6).

One fragment of skull vault was burnt (0.7% of bone), showing variations in colour from white (oxidised) to black (charred) both across and through the fragment. The fragmentation pattern and network

Table 9 continued: Summary of all human bone by Cutting and zone

Cutting	*Feature or Zone*	*Skeletal element*	*Age*	*Sex*	*Pathology*	*Comment*
12	'on' 6	s.	young adult	male		
12	'on' 6	l. (r)	adult	??male		
12	'on' 7	l. (r)	adult	??male		
12	'off' 8	l. (l)	adult			very worn
12	'off' 8	s.	older subadult/adult			?charcoal stained
12	'off' 8	a.	adult	female		worn
12	'off' 8	?u./l.?	neonate			adhering concretion
12	'off' 8	s.	older subadult/young adult			
12	'off' 8	l.(r)	older subadult/adult	??female		marks/old cuts
12	'on' 8	s.u.(r)	1) older subadult/young adult	?2) adult		fresh appearance
12	'on' 8	l. (r)	adult			
12	'on' 8	l. (l)	foetus			
12	'off' 9	l.(r)	adult	??female		
12	'off' 9	l.(r)	adult	??male	exo. - tibia	
12	Inter. 9	s.	subadult/adult			worn
12	'on' 9	u. (r)	foetus <			
12	'off' 10	u. (l)	subadult/adult			
12	'off' 10	s.u. (l)	1) adult 2) neonate	1) female		
12	'off' 10	s.	older mature/older adult			
12	'off' 10	s.	subadult/young adult			
12	'off' 10	s.	adult	female	cribra orbitalia; ?m.v. - metopism	
12	'off' 10	l. (r)	adult			
12	'off' 10	u.	subadult/adult			
12	'off' 10	s.	adult			
12	'off' 10	s.	older mature/older adult			
12	'off' 10	s.	older mature/older adult			
12	'off' 11	u. (r)	older subadult/adult	??female		
12	'off' 11	l. (r)	adult	male	o.p. - p.femur; new bone – p..femur	very worn
12	'off' 11	s.	young adult			
12	'off' 11	l. (l)	adult			
12	'off' 11	s.	young/younger mature adult		calculus	
12	'off' 11	s.	older mature/older adult		d.l. - incisor root	
12	'off' 11	s.	young/younger mature adult			
12	'off' 11	s.	older mature/older adult			
12	'off' 11	s.	young juvenile (7-8 yr)			

KEY:
skeletal element: s. skull, a axial skeleton, u. upper limb, l. lower limb; (r) right, (l) left
sex: ? denotes 'probable', ?? denotes 'possible'
pathology: m.v. - morphological variation, p.n.b. - periosteal new bone, p.d. - periodontal disease, exo - exostoses, d.l. - destructive lesion, p. – proximal

of fine surface cracking seen in the bone suggests that it was probably burnt as dry or semi-dry bone, probably already in a fragmentary state (McKinley 1994, 76–7). One other vault fragment appeared to have charcoal staining over one half of the bone. Locker noted that a similarly small percentage of the animal bone was also burnt (below). There is, however, no example of cremation *per se.*

While much of the animal bone had been butchered (Locker below), and *c.* 1–2% showed evidence of heavy gnawing by dogs, none of the human bone fragments demonstrated either fragmentation or cut marks clearly idicative of butchery, or evidence of gnawing by animals. There were however, three fragments of bone (2%) with old cut marks or 'scars'. A left ulna (Cutting 3, spit 95, see archive) had a splintered cut-mark 5.7mm long, at a 30° angle on the proximal posterior surface of the shaft, and a similar cut-mark was noted on a fragment of right femur shaft (Cutting 12 'off-terrace' Zone 3, spit 1409). Both appear to have resulted from chopping motions rather than stabbing or knife draw-marks produced by skinning, and neither penetrated very far. Numerous faint latitudinal marks, which appeared more like stains than cut marks, were noted along the medial-posterior shaft of another right femur (Cutting 12 'off-terrace' Zone 8, spit 2409). There were a minimum of 13 lines, all *c.* 100mm long, with a further four marks on the lateral side of the distal shaft. The proximal end of the shaft had a very old break, the bone was much abraded with several old, worn, diagonal and longitudinal, slightly deeper cut marks on the anterior and medial sides of the shaft. It is not possible to state whether these were sustained during life or after death.

Skeletal elements

Each spit contained fragments of only a single skeletal element, except those containing evidence for more than one individual or containing foetus/ neonates

(Table 9). Skull fragments were the most commonly occurring element (52.3%), mostly fragments of vault. Elements of lower limb were present in 28.9% of spits, primarily fragments of femur (58.8%), and most lower limb elements (82.3%) were from the right side. Twenty spits (19.6%) had elements of upper limb bone, the right and left sides being equally represented. Fragments of axial skeleton were present in only two spits, a fragment of innominate from the Deposit and bones from the grave-digging. The foetal/neonatal skeletal elements differed from the rest of the assemblage in several ways; only long bone diaphyses were recovered, no skull bone; both upper and lower limb and left and right sides were present in more equal proportions than in spits containing bone from older individuals.

There is some variation in the percentage of different skeletal elements within the different Zones, but the observation must be seen as tentative and viewed with caution given the low number of spits which could be reliably phased (see above). Across the 'off-terrace' zones (Cutting 12), skull elements outnumbered lower limb elements by a ratio of approximately 2:1. While they occur on average in roughly equal numbers in Zones 9–3, Zone 11 had 60.7% skull elements and 21.4% lower limb elements.

Except for the foetus burial, there were no vertebrae, no rib fragments, and no temporal vault. Only one fragment (part of a maxilla) of facial bone was recovered although there were several loose teeth, and only one finger phalanx and part of one metatarsal were found. Generally, very little spongy bone, ie, articular surfaces, innominates, etc, was present.

Those spits within the Deposit subject to sieving or trowelling produced only 1% more human bone than those excavated by picking, and they did not contain a greater number of smaller bones/bone fragments. Either individual small bones of the hands, feet, and axial skeleton were being removed from the assemblage — possibly by scavenging animals — or they never formed part of the assemblage. The presence of scavenging dogs on the Deposit is attested by the gnawing noted to animal bone and the quantities of coprolites recovered (Scaife, above). However, no evidence of gnawing was noted on any of the human bone, and if human bone was being redeposited on the Deposit as disarticulated dry-bone, as appears to be the case, it is probable that most dogs would have preferred the greater rewards to be had from the apparently fresher butchered animal bone available.

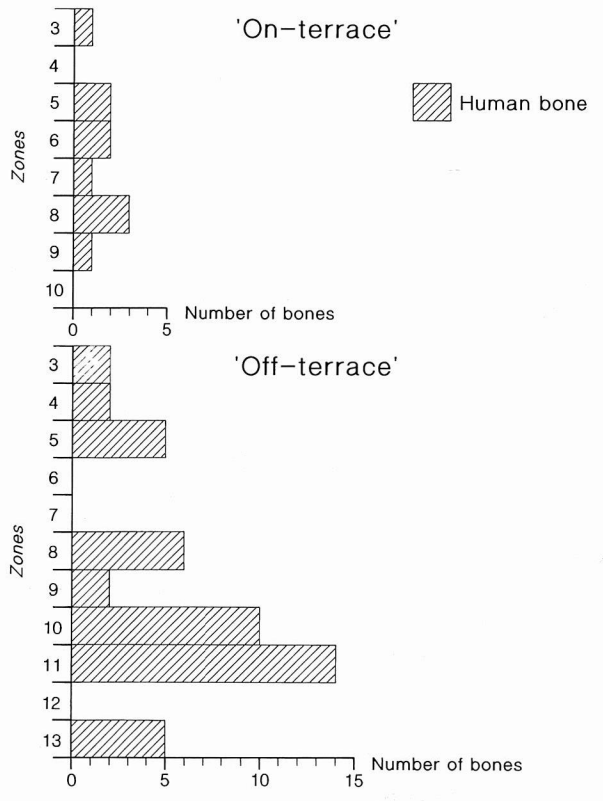


Fig. 28 Human bone: relative frequency by Zone in the 'off-terrace' area

Demographic data

Assessed as a whole, the human bone represents the remains of a minimum of 15 individuals. There was a minimum of seven (46.7%) immature individuals including two close to full-term foetuses, two neonates, two juveniles (one young, one older), and one young subadult. The minimum of eight (53.3%) adults included one young adult male, one young mature adult male, two adult females, and one old adult.

A number of factors were felt to preclude the reliability and relevance of further demographic comment other than to give a general overall view. A limited amount (37.4%) of material could be considered stratigraphically. Variations in condition of the bone (above) suggests that bone fragments were probably subject to different depositional and redepositional procedures at different stages, and the actual point of decease for the individuals represented by a certain bone fragment could not necessarily be securely recognised. The nature of the assemblage itself and the difficulty surrounding links between bone fragments/skeletal elements also created problems. In only two instances were bone fragments from different spits found to join, both were from the same horizon, one pair were from adjoining spits (Zone 10, spits 2811 and 2799), one pair from spits 2 m apart (Zone 13, spits 3413 and 3416). No other conclusive links between bones/fragments could be ascertained, although it seems highly likely that there are some, particularly amongst the foetal/neonatal bones. It does not appear that there was one particular phase where there was a noticeable

difference in the frequency of deposition of foetal/neonatal bone.

Skeletal indices

In view of the nature of the assemblage there were very few instances in which it was possible to record metric data. The platymeric index (expressing the shape of the proximal femur shaft) was calculated for six femora; all fell into the platymeric category, with a tight range of 68.95–75.08 for all except one at 83.55. Only three could be placed stratigraphically and were in the Zones 9–7. The platycnemic index (degree of medio-lateral flattening of the tibia) was calculated in only one instance for a bone in Zone 7, which fell in the platycnemic range (60.92).

Pathology and morphological variations

Pathological lesions and/or morphological variations were noted in bone from 13 spits (Table 9). In view of the fact that the assemblage was fragmentary and dispersed with few firm links between spits, it was not felt that further useful comment could be made other than to note the presence of lesions all of which are commonly seen in archaeological populations.

Discussion

Three different types of deposition seem to be represented by the recovered human bone. The burial of an undated *c.* 8-month foetus represents a different mortuary practice to that suggested by the remainder of the human bone. The latter which was clearly redeposited as disarticulated fragments or, in the case of some of the foetal/neonatal bone, as individual bones.

The variation in the physical condition of human bone from any single zone indicates that not all the generally contemporaneous fragments necessarily originated from the same source, or were subject to the same processes prior to their final incorporation in the Deposit. The very abraded condition of some of the bone fragments would suggest that they might have been subject to various episodes of redeposition or disposal, probably of a not very reverential nature.

The one fragment of burnt skull vault is probably the result of either accidental or incidental burning which, along with other aspects of the condition of the bone, has implications for the treatment of and attitude towards the human remains incorporated in the Deposit. At what point any transition in attitude may have occurred is open to debate – some of the human bone may have played a variety of different roles, as may other material incorporated in the Deposit at different stages.

The skeletal elements noted from Potterne appear very similar to those recovered from Early Iron Age settlements and hillforts, deposited within pits and layers comprising archaeological components indicative of 'occupation debris'. Wilson (1981), Walker (1984), and Wait (1985) all note a variety of Iron Age sites from which, predominantly in their early phases, individual and fragmentary bones were recovered from pits and 'rubbish' deposits. The most frequently occurring skeletal elements are skull and long bone, the latter predominantly from the right side, and, at Danebury femur was the most common long bone (Walker 1984; no actual figures are given). At Danebury, however, in contrast to the elements noted in the Potterne assemblage, small bones of the hands and feet, vertebrae, and ribs were also present. Ninety-three fragments of human bone were also found scattered on the living floors of the Late Bronze Age settlement at Runnymede Bridge (Boylston, pers. comm.). In Brück's (1995) assessment of Late Bronze sites from which unburnt human remains have been recovered, 37% comprised settlement sites where there was often an association with domestic refuse; at 16% of these sites (Potterne included) human bone was recovered from 'midden' deposits. The vast majority of the remains comprised disarticulated fragmentary or single bones, most commonly skull (52.3%) and long bone fragments (28%). Although inconsistancies in the recording of material included in the database used for analysis gives no detailed breakdown of the latter category (Brück 1995), the similarities with the skeletal elements within the Potterne assemblage are clearly evident.

Among those sites considered by Wait (1985), the human remains predeominantly comprised single bones and there was a very small percentage of immature remains, only *c.* 4% compared to the 46.7% at Potterne. Wait (*ibid.*, 94) comments that 'infants rarely occur in any category other than as complete inhumations'. However, Wilson (1981) noted that at Mount Farm, Gussage All Saints, Dorset and Ashville Trading Estate, Oxon, disarticulated but complete infant bones were recovered from areas within the settlement. The implication here being that the infant bone was derived from complete burials, whilst the fragmentary adult bone was already disarticulated prior to deposition.

Wait (1985) noted there was no evidence for dismemberment within the assemblages in his study. At Danebury (Walker 1984) and the Late Bronze Age settlement at Runnymede Bridge (Boylston, pers. comm.) there was evidence that some of the human remains had been gnawed by dogs and Walker has suggested that some of the fragmentation at Danebury may have been deliberate, ie, the result of 'butchery'. Occasionally, a fragment of human bone has been noted as being burnt, for example at Danebury (Walker 1984) and Runnymede (Boylston pers. comm.), the latter in a similar fashion to that from Potterne (writer's comment). Boylston also comments that most of the bone from Runnymede had a relatively 'fresh' appearance (pers. comm.).

There are clear similarities between the human bone assemblage from Potterne and those from the Early Iron Age settlements and hillforts, and the Late

Bronze Age occupation floors at Runnymede and other Late Bronze Age sites discussed by Brück (1995). The evidence from Danebury and Runnymede for gnawing by dogs again raises the possibility of the loss of certain elements from the assemblage as a result of scavenging (above; see Locker, below, for further discussion). However, the elements noted as absent from the Potterne assemblage were present at Danebury, and scavenging would not explain the low recovery of lower limb bones from the left side.

While it is true to say that the preferential recovery of skull and long bone fragments, as against small bones and trabecular bones, may be the result of normal taphonomic processes (ancient collection and recovery, preferential survival), the predominance of the right femur in this and other similar assemblages would seem to be the product of deliberate selection at some point. Although the form of the assemblage may be seen as characteristic of the Early Iron Age, it clearly pre-dates this period by some time. At Potterne, there was a substantial concentration of human bone in Zones 13–10 at the base of the Deposit. This would imply that the deposition pattern seen as characteristic of the Early Iron Age in fact represents a continuum of a practices which commenced at least in the Late Bronze Age, as is suggested by evidence presented by Brück (1995) and from Runnymede, and possibly earlier.

The reasons for the removal of human bone from one location, and its redeposition and subsequent incorporation within the Deposit are open to debate. It may indicate either the population's attitude towards the human remains (ie, incidental disposal), or some dimension of the normal ritual practice that is not represented within what is conventionally recognised as mortuary contexts.

9 **Animal Bone,** by Alison Locker

Prologue, by Michael J. Allen

The excavation of the Deposit in Cuttings 2, 3 (1983), and 12 (1984) has produced one of the largest faunal assemblages for the period in the country. The large scale and detailed analysis of this is presented below and in archive. The data entry onto the Ancient Monuments Laboratory, Comart-based osteometry system (Jones *et al.* 1981) in 1984 was based on the numerical record of bone fragments, and fragment counts are therefore used throughout this report. Few definitely articulated elements were recorded during excavation but a number of artefact scatters which included bones were present. Due to the size of the assemblage these were not collected as distinct groups as priorities lay elsewhere, and the method of excavation in 1 m^2 spits may have had the effect of dis-assembling coherent groups. One prominent articulated group of cattle vertebrae (and ribs) was, however, recovered in the 1983 season (Cutting 3), but detailed analysis was restricted to just the large assemblage of animal bones (about 180 boxes) from the 1984 season (Cutting 12) and thus excluded this element. The report presented here was essentially completed in 1986.

Introduction

The excavations produced a large sample of animal bones (around 134,000); this was all recorded and measured using the Ancient Monuments Laboratory osteometry system (Jones *et al.* 1981). The archive of the data is stored on magnetic tape with English Heritage and the bones are at Devizes Museum, together with a full set of measurements according to Jones *et al.* (1981). All the measurements present were made in accordance with the recommendations of von den Driesch (1976). Estimates of stature, separation of sheep from goat, sexual dimorphism, and separation of wild from domestic pig have been the main application of the data in this report. Summary information of the assemblage is presented in Tables 10–16; the detailed results are retained in the project archive and at the Ancient Monuments Laboratory.

The results of the analyses outlined in this report are largely based on the bones recovered from the stratified Deposit within Cutting 12. This cutting covered the greatest area, employed the most detailed recording techniques (Chapter 2), and included some areas of total recovery from sieved columns through the Deposit. The analysis was restricted to the bones from Zones 14–4. The top three zones were excluded (as for the mineralised and charred seeds) since they may have incorporated later material through ploughing. Zones 13 (heavily mineralised) and 14 lay beneath the Deposit.

Some 75,000 bones are attributable to Zones 14–4 from the 150 m^2 excavated in Cutting 12 (Tables 10–13); although this appears to be a large sample, it may represent less than 1% of the Deposit, for which auger samples suggest a possible extent of 3.5 ha.

The excavation and sampling methods employed are described above (see Chapter 2). Virtually all the small mammal remains came from the sieved column samples (Figs 6 and 10) and are discussed separately. There did not seem to be a difference in the range of species and body parts recovered during picking and trowelling, only an increase in the numbers of highly fragmented, often indeterminate, small pieces of bone in the latter.

The fragmentary nature of much of the bone is indicated by the high proportion of bones attributed to the unidentifiable mammal category (41% from all areas)

Table 10: occurrence of large mammal species and skeletal elements for Zones 4-11

	Cattle	*Sheep/ goat*	*Pig*	*Horse*	*Dog*	*Red deer*	*Roe deer*	*Large ung.*	*Small ung.*	*Indet*	*Total*
Skull											
Skull	23	26	1	1	10	-	1	-	-	-	62
Skull frag	31	51	222	-	3	-	-	633	1305	388	2633
Mandible	169	741	373	6	7	-	-	584	947	40	2867
Maxilla	54	205	262	-	11	-	-	52	22	3	609
Horncore	85	71	-	-	-	-	-	7	20	6	189
Antler	-	-	-	-	-	41	7	-	-	-	48
Teeth	1431	1923	936	61	4	1	-	100	73	108	4637
Forelimb											
Scapula	51	104	136	1	4	-	1	273	401	1	972
Humerus	60	96	112	-	5	1	-	71	201	-	546
Radius	63	110	81	1	4	3	1	80	516	4	863
Ulna	49	59	100	-	16	-	-	33	120	3	380
Metcarpal	75	107	-	2	-	1	-	20	172	-	377
Hindlimb											
Os Coxa	57	133	42	5	5	-	2	165	289	-	698
Femur	15	25	21	3	1	-	-	106	149	-	320
Tibia	65	75	58	1	1	-	-	87	707	1	995
Fibula	-	-	95	-	-	-	-	-	-	-	95
Calcaneum	84	44	27	7	-	2	1	31	61	-	257
Astragalus	71	62	27	2	-	-	-	2	15	-	179
Centroqu.	19	10	-	-	-	-	-	20	12	-	61
Metatarsal	100	104	-	2	-	1	-	67	390	1	665
Feet											
1st phalanx	26	-	116	6	4	4	-	176	195	-	527
2nd phal.	24	2	96	1	1	2	-	112	122	-	360
3rd phal.	16	-	62	8	-	-	-	56	44	-	186
Vertebrae											
Atlas	9	15	23	-	-	-	-	17	19	-	83
Axis	12	12	1	-	-	-	-	26	14	-	65
Cervical	2	5	4	-	4	-	-	129	71	-	215
Thoracic	-	-	-	-	-	-	-	171	371	-	542
Lumbar	-	-	-	-	-	-	-	47	127	-	174
Sacrum	-	-	-	-	-	-	-	5	16	-	21
Caudal	-	-	-	-	-	-	-	25	27	1	53
Indet	-	-	-	-	1	-	-	483	637	9	1130
Rib frag	-	-	-	-	1	-	-	1908	5558	46	7513
L bone fr	-	-	-	-	-	-	-	1762	8139	69	9970
Indet frag	-	-	-	-	-	-	-	1113	313	27373	28799
Total	591	3980	2795	107	82	56	13	8361	21053	28053	67091

Table 11: Total number of fragments for each species/group for Zones 4-14

Zone	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13: 3505*	*13: 3514*	*14*	*Total*
Cattle	201	237	250	322	422	474	473	281	43	168	167	15	3053
Sheep	-	1	-	-	-	1	-	1	-	-	-	-	3
Goat	-	-	1	-	-	-	-	1	-	-	-	-	2
Sheep/goat	737	739	526	388	426	439	476	387	69	146	156	8	4497
Pig	426	490	409	334	395	450	494	316	62	101	117	6	3600
Horse	20	16	11	12	26	15	15	6	2	7	6	-	136
Red deer	2	10	5	5	7	16	9	5	-	1	2	-	62
Roe deer	2	1	3	2	1	2	5	1	-	1	2	-	20
L ungulate	720	730	853	912	1199	1506	1615	1150	176	425	605	49	9940
S ungulate	3093	2925	2520	2406	2856	2768	2989	1985	351	466	581	65	23005
Dog	13	6	13	5	13	16	32	17	2	6	12	3	138
Indet mammal	3155	3158	3228	3123	3936	4126	4199	3529	433	819	972	69	30747
Indet species	139	39	82	36	43	99	182	54	-	-	-	-	674
Total	8508	8352	7901	7545	9324	9912	10489	7733	1138	2140	2620	215	75877

and, to a lesser extent, the 'small-' and 'large ungulate' groups (29% and 13% respectively) (Table 14). Non-specific identification is usually the result of heavy fragmentation, largely due to intensive butchery for marrow extraction in which the larger the carcass the greater the fragmentation. The high percentage of small ungulate remains (which largely belonged to sheep/goat) emphasises the importance of sheep/goat compared to cattle (to which most of the large ungulate remains belonged) in the economy.

In the original analysis of the spatial distribution of animal bone, aspects of the data were displayed visually (Reilly *et al.* 1988) to look for spreads of material, some of which (mainly comprising pottery) were observed during excavation, as well as for linkage by species, body part distribution, condition, etc. Henceforth, the bone was regarded as having been deposited as a series of more less horizontal tips, presumably with degrees of discontinuity and slippage. The question of 'on-' and 'off-terrace' deposits was not, and has not, been explored further because it is felt that, although actual percentages of species represented in these two areas may differ slightly, the overall trend is likely to remain much the same.

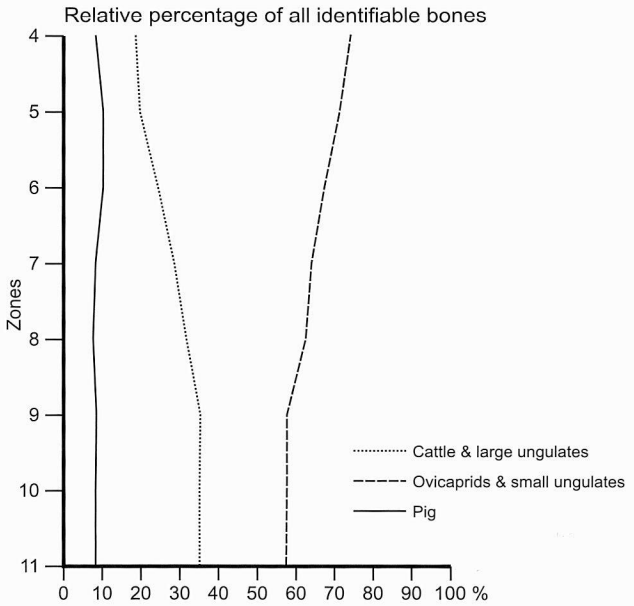


Fig. 29 Animal bone: relative frequency of all identifiable bone by Zone

Condition

In addition to being highly fragmented, some bones were also observed to be 'ivoried', burnt, or subject to mineralisation. The most common condition was mineralisation, where inorganic material was concreted on to bone. This was very evident throughout the lower levels of the Deposit, particularly in Zone 13, the 'concreted layer' below the Deposit. Macphail has commented (above) that the quantities of natural phosphate present in the ash, coprolites, and bone in the Deposit would be sufficient to account for the mineralisation, which also affected the seeds (Carruthers, above).

Another condition, seen less commonly, has been described as 'ivoried', where bone appears shiny, almost greasy, in appearance. This may be caused by some cooking treatment, such as boiling, affecting the bone before it was discarded. Since 'ivoried' bone is often identified as isolated examples it seems likely that this is a pre-depositional condition.

A small quantity of bone was burnt, the relative percentage of burning increasing from bottom to top. Below the main Deposit it is less than 0.5%, up to Zone 8 it is less than 1%, and above Zone 8 1–2% of bones are affected. There did not appear to be any selection governing which species or parts of the carcass were more likely to be affected by these conditions.

Species Representation (Common Domestic Mammals)

Table 10 presents the total number of bones identified for the common species and ungulate groups in the main Deposit (Zones 11–4) and Table 11 summarises the number of bones for each species/group found in each zone, including the earlier underlying deposits (Zones 14–12). Relative frequencies are shown in Figure 29. Cattle (*Bos taurus*), sheep/goat (*Ovis aries/Capra hircus*), pig (*Sus domesticus* and *Sus scrofa*), and the large and small ungulate groups (mainly attributable to cattle and sheep/goat) occur most frequently, particularly sheep/goat and small ungulates.

To separate sheep from goat, Boessneck's index (1969, 355), using metrical data from metacarpals and metatarsals, indicated one goat metacarpal from context 2904 and an intermediate metatarsal from 1578; the remainder were all within the range for sheep. Seventy-one horn core fragments were identified, of which only two could possibly be attributed to goat. No other goat remains were identified on non-metrical features and it is assumed that virtually all sheep/goat were sheep.

Cattle

Estimates of cattle withers heights were calculated using Fock (1966) and Matolcsi (1970) (archive). The samples are small by zone and there does not seem to be any temporal change in size. The cattle ranged in height from 99 to 122 cm (n=25); this small stature is typical of Iron Age cattle.

The metacarpals from Late Bronze Age deposits at Runnymede Bridge (Done 1980; 1991) show a similar size range to Potterne, whereas some of the metatarsals are smaller, and the larger ones are more slender than at Potterne. The metacarpals from Grimes Graves (Legge 1981, 33) were intermediate between compar-

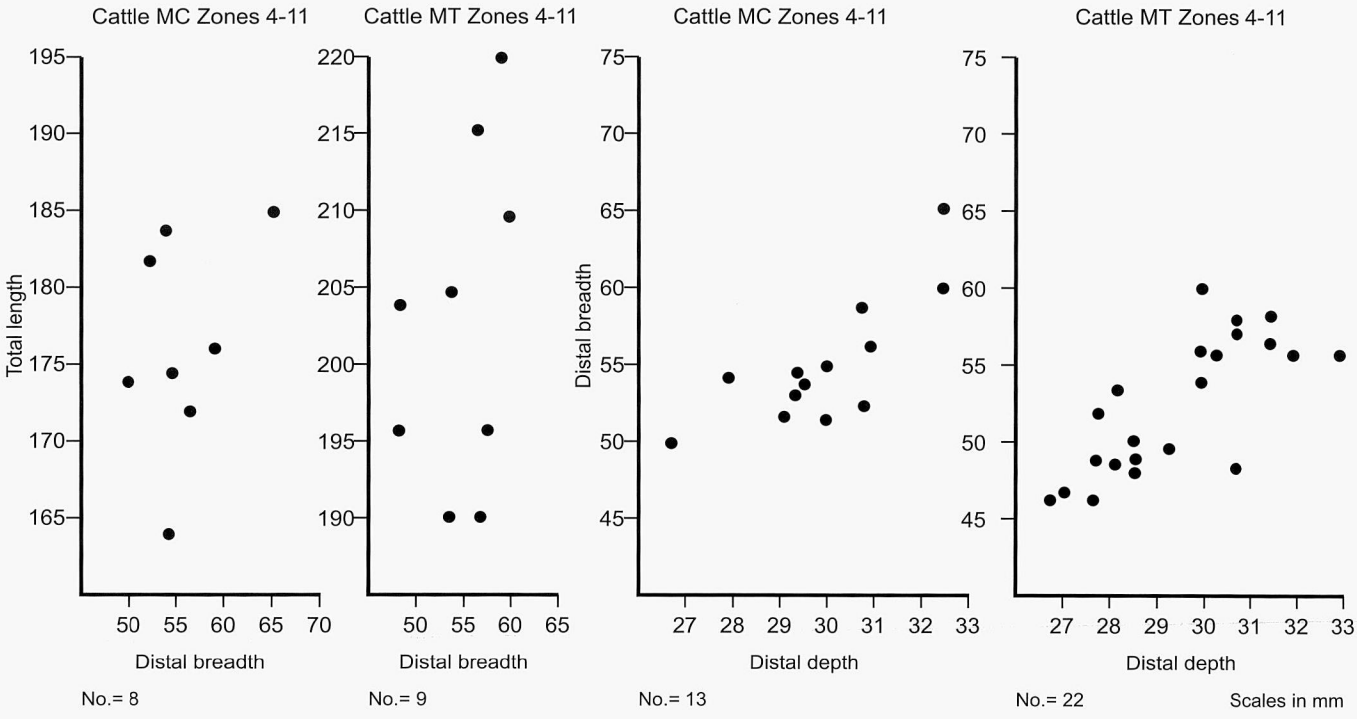


Fig. 30 Animal bone: comparison of cattle metacarpal (MC) and metatarsal (MT) proportions by Zone

ative Neolithic and Iron Age assemblages and Legge has suggested a reduction in cattle size between the Late Neolithic and Early Iron Age (not taking into account any regional differences or possible differences in the sex ratio). The Potterne material is within the size range seen at Grimes Graves for smaller cattle.

The greatest lengths of the medial sides (GLm) of astragali were measured (in mm) from Zones 14–4. These are summarised below and compared with the Late Bronze Age astragali from Runnymede Bridge (Done 1980, 76; 1991, 335) and the Iron Age sites cited by Maltby (1981, 187), in which Winnall Down is equivalent in date to the topmost zone of Potterne.

Potterne	49.5–66.7	n = 71
Runnymede (Surrey)	49.0–66.0	n = 38
Catcote (Co Durham)	51.0–63.0	n = 14
Gussage All Saints (Dorset)	54.0–62.0	n = 54
Winnall Down (EIA) (Hampshire)	55.8–61.6	n = 8
Balksbury Camp (MIA) (Hampshire)	55.0–63.1	n = 12
Grimthorpe (N. Yorkshire)	56.3–61.5	n = 8
Barley (Cambridgeshire)	54.1–62.1	n = 13

The sample from Potterne, although much larger, compares well with Runnymede. The later sites, particularly Gussage All Saints, show a reduced size range within those of Potterne and Runnymede. This increased uniformity could be attributable to a reduction in sexual dimorphism through size, or to a greater similarity in the 'types' of cattle kept in the Iron Age. The three largest astragali (over 63 mm) are from Zones, 8, 9, and 13.

Plotting the total length against the distal breadth of cattle metacarpals and metatarsals did not show any consistent evidence of two size groups (Fig. 30). The distal breadth against distal depth in the metacarpals produced two large outliers, a middle group and two smaller ones. While the metatarsals show two possible groupings, these are not as reliable as the metacarpals and there is no clear evidence to suggest any sex ratio.

Two cattle skulls were found in context 7 (occupation layer/lower Deposit) during the excavation of Cutting 1. The smaller of the two was examined by Dr P Armitage and judged to be from a short-horned male, 5–7 years old. The other (from which the horn cores were missing) was male, possibly castrate, and around 5 years old. Fracturing of the frontals may be evidence of poleaxing or post mortem damage. The difference between the two skulls could also reflect sexual dimorphism (Armitage, pers. comm.).

Done (1980, 74) has suggested that more than one type of cattle were present at Runnymede and this also seems to be the case at Potterne, both from the range of the metrical data and from the horn core evidence. The size and variety of cores in 41 measured specimens (details in archive) show 8 short-horned, 7 medium-horned, and 2 small-horned. Only 8 of the 41 were complete enough to plot the minimum/maximum diameter x 100 of the core against total length (after Armitage and Clutton Brock 1976), and no clusters were shown, partly a result of the small sample size.

Sheep/goat

The withers heights (Teichert 1975) range from 53 to 67 cm (n=46) and show the greatest size ranges in Zones 9 and 4. The smallest range is found in Zone 13,

but as the sample size is only two, it cannot be regarded as significant. Combining all zones, the average heights are between 57 and 63 cm.

The distal ends of many tibiae were measurable and have been compared with other sites. Potterne has the biggest sample and the greatest range available from a later Bronze Age site, analogous with both Runnymede (Done 1980; 1991) and Barley (Maltby 1981).

Potterne	distal breadth	20.5–26.5 mm	n = 70
Runnymede		19.0–24.0	n = 14
Winnall Down (EIA)		21.3–24.0	n = 7
Winnall Down (MBA)		21.1–23.7	n = 12
Balksbury		20.4–24.0	n = 19
Barley		19.9–26.0	n = 11

Plotting the distal breadth against distal depth of the tibiae for Potterne (n = 67) showed no groupings.

All the sheep were horned. The length range for complete cores was 65–140 mm (n=8). The lengths of the outer curve for the two goat horn cores were 150 and 155 mm.

Pig

Measurements were used to separate wild from domestic pig (Clason 1967). Only five possible examples of wild pig were isolated, including a lower third molar, two humeri (which were only 2 mm larger in distal width than the largest of the domestic range), an ulna and a metapodial (Table 15).

There is some overlap between large domestic and small wild pig in size, which confuses the separation (Grigson 1981, 223). This is exemplified by the closeness in the measurement of the distal width of the humeri above. It appears that most of the pig remains from Potterne are from domestic animals which provided all the meat and skins necessary without much recourse to hunting.

Other Domestic Mammals

Horse

Bones of horse (*Equus caballus*) are found in small quantities throughout the zones (Table 10) and vary between 0.1% and 0.3% of the main species/groups. All the bones were from mature animals except for a few deciduous teeth, which could have been shed, in Zones 4, 6, 8, and 10. A fragment of maxilla was estimated to be from an animal of around 5 years (Duncan 1949, 249).

Measurements taken on complete limb bones were used to reconstruct the withers heights (Kiesewalter in von den Driesch and Boessneck 1974). The evidence from Zones 14–4 is given below; no complete limb bones were found in earlier deposits.

Zone	Context		Total Length	withers
5	1822	Metacarpal	211.9 mm	135.8 cm
8	2401		219.9	141.0
10	2765		221.9	142.3
8	2333	Metatarsal	259.9	137.5
8	2333	Metatarsal	258.9	138.0

(Metatarsals are a possible pair)

These animals were ponies between 13 and 14 hands high.

Maltby (1981, 192), using the sites of Gussage all Saints (Dorset), Ashville Trading Estate (Oxfordshire) and Winklebury (Hampshire) gives a range of 10–14 hands for Iron Age horses. The same is true for Maiden Castle, Dorset (Armour-Chelu 1991, 146), while the horse remains from Runnymede (Done 1980, 75; 1991, 334) were between 12 and 13 hands. Measurements for the Middle Bronze Age animals from Grimes Graves, Norfolk (Legge 1981, 80) suggest animals of 12–14 hands, similar to those from Durrington Walls, Wiltshire, for the Neolithic (Harcourt 1971, 344).

There is no evidence that horses were eaten at Potterne: the bones were relatively complete compared to those of the other domestic species, and no butchery marks were observed. Grigson (1981, 184), discussing the relationship between people and animals in the Bronze Age, considers that horses were unlikely to have been eaten during this period. However, for the Iron Age, Maltby (1981, 184) lists a number of sites where horses were butchered for meat. A partial horse skeleton from Maiden Castle (Armour-Chelu 1991, 147) showed cut marks across the atlas suggesting decapitation, while some ribs were chopped through at the proximal end. At Grimthorpe, the presence of immature individuals led Jarman (1968, 189) to suggest the horse was not kept solely for draught.

As a raw material for bone working, horse 'splint' bones were particularly suitable and were used for making bone points. These are vestigial metapodials found on either side of the posterior surface at the proximal end of both metacarpals and metatarsals. Their natural shape means little alteration is necessary to make them into large bone points, but apart from these there is no other evidence for utilisation of the horse carcass.

An antler cheek piece (below) found at the site is evidence for the use of harnesses or bridles. The horse may have been a high status animal in this period, possibly only used by certain members of the community, or for some sort of light draught such as a travois type sledge. The predominance of adult animals may indicate extreme care in rearing so that there were no early fatalities, or the buying in of young healthy stock from elsewhere.

Dog

Bones of dog (*Canis familiaris*) were only present in small quantities, 0.1%–0.3% in Zones 11–4 and 0.2–1.4% in Zones 13 and 14. Although the bones were not heavily fragmented only a few were complete for estimation of the shoulder height, using the method of Harcourt (1974, 154).

Zone	Context		Total length	Shoulder height
4	1539	Femur	= 152.0 mm	= 46.7 cm
11	2930	Radius	= 157.9	= 50.4
nr base	3104	Ulna	= 214.0	= 60.1

These all lie within the range for dogs in the Bronze Age given by Harcourt (*ibid.*, 159) of 43–62 cm. Similarly, the length of the lower first molar, 22.2–25.5 mm (n = 7), is also within the range given by Harcourt of 20–25 mm.

There was one instance of articulated dog remains, a radius and ulna from Zone 10. Knife cuts were tentatively identified on the proximal and midshaft surface of the radius and may be evidence of skinning.

All parts of the skeleton were represented, with permanent dentition in wear and complete epiphysial fusion, except for an unerupted molar from Zone 10 and a distally unfused humerus from Zone 9. A mandible from Zone 6 showed the ante mortem loss of the second molar. The pathology on three lumbar vertebrae in Zone 4 (detail in archive) may be the result of an injury such as a kick or blow.

The activity of dogs on the Deposit is shown by the quantities of fossilised coprolites and by gnaw marks on 1–2 % of all bones. Scavenging may have destroyed many bones while radically altering the appearance of others. Binford (1981, 44) recognises four types of tooth marking on bone: punctures, pits, scores, and furrows. Both punctures and pits were frequently observed on the Potterne bone, the other two conditions were more difficult to quantify. Binford (*ibid.*, 51) also describes bone breakage and destruction, showing how gnawing animals remove the ends of long bones first, the articulation being softer than the shaft, and 'chip back' the edges of bone. Preferential destruction of certain bones may have affected the composition of the assemblage to some degree.

The status of dogs at Potterne is uncertain; they may have been used for hunting or herding and/or may have lived around the settlement scavenging on the refuse dumped nearby.

Wild Mammals

Deer

Both red deer (*Cervus elaphus*) and roe deer (*Capreolus capreolus*) were identified. Red deer are more numerous and both species are more commonly represented by antler fragments than by bones. Both species were found in every Zone except 12 and 14.

Antler fragments of red deer include pieces that appear to be either waste from bone working or were discarded before completion. All the finest worked pieces (Seager Smith, Chapter 6) were in antler rather than bone. At least three pieces were from cast antlers which must have been specifically collected as a valued raw material. There was a large number of cast antlers from Grimes Graves and Legge (1981, 102) has suggested that the absence of skeletal remains, both here and at other later British prehistoric sites, combined with the presence of cast antler, shows that the killing of this species was generally avoided. At other earlier sites (eg the Stonehenge ditch, Serjeantson and Gardiner 1995) both unshed and shed antlers were used as picks and discarded on the base of the ditches. At Stonehenge *c.* 65% of the antlers recovered in excavation were from slain animals. With only 56 pieces identified to red deer, of which 41 are antler, the sample from Potterne is insufficient to further support or refute Legge's theory, but the importance of antler is clear.

The presence of red deer post-cranial bones indicates some were, indeed, hunted, and their measurements, shown below, are within the same ranges and slightly larger than those from Durrington Walls (Harcourt 1971, 345), where most of the red deer were identified from cast antler fragments.

Zone	Context			
5	1781	Humerus	Distal width	53.3 mm
Post-hole	3580	Radius	Prox breadth	62.8
			Prox depth	31.5
9	2560	Radius	Prox breadth	30.5
9	2531	Radius	Prox breadth	53.8
			Prox depth	30.0
10	2744	Metacarpal	Distal breadth	40.0
11	2923	Calcaneum	Total length	109.0
nr base	3365	Calcaneum	Total length	121.2
8	2354	Metatarsal	Prox breadth	38.2
			Prox depth	42.8

Roe deer antler occurs less frequently than that of red deer. Cast antlers were found in Zones 4 and 8, so these were also collected. Only 13 fragments were identified of which seven were antler. Roe deer can be found in more open country than red deer as long as there is some cover. Coy (1982, 289) describes the importance of hazel in their diet and states that any clearance favouring the regrowth of hazel would favour roe deer. Hazel nuts were identified from among the carbonised remains (Straker, above) as well as other indicators of scrub and hedgerow which could indicate suitable local habitats.

Evidence from both species, largely represented by antler fragments, suggests that hunting was either not very important or meat from hunting was superfluous to the community's needs, most of the meat being provided by the domestic species. Antler was a valued material, taken from hunted animals (evidence from skull fragments) and collected when cast. Its value could have dictated the season for hunting and selection of males so that the antler could be used as well as the meat.

Other wild mammals are unlikely to have been eaten but could have been trapped for their pelts. Beaver (*Castor fiber*) was identified from a single incisor from

context 109 (upper Deposit below the topsoil in Cutting 2). This species is thought to have been present in Britain from the Early Postglacial. It is extinct in Britain today and in northern Europe is restricted to forested areas (Lyneborg 1977, 151). Beaver was certainly present in Wessex up to the mid-Saxon period (identified from deposits at Ramsbury, Wiltshire; Coy 1980) and has also been identified from earlier sites at Durrington Walls, West Kennet Long Barrow, and Grimes Graves, Bronze Age deposits in the Fenlands, and Iron Age deposits at Glastonbury. The preferred habitat is that of lakes and rivers surrounded by deciduous forest and scrub trees with plenty of undergrowth (Lyneborg 1977, 151). The location of the site at Potterne, not far from a stream, suggests beaver could have been found close by.

Wild cat (*Felis silvestris*) was found in Zone 10, identified from a mandible, and in Zone 13, from a single loose canine. The method used for separating wild from domestic cat is based on measurement of the first molar (Kratochvil 1973). The ranges for separating the two species are given below with the Potterne measurements.

Lower M1	Domestic Cat	Total length	= 5.7–8.0 mm
	Wild Cat		= 7.4–9.8
	Potterne		= 8.9
	Domestic Cat	Breadth	= 2.7–3.6
	Wild Cat		= 3.0–4.2
	Potterne		= 3.8

Although there is an area of overlap between the two, the Potterne mandible clearly fits in the larger end of the range for wild cat. The canine, although not metrically separated, was large and well stratified at a lower level than the mandible and also considered to be from wild cat (Total length of the canine = 21.7 mm; length of the enamel from the base to the tip of the tooth = 8.7 mm). Wild cat was formerly widespread across the British Isles; it is now restricted to northern parts of Scotland, central, south, and south-east Europe and interbreeds with domestic species. Its occurrence at Potterne may be incidental or as a result of being trapped for its pelt.

Polecat (*Mustela putorius*) was identified from four post-cranial bones in Zones 5, 7, and 8. This species also used to be widespread in Britain, but is now only found in Wales, Hertfordshire, Gloucestershire, and Shropshire (Corbet and Southern 1977). A nocturnal hunter with a preferred habitat in thickets, woodland and scrub, it is sometimes to be found near human habitation. Prey includes small mammals and, in the summer, birds, reptiles, frogs, and fish (Lyneborg 1971, 191). This species could have been trapped for its pelt or caught as a pest. Bewick (1790, 253) states: 'In the winter season it frequents houses, barns etc., feeding on poultry, eggs and even milk'. In lean times polecats may have come close to the settlement looking for food.

Fox (*Vulpes vulpes*) was identified from a single mandible that had been perforated through the mandibular hinge (gonion) presumably for some ornamental purpose. This species has adapted to many habitats, often close to human habitation exemplified by its modern exploitation of urban areas.

Small Mammals

These were mainly recovered in 1984 from the sieved column samples throughout Zones 11–4. There were a few small mammals from the 1983 season when sieving was carried out. The identifications are mainly from skull, mandible, and tooth fragments. The following species were identified: common shrew (*Sorex araneus*); pygmy shrew (*Sorex minutus*); mole (*Talpa europaea*); bank vole (*Clethrionomys glareolus*); water vole (*Arvicola terrestris*); field vole (*Microtus agrestis*); wood mouse (*Apodemus sylvaticus*); and house mouse (*Mus musculus*) (Table 12).

The above species are all native except for the house mouse, a commensal species. With the exception of the Late Bronze Age examples from Brean Down, Somerset (Levitan 1990), the previous earliest records are within Iron Age contexts at Gussage All Saints, Dorset and at Danebury, Hampshire (Coy 1984, 526). House mouse was also identified by Turk from mixed Iron Age and Bronze Age levels at Nour Nour in the Scillies. However, doubt has been cast on this identification (Grigson 1981, 219). At Potterne, house mouse was identified from every level, identified from tooth, mandible, and maxilla fragments (confirmed by P. Armitage and P. Jenkins British Museum Natural History). There has been some filtration of modern seeds through all zones (Carruthers, above), so it is possible that some small mammal bones may have originated at a higher level. Unfortunately the house mouse remains proved unsuitable for radiometric dating which would have confirmed their antiquity.

Birds

Only 28 bird bones were found, and these suggest that fowling and the trapping of birds was not considered a very important activity or source of meat. These are shown in Table 13. Goose (*cf.* greylag, *Anser anser*), mallard (*Anas platyrhynchos*), and teal (*Anas crecca*) could all have been caught by wild fowling. Woodcock (*Scolopax rusticola*) are solitary birds found in forests, heathlands, marshy, and swampy ground (Heinzel *et al.* 1977, 140). Crane (*Grus* sp.) used to breed in this country until the 17th century and was eaten, though the meat is said to be tough. Crane was also identified from Late Neolithic levels at Mount Pleasant in Dorset and from the Late Bronze Age at Ballinderry 11 in Ireland (Grigson 1981, 226 and 229). Small birds such as blackbirds (*Turdus merula*) and sparrows (*Ploceidae*) may have been trapped on lime sticks or netted, as they still are in some Mediterranean countries. The

Table 12: Total number of small mammal bones

Zone	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*'83*	*Total*
Common shrew	1	-	1	-	-	-	-	-	-	2
Pygmy shrew	1	-	-	1	-	-	-	-	-	2
Mole	-	-	-	-	-	-	-	-	1	1
Bank vole	1	-	1	-	1	-	-	1	-	4
Water vole	-	1	3	-	-	-	-	-	-	4
Field vole	-	1	1	-	1	-	-	1	4	8
Mouse indet.	1	-	2	-	1	1	-	1	7	13
Wood mouse	-	-	1	-	-	-	1	-	-	2
House mouse	2	7	8	5	7	9	3	2	93	136
Total	6	9	17	6	10	10	4	5	105	172

guillemot (*Uria aalge*), identified from a coracoid, is a coastal species that may have been brought inland to Potterne as part of a dried carcass.

Scavengers found around the site include crow (*Corvus corone*), raven (*Corvus corax*) and buzzard (*Buteo buteo*). Buzzard was formerly much more common than it is today, and all three may have scavenged among the refuse. A perforated claw of white tailed sea eagle (*Haliaetus albicilla*), now extinct in Britain, was found in 'off-terrace' Zone 8. It may have been worn as an ornament or charm.

Fish

Two vertebrae of eel (*Anguilla anguilla*) were identified, one from Zone 4 and one from Zone 11. A indeterminate skull fragment of a (?)freshwater fish was also present. Fishing does not appear to have been a very important activity if the two eel vertebrae are a representative sample. Eels could be caught in traps in local streams or speared, as they were within historic times in the area (Gingell, pers. comm.).

Discussion

The majority of the faunal assemblage is composed of the common domestic mammals (cattle, sheep/goat, and pig), and these provide the basis of the economy. The following discussion is largely based on the analyses of these elements.

Vertical distribution of species

Tables 11 and 14 suggest an increase in the number of sheep/goat and small ungulate bones, and a decrease in cattle and large ungulates through time. The number of pig seems to increase slightly, but when expressed as a percentage (Table 14, Fig. 29) appears fairly constant. To avoid the possible bias in interpreting species dominance from the total numbers of fragments (NISP), this trend was tested using only mandibles.

Mandibles are easy to identify to species level even when fragmentary. Table 16 shows the number of mandible fragments in each zone. Since pig mandibles are distinctive even when fragmentary, all the small ungulate mandible fragments are combined with sheep/goat and the large ungulates with cattle in Table 16 (and expressed as percentages in Fig. 31). In both cases it appears that changes in species representation takes place consistently from Zone 9 upwards, favouring sheep/goat; a trend also supported by using Levitan's (1990) Fragmentation Index. Below Zone 12 the deposits are different and include trampled/occupation areas; the quantity of bone from these areas is relatively small and more fragmentary, but also seems to favour sheep/goat. The trend for pig in the overlying levels remains consistent, with some evidence for age changes discussed below.

Lateral distribution of species

The absence of any differentiation between 'on-' and 'off-terrace' Zones in the Deposit has already been mentioned. Nonetheless, the use of computer graphics within a three-dimensional model (Reilly *et al.* 1988)

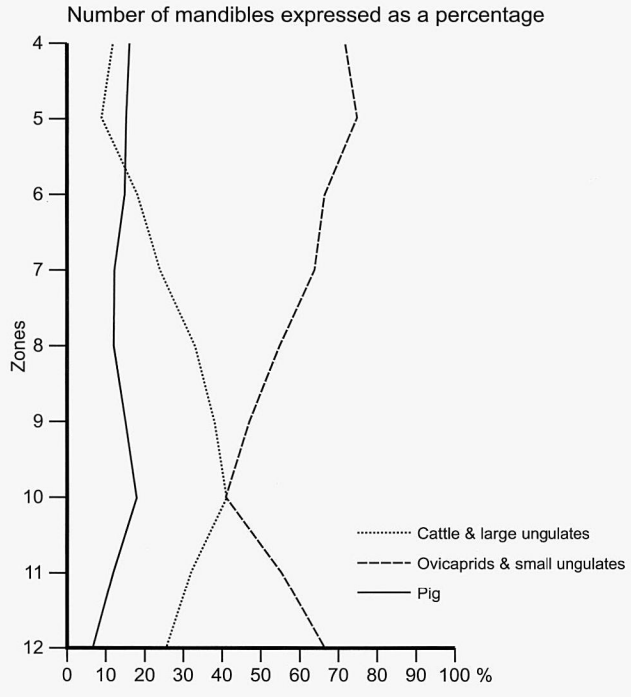


Fig. 31 Animal bone: relative frequency of different mandibles by Zone

Table 13: Total number of bird bones

Zone	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*13*	*83*	*85*	*Total*
Goose	1	-	-	-	-	-	-	-	-	3	-	4
Mallard	-	-	-	2	-	-	1	-	-	-	-	3
Teal	-	-	-	-	-	-	-	-	-	3	-	3
Crane	-	-	-	-	-	-	-	-	1	-	-	1
W T S eagle	-	-	-	-	1	-	-	-	-	-	-	1
Buzzard	-	-	-	-	1	-	-	1	-	-	-	2
Woodcock	-	-	-	-	2	-	-	-	-	-	-	2
Guillemot	-	-	-	-	-	1	-	-	-	-	-	1
Blackbird	-	1	-	-	-	-	-	-	-	-	-	1
Ploceidae	-	-	3	2	2	1	-	-	-	-	-	8
Crow	-	-	-	-	-	-	-	-	-	-	1	1
Raven	-	-	-	-	-	-	-	-	-	1	-	1
Total	*1*	*1*	*3*	*4*	*6*	*2*	*1*	*1*	*1*	*7*	*1*	*28*

showed no individual dumping episodes and failed to isolate groups of material when the bone was analysed within the 1 m square, 0.1 m deep, excavation units. This may be because the bone is in secondary deposition, cleared from smaller dumps, or because subsequent scavenging has disturbed bone associations.

Body part analysis

The parts of the skeleton represented in the assemblage for cattle and large ungulate, sheep/goat and small ungulate, and pig are expressed as histograms using the Fragmentation Index (Levitan 1990 and archive) (Figs 32–4). Ribs and vertebrae have only been recorded as large or small ungulate and therefore are not shown for pig.

The mandibles (primary butchery waste) and lower limbs (largely secondary butchery waste) of cattle are well represented (Fig. 32). All body parts (ie, food elements) for cattle and large ungulate decrease as the Deposit accumulates, the decrease being greater from Zone 7–4 than from 10–7, suggesting that the change is greater in the middle and upper levels. In the occupation level at the base, although the sample size is small, there does appear to be a bias in favour of the lower hind limb (tibia, calcaneum, astragalus, metatarsals, and phalanges). These are largely primary and secondary butchery waste elements that bear little meat, they are less fragmentary, thus increasing their representation, since bones of less than 25% completeness are not included.

The numerical dominance of sheep/goat is clear when the total number of fragments are compared (Table 10). Mandibles are well represented in Zones 7 and 4, increasing to become the most frequent bone in Zone 4 (Fig. 33). Although there is an overall increase in sheep/goat, this is not reflected in all body parts. Skull fragments, horn cores, mandibles (primary butchery waste), and humeri show a gradual increase, but metacarpals and tibiae (secondary butchery waste and minor food elements) do not show much change until Zone 4. Phalanges (primary waste) show an increase from Zone 10 to Zone 7 and then remain static. Calcanea and metatarsals (primary waste) show an over all increase from bottom to top, but there is a dip midway, around Zone 7. Conversely pelves and vertebrae (primary food elements) show a decrease from bottom to top, scapulae, radii, femora, and astragali (largely food elements) show an overall decrease with a further dip in the middle. As a general trend, the bones that decrease in relative proportion as the deposit accumulates are from parts of the carcass with most meat and could reflect a change in deposition favouring heads and limb extremities. In Zone 13 the sample is small; in one 1 m square (3514) radii and tibiae are best represented, as in square 3505, though it is not so marked in the latter.

In Figure 34 the distribution of pig suggests a greater similarity between Zones 10 and 7 than with Zone 4. In Zone 4 the proportion of mandibles increases, as do phalanges; humeri are absent, although relatively well represented in the other two zones, and pelves and femora (primary meat cuts) are poorly represented throughout. In Zone 13 the sample is small; and the hind limb (largely food elements) is particularly poorly represented (ie, pelves, femora, tibiae, and fibulae).

The absence of certain parts of the skeleton may be attributable to a number of factors. They may be truly absent (disposed of elsewhere or consumed by dogs), or so heavily fragmented (less than 25% present) that they are not included in the index (this is most likely to affect cattle and the large ungulate groups). Heavy fragmentation results in some bones being of an indeterminate appearance and being classified as a long

Table 14: relative percentages of fragments for cattle, sheep/goat and pig for Zones 4-11 (based on number of identified specimens)

Zone	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
Cattle	4	5	5	7	8	8	8	7
Large ungulate	14	14	19	21	23	27	27	28
Sheep/goat	14	14	12	9	8	8	8	9
Small ungulate	60	57	55	55	54	49	49	48
Pig	8	10	10	8	7	8	8	8

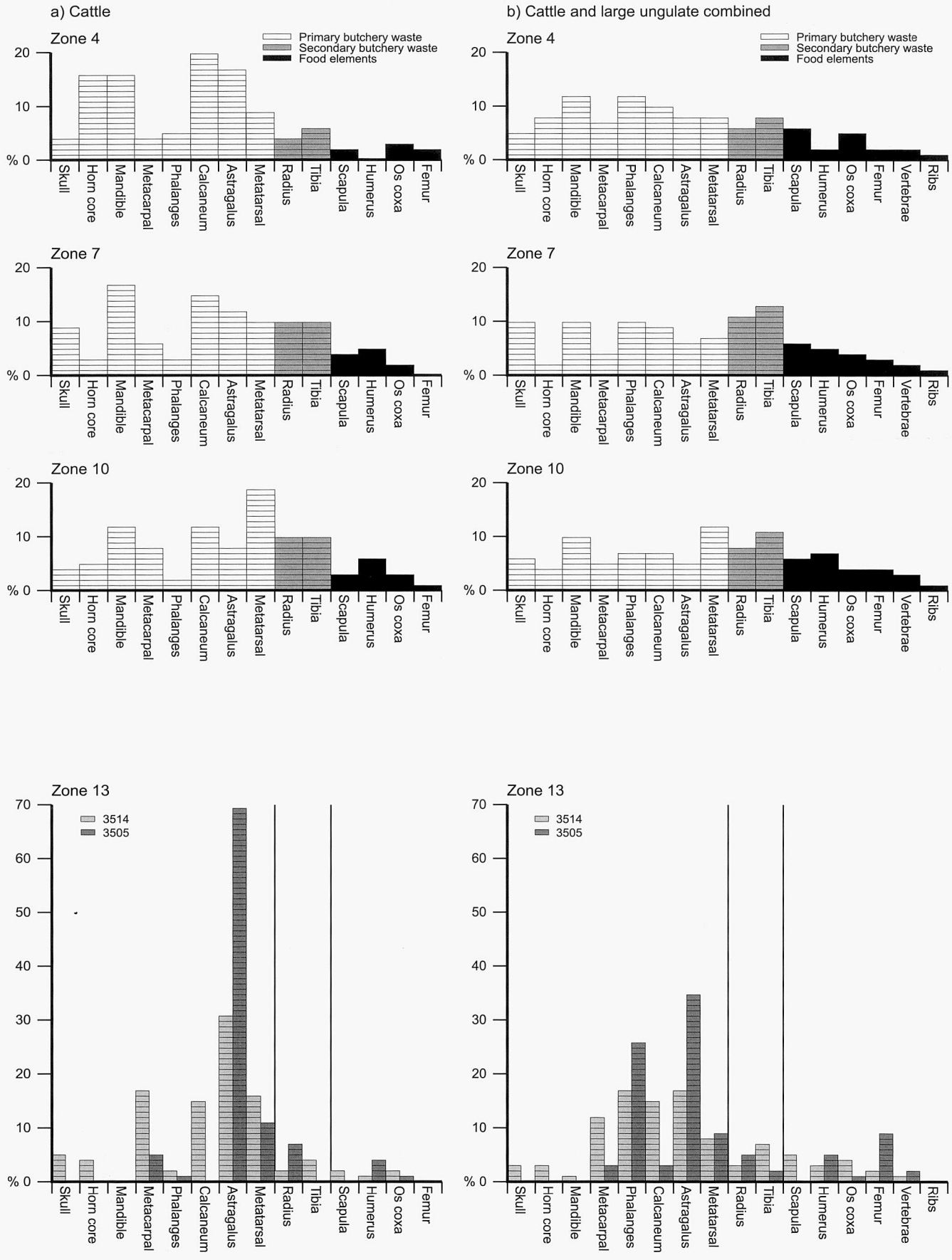


Fig. 32 Animal bone: occurrence in selected Zones of anatomical elements of cattle and large ungulates expressed as a percentage, using Levitan's (1990) fragmentation index

Table 15: Summary of animal bone measurements.

a) Cattle, long bone lengths

Radius: 230.0, 250.0, 260.0
Tibia: 290.0, 290.0, 314.0, 354.0

b) cattle, other measurements

Humerus		***Metacarpal***		***Metatarsal***		***Astragalus***	
Greatest breadth of trochlea	*Greates breadth of distal end*	*Maximum distal breadth*	*Maximum distal depth*	*Maximum distal depth*	*Maximum distal depth*	*Length medial trochlea*	*Distal breadth*
60.8	64.5	49.8	26.8	46.777	26.8	49.5	33.8
61	65.0	50.05	27	47	26.0788	50	34.2589
62.08	66	51.259	28.077	48.002599	28.22566	51	35.2359
63	67.5	52.025	29.0255	49.3	29.3	52.5	36.011255899
64.003558	68.055	53.7	30.007588	50.0	30.0003788	53	37.0000112222455558
65.0	69.7	54.22338	31.0	51	31.55	54.59	38.0000234557788
66.25	70.357	55.0	32.55	52.2	32.0	56.23557	39.0000222258
67.1	71.55	56.7	33.7	53.78	33.0	57.02255568889	40.0002557
68.25	72.59	57		54		58.005557788999	41.555
69	73.0	58		55.889		59	42.9
70.0	74.02	59.028		56.05		.00222556778899999	43.1
71.002	75.8	60.78		57.02		60.12227	44.3
72.29	76	61		58.0		61.00279	45.07
73.02	77.08	62		59		62.055	
74.8	78	63.7		60.01		63.02	
75.3	80.4	64				64.25	
76	81	65.7				65.0	
77	82					66.7	
78.0	83						
79	84						
80.0	85.6						
	86						
	87.0						
	88.04						

Sheep/goat, long-bone lengths

Humerus: 127.0, 136.0
Radius: 132.5, 140.0, 142.0, 148.0, 149.0, 152.0, 155.0, 160.0, 168.0
Femur: 152.0, 164.0, 168.0
Tibia: 190.0, 190.0, 192.0 195.0, 198.0, 200.0, 200.0, 200.0, 204.0, 204.0, 207.0, 212.0

Sheep/goat, other measurements

Metacarpal		***Tibia***		***Metatarsal***	
Distal breadth	*Distal depth*	*Distal breadth*	*Distal depth*	*Distal* breadth	*Distal depth*
21.99	13.7	20.5	16.5557	21.256889	13.8
22.000259	14	21.00557	17.00122224455567899999	22.05	14.89
23.15	.02223555	22.0022222244445577	18	23.78	15.02457
24.159	15.0009	23.000122224455577777888888999	.000000002222222222235555678888999		16.12
25	16.0	24.0000002255558888	9		
26		25.0228	19.000025899		
27.5		26.45	20.03		
			21.2		

Table 15 (continued): Summary of animal bone measurements.

Pig, all measurements

Humerus		**Tibia**		**Astragalus**
Greatest breadth of trochlea	*Distal breadth*	*Distal breadth*	*Distal depth*	*Total length (from historgram in Locker (unpub.) so no last digit*
28.7	37.002	26.8	21.7	32.xx
29.0	38.0	27.00059	23.9	33
30.28	39.03	28.288	24.2599	34.x
31.0057	40.0006	29.00	25.2557	35.x
32.55	41	30.3	26.3	36.x
33.00	42.00258	31	27.7	37.xxxx
34.14	43.2	32.55	28.02	38
35.05	44			39.xxxxx
36.5	45.07			40.xx
37.9				41.xx
				42.x
				43
				44.x
				45
				46.x
				47
				48
				49.x

bone fragment, or just fragment and excluded. Presence or absence may be as much a reflection of carcass processing as disposal methods.

Bone fragmentation and butchery

Fragmentation

The portion of the bone present and the degree of completeness were recorded and the calculation of the numbers of proximal-with-midshaft, midshaft, and midshaft-and-distal ensured the same bone was not counted twice. The results are shown in Figures 35–7.

With regard to cattle, all parts of the mandible are present (Fig. 35). Scapulae are most often represented by neck and blade fragments, chopped across the neck. The humerus was poorly represented, mostly by midshaft and distal fragments; the proximal end does not survive well. The number of proximal and midshaft radii increases with depth. The proximal end of the ulna was largely missing, possibly as a result of dog gnawing. No particular trends were observed for the hind limb, apart from an increase in the acetabular area of the os coxa and also the midshaft of the femur towards the base of the Deposit, but the sample size is small.

Table 16: a) total number of mandibles for cattle, sheep/goat and pig

Zone	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13: 3505*	*13: 3514*	*14*	*Total*
Cattle	14	7	14	24	23	42	26	19	-	-	1	1	171
Large ungulate	39	29	39	35	67	89	109	52	7	5	16	4	491
Sheep/goat	170	151	110	86	61	73	55	35	7	3	12	-	763
Small ungulate	155	138	84	69	88	90	80	90	11	11	21	2	839
Pig	71	58	43	28	32	55	59	27	2	4	8	-	387
Total	449	383	290	242	271	349	329	223	27	23	58	7	2651

b) number of mandibles expressed as a percentage of total within each zone

Zone	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
Cattle/lge ung	12	9	18	24	33	38	41	32	26
Ovic./sm ung	72	75	67	64	55	47	41	56	67
Pig	16	15	15	12	12	15	18	12	7

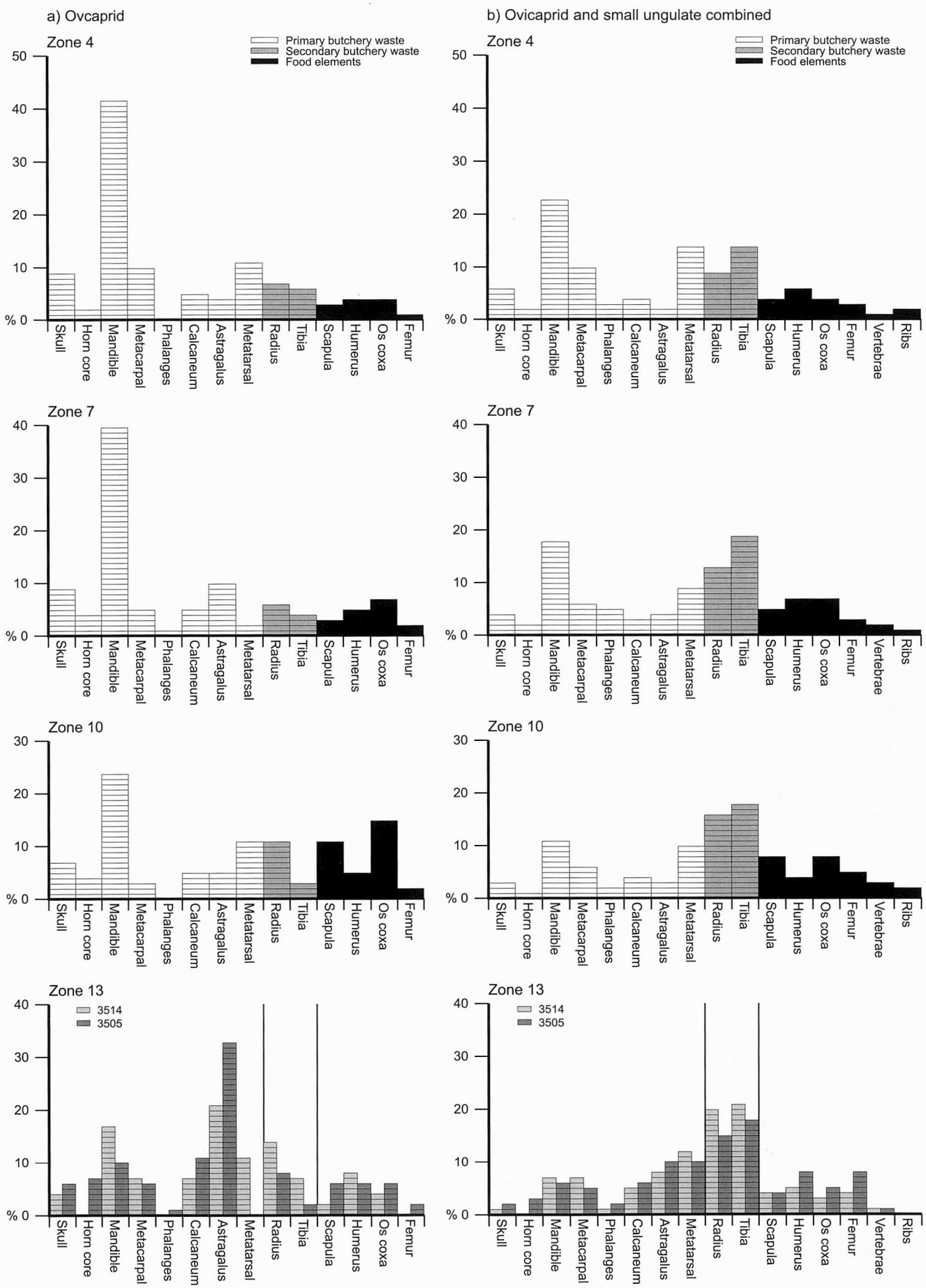


Fig. 33 Animal bone: occurrence in selected Zones of anatomical elements of ovicaprid and small ungulates expressed as a percentage, using, Levitan's (1990) fragmentation index)

For sheep/goat and small ungulates few bones are whole (Fig. 36). In Zone 4 almost complete mandibles (complete with gonion and diastema) are most common, while in Zones 8 and 11 the frequency of the mandibular hinge and tooth row area (gonion and alveolar area) suggests a change, with the front of the jaw (diastema and incisor areas) now broken/chopped off. Neither scapulae nor radii show any significant changes from the base of the Deposit upwards. Scapulae were broken across the neck and the blade, and radii at the end of the shaft.

On the hind limb, femora and os coxae proportions remain stable, and tibiae (mostly shafts) are most numerous in Zone 8. Metapodials (proximal and midshaft fragments) are most common at the top. The increase in mandibles and metapodials towards the top suggests an increase in disposal of low quality parts of the carcass.

Pig (Fig. 37) shows an increase in mandibles towards the top of the Deposit.

Overall there is no trend towards greater completeness lower down in the Deposit. Most of the fragmentation is due to butchery or dog gnawing.

Butchery

Specific butchery marks including knife cuts, chopmarks and evidence of splitting was noted in 3–4% of records in Zones 11–4 and only 1–2% in Zones 14–12. The latter reflects the poorer condition and greater fragmentation of the underlying deposits.

Axial splitting of vertebrae of small and large ungulates was evidence of division of the carcass into sides and chops. Similar splitting of cattle vertebrae was observed at Runnymede (Done 1980, 75) and was the most commonly occurring butchery.

Knife cuts are evidence of skinning, dismemberment, and filletting. They were most commonly observed on cattle mandibles on the mandibular hinge (gonion), under the tooth row (alveoli) towards the front of the jaw (on the diastema), all made during the removal of the cheek meat. Faint knife cuts were also seen on one of the two cattle skulls from context 7 in Cutting 1 (see above), near the horn core base and on the left mandible. Cut marks were also seen on pig mandibles on alveoli of molars and incisors, but were not seen on sheep/goat mandibles.

After initial dismemberment of the carcass, the removal of joints and fillets of high quality meat, fragmentation for marrow extraction and dog gnawing has destroyed and altered much of the bone. Heavy fragmentation reflects intense utilisation of carcasses, concentrating on meat bearing areas.

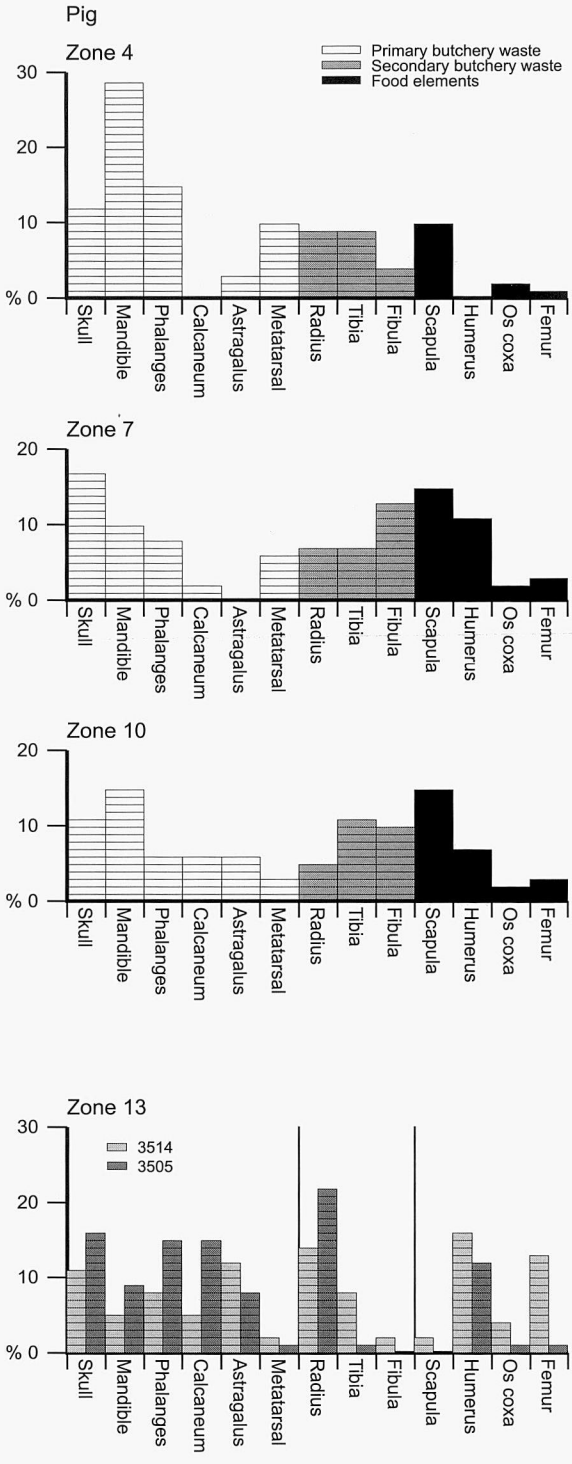


Fig. 34 Animal bone: occurrence in selected Zones of anatomical elements of pig expressed as a percentage, using Levitan's (1990) fragmentation index

Ageing (common domestic mammals)

The evidence is mainly from dental eruption and wear, supported by epiphysial fusion. The mandibles were classified according to Grant (1975). Where they were broken, if the age/wear stage could be estimated to within a value of five Grant (1975) wear stages, they were included in the sample giving the highest value.

The amalgamated age of death of cattle mandibles for all zones was drawn as a series of histograms (Fig. 38). Of 39 examples, three were *c.* 1–8 months old (the 2nd molar was unerupted), and 23 were *c.* 18–30 months (the 3rd molar had yet to erupt). Various sources of data give a range of between 2–5 years for

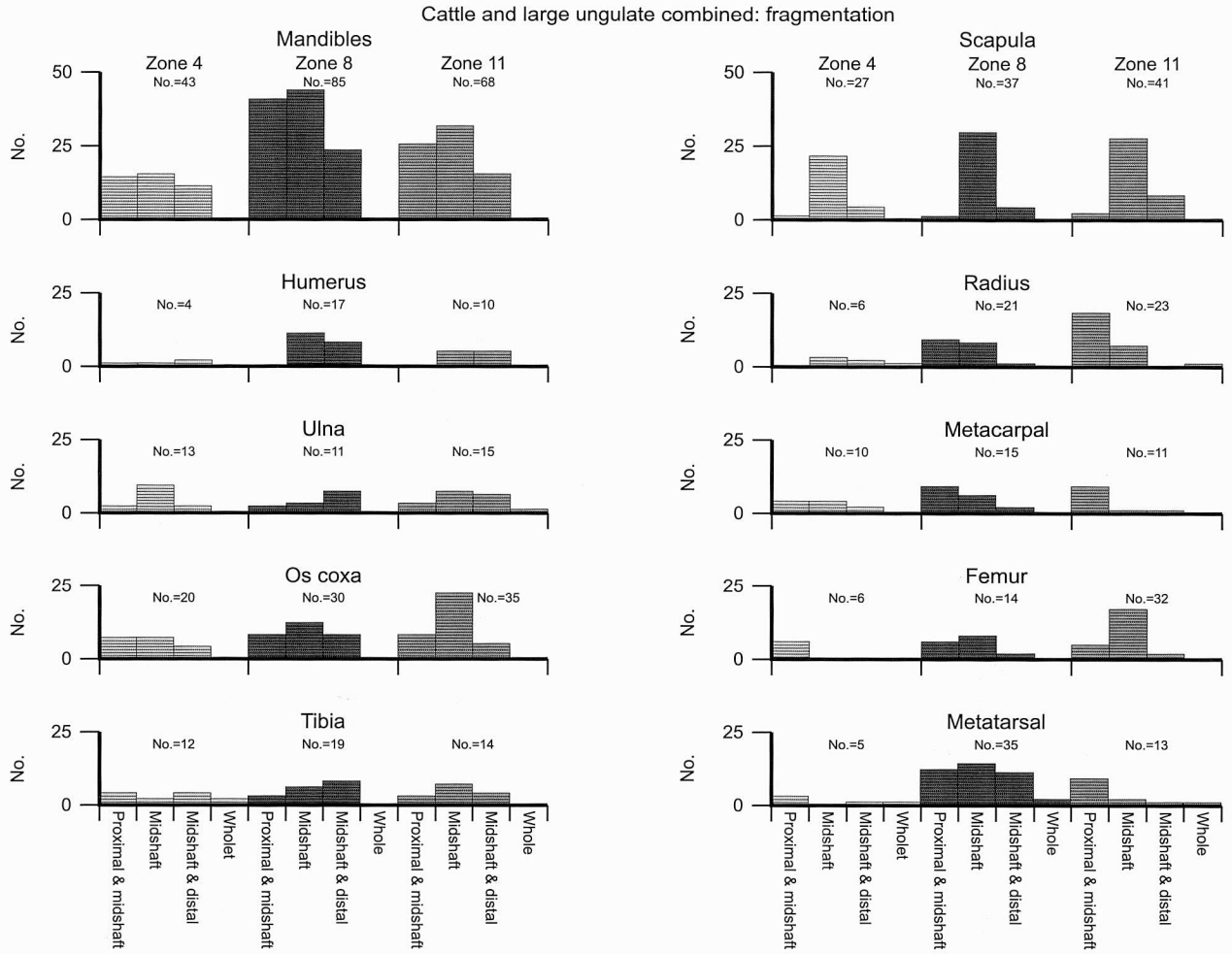


Fig. 35 Animal bone: frequency in different Zones of selected cattle and large ungulate fragments

the 3rd molar to erupt (Payne 1984, 77), but whatever the absolute age, the distribution of mandibles shows no specific peaks (numbers being too low between 1st and 2nd molar).

Ageing information, derived from tooth eruption data and expressed as a cumulative percentage, was compared with that from the Late Bronze Age deposits from Grimes Graves (Legge 1981, 88), with which five other European sites were also plotted to show differing mortality curves between milk and meat based economies. Dairying is suggested for Grimes Graves, where half the cattle in the assemblage were killed by 6 months while the cows were maintained to produce milk. Meat production shows few juvenile animals were slaughtered, but a peak around the time that the 3rd molar erupts and is just in wear, 'that period in which the killing of animals for meat would be most productive' (*ibid.*, 87). The Potterne cattle seem to be at an intermediate stage, suggesting they were kept for a number of purposes, with a surplus of animals at various ages for meat.

Sheep/goat tooth eruption and wear stages displayed in a similar manner to that for cattle showed that the main peaks occur for animals *c.* 0.5–1.5 years (between values 10–15), 2–2.5 years (values of 20–25), and *c.* 3.5 to 4+ years (values around 35–42). The combined histogram shows the approximate values at which the molars come into wear (Fig. 38. It has been suggested that the peaks (at values 5, 11, 25, 35 and ?42) are evidence of an autumn kill off at *c.* 6 months, 1.5 years, 2.5 years 3.5 years and 4+ years (Levitan, pers. comm.). Comparison with Payne's (1973, 232-4) expected kill-off patterns for flocks kept for a single product, viz milk, meat or wool, suggests that the sheep at Potterne were kept for a combination of products shown in three main peaks: 1) immature animals; 2) primarily ?males for meat; 3) mature animals (?females) kept for wool, milk, and breeding. Zones 4–6 show this, Zones 7 and 8 emphasise older animals, and in Zone 9 there is a group of immatures around value 10–12.

Maltby (1981, 172–4), in examining the sheep ageing data for the Iron Age, found six assemblages where there was a high proportion of sheep mandibles with only 1st molar in wear (*c.* 6 months to 1 year old), only a few with the 1st and 2nd molar in wear (1–2

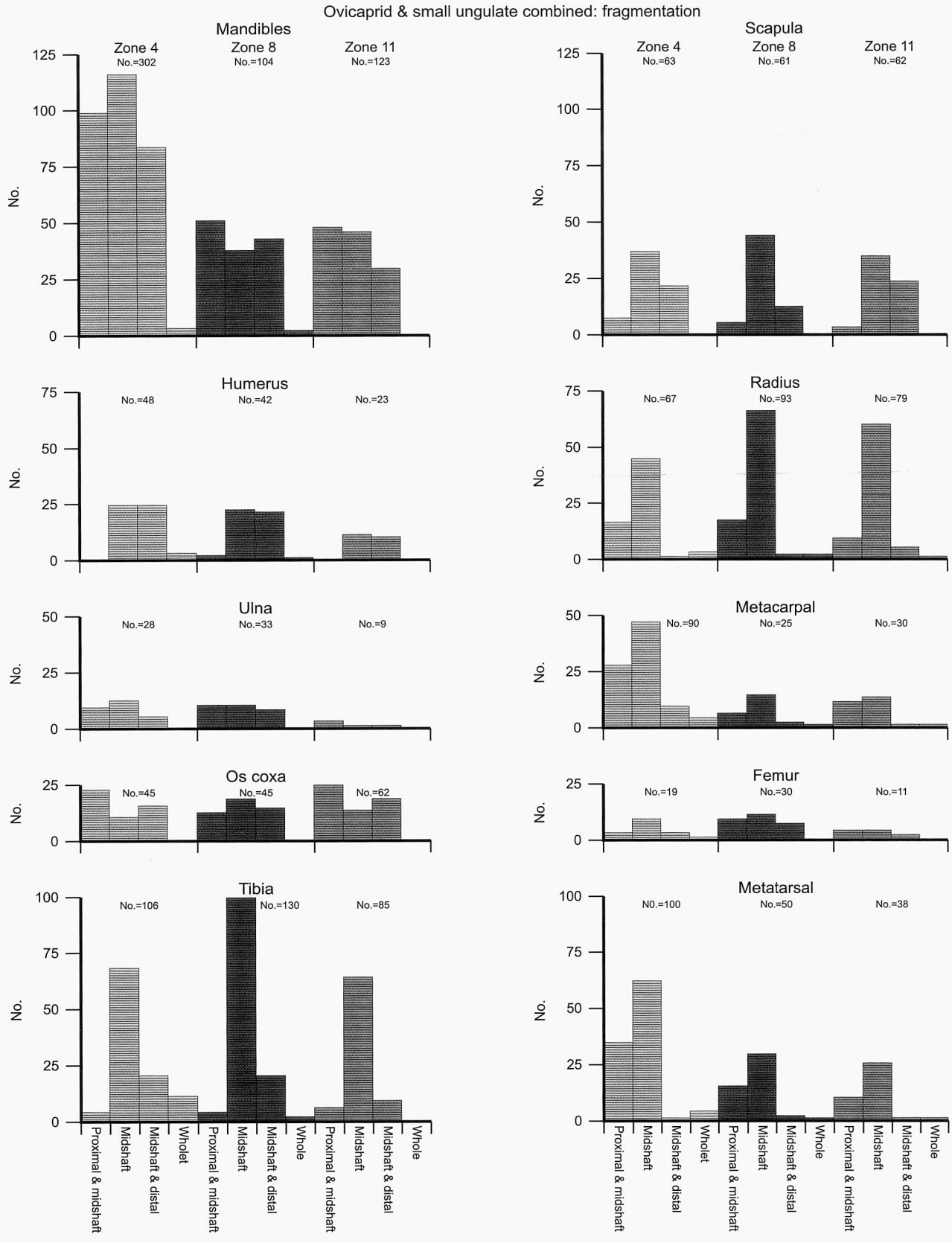


Fig. 36 Animal bone: frequency in different Zones of selected ovicaprid and small ungulate fragments

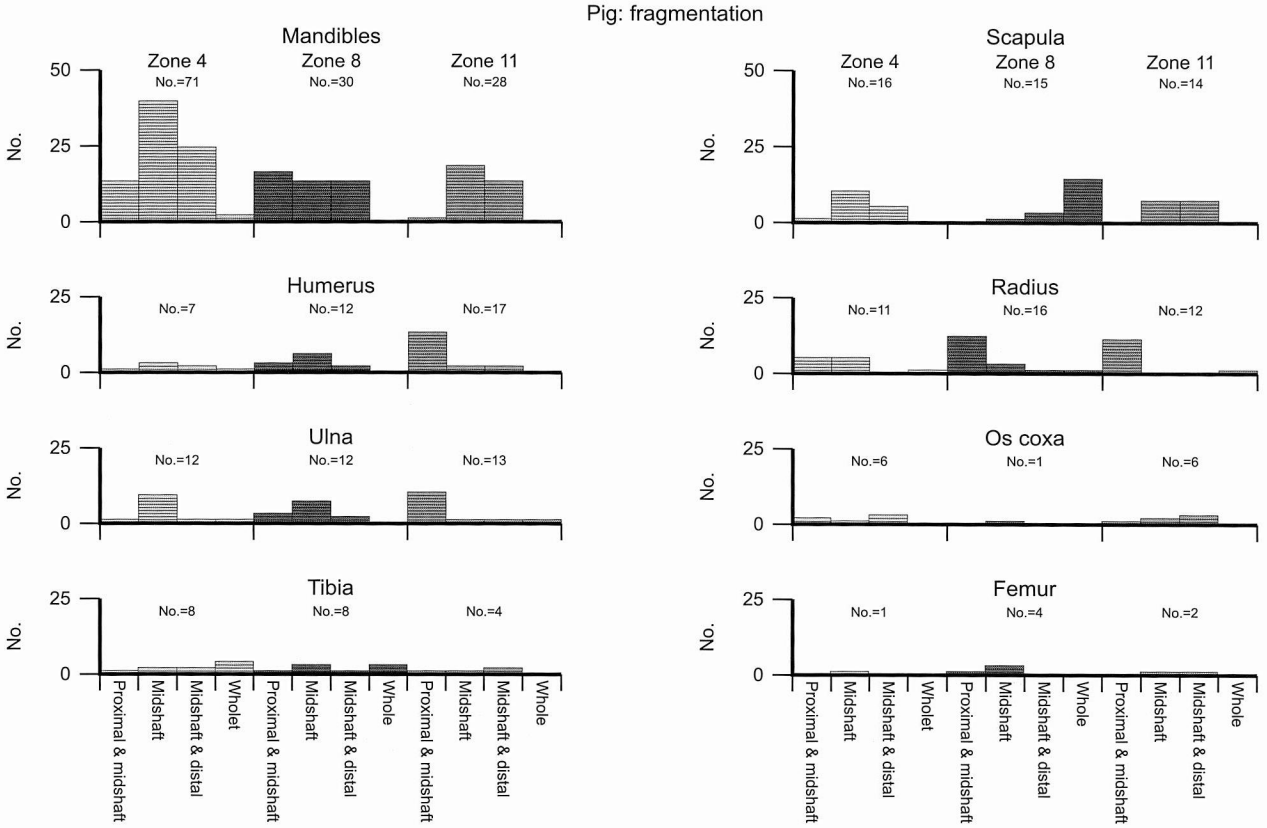


Fig. 37 Animal bone: frequency in different Zones of selected pig fragments

years) and a large number with a fully erupted tooth row (more than 2–3 years). Two other assemblages showed that a significant proportion was slaughtered between the early wear stages of the 2nd and 3rd molar. Although immature specimens may be under-represented due to their fragility, the age groups shown at Potterne could represent sheep husbandry at a subsistence level as suggested by Maltby (*ibid.*, 175), providing meat, milk, manure and wool in Early Iron Age Zone 4 as well as the Late Bronze Age levels.

The pig mandibles are all from domestic animals (see above; Fig. 38). The samples are small, with a peak at wear stage 27–30 (ie, subadult and prime age for food). The upper zones (4 and 5) show a higher proportion of immature animals (between the eruption stages of the 1st and 2nd molars wear stage 7–15; ie also good food animals) than in the underlying levels. This could indicate a greater surplus in the later period, but the evidence is slim.

Pathology

Dental pathology was observed on a number of sheep/goat, pig and cattle jaws. Sheep/goat showed the highest percentage, and mainly involved some form of alveolar recession around the 4th pre-molar and 1st molar. Forty-four instances of appendicular pathology were recorded, the greatest number (21) being in the cattle and large ungulate groups. Descriptions of the individual pathologies are in archive.

Conclusions

The domestic economy was based on cattle, sheep/goat and pigs. A few bones of goat were identified, but it was assumed that most of the ovicaprid remains were sheep.

At the base of the Deposit, although the samples are small, cattle (and large ungulates) are at least as important as sheep/goat (and small ungulates) and more typical of the Bronze Age assemblages described by Grigson (1981, 229) than they are from the subsequent accumulation. The bones in these early levels are more heavily fragmented (probably as a result of trampling) and heavily mineralised, particularly in Zone 13.

In the overlying zones sheep/goat become increasingly dominant and cattle decrease, although these changes are not exactly reciprocal. The assemblage becomes more typical of an Iron Age economy and may indicate an early regional trend towards keeping increased numbers of sheep. This is also suggested by the comparatively small sample of animal bones from the Wilsford Shaft (Grigson 1989). Conversely at Runnymede, although cattle also decline in the later period, pig becomes more common than sheep (Done, pers. comm.; 1991, 341). Grigson (1986; 1989) suggests an increase in sheep numbers in the Late Bronze Age as being possibly related to the introduction of woolly sheep. At Potterne sheep become increasingly important in the economy, weaving combs

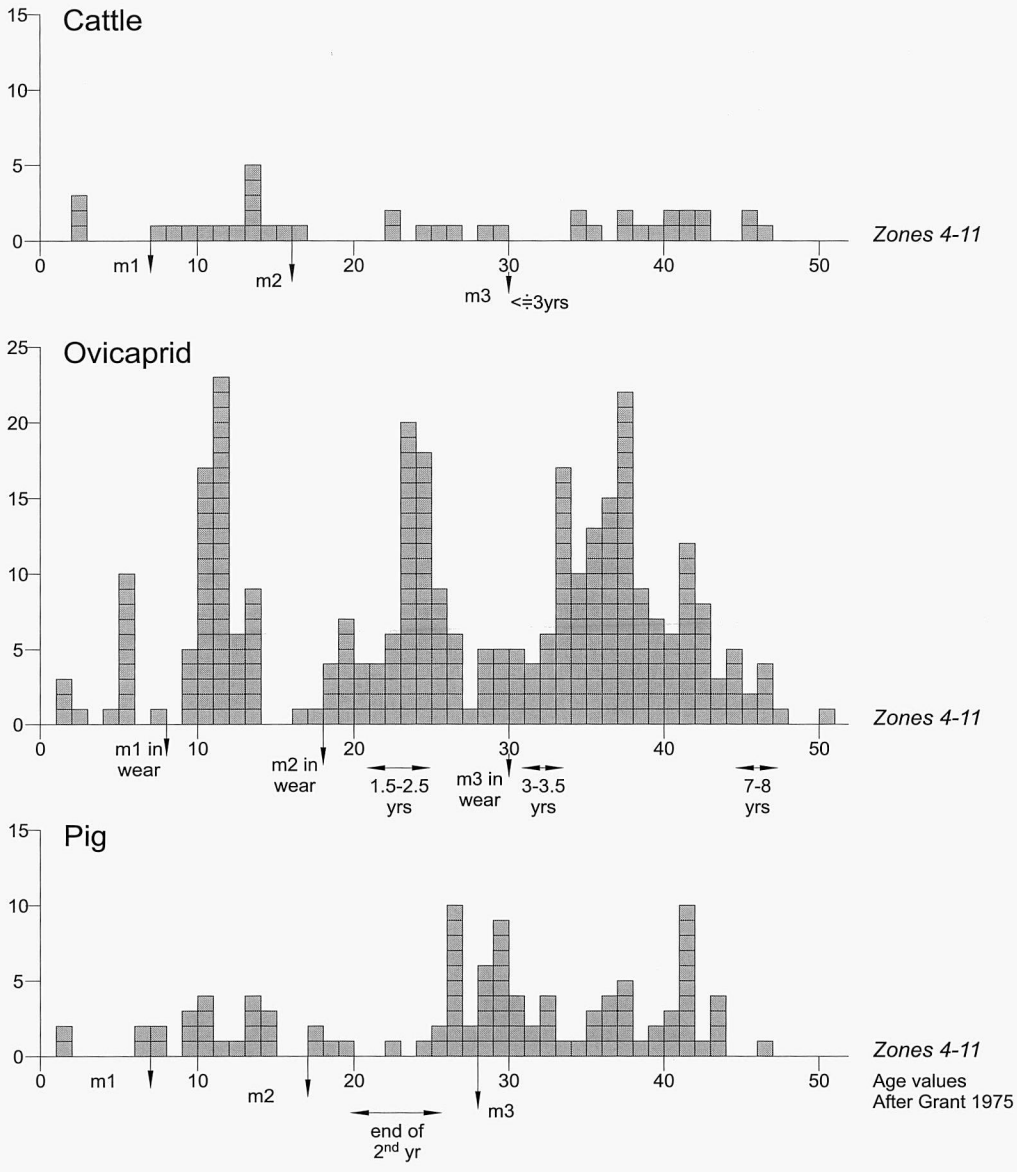


Fig. 38 Animal bone: ageing based on dental wear (after Grant 1975)

and other artefacts associated with spinning being found (see below).

The age structures of both sheep and cattle suggest they were kept for a variety of products. The relative importance of pig (largely domestic) remains fairly constant in both earlier and later levels (7–9%; Fig. 29), and seems always to have been of secondary importance. A few examples of wild boar have been identified, but most pigs were of domestic size. The ratio of sheep and cattle to pig as an indicator of pastoralism is discussed by Grigson (1986, 79), an increase in sheep and cattle at the expense of pig supporting the expansion of pastoralism. At Milton Lilbourne, Wiltshire (*ibid.*), and Runnymede (Done 1980; 1991) the proportion of pigs is relatively high. For the former Grigson has suggested that this indicates more generalised animal keeping and Done (*op. cit.*) postulates that the high proportion of pigs at Runnymede suggests permanent settlement, rather than seasonal or occasional use.

Horses were present in small quantities, represented by ponies of 12–14 hands. There is no evidence for butchery of horses, although the splint bones were used in bone working for making bone points. The importance of horse has already been discussed; they may have been reserved for special use and a harness/bridle piece made of antler has been recovered at Potterne. The remains of dogs were identified throughout the Deposit, and evidence of their scavenging and activities is shown from gnawed bones and quantities of fossilised coprolites. They could have been used for hunting or herding, although the former does not seem to have been a very important activity. Both red and roe deer were present (red being more common) and were valued as much for their antlers as their meat and were present in low quantities. Cast antlers of both species were collected. A few other species of wild mammals such as beaver may have been trapped for their pelts and other species present included wild cat, polecat and fox. Small mammal bones retrieved by sieving, included

voles, shrews and most interestingly house mouse, with over a hundred elements identified through the Deposit. Bird bones were scarce, despite extensive sieving of the Deposit, and were largely represented by common species found locally, except guillemot and white tailed sea eagle. They included species probably caught by netting and wild fowling as well as crow, raven, buzzard, guillemot and white tailed sea eagle. The eagle was identified from a perforated claw, and guillemot may have been brought from the coast. Two eel vertebrae are the only evidence for fishing and may have been caught in local streams.

The animal bone reflects a pastoral economy, with very little hunting, which centred on cattle and sheep, the latter playing an increasingly important role. Although in terms of meat weight, cattle would have been as important, the role of sheep for wool, milk, and manure should not be under-estimated.

The most outstanding feature of the Deposit is the consistent trend in species representation of the animal remains; repeated efforts to isolate specific dumping episodes were unsuccessful. This may be because of the unavoidable artificial division of the accumulation for excavation. It may also be because some of the material is of secondary deposition, originally disposed of closer to a settlement, and subsequent scavenging by both animals and humans which has disturbed any articulated bones.

10 Other Environmental and Scientific Analyses, compiled by Michael J. Allen

A series of small analytical reports was undertaken on environmental remains, and of the soils, which have produced little conclusive evidence in their own right. It has, however, been decided to incorporate these here as they may have a bearing in the future. For example, insect remains were sparse and no work beyond assessment was undertaken: Maureen Girling recommended that 'in view of the quantities of soil required for the extraction of such low numbers, I do not think that this particular line will be valuable to pursue.' (letter 7 Feb. 1984). The absence of parasite ova from coprolites reported by Andrew Jones is important in its own right in view of subsequent discussions and analysis of the Deposit.

Insect Remains

Mineralised remains extracted from residues were sent to the late Maureen Girling at the Ancient Monuments Laboratory who reported as follows:

> Millipedes occur as definite body segments, some with legs. The tiny, somewhat oval objects appear to be derived fossils as they have some sort of crystalline structure inside, and their composition is unlike that of the replaced arthropods. The identifications are:
>
> Polydesmidaea millipede (Indet. millipede)
>
> Ditperous (fly) puparium
>
> Polydesmidaea millipede (Indet. millipede)
>
> Indeterminate apex (?worm)

Millipedes and the puparium occurred as replaced fossils. Millipedes are general scavengers and fly maggots live in a variety of decaying organic matter.

Parasite Ova

Two samples of coprolitic material from the Deposit were submitted to A.K.G. Jones who reported as follows:

> **Specimen 1 from sample 628** (context not now known)
>
> A 6 g sample of the material was examined using the standard technique. The material appears to be something of a mixture of different coloured ingredients. There are also many small tunnels running through it, and it is difficult to tell whether these were made by roots or soil animals.
>
> A few fungal spores, and what appears to be finely divided fragments of insect or other arthropod exoskeleton were noticed. No parasite ova were present
>
> **Specimen 2 from sample 700** (context 3325), zone 12
>
> This sample was examined using the Stoll method and using a flotation procedure devised for collecting parasite ova from agricultural soil samples (Burden 1976). The sample consisted of a lot of small concretions amongst the matrix. Free-living nematodes and other soil fauna were noticed, but no parasite ova.

Parasite ova of *Trichuris* and *Ascaris* were, however recorded in pollen preparations from another coprolite sample by Scaife (above).

Other Zoological Remains

During the environmental processing various other mineralised remains were found during the sorting of the environmental residues by Wendy Carruthers. These included land snails and worm cocoons which are reported upon briefly below.

Land snails

A few land snail shells were noted by Wendy Carruthers during the processing of the environmental residues. Although bone preservation was good and there was evidence of base-rich ash (calcium carbonate), land snails were not preserved in large quantities within the deposits at Potterne and numbers of the burrowing snail (*Cecilioides acicula*) were present. The presence of this burrowing species and the low numbers of shells made detailed palaeo-environmental analysis inappropriate (J. Evans pers. comm).

Interestingly, however, a few other species were found in the environmental residues (W. Carruthers, pers. comm.) and were noted to be preserved in a

'mineralised state' (J. Evans and W. Carruthers pers. comm.). These shells were discoloured and 'ambered', unlike the specimens of *C. acicula* which had obviously burrowed into the deposits comparatively recently. *C. acicula* is a species not known in the British Isles before the medieval period and must have orgininated from the modern, or a more recent fauna. The species is present in the modern fauna at Potterne.

The shells preserved in a 'mineralised state' are probably contemporaneous with the Deposit and mineralisation here probably takes two forms; the first being calcium phosphate concretions on the shell, and second the possible replacement of the apatite-based shell with calcium phosphate compounds creating a pseudomorph.

Worm Cocoons

Mineralised worm cocoons were recovered from features and from the Deposit and are reported fully elsewhere (Piearce *et al.* 1990; 1992). They are significant in biological and zoological terms in that they are probably the earliest record we have of preserved worms in archaeological contexts in Britain. However, evidence of worm-working in the form of soil micromorphology has long been recognised.

Soft tissued earthworm cocoons were recovered in a mineralised state from pit 3704, context 3710 (Figures 12 and 16) (*contra.* Piearce *et al.* 1990 – 'Pit 3710') and the lower levels within the Deposit (Piearce *et al.* 1992). An X-ray emmission spectrum confirmed that mineralisation was attributable to calcium phosphate (Piearce *et al.* 1990, 540), probably poorly crystalline apatite, possibly hydroxyapatite (*cf.* Green 1979a). As Wendy Carruthers points out in her review of the processes of mineralisation (above), mainly soft-tissued animal remains are preserved, and these include invertebrates. Thus, the recovery of earthworm cocoons, sometimes found complete with embronyic earthworms (Piearce *et al.* 1990), is perhaps not surprising.

Of more significance is whether or not these remains are generally contemporaneous with the Deposit in which they were found. Obviously earthworms, because of their burrowing nature, are likely to be recovered from a moderate, though relatively shallow, depth and thus are likely to have penetrated earlier deposits. Perhaps more important, however, is the consideration of when mineralisation might have occurred. Certainly many of the botanical remains from the features, the pre-Deposit zones, and the Deposit itself seem to be contemporary with the deposition of the Deposit matrix. Soil micromorphological studies have shown that some contemporaneous earthworm burrowing does occur in these lower zones. Although, undoubtedly, it seems most likely that these are contemporaneous with the zones and features from which they were recovered, we cannot wholly discount the possibility that these cocoons relate to (archaeologically) relatively recent earthworms.

Perhaps, as with the mineralised plant remains, the species identified by Piearce *et al.* is significant. The single cocoon from pit 3704 contained an embryonic worm at a late stage of development and, although difficult to identify, was reported as most likely to be *Eisenia fetida*. This is a species which can be extremely common in compost (Piearce *et al.* 1990, 541), and is present in old manure heaps. Later analysis of 71 specimens from other contexts, however, concluded that although this was the most likely species, the worms could also include *Dendodrilus rubidus*, *Allolobophora chlorotica*, *Aporrectodea caliginosa* or *A. rosea* (Piearce *et al.* 1992, 1258).

Phosphate Analysis of the Deposit

Fifty-eight samples of air-dried soil <600 μm were analysed by David Gurney from five auger holes across the site; two (187 and 196) were through the Deposit, two possibly from the Deposit, towards its periphery (48 and 85), and one (223) from a location well away from the Deposit (Fig. 8). The auger holes were sampled at 10 cm intervals from the ground surface to the natural Greensand subsoil, enabling full phosphate profiles to be compiled. The method of analysis employed was based on the molybdenum blue method of Murphy and Riley (1962).

All samples from the auger holes through the Deposit (AH187 and AH 196) gave results of 360 mg P/100, except the lowest sample in AH196 which has a value of 300 mg P/100 (Table 17). In each auger hole the Deposit was described and divided into three layers, but phosphate levels throughout the Deposit are surprisingly consistent indicating little variation through the soil profile. These results indicate that there has been significant enhancement of phosphate levels throughout the soil profile, and that this has resulted in similarly high levels in at least the upper 10 cm of the Greensand subsoil, probably due to leaching.

Auger hole 223 outside the extent of the Deposit (off-site) comprised a light grey sand over yellow–brown sand (Greensand). The five samples from this profile have a range from 61 to 67 mg P/100 g. These values are almost certainly representative of the natural 'background' phosphate levels and illustrate the high levels of enhancement encountered in the Deposit.

The two auger holes possibly from the Deposit produced convincing results. Eighteen samples from auger hole AH85 were again all 360 mg and indicate that this is indeed within the extent of the Deposit.

Auger hole AH 48 has a wider range of values, from 88 to 260 mg. The topsoil has values of 150–160 mg, and below this a layer of light brown sandy soil has values of 88–91 mg in the upper part of the layer, and 170–260 mg in the lower part. Pottery was also found at 45 cm (in the lower part), coincident with the phosphate vale of 170 mg. Given the consistency of phosphate values elsewhere (360 mg AH85, AH187, AH196), it seems unlikely that this is a part of the

Table 17: Phosphates: results from pilot study

		Possible Deposit		*Deposit*	*Off-site*	
	auger hole co-ordinates	*AH48*	*AH85*	*AH187*	*AH196*	*AH223*
	Mg P/100g	*135/140*	*095/260*	*168/199*	*134/199*	*-045/260*
sample	*depth (cm)*					
1	0-10	160	360	360	360	64
2	10-20	150	360	360	360	67
3	20-30	88	360	360	360	61
4	30-40	91	360	360	360	67
5	40-50	170	360	360	360	64
6	50-60	260	360	360	360	-
7	60-70	240	360	360	360	-
8	70-80	260	360	360	360	-
9	80-90	-	360	360	360	-
10	90-110	-	360	360	360	-
11	100-110	-	360	360	360	-
12	110-120	-	360	-	360	-
13	120-130	-	360	-	360	-
14	130-140	-	360	-	360	-
15	140-150	-	360	-	360	-
16	150-160	-	360	-	300	-
17	170-180	-	360	-	-	-
18	180-190	-	360	-	-	-

Deposit proper, although phosphate levels are clearly enhanced. This may, therefore, be near the edge of the Deposit, or be colluviated material leading to some enhancement.

To conclude, the natural background phosphate level is *c.* 65 mg, and the Deposit produces significantly enhanced levels of phosphate levels of consistently the same value (360 mg). There is little evidence for variation in phosphate levels in the Deposit either horizontally or vertically through the soil profile.

Other Chemical Analyses

Long-chain *n*-alkanes in coprolites

This report is a summary of the short, but more detailed, archive report by R.W. Mayes and J.H. Ottoway. Long-chain *n*-alkanes are one of the commonest of plant cuticular waxes, and can be detected and identified in faeces. Analysis of coprolites can therefore establish estimates of the composition and the amount of fodder eaten by the animal. Analysis of coprolites from Potterne and Alington Avenue, Dorset for long-chain n-alkanes was undertaken as an experiment in determining the preservation of *n*-alkanes in sub-fossil specimens (coprolites) and in soils.

Four coprolites from the Deposit thought to be from dogs or pigs were analysed (details in archive). Three of the four coprolites had ratios of C_{29}:C_{31}:C_{33} alkanes which are consistent with those from sheep fed on perennial ryegrass (*Lolium perenne*). The fourth provided different results, the relative proportion of the three alkanes differ, but also the presence of about 20% of C_{27} *n*-alkane. Since there is no reason to suppose that the animal from which this coprolite came was either a herbivore, or had been ingesting a single plant species, nothing further could be concluded.

If it is assumed that grass formed only 10% of the animals' diet, the recovery from these samples appears to be rather low, but no firm conclusions from this experimental work could be drawn except that enough *n*-alkane persist in the subfossil specimens for a pattern to be recognised.

An Assessment of the Magnetic Susceptibility Results

This report incorporates comments from Alister Bartlett and is the first stage in realising of the analysis proposed by the late Tony Clark. As reported in Chapter 2, magnetic susceptibility, like phosphate analysis (above) was used as an aid in defining the extent of the Deposit. Because Clark had demonstrated that stratigraphic variations within each auger profile might be more reliably indicated by the measurement of magnetic susceptibility levels than by other methods, a large programme of magnetic susceptibility measurement was undertaken (above, Chapter 2). This

resulted in a database of about 2500 measurements. A preliminary exercise in plotting the results along major grid lines clearly demonstrated the utility of magnetic susceptibility in variations within the Deposit and the natural subsoil, and also in identifying naturally developed soil profiles beyond the edges of the surviving site (details in archive). An assessment of that data is presented here.

The project archive contains magnetic susceptibility data from 212 auger holes. Topsoil readings outside the area defined as the Deposit range around 6 to 23^{-8} SI/kg. However the topsoil over the Deposit itself clearly shows significant enhancement with readings consistently over 100^{-8} SI/kg, and reaching 171^{-8} SI/kg. Readings throughout the Deposit in each core are comparatively consistent and most lie within the 50–100^{-8} SI/kg range (Fig. 9). Significant fall-off in readings is seen in the lower Deposit and in any pre-Deposit and subsoil levels to less than 25^{-8} SI/kg.

Cursory examination and plotting (archive) of a series of other profiles indicates that the Deposit is, in magnetic susceptibility terms, relatively uniform laterally with the exception of one or two 'hot spots' of individual higher readings or small groups of higher readings. Examination of repeated profiles through the Deposit enables some distinction between the upper and lower portions of the Deposit; the upper giving higher readings (*c.* 125^{-8} SI/kg) and the lower elements being around 70^{-8} SI/kg (Fig. 9).

Significant magnetic susceptibility enhancement of the topsoil above the Deposit and of the upper Deposit may well result from a combination of the modern reworking of the Deposit material into the current topsoil by earthworms and other soil fauna (as recorded by both Macphail and Carruthers), and the continued enhancement by modern pedogenic activity (Allen and Macphail 1987; Allen 1986; 1988). Variation within the Deposit is not as striking; and the consistent levels seem, in general, to mirror the results of the phosphate analysis (above). What variation does occur, does not seem to obviously reflect the Upper, Middle, and Lower Deposit as identified by soil micromorphology, but magnetic susceptibility levels, like phosphate, need not necessarily reflect these facies anyway.

In summary, the upper levels of the Deposit are enhanced, this enhancement possibly increased by modern pedogenic processes; the middle and lower levels of the Deposit are not generally easily distinguishable on cursory examination. The lower levels of the Deposit, although generally having lower magnetic susceptibuility readings, often display a peak prior to the subsoil (eg, AH 81, AH83; Fig. 9).

This preliminary assessment of the recordings indicates the potential of more detailed analysis of this data using a three-dimensional graphic array, which might provide a better resolution of interpretation (Bartlett and Allen in prep.).

11 Palaeo-environmental Data: Site Formation and the Economy, by Michael J. Allen

The palaeo-environmental data from the prehistoric Deposit at Potterne is exceptional in its wealth and diversity and also in the fact that detailed soil micromorphological studies were undertaken through the Deposit sequence, albeit largely as a single sequence from one excavated section. The preservation of mineralised plant remains throughout the sequence is of great significance and provides the rare opportunity to compare them with plant remains recovered in charred form. In palaeo-environmental terms, the array of preserved material and remains can be compared more favourably to that recovered from wetland sites than from dryland locations (*cf.* Coles 1987, fig 10). By virtue of the large range of data it is possible to examine the nature of this rural prehistoric site in a way that no other dryland site in England has been. It enables the interpretation of the on-site conditions, the nature of the site and its setting and the identification of activities and economy of the populations who produced the Deposit. The detailed environmental and scientific analyses provide complementary, though sometimes superficially contradictory, evidence which enables us to provide an overview of the interpretations generated by that data. In this section several main themes are examined:

- the taphonomy and nature of the Deposit
- changes in the on-site environment
- the range of activities that occurred 'on site'
- the range of activities that produced the Deposit
- the farming and food economy of the local inhabitants and the way it related to those of the region and period as a whole.

Taphonomy and the Nature of the Deposit (Micro-environment and Post-depositional Changes)

Conditions created by the Deposit

The deposition of large quantities of organic refuse (urine, dung, byre waste, and plant remains) among the cultural debris (pottery, animal bone, etc.) created anaerobic and moist conditions similar to those found in any large compost or manure heap. The decomposition of vegetable matter can generate relatively large quantities of liquid, even without the direct input of animal urine. In addition, calcium carbonate from the decomposition of plant cell walls (Clapham pers. comm.) and in the form of ash is also a major component at Potterne. Ironically, despite this micro-environment being ideal for decomposition, the combination of moisture, anaerobic conditions, and

availability of phosphorous and calcium also provides suitable conditions for preservation by mineralisation. Indeed plant remains and stems with mineralised surfaces are observable within modern domestic compost heaps with mineralisation having occurred within months, not years, of deposition.

It is the accumulation of the Deposit and precisely these 'micro-environmental' conditions within it that have led to the diversity of preserved remains. Animal bone, charred plant remains, and charcoals which normally survive on dryland sites are all present but, in addition, mineralised plant remains and mineralised soft-bodied invertebrates also occur. These are more normally recovered from waterlogged (Coles 1987, fig. 10) or lowland post-Roman urban sites, and urban cess deposits of medieval and later date. Land snails are one of the few strands of evidence that are often preserved in dryland sites in southern England but which do not survive here because of the non-calcareous conditions provided by the natural soils, exacerbated by the locally more acidic conditions within the Deposit. Some shells were protected by rapid mineral coatings, but not enough shells survive to make analysis viable. Even had enough shells been preserved, their interpretational role in this type of deposit may have been limited.

Biases created by preservation conditions

Many specialists have discussed biases in their data. Although it is true that the representative nature of the assemblages may be questioned, the very range of preserved items from the Deposit makes this one of the least biased prehistoric palaeo-environmental assemblages in southern England. As a dryland assemblage it contains one of the most complete ranges of preserved data, lacking in only two areas:

i organic material (leather, textiles etc) which often occurs in waterlogged sites,

ii extensive study of some of the rarer items (eg, soft-bodied worm cocoons).

In the latter case some minimal analysis was facilitated as a result of careful observation in the first place by Wendy Carruthers. In pure archaeological interpretational terms, the identification and study of worm cocoons does not significantly enhance our understanding of the site, they do however, play an important role in understanding the process of mineralisation, and of the biological and zoological history of worms, as indicated by Piearce *et al.* (1990; 1992).

Mineralisation of plant remains provides whole assemblages of material not normally preserved for study. However, as Carruthers explains, the process itself is selective; mineralisation favours soft-bodied plant materials, rather than more cellulose-rich stems. This process is also directly linked to the micro-hydrology of the Deposit, which itself relates to planar surfaces within the accumulation and of concreted surfaces creating localised temporary 'waterlogged' conditions. Other chemical processes largely relate to selective decomposition. Since the analysis and review of mineralisation undertaken by Carruthers for this volume, some further work has been conducted into the mechanisms and nature of mineralisation (Clapham *et al.* 1992, 20–5), and X-ray diffraction confirmed the mineralisation of calcium magnesium phosphate based salts. These results echo geological evidence for soft tissue mineralisation, which appears to proceed along three routes, carbonate and phosphate of calcium, and pyritisation; the latter being essentially a marine phenomenon (*ibid.*).

Post-depositional processes

Changes within and caused by the Deposit affect the preservation, recovery, and location of items; mineralisation is one of the most significant changes. These processes can be divided into those which are chemically or hydrologically generated (see above, mineralisation), and those which relate to biotic activity, ie, physical movement by soil fauna and rooting.

Mixing by soil fauna is important in that environmental macro-remains (charred and mineralised plant remains, snails, etc.) can be moved through the stratigraphy through pores created by soil biota, largely Oligochaetes (Darwin 1881; Atkinson 1957). On dryland sites this is principally by earthworms, typically *Lumbricus terrestris*. When burrowing, this species makes macropores commonly of 6 mm diameter through which many environmental items can be transported. Items can be dropped into layers of earlier date, especially as many worms (especially *L. terrestris*) create aestivation chambers at depth and often line them with small rounded stones (seeds). Such movement of plant remains was demonstrated by the two *Vitis vinifera* (grape) pips from 'secure' Neolithic contexts in the enclosure ditches at Flagstones, Dorset. Both pips were radiocarbon dated to the 16th–20th centuries AD (Smith *et al.* 1997, 38, table 1), and are likely to have been intruded by worms lining aestivation chambers (*ibid.*, 188). Environmental items of about 0.5 mm can also be ingested by earthworms and excreted on the contemporaneous surface, providing a mechanism for material to move up through the stratigraphy as Carter (1987; 1990) has demonstrated.

At Potterne, however, there is little evidence of *L. terrestris* in the Lower and Middle Deposits although they are clearly present in the 'terrace soil'. Some macropores were noted in the soil micromorphology but these were not significant. These relatively low levels may be due to the higher pH of the Deposit which do not favour the common earthworm. Significantly, however, it was within these lower horizons that fossil earthworm cocoons were recorded, though these are likely to be *Eisenia fetida* which are 'extremely abundant in compost, and hardly ever absent from old manure heaps ...' (Piearce *et al.* 1990, 541). This species, and the other likely species recovered (Piearce *et al.* 1992) are all considerably smaller (1.4–2.5 mm diameter) than *L. terrestris* and create

much narrower channels, but still could be responsible for some limited mixing.

The only locations where mixing seems to be a problem in palaeo-environmental terms is in the Upper Deposit where modern earthworms and rooting have penetrated the Deposit. This was noted both in the soil micromorphological studies and in the preliminary examination of the flots. Throughout the analysis of included environmental items, therefore, the upper levels are omitted from the reporting.

One other post-depositional process to consider is that of rooting within the Deposit itself. Certainly there is strong argument that many of the mineralised remains represent plants that were growing on the Deposit during its accumulation and which rooted into it. Mineralised roots were even recovered from the pre-Deposit and Primary Deposit levels. We cannot determine to what extent this has played a role in the movement of microscopic remains, but it is unlikely to be significant.

In the upper horizons larger scale physical mixing by ploughing with the addition of material of much later date is more significant. It makes the integrity of individual items of even the larger material (animal bones) less certain. Because of this mixing, the animal remains from the upper three zones were also only studied in a summary fashion.

Material Comprising the Deposit

A significant bulk of the Deposit itself is composed of pottery and animal bone, however the matrix of the Deposit largely results from the addition and decomposition of organic matter in one form or another. The most common additions include the following:

- ash
- straw/hay/grasses making phytolith rich soil microfabrics
- dung, probably large herbivore, ie cattle/horse
- urine, probably deposited direct onto the Deposit
- roofed stabling waste
- byre waste
- fodder
- coprolites (dog, human and pig)
- some green plant material such as cuttings, weedings and herbaceous vegetation clearance etc.

These components largely give rise to the humic fabrics and high phosphate levels and together with evidence for burning they have led to the high magnetic susceptibility levels recorded.

In addition to this 'organic' waste are materials more commonly recovered from archaeological sites as refuse and general 'domestic' waste. These include charred plant remains and charcoals, hearth material and burned soil (typical of settlements), animal bones (largely food and preparation waste) including burned bone, fragmentary human remains, and artefacts. Animal bones are deposited both as individual elements and as occasional articulated remains (probably stripped of meat, but with sinews still attached and bones articulated). The final non-artefactual component is the plants growing on the Deposit which were buried within the rapid accumulation and then preserved by rapid *in situ* mineralisation.

Disposal

The nature of the archaeological remains and their distribution can provide us with some information about the form of disposal. For instance, the presence of individual bone elements (and some partially articulated limbs) indicates both the nature and form of discarded material and allows us to consider both what the site would have been like and what activities it, itself, would have engendered (eg, scavenging, see below).

Some of the materials of the Deposit matrix, listed above, have been discarded onto this designated location; others have been excreted directly on the site. Dung, for instance, although partly representing stabling and mucking-out, was also probably passed directly onto the Deposit, and urine must have been passed at the same time. It is difficult to envisage animal urine being collected and utilised elsewhere and then tipped or poured onto the Deposit, although small quantities may have arrived in soiled bedding and stabling material. Other faecal remains, particularly those of dog, were probably defecated onto the Deposit, and we can assume that this was the same for the unburnt human faeces. At the Viking period settlement at Coppergate, York, human faeces were, however, found in the settlement, and although considered to be an 'accident' or illness, it does remind us of the differing social and hygiene perceptions held by 20th century society and that held by earlier communities.

Discrete episodes of dumping are evident in both the artefact (especially pottery) and animal bone assemblages, and we can similarly assume that byre debris and soiled animal bedding waste was discarded in a series of single dumps, presumably after having been transported (?cart) and possibly tipped or forked onto the Deposit. Single masses of dumped material are particularly clear in the 4 cm thick Primary Deposit as identified in the soil micromorphology. This is an ash rich and phytolith-abundant fabric that indicates a dump of hay/straw and 'domestic' settlement waste. Crop processing debris included chaff and hay/straw (phytoliths) and occurred at exactly the zone where Wendy Carruthers reports an increase in mineralised plant remains (Fig. 22) and suggests the disposal of arable weed seeds as unburnt crop processing waste.

Some of the features identified by soil micromorphology are indicative, according to Macphail, of stabling in roofed structures. Their presence here therefore indicates either the occurrence of such struc-

tures on the Deposit (see below), or that fragmentary soiled stabling crusts were dumped from elsewhere and became buried (possibly by more of the same) such that it was protected from the elements and from further disintegration and destruction.

At the microscopic level, the decomposition of layered material types is reflected even in the soil micromorphology as microscopic layering. In the Lower Deposit microscopic layering may reflect decomposition of amorphous organic matter whereas elsewhere, horizontally layered lengths of charred plant stems were seen in the Middle and Upper Deposit, presumably representing straw or hay from fodder or bedding.

Nature of the disposal patterns and the form of the final Deposit (spatial variation and trends)

The deposition of relatively large quantities of specific material types obviously creates highly localised patches which need not be representative of the whole. This is a concern reiterated by the environmental specialists in questioning how representative is their data of the Deposit as a whole. Not only are their sample locations highly specific, but they were nearly all taken from Cutting 12, which itself is only a fraction of the whole Deposit as mapped by both augering and magnetic susceptibility (Fig. 8). Despite these concerns, and the recognition that some localised biases obviously occur, what is significant is the ways in which the changes and trends in the data are interpreted, rather than changes in the absolute frequencies of the raw data itself. On the whole consistent trends can be detected vertically through the Deposit, and samples taken for soil micromorphology and mineralised remains from different locations, for instance, provide complementary results. A notable point here is the Primary Deposit as mention above. In general, therefore, we can see greater variation laterally (relating to individual deposition episodes), than vertically where there is a more coherent trend, and it is this latter which largely provides the information about changes in the specific nature of the site and farming economy (below). One of the most striking aspects of the Deposit is the huge quantities of artefacts it contained and notable changes, stylistically at least, in the pottery assemblages (ie, material culture) through time. Such definite changes are not detectable in the environmental evidence, nor would one necessarily expect them to be.

Throughout the Deposit there is no evidence of any major disturbance. There are localised disturbances varying from the microscopic scale (see taphonomy above) to localised trampling and scavenging by animals (see below), but little evidence for disturbance in the form of digging within the Deposit (except features predominantly in the lower layers), turning of the Deposit, or other major disruption. The consistent evidence of *in situ* and undisturbed finds (pottery spreads and animal bone groups) to the microscopic layering of herbaceous stems testify to the intact nature of the Deposit as excavated and sampled. In the Middle and Upper Deposit, there is no evidence of occupation surfaces which might compress material, nor of ditches, pits or postholes which would disrupt the deposits and artefact spreads.

The environment of the accumulating Deposit

Having discussed the composition of this vast heterogeneous heap, we can return now to a consideration of what the site was like. The nature of the 'terrace soil' environment is discussed below, but that it was truncated and mixed by animal hooves indicates, at some point, a wet muddy trampled area. It is perhaps not surprising that the first debris (the Primary Deposit) comprised ash, cinders, dusty cereal processing waste, straw, and hay; an ideal mixture to soak up the wet trampled area. Further activities associated with this deposit are discussed later, but it was sealed by the Deposit itself. The majority of this matrix comprised decomposing organic waste, largely faecal and vegetative and perhaps akin to a large farmyard manure heap.

In such large masses of rotting debris, the decomposition process produces large quantities of liquid which can often be seen seeping from the base, or forming pools on its surface. In some cases the latter is animal urine applied direct and creating very small patches of water-retentive organic waste supporting acidophile species such as blinks and sheep's sorrel, among the arable weeds of the lighter 'soils' around. As might be expected, most of the vegetation growing on the Deposit (identified from mineralised seeds) included those that can be classified as 'weeds of disturbed ground'. It included henbane and nettles (ie, species indicative of the nutrient-rich soils created by the Deposit itself), and corn gromwell and brassicas which are classified as 'weeds of arable land', and became established in the 'disturbed' habitat (ie, the loose surface) of the Deposit. The bio-diversity is therefore not the result of plants being drawn from completely different ecosystems, but reflects the highly variable and extremely localised nature of the surface of the Deposit created by discrete and individual episodes of dumping of differing material types. Carruthers (above) concludes that the variation in species composition may reflect the patchy distribution of the dumping of water-retentive organic waste, with the arable type of weeds growing in lighter 'soils' on the Deposit around the patches of more organic 'soils'. The relative proportion of annual and perennial plants suggests that there were occasional periods of stabilisation when deposition ceased for a while before the plants were once again buried.

One of the other by-products of decomposition is heat, often great enough to lead to spontaneous combustion and very localised burning of dry surface material, which may be difficult to differentiate from the disposal of burnt crop waste and hay/straw. Immediately we can see the possibility of evidence of localised wet environments on the Deposit which

Table 18: Summary interpretation of environmental data

	Processes	*Material brought to site*	*Disposed direct on site*	*Major on-site activities*	*Peripheral on-site activities (on-site environment)*	*Off-site cultural activities*	*Interpretation*
Deposit	worms *(L. terrestris)* especially at top mineralisation and decomposition	dung and farm waste inc soiled stabling waste and bunt straw etc	Cattle/horse dung and urine	Disposal of farm waste	dogs scavenging + defecating birds scavenging	occupation near by	Livestock rearing and penning on site, possible marketing becoming less common later onsite. Roofed stables offsite or nearby with sheep and cereal farming textile production from sheep in upper, but cereal processing in lower. Settlement off-site or nearby as site becomes bigger and dryer so more normal domestic debris disposal patterns are recognised settlement
	worms (Eisenia fetida), especially towards the base	domestic debris (animal bones, pottery, discarded objects, ash and heath sweepings/bonfire debris)	dog faeces	Deposit of domestic debris becoming more 'normal' site towards top	local fires a burning on site	livestock rearing stabling of cattle (?horses) in roofed stables,	
				Cattle penning, corralling and consequent trampling animal market	?pigs foraging	cereal cultivation and processing	
				occupation near by	plants (corn gromwell and brassicas) on loose soil and blinks, sheep sorrel in local organic oatches. Plants becoming dryer towards top	sheep farming and pigs	

Table 18: Conintued

	Processes	*Material brought to site*	*Disposed direct on site*	*Major on-site activities*	*Peripheral on-site activities (on-site environment)*	*Off-site cultural activities*	*Interpretation*
Primary Deposit	mineralisation	Hay/straw hearth sweepings and ash domestic flooring debris	Cattle/horse dung and urine	Cattle/horse trampling		occupation near by hay and straw production, cereal growing livestock	cattle feeding and ?penning
Features (pre Deposit and Deposit)	mineralisation	Occupation debris		penning, enclosures occupation		cereal cultivation and processing occupation	
Terrace Soil	mineralisation	Farm waste	Cattle/horse dung	digging of features occupation prior to trampling	Intensive Cattle coralling	Settlement	Settlement,much evidence destroyed by later animal traffic and trampling
	erosion/mixing and loss oftopsoil layer	Domestic debris	mud and soil on animal hooves	animal trampling/ defecation particularly when wet			
	accretion			Penning/corralling cattle/livestock			
	worms						

might be reflected in the nitrogenous plants growing on it, adjacent to areas of dry and even burnt Deposit. We may conclude, therefore, that superficially conflicting evidence may, in fact, be perfectly complementary in this environment.

The Deposit can be seen to be largely a product of specialised animal husbandry. Large quantities of dry domestic waste and refuse (pottery, animal bones, hearth sweepings, and ash) imply general refuse disposal but the disposal of other material such as animal remains and human faecal waste tend to convey a less pleasant aspect. These latter elements in particular, will be odorous on decomposition, and will attract flies and maggots, etc, as well as scavenging pigs, dogs, and birds (buzzards, crow, and raven), for all of which there is evidence.

It seems that in the height of the accumulation (ie, the Deposit) and immediately after deposition, settlement on this area is unlikely, but that occupation and structures associated with both housing animals and people cannot have been far away, and in some cases that location may even have been subsumed by the growing extent of the Deposit. Further, as areas of the Deposit dried out and become more stable, settlement may have encroach on these former unsuitable areas, providing the opportunity of cyclical deposition and 'settlement' activities.

Activities on the Site and Associated with it

The environmental and scientific evidence from the site can be used to determine its nature (above), but also to determine some of the activities of people and animals associated with the Deposit. It is important that we differentiate between those activities that have occurred on the site (ie actually on the growing accumulation of the Deposit), and those that are represented by the discarded refuse. The activities represented by the environmental information are summarised in Table 18.

The 'terrace soil': nature, erosion, and associated activities

The 'terrace soil', originally considered in the field to be a buried topsoil, was shown by soil micromorphology not to be so. It is an anomalously organic, trampled, uniform horizon comprising the former soil which is intensively mixed with organic waste. It includes indicators of occupation such as charcoals and coprolitic material. There is, therefore, evidence of domestic settlement and some may represent *in situ* occupation that has been severely homogenised by physical mixing, and may account for the presence of both hearths and pits possibly associated with this soil.

The quantity and nature of some of the domestic material (charcoal and pottery, etc.) need not all have been removed from its place of use and dumped. Some may be evidence of *in situ* occupation activity relating to a pre-Deposit, Middle to later Bronze Age occupation soil prior to truncation and severe homogenisation by physical mixing (ie, animal traffic and trampling). Truncation of the topsoil may have been related to this occupation. The presence of comminuted cultural debris within it, therefore, strengthens the case for an anthropogenic activity, and possibility of settlement evidence either within the now disrupted 'terrace soil' or the immediately adjacent, unexcavated areas.

It is evident that the organic topsoil had been truncated, but the main activity that produced the development of the 'terrace soil' over the 'on-terrace' area was the trampling by large animals (cattle/horses), indicating the pounding or corralling of these animals, possibly in stock enclosures. Elsewhere (ie, 'off-terrace') the former soil had been completely removed, possibly by the same or other separate activities. Fencing, screening, and partitioning may have given rise to some of the array of post-holes cut into the natural. The consequence of penned animals was not just the physical mixing, but also the addition of large quantities or urine and dung, and of 'foreign soil' from muddied hooves and fetlocks. Essentially, the 'terrace soil' is the mixing of the former soil and subsoil (hence a greensand-dominated fabric) and accumulation. Its formation was in part colluvial and was created in unroofed areas by the hooves of animals, their dung and slurry. Thorough mixing to such an extent indicates a very wet and muddy soil (typically found where cattle congregate), being wetted by both natural rainfall and cattle urine.

Primary Deposit: sealing the slurry

A very thin (40 mm) discrete layer (in soil micromorphological terms) clearly marks the beginning of the Deposit. It is largely composed of coarse wood ash, phytolith-rich fabrics, fused-ash, burnt bone, and coprolitic residues and probably represents constituents such as hearth sweepings, grasses (hay and cereals), crop processing waste, and possibly even floor matting. This dry domestic and cultivation waste may have been purposely selected to scatter over muddy trampled slurry of the terrace soil, performed both 'cleansing' and sealing functions. This would have been more hospitable for human passage, but also for further animal traffic and pounding. Only a relatively short-lived phase is represented by this layer, prior to the accumulation of the Deposit proper; there is distinctly less *in situ* trampling, urination, or defecation than in the 'terrace soil'; much of the coprolitic residues is burnt and imported with the dry waste.

Such a deposit may in part be created simply by the spreading of hay for cattle to eat. Invariably the animals group around and on the hay, eating it, lying on it, defaecating and urinating on it and, if wet, churning both ground and hay. This is a scene common in fields and meadows today.

The included materials provide an indication of a number of activities within the vicinity, of which the

two main categories can be seen to be domestic activity (hearth sweepings) and animal husbandry/stabling. The spread of hearth debris, including fuel ash, burnt soil and burnt bones, strongly argues for a 'domestic' and 'settlement' origin, while the phytolith-rich fused ash suggest burning of grasses and cereals and may, by extension, indicate processing of cereals. Burnt bone itself, albeit in very small fragments within the soil thin sections, may indicate food preparation.

Although this layer is too thin to relate to the animal bone assemblages, the soil microfabrics include evidence of stabling material and also possible hay (animal foodstuffs), while the dried and burnt coprolitic resides were probably incorporated in soiled animal bedding waste. There is, therefore, indirect evidence for mucking-out of soiled stable and byre waste and burning with dung prior to their disposal with other burnt residues forming the Primary Deposit.

The Deposit

By far the main element of the site comprises the Deposit, which can be divided into the Lower, Middle and Upper facies, on the basis of soil micromorphological characteristics.

1. Features

A series of cut features, comprising a variety of pits, post-holes, and stakeholes (Fig. 10), cutting through, in particular, the lower Deposit facies was found at either end of the main cutting (and in other test pits), as well as built features such as hearths, a line of Greensand boulders and patches of imported chalk. These features did not all belong to a single phase of settlement. Although the limited area investigated precludes detailed discussion of spatial patterning, the stratigraphic relationship of these features is important. The 'terrace soil' at the southern end of Cutting 12 both seals and is penetrated by cut features and whereas some of these may be coeval with activity on its surface or later (below), others are contemporary with its formation or earlier (Fig. 15). The fact that most of these features contain finds which include later Bronze Age pottery means that they should not be associated with the Neolithic and Early Bronze Age activity suggested by residual finds.

2. Changes and trends

Although three major deposit facies have been defined within the Deposit (Lower, Middle, and Upper), in real terms they do not represent huge changes of activities on-site, nor off-site, but general trends within the Deposit. Some changes in the defined facies may be due to post-depositional changes, in particular in the Upper Deposit. It is therefore proposed to discuss the activities associated with the Deposit as a whole, and examine the trends in relation to the interpretation of changes in the evidence for the farming economy (below). Some of these activities are also evident in the form of evidence of fences for corralling and enclosing animals and posts for tethering

3. Activities

On-site the most constant activity was the disposal of farm waste in the form of soiled stabling debris, and domestic/settlement waste in the form of animal bone and artefacts, in particular pottery. The farm waste largely comprises the matrix, and the artefacts comprise the included elements within that matrix. In terms of cultural activities, there is evidence of animal pounding, penning, and trampling; though this seems to decrease through time in the Deposit. Scavenging animals such as dogs (and pigs) are evidenced in the form of both gnawed and chewed bone, and faeces. Other scavengers included birds and evidence of buzzard, raven, and crow is present in the faunal assemblage. Birds may have been scavenging anything from the largely de-fleshed animal remains to the cereals and seeds disposed of on the Deposit, as well as some of the seeds from plants actually growing on it. A site of this type is likely to be the home of burrowing rodents, and a number were represented, but little evidence of their burrowing activities was found.

On site there is evidence, therefore, of disposal, scavenging, and plant growth and of animal pounding, penning, and stocking. The latter may have taken the form of open enclosures/paddocks or tethering. Animal pounding continues to be a significant, but probably intermittent, activity on the Deposit. Although the soil micromorphological evidence indicates the presence of roofed stables there is no direct evidence that they were situated on the Deposit within the excavated area. All of the stabling waste identified in thin section is microscopic and, although intact, it is not *in situ*; ie has been mucked-out and redeposited. What is unclear is exactly how close to the excavation trench were located these structures. Evidence of domestic waste and activity continues throughout the Deposit in the form of coarse charcoal, charred cereal remains, butchered animal waste, and burnt bone but the presence of associated features and any possible structures decreases.

The presence of long articulated phytoliths 1–4 mm long, phosphatised charred plant remains and small intact charred stems (soil thin sections) suggest the deposition of soiled stabling/byre waste and dung mucked-out from pen and pounding areas probably of cattle/horse with possibly sheep. Some of the long articulated phytoliths may indicate not just stabling material, but also possibly fodder. Animal husbandry, initially large herbivores (cattle), but latterly sheep was obviously still an important element. Cultivation of wheat and barley and crop processing is evident from the charred plant remains and the presence of both crop processing waste and the fused cereal ash in thin section indicating the burning of this waste. Some charring of unburnt waste may have taken place *in situ*.

In more domestic and settlement terms there is evidence of hearths (wood ash and coarse wood charcoals), as well as burnt daub and soil which might indicate 'domestic' hearths or bonfires. The large array of animal bones is predominantly evidence of butchery

and food waste. These activities indicate the presence of a typical Late Bronze Age–Early Iron Age settlement, which is confirmed by the large array of artefacts and pottery. Whether there is any discernible degree of specialisation is discussed below under aspects of the farming economy. What we can, however, anticipate, is the presence of a more typical Late Bronze Age–Early Iron Age settlement comprising round-houses, pits and post-holes within the immediate vicinity and probably within the area surveyed and mapped in Figure 8 and possible elsewhere on the Deposit. After decay, compaction, burial, and drying of the Deposit surface, occupation on the Deposit would have been plausible, however no obvious compacted occupation surfaces associated with structures were noted in the very limited area excavated.

Post-Deposit (Romano-British) activities

The Deposit was ploughed during Roman times with concomitant weathering, whilst off-site there is evidence of the digging of a ditch, but no further environmental or economic information can be given.

Economy

We must express some caution when interpreting the data in terms of the farming economy. Although all sites contain biases in preservation and disposal, on most settlement sites of this period we are comparing like-with-like and thus any inherent biases or error in our interpretation is, at least, consistent. Here, the entirely different type of excavated archaeological site and its unusual nature may have resulted from a completely different range of selective disposal practices, which has produced assemblages not comparable with those from more 'normal' sites. For instance, we must be cautious in suggesting that the relative lack of charred cereals may indicate that agriculture was not an important part of the local economy. It may be that the disposal of cereal remains, which had been accidentally burned during drying, parching or roasting, had both occurred and been discarded elsewhere. For instance over 100 quern fragments and a number of rubbers were recovered.

Farming economy

1. Pre-Deposit features

The charred seeds recovered from pre-Deposit features (Straker, above) include a wide range of cereals including spelt, emmer, and free-threshing wheat as well as barley. The weed component includes more taxa of arable land than that in the Deposit; all this evidence implying the exploitation of the different geology in the site's hinterland. The combined environmental and economic evidence clearly indicates mixed farming with the herding, pounding and stabling of cattle, the consumption of sheep and pigs and widely-dispersed arable areas for the growing of grain.

2. The Deposit: agriculture and animal exploitation

The main cultivated crops, of roughly equal significance, were barley and wheat, with evidence of both autumn and spring sowings and thus of the institution of organised and systematic arable regimes exploiting different soils in the area. Spelt and emmer wheat were found in approximately equal proportions, with bread wheat being only a minor component. The presence of relatively small numbers of carbonised grains and chaff within the Deposit offer limited evidence of crop-processing. Weed seeds suggest that the harvest was cleaned, although plants such as oats and brome may also have been used as food or animal feed. Small numbers of fruits indicate that scrub woodland and possibly hedgerows were exploited seasonally, and plants such as wild turnip and wild carrot, if not growing on the site, were collected.

Farm animals exploited for food included cattle, sheep, and pig, with sheep increasing in importance at the expense of cattle during the period of the Deposit's formation (Locker, above). The reduction in the graminae (grass) ash component of the Deposit in the upper part of the sampled sequence (the median levels; above) may reflect the decreasing importance of cattle, and possibly the use of less intensive systems of husbandry, during the accumulation of the Deposit. Both sheep and cattle were kept for milk production before being slaughtered for meat, their bones showing signs of intensive butchery. Sheep would also have provided wool, while cattle produced hides and may have been used as draught animals. Analysis has demonstrated that the best meat-bearing bones decrease in occurrence through time, perhaps indicating that, increasingly, favoured joints were taken away from the site or that meat-preparation practices changed. The increased deposition of heads and limb extremities may also be associated with increasing treatment of hides or disposal on the Deposit, of primary, rather than secondary, butchery waste. Pigs were of secondary importance, but were consumed at a relatively constant rate throughout the period. Horse bones were found in very small quantities throughout the Deposit, but do not appear to have been butchered and these animals were presumably kept for riding, as pieces of harness among the finds suggest. Dogs were kept, and may have been skinned, as is likely for beaver, cat, polecat, and fox, all of which were represented. Other wild animals such as red and roe deer and wild boar were exploited, but hunting appears to have contributed only marginally to the diet, while fishing and fowling appear to have played no significant role in the community's subsistence strategies.

The change in dominance from that of nitrophilous plants to that of annual weeds of lighter soils growing in the upper part of the Deposit may reflect the diminishing effect of impeded drainage (caused by the hard-pan layer at the base of the Deposit) as the Deposit grew, but may also possibly reflect a reduction in cattle dung as sheep

became more dominant in the economy, or in the utilisation of the part of the Deposit excavated.

Specialisation or bias

The increased presence of sheep in the later stages of the Deposit might reflect the lack of pits and cut features (in which larger animal bones, ie, cattle and horse are normally deposited) and represent more general, less specific, occupation debris. Such taphonomic variation has also been noted more explicitly at Cadbury, Somerset where Maltby and Hamilton-Dyer (pers. comm.) have shown that the difference in the assemblages in the layers versus the features is largely a taphonomic, rather than chronological, phenomenon.

The excavated data seems to provide evidence of a significant reliance on animal husbandry, particularly that of cattle and especially in the lower levels of the Deposit. This can be seen in the faunal record (Fig. 29 and Table 14), the evidence of stabling, pounding, and mucking-out in the soil micromorphology studies, and in part from the structural evidence too. Whether the site represents a farming economy specialising in livestock, at the expense of arable cultivation, or whether this is due to the fact that the excavations have centred on the by-products of the animal husbandry rather than the settlement itself, is open to debate. Certainly it is interesting to speculate that some form of specialisation in cattle may be responsible for the Deposit. This rare specialisation might provide both wealth and status (as suggested by some of the artefacts), but also a mechanism for the production of such a large accumulation of material (the Deposit) so rarely seen in other Late Bronze Age and Iron Age sites in Britain. Indeed the animal bone assemblage itself is one of the largest assemblages of the period by order of magnitude; including large scale excavations at sites of broadly comparable date. At Maiden Castle, Dorset, there were 11,681 bones from all Iron Age phases (Armour-Chelu 1991), and even ten seasons of large scale open area excavation at Danebury, Hampshire, included 138,000 bones (Grant *et al.* 1991, 447), where Potterne produced 134,000.

Both the faunal remains and the soil micromorphology emphasise the presence of cattle, but sheep/goat are typically a significant component of the assemblages, yet are not as evident in the form of charred excrement. Had sheep been more predominant more spherulites would have been expected in the soil thin sections. At both East Chisenbury, Wiltshire and West Heslerton, North Yorkshire, spherulites are more common and sheep/goat coprolites were recovered from the latter (Macphail pers. comm.). This superficially contradictory evidence is easily explained, however; both sheep and cattle are an important part of the livestock economy, but cattle, unlike sheep, are penned and corralled on the Deposit while sheep are probably grazed in fields elsewhere.

Cattle are naturally browsers, but today are farmed by grazing. In many prehistoric and nearly every present-day non-urban farming society cattle receive special treatment (Reynolds 1979, 50) including in their feeding. They can live in the same buildings as humans or special byres which can be seen in present day Spanish peasant communities and from prehistoric and modern long houses in northern Holland where animals are kept at one end, in the 'barn', and people reside in the other. Cattle can also be managed on a zero grazing system, where the animals are tethered for certain periods of the day, or food is brought to them (Reynolds *op cit.*). The adoption of this system would for instance, quite neatly explain the Primary Deposit, but could also have been a major activity comprising the production of the Deposit.

The fact that there is evidence for most aspects of arable farming indicates that the societies at Potterne had access to and used animal and arable products. The site at Potterne itself may however have been for specialised aspects of the farming economy, such as predominately for livestock. This may have entailed the herding and husbandry of cattle (especially on the Deposit) was well as sheep, or even the gathering, corralling and exchange (market) of cattle in particular.

Accumulation and Presence/Survival of the Deposit

The data here is significant if only that it provides evidence for sophisticated animal husbandry and stabling, not proven in earlier periods, nor elsewhere in southern England at this time. The corralling, stocking, and stabling of herds of cattle would certainly produce large quantities of dung and stabling waste. Good animal husbandry would require these pounds and stables to be mucked-out. The consequence would be the generation of a 'manure' heap. In many excavated Late Bronze Age and Early Iron Age settlements there is evidence of cattle and sheep, but not necessarily of stabling. Even if we could recognise the archaeological evidence for such structures, none of these sites has produced a deposit analogous with that at Potterne. If a manure heap was generated on these sites, then it has not been recognised or preserved in the archaeological record, probably because it was spread as manure over fields, providing the classic archaeological argument for the widespread redistribution of cultural artefacts (Reynolds 1981; Fenton 1981). Potterne may, therefore, in part represent this archaeologically elusive, yet commonly assumed, feature. The most important question then is why, at Potterne, was this deposit not redeposited as manure over the surrounding landscape? Net accumulation at Potterne, must have exceeded net redistribution. It is through enquiry at this level that perhaps some of the more pertinent observations can be made.

Net accumulation may have been achieved if:

i) re-distribution as manure was not necessary as the immediately surrounding land was fertile enough to

not require manuring at the intensity and density required to redistribute all that was produced

ii) the land under cultivation was not of sufficient area to warrant the re-distribution of all of the manure

iii) the rate of generation of farm debris was much greater than other sites of this period because of a specialisation in livestock.

This of course assumes that the Deposit was primarily a manure heap, though the quantity of animal bones and cultural artefacts in particular, may be taken to augment this hypothesis. In environmental terms, therefore, we can interpret the Deposit as being functional; a by-product of livestock farming. It is perhaps the artefactual content and its wider setting in Iron Age societies that may allow us to imbue the site with more significance (below, Chapter 7). It emphasises the fact that the Deposit at Potterne may represent specific activities not represented as well on other sites. It may have performed a specific function in cattle production or even as a market. The Deposit and the evidence from Potterne provide just one facet of a complex Late Bronze Age/Early Iron Age social system that may have encompassed relatively large terrains.

Section 3. The Artefacts

6. The Artefacts

1 Introduction to the Assemblages
by Lorraine Mepham

The excavations at Potterne produced an enormous and well preserved artefactual assemblage which has proved crucial particularly for the dating of the site but also for its intepretation. The level of preservation on the site, coupled with the methods employed for the excavation of the Deposit itself, have resulted in the recovery of a wide range of material types in a seriated sequence. These range from at least the Late Bronze Age through to the Early Iron Age, with some earlier (Neolithic, Early Bronze Age, and Middle Bronze Age) material incorporated in the lowest levels of the Deposit, and with Romano-British, medieval, and post-medieval artefacts marking disturbance through ploughing in the upper levels.

The artefactual assemblage is dominated by pottery, recovered in overwhelming quantities which are unprecedented for a site of this period; the preservation of which has allowed detailed analysis of a range of attributes. Other material types are present in smaller but still significant quantities, in particular metalwork and metalworking residues, worked stone, shale and worked bone. Also of interest are the small quantities of 'exotic' material types, such as amber, glass, and gold, which occur rarely on contemporaneous sites.

Artefact Recovery and Recording

The excavation methodology for the various seasons of work on the site has already been detailed (Section 1). Finds recovery was achieved through various methods:

- From hand-excavated, artificial context units within the Deposit (the one metre square columns excavated in spits in 1983 and 1984). Within these columns, clusters of pottery and other artefacts which appeared to form discrete groups were assigned separate context numbers, and each object individually numbered. Other objects (worked bone, flint, stone and shale, metal objects, glass, and amber beads) were allocated individual Special Find (SF) numbers and, in some cases, three-dimensionally recorded.
- From sampling within the Deposit, designed to maximise the recovery of environmental evidence and also small artefacts through wet sieving. Two one metre columns were selected for sampling in 1983 and four columns in 1984, as well as one 0.5 m^2 column (151) excavated into the section in 1984 to obtain pottery samples for thermoluminescence dating.
- From systematic metal-detecting under controlled circumstances within the Deposit, introduced in 1984 during the excavation of Zones 7 and 8 and continued to the lowest levels. This method proved particularly useful in the recovery of small metal objects, such as lead droplets, which may have been missed in the upper levels.
- From hand excavation by standard methods of other contexts and negative features on the site.
- From chance finds made during grave-digging. After the recovery of the gold bracelet in 1982, finds were recovered from a number of graves, and these finds have been included here where appropriate. Full details of all grave finds are held in the archive.

All finds were quantified by material type within each context (and by sample number where appropriate). These records form the basis of the primary finds archive, together with lists of individually recorded Special Finds.

Phasing/Zoning of the Deposit

The basis for the establishment of stratigraphic Zones within the Deposit is outlined above (Section 1). Fourteen zones were created by the grouping of contiguous spits (see Fig. 9), taking into account the site topography. These zones form the basis of the chronological sequence through the Deposit, and have been used for all of the artefactual analysis. The distinction is also made between 'on-terrace' and 'off-terrace' zones (see Chapter 4).

It should be pointed out at this stage that all artefactual analysis was completed prior to the soil micromorphological analysis, which has resulted in the definition of sub-divisions of the Deposit according to soil characteristics (see Chapter 5). While it is recognised that the Deposit was not, as it usually appeared to be, uniform and homogeneous, and that the use of the artificial zones may be to some extent inaccurate, it was felt that any attempt at this stage to correlate the zones with the soil micromorphology within the artefactual reports as presented here would be impracticable.

Post-excavation

It is important to stress at the outset that no comprehensive project design was formulated for the artefactual analysis and report preparation, and the analysis of each individual material type was conducted separately with minimal reference to other material

types, as was the case for the environmental reports (see Chapter 5, Introduction).

The analysis of the large pottery assemblage formed the major part of the post-excavation programme, and this provided an overall chronological sequence for the Deposit. Analysis concentrated on the examination of the changing trends in pottery production and distribution during the Late Bronze Age and Early Iron Age through detailed analyses of fabrics, forms, decorations, and surface treatments. Such detailed quantitative analysis, in particular the objective definition of fabric types based on the range of inclusions and supported by a large-scale programme of thin-sectioning, represented at the time a pioneering use of the pottery recording system which now forms the basis of nationally recommended guidelines (PCRG 1997).

For other material types, such as objects of metal (gold, copper alloy, lead, and iron), fired clay, stone, and bone, catalogues were created for individual objects which then formed the basis of the text reports. The emphasis has been on the description of the range of objects present for each material type, with relevant parallels cited in support of dating and/or functional interpretation, and to set the assemblages in their local, regional and, in the case of the metalwork, international context.

Scientific analysis (X-ray fluorescence) has supplemented the metalwork report, while the analysis of metalworking evidence (crucibles, moulds, and residues) has helped to characterise the range of metalworking activities carried out on or near the site, including evidence for ironworking at a very early date. At the time such evidence was virtually without parallel at this stage of the Early Iron Age and was viewed with some suspicion. More recent work has, however, produced a growing body of comparable evidence for early ironworking in southern England.

Chemical analysis of the glass has revealed an interesting range of compositions and has added significantly to the knowledge of the production of glass in the Late Bronze Age and Early Iron Age. Once again Potterne has provided rare evidence – very few other Late Bronze Age and Early Iron Age settlement sites in Britain have produced glass.

Format and Structure of the Artefactual Reports

Editing prior to 1998 had resulted in the standardisation of the artefact reports, ensuring that terminology and the use of context/zone information was consistent. The discussion of various artefact categories was also enhanced at this stage in order to make more explicit the archaeological implications of the artefactual assemblage.

The most recent stage of editing (in 1998) has concentrated on refining this process, to ensure internal consistency in both text and tabulated presentation, to provide cross-referencing between artefactual reports where appropriate, and to draw out pertinent points from individual discussions to inform an overview of the artefactual assemblage as a whole, and to relate this to the overall site interpretation and discussion (below).

Text reports with supporting tabulated data and illustrations are presented below by material type, starting with the pottery. Appendices 3a and 3b include the full pottery fabric series and the decoration type series (motif types). Catalogues of objects by material type (metalwork, stone, shale, amber, glass, worked bone) are held in archive, together with all other supporting documentation arising from post-excavation analysis. The full contents of the archive are presented in Appendix 4.

2 Pottery

Introduction, by C.J. Gingell

Four excavation seasons at Potterne yielded approximately 100,000 sherds (*c.* one tonne in weight). The overwhelming majority belongs to the British later Bronze Age tradition (Barrett 1980), including both plain ware Late Bronze Age material and decorated pottery of the Early All Cannings Cross tradition (Cunliffe 1991, 65), conventionally dated to the Early Iron Age in Wessex (Davies 1981, 101–11, figs 15–16; 1994, 58–9). Significant quantities of pottery were also unsystematically recovered during the observation of grave digging, but these finds have not been included in any of the analyses. Earlier prehistoric pottery as well as Roman and later pottery were identified and these are discussed separately.

Throughout the Deposit, the pottery was in good condition, with burnish, surface coatings, food deposits, and sooting, when present, especially well preserved. Much of the pottery was mineralised or coated with organo-phosphate deposits, notably represented by a powdery, yellow–green, calcium phosphate accretion.

Earlier Prehistoric Pottery, by Elaine L Morris

Two sherds of decorated earlier prehistoric pottery (Fig. 39, 1–2) were identified during the analysis of Cutting 12 pottery. These are in addition to those assigned to fabric FT 15 originally recognised as undecorated body sherds of Beaker-type fabric (detail in archive). The decorated sherds are described separately below.

1. Rim sherd (26 g) of a Peterborough Ware bowl, flattened and expanded internally. Twisted cord decoration on rim, on exterior and on interior just below rim. Moderately hard fabric containing a sparse to moderate amount (5–10%) of angular flint fragments (≤5 mm), patinated and not calcined, in a fine but laminated, glauconitic sandy and micaceous clay matrix; rare to sparse (2–5%) subrounded quartz grains and

glauconite pellets (<0.3 mm). Brown interior and margin, black exterior and margin. Possibly burnished on interior; weathered or abraded on exterior. Featured sherd number 15001, context 3411, col. 111, Zone 13, 'off-terrace'.

This vessel may belong to either the Ebbsfleet or the Mortlake style of Peterborough Ware. The unthickened rim form is typical of the Ebbsfleet style, while the crescent-shaped interior decoration is found on Mortlake vessels. This combination of substyle details was recognised on a similar vessel rim from W31 Wilsford Down of the Stonehenge Environs Project (Raymond 1990, fig. 119, P99). The Potterne example is probably a locally made vessel due to the presence of glauconite in the fine sandy fabric.

2. Body sherd (8 g) of a Beaker vessel. Decorated with several rows of twisted cord impressions arranged in a nested chevron motif. Soft fabric with a moderate to common amount (15–20%) of angular to subangular grog fragments (≤2 mm) in a dense or finely textured clay matrix. Light brown exterior surface, black core and interior. Featured sherd number 15000, context 3368, col. 90, Zone 13, 'off-terrace'.

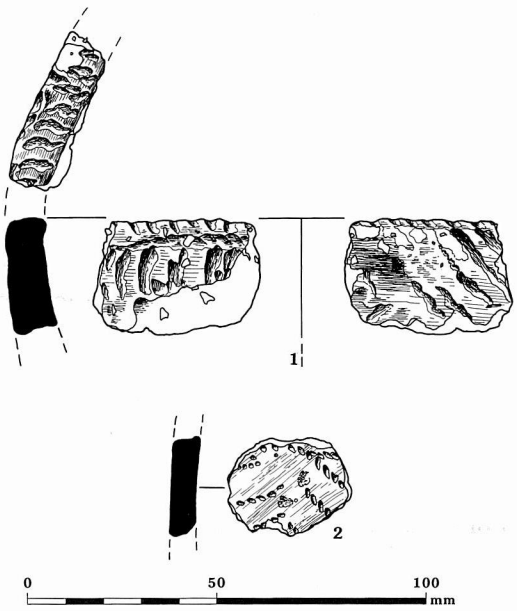


Fig. 39 Early prehistoric pottery, 1-2. Scale 1:2

Recording and Analysis of the Later Prehistoric Pottery, by C J Gingell

Not all of the pottery has been analysed to the same level of detail. The pottery recovered from Cutting 1 of the 1982 season, from Cutting 3 and the lowest level of Cutting 2 both from the 1983 season, and from seven columns in Cutting 12 was initially analysed to determine fabric types. The pottery from Cutting 12 has been examined in the greatest detail. This constituted a sample of the total recovered during the 1984 excavation, based on 104 (69%) of the 151 columns excavated. The columns examined were chosen to include large quantities of pottery located 'off-terrace' and along the sections (Figs 6 and 40). The pottery sample was analysed to fabric, and the numbers of plain and decorated rims and body sherds, bases, and lugs in each fabric within a context (ie, a spit) were recorded, as were the presence of soot and food deposits and surface treatments, the weights, and sherd thicknesses. Subsequently, the featured or diagnostic sherds from the same 104 columns were individually catalogued; 921 contexts were found to contain rim sherds, decorated body sherds, lugs, or base sherds. Each of these sherds received a sequential number and its details recorded on a standard pro forma. Numerical codes were devised for vessel types, for six broad decorative styles, or designs, for more specific motifs and for surface treatments. Records were made of the incidence of different vessel types in each context, and of the interrelationship of vessel type, fabric, style, and motif. All of this detail is available in the archive, and selected aspects were entered onto a computer database (see Williams, below).

In addition, the incidence of refitting pottery sherds was recorded on a limited basis. This was started before any of the analyses described above, in order to provide an indication of the stratigraphic integrity of the Deposit (Gingell and Lawson 1985, 104–8, fig. 5), and was continued during the compiling of featured sherd and fabric data. In the initial exercise, pottery from both adjacent and widely separated zones and contexts was laid out and some 600 refits were found. This total quantity of refits includes sherds joining within a context, as well as sherds which joined across contexts (Gingell and Lawson 1985, fig. 5a). Each join or set of joining sherds was allocated a vessel number; a second record was made of the data in context order. Only contexts from Zones 3–9 were examined in this manner due to the restricted time available, while the smaller sherd sizes and undecorated nature of the pottery in lower zones, and later contamination and plough damage effect in the upper zones (ie, Zones 1 and 2) were considered such as to make the exercise not worthwhile in these locations.

The pottery from the features within Cutting 12 was also assigned form and decoration types but this does not form part of the computerised record (see archive) due to the small quantity of material recovered being invisible in any statistical assessment. In addition, some of the pottery from Cuttings 2 and 3 was assigned form and decoration types (archive only) to establish that this material was consistent with the larger assemblage. Subsequent seasons of work achieved only the recording of fabric types for Cuttings 10, 14, and 16 (see archive).

Throughout this discussion, the sample analysed from the 'off-terrace' columns within Cutting 12 forms the basis for comment because this area is freer of the complexities of zonation (above) and the trends are clearer. However, specific comment is made of the 'on-terrace' deposits, and those in Cuttings 2 and 3 where appropriate.

Computerised Analysis of the Pottery, by P.W. Williams

The data relating to Cutting 12 was entered into three independent dBase III Plus database files using the data structures and coding system dictated by the extant paper record. A further database was also created detailing the incidence of refitting pottery sherds. The function of this dataset was to facilitate a three-dimensional spatial analysis of the distribution and dispersal of ceramics within the Deposit and to test the stratigraphic integrity of the Deposit.

Subsequently, a statistics/graphics package (Statgraphics) was used to carry out a simple assessment of the potential of the dataset. The full datasets are available in an archive report, but here the uses made of them are briefly described.

Assumptions and depositional model

The first stage of any analysis is the construction of a model, or set of assumptions, within which the analysis will take place. The first assumption is that the deposited ceramics are an accurate reflection of those that are in use on or near the site. The second part of the model relates to the stratigraphy, or rather the apparent lack of such.

It was theoretically possible for the disorganising processes at work in the gradual accumulation of the Deposit to have so mixed the ceramic assemblage that it became homogeneous. This was, however, very unlikely: to use the analogy of the mixing of a cake, very intensive beating is required before homogeneity of the ingredients is achieved.

A likely model for the build-up of the Deposit is that rubbish containing a ceramic element was deposited in one location. The next deposit subsequently occurred, but not necessarily close to the first, and so on. If such deposition were allowed to continue undisturbed then the end product would be a series of partially overlapping lenses of dumped material with the oldest at the base and the most recent at the top but with adjacent lenses possibly separated by significant periods of time. Such a model is well illustrated by the development of a spoilheap during the course of an archaeological excavation.

In the case of the archaeological Deposit, the dumped material was unlikely to remain undisturbed between successive dumpings: animals were likely to root amongst it in search of food; it may have been shovelled around to construct pathways or pits; or indeed, elements of the assemblage may be moved by processes such as settlement, and water action. In such a case any given volume of soil was likely to contain the 'dense' fractions of one or more dumpings together with the 'less dense' elements of several others. It would be very dangerous to look for anything more than very broad trends within such an assemblage unless a sizeable sample was available for analysis. It is suggested that the Potterne assemblage does, indeed, fall into this class but even in this case great care has to be exercised so as not to over-interpret the results.

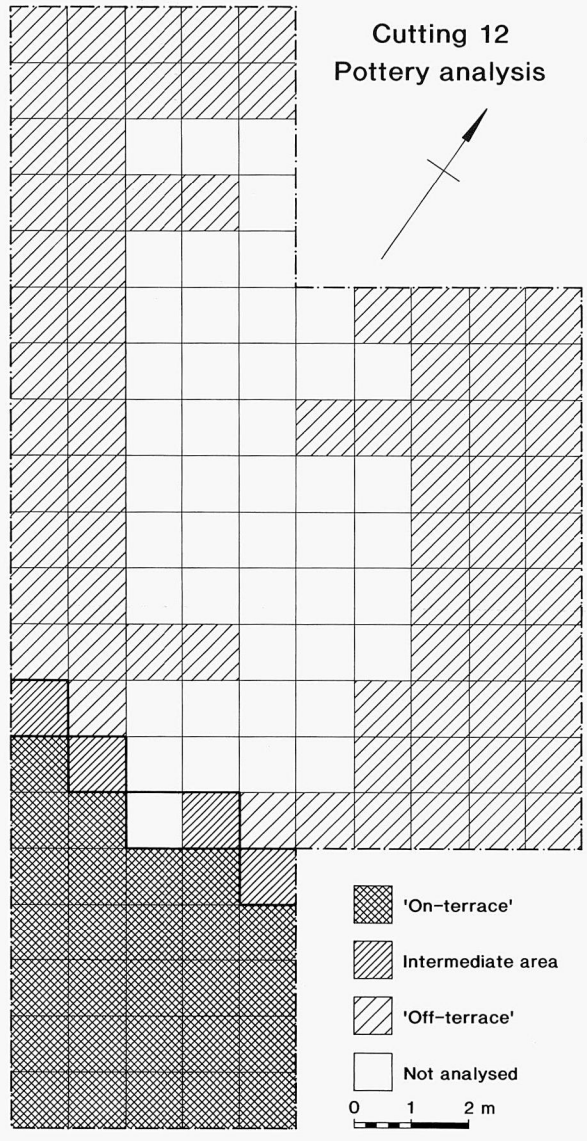


Fig. 40 Plan of Cutting 12 showing columns used in the pottery analysis

During the process of excavation a few dense ceramic 'spreads' were identified within the Deposit (Plate 8). They were allocated individual context numbers in each column within which they occurred but were not recorded by zone, being given the notional identifier 'Zone 0'. As such these contexts were also eliminated from the following analytical procedures.

Basic quantification of the assemblage

The sherd counts and weights of prehistoric pottery were summed for each zone in each of the three areas of Cutting 12 (Fig. 40) and the percentages within each zone calculated. The number of contexts in each zone was variable. This variability is accounted for in three ways: first, the lower zones were only present in some of the excavated columns; secondly, some contexts contained no ceramic material and therefore did not

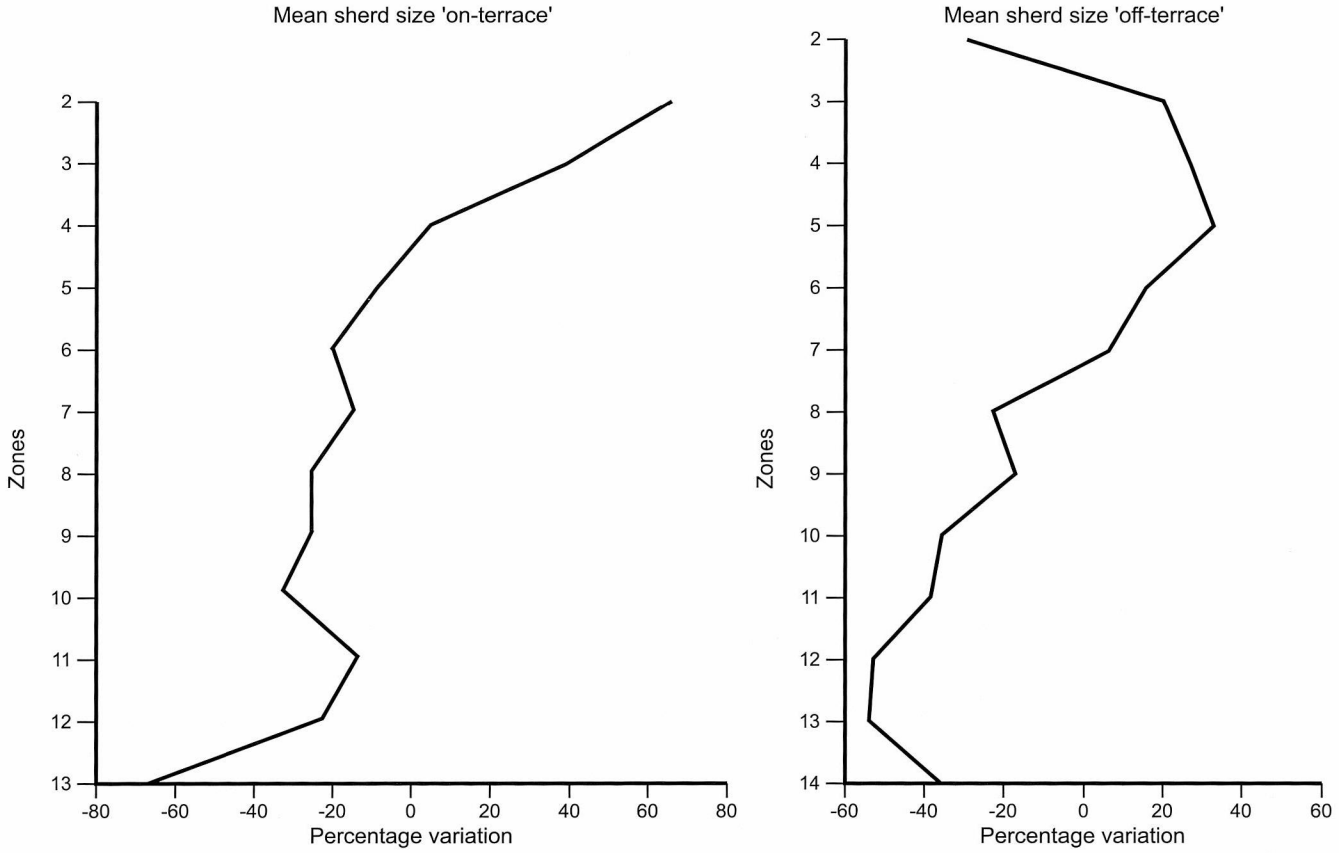


Fig. 41 Pottery: percentage variation from mean sherd size (including all prehistoric fabrics) by Zone 'on-terrace' and 'off-terrace'

appear in the database; thirdly, excavated features were allocated separate context numbers within each zone.

The sherd counts and weights by zone were plotted. Both 'on-terrace' and 'off-terrace' curves exhibit the same general profile with a gradual increase in the quantity of material above the lowest zones reaching a peak at Zones 4–5 and then declining rather more rapidly. No data were recorded for the wedge-shaped levelling spits, Zone 1.

In order to assess the possibility of recent contamination and mixing of the assemblage, the quantities of Roman and later ceramics were examined (Seager Smith, below). As expected, percentiles by sherd count and weight decrease rapidly with depth, both 'on-terrace' and 'off-terrace', although two anomalies are present in Zone 14 'off-terrace' and Zone 12 'on-terrace'. Both are produced by single sherds, each weighing less than one gram, which may easily have been introduced to the Deposit by human, animal, or plant activity.

The percentage variation from mean sherd size was calculated by zone for the prehistoric pottery. Significantly different curves were produced for the 'on' and 'off-terrace' assemblages (Fig. 41). The 'on-terrace' curve is close to logarithmic. Some increase in sherd size is observable within Zones 11 and 12, probably as a result of the incorporation of some sherds within feature fills, thereby reducing their subsequent degradation. The 'off-terrace' curve shows a degradation in sherd size from Zones 5–13 which is close to linear, and, similarly, from Zones 5–2.

Each of the four main fabric groups (sandy, shell, flint, and oolitic-tempered wares) were then examined in the same manner. With the exception of oolitic and to some extent sandy wares 'on-terrace', all behaved in a manner similar to the parent curves, suggesting that the parent curve profiles are not a function of the variability in the frequency of the fabric groups.

The quantified data were used as the basis for analysing trends in the changing use of fabrics, vessel forms, surface treatment, and decoration. In the case of designs (Morris, below), the sherd counts and percentages within each zone were calculated for each of six designs, both 'on-' and 'off-terrace'. Four designs (1, 3, 4, and 6) had sufficiently high counts to facilitate analysis of variance. Design 5 (swag designs), though present in very small quantities, was also included to contrast with Paul Reilly's visualisation experiments (archive; see also Reilly *et al.* 1988, figs 18:8 and 18:9). The four designs with large total sherd counts all illustrate smooth variation with depth in the Deposit. The swag design shows some variation with depth but the quantity of sherds is very small.

The majority of motifs are comparatively rare within the assemblage and are not suitable for any further analysis; of the remainder, finger tipping had

Table 19: Weights of sherds (g) by fabric groups by Zone, Cutting 12 'off-terrace'

Zone	*Unusual*	*Calcareous*	*Micaceous*	*Flint*	*Shell*	*Oolitic*	*Sandy*	*Rarities*
2	29	44	12	317	858	3466	12223	2
3	3	50	12	904	1187	13430	32129	10
4	49	80	9	834	2331	17015	47614	1
5	863	235	44	1142	4928	16955	59191	61
6	13	-	58	1480	6762	8773	44104	10
7	-	47	224	2987	5161	3997	29799	85
8	537	102	167	8369	5505	1360	24351	41
9	357	64	183	12438	7098	873	16933	72
10	37	73	150	12182	4242	729	8428	64
11	28	9	106	4766	1821	255	3380	24
12	17	2	7	992	422	109	695	16
13	18	30	59	1041	1100	67	617	4
14	-	8	15	181	199	-	72	-

already been examined as design style 1. Nonetheless, three motifs and groups of motifs were chosen for analysis, and graphs of their percentage occurrence produced (Fig. 42). Even though the percentages are very low, panel motifs (13.0 and 13.1), linear borders (10.0), and furrowing (motif 6.3) produced very good curve profiles for both the 'on-' and 'off-terrace' assemblages.

Fabrics, by Elaine L. Morris

The pottery recovered from 69% of Cutting 12 (Fig. 40) was examined macroscopically to determine the main inclusion visible and the variations of that inclusion type, such as density, size range, and shape, as well as the presence of other less common inclusions. The main inclusion was used to determine the fabric group of the sherd, and the variations to determine the fabric type (FT below). The fabric groups are described below. Detailed descriptions of the 54 fabric types within these groups are in given Appendix 3. A programme of petrological analysis was conducted to refine the macroscopic observations, and the results are presented below after a framework for the investigation is discussed.

The weight of pottery by fabric groups in each 'off-terrace' zone in Cutting 12 are presented in Table 19; organic fabrics are incorporated with micaceous or sandy fabrics and grog with calcareous fabrics in this table.

Pottery production and resource exploitation

The production of prehistoric pottery can be investigated from the analysis of the range of inclusions found in the fabrics, and from an understanding of the resources that were available to the potter and that could have been utilised at the time of production.

For Potterne, the fabric types and fabric groups were established with the aim of investigating the attributes of fabrics and vessel morphology, as an aid towards understanding the use of vessels and the changes in technology and resource exploitation during the later Bronze Age. The identification of the inclusions found in the fabric types and the likely sources for these inclusions was the first level of research. If the pottery was all produced locally (ie, within a radius of 7 km of the site: Arnold 1981; 1985, 33), then a simple household production or household industry system could be envisaged, with one or more potters producing the pottery for this community at any one time using local resources (Peacock 1982). But if the pottery was found to have been made from inclusions not available locally, then other explanations would need to be sought. Similarly, if the pottery production system could be shown to change during this period, then reasons for these changes would need to be found.

In Figure 1 the geology is depicted for an area *c.* 15–20 km around the site. Local resources include alluvium and terrace deposits, Chalk, Upper Greensand, Gault, Lower Greensand, Portland Beds, Kimmeridge Clay, Corallian, Oxford Clay, and Kellaway Beds from the Jurassic system (Jukes-Brown 1905; White 1925). Non-local resources outside this area which could have been used in the pottery fabrics include oolitic limestone found in the Bath area over 15 km from Potterne, which is discussed further below.

Such analysis had been anticipated already by Cunnington (1923, 29–30), who emphasised the surprising variety of fabric inclusions in the collection of pottery from her excavation of the Early Iron Age site at All Cannings Cross, located less than 10 km to the north-east of Potterne. She emphasised that there was a clear distinction between inclusions in some fabrics which could have originated from the local geology and some which could only have come from deposits at a distance from the site. In particular, Cunnington noted that some pottery fabrics contain ferruginous rock and fossil shells which do not occur locally and therefore concluded that these vessels must have been brought to the site from some distance. Boyd Dawkins suggested that the pottery containing these inclusions was 'derived from the lower part of the Kimmeridge Clay of the district where it passes into the ironstone of the Corallian' (*ibid.*, 29). Kimmeridge Clay without ironstone is found about 12 km from All Cannings Cross, and the Corallian about 30 km away. Some of the pottery, however, is flint-gritted and could have been produced from local flint, and in particular,

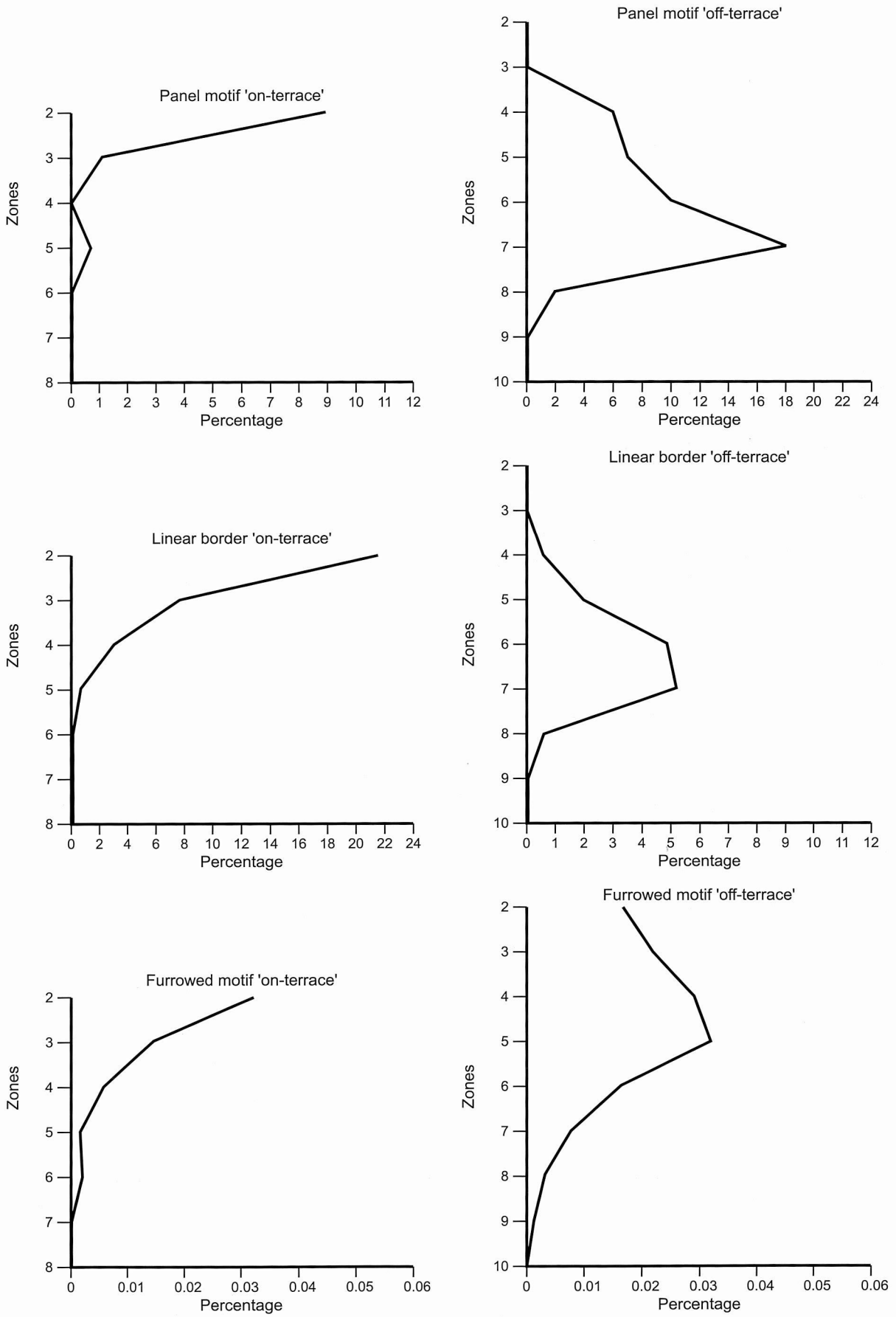


Fig. 42 Pottery: percentage variation by Zone of panel motif, linear border and furrowed motif decoration 'on-' and 'off-terrace'

Cunnington (*ibid.*, 30) noted that 'the Gault, which also makes good pottery, crops out about four miles from All Cannings Cross' (ie, *c.* 7 km).

Petrological analysis

Macroscopic examination of the pottery revealed an enormous variation in fabric types within several broad fabric groups, based on the dominant inclusion in each sherd. A programme of petrological analysis was designed to address three main issues:

1. whether these identifications could be verified as petrologically definable types or, if the recorded variability was simply a result of subjective observations, could types be consolidated to streamline future work;
2. to determine the most likely sources of the raw materials and any variation in technology represented so as to provide additional information about changes in ceramic production and exchange systems during the later Bronze Age in this area; and
3. to evaluate techniques of petrological analysis in order to determine appropriate methods for future research and, in so doing, indicate the problems and the potential of this assemblage.

A total of 361 sherds was selected for petrological analysis. This included a sample of each macroscopically-defined fabric type, plus at least ten samples from each of the more common fabric types from different zones and columns located along each of the main Cutting 12 sections and from the trowelled columns in the central and western parts of the trench (Fig. 6). This number of samples was determined to provide as broad a coverage as possible of variation in the material throughout the Deposit, which would also allow enough samples for use in the future as part of any statistical assessment of grain-size or textural analysis (Darvill and Timby 1982; Streeten 1982; Middleton *et al.* 1985). Subsequently, a third selection of 30 samples was based on the need to determine the precise fabric type of a small number of vessel types and decorative techniques once these had been established.

Thin sections were prepared using standard procedures (Williams 1983). In addition, 16 samples were chosen (details in archive) for heavy mineral analysis. These samples were representative either of extremely common fabrics, or of common but not easily differentiated fabrics. The preparation of heavy mineral residues (Williams 1983, 305–6) from the 16 selected samples did not result in enough minerals for statistical calculations. This may be a result of the overwhelming preponderance of iron oxides which were precipitated and not separated during the preparation.

All of the recorded and quantified information for each of the thin sectioned samples, those samples chosen for heavy mineral analysis, and the Wessex Archaeology pottery fabric sheets displaying details of each fabric type are available in the archive. The thin sections are held by Southampton University.

Definition of the fabrics

Detailed descriptions of each fabric type are presented in Appendix 3. The list includes the 54 prehistoric fabric types which remained after petrological examination.

All examples of flint inclusions are calcined and all examples of limestone are simple recrystallized forms, unless otherwise indicated. The glauconite pellets present in section were altered to brown limonite due to firing of the fabrics. Terms such as rare (<3%), sparse (3–10%), moderate (10–20%), common (20–30%), very common (30–40%), or abundant (>40%) are used to indicate the density or concentration of an inclusion (Terry and Chilingar 1955).

Fabric Groups

Unusual (UU)

The two fabrics in this group are not related to each other in any way. FT01 contains a moderate amount of comminuted or disaggregated pieces of biotite granite rock in a glauconitic sandy clay matrix. FT02 contains a variety of unusually rounded and large grains of flint, limestone, and quartz in a nearly sandy-free matrix which therefore feels soft and soapy.

There are two obvious possibilities of sources for the combination of glauconitic sandy matrix and biotite granite in FT01: either the vessel was produced in an area such as to the east of Dartmoor in Devon where granitic rock can be found reasonably close to an area of glauconitic sand deposits (Edmonds *et al.* 1975, 43–6 and 66–70), which would indicate that the vessel had been transported some distance to Potterne; or a granite rock originally transported to the Potterne area to be used as a quernstone had been reused as an igneous rock temper by a local potter.

The large, rounded inclusions in FT02 suggest a water-derived deposit. The alluvium deposits to the east of Potterne in the chalk zone are a possible source.

Non-specific calcareous matter, or limestone (LM)

There are six fabric types in this fabric group which have been grouped together due to the presence of a variety of different calcareous inclusions and to the paucity of any single, dominant calcareous material such as fossil shell, oolitic limestone, or calcite (which form the basis of other Fabric Groups). None of the fabric types is very common in actual numbers of sherds.

FT12 contains very fine, and also rare, large pieces of crystalline limestone in a glauconite pellet-bearing, sandy clay matrix, while FT13 is rich with a great variety of different calcareous materials including calcareous sandstone, and flint and fine sandstone in a non-sandy clay matrix. FT16 is glauconite pellet-free but very sandy and has some shell. In contrast, FT17 is a glauconitic and micaceous sandy clay matrix with a highly variably amount of rock and limestone inclusions such as glauconitic calcareous sandstone, tufa and flint. The tufa is always the most common inclusion, but it is interesting to note that the glauconitic calcareous sandstones are also rare occurrences FT14 (GG; see below). FT19 is another smooth and soapy fabric with a glauconite pellet-free, hardly sandy clay matrix with some fine pieces of limestone and grog. The grog is not visible macroscopically

so FT19 is still part of this group. FT49 is the most petrologically distinctive fabric type in this group. It contains a range of limestone, calcite and fossil shell fragments, coral and some iron oxides. The shell fragments are not at all similar to those in the fossil shell series described below (SH).

FT12 does not display characteristics distinctive enough to determine more than a glauconitic sandy source near some form of limestone. FT13 is simply unusual in its combination of inclusions, while FT19 is fine and undiagnostic. The presence of shell in FT16 suggests a relationship to the Fossil Shell group of fabrics (SH; especially FT41 and FT46), or possibly with the Oxford Clays and Kellaway Beds to the north-west of Potterne (White 1925, 9–14). FT17 contains a suite of inclusions suggesting a source somewhere near a spring (tufa) in the Upper Greensand/Gault Clay and the Chloritic Marl of the Lower Chalk (glauconitic calcareous sandstone in a glauconitic and micaceous sandy clay matrix) which is found immediately in the Potterne area (Jukes-Browne 1905, 13–32 and 52). The presence of worn tufa fragments concentrated in Zones 5–7 may be noted (Seager Smith, below). Similarly, FT49 with its range of coral fossils and shells indicates a source in the Corallian series (White 1925, 15–27) such as that found 6 km to the west of Potterne in an area free of glauconitic sands and clays.

Grog-tempered (GG)
Grog is the term used to describe all types of crushed fired pottery added to a clay matrix as temper. There are two very different fabric types in this group. The thin-sectioned example of FT15 is made from a fine glauconitic, micaceous sandy clay matrix which contains grog actually tempered with grog ('grog-tempered grog') in moderate concentration. This is another rather rare fabric type in the Potterne assemblage and the stratigraphical position within the Deposit suggests that it may be very early. One other, fine, thin-walled, grog-tempered sherd with oxidised exterior surfaces and unoxidised interior margins and surfaces proved to be of later Beaker type (see above).

FT14 is usually (90% of cases) a glauconitic sandy clay matrix which contains a variable amount of angular pieces of grog and either flint, fossil shell, shelly limestone, fine and glauconitic, calcareous sandstone, tufa, sandy limestone, organic matter with cellular structure, or any of these in combination. The first three additional inclusions are the most common with the others occurring only rarely. The grog itself is unusual since there may be one or more types of grog present in a sample and it can be oxidised or unoxidised. The different grog types include pieces of pottery identical to FT05 or FT88 (CT), FT41 or FT42 (SH), and FT62 or FT67 (GS) in addition to types which are not part of this fabric series such as a glauconite pellet free sandy fabric. In contrast to FT15, sherds in this fabric are usually 10–14 mm thick, while the FT15 sample is only 7 mm thick which suggests different types of vessels were made from the two fabrics in this Fabric Group.

The variety of inclusions in FT14, combined with the glauconitic sandy clay matrix, all indicate that the local Upper Greensand/Gault, Lower Chalk, and Portland Beds deposits in the area were the likely source (Jukes-Brown 1905, 13–32; White 1925, 6–7; Insole and Wright 1977). The variation in types of grog and the irregular quantities of these other inclusions suggest that the exploitation zone may have been broad and that there may have been either a number of potters or a number of production years represented in this range. What is most interesting is that the commonest grog types were FT41 and FT62 which indicates which other fabric types were in use prior to the production of the FT14 vessels. The addition of more than one type of grog as temper in the fabric of these vessels is a technique as yet unique in the published literature examined.

FT15 is another glauconitic sandy fabric with much less grog but has none of the other inclusions of FT14. The fine nature of the grog suggests that this may be a Beaker-type fabric.

Micaceous (MC)
This group of three fabrics has a common denominator consisting of a very fine and well-sorted range of quartz and glauconite grains in a very micaceous clay matrix. In FT20 the sand grains are from 0.4 mm or less in size and, in particular, are mainly silt-size or less (<0.1 mm). FT21 has the addition of a rare to moderate amount of angular pieces of flint and FT23 has a rare to sparse amount of pieces of limestone or shell. FT20 and FT21 are from thin-walled, usually unoxidised and burnished vessels while FT23 samples are not burnished and are from moderately thick-walled vessels (7–10 mm).

The inclusions in this range of fabrics, with an abundance of mica, fine sand or silts, and glauconite pellets, clearly indicates a source in the Gault deposits which are silty micaceous clays and near the Upper Greensand junction. Such an association of minerals is typical of the deposits found locally around Potterne (Jukes-Brown 1905, 13–25; White 1925, 37–42). However, it is important to note that the quantity of mica, the fineness of the grains and the occasional abundance of glauconite pellets in this group suggest that the sources of these clays are slightly different from those of the glauconitic sand group (GS) described below. The rare pieces of calcareous matter are expected in any of the fabrics derived from Cretaceous deposits.

Flint-gritted (FL)
Flint-gritted fabrics are those which display a moderate to abundant amount of angular flint in any type of clay matrix. There are eight fabrics in this group and six of them always have a glauconitic sandy clay matrix.

FT31 is defined by the presence of a common to abundant amount of poorly-sorted flint. Variation characterises the rest of this fabric: the occasional rare presence of limestone or grog inclusions, the irregular nature of the sand component which could be sparse to common in density, with or without glauconite pellets, and either medium or coarse in texture. FT32 is similarly irregular but is more often a glauconitic sandy clay matrix with only a moderate to common amount of poorly sorted flint. The sand grains vary considerably from a fine range similar to FT20, or a fine–medium and coarse range similar to FT62 to a single example with only medium-sized grains. Seven out of eight samples contained glauconite pellets. The lack of grain size

consistency within a basically glauconitic sandy fabric suggests a possible variety of sources within a limited geological type. FT33 is always unoxidised and usually burnished but has a range of variation within the sand component which is as irregular as that for FT32. It is distinctive due to the presence of a sparse to moderate amount of reasonably well-sorted flint. This fabric is used for both thinner and moderately thick-walled vessels (5–10 mm).

FT34, FT37, and FT38 are very similar to each other and could be combined in the future. They have been kept separate for this report in case form differences had been noted in any of the other pottery analyses. These fabrics are characterised by the presence of a harsh feel to the surface due to an abundance of glauconitic quartz sand in the clay matrix and a sparse to moderate amount of poorly-sorted flint. The sand is very obvious because of the coarseness in size of many of the grains (from 0.2–2.0 mm but usually 1 mm or less). Pieces of limestone have been identified in these fabrics.

FT36 is a rare fabric type. It contains an abundant amount of very coarse flint (up to 9 mm across) in a very micaceous, only slightly sandy clay matrix containing pellets of glauconite. The single sample was unoxidized and from a thin-walled, sooted vessel (5–7 mm) in an early context. FT39 is another rare fabric type in this glauconitic sandy clay matrix group but is characterised by a sparse amount of moderately well-sorted flint and a rare amount of pieces of limestone.

FT31, FT33, and FT36 are the most likely fabrics to be tempered with flint. The nearest large deposits of flint occur in the Upper Chalk to the north-east (White 1925, 58–71), and to the south of Potterne within 8 km of the site (Jukes-Browne 1905, 36–9). The flint temper added to a glauconitic sandy clay matrix for FT32 and FT36 could have been produced more locally, as is the case for the better sorted flint temper in FT33 and FT39. Local field clearance may also have provided quantities of flint, as discussed elsewhere by Healy for the worked flint resources (below).

FT34, FT37, and FT38 may not have been tempered, but the large size of so many of the flint fragments makes this observation a very inconclusive contribution to any understanding of the technology of production. The range of inclusions observed in these fabrics could undoubtedly be of local origin due to the presence of glauconite pellets in the sandy clay matrix. The presence of sparse to moderate amounts of flint in these fabrics is in contrast to the rare to sparse amounts in FT63, although these are clearly related wares.

Fossil shell (SH)

There are five fabric types in this group. FT41 is a glauconite-free, only slightly sandy clay matrix containing a common to very common amount of crushed pieces of iron-rich fossil shell (including include Ostrea, ammonites, and foraminifera) and fossiliferous, calcitic limestone rock. FT42 contains the same range of fossil shells as FT41, in a glauconitic sandy clay matrix. It is the very obvious presence of the sand component which differentiates FT42 from FT41 and which suggests a different source for the clay matrices.

FT46 is characterised by the presence of medium–large and well-sorted quartz grains which give a distinctively harsh and sandy feel to this fossil shell fabric. The range of shells is the same as for FT41 and FT42 and the concentration varies from moderate to very common. But the unusual aspect is that in spite of the presence of so much quartz, there are no, or hardly any, pellets of glauconite in the sand component. FT47 is a glauconitic sandy clay matrix containing a moderate amount of finely crushed pieces of fossil shell.

FT45 probably should be reclassified as another group. It has a glauconite pellet-free clay matrix containing a very common amount of finely-textured limestone and a moderate amount of organic matter with linear and oval vesicles or unusual cellular structure as in rare examples of FT14 (GG) and FT64 (OR). The rarity of this type, however, did not merit alteration of classification.

The types of fossil shells found in these fabrics, particularly FT41, FT42, and FT46, are the same range as that identified in the Bishops Cannings Down Deverel-Rimbury barrel urn assemblage and provenanced to the Kimmeridge Clay deposits in the immediate area (Tomalin 1992, 75, fig. 55; Jukes-Brown 1905, 5–6; White 1925, 28–30; Insole and Wright 1977). The different kinds and quantities of sand in the matrix for each of these fabrics suggest however that a variety of sources may have been exploited. A number of different Kimmeridge Clay deposits do exist in the area; and some are near glauconitic sand deposits and some are not. The latter have been proposed as the possible sources for the Bishops Cannings Down material which does not contain glauconite pellets and therefore is very similar, if not identical to FT41.

Oolitic limestone (OL)

This very distinctive type of limestone rock is found in four major fabric types. FT51 contains a common to abundant amount of angular pieces of iron-rich, oolitic and shelly limestone rock, and comminuted pieces of rounded ooliths and angular shell, and limestone and calcite matrix in a glauconite pellet-free, hardly sandy clay matrix. In contrast, FT52 is distinctively harsh to touch with a moderate to common amount of glauconite pellet and quartz sand and only a sparse to common amount of the same range of calcareous inclusions.

FT53 is very similar to FT52 as a glauconitic sandy clay matrix but with only a rare to sparse amount of ooliths, shell and limestone. FT54 is distinctive for being a slightly glauconitic sandy clay matrix with a moderate to common amount of rounded iron oxides and a sparse to moderate amount of ooliths, shell, calcite and limestone. The size of sand grains is similar either to FT53 or to FT71 (GS).

FT51, containing oolitic limestone rock, is obviously made from clays near a weathering Jurassic outcrop of oolitic limestone or has been made by adding crushed pieces of rock to a clay near that source. The absence of any other inclusions in the clay strongly favours the former interpretation. The closest oolitic limestone outcrop lies 15 km to the west of Potterne in the Bradford-on-Avon/Budbury area, and oolitic limestone fabrics have been identified in the pottery collection from Budbury (Wainwright 1970; Hawkins 1986).

In contrast, FT52, FT53, and FT54, containing ooliths with shell and limestone, quartz sand, and glauconite pellets and, in the case of FT54, large

quantities of iron oxides, indicate a quite different source, or sources. Since there are no sources of glauconitic sandy clays in the area immediately around the major oolitic limestone outcrops in this region (Kellaway and Welch 1948), other sources of mixed ooliths and sandy clays must be examined. One possibility is the zone where the Coral Rag Series containing ooliths is found next to Gault Clay between 8–10 km to the north of Potterne. In this same area, Lower Greensand with Ferruginous Sands are also common which could be the source for the abundance of iron oxides in the glauconitic sandy clay matrix.

Glauconitic sand (GS)
There are ten fabrics in this sandy fabric group. All are characterised by the presence of glauconite pellets and quartz sand grains. The most common fabric type in this assemblage is FT62. It contains a common to abundant amount of angular/sub-angular to sub-rounded/rounded grains of quartz with sub-rounded to rounded glauconite pellets in a micaceous clay matrix. There are infrequent but occasionally large, rounded pieces of iron oxides. The grains are moderately well-sorted.

All other fabric types are a variation of FT62. For example, FT61 is a very coarse version of FT62 with the sand component having a majority of grains between 0.3–0.9 mm and some up to 2 mm, and rare pieces of limestone. FT63 and FT65 are the same as FT62 but the former has a rare to sparse concentration of sub-angular to angular pieces of flint, and the latter has fossil shell, shelly limestone and limestone fragments of the same size and density. FT67 is a fine, well-sorted version of FT62 with medium–fine and silt-sized quartz grains and glauconite pellets. FT68 and FT75 are the same fabric as FT62 but have been kept separate due to the possibility of different vessel forms correlating to their firing and surface treatment characteristics. Similarly, FT69 was differentiated due to the presence of a 'haematite-coated' slip on one or more surfaces, but petrologically this fabric is identical to either FT62 or FT67.

FT71 is a glauconitic sandy clay matrix containing a moderate to common amount of sub-rounded to rounded pieces of iron oxide. The sand component is similar FT62, FT53, or FT54. FT78 is another coarse glauconitic sandy fabric similar to FT61, but contains rare pieces of both flint and limestone.

This great range of fabrics is clearly derived from the Lower Greensand, Gault, and Upper Greensand deposits common in the immediate Potterne area. For example, FT71, which is rich with iron oxides, is typical of the ferruginous sands of the Lower Greensand, while FT62, FT67, FT68, FT69, and FT75 can be nothing other than Gault/Upper Greensand products. The coarse range of glauconite pellets and sand in FT61 with the rare presence of limestone or shell fragments suggest a possible Lower Greensand source for this fabric, but variations do occur in all of these deposits and the presence of rare fragments of flint or limestone for FT63 and FT65 are simply normal variations within any such deposit.

Calcite (CT)
The three fabric types in this group are FT05 which is a glauconitic sandy clay matrix containing a common amount of poorly-sorted, angular calcite fragments, FT88 which contains an abundant amount of calcite in prismatic, comminuted and irregular form and FT90 which is not dissimilar to FT05 but has only a sparse amount of angular pieces of calcite.

FT05 and FT90 appear to be similar to the sparsely to moderately calcite-tempered ware (Fabric D) identified in the Bishops Cannings Down assemblage (Tomalin 1992, 74) but the presence of glauconite pellets in the clay matrix is not mentioned in that fabric description. FT88, however, is abundantly tempered with calcite in a glauconite pellet free matrix which indicates a different source. A less fossiliferous zone in the calcite strata of the Kimmeridge Clay was proposed as the source for this calcite, if the pottery is local, and calcite matrices are known in the Greensand. However, other sources further afield cannot be ruled out, particularly for FT88. Calcite-gritted pottery has been identified amongst the Middle Iron Age pottery from just outside the region and sources in the vicinity of and south of Bristol proposed for this very distinctive rock (Peacock 1969, 48; Morris 1983; 1987; 1988; Kellaway and Welch 1948, 41; Woodward 1990, 122).

Organic-tempered (OR)
The two fabrics in this group are similar to types in other groups but have been separated for technological and quantification purposes and are considered to be tempered, although this is not 100% certain in every case. FT22 is a micaceous group fabric (MC) with a very micaceous and glauconitic sandy clay matrix containing a rare to common amount of organic matter or linear vesicles. The samples are usually unoxidised and several were burnished on one or more surfaces. The majority are from thin-walled vessels. This is a porous version of the dense and homogeneous FT20. FT64 is actually FT62 (GS) with a rare to moderate amount of organic matter, linear or ovoid vesicles. Two samples had visible plant cell structure in cross section.

The presence of glauconite pellets in the fine, micaceous sandy clay matrix of FT22 and in the sandy matrix of FT64 clearly indicates that these fabrics are likely to have been produced from local Greensand deposits. Organic matter can be found naturally in clays, but can also be added as temper to increase the plasticity of clays and the porosity of vessels and to interrupt the cracks which develop from firing and use (Rye 1981, 33–4; Skibo *et al.* 1989). Therefore, as with FT34, FT37, and FT38 above, the division between tempered and naturally gritted fabrics is not always certain.

There was a possibility that some of this material could have been sherds from briquetage containers used to dry and transport salt (Foster 1990), but the possibility of a local source for the clays and the occasional example with burnished surfaces would rule out such an interpretation.

Irregular or rare (IR)
There are nine fabric types, represented by a single sample each, in this group. FT81 is a glauconitic sandy clay matrix with moderate amounts each of angular flint and fossil shell.

Table 20: Frequency of fabric groups within Cuttings 2 and 3, lowest deposits and/or features (see also Fig. 44)

Fabric group	*No. of sherds*	*%*	*Weight (g)*	*%*
Cutting 3; pre-Deposit accumulation and features				
Grog-tempered	81	31.6	446	25.4
Organic	13	5.1	76	4.3
Micaceous	8	3.1	31	1.8
Flint-gritted	82	32.0	646	36.7
Fossil shell	60	23.4	501	28.4
Oolitic limestone	4	1.6	24	1.4
Glauconitic sand	7	2.7	31	1.8
Unusual/calcareous/ calcite	1	0.4	3	0.2
Total	256	99.9	1758	100.0
Cutting 2; 'pre-Deposit' level				
Grog-tempered	34	27.2	349	30.6
Organic	3	2.4	10	0.9
Micaceous	20	16.0	112	9.8
Flint-gritted	29	23.2	341	29.9
Fossil shell	19	15.2	148	13.0
Oolitic limestone	4	3.2	23	2.0
Glauconitic sand	9	7.2	57	5.0
Unusual/calcareous	7	5.6	99	8.7
Total	125	100.0	1139	99.9

FT82 is an unusual, soft and soapy, glauconite-free, hardly sandy matrix with a moderate amount of irregularly shaped vesicles.

FT84 is a very coarse sandy fabric with a bi-modal quartz sand component having a moderate amount of large grains and a common amount of silt-sized grains. Glauconite pellets are found only among the finer grains, the clay matrix is very micaceous and there are single pieces of calcite and limestone in the one sample examined. The latter group of inclusions suggests that this part of the fabric is equal to FT23 and that the larger quartz may be added temper. FT87 is not dissimilar to FT63, and FT91 is a glauconite-free version of FT81 with flint and calcareous inclusions. The thin section of FT95 did not include any of the large angular pieces of either quartz or flint visible macroscopically but the sandy clay matrix is glauconite-free. Both FT96 and FT99 have glauconitic sandy matrices with varying amounts of either micaceous and glauconitic sandy limestone or calcareous fine sandstone and glauconitic sandy limestone. FT101 is rather odd. It is a glauconitic sandy clay matrix containing a common amount of flint and a sparse amount of ooliths, but the flint appears to be on the inner, unoxidised half of the sherd samples and the ooliths on the outer, oxidised half.

FT81 has another combination of local Greensand clay matrix but the quantity of flint and shell is suggestive of a very different source from those above, while FT83 is more like the GS group above. FT96 and FT99 contain glauconitic sandy limestones and other arenaceous rocks in glauconitic sandy clay matrices which can only be from the Upper Greensand deposits such as those found in the immediate area of Potterne (Jukes-Browne 1905, 13–25).

Discussion of the fabrics

Petrological analysis has determined that the majority of fabrics were produced from clays and inclusions which can be found locally, within 7 km of Potterne. One group, with fabric types containing varying amounts of oolitic limestone, could not be produced from local resources. The nearest sources are *c.* 15 km from the site. One fabric contained biotite granite rock fragments which are likely to have originated from south-western England. Therefore, out of 54 fabric types, 49 are likely to be of 'local' manufacture and 5 are 'non-local' wares. Within the framework of pottery production systems discussed above, it is likely that the household production of pots, to be used by the immediately local community, was the main mode of production in the Potterne area. However, at least some intra-regional trade of pottery to Potterne occurred as a result of a household industry level of manufacturing vessels elsewhere for more than local use.

Figure 43 indicates the relative percentage by weight and sherd number of each major fabric group by zone within Cutting 12 ('on-' and 'off-terrace'). If the assemblage from the lowest part of the Deposit 'off-terrace' is examined in detail (Zones 14–11) the fabric range is dominated by the flint (38–43%), sand (25–37%) and fossil shell (29–15%) groups with micaceous, oolitic limestone, and other calcareous fabrics in more minor quantities. (The very small fabric groups OR and GG do not appear separately on these graphs; grog-tempered is within LM and organic-tempered fabrics in MC and GS.) Similar proportions can be seen in an examination of the small quantities of pottery from the assumed 'occupation layers' and features below the Deposit in Cutting 3 and in the earliest deposits in Cutting 2 representing terrace-like material (Fig. 44; Table 20).

The relative proportions amongst the fabrics, however, change quite dramatically when comparison is made between these lowest zones and the lower to middle part of the Deposit (Zones 10–7). The grog-tempered fabric (part of the LM group) disappears entirely, the FL group reduces progressively in frequency (38% to 8%), the SH group continues to reduce in frequency and then levels off (from 15% to 2%), while the GS group increases dramatically (37% to 75%). By the end of Zone 7, the OL group is just beginning to increase in frequency (from 3% to 12%). There are at least three possible reasons for these changes:

1. a significant time gap or disjunction exists between the earlier occupation and the lower part of the Deposit which is lost in the merging effect of the form of representation within this study (see Dating, Chapter 4.3, above);
2. Zones 10–7 represent *c.* 0.4 m Deposit built up over a rapid period of time which differs in the rate of accumulation between the Deposit in Zones 14–11 and in Zones 6–2;
3. the accumulation rate during this period was the same as for all other parts of the Deposit and pre-Deposit activity, but that there was a very dramatic change in the nature of pottery technology with regard to the production of fabrics, with sand becoming the preferred medium for the production of all types of vessels, and the increase in relation-

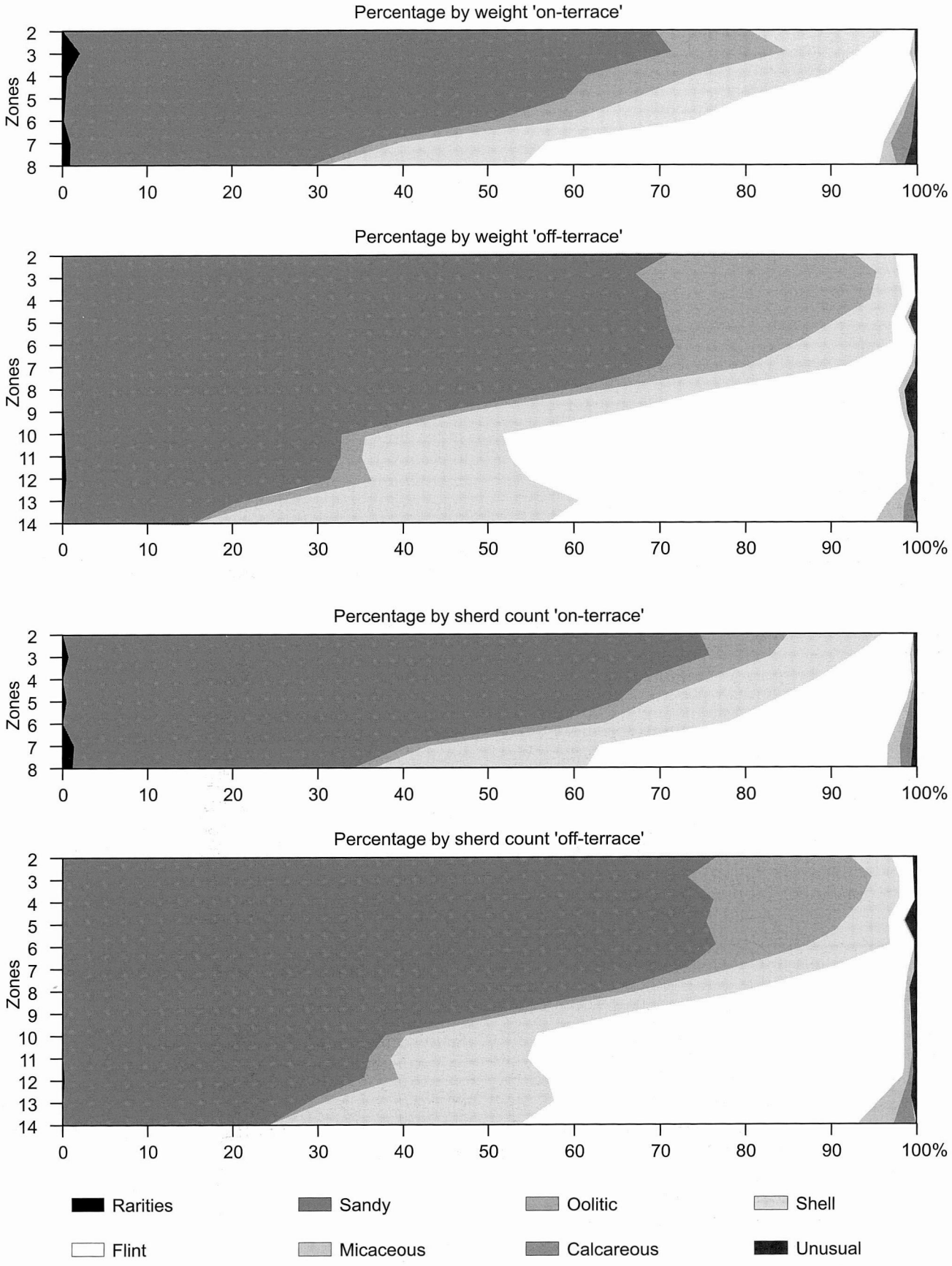


Fig. 43 Pottery: percentage variation of pottery fabrics by weight and by sherd count 'on-' and 'off-terrace'

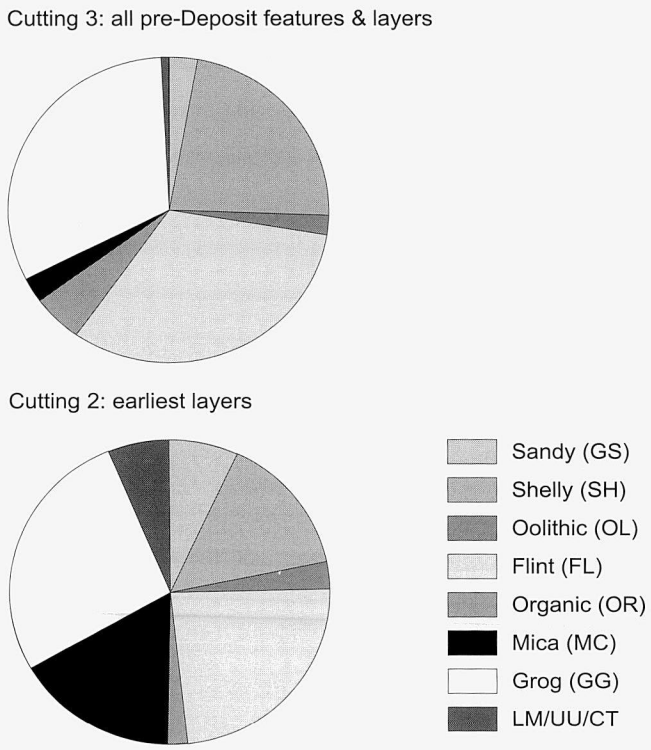


Fig. 44 Pottery: composition of the assemblage by fabric from all pre-Deposit features, Cutting 3, and from the earliest layers, Cutting 2

ships with potters or communities which made/utilised oolitic limestone fabrics.

The use of grog-tempered pottery specifically may have been a very short-lived ceramic trend which was rapidly going out of use at the time of the activity found beneath the main Deposit.

To summarise, vessels made from flint-bearing fabrics were much less frequently deposited at the site by the end of the Zone 7 period (which is similar to the deposition of worked flint; see Healy, below) and appear to have been replaced by a great deal more of the sandy fabric group while the reduced quantity of fossil shell and other limestone fabrics is inversely correlated to an increase in the oolitic wares, both the coarser varieties and those bearing sand in the clay matrix. This trend is continued in the upper zones of the Deposit resulting in relatively insignificant amounts of fossil shell (4%) and flint-bearing fabrics (3%), which might be considered residual in nature at this point in time, the disappearance of other limestone or rare fabric types altogether, and the overwhelming dominance of the various sandy wares and a significant amount of non-local oolitic limestone vessels by Zones 3–2.

This pattern could be explained by a combination of technological aspects in the first instance. There is a similarity in the chemical structure of the different dominant inclusions within these fabric groups while at the same time a difference between the overall morphology of the inclusions within the groups. At low fired temperatures, the silicate structure of flint and quartz sand would have similar properties when submitted to cycles of heating and cooling during both manufacture and use known as thermal shock, which means that these two fabric groups could be equated by their basic chemistry. This would have been true also of the calcium carbonate, fossil shell and oolitic limestone fabrics (Rye 1976; 1981, 32–6 for detailed explanation of technological properties of common additives in ceramics). However, this does not explain why the change took place; it only indicates that the resultant properties of the fabrics within the silicate group and within the carbonate group could have been equivalent technologically. Reduction of wall thickness is another variable in the resistance to thermal shock because it lessens the thermal gradient (Rice 1987, 229).

The size of inclusions is a third variable in understanding how the change could have taken place technologically because 'resistance to crack initiation in fired pastes increases with decreasing grain size in the fired paste' (Braun 1983, 123). The flint inclusions range up to 6 mm across amongst the various fabric types, while the quartz sand grains measure usually less than 1 mm across. The combination of both quartz sand and small oolitic limestone inclusions in three fabrics (FT 52–54) was likely to have had special advantages for vessels used as serving or food processing containers (bowls) since the presence of crack reduction inhibitors may have improved the mechanical shock resistance of such vessels. A fourth factor is the hardness of vessels; the harder the vessel, up to a point, the more resistant to mechanical stress. These contrasts in technology would have allowed some scope for the manufacture of new vessel shapes and a reduction in vessel wall thickness, with more fineware bowls and more thin-walled vessels a distinct possibility. Equally important, however, is the realisation that finer fabrics provide better surfaces for applying decorations (Rye 1981, 27); thus it may well have been a combination of technological and social requirements which fostered the search for new fabric recipes during this period. An understanding of the properties of these materials, both the clays and the additives, and their manipulation clearly had a major impact on the pottery assemblage which is discussed further below.

The overall increase in the amount of sand in fabrics from the bottom to the top of the Deposit is easily demonstrated by noting the change in relative frequency of the sandy fabric groups (Fig. 43). However, what must be emphasised is that many of the finer fabrics used to make bowls, such as that mentioned above (FT52), while classified according to their observed diagnostic inclusion, also contain sand as a frequent component. These finer fabrics are more frequent within the upper part of the Deposit. The increased occurrence of quartz sand in fabrics during the later Bronze Age was also noted amongst the Marlborough Downs collections (Gingell 1992) and the Wessex Linear Ditches plain ware assemblages (Raymond 1994).

The replacement of local fossil shell and other limestone fabric vessels with non-local oolitic limestone fabric vessels could be one of the clearest indicators of

Table 21: Correlation of fabric and form groups, Cutting 12 'off-terrace'

	Bi-conical urn	*Carinated bowl*	*Long-necked bowl*	*Other bowl*	*Cup*	*Carinated jar*	*Indet. jar*	*Narrow-mouthed jar*	*Shouldered jar*
Calcareous	-	-	-	-	-	-	1	-	2
Flint-gritted	2	7	8	1	2	1	10	1	115
Micaceous	-	2	2	-	-	-	-	1	-
Oolitic limestone	-	10	66	1	1	22	19	7	88
Rarities	-	-	-	-	-	-	1	-	1
Glauconitic sand	149	385	541	8	15	98	54	116	493
Fossil shell	-	2	2	-	-	7	23	2	96
Unusual	1	-	-	-	-	-	-	-	1

the emergence of an early ceramic exchange pattern with producers on the fringe of and just outside the Potterne area. This is an exceptional pattern which demonstrates what appears to be a reduction in local production in favour of the development of trading for the non-local version of a similar product. It is this sort of evidence which may indicate the establishment of regional links that cannot be explained purely in terms of the absence of specific and necessary resources (Morris 1994); the production of a variety of calcareous fabric wares was a local tradition which was being reduced in importance by the acquisition of another form of similar pottery from outside the local area.

In addition to these changes in fabric types, there is a clear reduction in the number of major fabric groups during the period of deposition. The earlier zones have several different fabric groups represented (flint, shell, sand, oolitic limestone, grog, organic, other limestones, and mica). By the time Zones 4–3 were deposited, the number of groups is reduced to three: mainly oolitic limestone and glauconitic quartz sand, with fossil shell a minor group; the flint group was probably residual at this level in the Deposit. This reduction in the number of fabric groups suggests that there may have been a concentration of effort in pottery production at that time; fewer potters were making more pots. Therefore, to return to the models proposed by Peacock regarding household production for local or family use and household industry for more than local use, it appears that two aspects support an increased importance on the household industry level of production: the increased use of non-local pottery during the period of deposition and reduction in range of fabrics being utilised. Since the non-local oolitic limestone vessels are both coarsewares and finewares, our appreciation of the nature of this more specialised production needs to be revised. The recognition of production for exchange, as opposed to local use, has traditionally been confined to finewares (Middleton 1987), but the evidence from Potterne has altered this perspective.

Form Series by C.J. Gingell and Elaine Morris

The present form series is divided into three broad groups of bowls, jars, and cups, with various miniature vessels, bases, lugs, and one stabbed form also included. These broad groups have been identified as the main forms which distinguish Late Bronze Age from Middle Bronze Age assemblages (Barrett 1980). No attempt has been made to classify the types into fineware and coarseware groups (Classes I–V; *ibid.*), nor were vessel capacities calculated or estimated (*ibid.*).

The vessel type series was originally based on the recognition of featured sherds generally, not simply rim sherds; partial profiles lacking rims were also included in the series. The scarcity of fully reconstructable profiles is worth stressing; altogether, only five cups, seven bowls, and four jars have complete profiles. All of these were recorded on the database by numerical codes. This form series was established from an examination of the majority of sherds recovered from Cuttings 2 and 3, and from the 69% by area sample of Zones 9–2 only in Cutting 12. The pottery from the stratigraphically earliest contexts in Cuttings 2 and 3 and from Zones 14–10 in Cutting 12 are discussed separately below.

A number of sites were examined for parallels for the various vessel types. Those specifically cited here are concentrated on sites in the local area, eg, All Cannings Cross (Cunnington 1923), Budbury, Bradford-on-Avon (Wainwright 1970), Dean Bottom, Rockley Down and Burderop Down on the Marlborough Downs (Gingell 1992); and on sites elsewhere in central southern England which have independently dated ceramic sequences, eg, Runnymede Bridge, Surrey (Longley 1980), Petters Sports Field, Surrey (O'Connell 1986), Aldermaston and Knight's Farm, Berkshire (Bradley *et al.* 1980). Other sites referred to include Old Down Farm, Hampshire (Davies 1981) and Eldon's Seat, Dorset (Cunliffe and Phillipson 1968). To facilitate the referencing of parallel vessel types, only the site names are presented with the published figure number. Dates given for these vessel types are as published.

The correlation of fabric types to form types for featured sherds recorded for 'off-terrace' zones in Cutting 12 is summarised by fabric and form groups in Table 21. The frequency of the broad vessel form groups is shown by 'off-terrace' zone in Table 22 and in Figure 44.

Table 22: Numbers and percentages of sherds for vessel form groups by Zone, Cutting 12, 'off-terrace'

Zone	*Bowls*			*Jars*			*Cups*		
	No. of sherds	*% in zone*	*% by zone*	*No. of sherds*	*% in zone*	*% by zone*	*No. of sherds*	*% in zone*	*% by zone*
2	69	73.40	5.81	24	25.53	2.07	1	1.06	5.56
3	149	59.13	12.55	100	39.68	8.63	3	1.19	16.67
4	289	63.94	24.35	163	36.06	14.06	-	-	-
5	293	52.42	24.68	259	46.33	22.35	7	1.25	38.89
6	167	48.27	14.07	178	51.45	15.36	1	0.29	5.56
7	107	46.72	9.01	122	53.28	10.53	0	0.00	0.00
8	58	34.94	4.89	107	64.46	9.23	1	0.60	5.56
9	36	22.22	3.03	125	77.16	10.79	1	0.62	5.56
10	14	19.18	1.18	56	76.71	4.83	3	4.11	16.67
11	4	17.39	0.34	18	78.26	1.55	1	4.35	5.56
12	-	-	-	1	100.00	0.09	-	-	-
13	1	20.00	0.08	4	80.00	0.35	-	-	-
14	-	-	-	2	100.00	0.17	-	-	-

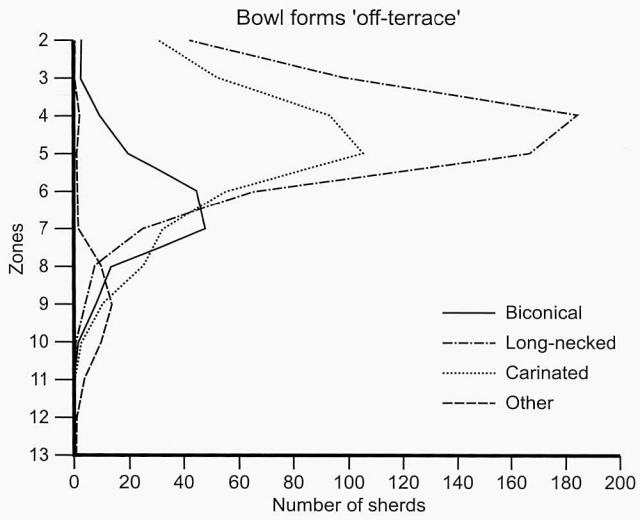


Fig. 45 Pottery: relative frequency of bowl forms by sherd count from 'off-terrace' Zones

Bowls

There are four main bowl groups: biconical bowls (Types 1 and 14), the long-necked, carinated bowl (Type 2), other carinated bowls (Types 3.0–3.4) and bowl forms with few individual examples (Types 4, 7, 10–11) (Fig. 45). Unused numbers in the series are a result of the modification required for assessment of the computerised database.

Bowl Type 1: biconical bowl (Fig. 47, 1–11)
Bipartite form, having either a vertical or slightly everted rim, which is sometimes beaded; a smaller version of Bowl Type 14; similar to Knight's Farm sub-site 1 (fig. 35, 43–7 and 52, fig. 36, 76), Runnymede Bridge (fig. 37, 421); Early All Cannings Cross group (Cunliffe 1991, 64–5 and fig. A:2; Cunnington 1923, pl. 35, 6 and 10, pl. 48, 1); 10th/9th–early 6th centuries BC.

Bowl Type 2: carinated bowl with long-neck (Fig. 47, 12–17)
Most examples have hollow neck with profile a true arc; rim usually sharp or simple rounded, plain form, but some flat-topped; includes examples of furrowed bowls; similar to Runnymede Bridge (fig. 81, P61); Later All Cannings Cross and All Cannings Cross-Meon Hill groups (Cunliffe 1991, 71–25 and fig. A:6; Cunnington 1923, pl. 28, 1 and 9; pl. 45, 2–3), but the long neck is not associated with round-bodied bowls at Potterne and therefore the long-necked form is probably earlier than ceramic phases 1–3 at Danebury (mid-6th to mid-5th century BC) where round-bodied bowls were recovered (Cunliffe 1984, 242, 248 and fig. 6.17); late 8th–early 6th centuries BC.

Bowl Type 3: carinated bowl with no rim (not illustrated)
Incomplete profile with rim detail unknown; usually sharp carination above shallow lower half; includes examples of carinated profile and furrowed design; similar to All Cannings Cross (pl. 28, 11); Late Bronze Age–Early Iron Age

Bowl Type 3.1: carinated bowl with short, upright rim (Fig. 48, 18–26)
Bipartite form, often with sharp carination, having short, plain nearly upright rim and straight, or slightly convex, upper body; plain rims slightly rounded, or occasionally flat-topped; includes examples of furrowed bowls; similar to Budbury (fig. 14, 74–8; fig. 15, 80, 81, 83, 84, 86, 87); Early All Cannings Cross group (Cunliffe 1991, 64–5 and fig. A:2; Cunnington 1923, pl. 40, 1); 8th–7th centuries BC

Bowl Type 3.2: high-shouldered bowl (Fig. 48, 27–9)
Bipartite form with distinctive shoulder or carination placed high on vessel profile resulting in short neck to rim zone; usually upright rim; similar to Budbury (fig. 14, 70), Runnymede Bridge (fig. 37, 430); 10th/9th–early 6th centuries BC.

Bowl Type 3.3: tripartite, carinated bowl (Fig. 48, 30)
Large, tripartite form having everted rim; includes furrowed bowls; similar to Old Down Farm (Davies 1981, fig. 15, 29); 7th–early 6th centuries BC.

Bowl Type 3.4: carinated bowl with flaring or flat-topped rim (Fig. 49, 31–4)
Bipartite bowl with slightly flaring rim or with flat-topped rim; includes furrowed bowls; similar to Runnymede Bridge (fig. 30, 257; fig. 40, 511); 10th/9th–7th centuries BC.

Bowl Type 4: flared, funnel-shaped bowl (Fig. 49, 35–6)
Inverted conical form with flaring sides, stepped with a carination and short re-entrant neck; similar to Runnymede Bridge (fig. 37, 429; fig. 82, P73); 10th/9th–7th centuries BC.

Bowl Type 7: round-shouldered, goblet-shaped bowl (Fig. 49, 37)
Narrow-mouthed, deep bowl with a plain upright rim and very rounded profile; similar to Eldon's Seat (fig. 17, 146); Early Iron Age.

Bowl Type 10: large conical bowl (Fig. 49, 38)
Large bowl with flared upper part having expanded rim with slight bevel inwards and distinctive patterned burnishing on the interior; uncertain vessel profile, only one example in

Table 23: Bowl groups: number of sherds by Zone, Cutting 12, 'off-terrace'

Zone	*Type 1/14*	*Type 2*	*Type 3/4*	*Type 7/10/11*
	Biconical	*Long Necked*	*Carinated*	*Other*
2	3	36	30	-
3	3	94	52	-
4	10	184	93	2
5	20	167	105	1
6	45	64	56	2
7	48	25	32	2
8	14	8	25	11
9	8	4	10	14
10	1	9	3	10
11	-	3	-	4
12	-	-	-	1
13	-	1	-	10

collection; similar to Aldermaston (fig. 13, 39; fig. 14, 52; fig. 16, 119); 9th–8th centuries BC.

Bowl Type 11: wide-open shallow bowl (Fig. 49, 39)

Very wide-open shallow bowl or dish with everted or slightly expanded rim; similar to Aldermaston (fig. 14, 55, 59, 67, fig. 16, 119); 9th–8th centuries BC.

Bowl Type 14: large biconical bowl (Fig. 50, 40, 41)

Large, deep bowl with sharp shoulder and slightly beaded rim; similar to Bowl Type 1, and in particular to Budbury (fig. 16, 116); 7th century BC.

Bowl Type 99: uncertain bowl form, other types (not illustrated)

Discussion

Biconical bowls (Types 1 and 14) first occurred in Cutting 12 ('off-terrace') at Zone 10, peaked in deposition at Zones 7–6, and became infrequent from Zone 5 upwards (Fig. 45; Table 23). Long-necked carinated bowls (Type 2), the most common general bowl form in the recorded assemblage, were first discarded in Zone 9 (four examples identified) and became quite common in the Deposit by Zone 6 through to Zone 2. Combining the evidence for different carinated vessels with shorter necks (Types 3.1, 3.3, and 3.4), a pattern of deposition results which suggests that at Potterne at least these vessels were broadly contemporary with the long-necked examples. However, the number of examples is very small and the majority of carinated bowls occur without necks and rims (Type 3.0). Nevertheless, if these are taken into account, then a late deposition pattern is emphasised. High-shouldered bowls (Type 3.2) are infrequent in the assemblage but appear to have been deposited in a similar pattern to that of the biconical bowls.

Bowls were usually made from sandy fabrics (Table 21). Over 90% of the biconical and carinated bowls and 87% of the long-necked bowls are in glauconitic sandy fabrics. The other main fabric group used to make long-necked bowls is the oolitic limestone group (11% of this form), and in particular the finer types FT 52–4 which contain sand in some quantity.

Jars

There are four main jar forms: the round-bodied, narrow opening jar (Type 20), the carinated jar (Types 30–33 and 36), the shouldered jar (Types 50, 51, 56, 58, 9) and the indeterminate jar (Type 40). Ovoid or convex-profile jars are present in the assemblage but were not recorded.

Jar Type 20: globular, or round-bodied, jar (Fig. 51, 42–8; Fig. 52, 49–51)

Rounded body vessel, lacking a shoulder, with relatively narrow mouth and upright rim or outward sloping, flared rim above a short angular neck; clearly a closed form vessel; often has vertical lugs which are horizontally pierced; similar to All Cannings Cross (pl. 29, 1; pl. 31, 1, 2; pl. 38, 4, 5); 8th–6th centuries BC.

Jar Type 30: carinated jar, usually with no rim present (Fig. 52, 52–6)

The angled sherds from carinated jars which lack enough profile for full vessel shape to be determined; some have lugs which are either vertically or horizontally pierced; Early Iron Age.

Jar Type 31: carinated jar with everted rim (Fig. 53, 57–9)

Carinated jar with carination high on profile and an everted rim; not dissimilar to Jar Type 51; similar to Knight's Farm 1 (fig. 34, 20; fig. 35, 22), Runnymede Bridge (fig. 29, 232; fig. 98, P431); 10th/9th–early 6th centuries BC.

Jar Type 32: sharply carinated, tripartite jar (Fig. 54, 60–3)

Sharply carinated, tripartite vessel, usually with a flared, funnel-shaped neck; not dissimilar to Jar Type 31 but usually has a longer neck to rim length; similar to Runnymede Bridge (fig. 35, 372); 10th/9th–early 6th centuries BC.

Jar Type 33: slightly carinated, bipartite jar (Fig. 54, 64–6)

Jars with slight carination, or shoulder, and an undifferentiated neck-rim zone sloping inwards from the shoulder; the rim is plain or slightly bevel-edged on the interior; can have vertical lugs which are horizontally pierced; similar to Budbury (fig. 11, 7, 9) and Runnymede Bridge (fig. 20, 34); 10th/9th–early 6th centuries BC.

Jar Type 36: carinated jars with cordons (Fig. 55, 67, 68)

Carinated vessels which appear to have been differentiated solely by the presence of applied cordons at the neck to rim join; similar to one from Bray, Hoveringham's Pit in Berkshire (Barrett 1980, fig. 6, 2); decorated phase of the later Bronze Age; 8th–7th centuries BC.

Jar Type 40: miscellaneous jar forms (Fig. 55, 69–72)

Sherds for which a diagnostic form type was not assigned; can include rims, angled sherds and bases with a partial profile; Late Bronze Age/Early Iron Age.

Jar Type 50: smoothly shouldered or slack-shouldered jar/bowl (Fig. 55, 73)

A gently curving profile vessel with low placed shoulder or girth and simple upright rim; wider rim opening than for Jar Type 20 which suggests it may have been a bowl similar to Bowl Type 14; similar to Runnymede Bridge (fig. 20, 33); 10th century BC but later if decorated.

Jar Type 51: shouldered jar (Figs 56, 74–8; 57, 79–85; 58, 86–9)

The classic shouldered jar, or situlate form, usually with long neck zone and upright rim; not dissimilar to Jar Type 31; can have applied vertical cordons on the neck zone but horizontal cordons are Jar Type 56; similar to All Cannings Cross (pl. 40, 2; pl. 41, 4; pl. 42, 2; pl. 44, 2), Burderop Down

(fig. 75, 2), Runnymede Bridge (fig. 30, 250, 257); 10th–early 6th centuries BC, and possibly earlier than the 10th century BC.

Jar Type 56: shouldered jar with applied horizontal cordons (Fig. 58, 90–2)

The typical shouldered jar form with horizontal applied cordons, single or multiple; similar to All Cannings Cross (pl. 44, 1), Knight's Farm 1 (fig. 34, 15); 9th–7th centuries BC.

Jar Type 58: shouldered, tripartite jar with unusually slipped exterior surface and applied cordon at neck to rim join (Fig. 59, 93, 94)

A tripartite, shouldered jar with long shoulder zone and tall, vertical rim, having an applied, horizontal cordon at base of neck and a slipped surface which flakes away from the vessel surface; similar vessels not found and therefore possibly unique to Potterne; probably 8th–7th centuries BC. by association with other vessels at this site.

Jar Type 59: shouldered vessel with very short neck zone (Fig. 59, 95–7)

Vessel with shoulder placed high on profile creating a very short zone between shoulder point and rim; these vessels may be jars but the small size of two examples selected for illustration (Fig. 62, 96, 97) suggests a similarity to Bowl Type 4; similar to Petters Sports Field (fig. 50, 127–36); 8th–7th centuries BC.

Discussion

The shouldered jar forms (Types 50–9) first occur in Zone 14 and were discarded in some quantity throughout most of the Deposit. In contrast, the carinated jar forms (Types 30–6) were first identified in Zone 9 but were deposited in significant quantities in Zones 7–3. The round-bodied jar form with flaring rim (Type 20) first occurred in Zone 7 of Cutting 12 and achieved some significance within the assemblage between Zones 6–3.

The shouldered jar (Types 50–9) was a form produced in a variety of fabrics (Table 21). As expected, the majority are in sandy fabrics (62%), but flint-gritted (14%), shell-bearing (12%), and oolitic limestone (12%) examples were recovered in significant proportions. Narrow-mouth, round-shouldered jars are predominantly in sandy fabrics (91%), with carinated jars in sandy (77%), oolitic limestone (17%), and shell fabrics (5%).

Cups

Cups were not defined by their rim diameters or capacity, but simply by general observation as being apparently smaller than bowls or jars. Only 27 occurrences of cups were recorded from the 69% sample of Cutting 12 (Table 22) and six types were defined amongst these. Cups occur throughout the Deposit and were usually made in sandy fabrics (83%) with some examples of flint-bearing (11%) and oolitic limestone fabrics (6%) (Table 21).

Cup Type 80: simple, hemispherical form (Fig. 60, 98)

Classic cup-like shape with convex profile; a small example similar to Petters Sports Field (fig. 41, 1); 7th century BC.

Cup Type 81: small example of Bowl Types 1 and 3 (Fig. 60, 99–104)

Biconical and carinated profile with short vertical, or slightly angled-inwards, rim; can have furrowed decoration; 8th–7th centuries BC.

Cup Type 82: small example of Bowl Type 2 (Fig. 60, 105–8)

Carinated long-necked profile; can have furrowed decoration and omphalos base; similar to Old Down Farm (fig. 16, 54); 7th–6th centuries BC.

Cup Type 83: small examples of Bowl Types 3–3.4 (Fig. 60, 109–11)

Carinated profile; can have omphalos base; 9th–7th centuries BC.

Cup Type 85: tub-shaped cup (Fig. 60, 112)

Wide flat base with round base angle and squat upright sides; similar to Knight's Farm sub-site 1 (fig. 36, 79) and Old Down Farm (fig. 16, 61); 7th century BC.

Cup Type 86: high, round-shouldered cup with rounded, beaded rim (Fig. 60, 113–7)

Form with high, very rounded shoulder and very fine, rounded or beaded rim; similar to Knight's Farm subsite 1 (fig. 36, 82); 8th–7th centuries BC.

Miniature Vessels

Three miniature vessels were recovered and all are illustrated. These were recovered from Zones 6 and 7.

Vessel Type 87: miniature vessels (Fig. 60, 118–20)

Unusual, jar-like, closed form vessels which measure approximately 50–70 mm tall and 30–55 mm in diameter; could be children's toys or thumb-pots; one is roughly finished on the exterior surface

Lugs

There are at least three different types of lug attachments in the Potterne assemblage. Lugs in this instance are defined as applied attachments bearing one or more perforations through which adult fingers cannot pass. This form suggests that the vessels were suspended using ropes or cords. These lugs are typical of Late Bronze Age–Early Iron Age collections in southern England. No examples of unperforated lugs or any other individually applied knobs as one might expect in a Middle Bronze Age assemblage were identified in the sample.

The earliest occurrences of lugs in Cutting 12 were at Zone 11; however, lugs do not achieve a numerically significant occurrence in any zone. There are no examples of actual hand-sized handles in the collection. Lug types, or the presence of lugs, were not included in the database record, but are available in the archive records.

Lugs have been found most often on Jar Types 20 (narrow-mouthed, generally round-bodied) and 30 (carinated). The commonest type of lug, which is the vertically applied strip lug with single horizontal perforation (Lug Type 1) is found on both decorated and undecorated examples of these two jar forms (Fig. 52, 49–51, 53–6) while the much rarer, horizontally applied lug with double vertical perforation (Lug Type 2; Fig. 52, 52) has been found solely on a large jar with furrowed decoration in this assemblage.

Lug Type 1: vertically attached and horizontally pierced strip lug, single perforation (Fig. 52, 49–51, 53–6; Fig. 54, 66)

Similar to All Cannings Cross (pl. 38, 4, 5), Budbury (fig. 16, 117–20) and Runnymede Bridge (fig. 37, 405); later Bronze Age/Early Iron Age, 9th–6th centuries BC.

Lug Type 2: horizontally attached and vertically pierced strip lug, double perforation (Fig. 52, 52)
Similar to All Cannings Cross (pl. 37, 4); 7th–early 6th centuries BC.
Lug Type 3: rim perforated lug (Fig. 60, 121)
A lug attachment which appears to have been created by pulling the clay up from the rim edge, not attaching it to the vessel wall; vessel form unassigned but the single example has a pointed top edge to the rim and an internal lip; similar to All Cannings Cross (pl. 37, 1) and Danebury (Cunliffe 1984, fig. 6.78, 560); 8th–6th centuries BC.

Bases
Two main types of bases were identified: flat and omphalos. Flat bases are by far the commonest type. Omphalos or raised bases are often found on bowls and cups (Fig. 47, 12; Fig. 60, 105, 110, 111, 116). Base types were not recorded as part of the database, but are indicated on the archival featured sherd record. Omphalos bases were also recovered at All Cannings Cross (pls 32, 33), but none were identified amongst the 400 bases found at Budbury (Wainwright 1970, 138).

Four examples of perforated base sherds or sieves were found in Cutting 12, one of which is from an omphalos base (Fig. 60, 122), and one in Cutting 1. All have randomly spaced holes formed in a plastic state, varying from 3.5–9.0 mm in diameter. The examples are in fabric types FT67 (three sherds), FT42 (one) and FT31 (two). The Cutting 12 examples were recovered from Zone 4, 'off-terrace' contexts (three examples) or Zone 3 (one). The occurrence of perforated bases amongst Late Bronze Age/Early Iron Age pottery is known, but not common (Cunnington 1923, pl. 48, 2; Wainwright 1970, 138). This base form is, however, well-known in later Iron Age assemblages in southern England (Cunnington 1923, pl. 29, 10; Davies 1981, fig. 28, 102, 103; Cunliffe 1984), and may represent a special aspect of food processing which became more common later in the 1st millennium BC.

Repaired vessels
There are at least 24 examples of perforations on sherds created after firing had occurred. These perforations are likely to indicate repaired vessels. One example was noted in the Cutting 1 collection, in a fabric FT31 sherd. No examples were observed in the Cutting 3 material or in the material analysed from the lowest levels of Cutting 2. (The remaining 23 sherds are listed in archive). Repaired sherds were recovered at all levels within the Deposit, and in all the major fabric groups, including both local and non-local fabric types, plain and decorated vessels, coarsewares and finewares. Repair holes are indicated on Early Iron Age material from All Cannings Cross (pl. 35, 4, 14; pl. 37, 6).

Stabbed vessel
One rim sherd, recovered from Zone 8, bears an impression produced during manufacture which does not penetrate completely through the vessel wall (Fig. 60, 123). Since there is only one stabbing at this location on a sherd of reasonable size, it does not appear to be a form of decoration in this case. The rim may belong to a Jar Type 33 vessel and is in fabric FT42. Similar examples of incomplete stabbing occur on vessels from Knight's Farm 3 (fig. 32, 46).

Decorations

Examination of Figures 102–8 (Appendix 3) will demonstrate the enormous variety of incised, furrowed, impressed, applied, and raised cordon decoration recorded. Similar decorations to all of these can generally be found among the All Cannings Cross and Budbury assemblages and therefore individual parallel examples will not be presented. It is important to note, however, that there are several motifs in the large All Cannings Cross collection (pl. 29, 1; pl. 31, 1, 3, 5, 7; pl. 32, 5) which do not occur in the sampled and analysed Potterne assemblage and vice versa; these may prove to be decorations which were created by local potters on pots for use by local inhabitants respectively, or which have some chronological significance.

Design Groups and motifs
Design Groups were created as a broad concept used to cluster more specific motifs (discussed below) into a pattern. Designs were divided into six broad style groups and 41 constituent motif types. Therefore, a series of horizontal, diagonal and vertical incised lines would make up a design of parallel lines (Design Group 3), as would a pattern of horizontal or vertical furrows (Motif 6.3). The motif types illustrated in Figures 102–8 (Appendix 3) are grouped by motif form and/or technique, eg, impressed motifs, linear motifs, modified and unmodified cordons. The sherd counts and percentage of each design within the sampled collection from Cutting 12 are detailed in archive, as are details of the correlation of designs with fabric groups and with form types. This system attempted to be objective but is far from exhaustive.
Design Group 1: Finger-tipping
Comprises impressed motifs made with thumb, finger or nail, while the vessel is in a plastic state
Design Group 2: Cordon/Applied strip
Cordons may be plain, finger-tipped, impressed or slashed; applied strips are vertical strips which may be finger-tipped or impressed and are applied usually in pairs or in fours
Design Group 3: Parallel lines
A range of vertical and horizontal decoration, executed with tools of different thickness and sharpness to give techniques of incision, grooving, and furrowing
Design Group 4: Diagonal lines
Comprises oblique lines, chevrons, triangles, diamonds, and any other linear design not strictly horizontal or vertical, in a variety of combinations and patterns
Design Group 5: Swag
A continuous wavy pattern around the circumference of the vessel
Design Group 6: Impressed zones
A range of patterns made with an instrument, other than those for Group 1, pressed into wet clay; can be combined

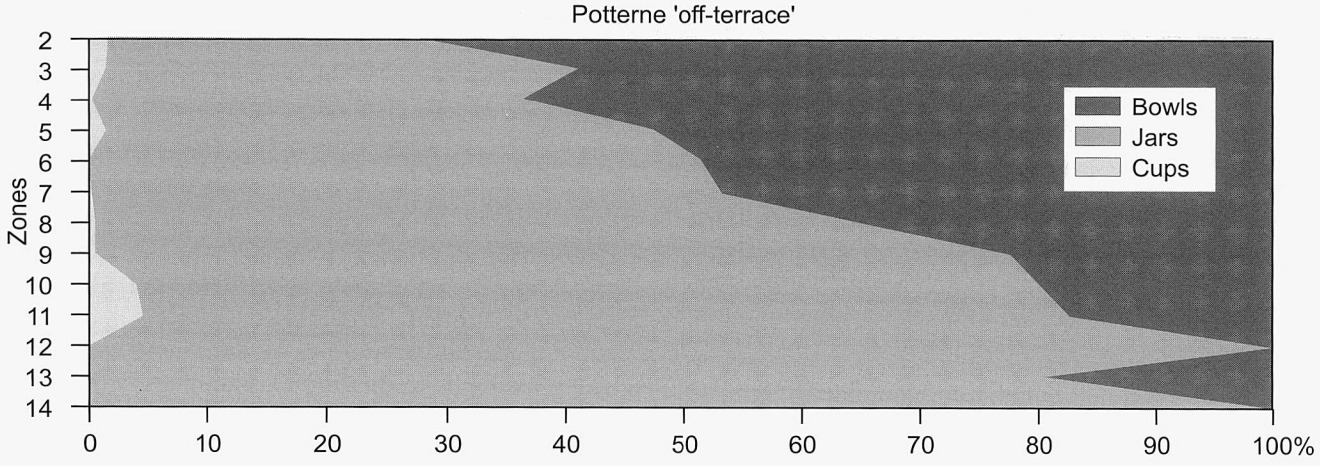


Fig. 46 Pottery: percentage variation of bowls, jars, and cups from 'off-terrace' Zones

Table 24: Design groups (D1-D6); number of sherds by Zone, Cutting 12,'off-terrace'

Zone	*D1*	*D2*	*D3*	*D4*	*D5*	*D6*
2	64	1	100	16	2	15
3	181	-	182	49	1	32
4	264	2	280	89	1	58
5	400	5	347	114	9	79
6	315	4	266	130	6	11
7	215	8	152	103	2	84
8	196	7	56	31	-	24
9	179	5	21	11	1	14
10	108	6	11	5	-	4
11	36	3	4	3	-	-
12	6	-	3	3	-	-
13	7	3	1	-	-	-

with linear features, occurring in bands or contained within linear borders or vertical panels

Motifs

These are not described but are presented in a pattern book format in Figures 102–8 (Appendix 3) with additional examples illustrated by fabric group in Figures 109–17 (Appendix 3). The sherd counts and percentages of selected motifs by zone for the Cutting 12 'off-terrace' sample is presented in available in archive as is the correlation of motif types with fabric types and with form types.

Discussion

Decorated vessels occur throughout the Deposit (Table 24 and Fig. 42). The earliest 'off-terrace' deposits appear to have a very low proportion of decorated material (2–3%) which is similar to the amount identified amongst the material from the lowest levels within Cuttings 2 and 3. This proportion gradually increases from Zone 10 to 8 within Cutting 12 (*c.* 6%) and then dramatically from Zone 7 to 5 (18%). This is the maximum amount of decorated pottery at Potterne by zone since above these zones the quantity gradually decreases to 9% by Zone 2 ('off-terrace'). It is similar to the proportion of decorated vessels from the 9th century BC occupation at Runnymede (*c.*16–22%; Longley 1980, 70–1, fig. 46) but these proportions were not prepared by the same method since Potterne is from the total number of sherds and Runnymede the total number of vessels. This latter method was also applied to the Budbury (24% out of a minimum of 1729 vessels; Wainwright 1970, 138) collection which is 7th–early 6th centuries BC in date. However, the collection from Petter's Sports Field, dated by later Ewart Park Phase metalwork and radiocarbon determinations to the 7th–6th centuries BC, contains 25% decorated *sherds* (O'Connell 1986, 63, 71–2).

Sherds with finger-tip decoration occur throughout the Deposit excavated in both the statistically significant zoned material (Table 24; Fig. 109, 1–5, 25; Fig. 110, 26, 27, 34, 35; Fig. 111, 47–53) and in the lowest deposits where smaller quantities of material were recovered. It is apparent that finger-tip decoration is the most common form of decoration within Zones 14–11, and that it increases gradually from Zones 10–5 (from 3% to 7% of all sherds; Table 24) and then declines once more from Zone 4 (5%) to Zone 2 (3%). Amongst the decorated sherds alone, however, the significance of finger-tip decoration decreases as new styles are utilised, such as incised designs and furrowed designs. The latter design style reaches a statistically significant frequency by Zone 7 'off-terrace' (5%) and this is continued through Zones 6–4 (5–6%).

Raised cordons and applied strips were identified throughout the Deposit but always in very small quantities (details in archive). This particular style never reaches a statistically significant proportion in any zone. Parallel lines, including incised and furrowed examples, are grouped together as a design style. This group was identified throughout the Deposit, generally in very small quantities, but was deposited in statistically significant quantities in Zones 6–3. Diagonal lines are also present in nearly all zones, but never become statistically significant as a design style group. Swags

Table 25:
Number of sherds with different surface treatments by Zone, Cutting 12, 'off-terrace'

Zone	*Haematite surfaces*	*White infill sherds*	*Wiped surfaces*	*Burnished surfaces*	*Coated surfaces*
2	72	8	48	233	5
3	139	30	162	626	2
4	290	63	253	1215	5
5	357	50	332	1638	6
6	187	69	252	1206	3
7	67	64	134	1014	3
8	37	8	141	1185	-
9	11	5	142	813	-
10	2	-	95	860	-
11	-	0	18	287	-
12	-	0	7	53	-
13	-	0	3	46	-
14	-	0	-	6	

and impressed zones are numerically insignificant designs which do not occur before Zones 9 and 10 respectively.

Therefore, within the zones which produced large amounts of pottery (Zones 10–2), only finger-tip designs and parallel line designs (Fig. 42) are numerically significant decorative patterns, but not until the period of activity represented by Zone 7 for the former and Zone 6 for the latter. Some significance, however, must be ascribed to the recognition that all decorative types appear to decline after Zones 5 or 4. This may have a bearing on the dating of the abandonment of this location as a dumping ground and will be discussed further below.

Surface treatment

Several different kinds of surface treatment were observed on the Potterne assemblage. The most common was burnishing on the exterior of closed vessels and on both surfaces of open vessels. In addition, vertical wiping of vessel exteriors, polished red coating of both surfaces and the combined technique of incising, white infilling, and red coating to create a polychrome effect was identified.

Throughout the recording by fabric types of the sherds from the 1059 contexts within the analysed sample, the presence of surface treatments was recorded for interior and exterior surfaces together as the number of surfaces. The different types of treatment were recorded as:

Type 12.1: red-finished/'haematite-coated'
Type 12.2: white (chalk) infill
Type 12.3: burnished
Type 12.4: colour-coated
Type 12.5: wiped

Discussion

The application of a coating to the exterior and to the interior of vessels was a minor but visually significant occurrence. The application proved to have been achieved in a variety of different techniques. The most easily identified was the red-finished, or 'haematite-coated', surface treatment. Samples of 14 sherds of this type and others, three with apparently black and burnished finishes and 11 with red and burnished finishes, were analysed by Andrew Middleton of the British Museum Research Laboratory, who determined that the black vessels were simply burnished and had no extra coating application, while the red vessels appear to have been produced by the application of either a ferruginous clay coating or slip, or perhaps by burnishing fine-grained iron oxide into the surface of the vessel. This technique is different to material recovered on similar appearing sherds from Kent where a thick, crushed haematite coating was identified (Middleton 1987). Samples of both glauconitic sandy fabrics and fabrics with glauconite pellets, sand and oolitic limestone were examined. Occasionally, the red finish on (unsampled) sherds is not actually burnished. When the vessel type is apparent, it is the bowl forms, particularly Types 2 and 3, on which a very high degree of burnish is present. The physical analysis has confirmed the macroscopic observation that there may be both dry and wet forms of this coating.

A very specific execution of this surface treatment technique was identified on a sharp shouldered jar (Fig. 113, 118). Here a thin slip preparation seems to have been brushed or sponged over selected areas of the design between the incised and impressed borders of an arcade or swag which, when fired, created a red finished effect solely within the blank area defined by the arcs. On vessels with more geometric decoration not forming actual panels, such a thin slip finish may be applied to the whole surface. Very rarely are such surfaces burnished. Red finishing first appears in Zone 10 and was deposited in small quantities (1–3%) from Zones 7–2 (Table 25).

Incised and impressed designs may be infilled with a white paste which clearly emphasises the design. The actual proportion of this application on vessels is very low (less than 2% in Zones 7–6 and 4; less than 1% in all other zones), and is restricted to Zones 10–2 (Table 24). White paste infilling was also identified in the All Cannings Cross (Cunnington 1923, pl. 31, 1), Budbury (Wainwright 1970, 138), Rams Hill (Bradley and Ellison 1975, fig. 3:6, 36, 38, 53, 55, 56, 59), and Runnymede (Longley 1980, 70) collections.

Evidence for the wiping of surfaces occurred less frequently than that for burnishing (Table 25) and was mainly restricted to jar forms (details in archive). Burnishing of surfaces was a technique which varied from slight burnishing to a high polish. Burnished sherds occurred throughout the Deposit but were always statistically significant from Zones 2–12. This technique is common on bowl forms (detail in archive).

Special examples of both slip and burnish include the highly burnished bowl Type 14 in fabric FT62

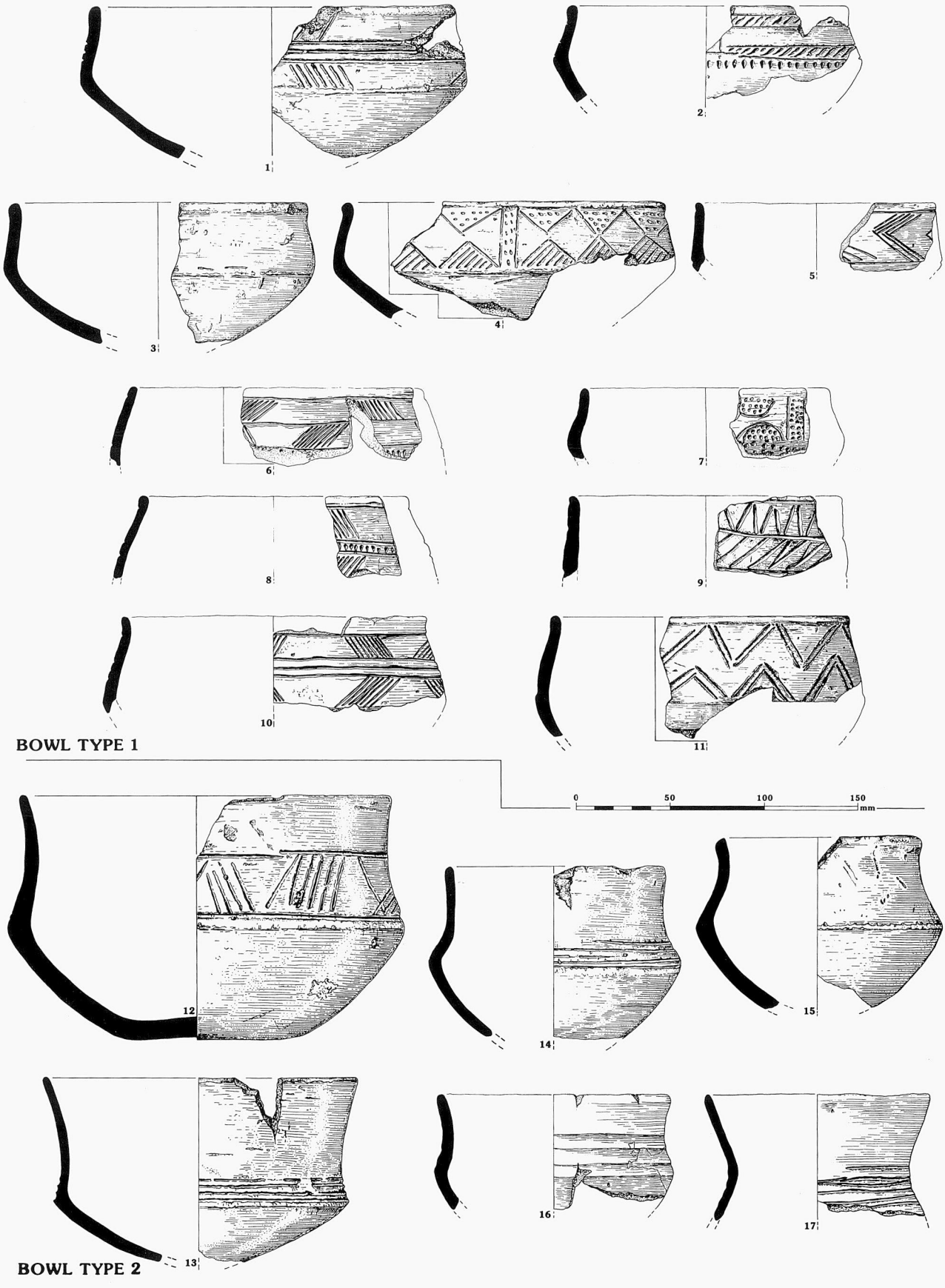


Fig. 47 Pottery: vessel forms: bowl types 1, 1-11; 2-7. Scale 1:3

(Fig. 50, 40) which has a cream-coloured slip finish and the jar Type 58 in fabric FT62 (Fig. 59, 93) which has a moderately thick slip or a very fine clay paste which has subsequently been highly burnished, with the finely grooved comb-like decoration added as a final stage. The most complex combination of these different surface treatments is present on one Type 20 jar in fabric FT62 (Fig. 51, 43). The incised and impressed design of swags, or arcades, and circles is inlaid with white chalk paste and filled in with a brick-red painted slip against a deeper reddish–brown painted field. This three-tone combination of brown, red, and white may be termed 'polychrome'. It is interesting to note that these three vessels were made from the same glauconitic sandy fabric and were therefore locally produced. A painted vessel of similar form and date was recovered at the Highfield site, Salisbury (Stevens 1934, fig. 7, 33). The production of polychrome wares is also a feature of Late Bronze Age and Early Iron Age pottery from Kent (Macpherson-Grant 1991; Middleton 1995).

Residues and Vessel Use

Residues are well preserved on sherds in the Potterne assemblage. The presence of soot and carbonised food were recorded for both the fabric record and the featured sherd record, and is available in the archive files. Limescale was not recorded due to the difficulty of differentiating between it and various other concretions on the surface of some sherds. Residue analysis has not been undertaken.

In addition, vessels made in calcareous fabrics occasionally retained evidence of use by the presence of pitting, on the interior surface of sherds only, due to leaching by acidic substances held in the vessels. This is particularly noticeable on sherds made from the oolitic fabrics, although also present with fossil shell tempered fabrics. This information, however, was not recorded during analysis.

'Pot Spreads' or 'Sherd Groups'

During the carefully trowelled excavation of selected columns in Cutting 12, it became apparent that clusters of pottery and other artefacts appeared to be discretely grouped and lying flat, or relatively horizontally, within the Deposit (Pl. 8, above). These were labelled 'pot spreads' or 'sherd groups' and assigned separate context numbers. Within the context each sherd, bone or other artefact was assigned a sub-context number (eg, 1685.1, 1685.2, etc), and the group drawn in situ. The pot sherds were joined where possible, analysed and recorded in the same manner as applied to the bulk of the pottery from the rest of the cutting.

Examination of the pottery has shown that there was never more than 25% of any vessel deposited in an analysed spread, often more than one vessel was found together in a spread, and artefacts other than pottery were nearly always found in such so-called 'pot spreads'. This information suggests that these 'spreads' were simply dumps of material which had become a focus of attention during the more careful excavation by trowel than elsewhere in the Deposit. What is interesting about such spreads, however, is that if no more than 25% of any vessel is represented in such a clump of debris, then the remaining 75% of the vessel has been utilised or lies elsewhere. This suggests that if the main Deposit had been made from many series of such dumps over time, then the original location of breakage was not likely to have been where the recovered sherds lay (Chapter 7). It may be that the settlement activity zone producing such deposits was composed of immediately local house middens to which broken debris was removed. Then these house middens were subsequently removed to the larger dump, which now constitutes the Deposit, and in so doing reworking broken material slightly. This would make the resultant phenomenon of only 25% or less of any vessel at any location in the main dump of no surprise.

Dating by Elaine L. Morris

This section will give an overview of the similarities between the Potterne collection and assemblages from elsewhere in southern England to date the beginning of the activity at this location, the duration of occupation, and the period of abandonment. The assemblage is discussed in two parts: Zones 14–11/10 and Zones 10/9–2, based primarily on the 'off-terrace' area. The pottery from Zone 10 alters from being statistically suitable for discussion with that from Zones 9–2 for certain variables investigated such as fabric groups, although it can be unsuitable as a result of small sample size for other variables such as vessel types or decorations; it is, therefore, discussed here with the material from Zones 9–2.

Zones 14–11

This discussion is based on a scan of the material from several contexts in Zones 11–14, and in particular 68 spits which contained featured sherds from Zone 13 ie the 'concreted layer' at the base of Cutting 12 (Chapter 3). The sample contained 1299 sherds altogether, 97 of which are rim and decorated sherds and one is part of a lug. Two sherds from earlier prehistoric vessels, one Peterborough Ware and one Beaker (Fig. 39), described above, were also recovered from this zone. As discussed elsewhere, the relatively small amount of pottery from these zones, compared to that from Zones 9–2, makes it impossible for statistical analysis to represent variation amongst the entire collection. This part of the Zone 13 pottery was not assigned to form type. Therefore, this material, and pottery from comparable levels in Cuttings 2 and 3 (Fig. 44), will be discussed separately here.

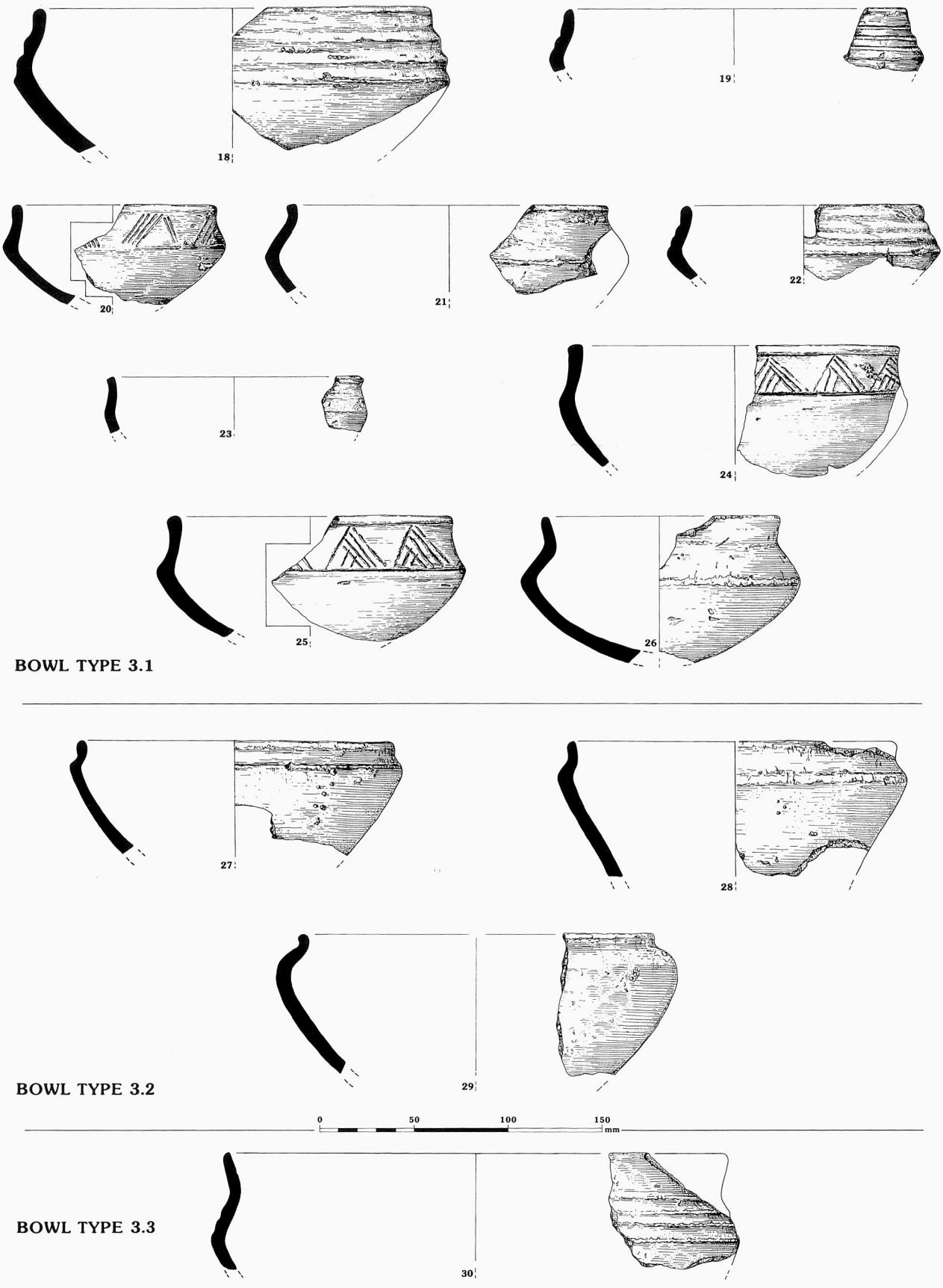


Fig. 48 Pottery: bowls types 3.1, 18-26; 3.2, 27-9; 3.3, 30. Scale 1:3

There is a variety of fabric groups identified in the pottery from Zones 14–11, including the micaceous (MC), organic-tempered (OR), calcareous (LM), grog-tempered (GG), fossil shell (FS), sandy fabrics (GS), and oolitic limestone (OL) groups (Figs 43–6). The proportions of these groups are different from those established for Zones 9–2 (discussed below), with the clear presence of the first three groups in small proportions, the relatively smaller amount of the groups which dominate the upper zones (ie, the sandy and oolitic fabrics) and also the considerable proportions of the flint and fossil shell fabrics.

The significant presence of so many fabric groups is a characteristic of later Bronze Age assemblages in Wiltshire and Hampshire, particularly those dated to the plain ware phase. For example, the pottery from phase 2 at Old Down Farm consists of mainly sandy fabrics, but there are also flint, shell, and non-local oolitic limestone-gritted fabrics (Davies 1981, fig. 8). Although this material has been published as *c.* 8th century BC in date, the author has suggested that this was a conservative interpretation which now would be better allocated an earlier date of 10th–9th centuries BC (Davies, pers. comm.). A substantial assemblage of pottery from a single feature at Norton Bavant Borrow Pit near Warminster, Wiltshire, contained a similar broad range of pottery fabrics to that found in these zones at Potterne including a non-local, oolitic limestone-gritted fabric which made up 3% of the assemblage (Mepham and Morris 1992, 18–9, table 2). Outside this area, it is much more common to find a single major fabric group dominating plain ware assemblages, as at Brean Down, Somerset (Woodward, 1990, 140) and Runnymede Bridge (Longley 1980, 40).

A selection of pottery from these zones in Cutting 12 has been illustrated (Figs 61–2, 137–63) and a number of decorated pieces from Cuttings 2 (Fig. 62, 164–8). The main forms which characterise this assemblage are thick-walled and either straight-sided (Fig. 62, 148) or barrel-shaped vessels (Fig. 62, 158, 164), incurved or hooked rim jars (Fig. 61, 144; Fig. 62, 155), simple ovoid jars (Fig. 61, 127, 132, 145, 146; Fig. 62, 147, 150), shouldered jars (Fig. 61, 141; Fig. 62, 162, 163), slack-shouldered jars (Fig. 62, 157), and flat-topped bowls (Fig. 61, 138; Fig. 62, 160). Forms which have not been illustrated include vessels with an external burr and several bevel-edged vessels. The flat-topped bowl and the shouldered jar are types which were also identified in the collection from Zones 9–2 (Types 11 and 51 respectively).

The straight-sided and barrel-shaped vessels are reminiscent of Middle Bronze Age urns and are similar to examples found on the Marlborough Downs site at Bishops Cannings Down (Tomalin 1992, fig. 56). The most common vessel form in Zone 13 is the hook-rim jar, also found, for example, at Aldermaston Wharf (Bradley, *et al.* 1980, fig. 11, 6; fig. 12, 11–12). These two main forms are known to occur as early as the 12th–11th centuries BC at Itford Hill, Sussex (Burstow and Holleyman 1957) and South Cadbury, Somerset (Barrett 1975, 103), but also continued to have been made from the 10th to 8th centuries BC.

The simple ovoid, barrel-shaped jar was also found in Zones 9–2. It is a basic closed shape that was used not only in the later Bronze Age (Woodward 1990, fig. 93, 75) but also in the Iron Age (Cunnington 1923, pl. 29, 9; Cunliffe 1984, fig. 6.67). The slack-shouldered jars can be large or small forms and these occur in a variety of mainly coarser fabrics, including one example in the granite-tempered fabric (FT 01).

The presence of one lug in these lower zones is not unusual. Two were recovered in the plain assemblage phase at Lofts Farm, Essex, dated to the 10th–9th centuries BC (Brown 1988, fig. 14, 15, 25). One rim sherd has a single perforation which was created prior to firing and therefore is likely to indicate that the vessel was meant to have been suspended by rope or cord (Fig. 61, 133).

An additional 13 sherds from Zone 10 have been illustrated (Fig. 61, 124–136) to provide a range of types, deposited at some time after Zones 14–11, for comparison. This collection contains a carinated bowl (Fig. 61, 134) and a furrowed vessel (Fig. 61, 126), types which are not found in the earlier zones.

Twenty-two sherds among the 1299 examined are decorated (1.6%). The most common form of decoration is finger-tipping (82%) which occurs either on the top rim edge of barrel-shaped (Fig. 62, 158, 164) or straight-sided vessels (Fig. 62, 151, 156) or on the shoulder area of shouldered jars (Fig. 62, 166). This type of decoration is also found on applied strips (Fig. 62, 167, 168). Other examples of decoration present include one rim sherd with a finger-nail impression on the vessel wall (Fig. 62, 148), thick applied or raised cordons (Fig. 62, 165), four sherds with unpatterned incised lines and one sherd with a tooled chevron design (not illustrated). The tooled technique, actually a very shallow, burnish-like technique, may well explain the recording of furrowed motifs (Motif 6.3) on sherds identified from the general part of Zones 14–12 (details in archive).

The finger-tip or finger-nail designs always appear on coarsely-gritted jars, Barrett's Class I vessels (Barrett 1980, 302–3). The two other techniques, the incised and tooled designs, were found on vessels made from finer fabrics.

There are no examples of red-finished, or 'haematite-coated', sherds in Zones 14–11 or in the early deposits of Cuttings 2 and 3. Burnishing and wiping are present in these zones, and the former is usually identified on open forms (Fig. 61, 138; Fig. 62, 162).

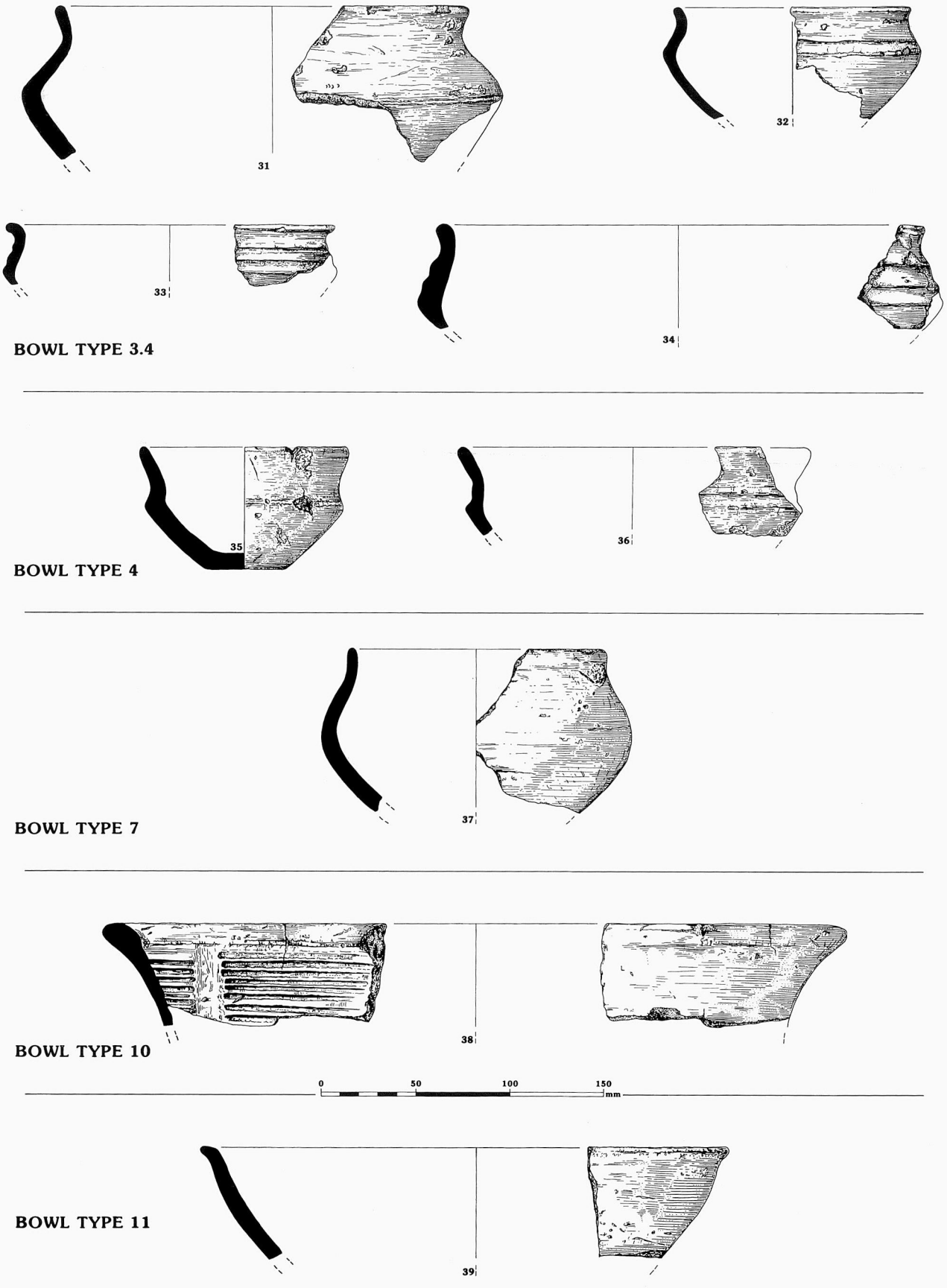


Fig. 49 Pottery: bowls types 3.4, 31-4; 4, 35-6; 7, 37; 10, 38; 11, 39. Scale 1:3

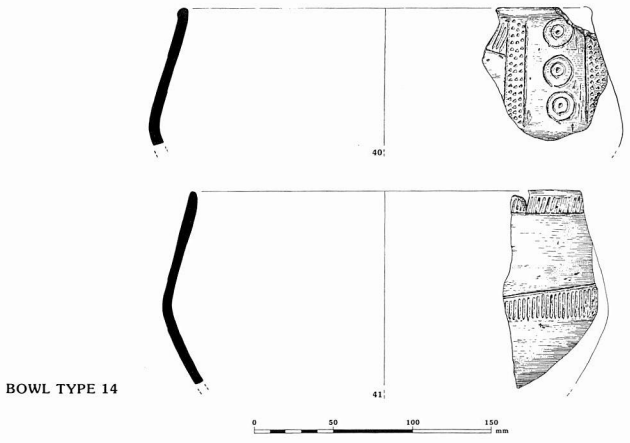


Fig. 50 Pottery: bowl type 14, 40-1. Scale 1:3

The range of forms and decoration recovered from Zones 14–11 in Cutting 12 and from adjacent levels in Cuttings 2, 3, and 10 are typical of the plain assemblage phase of the later Bronze Age or post-Deverel-Rimbury ceramic tradition as defined by Barrett (1980). The proportion of decoration is very small, the vessel forms of jars and bowls and the variety of fabrics would normally be taken to indicate a date from the 10th–9th centuries BC, or later. However, there is no reason why we should not allow the dating of evidence from Potterne to speak for itself, albeit that it is rather meagre and suggest a slightly earlier date, commencing before 1100 BC for the initiation of the accumulation. The continuation of the deposition of this material is likely to have been contemporary with that at Brean Down Unit 4, South Cadbury 4, Old Down Farm phase 2, Aldermaston Wharf and Knight's Farm 1, and Runnymede Bridge.

Two additional aspects of some interest are the presence of the fossil shell fabric group in significant quantities in this early part of the Deposit and the presence of the grog-tempered fabric with thick-walled vessels. The former is a fabric group recognised amongst the Bishops Cannings Down pottery from the Marlborough Downs excavations where the pottery has been dated to the Middle Bronze Age or Deverel-Rimbury tradition (Tomalin 1992). Either this represents the continuation of an archaic ceramic tradition into the later Bronze Age or, more likely, the presence of a significant Middle Bronze Age component amongst the assemblage from the lowest levels of the Deposit, the lowest levels thus witnessing the transition from the conventional Middle Bronze Age to the Late Bronze Age.

The use of the granite-tempered fabric, FT01, for a small slack-shouldered, necked jar with flat-topped rim recovered from Zone 13 is interesting since a granite rock quern was also found at this level in the Deposit. The presence of organic matter in both finer and sandier fabrics (FT22 and FT64) in forms which can be difficult to define (Fig. 62, 154, 155, 160, 161) is also characteristic of these early zones.

Zones 10/9–2

The Potterne assemblage from Zones 10/9–2 'off-terrace' displays a wide range of forms within the broad groups of bowls, jars and cups which characterise the decorated phase of later Bronze Age in lowland England (cf Barrett 1980). These include round-bodied, carinated and shouldered jars and biconical, shouldered, carinated, long-necked, and conical bowls, many of which are decorated. Cups and miniature vessels were also identified. No examples of round-bodied, necked bowls were found during the general excavation or the analysis of the pottery.

As expected, fine vessels manufactured from mainly sandy fabrics, which include fabrics with fine, sparse flint or ooliths, comprise the various bowl types, short-necked and carinated bowls, biconical bowls, high-shouldered bowls, and the long-necked, carinated bowls. These are often decorated with furrowed or incised designs, the latter bearing a wide range of motifs. Bowls are often covered with surface treatments, mainly burnishing but an impressive proportion bear the red-finished technique of so-called 'haematite-coating'. Assessment of the frequency and significance of these bowls generally and of specific types (Fig. 45) has shown that bowls are present throughout these zones and become more frequent by Zones 5–2 at the expense of jar forms (Fig. 46). Jars are very numerous in Zones 10–9 (77% 'off-terrace') and less frequent by Zones 5–2 (26–46%). A ratio of *c.* 4:1 (jars to bowls) in the lower zones is the expected assemblage for the decorated phase of the later Bronze Age (Barrett 1980, fig. 4). What is significant at Potterne is the significant change in this ratio in the later zones which seems to suggests that there is a very marked development through time within these levels of the Deposit. A functional difference or localised trend in this part of the Deposit cannot be ruled out.

Carinated and biconical bowls are well-known in deposits dating from the 8th to 7th centuries BC, such as Petters Sports Field (O'Connell 1986), as well as much of the occupation at All Cannings Cross (Cunnington 1923) and Budbury (Wainwright 1970). At Potterne, biconical bowls peak in frequency of bowl groups at Zone 7 and long-necked bowls at Zones 4–3; carinated bowls are relatively common thoughout Zones 9–2.

Chronological indicators which are entirely missing from the range of bowls which might have been expected in this very large assemblage are round-bodied bowls generally and the 'haematite-coated, scratched-cordoned ware' bowl specifically (Cunliffe 1984, 254, fig. 6.22). The latter is a very distinctive, decorated type now dated to the 5th to mid-4th centuries at Danebury (Cunliffe 1995, 17–8), a site located 20 km east of the likely area of production near Salisbury; Potterne is located 30 km north-west of the source. This very distinctive fineware type is known to occur up to 40 km from this source; it was present, for

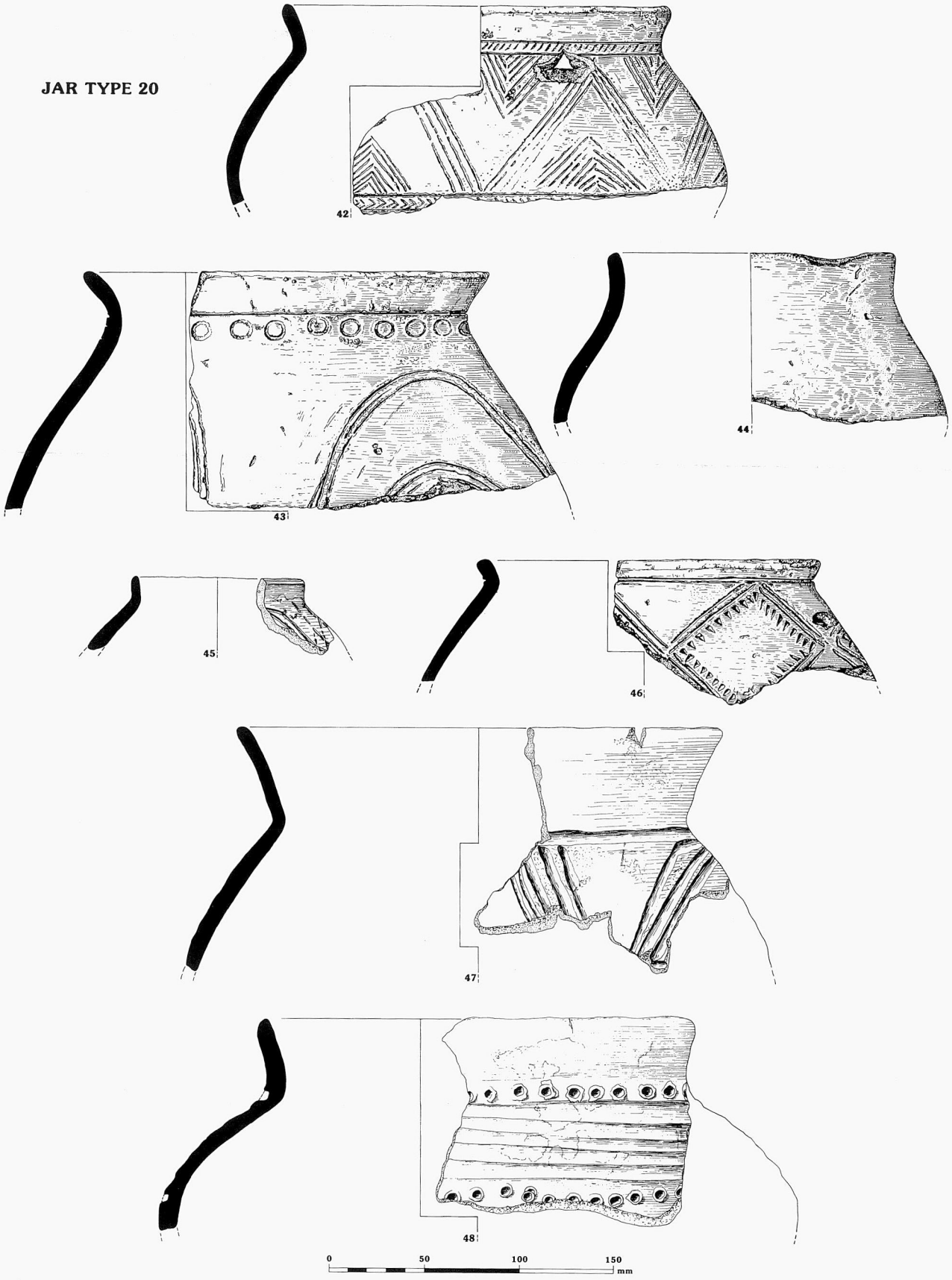


Fig. 51 Pottery: jar type 20, 42-8. Scale 1:3

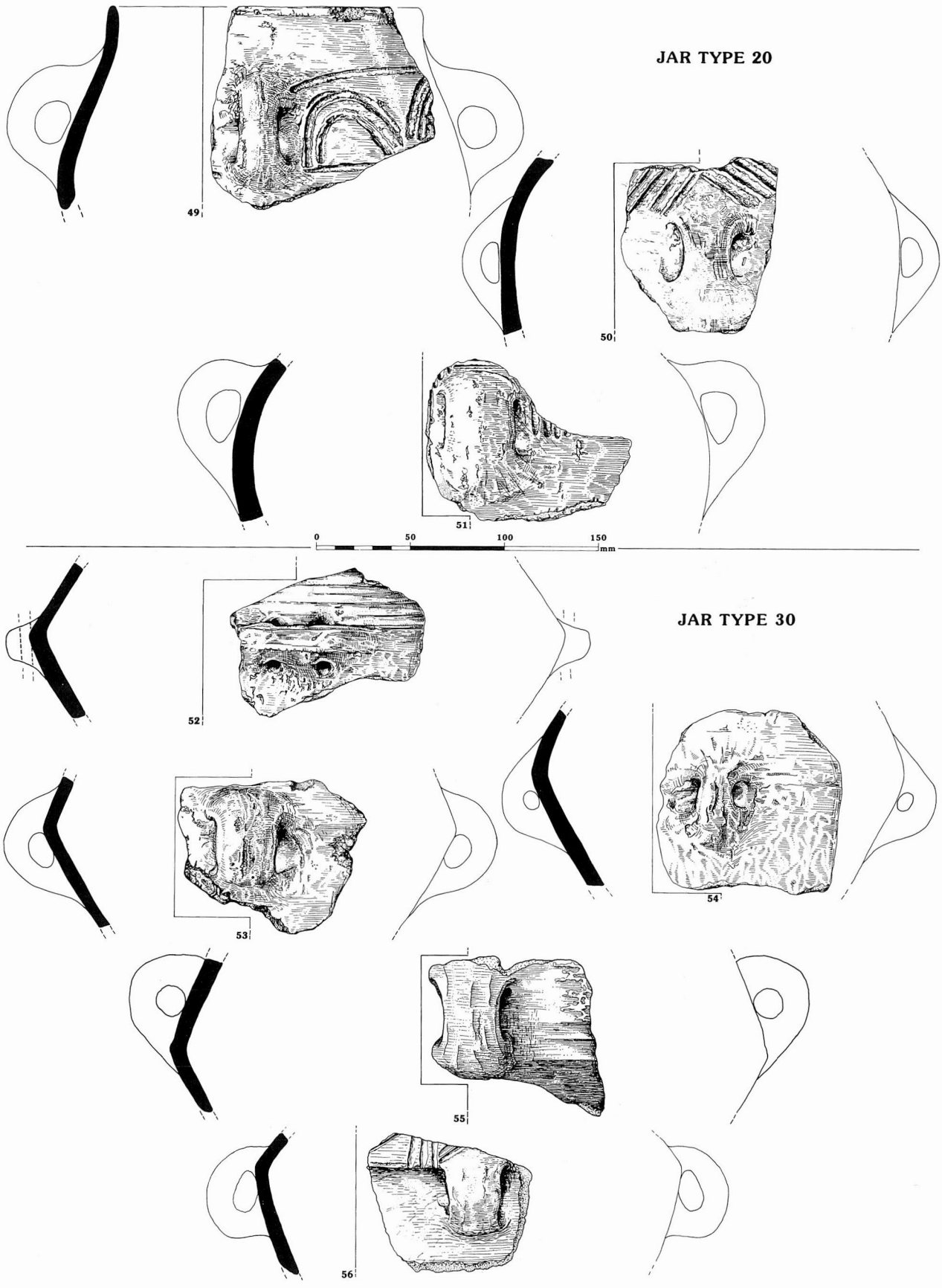


Fig. 52 Pottery: jar types 20, 49-51; 30, 52-6. Scale 1:3

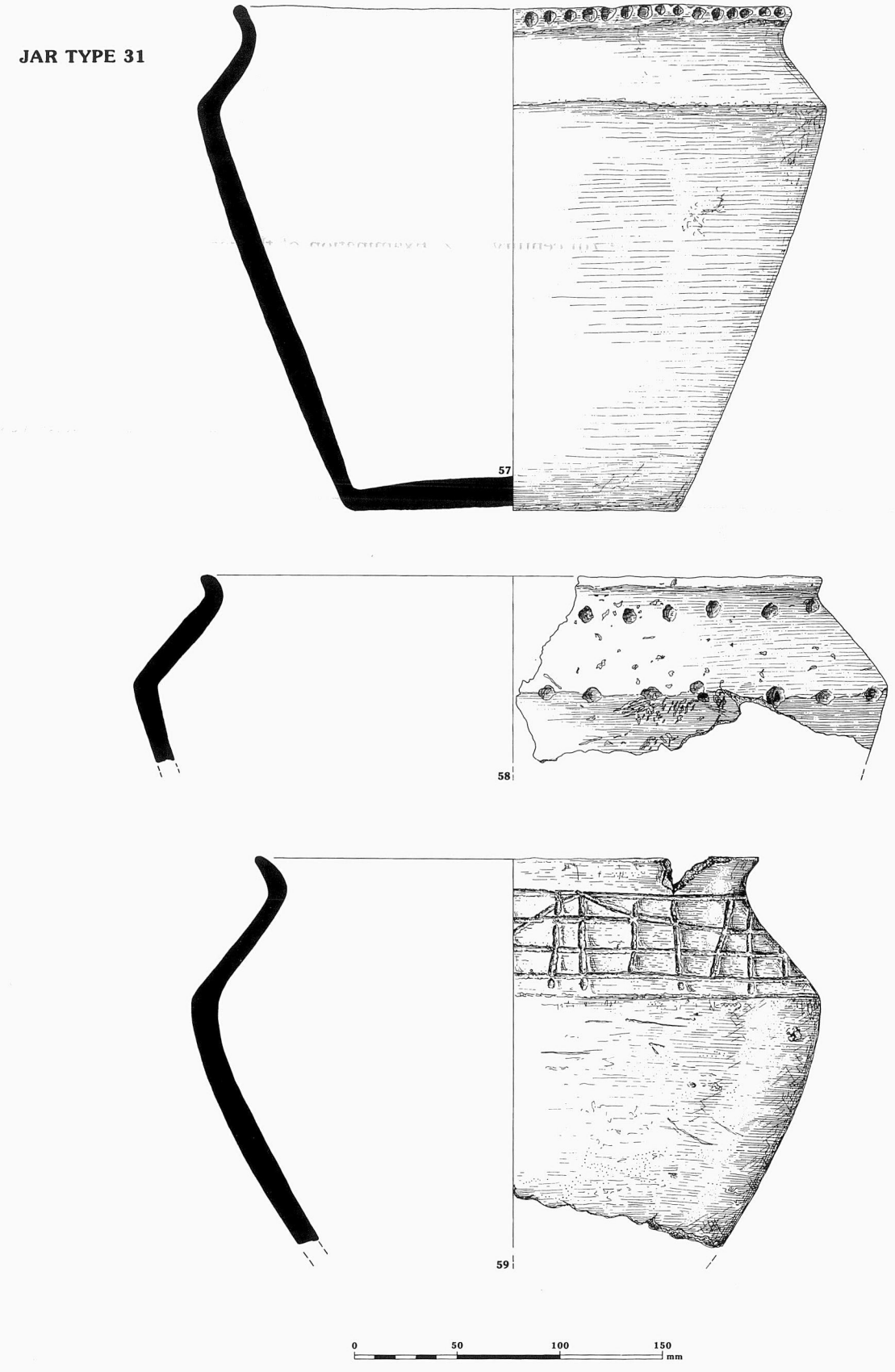


Fig. 53 Pottery: jar type 31, 57-9. Scale 3:1

example, at All Cannings Cross (Cunnington 1923, pl. 28, 2–4; pl. 33, 1–6, 8) and Yarnbury, Wiltshire (Cunnington 1933, pl. 14, 1, 2). The absence of even a single sherd of this type in the large assemblage at Potterne, which lies well within the known area of distribution, indicates that the Potterne assemblage represents activity prior to the 5th century BC and it is very likely that due to the absence of round-bodied bowls generally the final prehistoric deposition at Potterne occurred at sometime within the 7th century BC. Chadwick Hawkes (1994, 58) has suggested that long-necked, round-bodied bowls found at Longbridge Deverill Cow Down, Wiltshire, in association with plain and decorated carinated bowls (*ibid.*, 58; fig. 5, 1–12, 14, 15) are likely to be contemporary with, or earlier than, ceramic phases 1–3 at Danebury. Thus plain round-bodied bowls would not be out of place in the 5th century BC or earlier if a case could be made for the plain forms occurring prior to the scratch-cordoned decorated forms. There is some evidence that these plain forms may have been produced towards the end of the 7th century BC onwards. Plain and decorated, round-bodied bowls appear in the later Early Iron Age in Berkshire and Oxfordshire (Cunliffe 1991, A10–11).

From the assemblage of bowls, therefore, it appears that the pottery from Zones 10/9–2 is most similar to the 8th–7th century BC style known as the Early All Cannings Cross group (Cunliffe 1991, 64–5, fig. A:2). It is clearly not part of the Later All Cannings Cross–Meon Hill style of the 6th–5th centuries BC (*ibid.*, 38–40, fig. A:6) and with recent revisions into the 4th century BC (Cunliffe 1995, 17–18). It is tempting to suggest that the pottery from Zones 10–6 may represent 8th century activity and that from Zones 5–2 represents 7th century material. The reduction in frequency of biconical bowls at about Zone 7 and the increase in frequency of long-necked bowls by Zones 4–3 together support this view. This interpretation can be accommodated within the results from the radiocarbon dated samples (Chapter 4).

There is also a change in the frequency of jar forms throughout Zones 9–2. Shouldered jars dominate the jar groups throughout Zones 9–2, but the significant appearance of carinated jars in Zones 7–3 and narrow-mouthed jars in Zones 6–2 affected this proportion. As such, jars are less diagnostic of specific ceramic phases than the bowls discussed above. In southern Britain, shouldered jars occur from the 10th century BC onwards. These may be decorated with finger-tip or nail motifs and applied or raised cordons, and with the more complex incised and impressed motifs by the 8th century BC (Barrett 1976, 105–6; 1980, 306–9; Cunliffe 1991, 61–5). Decorated round-shouldered jars clearly belong to the Early All Cannings Cross style (Cunliffe 1991, fig. A:2). Carinated jar forms appear to occur in the later part of this style period from the 7th–6th centuries BC, but there is the possibility that clearly tripartite, carinated vessels may have marked the start of this more decorated and varied jar tradition from the 9th century BC (Alcock 1980, 689, fig. 13). At Potterne, the tripartite jar form (Type 32) first occurs in Zone 7 ('off-terrace') while slightly carinated jars (Type 33) appear from Zone 9 upwards.

The jars, therefore, are less specific in date range than the bowls, but do show an increase in the range of form types and decoration types utilised, as well as in the frequency of decoration from Zones 10/9 to Zone 2. Examination of the jars supports the interpretation that these zones contain pottery largely of the 8th–7th centuries BC, although an earlier start in the 10th century is possible. The jars alone cannot provide a date for the end of this sequence.

The proportion of decorated sherds in Zone 5 'off-terrace' (18%), as discussed previously, seems to be most similar to the number of decorated vessels in phase 3 (*c.* 7th century BC) at Old Down Farm (at least 19% are decorated vessels; Davies 1981, table 5, figs 15–16) and to the assemblages at Budbury (*c.* 25%) and Petters Sports Field (25%).

The overall increase in decoration is closely associated with the increase in bowls in these zones, as well as the increase in decorative types and treatments, such as white infilling which does not occur prior to Zone 9 'off-terrace' and Zone 4 'on-terrace'. It is consistent with all the previous evidence that sherds bearing red-finished, or 'haematite-coated', surfaces first appear in Zones 10–9 with a maximum frequency in Zones 4–3 'off-terrace' (3%). This increase is associated with an increase in bowls generally, in particular the increase in furrowed bowls. However, not all furrowed bowls display this surface treatment. The furrowed motif (Motif 6.3) was found in Zones 10–2 and occurred most frequently in Zone 5 'off-terrace'. A similar apex in frequency also occurred for finger-tipping (Motif 1) and nail impression (Motif 2) at Zone 5.

An examination of the proportions of fabric groups 'off-terrace' similarly demonstrates a significant change from Zone 10 to Zone 7 at which the variation becomes less dramatic. It is noticeable that the proportion of quartz sand fabrics levels off at Zone 7 and maintains an equilibrium while the proportion of oolitic limestone fabrics rapidly increases from Zone 7 replacing the fossil shell-bearing fabrics. This increase is probably associated with the increase in number of bowls which are often made from the finer, sandier oolitic limestone fabrics (discussed above). Changes in fabric groups similar to these have been noted at South Cadbury from phase 4 (calcite and shell-dominated) to phase 5 (a variety of) fabrics.

In summary, the pottery from Zone 9 to Zone 2 is most likely to date from the end of the 9th century BC into the 7th century BC, although a start as early as the 10th century is possible. The lower of these zones represents mainly 8th century deposition and the upper zones 7th century activity, while the latter seems to coincide with the Early All Cannings Cross based on a reduction in the number of jars and an increase

in frequency of bowls and 'haematite-coating' (Cunliffe 1991, 65). The upper zones were clearly deposited at a time contemporary with the earlier activity at the settlement of All Cannings Cross, the later phase at Rams Hill and undoubtedly much of the occupation at Budbury hillfort.

Summary, by Elaine L. Morris

The assemblage

The pottery assemblage as a whole is remarkably uniform in the range of forms present throughout the Deposit, being basically a jar and bowl assemblage, with cups forming only a very minor component. It is quite clear, however, that there were significant changes in fabric technologies with changes from coarse grained to fine grained recipes, and it may be that the desire to create more fineware bowls encouraged experimentation with different fabric recipes and the manufacture of carinated thin-walled and hemispherical bowls with different firing requirements, ie, whether red or black was required. There was an associated increase in frequency and variety of decoration, the range of motifs increasing along with the increase in the frequency of bowls, but with similar motifs, whether created by incising or furrowing for example, being found on both fineware jars and fineware bowls. This change did not develop at the expense of early motifs, finger impressed motifs on the shoulder and rim of jars being found throughout the Deposit.

The lowest excavated levels of the Deposit, represented by the disturbed Greensand and the zones immediately above it (Zones 14–11), is characterised by a variety of fabric groups, dominated by flint and fossil shell fabrics. The minor groups include grog-tempered, organic-tempered, micaceous, sandy, oolitic limestone, and other calcareous types. The range of vessel forms, consisting predominantly of ovoid, barrel-shaped, hook-rim and straight-sided jars, with occasional shouldered jars and bowls, are only very rarely decorated with finger-tipping or cordons. Incising and tooling does occur in these early deposits, but cannot be used to characterise the assemblage. Burnishing and wiping are the only surface finishes observed. This pottery is similar to the material from Brean Down Unit 4, South Cadbury 4, Aldermaston Wharf and Knight's Farm 1, and is dated conservatively to the 11th–10th centuries BC. An earlier starting date in the 11th century BC based on the similarity of some forms, the plain and hooked rim jars to those from Itford Hill and the radiocarbon dates from there and from South Cadbury (Barrett 1975, 103; Alcock 1980) could be suggested.

The pottery from Zones 10–9 upwards is different from this earlier material in many ways. Starting with these zones, there is a distinct change in the proportions and presence of many fabric groups. The grog, organic and micaceous fabrics virtually disappear, the oolitic limestone pottery has increased slightly and the decrease in the flint-gritted and fossil shell fabrics and the increase in sandy fabrics start here. Similarly, furrowed vessels (Fig. 61, 126) and carinated bowls (Fig. 61, 134) as well as red-finished ('haematite-coated') vessels first occur in these zones. These changes signify the developments which lead into the depositional levels, Zones 9–7, where shouldered and carinated jars dominated the assemblage with some biconical and carinated bowls, decoration becomes slightly more common with incised and furrowed vessels present, and red-finished surfaces are recognised on both jars and bowls. White-infilling of incised designs did occur at this level but were so infrequent that this attribute cannot be used to characterise this ceramic phase. The pottery generally is most similar to that from Runnymede Bridge, Wallingford and the later phase at Rams Hill, dated to the 9th–8th centuries BC. This data accords well with the radiocarbon dates obtained from Zone 7.

Zones 6–2 are characterised by a significant increase in the proportion of bowls and especially the appearance of long-necked carinated types, the introduction of narrow-mouthed, round-bodied jars, an increase in decoration particularly incised motifs with white-infilling and furrowed examples, as well as the continued use of red-finishing on bowls. This pottery is similar to that from Old Down Farm phase 3, Petters Sports Field, Budbury, and much of the occupation at All Cannings Cross, and is dated to the 8th–7th centuries BC. A decrease solely in the frequency of decoration marks out Zones 2–3 as witnessing a ceramic change during this period.

Activity at this part of the Potterne site appears to have ceased prior to the 6th/5th century BC on the basis of the absence of any sherds of scratched-cordoned ware bowls.

Exchange and production

Pottery production was likely to have been a very locally-based system during the earlier occupation at Potterne with only a very small amount of non-local material being used, which is a similar system to that identified in the phase 2 features at Old Down Farm. In the lower part of the Deposit, as represented by the 1984 'off-terrace' Zones 14–10, eight different fabric groups are represented, with at least 95% of the pottery being made from local raw material resources. However, from Zones 9–2, the percentage of non-local pottery increases gradually from 5% to 16%, and must have been acquired through a trading system. This gradually changed during the period represented by the upper part of the Deposit. By Zone 3, nearly 20% of the pottery is non-local material having been produced from clays and inclusions occurring over 15 km distant from the site.

The increase in use of non-local wares from sources, presumably pottery-making settlements, located to the west and north west of Potterne at this

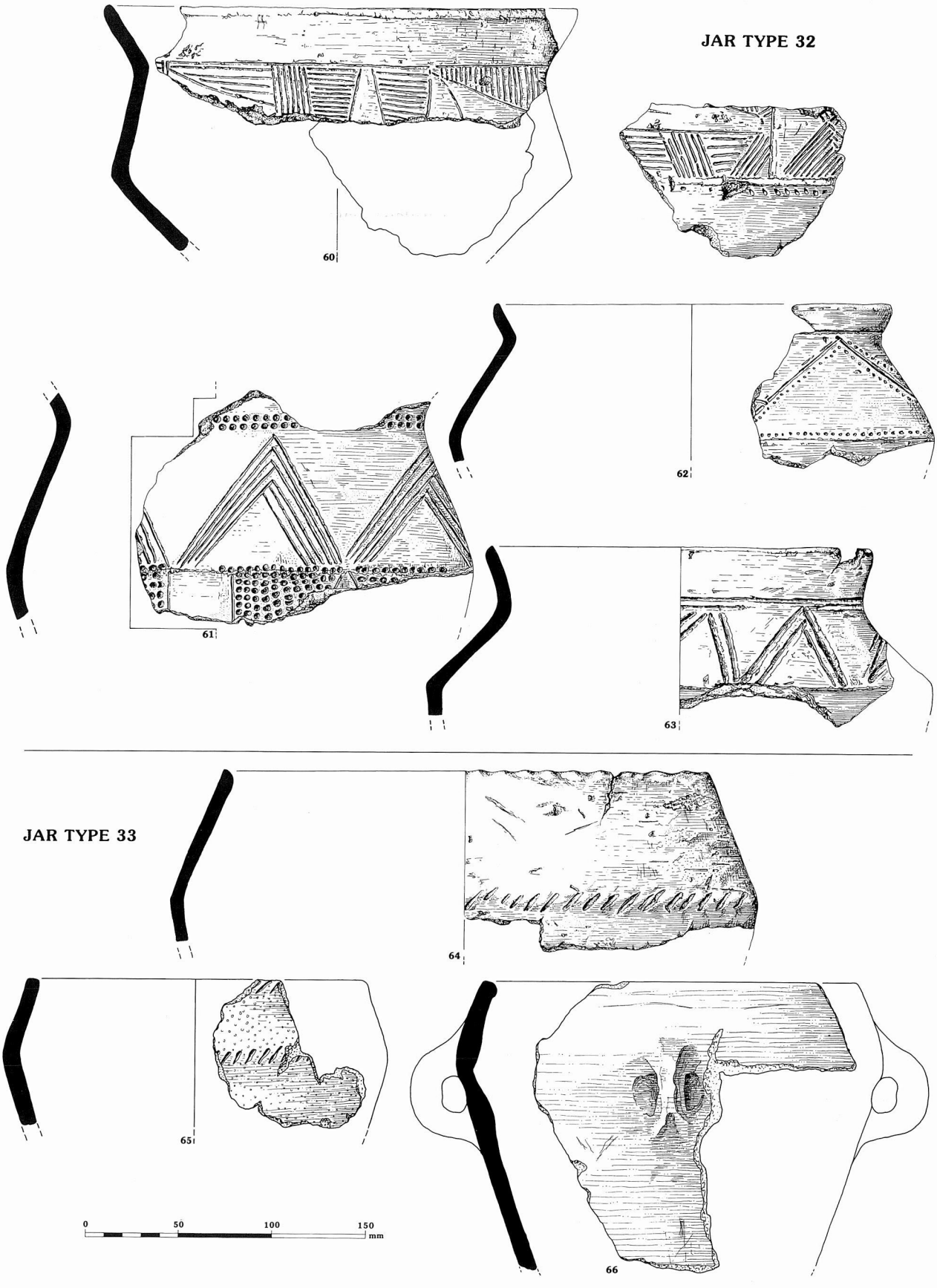


Fig. 54 Pottery: jar types 32, 60-3; 33, 64-6. Scale 1:3

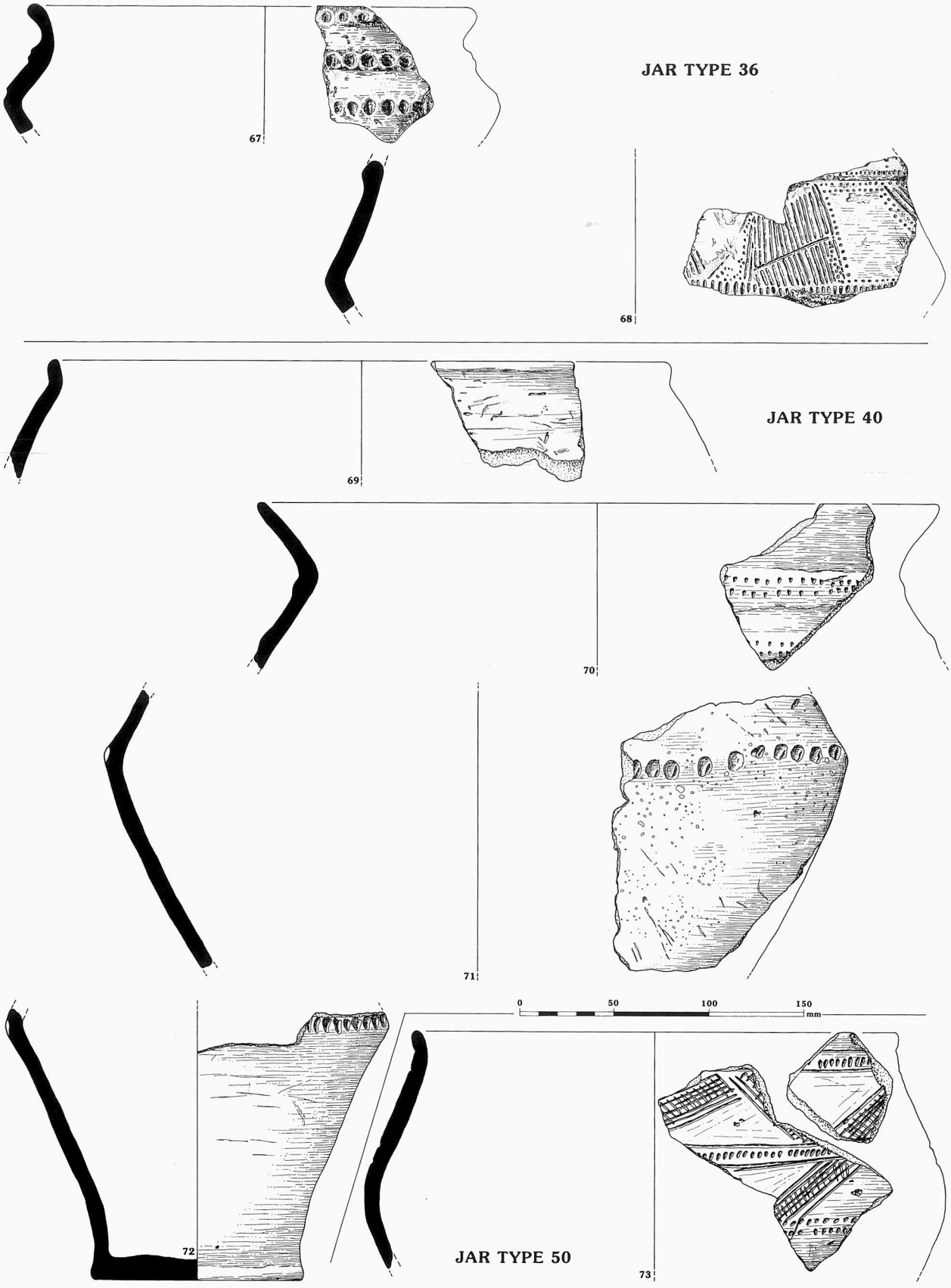


Fig. 55 Pottery: jar types 36, 67, 68; 40, 69-72; 50, 73. Scale 1:3

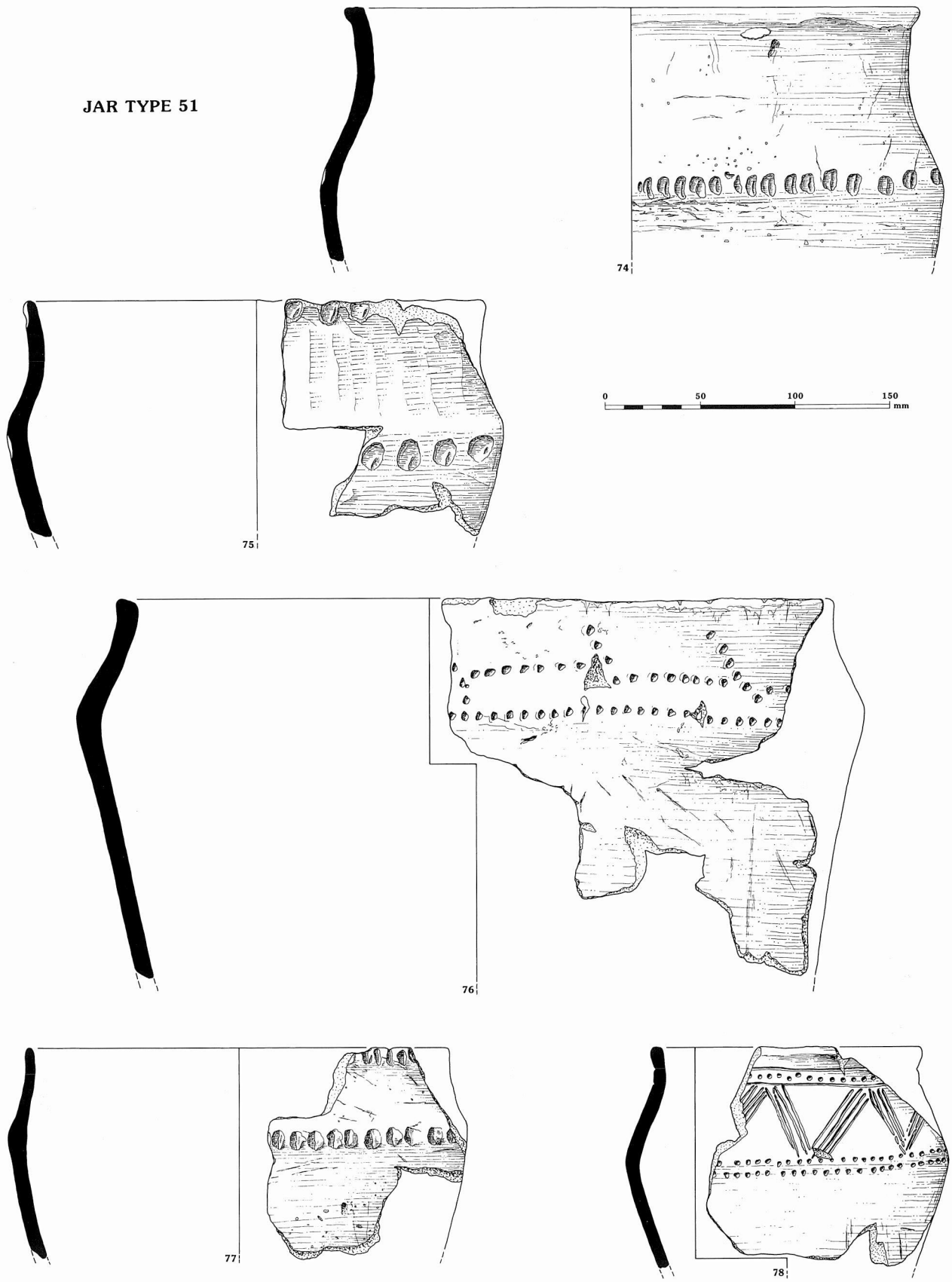


Fig.56 Pottery: jar type 51, 74-8. Scale 1:3

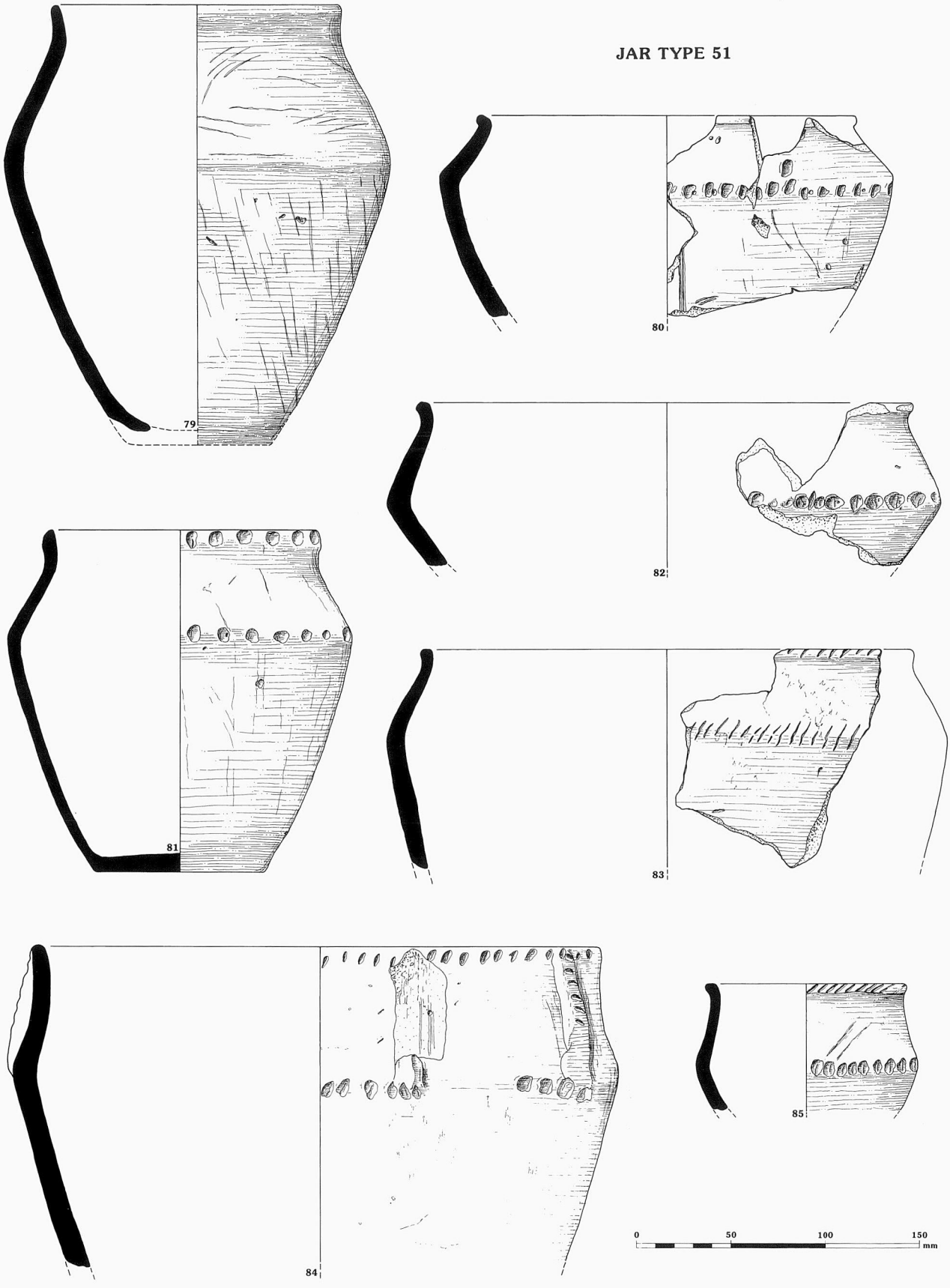


Fig. 57 Pottery: jar type 51, 79-85. Scale 1:3

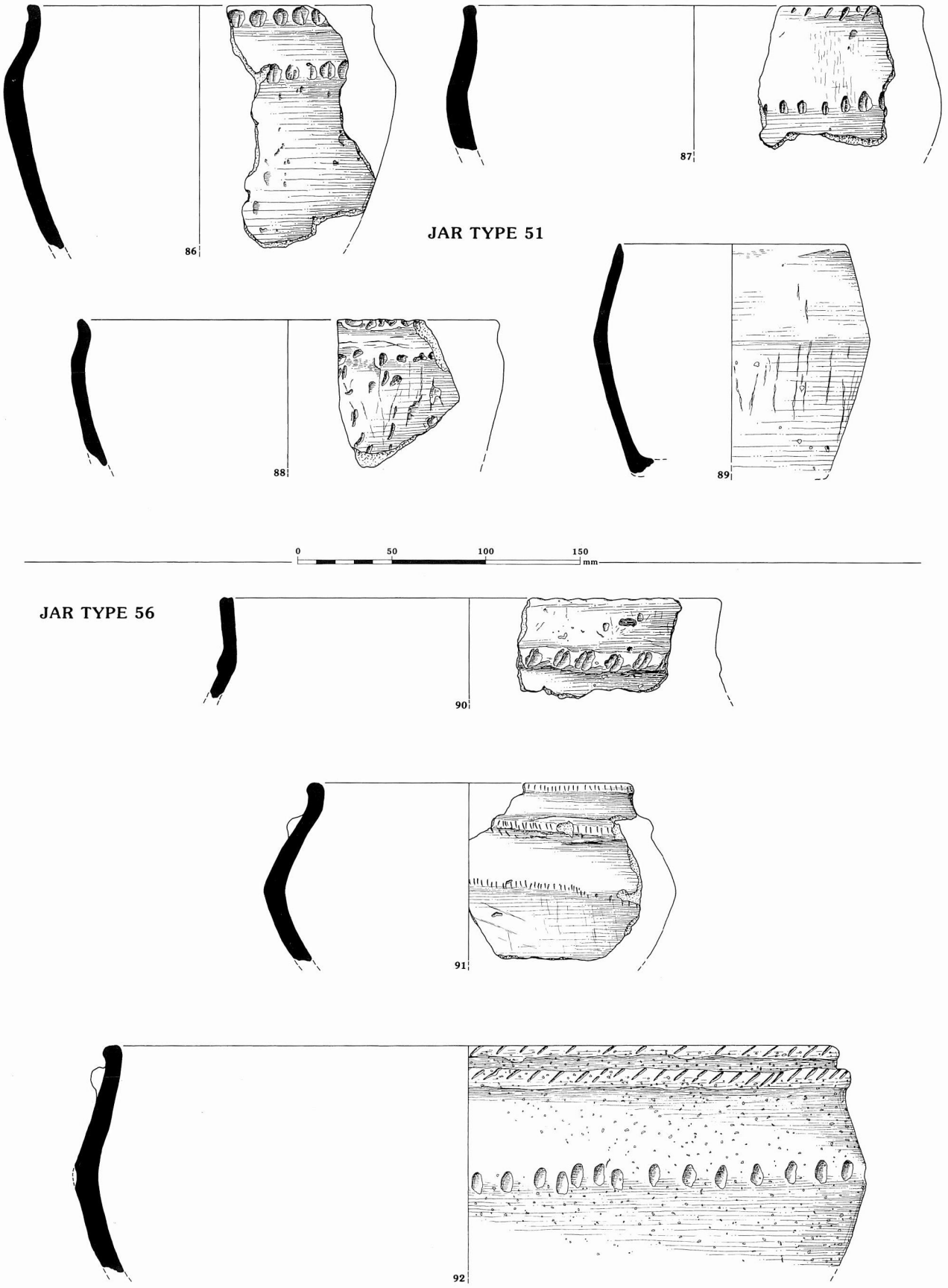


Fig. 58 Pottery: jar types 51, 86-9; 56, 90-2. Scale 1:3

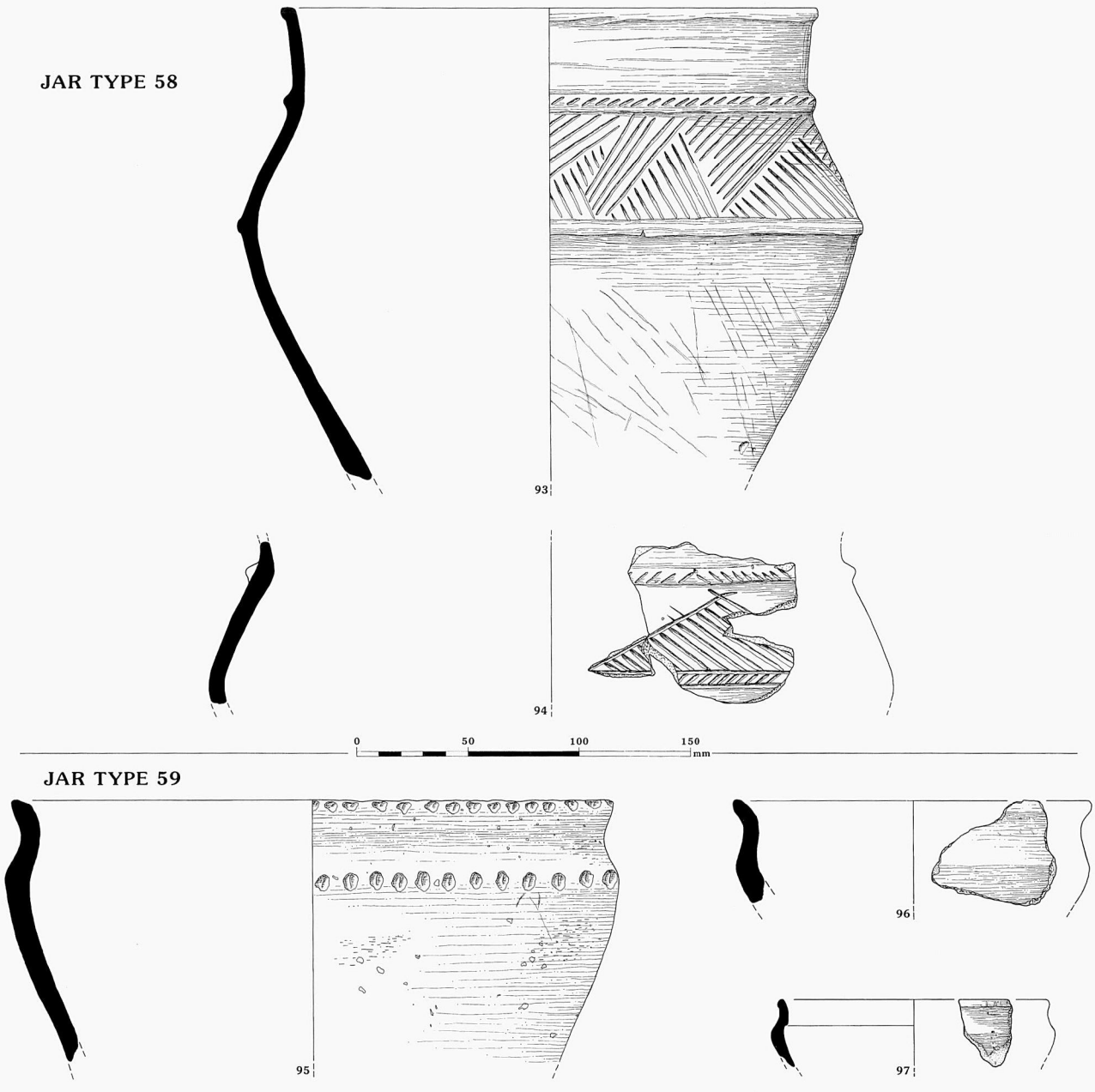


Fig. 59 Pottery: jar types 58, 93, 94; 59, 95-7. Scale 1:3

time demonstrates that the occupants of this site were linked to the Bristol Avon valley trading networks. We know that this network may well have included the Warminster area (cf. Mepham and Morris 1992). Since Potterne is located at the eastern edge of this vale, it would be important for future provenance studies to determine whether the trade in pottery vessels was one-way only.

The vessel forms and decorations of these non-local products, however, are surprisingly similar to those being produced locally. It is suggested that this may be a form of artificial exchange organised to articulate the social and political system, an insurance policy which has been referred to as 'social storage' (Halstead and O'Shea 1982). This kind of pottery exchange, when adequate resources for the production of similar artefacts are available locally, has been noted for prehistoric groups as far apart as the later 1st millennium BC in the Severn Valley Basin and southern Britain (Morris 1994) and Papua New Guinea (Gosden 1989). A picture of regular feasts where the success of the production system is celebrated, or where food is either redistributed or given as gifts (prestation) to neighbours in the valley network and where marriage partners are negotiated and alliances acknowledged can be imagined easily.

It is not possible at present to determine whether pottery was actually made at Potterne, as evidence for pottery production has not been identified within the Deposit. Pottery production during this period did not

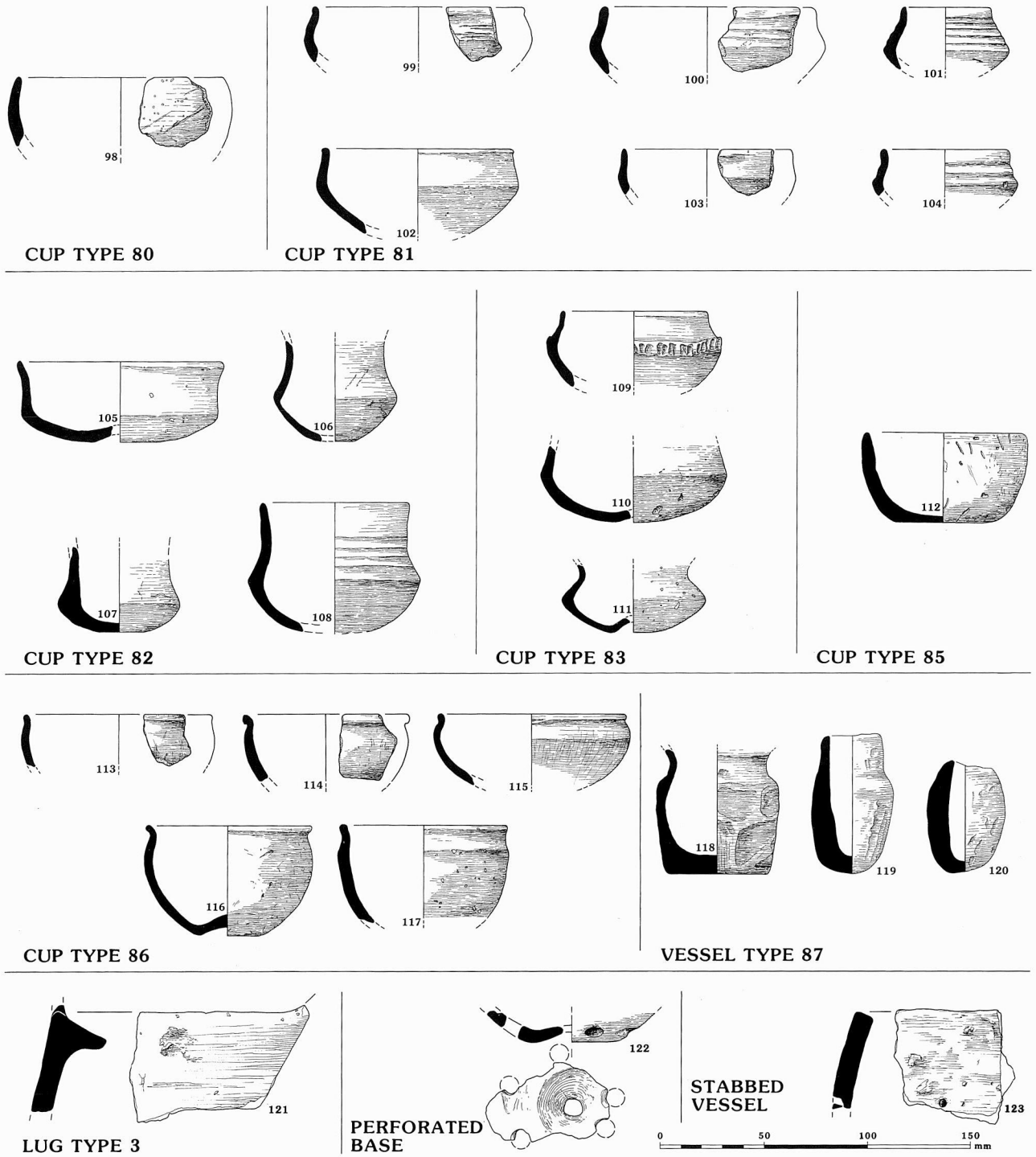


Fig. 60 Pottery: cups types 80, 98; 81, 99-104; 82, 105-8; 83, 109-111; 85, 112; 86, 113-7; 87, 118-120: lug type 3, 121; perforated base, 122: stabbed vessel, 123. Scale 1:3

result in specific features, or the occurrence of frequent failures which could be identified in the archaeological record. Nevertheless, the presence of a high density of ash in the Deposit from the burning of straw and dung may have been due to pottery production.

Use and discard

Jars, used for storage and cooking, appear to have been used relatively consistently during the centuries of activity represented by the Deposit, while bowls, commonly accepted as vessels for preparing or serving foodstuffs, increase in frequency over time. If we assume that the Deposit accumulated at a fairly constant rate, then the change with time of the relative proportions of jars and bowls can be gauged from Figure 46.

The incomplete nature of any pottery vessel identified within trowelled columns, including those recorded in details as 'pot spreads', indicates that no

Table 26: Illustrated pottery by form
(* = 'sherd group' context number)

Form	*Illus No.*	*Featured sherd no.*	*Context*	*Column/ cutting*	*Zone*	*Terrace location*	*Fabric*
Bowl type 1	Fig. 47, 1	628	2117	94	7	'OFF'	74
	2	652	1285	135	2	'ON'	71
	3	713	1972	55	6	'OFF'	62
	4	651	1271/ 1421/ 1297	144/ 144/ 140	2/ 3/ 2	'ON'/ 'ON'/ 'ON'	62
	5	171	127	Cut 3	-	-	61
	6	622	1395	145	3	'ON'	67
	7	612	1387	129	3	'ON'	62
	8	8102	2006	26	6	'OFF'	67
	9	3517	1387	84	3	'OFF'	62
	10	180	201	Cut 3	-	-	62
	11	620	1379/1781	130/33	3/5	INT/'OFF'	62
Bowl type 2	12	653	1820	27	5	'OFF'	62
	13	949	*1698	27	4-5	'OFF'	62
	14	649	1908	3	6	'OFF'	74
	15	4686	1370	104	3	'OFF'	62
	16	7596	1829	21	5	'OFF'	62
	17	703	94	Cut 2	-	'OFF'	62
Bowl type 3.1	Fig. 48, 18	697	1379	130	3	INT	62
	19	1118	2636	7	8	'OFF'	62
	20	604	1143	134	1	'ON'	62
	21	7039	1631	144	4	'ON'	46
	22	710	2005/2014	86/88	6/6	'OFF'	62
	23	1238	2544	8	9	'OFF'	62
	24	121	55	Cut 3	-	-	61
	25	642	1395/1462	145/139	3/3	'ON'	62
	26	619	1392	49	3	'OFF'	62
Bowl type 3.2	27	129	86	Cut 3	-	-	62
	28	6191	2345	124	8	'OFF'	64
	29	131	156	Cut 3	-	-	42
Bowl type 3.3	30	618	1829	21	5	'OFF'	62
	Fig. 49, 31	133	202	Cut 3	-	-	62
	32	721	1526	124	4	'OFF'	62
	33	687	1647	106	4	'ON'	62
	34	773	1143/1286	134/133	1/2	'ON'/'ON'	61
Bowl type 4	35	645	1818	60	5	'OFF'	34
	36	608	1989	63	6	'OFF'	62
Bowl type 7	37	621	1566	7	4	'OFF'	52
Bowl type 10	38	647	2042/1752	128/69	6/5		62
Bowl type 11	39	635	2746	111	10	'OFF'	62
Bowl type 14	Fig. 50, 40	140	12	topsoil	-	-	62
	41	134	57	Cut 3	-	-	62
Jar type 20	Fig. 51, 42	654	1961/1966/ 1999/2000/ 2008	37/36/38/ 23/70	6	'OFF'	62
	43	662	1773/1921/ 2010	7/67/98	5/6/6	'OFF'	62
	44	835	1754/1756	7/13	5	'OFF'	62
	45	7598	1829	21	5	'OFF'	62
	46	122	12	topsoil	-	-	62
	47	7607	1829/1590	21/21	5/4	'OFF'	62
	48	694	1394	113	3	'OFF'	62
	Fig. 52, 49	646	1609	72	4	'OFF'	62
	50	144	24	Cuts 2+3	-	-	62
	51	145	23	Cut 2	-	-	62

Table 26 continued: Illustrated pottery by form
(* = 'sherd group' context number)

Form	*Illus No.*	*Featured sherd no.*	*Context*	*Column/ cutting*	*Zone*	*Terrace location*	*Fabric*
Jar type 32	Fig. 54, 60	627/ 681	2146/2147/ 1142/2334	69/83/ 133/69	7/7/1/ 8	'OFF'/'OFF/ 'ON'/'OFF'	64
	61	934	1404/1441/ 1596/1604	55/55/64/ 54	3/3/4/ 4	'OFF'	62
Jar type 32	62	1011	2190/2135/ 2131	17/23/93	7	'OFF'	62
	63	639	1752/1765 1780	69/68/59	5	'OFF'	64
Jar type 33	64	130/ 164	39	Cut 2	-	-	62
	65	861	1799	124	5	'OFF'	51
66	4181	1950/2110/	75/95/94 2117	6/6/7	'OFF'	62	
Jar type 36	Fig. 55, 67	125	212	Cut 2	-	-	51
68	1009	2136/1944	19/20	7/6	'OFF'	62	
Jar type 40	69	632	2034	143	6	'ON'	64
70	690	1429	117	3	'ON'	62	71
1006	1769	8	5	'OFF'	51		72
727	1643	118	4	INT	?		
Jar type 50	73	2872/ 155/179	59/127-8/ 1900	Cut 3/ Cut 3/65	-/-/6	-/-/'OFF'	62
Jar type 51	Fig. 56, 74	1029	1746	14	5	'OFF'	52
75	810	1568/1604/ 1624	52/54/63	4	'OFF'	61	
	76	941	*1622/2402	67/67	4/8	'OFF'	34
77	900	1733	17	5	'OFF'	52	78
641	1272	145	2	'ON'	62	Fig. 57, 79	
696	1608	89	4	'OFF'	62	80	
945	*1663	56	8	'OFF'	34	81	
979	1441/1596/	54/64/54/ 1624	3/4/4/ 1604/1588/	'OFF' 55/63	42 4/4		
	82	1051	1387	129	3	'ON'	62
83	8400	2151	36	7	'OFF'	62	84
658	1799/1940	124/115	5/6	'OFF'	52	85	
660	1600	129	4	'ON'	62	Fig. 58, 86	
1052	1462	139	3	'ON'	62	87	
614	2116	53	7	'OFF'	62	88	
120	30	Cut 3	-	-	62	89	
6919	2450	128	8	'ON'	62		
Jar type 56	90	174	221	Cut 3	-	-	43
	91	689	2147	83	7	'OFF'	52
	92	10882/ 638	1643/1731	118/120	4/4	INT/'OFF'	51
Jar type 58	Fig. 59, 93	688/58 (Pot No. 5)	1452/1830/ 1984/1989/ 1998	134/129/ 73/63/90	3/5/6/ 6/6/	'ON'/'ON'/ 'OFF'/ 'OFF'/ 'OFF'	62/67 Thin Section Cod PS 304
	94	718	1651/2017	139/119	4/6	'ON'/INT	65
Jar type 59	95	693	2608	57	9	'OFF'	41
96	3777	1753	86	5	'OFF'	61	97
4098	2606/s.586	88	9	'OFF'	33	Cup type80	Fig. 60, 98
4524	1725	95	5	'OFF'	52		
Cup type 81	99	6698	1456	132	3	'ON'	62
100	6595	1277	142	2	'ON'	62	
101	4540	1923	95	6	'OFF'	62	
102	648	2041	133	6	'ON'	63	
103	7407	1650	135	4	'ON'	62	
104	5755	1731	120	5	'OFF'	62	

Table 26 continued: Illustrated pottery by form
(* = 'sherd group' context number)

Form	*Illus No.*	*Featured sherd no.*	*Context*	*Column/ cutting*	*Zone*	*Terrace location*	*Fabric*
Cup type 82	105	616	2308	31	8	'OFF'	101
106	10119	1382	50	3	'OFF'	62	
107	698	160	Cut 3	-	-	67	
108	3548	1749	84	5	'OFF'	67	
Cup type 83	109	6604	2784	124	10	'OFF'	39
110	6685	2449	129	8	'ON'	38	
111	692	1435	21	3	'OFF'	62	
Cup type 85	112	630	1405	83	3	'OFF'	62
Cup type 86	113	5900	2822	119	10	INT	62
114	10884	2032	144	6	'ON'	62	
115	108	221/2789	Cut 3/ 113	-/10	-/'OFF'	62	
116	699	12	Topsoil	-	-	20	
117	7092	1627	150	4	'ON'	33	
Minature Vessel type 87	118	10399	2002	27	6	'OFF'	62
119	S.F.532	2137	92	7	'OFF'	23	
120	S.F.515	2118	111	7	'OFF'	?	Lug type 3
121	S.F.1888	1622	145	4	'ON'	18	
Perforated Base	122	S.F.435	1565	70	4	'OFF'	67
Stabbed Vessel	123	S.F.1093	2448	138	8	'ON'	42

Table 27: Illustrated pottery from Zones 10 and 11
B - burnished; W - wiped; Sm - smoothed; b - both surfaces; i - interior; e - exterior; * - sooted

Zone	*Illus. No.*	*Featured sherd no.*	*Context*	*Column*	*Terrace location*	*Fabric*	*Surface treatment*
10	Fig. 61, 124	4401	2799	88	'OFF'	63	B/b
	125	4402	2799	88	'OFF'	42	B/b
	126	4404	2799	88	'OFF'	63	B/b
	127	4146	2727	89	'OFF'	67	B/b
	128	4147	2727	89	'OFF'	20	B/b
	129	4149	2727	89	'OFF'	42	-*
	130	4150	2727	89	'OFF'	42	-
	131	4406	2799	88	'OFF'	32	W/b
	132	7770	2758	21	'OFF'	33	-*
	133	7772	2758	21	'OFF'	41	w/i
	134	8157	2769	26	'OFF'	21	B/e;Sm/i
	135	8158	2769	26	'OFF'	42	-
	136	8159	2769	26	'OFF'	63	B/b
11	137	4414	2988	88	'OFF'	42	-
	138	8987	2968	51	'OFF'	34	B/b
	139	8988/9123	2968/2966	51/52	'OFF'	44	-*
	140	9122	2966	52	'OFF'	32	W/e
	141	8471	2918	36	'OFF'	62	W/b
	142	8619	2912	37	'OFF'	38	-
	143	8621	2912	37	'OFF'	63	W/e
	144	7940	2916	22	'OFF'	32	-
	145	7941	2916	22	'OFF'	34	B/b
	146	8357	3100	27	'OFF'	32	B/b

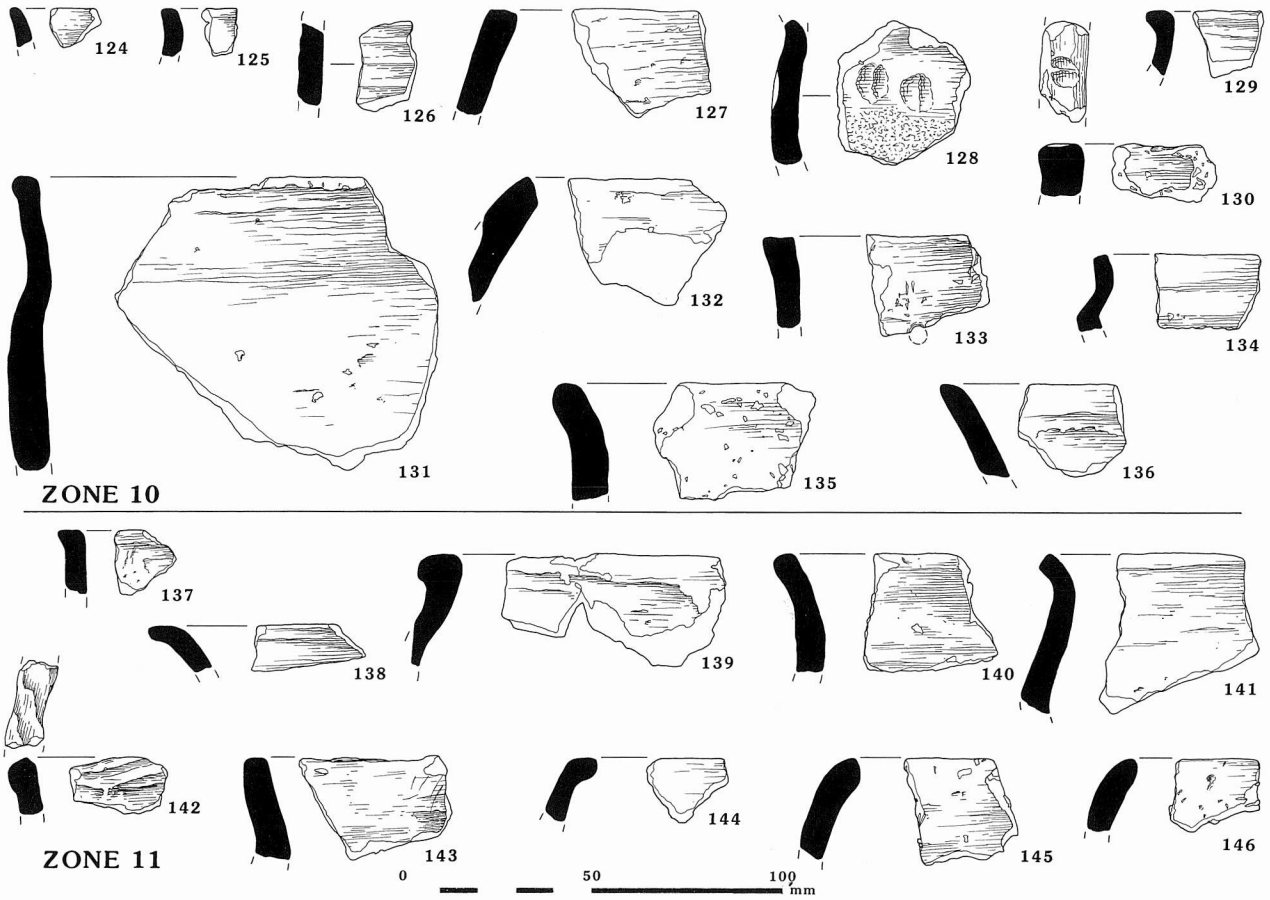


Fig. 61 Pottery: selected forms from Zones 10, 124-36; Zone 11, 137-46. Scale 1:3

whole vessels (with the exception of miniatures) were deposited at this location. This indicates that vessels were broken somewhere else and mixed with other domestic refuse before being discarded at this Deposit. It is possible that temporary middens were located near the place where the original material culture was being used and that when these became large they were removed to the eventual site of abandonment.

Romano-British Pottery, by Rachael Seager Smith

A rapid scan to establish the date and range of Romano-British pottery present identified a total of 973 sherds (6054 g). This includes *only* material from contexts listed in the archive as containing Romano-British or probable Romano-British pottery, the assemblage being too large to check every context for Romano-British sherds. Notable exceptions likely to include additional sherds of Romano-British date are all the topsoil contexts (including those forming Zone 1 of Cutting 12) and the material recovered during grave digging, none of which was examined.

The assemblage would appear to span the entire Roman period although precise dating is hampered by the small size and abraded condition of the sherds (mean sherd weight 6.2 g) and the paucity of featured sherds. However, Savernake ware, which dominated the coarseware market in this area of Wiltshire during the 1st and early 2nd centuries AD, and the presence of a few sherds of Southern and Central Gaulish samian are indicative of early Roman activity. One sherd of unprovenanced imported fineware was also identified, probably of earlier Roman date. Sandy grey coarsewares are known to have been produced in north Wiltshire from the early 2nd into the 4th century AD (Anderson 1979), and probably in other areas of the county too (Rodgers and Roddham 1991, 51). These fabrics dominate this assemblage, accounting for approximately 50% of all the sherds identified; vessel forms such as dropped flange bowls, very everted rim jars and rope-rim storage jars indicate activity into the later 3rd and 4th centuries AD. Late Roman finewares from the Oxfordshire and New Forest centres were also identified, while the only mortaria present occurred in Oxfordshire fabrics. Another common fabric was a distinctive hard-fired, fine-grained ware, wheel-made and either oxidised throughout or with oxidised surfaces and an unoxidised core. The dating and provenance of this ware are unknown but it has been noted at other sites in the county (Seager Smith 1996a; 1996b). Black Burnished ware (BB1) from the Wareham/Poole Harbour region of Dorset is poorly

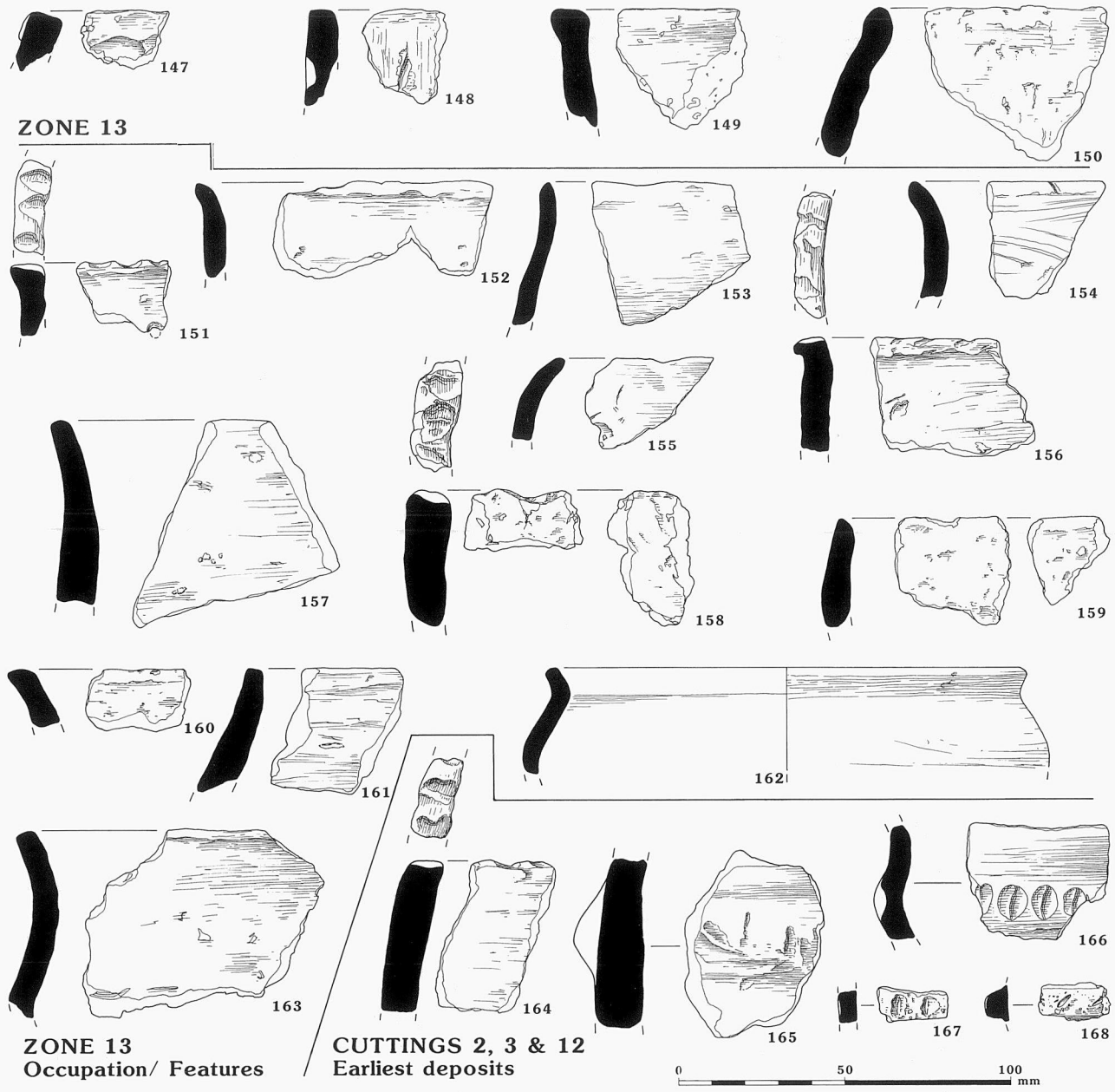


Fig. 62 Pottery: selected forms from Zone 13; 147-50; Zone 13 occupation/features, 160-3; Cuttings 2, 3 and 12 earliest deposits, 164-8. Scale !:3

represented, only 22 sherds being identified although this may be a result of the poor condition of the assemblage in general, hampering recognition among the sandy greywares in general. Most of the BB1 sherds exhibit the surface finishes characteristic of the later Roman products of this industry.

The vast majority of Romano-British sherds were found in the upper part of the Deposit and are indicative of later disturbance affecting only the top 0.3–0.4 m. Of the 280 Romano-British sherds from Cutting 12 in 1984, only a handful occurred below Zone 3 (four sherds from Zone 4, one from Zone 5, and one from Zone 8). It should also be noted that the single sherd from Zone 8 is only tentatively assigned a Roman date, being from an unusual burnished, bead-rim bowl/dish form, in an oxidised sandy fabric; the possibility of it being an 'exotic' of a prehistoric date more in keeping with the rest of that assemblage cannot be excluded. It may also be relevant that by far the majority of the 1984 sherds occurred 'off-terrace'; only one sherd being from the intermediate zone and two from the 'on-terrace' area. All three of these sherds were from Zone 2.

Post-Roman Pottery, by Lorraine Mepham

Medieval and post-medieval sherds are present amongst the overall pottery assemblage, but have not been quantified. A total of 148 contexts within the Deposit are listed as containing medieval or post-medieval sherds, the majority within Zones 2 and 3 with a small number,

Table 28: Illustrated pottery from Zone 13, Cutting 12; features and surface of concreted layer 3514, Cutting 2; lowest deposits, Cuttings 2, 3, and 10

Illust. No.	*Featured sherd no*	*Context/Cutting*	*Column/ feature*	*Terrace location*	*Fabric Type*	*Surface treatment*
Cutting 12, Zone 13						
Fig.62, 147	8623	3392	37	'OFF'	32	-
148	8924	3392	37	'OFF'	32	-
149	7946	3397	22	'OFF'	41	-**
150	8367	3394	27	'OFF'	42	-*
Cutting 2 - features and surface of concreted layer 3514						
151	9533	3522	linear 3521	-	46	-
152	9538/9537	3526	linear 3521	-	67	-*
153	9532	3522	linear 3521	-	23	-
154	9540	3529	PH3527	inter	64	-
155	9544	3548	linear 3521	-	64	-
156	9539	3528	PH 3527	inter	41	-*
157	9541	3529	PH 3527	inter	64	-
158	9599/9560	3577	layer 3514	inter	14	-
159	9601/9602	3577	layer 3514	inter	13	-
160	9603	3577	layer 3514	inter	22	-
161	9608	3592	PH 3590	'OFF'	64	-
162	9610	3594	PH 3581	'ON'	22	B/b
163	9616	3612	PH 3611	'OFF'	41	-*
Cuttings 2, 3 and 10 - lowest deposits						
164	Sherd E	Cut 3, 314	-	sandy layer	14	-
165	Sherd A	Cut 2, 444	-	pre-Deposit	14	
166	Sherd B	Cut 10, 439	-	-	21	-
167	SherdC	Cut 2, 474	-	pre-Deposit	21	-
168	Sherd D	Cut 3, 314	-	sandy layer	51	-

B - burnished; W - wiped; Sm - smoothed; b - both surfaces; i - interior; e - exterior; * - sooted; ** - food deposit on interior

presumably representing intrusive sherds, in Zones 4 and 5. A rapid and selective scan of this material (from contexts also containing Romano-British sherds) has been undertaken, and has allowed broad conclusions to be drawn as to its range and date.

The medieval assemblage is dominated by coarsewares, including both sandy and calcareous fabrics, all of which are likely to derive from sources within Wiltshire, such as Nash Hill, Lacock (McCarthy 1974) and the putative medieval kilns at Crockerton near Warminster (Smith 1997). These coarsewares have a probable date range of 12th to 14th century. No glazed finewares were noted during the selective scan.

The post-medieval assemblage consists mainly of coarse earthenwares, including both redwares, again with one possible source at Crockerton (Smith 1997), and Verwood-type earthenwares from Dorset (Algar *et al.* 1987). Also present in smaller quantities are stonewares and modern industrial white wares. The likely date range of the post-medieval assemblage is 18th to 20th century

3 Fired Clay Objects, by Kirsty Hall

A total of 100 fired clay objects and objects made from reused pottery sherds was found during the excavation. A further object was recovered during grave-digging. Full descriptions are in archive.

Spindle Whorls

Fired clay

Forty examples of fired clay spindle whorls were found, of which seven are complete (Fig. 64, 1–4, 7, 11, 12). The average diameter is 36 mm (range 25–44 mm), and average height 24 mm (range 9–40 mm). The complete spindle whorls have an average weight of 45 g (range 24–64 g). The perforations are usually centrally placed, with an average perforation diameter of 7 mm (range 4–11 mm). Some of the perforations are slightly wider at the edges, which in most cases was probably the result of wear.

The spindle whorls were made in a variety of fabrics: 46% were sand-tempered (pottery fabrics FT62, 64, 67, 68) 23% flint-tempered (FT32–35), 15% micaceous (FT20, 22), and 15% shell-tempered (FT43, 46, 47). All these fabrics could have been made from clays and inclusions found in the local area (Morris, above).

Seven forms were identified: spherical (2 complete, 4 incomplete); oval-sectioned (2 complete, 6 incomplete); bun-shaped (4 incomplete); conical (1 complete, 2 incomplete); biconical (7 incomplete); cylindrical (2 complete, 8 incomplete); and discoidal (2 incomplete). Both form and weight could be related to spindle whorl function. Finer yarn needs a faster rate of spindle rotation, and thus a lighter spindle whorl; the heavier whorls would have been used for coarser fabrics. The shape of the whorl would also have been

important, conical whorls, for example, turning more rapidly than spherical or flat ones (Øye 1988, 54–5).

Ceramic
Nineteen examples were found of pottery sherds reshaped for use as spindle whorls (Fig. 65, 14–16). These were apparently manufactured in the following stages: a sherd was cut and snapped into a roughly circular form; a central hole was drilled with a point-tipped drill from each surface, producing an hour-glass shaped perforation; finally the edges were abraded to form a smooth disc. Recovered examples were either abandoned during manufacture or had been complete but were probably broken in use. Three stages of development are represented: Stage 1, abandoned with unfinished perforation; Stage 2, perforated but with unshaped edges, and Stage 3, completed whorls.

The principal reason for abandonment in Stages 1 and 2 seems to have been the failure to align the two drilling stages of the perforation. These whorls have an average diameter of 33 mm (range 22–48 mm). The weight of the only complete Stage 3 whorl is 30 g, which is within the range recorded for the baked clay whorls. Two examples were produced from decorated sherds, one of which is illustrated (Fig. 65, 14). The fabric types of these reused sherds include micaceous (FT20, 23), flint-tempered (FT32), and sand-tempered (FT61, 62, 64, 67, 73).

Potsherd Discs

The term 'disc' is used to describe these objects as their function is unknown. Eighteen examples were found of which 14 were complete. The average diameter is 35 mm (range 29–56 mm), while the average weight is 16 g (range 6–46 g). Two examples were produced from decorated sherds (Fig. 65, 17, 18), while three are 'haematite-coated' and four displayed traces of burnishing. Fabric types include sand-tempered (FT 61, 62, 67), which account for 74% of the assemblage and flint-tempered (FT32, 33).

There has been much discussion as to the likely function of these objects, suggestions including unfinished spindle whorls, or the larger examples possibly having served as covers for pots (Cunnington 1923). One example (Fig. 65, 19) has badly abraded edges on the interior surface, as though it had been pushed or dragged across a surface, possibly indicating use as a gaming counter.

Clay Objects of Uncertain Function

Balls
Four small spherical balls with stabbed perforations of varying depths were found (Fig. 65, 20, 21). Three have a single perforation and one has three stabbed holes of unequal depths. Fabric types are micaceous

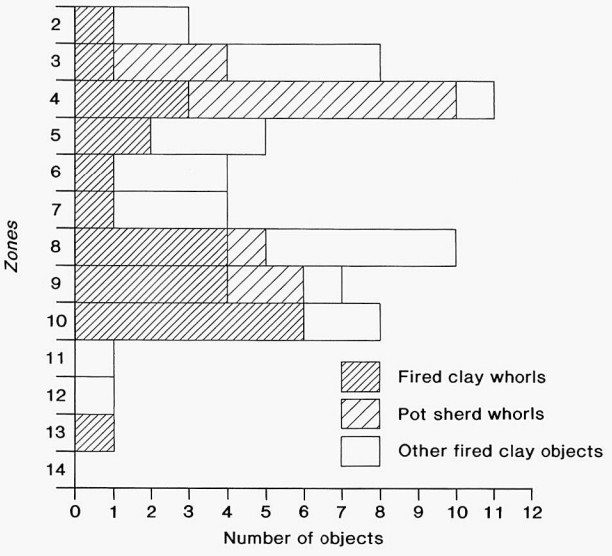


Fig. 63 Fired clay objects: relative frequency by zone

(FT20), oolitic limestone (FT58), and sand-tempered (FT63, 67). The largest, which was flattened at one end, has a diameter of 26 mm and weighs 11 g (Fig. 65, 20), while the smallest is 17 mm in diameter and weighs 4 g.

The function of these objects is uncertain, although it has been suggested that they were used as pin heads or as weights on bow drills (Poole 1984, 398). Another possibility is that they were intended to be beads, but, for some reason, were abandoned before the perforations were drilled all the way through.

Rings
Three fragments of flattened quoit-shaped objects were found (Fig. 65, 22).

Slab
A piece of a clay slab, possibly originally circular, was found during grave digging (Fig. 65, 23). There is a rectangular indentation surviving on its outer edge, at right-angles to which is a radial groove. Such grooves appear to have been common features on other slabs of this type, although it is unclear whether they were functional or were a result of the method of fabrication. All the surfaces were highly burnished and unoxidised or black in colour.

It has been suggested that clay slabs were used in connection with ovens or furnaces (Champion 1980, 237–8; Neal 1980, 118–21, fig. 18). They may have been used in firing pottery in bonfire kilns, since they are very similar to the perforated baked clay plates found at kiln sites of the Roman period (Swan 1984, 64–6). A group of rectangular perforated slabs characteristic of Late Bronze Age sites in the lower Thames area, for instance at North Ring, Mucking, Essex (Bond 1988, fig. 27, 1–14), Runnymede Bridge (Longley 1980, fig. 17, 57–8), and Petters Sports Field, Egham (O'Connell 1986, fig. 40, 6–8) may be a related form.

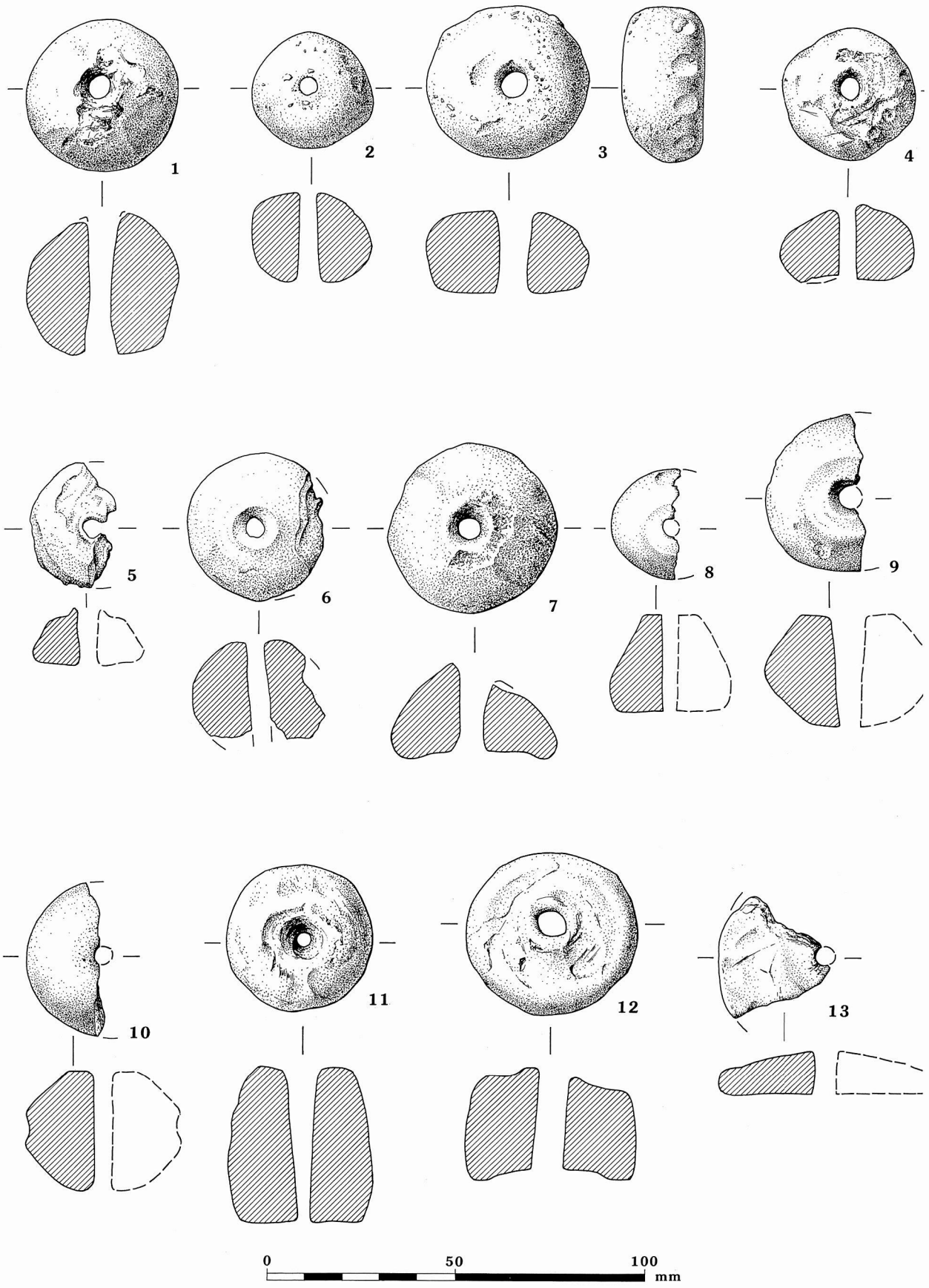


Fig. 64 Fired clay objects 1-13. Scale 2:3

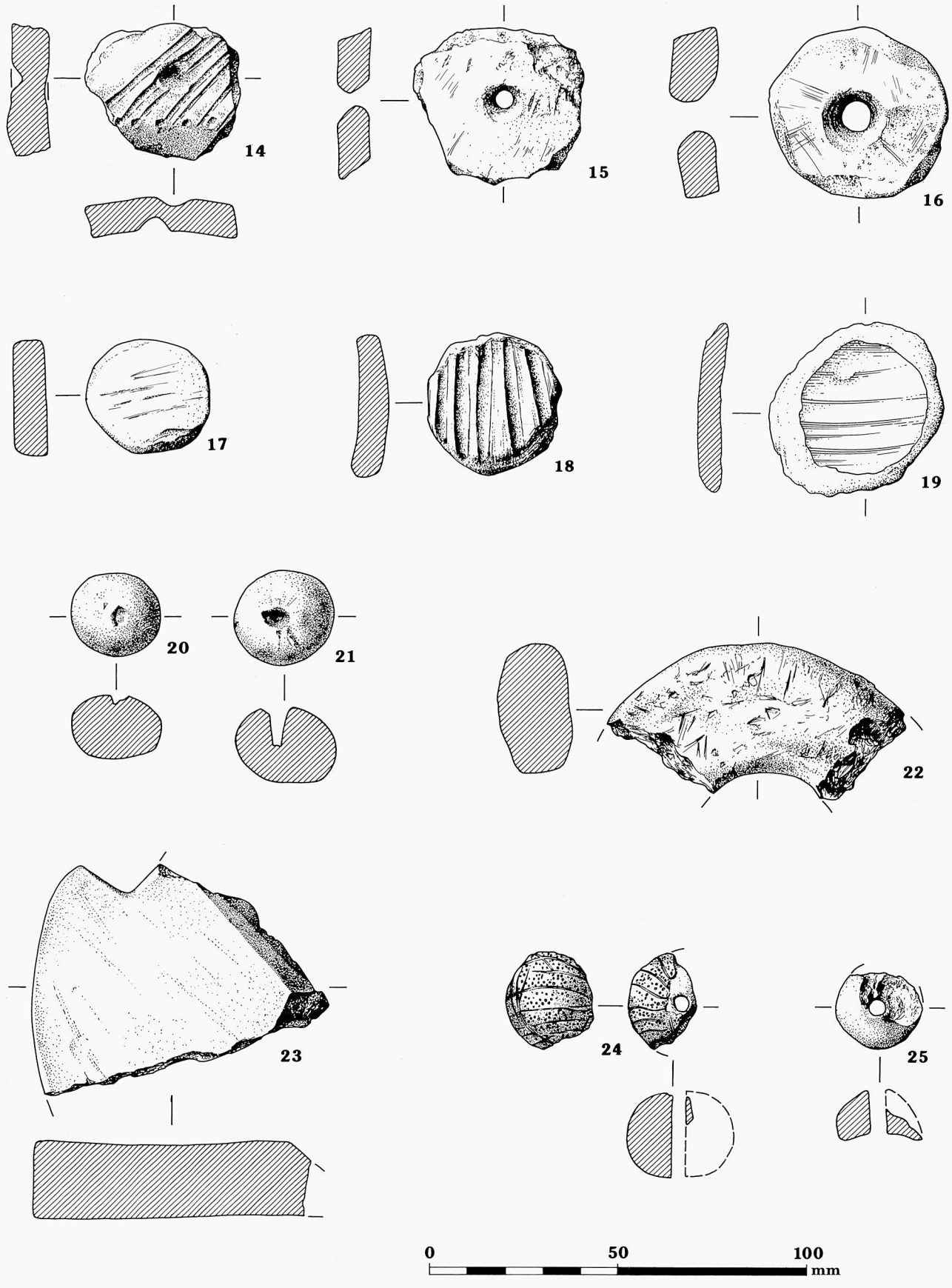


Fig. 65 Fired clay objects 14-25. Scale 2:3

Ceramic Beads

Three incomplete ceramic beads were found, two spherical and decorated with very fine incised vertical lines and fine dots and one bun-shaped (Fig. 65, 24, 25). Spherical ceramic beads have been found at Runnymede Bridge (Longley 1980, fig. 17, 35) and Budbury (Wainwright 1970, fig. 19, 149).

Clay Bars/Pedestals

A fragment of an oval-sectioned clay object which ends in a flat expanded 'foot' (Fig. 66, 26) is similar to objects found at North Ring, Mucking (Bond 1988, fig. 27, 15–17) which are thought to be associated with the manufacture of salt. However, given the distance of Potterne from the coast, this is perhaps an unlikely interpretation, a more plausible one perhaps being that it was used as a piece of kiln or oven furniture.

A complete clay bar or toggle (Fig. 66, 27) is similar to an object found at Little Waltham, Essex (Drury 1978, fig. 66, 13.4). The object was very roughly shaped by hand, and it is possible that it is simply the result of a child playing with some clay.

Clay Weights

One complete and two incomplete clay weights were found (Fig. 66, 28, 29). The complete example is here classified as a clay reel/weight, since the perforation is not central and the object would not, therefore, have made an effective spindle whorl. One of the incomplete examples may have been a spindle whorl, but in the absence of a central perforation, this could not be determined. The other may have been part of a very large spindle whorl. However, given that, unlike all the other spindle whorls, its fabric type (FT 51) is not a local one, this casts some doubt on this interpretation.

One complete example and four fragments of loomweights were found (Fig. 66, 30, 31). Reconstruction of the incomplete examples is not possible because of the small size of the fragments but it is likely that these originated from spherical, pyramidal, or cylindrical forms such as those found at Poundbury, Dorset in Bronze Age deposits (period 1) (Davies 1987b, fig. 79, 1, 2).

Three objects were too fragmentary to be securely assigned to any category but may have been from spindle whorls or loomweights.

Discussion

Apart from a single fired clay spindle whorl in Zone 13, all the spindle whorls, as well as all other evidence of textile production from the 1984 'off-terrace' area, came from Zone 10 or above, although with some variation of distribution through the Deposit. Of the 37 spindle whorls, 17 (45.9%) were from Zones 10–8, with a sharp drop to 4 (10.8%) in Zones 7–5 above, and then a rise again to 14 (37.8%) in Zones 4–2 (Fig. 63). In Zones 7–5 there was less artefactual evidence of textile production generally, perhaps suggesting a diminution of this activity, although it is interesting to note that the animal bone assemblage indicates a greater proportion of sheep bone in the upper levels of the Deposit than in the lower.

Changes in production may also be associated with changes in the ratio of fired clay to potsherd spindle whorls through the Deposit (Fig. 63). In the lower half of the Deposit fired clay whorls predominate, with 62.5% (15) being recovered from Zones 14–8 (all but one from Zones 10–8), compared with 23% (3) of the pot sherd examples (all from Zones 8 and 9). In contrast, the remaining 10 pot sherd whorls (77%) were from the upper part of the Deposit (all from Zones 3 and 4), compared with the 37.5% of fired clay examples spread throughout Zones 7–2. Clay loomweights were found in Zones 5 and 9 'on-terrace' and 'off-terrace' in Zone 8.

Spindle whorls, loomweights, weaving combs, and threaders are found on most later Bronze Age sites but not always in equal quantities. Potterne, for example, produced a far greater number of spindle whorls in relation to loomweights, 59 baked clay and potsherd whorls to 5 loomweights (a ratio of *c.* 12:1). A similar proportion was recorded for Site B at Plumpton Plain, Sussex (Holleyman and Curwen 1935, 38, figs 18–26). However, it must be noted that spindle whorls are smaller and more compact and are therefore more likely to be found either whole or reconstructable, allowing easier identification. Loomweights are more of a problem in that their fragments are difficult to identify unless a particularly diagnostic element is found. Nevertheless, as Marchant (1989) has demonstrated for the Iron Age in Britain, and Smith and Hirst (1988) for cotton production in pre-hispanic Mexico, the comparison of ratios of these objects is essential if aspects of textile production are to be investigated.

Ceramic Objects of Roman Date, by Rachael Seager Smith

A spindle whorl, made from a sherd of an oxidised sandy fabric, recovered from the Potterne Deposit is on display in Devizes Museum. In addition, ten ceramic counters, all from 40–50 mm in diameter, were recognised. These were recovered in 1985 from immediately beneath the ploughsoil in Cutting 15. At least one is of Savernake ware and another, also of this fabric is unfinished; four have been made from sherds of Roman sandy grey ware. The remaining four counters were made from thick-walled sherds of a fine-grained, sandy fabric which is probably of Late Bronze Age/Early Iron Age date. However, the predominance of Roman pottery in this context, together with the counters made from definite

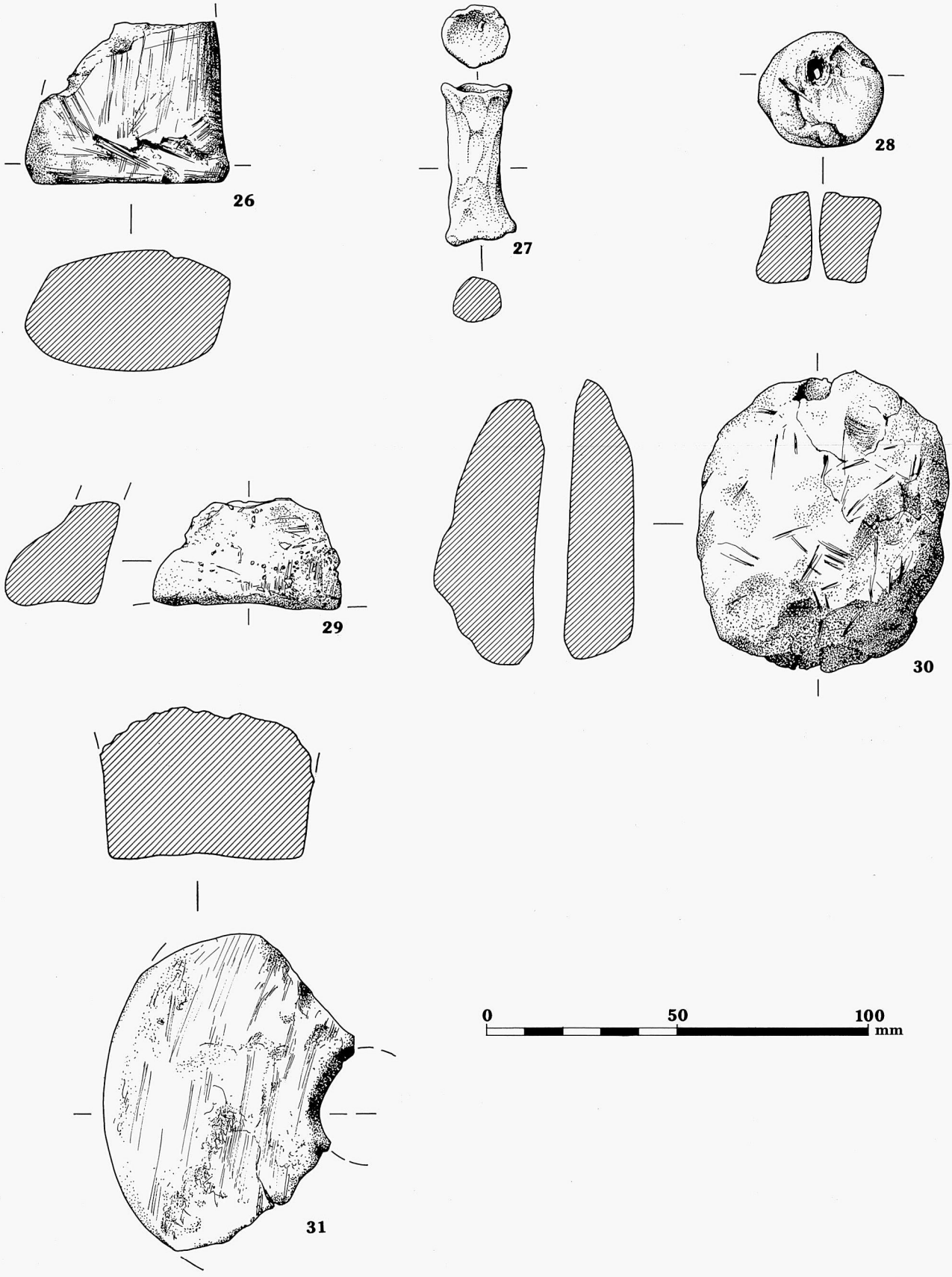


Fig. 66 Fired clay objects 26-31. Scale 2:3

Romano-British fabrics, suggests that these earlier sherds were reused during the Roman period.

A fragment of a coarsely-tempered clay disc was also found in this same context. The function of these type of objects is uncertain. Examples have been found on the Savernake Forest kiln sites, suggesting their use in pottery production or as part of heating structures, but fragments have also been found on domestic sites in south Oxfordshire (Miles 1978, fig. 57, 32; Sanders 1979, fig. 28, 124–7) and Wiltshire (Seager Smith 1996a, 58). Other possible uses include lids for cheese-presses or storage jars, as kitchen boards or plates.

Illustrated fired clay objects

Fig. 64

1. Complete spherical spindle whorl; SF 1466, context 1237, 'off' Zone 2
2. Complete spherical spindle whorl; SF 594, context 2502, 'off' Zone 9
3. Complete oval spindle whorl, shallow finger tipping around base angle; SF 582, context 1656, 'on' Zone 4
4. Complete oval spindle whorl; SF 534, context 2300, 'off' Zone 8
5. Incomplete oval spindle whorl; SF 962, context 2424, 'on' Zone 8
6. Incomplete bun-shaped spindle whorl; SF 910, context 2038, 'on' Zone 6
7. Complete pyramidal spindle whorl; SF 2134, context 5
8. Incomplete pyramidal spindle whorl; SF 798, context 2590, 'off' Zone 9
9. Complete biconical spindle whorl; SF 887, context 2773, 'off' Zone 10
10. Incomplete biconical spindle whorl, incised groove around circumference; SF 1094, context 1462, 'on' Zone 3
11. Complete cylindrical spindle whorl; SF 23, context 34
12. Complete cylindrical spindle whorl, hollowed base; SF 1903, context 4072
13. Incomplete discoidal spindle whorl; SF 707, context 2387, 'off' Zone 8

Fig. 65

14. Stage 1 potsherd spindle whorl; SF 1143, context 1533, 'off' Zone 4
15. Stage 2 potsherd spindle whorl; SF 593, context 1273, 'on' Zone 2
16. Stage 3 potsherd spindle whorl; SF 431, context 1392, 'off' Zone 3
17. Complete potsherd disc; SF 1109, context 1512, 'off' Zone 4
18. Complete potsherd disc; SF 474, context 1797, 'off' Zone 5
19. Complete potsherd disc; SF 1738, context 2150, 'off' Zone 7
20. Stabbed ball; one partial perforation; SF 301, context 243
21. Stabbed ball; one partial perforation; SF 894, context 2775, 'off' Zone 10
22. Incomplete clay ring; SF 1230, context 3710, 'off' Zone 12
23. Fragment of ?circular clay slab; grave-digging
24. Incomplete spherical bead, fine incised vertical lines, very fine dots; SF 1568, context 1336, 'off' Zone 3
25. Incomplete bun-shaped bead with hollowed base; SF 716, context 2379, 'off' Zone 8

Fig. 66

26. Frag., oval-sectioned clay object, flat expanded 'foot'; SF 387, context 251
27. Complete clay bar/toggle; SF 209, context 154
28. Complete clay reel/weight; SF 584, context 2190, 'off' Zone 7
29. Fragment of possible bun-shaped weight; SF 1887, context 1757, 'off' Zone 8
30. Complete oval loomweight, longitudinal perforation; SF 990, context 2227, 'on' Zone 5
31. Frag., deep cylindrical loomweight, large perforation; SF 1103, context 2635, 'on' Zone 9

4 Gold Objects

Gold Bracelet, by Joan J Taylor

The discovery of the gold bracelet in 1982 is more fully published elsewhere (Taylor 1984) but this synopsis reviews the possible date of the object in the light of radiocarbon dates from Potterne and elsewhere. The bracelet (Fig. 67) consists of a gold band, the body of which was hammered flat giving it a ribbon-like appearance 8.25 mm wide at the mid-point (Taylor 1984). At the terminals the band is round in cross-section, the ends of the band having been flattened, resembling the heads of nails (diam. 7.5 mm and 7.1 mm), an arrangement broadly similar to numerous Bronze Age penannular bracelets. The bracelet, which weighs 25.54 g, has an overall diameter of 63.4 x 66.6 mm. It is in excellent condition and shows little signs of wear, the outer surface and internal lipping retaining a dull surface, rather than being polished.

This and four similar gold bracelets of nearly identical weight have established a new type of bracelet for the later Bronze Age. The other recent finds comprise a pair from Brean Down, Somerset (Crabtree 1984), one of a pair of bracelets from Llanarmon-yn-Iâl, Clywd, found with a Ewart Park phase socketed axe of Gillespie type (Green 1983), and a stray find from Henhull, near Nantwich, Cheshire. Two earlier finds, from the Lincolnshire fens and Fore Abbey, Co. Meath, Ireland, also clearly belong to the type. As the Potterne bracelet was the first of the recent finds, that name has been suggested as the type name.

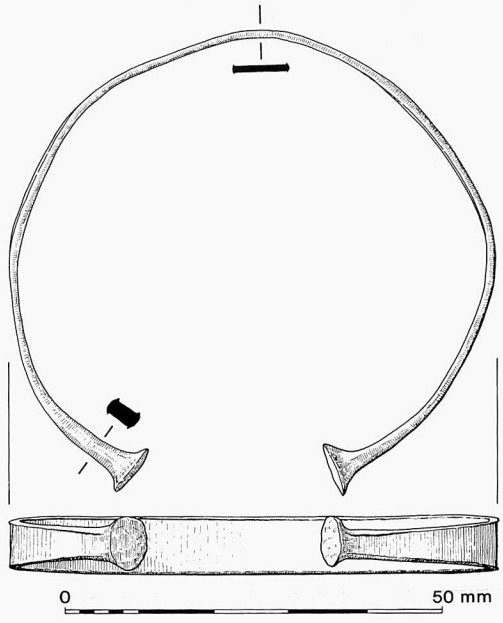


Fig. 67 Gold bracelet. Scale 1:1

The bracelet probably came from the level of the hearths and other features low down in the Deposit. The Brean Down parallel, also recovered from a midden deposit, was associated with pottery (unit 4) comparable with that from Zones 14–11 at Potterne, suggesting a date in the *c.* 10th–9th centuries BC, the youngest of three dates from that stratigraphic unit (Bell 1990, 71, 108).

Other Gold Objects, by Rosamund M. J. Cleal and Andrew J. Lawson

During sieving in 1983, a small triangular fragment of gold sheet was recovered from context 192 (in column 3.1), in the lowest zone in Cutting 3. One edge appears to have been cut, and the other two to have been sheared leaving uneven, ragged edges with a slightly layered appearance. Its maximum dimensions are 7 mm by 6 mm, 0.6 mm thick, and it weighs less than 0.1g.

It is, perhaps, interesting to note that a fragment of gold strip was found with the two intact gold bracelets at Brean Down (Needham in Bell 1990, 146). Although the fragment from Brean Down is five times the size of that from Potterne and there is no contextual association between the bracelet and the fragment at Potterne, the presence of objects of very similar form on occupation sites may have implications for the working, reworking, and loss of such apparently valuable items (see also below).

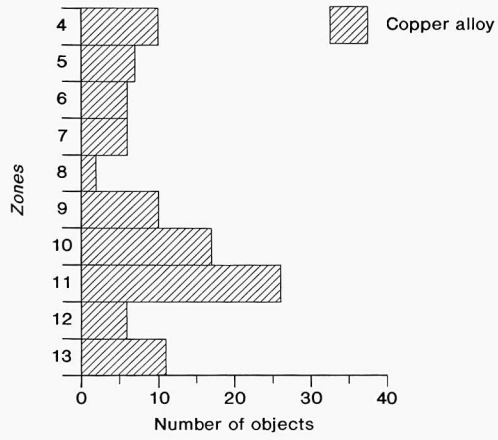


Fig. 68 Copper alloy objects: relative frequency by zone

5 **Copper Alloy Objects,** by C.J. Gingell

The metalwork assemblage, excluding unstratified finds and those from Romano-British ditch 4000, contains 186 pieces of copper alloy. Seventy-six objects from Zones 4 downwards, and diagnostic pieces from upper zones, are illustrated and described here; details are in archive. The majority of objects not illustrated are small amorphous lumps of bronze, mainly found in Zones 10 and 11, but this group also includes small fragments of sheet and wire from Zones 4 and 8. Grave digging in the modern cemetery also produced additional finds, including several important pieces; those recovered up until 1986 (five objects) are discussed in this report.

Finds were frequent throughout the Deposit, although the dating of a number of fragments, from grave digging or the upper zones, to the Late Bronze Age rather than to the Romano-British or post-medieval phases, remains uncertain. The distribution of objects by zone can be seen in Figure 68, where the concentration in the lower zones of the Deposit is evident, and in Table 29, in which the pre-Zone 3 finds from the 1984 excavation are shown by type.

The metalwork was radiographed by the Wiltshire Museum Service Conservation Laboratory soon after it was recovered. In general, its condition after cleaning was moderately good, although surfaces were etched, and grinding, honing, or casting marks were not often visible. A full report on the conservation of the artefacts is available in archive. Of the illustrated objects, 19 were subject to X-ray fluorescence analysis carried out by Catherine Mortimer at the Research Laboratory for Archaeology and the History of Art, Oxford, the results of which are described below and integrated in the discussion below.

Table 29: Number of copper alloy objects by type and Zone (1984 finds, pre-Zone 3 only)

	Tools and other implements				*Ornaments*		*Vessels/ sheet*	*Cast frags*	*Misc. obj./ waste*	*Featureless pieces*
	Blade	*Awl*	*Tweez.*	*Misc.*	*Pins*	*Rings/ Bracelet*				
'Off-terrace'										
Zone 4	-	-	-	-	-	-	6	-	2	2
Zone 5	-	-	-	-	-	1	2	-	2	2
Zone 6	-	-	-	-	-	2	2	-	-	2
Zone 7	1	1	1	-	-	-	1	-	-	2
Zone 8	-	1	-	-	-	-	-	-	-	1
Zone 9	-	2	1	-	1	-	-	1	-	5
Zone 10	1	-	-	-	1	-	1	-	2	12
Zone 11	1	-	-	3	3	1	4	1	1	12
Zone 12	-	1	1	-	-	1	1	1	-	1
Zone 13	1	2	-	1	2	-	1	-	-	4
Unzoned	-	-	-	-	-	-	1	-	-	-
'On-terrace'										
Zone 5	-	-	1	-	-	-	-	1	-	1
Zone 6	-	-	-	-	-	-	-	-	-	-
Zone 7	-	-	-	-	-	1	1	-	-	1
Zone 8	-	-	-	-	-	-	-	-	2	-
Zone 9	-	-	-	-	-	-	1	-	-	-
Intermediate										
Zone 9	-	-	-	-	-	-	-	-	1	-
Total (112)	4	7	4	4	7	6	21	4	10	45

Knives

Three (possibly four) knives (as opposed to fragmentary blades) were recovered; one of Thorndon type (Fig. 69, 1), one reworked from a broken blade (Fig. 69, 3), and one single-edged (Fig. 69, 9).

Thorndon-type knives are found with either one or two pairs of rivet holes. Apart from the eponymous example (Thorndon hoard, Suffolk: *Invent. Archaeol.* GB11, 2), those from, for example, the Reach Fen, Cambridgeshire (*Invent. Archaeol.* GB17,1) and Keston, Rutland, hoards (Clough 1979, fig. 5.4, 17) were double riveted like the present specimen, while those from the Ellesborough, Buckinghamshire (Farley 1979, fig. 7, 2) and Nottingham Hill, Gloucestershire (Hall and Gingell 1974, fig. 3, 6) hoards have a single pair of holes. The flattened mid-rib of the Potterne example is typical. These knives are datable to the Ewart Park phase of the Late Bronze Age metalworking in the 9th and 8th centuries BC.

The very small number of later Bronze Age settlements in England which have produced assemblages of metalwork include a number of examples of the simple two-edged knives manufactured from broken blade fragments. At Bishops Cannings Down a blade fragment of a Lisburn-type rapier was found with blunted and notched edges at the broken upper end, where the mid-ribs had been ground down (Gingell 1992, 105). At the same site a smaller blade fragment of lozenge section had similarly ground-down surfaces at one end (*ibid.*). At Black Patch, Sussex, another probable rapier blade fragment had been modified by grinding down the surface near the upper break (Drewett 1982, fig. 29.8). The reworked blade at Potterne (Fig. 69, 3) was shown by analysis to be moulded apparently from a tin-bronze with a very high lead content (33.7%, below). The relative softness of its composition seems to be confirmed by the nature of the hammer marks along the blade bevels, and it may have been adapted, not for the durability of its metal, but because of the ease with which it could be reworked. The blade may have been reworked from another Thorndon-type socketed knife, a type which shows some variety in blade section.

Single-edged knives comparable to that from Potterne (Fig. 69, 9) rarely occur in Britain, the closest parallels being possibly found in France, although the position of the Potterne knife in the sequence of continental finds is not clear. The single-edged tanged knife occurs from late Urnfield times (eg, Ribiers hoard, Hautes-Alpes, France; Audouze and Courtois 1970, fig. 27.15). In the Bronze Final III and early Halstatt periods in central France tanged and socketed forms occur (Venat hoard, Saint-Yrieix, Charente; *Invent. Archaeol.* F6. No. 312–33; Camp Cesar, Cantenoy, Oise; Blanchet and Talon 1987, fig. 15, 1 and 19). The socketed forms, as in the Venat find, are related to the curved knives of Urnfield central Europe which may occur as spike-grip or tanged forms from Hallstatt A1, or socketed forms from Hallstatt B2–B3. The decorated tanged knives (eg, Camp Cesar, *ibid.*, fig. 15.19 or an example from the River Marne at Brasles, Aine, Germany; Jacob-Friesen 1967, Taf. 167.5) are widespread and have a currency from Hallstatt B2 around 900 BC. The one previous British find, from the Ffynhonnau hoard, Brecon (Burgess 1969, fig. 2.1) falls into this latter group, and is given a slightly earlier

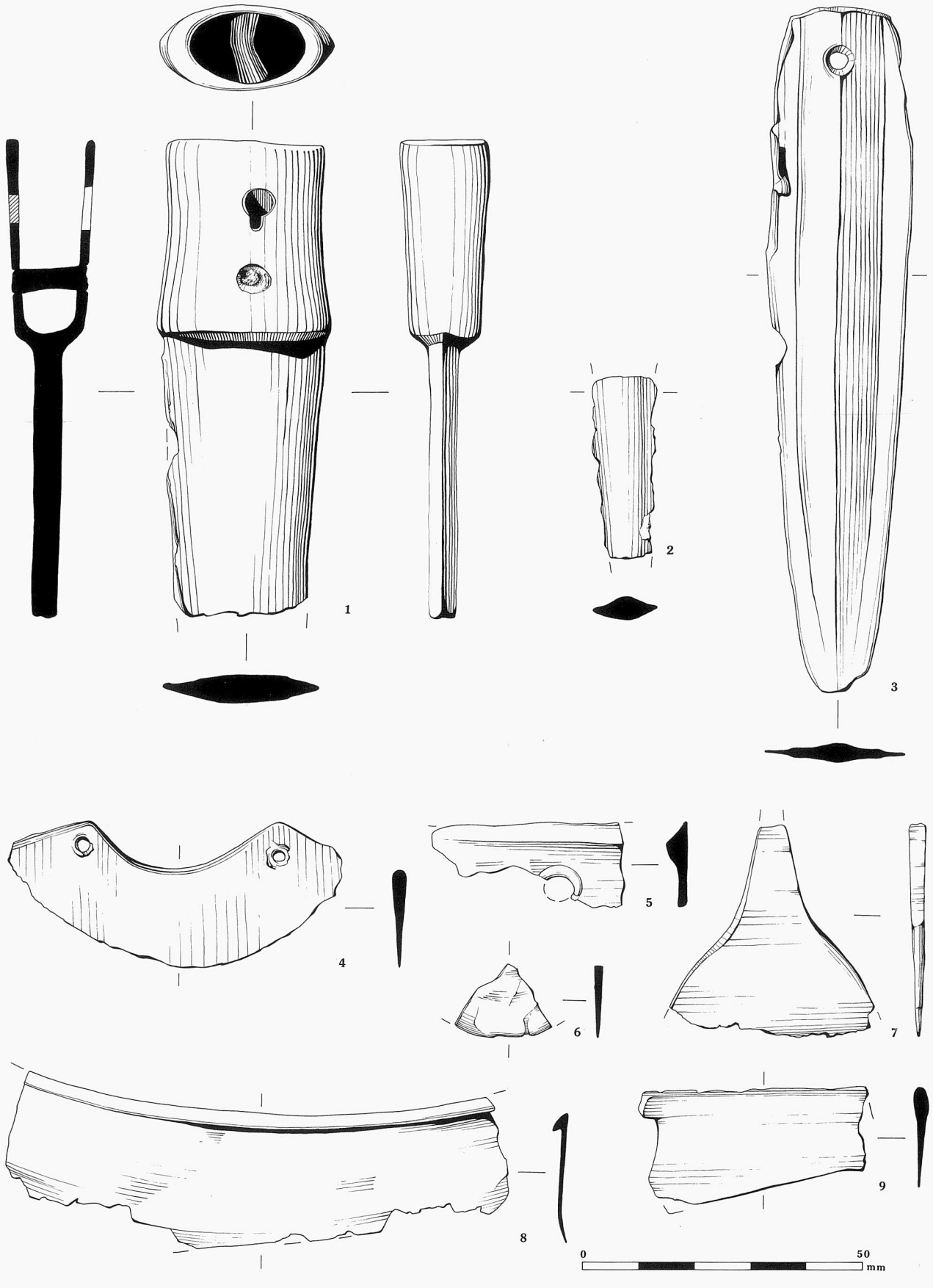


Fig. 69 Copper alloy objects 1-9. Scale 1:1

dating in the Penard phase by Burgess (1968, 34; pers. comm.). In general the continental tanged knives have a sinuous blade form, whereas the socketed single-edged knives usually have a 'hump-backed' blade with a pronounced heel.

The object illustrated as Figure 69, 8, is interpreted by the author as a single-edged blade, but by Stuart Needham as a fitting for a bucket or other container, possibly in an organic material. In its present form the piece has a slight kink (which does not show in the illustration), suggesting that it has been straightened or flattened to some degree. If the piece is an attachment to, or part of, a container, it must belong to one in which the shoulder is virtually horizontal, on the grounds of the curvature of the rim; this occurs, for instance, on some cauldrons. No rivet or pin holes are visible, but very little of the lower edge survives.

Razor

The only razor recovered has a convex cutting edge and two perforations (Fig. 69, 4). It is of an unparalleled type, but it may be related to those Halstatt C razors, with twin loops and single straight or convex blades, which have been found at a number of British sites, such as Staple Howe, Yorkshire (Brewster 1963, fig. 61, pl. 40), Danebury hoard (Cunliffe and O'Connor 1979, fig. 12.1, 6), Ham Hill, Somerset (Piggott 1946, 140, 91), South Cadbury (Alcock 1971, pl. iv, c), and the Thames at Richmond, Surrey (Burgess 1969, fig. 18.8). Even in western Europe, there are no direct parallels. Jockenhövel (1980, corpus nos 520, 529, Taf. 28) illustrates two razors with crescentic blades and two perforations, razors which he considers to be contemporary with the Carp's Tongue Complex, from the lakeside settlement at Grésine, Lac du Bourget, France.

Miscellaneous Blades

Four fragments of blade, which are not clearly assignable to specific knife or other tool types, were recovered. The section of one blade (Fig. 69, 2), with its thick convex mid-rib tapering sharply to one end, and its narrow blade edges, strongly resembles that of the tips of many spearheads of the Wilburton-Wallington traditions of the 11th or 12th century BC. Examples may be found in the hoards from Wallington (Burgess 1968, fig. 10,1) and Blackmoor (Colquhoun 1979, figs 4.1–4.3). Alternatively (S. Needham, pers. comm.), the piece may have been part of a rapier or dirk.

The thick lateral rib of a second blade (Fig. 69, 5), reminiscent of Middle Bronze Age knobbed sickles of the Ornament Horizon, is also paralleled in Late Bronze Age continental examples. British parallels are rare, and include finds from the River Thames near Bray, Berkshire (Brailsford 1953, fig. 11.15), and from the hoard from Llantwit Major, Glamorgan (Grimes 1939, fig. 69.12), although the latter had a thickened back to the blade, rather than a defined rib. The form of the Potterne fragment corresponds well to the tang of a sickle blade from the Venat hoard (*Invent. Archaeol.* F6, no. 91), which has two lateral ribs, one rivet hole, and a notched butt or tang. The Venat material may be assigned to the Carp's Tongue sword complex of Bronze Final IIIb/Halstatt Roman, with its Western European distribution (*cf.* Briard 1965). Further east, in Hessen, Germany, parallels may be found in the Halstatt B hoards from Eibingen, Kr Rudesheim (Jacob-Friesen 1967, Taf. 155, 12). In fact, the type was widespread throughout later Urnfield times, being most abundant in the sickle hoards of Central Germany (von Brum 1968, 202ff).

Small Objects

Awls

Eight awls, one graver/tracer and three fragments, probably also from awls were recovered (Fig. 70, 10–21). Awls and similar small tools occur ubiquitously throughout the Bronze Age, in grave groups in the Early Bronze Age (eg, Annable and Simpson 1964, 415–31), and in both hoard and settlement contexts in the Later Bronze Age (Needham 1986a). The most common form had a square or rectangular-sectioned tang and a round-sectioned working end, although repeated re-sharpening makes the latter a poor diagnostic feature. Among awls from settlements in Wiltshire, those from Bishops Cannings Down and Burderop Down (Gingell 1992, fig. 76, 7, fig. 78, 14–16) had square-sectioned blades ground to a rounded section at the point. The example from the Ewart Park weapon hoard at Nottingham Hill, Gloucestershire, had an octagonal-sectioned blade (Hall and Gingell 1974). In many examples, the tangs had been ground or hammered to a chisel-like edge, suggesting that these tools may have been used as double-ended awl/tracers (Black Patch, Sussex; Drewett 1982 fig. 29, 6–7, p. 361), Heathery Burn Cave, Co. Durham (*Invent. Archaeol.* GB55 no. 89), and Runnymede Bridge, Surrey (Needham and Longley 1980, fig. 11, 4).

Tweezers

Five pairs of tweezers, or tweezer fragments, were recovered (Fig. 70, 26–30). Such items are represented in European Bronze Age assemblages from the Tumulus period (Reinecke C) onwards, frequently in burial contexts, or in associations comprising largely of groups of ornaments (eg, Villethiery hoard (Yonne), France; Mordant *et al.* 1976). British examples have narrow blade ends, are undecorated, and are found principally in settlement assemblages dating from Late Bronze Age (LBA) 2–3, eg, Burderop Down (Gingell 1992, fig. 78, 11, 12), Runnymede Bridge (Needham

and Longley 1980, 7–9), Ivinghoe Beacon, Buckinghamshire (Cotton and Frere 1968, fig. 11.16), Staple Howe, Yorkshire (Brewster 1963, fig. 61.4), and the Breiddin, Powys, where the attribution to a Bronze Age rather than an Iron Age date is uncertain (Coombs 1991). However, tweezers are now also attested from Middle Bronze Age contexts, with examples from Grimes Graves, Norfolk, and in the Bishopsland hoard, in Ireland (S. Needham, pers. comm.). The secure context of the Potterne examples confirms Needham's (1980, 25) identification of the type as a recurring attribute of metalwork assemblages from Late Bronze Age settlements.

Pins and Needles

Nine pins, or pin fragments, were recovered from the site (Fig. 71, 31–7, 39, 41). These include examples of those forms which might be expected in a British Late Bronze Age domestic assemblage (eg, Fig. 71, 31, 35), and also of those forms for which closer parallels can be found among continental finds (Fig. 71, 32, 33).

Among the first group is one example (Fig. 71, 31) that may be classed as a nail-headed pin. This is a disparate category, which includes pins both with relatively broad disc-like heads, like wire nails, and small inverted conical flat-topped heads, like panel pins, both of which forms may be dated, from settlement contexts, to the latter part of the Late Bronze Age (LBA 2–3). The Potterne example has a head diameter which places it in the latter group, as for example at Scarborough, Yorkshire (Wheeler 1931, figs 16.10 and 16.11) where an iron pin also occurred (*ibid.*, fig. 16.12). However, its head is more disc-shaped, similar to another Wiltshire find from Burderop Down (Gingell 1992, fig. 78, 3). Both forms were found at Heathery Burn Cave, Co.Durham (*Invent. Archaeol.* GB55. 95–107), some of the larger examples having concave heads. The recessed head of the Potterne example, and its surrounding lip or flange are paralleled in a larger pin from the important Carp's Tongue complex hoard from Lulworth, Dorset (Drew 1935, pl. 69.5).

The decorated pins from Potterne (Fig. 71, 32, 33) are of a type more closely paralleled on the continent, although they are smaller in size. Both of the pins have similar recessed heads, but they are unusual in combining elaborate panelled decoration, usually associated with Urnfield pins, especially swollen-necked forms (cf. 'Picardy' pins; Hawkes 1942), and bands of finely hatched decoration around each head, as on Únetice bulb-headed pins, with the greatly reduced head forms characteristic of many Halstatt-period types. Most of the later forms have simpler annular decoration around the upper shank, yet the principal motif in these designs, infilled pendant triangles, is well-represented on Early Iron Age pottery in Britain and Hallstatt pottery elsewhere. In other respects (ie, the head form combined with the finely incised decoration), a pin from a contemporaneous site, Camp Cesar, Catenoy (Blanchet and Talon 1987, fig. 15.9) is very similar. The parallel cited by Blanchet and Talon from the Lac du Bourget (Audouze and Courtois 1970, 529), with its recessed head with central 'pimple', draws attention again to Heathery Burn Cave where the same features are found on a nail-headed pin (*Invent. Archaeol.* GB55, 105), and to a find from 'South Wiltshire' (Brailsford 1953, fig. 13.8) which has been claimed by Gerloff (1975, pl. 57) for the period of the Wessex Culture. There is little reason to doubt the late date of these pins (supported by their identification as leaded tin-bronzes).

Figure 71, 34, shows a spiral-headed pin, of which the key features seem to be the round section of the wire from which the head is formed, and the slight curve to the shank below the head. German scholars distinguish between *rollennadeln,* in which the upper part has been forged to a flat section and rolled down to form the head without curvature to the upper shank, and *spiralkopfnadeln,* in which the head is formed of round-section wire and the upper shank is cranked, producing a form probably related to swan's-neck pins.

British spiral-headed pins have been divided in a similar manner. Those from Heathery Burn Cave (*Invent. Archaeol.* GB55, 108) and Merlin's Cave, Symonds Yat, Herefordshire (Phillips 1931, pl. ivb no. 8) have heads formed in a single turn from flat strips on a straight shank. A similar pin from Petters Sports Field, Egham, is securely stratified in a deposit with Late Bronze Age occupation debris (Needham 1986, 52, fig. 37, 12). The pins from Potterne and Ivinghoe (Britton 1968, fig. 11, 13), on the other hand, have multiple-turn spiral heads with a slight bend to the top, although the Ivinghoe example has a head of flat strips. A pin, with German parallels, from the Thames at Hammersmith, Middlesex (Dunning 1934, fig. 2.6), combines a coiled head with a true swan's-neck form of shank. There can be little doubt that the type represented by the Potterne find should be dated in Britain to LBA 2–3.

The final example (Fig. 71, 35), although corroded, appears to consist of a head with a domed top on a conical base. Again, there is a parallel from Ivinghoe Beacon (Britton 1968, fig. 11, 15), as well as one from All Cannings parish (probably from Tan Hill), Wiltshire, rather tentatively identified by Moore and Rowlands (1972, 65, 79 and pl. 16) as a *kugelknopfnadel.* There is a similar object in Devizes Museum, although it is of uncertain origin. It was attributed by Cunnington and Goddard (1896, 51, 188) to a barrow on Oakley Down, Dorset (Wimborne St Giles G20), but it may be, in fact, a North German find from the Zimmerman collection (P.H. Robinson, pers. comm.). These pins may certainly be compared with pins from North Germany (eg, Laux 1976, pl. 30, 381) where the classification (*ibid.*) is hard to comprehend, the unassociated example cited here being classed as a

swollen-neck variant of poppy-headed pins, implying a late Tumulus/Urnfield date. It may be, however, that the British examples are no more than variants on the more common nail-headed pins of the Late Bronze Age.

A single needle (Fig. 71, 42) was found, the only comparable British find coming from Burderop Down (Gingell 1992, fig. 78, 7), another Wiltshire settlement of Later Bronze Age date.

Rings and bracelet

Five rings, or ring fragments (Fig. 71, 43–5, 47, 48) were recovered. Rings, both cast and forged, are quite frequently encountered in hoards of the Late Bronze Age. These may be heavy cast rings possibly for harnesses, or smaller (Britton 1968, 206), and may occur separately, as pendant rings (Braes of Gight, Aberdeenshire; Coles 1959–60, 39–43), or with small fittings (Hall and Gingell 1974). They are also well-known from settlements, such as Runnymede Bridge (Needham and Longley 1980, 21, fig. 12, 18, 19), and, in Wiltshire, from the later Bronze Age settlement at Dean Bottom (Gingell 1992, fig. 77, 1, 2).

The single bracelet fragment (Fig. 71, 46) has very close parallels in the Venat hoard (*Invent. Archaeol.* F6, especially 59).

Vessels and Other Sheet Metalwork

The assemblage of sheet metalwork and associated fittings, comprising 26 pieces, consists of three clear elements: scrap vessels, small objects probably produced from reused or surplus sheet, and scrap fragments.

Of the fragmentary vessels, one (Fig. 72, 50) appears to be part of a bucket or situla. If of bucket form it may have resembled that from Heathery Burn Cave (*Invent. Archaeol.* GB55, 58). The lack of rivet holes along the edge suggests that this piece may have been an attachment to a wooden or leather container rather than part of a sheet-metal vessel which would require riveting, although it also possible that the piece was discarded before completion, and lacks rivet holes for that reason (S. Needham pers. comm.).

The second vessel fragment (Fig. 72, 51), although much distorted so disguising its shape, can be interpreted as a form of furrowed bowl, the most obvious parallel being the Welby bowl (Powell 1948, *Invent. Archaeol.* GB24, 6). The latter, found in a hoard with a Ewart Park sword and several objects of Hallstatt B or C character, is related in style to pottery bowls and has been widely discussed (eg, Champion 1975, 36).

The third vessel fragment (Fig. 72, 59), of more ovoid form, has more in common with small Central European cauldrons than with other bowls. The design of raised pellets on this object, known in Britain and Ireland also on shields, is widespread on vessels and other sheet metalwork from Central and Southern Europe, for example on crested helmets (Hencken 1971). Needham has noted (pers. comm.) that the edge without pellets appears to be an original edge, rather than a tear, with only one or two pin holes. The lack of rivet holes along the edge suggests that this piece also was an attachment to a wooden or leather container, rather than part of a sheet-metal vessel.

These vessels appear to have been scrapped by cutting the sheet down, and the scrap fragments seem to have been produced by a similar process. Sheet metal has disadvantages for remelting, as its large surfaces causes a high proportion of dross to form. It may be, therefore, that the scrap sheet was used directly to produce further small objects, such as the examples shown. Examination of all the scrap in the assemblage suggests that the processes observed on two examples (Fig. 73, 65, 66) are typical, with a cold chisel having been used for cutting the sheet, and the areas containing rivets being removed and discarded. The rivet illustrated as Figure 82, 62, is a typical Late Bronze Age, pre-Llyn Fawr phase, flat-topped rivet, later rivets developing more pointed heads (S. Needham pers. comm.).

Miscellaneous Objects and Waste

A miniature socketed axe (Fig. 71, 49) was recovered from the Deposit. Some 18 such axes are known from England, in forms representing a wide range of full-size axe types, but none were found in clear Late Bronze Age contexts, or have clear Late Bronze Age associations. One, or possibly two, examples come from Cold Kitchen Hill, Brixton Deverill, Wiltshire, which has yielded material ranging from Middle Bronze Age to Romano-British date. Of the remainder, most are chance finds, and where their associations or contexts are known they are Iron Age and Romano-British in date (Robinson 1995). Until the present discovery, one explanation of these objects was as Iron Age, and possibly Romano-British, ornaments or amulets produced in imitation of bronze axes discovered by chance, but it is now possible to date at least some of these objects to the Late Bronze Age itself. Their occurrence in later contexts, therefore, may be due to their being unearthed at a later date and retained, or due to the continuing production of miniatures axes for cult reasons, perhaps for a millennium, retaining an obsolete morphology.

An object with the remains of an attached loop (Fig. 71, 38) has been tentatively identified as a bar toggle (Rafftery 1975). It has been suggested that the tubular object (Fig. 73, 75) is possibly part of the handle fitting of a type B2 cauldron (S. Gerloff, pers. comm.). This identifiction is speculative because most cauldrons have heavy, cast ring handles and attachments. Nonetheless, B-type cauldrons have a currency from the 11th century BC (the Isleham Hoard) to the 7th

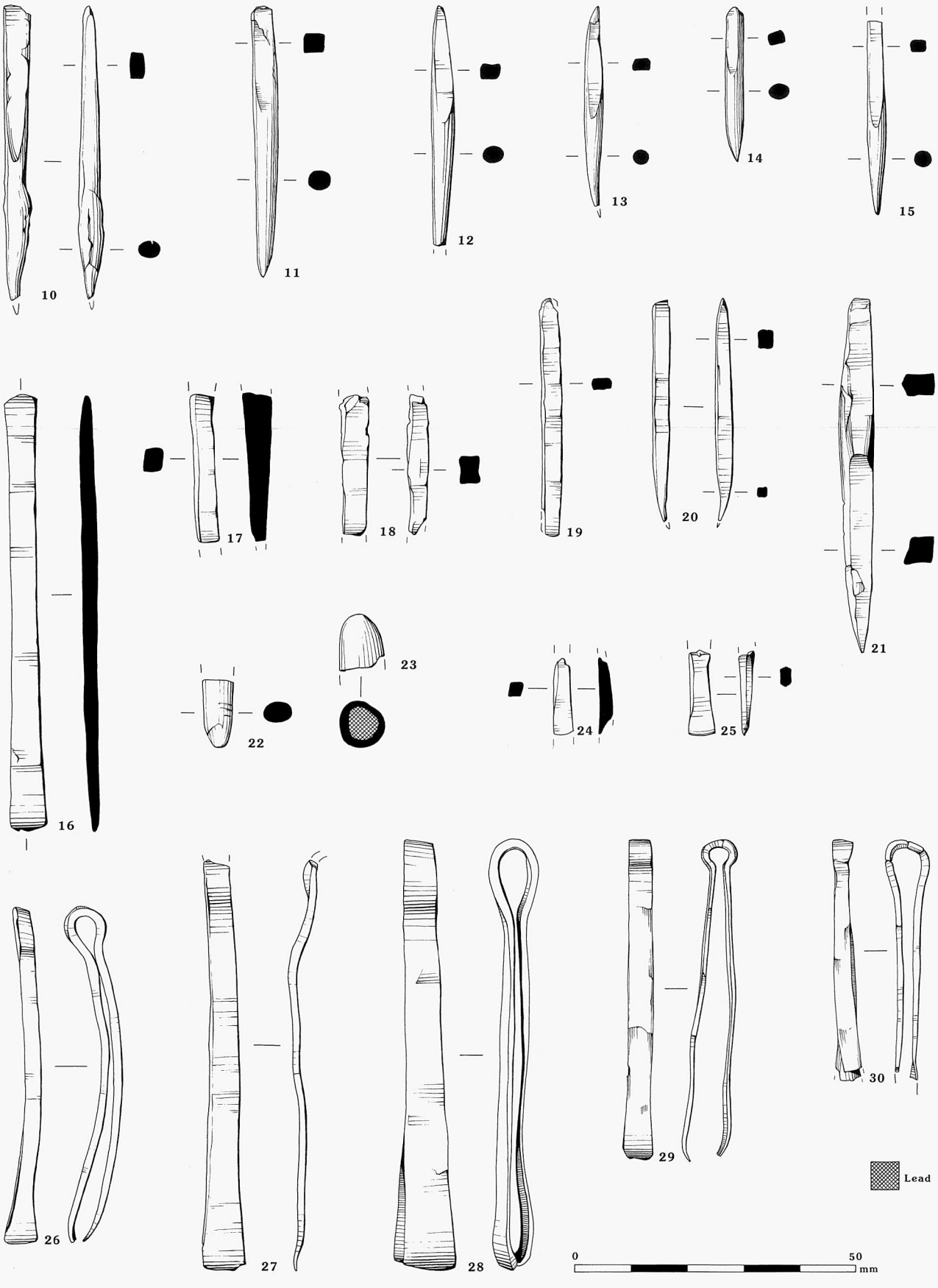


Fig. 70 Copper alloy objects 10-30. Scale 1:1

century BC (Llyn Fawr) (O'Connor 1980; Briggs 1987, 168) and the stratigraphic position of the Potterne piece (1982 context 5; Fig. 4) would place it within this date range.

The bag-shaped chape (Fig. 73, 76) is one of the best known components of hoards and assemblages of the Carp's Tongue complex. Examples occur in hoards from Levington, Suffolk (Burgess 1969, fig. 13.24), Reach Fen (*Invent. Archaeol.* GB17, 20), Felixstowe, Suffolk (*Invent. Archaeol.* GB16, 2), Grays Thurrock, Essex (*Antiq. J.* 2, 1922, 106), and in France in the Venat hoard, Saint-Yrieix, Charente (*Invent. Archaeol.* F6, 21). One from the Eaton hoard, Norwich (Norwich Castle Museum 1966, 28, fig. 79), is decorated with beaded decoration on the mouth moulding. The design of concentric circles – typical of Carp's Tongue material – is, however, paralleled on the cast plate from the Watford hoard, Hertfordshire (Coombs 1979, 209, fig. 11.6, 51) which, if it were a scabbard mount, would match the Potterne chape well. A parallel for the chape and its decoration is provided by that from Petters Sports Field, Egham (Needham 1986, 51, fig. 37, 30), which has one peg hole surrounded by three concentric compass-drawn grooves. This is noted by Needham as lying further to the west than the distribution of bag-shaped chapes published by O'Connor (1980), and this is now itself superseded by the Potterne example.

Discussion, by Andrew J. Lawson

A number of trends can be observed in the assemblage of copper alloy objects. The number of objects found decreases steadily with the increase in height of the Deposit (ie above Zone 11). This may reflect either changes in the activities which produced the waste being dumped, or the replacement of bronze and copper alloy for utilitarian tools by other materials.

Awls were found throughout the lower part of the sequence, from a feature (Fig. 70, 12) up to Zone 7 (Fig. 70, 15). Only one example (Fig. 70, 19) was found above this, in Zone 1. Similarly, with the exception of one pair (Fig. 70, 26), the tweezers were found in the lower part of the Deposits (Zones 12–7, 'off-terrace'; Zone 5 'on-terrace'). The provenance of the pins shows a similar bias, the finest (Fig. 71, 31–3) are all from Zone 11. The sole needle also came from the base of Cutting 3. The majority of the small amorphous lumps of bronze were found in Zones 10 and 11, as was the only recognised casting runner (Fig. 73, 74) possibly suggesting that bronzeworking was only carried out on the site in the earlier phases of Deposit accumulation.

Although it must be remembered that systematic metal-detecting on site was only introduced for the excavation of Zone 7 and below (Chapter 2) and, therefore, it is possible that smaller objects were found with greater regularity in these Zones, the distribution may be valid and a distinction in the assemblage be made between the upper and lower Zones. Associated with the awls, pins, etc, in the deeper Zones are a number of cast blades. The earliest in manufacture was a possible rapier or spearhead (Fig. 69, 2). At the base of Cutting 2 was a blade (Fig. 69, 9) of possible Penard affinities, while other blade fragments came from Zones 7 and 13. The only cast blade from the upper levels is a possible Halstatt C razor (Fig. 69, 4).

By contrast, the vessel fragments (Fig. 69, 8; Fig. 72, 51, 59, 60) were found in Zones 6–3. Although small objects of sheet bronze were recovered from deeper contexts (Fig. 72, 52, Zone 10; 56, Zone 9), larger pieces which may have been used either as embellishments of composite objects or as metal containers appear to be absent from these levels.

This trend may signify a difference in requirements for bronzes, or of fashion through time. For example, the apparent absence of small tools such as awls, from the upper Zones could reflect a change in activities on the site. If these objects were used for piercing leather, a decrease in the use of cowhide, and thus the need for awls, may be indicated in the reduction of cattle bones in the Deposit (Locker, above).

The currency of any bronze type may be long-lived but the range of types in use at any particular stage of the Bronze Age has largely been established from studies of hoards (for example, Burgess 1968) in the absence of a wide range of artefact-rich settlements. Although many of the fragmentary objects from Potterne might not normally be found in hoards, those pieces which are distinctive can be related to the metal-working traditions exemplified by hoards. Thus, a few of the Potterne bronzes (Fig. 69, 2, 9) appear to be from the earliest Late Bronze Age traditions of the 12th century BC, the majority to the Ewart Park tradition conventionally assigned to the 9th or 8th centuries BC, but the Halstatt razor (Fig. 69, 4) and vessel fragments herald the Llyn Fawr tradition of the 8th or 7th century BC. Many of the simple objects (such as the awls) could date from earlier periods, but the bag-shaped chape (Fig. 73, 76) found at the base of the Deposit (Zone 11) is of such a distinctive form, that on the basis of this piece, it would seem unlikely that the Deposit began to accumulate much before the 10th century BC.

The absence at Potterne of large bronzes, such as weapons and heavy tools, emphasises that the hoarding and subsequent disposal of such items is a particular activity which frequently removes the greatest volume of metal from domestic debris. Occasionally, as at Petters Sports Field, hoards may be buried on the periphery of a settlement, but no such hoard has been found at Potterne. Instead, the range of bronze debris in the Deposit is comparable to the assemblages from the few, rich excavated Late Bronze Age settlement sites such as Runnymede Bridge (Longley 1980) or the Marlborough Downs (Gingell 1992). Because these sites are most probably coeval with the earlier part of the Deposit, the assemblage from the lower Zones is most similar to other

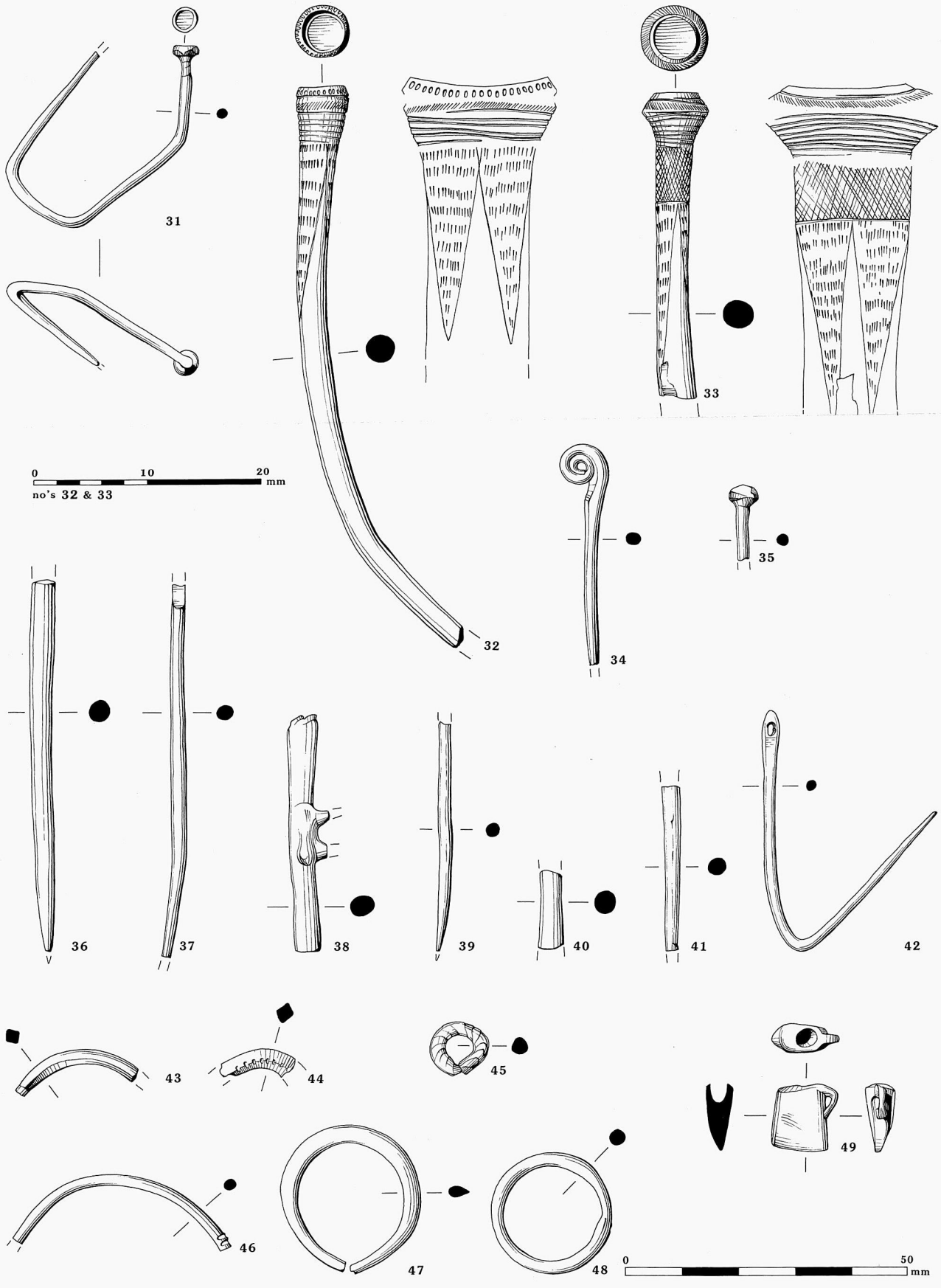


Fig .71 Copper alloy objects, 31-49. Scale 1:1

excavated Late Bronze Age sites, while the assemblage from the upper Zones might best be compared with those previously referred to as Early Iron Age.

List of illustrated copper alloy objects

Fig. 69

1. Thorndon-type socketed knife; grave-digging
2. Blade frag.; SF 911, context 2934, 'off' Zone 11
3. Knife reworked from broken blade; grave-digging
4. Razor; SF 37, context 85
5. ?Tanged or riveted sickle; SF 1042, context 3503, 'off' Zone 13
6. Blade frag.; SF 564, context 2165, 'off' Zone 7
7. Tanged chisel or razor; SF 913, context 2791, 'off' Zone 10
8. Blade of single-edged knife; SF 454, context 1380, 'off' Zone 3
9. Single-edged tanged knife; SF 282, context 241

Fig. 70

10. Awl; SF 965, context 3131, 'off' Zone 12
11. Awl; SF 736, context 2556, 'off' Zone 9
12. Awl; SF 319, context 247
13. Awl; SF 1038, context 3513, 'off' Zone 13
14. Awl; SF 773, context 2585, 'off' Zone 9
15. Awl; SF 547, context 2171, 'off' Zone 7
16. Graver or tracer; grave-digging
17. Tang frag., ?awl; SF 924, context 2441, 'off' Zone 11
18. Tang frag., ?awl; SF 194, context 194
19. Rectangular section rod; SF 1746, context 1028, 'off' Zone 1
20. Awl; SF 1125, context 3361, 'off' Zone 13
21. Awl; SF 689, context 2384, 'off' Zone 8
22. Tool frag.; SF 968, context 2974, 'off' Zone 11
23. Hollow casting frag.; lead or lead alloy core; SF 994, context 3512, Zone 13
24. ?Tang frag.; SF 793, context 1847, 'on' Zone 5
25. Blade of small tool; SF 925, context 2948, 'off' Zone 11
26. Pair of tweezers; SF 423, context 1380, 'off' Zone 3
27. Tweezers frag.; SF 953, context 3112, 'off' Zone 12
28. Pair of tweezers; SF 877, context 1862, 'on' Zone 5
29. Pair of tweezers; SF 686, context 2209, 'off' Zone 7
30. Pair of tweezers; SF 738, context 2558, 'off' Zone 9

Fig. 71

31. Nail-headed pin; SF 814, context 2907, 'off' Zone 11
32. Decorated pin frag.; SF 900, context 2918, 'off' Zone 11
33. Decorated pin frag.; SF 984, context 2989, Zone 11
34. Spiral-headed pin; SF 733, context 2538, 'off' Zone 9
35. Small domed or bi-conical headed pin frag.; SF 840, context 2755, 'off' Zone 10
36. Pin shank frag.; SF 307, context 246, cutting 2
37. Pin shank frag.; grave digging
38. Copper alloy object, frag.; SF 1238, depth 0.10 m auger hole 212
39. Pin shank frag.; SF 1212, context 3461, 'off' Zone 13
40. Rivet; length 14.2 mm, SF 182, context 176 Zone <4>
41. Pin frag.; SF 1115, context 3352, 'off' Zone 13
42. Needle; SF 212, context 222
43. Ring frag.; SF 932, context 2955, 'off' Zone 11
44. Ring frag.; SF 486, context 1922, 'off' Zone 6
45. Penannular ring; SF 1002, context 2246, 'on' Zone 7
46. Penannular bracelet frag.; SF 490, context 1826, 'off' Zone 5
47. Ring; SF 967, context 3125, 'off' Zone 12
48. Ring; SF 481, context 1928, 'off' Zone 6
49. Miniature socketed axe; SF 524, context 1827, 'off' Zone

Fig. 72

50. Sheet metal vessel frag., ?bucket; grave-digging
51. Buckled sheet metal, ?vessel; SF 2001, context 4
52. Folded sheet metal frag.; SF 752, context 2718, 'off' Zone 10
53. Rolled sheet metal frag.; SF 1743, context 1510, 'off' Zone 4
54. Folded sheet metal frag.; SF 557, context 2185, 'off' Zone 7
55. Sheet metal tube, decorated; SF 53, context 89
56. Folded sheet metal frag.; SF 1023, context 2626, 'on' Zone 9
57. Curved sheet metal frag.; SF 7, context 12
58. Sheet metal frag.; SF 1741, context 1030, 'off' Zone 1
59. Rim frag. decorated sheet metal bowl; SF 418, context 1749

Fig. 73

60. Curved sheet frag., decorated; SF 522 and SF 523, context 2002, 'off' Zone 6
61. Folded sheet frag., rivet-hole; SF 1734, context 1564, 'off' Zone 4
62. Rivet; SF 1051, context 3551 unzoned, 'off'
63. Rivet; SF 1009, context 2248, 'on' Zone 7
64. Folded sheet metal, ?strap end; SF 434, context 1761, 'off' Zone 5
65. Scrap sheet metal, rivet in situ; SF 447, context 1564, 'off' Zone 4
66. Scrap metal, rivet; SF 1742, context 1223, 'off' Zone 2
67. Curved cast metal frag.; SF 908, context 2604, 'off' Zone 9
68. Curved cast frag.; SF 753, context 2903, 'off' Zone 11
69. Curved cast frag.; SF 864, context 1856, 'on' Zone 5
70. Cast tubular object frag.; SF 1324, context 1349, 'off' Zone 3
71. Cast tubular object frag.; SF 987, context 3135, 'off' Zone 12

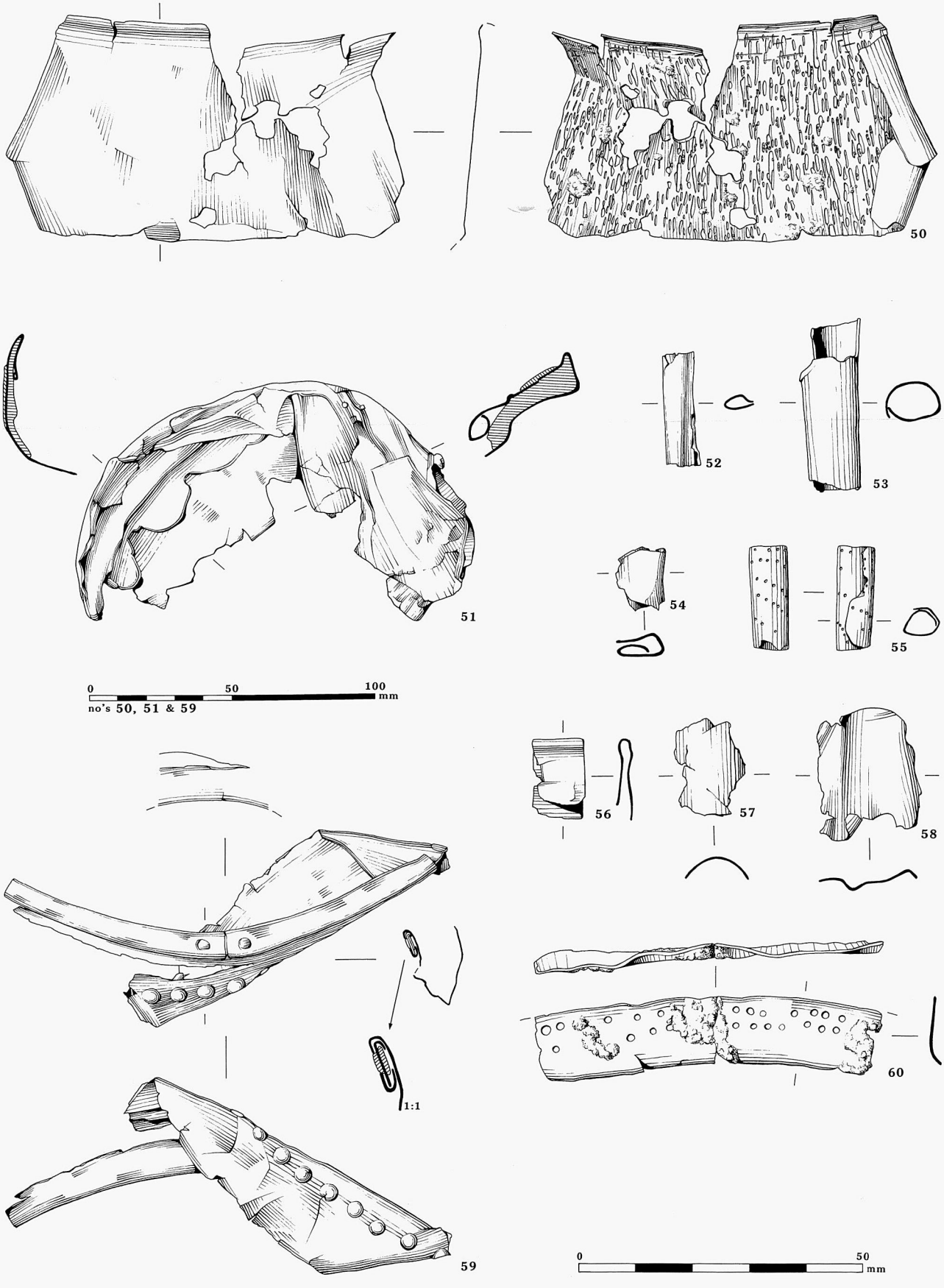


Fig. 72 Copper alloy objects, 50-60. Scales 1:1 and 1:2

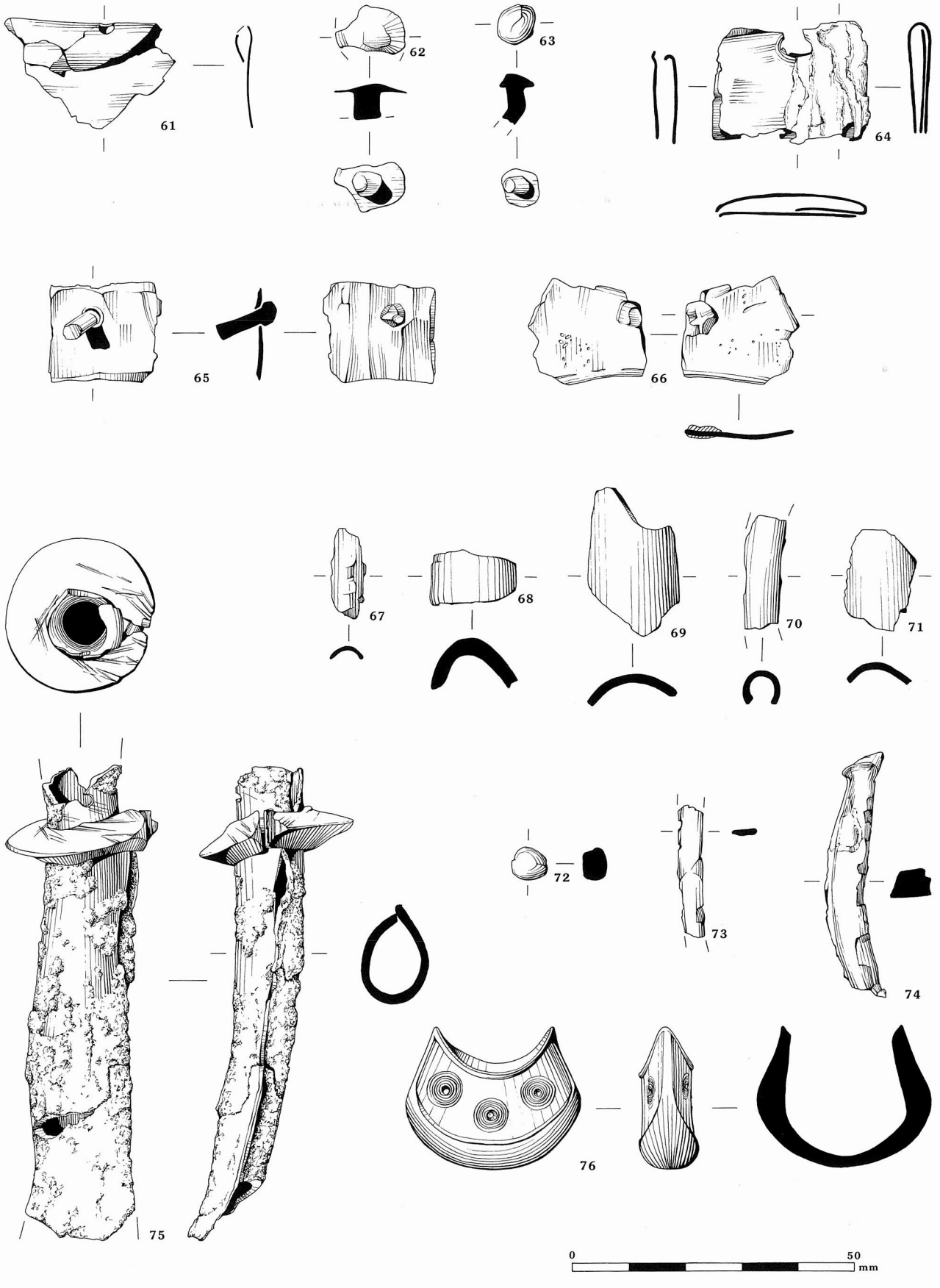


Fig. 73 Copper alloy objects, 61-76. Scale 1:1

Table 30: XRF analyses of selected copper alloy objects

Description.	*Lab No*	*Fe*	*Ni*	*As*	*Pb*	*Ag*	*Sn*	*Sb*	*Cu*
knife	820115	-	0.2	-	10.9	0.15	14.6	0.3	73.9
knife	830350	-	0.1	-	33.7	tr	5.3	0.3	60.7
razor	830625	*	-	-	7.8	-	14.8	0.3	77.1
?sheet	840162	-	0.5	2.1	8.9	2.8	14.9	0.7	Rem
knife	830624	heavily leaded tin bronze: silver and antimony traces							
graver	830349	-	-	-	7.1	-	10.3	-	82.6
awl	840238	-	-	-	7.5	-	18.4	0.2	73.9
tweezers	840159	-	-	-	5.8	-	8.9	-	85.4
pin	840268	*	-	-	46.0	-	1.6	0.2	43.2
pin	840270	-	0.3	0.6	5.9	0.25	18.5	0.8	73.6
pin	840465	*	0.2	2.0	9.0	2.04	26.3	4.5	56.0
miniature axe	840169	bronze with high levels of tin; arsenic traces							
sheet	850031	0.2	-	-	7.2	-	8.5	-	84.0
sheet	820303A	-	-	-	3.4	0.08	1.7	-	94.8
sheet	820303B	0.2	0.2	0.5	10.6	0.06	3.8	-	84.6
sheet	820303C	-	-	-	8.1	0.12	12.4	0.2	79.3
sheet	840143	0.1	-	tr	12.5	tr	7.4	0.1	79.8
collar	820225	0.2	0.2	1.5	33.7	0.36	13.3	0.9	49.8
chape	840273	*	0.2	-	15.2	0.33	16.9	0.9	66.4

*indicates that iron was detected at very high values which do not correspond to high levels of iron in the alloy but to corrosion products incorporating iron from the soil which have not been removed successfully.

72. Droplet; SF 388, context 255 (fill of hearth 285)

73. Strip metal frag.; SF 2011, context 9,

74. Runner from mould; SF 732, context 2709, 'off' Zone 10

75. Tube, fitted collar or ring; 1982, SF 2002, context 5

76. Bag-shaped chape; SF 909, context 2924, 'off' Zone 11

X-Ray Fluorescence Analysis of Selected Copper Alloy Objects, by Catherine Mortimer

Two batches of copper alloy objects were analysed at the University of Oxford Research Laboratory for Archaeology and the History of Art, 16 items in 1987 and 3 more in 1990. All artefacts were prepared by scraping the surface with a scalpel, but the results should still be treated as surface analysis only, since it is likely that some corrosion remained. Two of the three pieces submitted for analysis in 1990 were difficult to clean properly, so that only their general alloy type was determinable. Alloys with high lead content are unlikely to give precise composition values since lead does not dissolve in copper alloys over a few percent concentration and remains in discrete blobs. This is noticeable at the microscopic level when sections of such alloys are examined with a microscope but at the scale of the XRF beam (1 mm x 2 mm) this problem becomes avoidable. Likewise the possibility of tin-enriched surfaces (whether deliberate or as an accidental result of the processes of formation) should be noted for those objects with high tin contents.

The results are presented in Table 30. No zinc was detected. Copper was calculated by difference. Generally, leaded tin-bronze was used although the relative amounts vary considerably. Individual objects were made out of particular alloys presumably chosen with a view to easing casting and working qualities. High lead and/or tin contents are not unusual in metalwork of this period, although at very high values this would have made working with the alloy quite difficult. Noticeable amongst the analysis are the high trace element concentrations in a few objects which suggest a quite different ore source for these pieces. Lab. Nos 840268 and 820225 (Fig. 71, 31; Fig. 73, 75) are in alloys which may be termed heavily-leaded tin-bronzes.

6 Evidence for Non-Ferrous metal working by Justine Bayley and Elaine L. Morris

Twenty fragments of fired or vitrified clay with traces of copper alloys adhering to them were found in the Deposit, and are listed in Table 31. These were examined by Justine Bayley, and the metal rich deposits on the surfaces were analysed by X-ray fluorescence (XRF).

Crucibles

There are 13 crucible fragments, one of which (Fig. 74, 6), the base of a triangular crucible in a sandy fabric, is from a vessel heated from below. The remaining 12 fragments are from two or more relatively large vessels, which were heated from above. One is a base sherd (Fig. 74, 1) from a flint-tempered crucible (pottery fabric FT32), while the other fragments, including a rim (SF 1193), are remnants from sand-gritted crucibles.

Table 31: Non-ferrous metalworking debris
= 1983 zone

Context	*SF no.*	*Zone/location*	*Description*
33	113	C 2, <1>	relining from crucible
146	175	C 2, <3>	crucible fragment with relining
221	216	C 2, <4>	relining from crucible
89	404	C 2, <1>	relining from crucible
221	305	C 2, <4>	relining from crucible
221	306	C 2, <4>	? mould fragments, including in-gate
1810	579	'off' Zone 5	hearth lining and copper
2734	776	'off' Zone 10	hearth lining and copper
2591	799	'off' Zone 9	crucible base fragment
2914	898	'off' Zone 11	? relining from crucible
2930	930	'off' Zone 11	relining from crucible
2775	937	'off' Zone 10	relining from crucible
3133	986	'off' Zone 12	? relining from crucible
1757	1028	'off' Zone 5	3 joining sherds from base of triangular crucible with outer vitrified layer
1810	1088	'off' Zone 5	fuel ash slag and copper
1732	1096	'off' Zone 5	hearth lining and copper
3710	1193	pit 3704 (S. 670)	crucible rim
1281	1702	intermediate Zone 2	over-fired/vitrified sherd (? hearth lining and copper)
2714	1709	'off' Zone 10	relining from crucible
444	1770	C 2, pre-Deposit	? mould fragment

The base sherd has a diameter of *c.* 150–200 mm, and appears to have been relined on the interior surface. The other fragments had been relined on six or more occasions, producing the multi-layered structure evident in many of the pieces (Fig. 74, 2–5). These were oxidised, with only the thin layer in contact with the fire and the metal being reduced. Where the surface was vitrified, the copper present produced a deep red colour.

Seven of the eight crucible fragments from the 1984 excavation were recovered from contexts in 'off-terrace' Zone 9 or below (Table 31), the rim being recovered from a feature cut into the Greensand below the Deposit. Only Figure 74, 6, came from a higher level, in 'off-terrace' Zone 5. Although two fragments found in Cutting 2 came from the uppermost of the 1983 zones, the stratigraphic positions and later prehistoric date of the majority of these objects seems secure.

Large open crucibles are known from a number of Bronze Age sites in Britain (Tylecote 1986, 233). While the fabric of the base sherd is unusual within that range, a variety of coarsely-tempered fabrics, which are resistant to the extremes of thermal shock, have been identified for this type of crucible. More unexpected within a Late Bronze Age context, however, is the identification of the sandy fabrics for the remaining examples within this type. The fragment regarded as part of a triangular crucible (Fig. 74, 6) is atypical in that later Iron Age examples are usually thinner and were heated from above. The few known earlier Iron Age examples are not of this form (for example from Danebury, Hampshire: Cunliffe and Poole 1991, 411–2; Cunliffe 1995, 67–8).

Moulds

Three pieces of fired clay in a group (SF 306) had no metals adhering to them detectable by XRF. However, one of them was an in-gate for a mould (Fig. 74, 7), and the others are likely to have been parts of an unused mould. Another possible mould fragment (Fig. 74, 8) had slight traces of metals and was reduced-fired which suggests that it had been used. All the pieces were recovered from Cutting 2, the group of three fragments from near the base of the Deposit, and the other piece from a pre-Deposit context (Table 31).

Hearth Lining and Fuel Ash Slag

Five fragments of hearth lining and fuel ash slag bearing traces of copper, were recovered from the Deposit (Table 31). Both materials are formed by the reaction of silicate materials with ash in a fire at high temperatures (Bayley 1985). The presence of copper shows that copper or its alloys were being melted in the fire. The items were recovered from intermediate Zone 2, and 'off-terrace' Zones 5 and 10.

The Metals on the Crucibles

The X-ray fluorescence analyses all indicated that the metals being melted were bronzes. In most cases lead was detectable, although in varying proportions; not all the metals being melted would have been heavily leaded. In some cases, traces of zinc were also detectable, though not in significant quantities.

Discussion

The presence of more than one large Bronze Age type crucible towards the base of the Deposit, and one triangular crucible near to the top is significant. This sequence of forms, stratigraphically related spans the transition from the later Bronze Age production technology to that of the earlier Iron Age, and may represent a unique occurrence of this change at a single site. The analysis of bronzes from the site, the presence of lead fragments and droplets, and the occurrence of metalworking debris and fuel ash slag, all suggest that the casting of leaded bronzes had taken place at Potterne, although on a modest scale.

List of illustrated non-ferrous metalworking evidence

Fig. 74

1. Crucible base frag.; fabric FT32; diam. 150–200 mm; 15–17% present; SF 799; context 2591, 'off' Zone 9
2. Relining from crucible; SF 930, context 2930, 'off' Zone 11
3. Relining from crucible; SF 937, context 2775, 'off' Zone 10

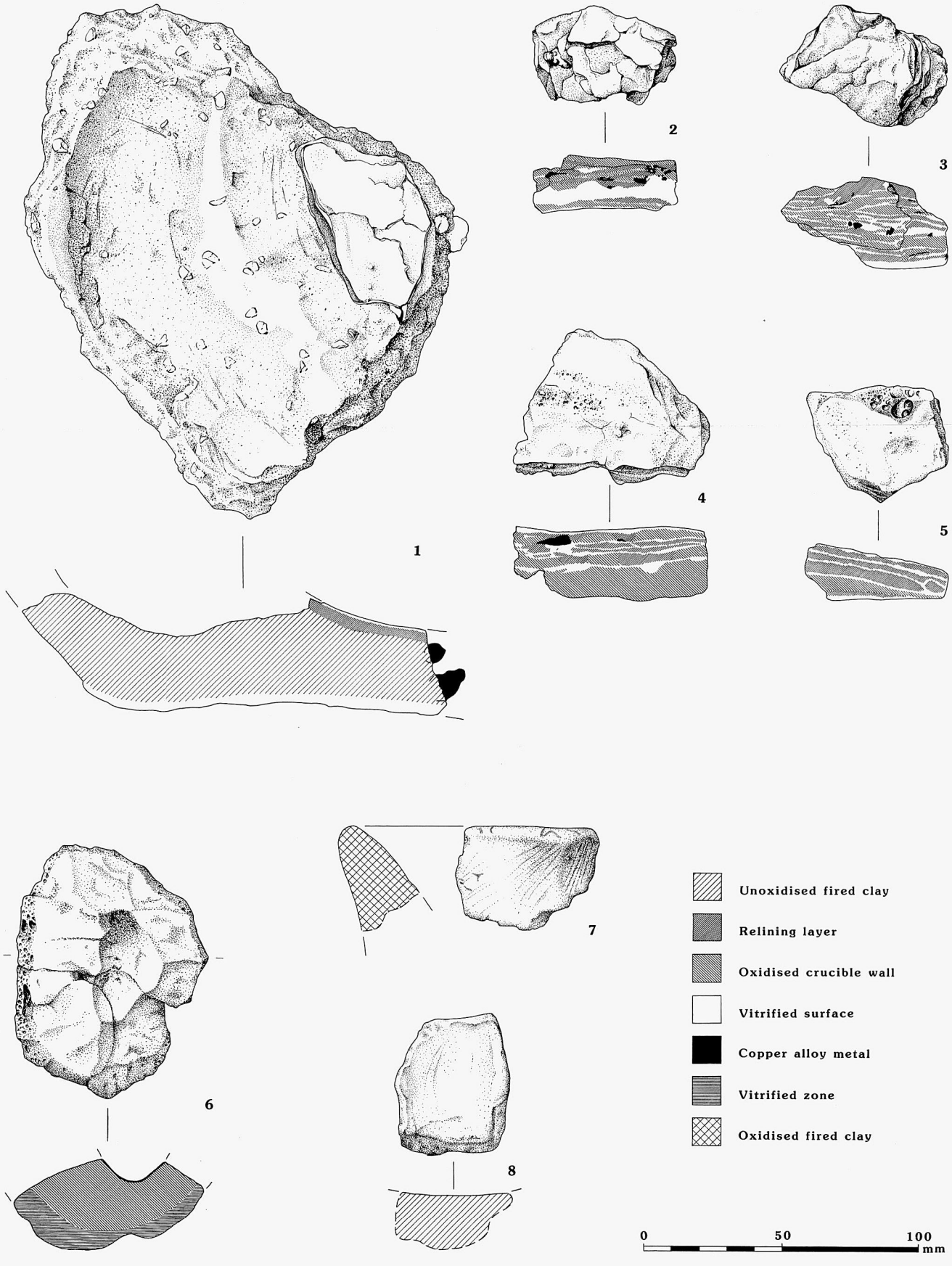


Fig. 74 Non-ferrous metal working debris, 1-8. Scale 1:2

4. Crucible frag. with relining; SF 175, context 146
5. Relining from crucible; SF 304, context 89
6. Base of triangular crucible; SF 1028, context 1757, 'off' Zone 5
7. In-gate frag.; SF 306, context 221.
8. ?Mould frag.; SF 1770, context 444

7 **Lead Objects,** by C.J. Gingell

Lead was extremely difficult to identify in the matrix of the Deposit, as the pieces were very similar in appearance to small stones and lumps of soil (a problem noted by Needham and Hook 1988, 265). Only seven lead objects were recovered by conventional excavation methods from the Deposit, all of them during the 1984 excavation. The rate of recovery was improved markedly by scanning the Deposit with a metal-detector (Chapter 2), a procedure which led to the recovery of a significant number of small lead droplets. This practice was not initiated until contexts in Zone 7 were under excavation, however, and it should be borne in mind when assessing the metalwork assemblage that similar material, if present in higher zones, is likely to have to have been missed. Nonetheless, it should be noted that most of the larger pieces are from the base of the Deposit or immediately above (Zones 13–9 'off-terrace'). A catalogue of the lead objects can be found in archive (but does not include most of the small droplets recovered as a result of the metal-detector survey).

X-ray fluorescence showed that five of the objects (Fig. 75, 1–5), including a piece of lead sheet, consist largely of lead, while a possible sprue cup (Fig. 75, 6), a ring (Fig. 75, 7), and a droplet (Fig. 75, 8) are of alloys of lead and tin.

In spite of the widespread and consistent employment of lead for alloying tin-bronzes in the Late Bronze Age, finds of lead itself are very rare (Needham and Hook 1987, appendix I). Occurrences include a fragment which may have been part of the lost hoard from Greenborough Farm, Shernstone, Staffordshire (Chitty and Coombs 1968, no. 21) and a square lead alloy block in the West Caister, Norfolk, hoard (Lawson 1979, fig. 9.2e, 176). This block has been shown to be of a lead-tin alloy (Craddock, pers. comm.). Reinforcing the connection with tin-bronze alloying, two of the copper alloy rings from Potterne (Fig. 71, 44, 45) are similar in form to a fragment of a ring, with a composition of 79% tin and 21% lead, in the

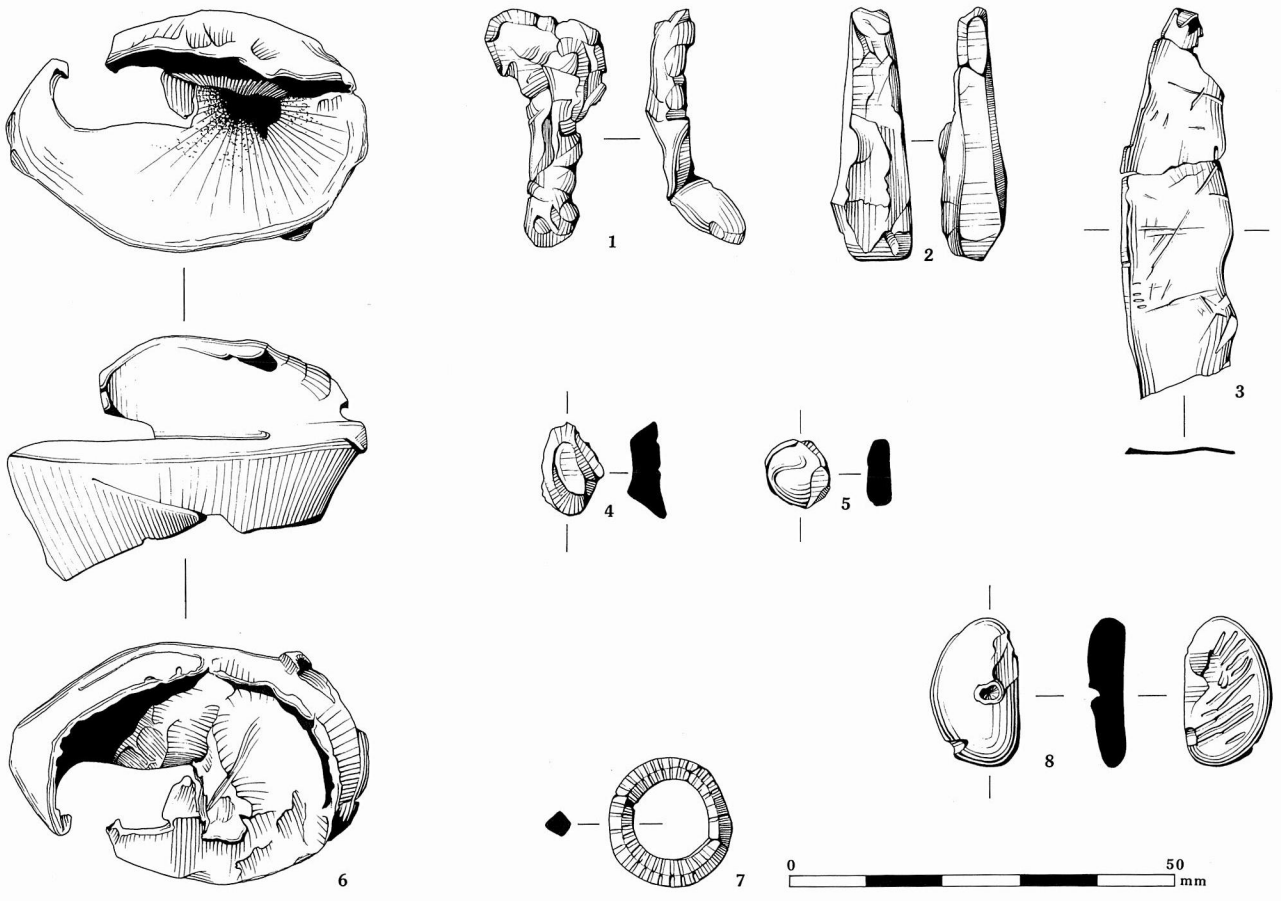


Fig. 75 Lead objects, 1-8. Scale 1:1

Auchtertyre hoard, Morayshire (Coles 1959–60, 121), and closely paralleled in the assemblage from the Lac du Bourget, France (Briard *et al.* 1985, fig. 6, 36–9).

In southern England, the Late Bronze Age site at Runnymede Bridge which, on the basis of the pottery and copper alloy artefacts, is likely to be largely contemporary with Potterne, has produced seven lead objects (Needham and Hook 1988). These include waste (including a sprue cup), a binding strip, a peg or rivet, a pommel, and a block similar to that recovered from West Caister. The Runnymede assemblage is more varied than that from Potterne, and Needham and Hook suggest with some confidence that lead was actually being worked at Runnymede. The same conclusion might also be drawn from the small assemblage at Potterne. The limited range of finds includes only a single finished object (the ring, Fig. 75, 7) with the remainder all having possibly been associated with leadworking. If the interpretation of Figure 75, 6 as a sprue cup is correct, then this would indicate the casting of lead or lead alloy objects, though its dating is uncertain. This object was found 'on-terrace' in Zone 3 and might therefore be of Iron Age or Romano-British date. However, it may be relevant to note that a fragment of a hollow copper alloy casting with a lead or lead alloy core (Fig. 70, 23) came from Zone 13, and this may indicate the production of lead patterns for instrument casting though this is unlikely to have been a routine method of manufacturing copper alloy objects (Needham and Hook 1988, 265–8).

The remaining lead objects were all from lower zones (Zones 13–9) with many of the droplets coming from the base of the Deposit (Zone 13) and unlikely, therefore, to have been intrusive. This suggests that leadworking was taking place at the site in the Late Bronze Age. Objects 1–5 are all fairly pure lead, and perhaps these were associated with alloying leaded bronze or heavily-leaded bronze, either destined for the process (eg the bar/?ingot (Fig. 75, 2) and the fragments of cut sheet (Fig. 75, 3)) or debris from it (the droplets). The presence of crucible and mould fragments described above with traces of leaded bronze detectable in some examples from the lower zones, supports the contention that the casting of leaded bronzes took place at Potterne in the Late Bronze Age.

List of illustrated lead objects

Fig. 75

1. Frag.; SF 754, context 3503, 'off' Zone 13
2. Tapering bar, ?small ingot; SF 734, context 1689 (metal-detecting of context 2702), 'off' Zone 10
3. Three joining frags, irregular sheet; SF 740, context 2563, 'off' Zone 9
4. Droplet; SF 1160, context 3367, 'off' Zone 13
5. Droplet; SF 746, context 3503, 'off' Zone 13
6. Mass of metal, ?sprue cup; SF 1311, context 1420, 'on' Zone 3
7. Ring, lozenge section; SF 972, context 2977, 'off' Zone 11
8. Droplet; SF 1126, context 3359, 'off' Zone 13

8 **Iron Objects,** by Rosamund M. J. Cleal and Andrew J. Lawson

Excluding unstratified finds, 331 iron objects were recovered from the excavations. Of these, only two unusual objects from Zone 3 (1984 excavation) and the 12 pre-Zone 3 finds are reported on here, as it is possible that the stratigraphically later objects might be of Romano-British or medieval date. The full details of all the objects are in the archive. Although the pre-Zone 3 and, more particularly, the pre-Zone 4 contexts are largely undisturbed, apparently recent iron objects were found as low as Zone 8 (eg, a wire nail and button).

Of the illustrated objects, the two from Zone 3 comprise a possible punch (Fig. 76, 3) and an unusual tool, possibly a round-sectioned awl (Fig.76, 1) for which no close parallels have been found. The two objects from Zone 5 comprise an object which bears a similarity to items from Romano-British toiletry sets (Fig. 76, 4), although these occur more commonly in copper alloy, and a possible tang from a small tool (Fig. 76, 5). A possible tanged blade was recovered from 'off-terrace' Zone 5 (Fig. 76, 2).

It is tempting to dismiss all of the iron found at Potterne as Romano-British or later in date and to suggest that tillage and the activities of burrowing animals have introduced it into later prehistoric levels. Neither at Potterne nor at contemporaneous sites is there a range of chronologically distinct iron tool types which could be ascribed with confidence to the date of the Deposit. Indeed, the introduction of iron in Britain is extremely difficult to document due to a general dearth of the metal from excavated sites (Ehrenreich 1985). Nonetheless, Turnbull (1982) identified nearly 30 'Late Bronze Age' sites which produced iron objects and slag, suggesting that the production of the metal was already established while (Ewart Park) bronze casting was at its height in the 9th century BC. The quantities of recovered iron have been small and the pieces largely nondescript, as is the case at Potterne and the possibility must remain that some of the iron, especially the 14 pieces selected here, are contemporary with the Deposit and, in the case of Zones 8–4, could most likely be of 9th–7th century BC date. A small quantity of ferrous metalworking debris has also been recovered from Potterne (below) which, it is suggested, may be as early as 7th century BC in date. This provides a modicum of evidence for ironworking (smithing) on or near the site in the Early Iron Age. The site is well-situated to exploit the ore-quality ironstone of the Lower Greensand (Salter and Ehrenreich 1984, 148). Ironworking is certainly attested in Wessex by the 5th century BC, if not earlier, as finds from All Cannings Cross and Swallowcliffe Down, Wiltshire

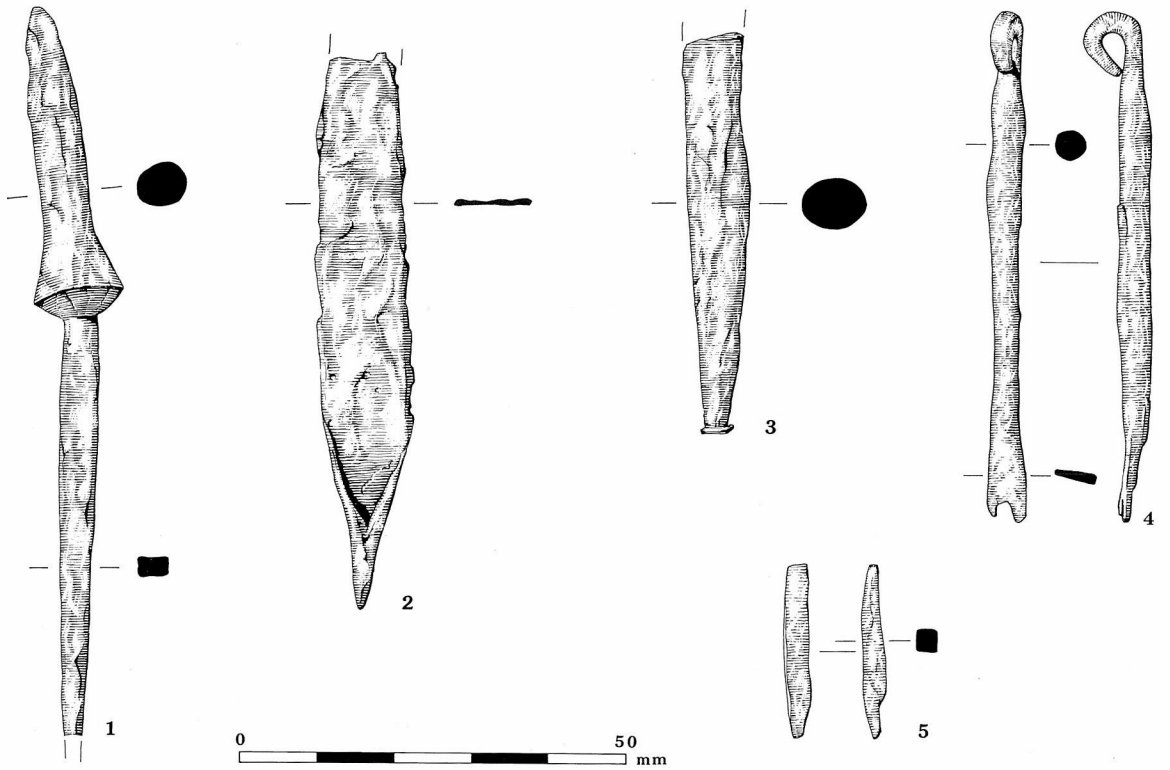


Fig. 76 Iron objects. 1-5. Scale 1:1

(Tylecote 1986), La Sagesse, Romsey (Green 1994) and Rooksdown, Basingstoke, Hampshire (Andrews and Laidlaw in prep.) demonstrate, but proof of its inception remains elusive.

List of illustrated iron objects

Fig. 76

1. ?Round-section awl; SF 449, context 1436, 'off' Zone 3
2. Flat strip; ?tanged blade; SF 1211, context 1529, 'off' Zone 4
3. ?Punch; SF 592, context 1375, 'off' Zone 3
4. Looped object; SF 436, context 1712, 'off' Zone 5
5. Short rectangular-section rod; SF 496, context 1823, 'off' Zone 5

9 Ferrous Metalworking Debris

The site produced a small quantity of ferrous metalworking debris. For this report, 14 samples from 11 spits were submitted for analysis. Of these, one (context 1434) lay within Zone 3 but all the others were from Zone 5, in the northern half of Cutting 12 and 'off-terrace' (Table 32). The absence of samples from the southern half of Cutting 12 may be a product of the truncation of the part of the Deposit equivalent to Zone 5 in the northern half by Romano-British and later tillage. On this basis the analysed samples (465 and 164) are best regarded as being contemporary with the upper part of the Deposit and probably of 7th century BC date. This identification makes a significant contribution to the small body of data for early iron smithing in central southern England recovered from excavated sites such as Winklebury, Hampshire (Smith 1977) and Cooper's Farm, Berkshire (Fitzpatrick 1995).

Analysis, by J.G. McDonnell

A small quantity (846 g) of fragments of probable ironworking slag was examined and ascribed to four slag types; iron smithing slag, iron smithing slag/cinder, hammer scale, and hearth lining. A single piece of hearth lining was identified (context 1790, weight 20 g). It is not diagnostic and cannot be ascribed to the ironworking process with certainty, ie, it may have derived from any other 'hearth' activity. Context 1434 contained spheroidal and flake hammer scale. Spheroidal hammer scale consists of small (less than 1 mm diameter) balls of slag formed during smithing; when two pieces of iron are welded together entrapped slag is expelled, forming spheroids which cool in flight. Flake hammer scale is thin flakes of scale formed on the surface of the iron during heating and removed during working. Hammer scale is evidence for blacksmithing having been practised on the site, because scale is normally deposited in the vicinity of the activity. The

Table 32: Ferrous metalworking debris: Total weight (g) by Zone/context

Zone/Context	*Smith*	*Other*	*Other type*
3/1434	-	1	Hammer scale
5/1722	50	-	
5/1728	-	80	Smith/cinder
5/1738	60	-	
5/1745	100	-	
5/1765	50	-	
5/1772 (SF465)	155	-	
5/1777 (SF1164)	110	-	
5/1790	80	20	Hearth lining
5/1797	20	-	Smith/cinder
5/1810	40	80	
Total	665	181	

remainder of the material was identified as either iron-smithing slag or iron-smithing slag/cinder. Both are by-products of the smithing process, the cinder having a higher silica content (probably) due to reaction with the hearth lining. The Potterne slag occurs as small fragments, rarely more than 20 g in weight, and none is in the distinctive form of hearth bottoms.

Sample analysis

Two samples were selected for more detailed analysis in order to confirm or refute the theory that the slag derived from the ironworking process. The full analytical report (AML Report 159/87) is in archive.

The mineral texture and phase percentages (volumetric analysis) were determined using the metallurgical microscope. The chemical composition was determined using a scanning electron microscope with an attached energy dispersive analytical system. Area analyses (ie, 'bulk analyses') were obtained using the raster scan mode at magnification of x200; individual phase analyses were determined using the spot mode.

A typical small lump of slag from context 1772 (SF 465) was taken for analysis. Morphologically, it has an atypical fayalitic slag appearance, grey in colour and slightly vesiculated. The mineral texture of the slag comprised small rounded iron oxide dendrites and massive silicate in a glassy matrix. The percentages of each of the major phases varies greatly from one area to another, which indicates that the slag had never been fully liquid, and had accumulated slowly, each area representing different periods of working or changes in conditions. This is characteristic of iron-smithing slags.

The 'bulk analyses' are less heterogeneous than the optical analyses. The slag is rich in iron oxide, and the phosphorous oxide and alumina contents are high with respect to potassium and calcium oxide contents. The silicate phase (SIL) analysis confirms it as fayalite ($2FeO.SiO_2$). The analysis of the iron oxide phases are typical, and suggest that the iron oxide dendrites are heterogeneous in oxidation state, ie, both wustite (FeO) and magnetite (Fe_3O_4) compositions are present. The glass phase analysis is atypical with respect to the other alkali oxide percentages, with the lime content being very low. The analysis total is greater than 100% and the iron oxide content is high. This suggests that the analysis impinged upon an inclusion of metallic iron.

There is no 'characteristic smithing slag analysis', but two points must be considered. First, there is no significant copper content, therefore the slag does not derive from copper working (smelting). Secondly, there is no significant manganese content which has been found to be the only element characteristic of some iron smelting slags. Therefore, there is no evidence to suggest any other genesis of the slag other than iron smithing.

The sample extracted from context 1777 (SF1164) is more cindery than that from 1772. Morphologically it is similar to a fayalitic slag but with bands or regions of higher silica content. The optical analysis confirms the heterogeneous composition. The mineral texture of the slag comprises rounded iron oxide dendrites, massive silicate, a cubic silicate (?) phase, and bands of an indeterminate mineral(s) in the forms of either needle laths or feathery dendritic crystals. Prills of metallic iron, a few silica inclusions, and a glassy matrix are also present. The cubic silicate phase is probably a spinel, perhaps hercynite. The mineral texture is segregated, like that from context 1772, but the variation is so great that no satisfactory results could be obtained from the volumetric analysis.

The 'bulk analyses' show significant differences between the areas of differing microstructure, notably in the alumina, silica, lime, and iron oxide contents. The ratio of the mean values of silica plus lime to iron oxide varies from 0.7 to 1.7. This reflects the absence of free iron oxide in the feathery microstructure areas. Overall, the analyses differ from the sample from context 1772 in having a higher alkali oxide content and correspondingly lower iron oxide percentages. The phase analyses confirm the silicate as fayalite containing significant magnesia and lime percentages. The second phase contains alumina, silica, and potassium oxide; applying a normative calculation to this composition, kalsilite ($KAlSiO_4$) and orthoclase ($KAlSi_3O$) are the principal mineral constituents. The glass phase totals less than 100%, which is not unusual due to the nature of the glassy phase composition, and should only be treated as semi-quantitative. The composition is atypical being rich in iron oxide. The iron oxide analysis is characterised by the high titania content. This has been recorded in other slag analyses, but has not been satisfactorily explained. It does indicate that the iron oxide has a spinel structure, ie, it is predominantly magnetite rather than wustite. The feathery dendrites and the surrounding glassy phase observed in the silica-rich area of the slag were analysed. The feathers were essentially fayalitic in composition, containing magnesia and lime, but are iron oxide deficient. The surrounding glassy phases are low in iron oxide but vary in the percentage of alkali

Table 33: Struck flint from Cutting 12 by Zone

Zone	*'On-terrace'*		*Intermediate*		*'Off-terrace'*	
	no.	*wt (g)*	*no.*	*wt (g)*	*no*	*wt (g)*
1	23	217	-	-	125	549
2	19	204	4	59	348	2900
3	44	431	4	52	210	2132
4	74	661	3	62	218	2248
5	160	1498	14	140	179	2701
6	127	1420	18	357	179	2026
7	125	1280	15	144	267	2962
8	126	1014	15	78	299	3290
9	99	745	20	143	457	3317
10	31	184	27	310	579	4831
11	19	116	5	23	351	2880
12	16	48	-	-	88	605
13	-	-	6	86	272	3345
14	-	-	5	12	27	192
Total	863	7818	136	1466	3599	33,978

oxides present, and are similar to the glassy phase compositions recorded in other slags.

The optical and chemical analyses of the sample from context 1777 confirm the variable composition observed in the morphological study, with silica-rich areas present. They show that the slag derives from the ironworking process (though there is significant non-ferrous metal content) and that it is a by-product of the iron-smithing process on the basis that there is no significant manganese content and the slag is very heterogeneous. However, the mineral texture and composition of the sample from context 1777 differs significantly from that from context 1772.

10 Worked Flint, by Frances Healy

Struck flint was recovered during every season of excavation, but here only the quantification and sampling of the material excavated from Cutting 12 in 1984 has been undertaken, because it was recovered under the most controlled conditions. This material amounts to over 4000 pieces, which were most abundant in lower zones of the 'off-terrace' Deposit (Fig. 77; further detail in archive). The material from the two largest blocks of trowelled columns (columns 21–2, 26–7, 36–7, 46–7, and columns 102–3, 112–3; Fig. 6) was selected as a sample for further examination. Its composition and incidence are summarised in Table 33. The description which follows applies only to this sample, although brief examination of the total collection from this cutting during quantification indicated that it is representative of the whole. This report was written in 1991.

Raw material and Flintworking

Throughout the sequence most of the raw material consists of nodular chalk flint, black to dark grey in colour with lighter mottling, some cherty and fossil inclusions, and frequent thermal fractures. Cortex, where it remains, is worn and weathered. The generally small nodule size is reflected in the mean core weight of 48 g. This flint is likely to have been collected from the surface of the nearby chalk. The Lower Chalk beneath Potterne Field lies immediately to the east of the site, while the Middle and Upper Chalk which form the Marlborough Downs and Salisbury Plain are situated 8 km and 5 km away respectively (Fig. 1). The artefacts are almost all uncorticated and in fresh condition, although often encrusted, probably with calcium phosphate. Those from the upper zones seem more abraded. There is, however, no difference in the incidence of breakage between upper and lower zones (Tables 34–5).

The full reduction sequence is represented, from flakes with completely cortical dorsal faces to finished implements. Broad, thick-butted flakes were struck, generally with hard hammers, from cores which were often abandoned after a few removals. Evidence of

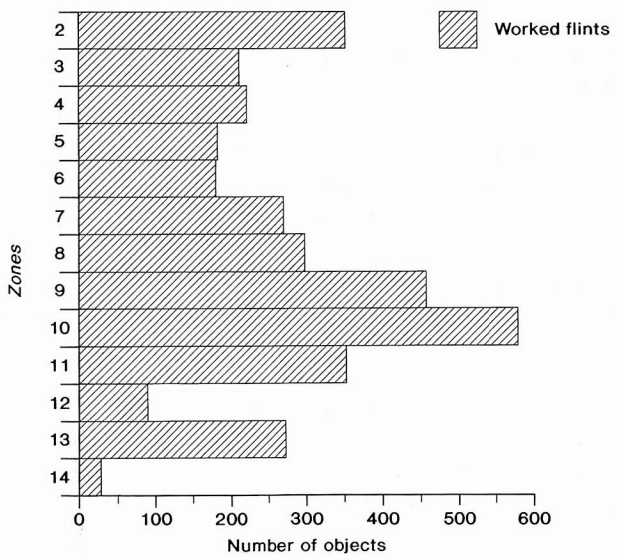


Fig. 77 Worked flint: relative frequency by Zone

Table 34: Overall composition of worked flint assemblage 'off-terrace' columns 21-2, 26-7, 36-7, 46-7

-	*1*	*2*	*3*	*4*	*5*	*6*	*total*	*burnt*	*broken*	*flint:sherds*	
Zone										*no.*	*wt(g)*
1	15	4	-	29	-	1	49	2	23		
2	10	1	-	36	-	1	48	1	22	1:9	1:5
3	3	2	-	6	-	-	11	-	2	1:45	1:52
4	-	2	-	8	-	3	13	1	2	1:69	1:37
5	2	4	-	14	-	32	23	1	6	1:88	1:78
6	-	5	-	17	-	2	24	3	6	1:45	1:26
7	1	4	1	30	-	-	36	15	9	1:14	1:17
8	5	1	-	32	1	3	42	12	8	1:27	1:24
9	2	2	1	26	-	3	34	2	11	1:23	1:22
10	-	2	1	27	1	2	33	6	10	1:19	1:9
11	4	-	-	28	-	1	33	5	13	1:9	1:10
12	-	-	1	9	-	-	10	1	4	1:24	1:28
13	1	1	-	14	-	2	18	4	3	1:5	1:2
14	1	-	-	2	-	1	4	-	2	1:6	1:3
Total	44	28	4	278	2	22	378	57	124		
	11.7%	7.4%	1.0%	73.6%	0.5%	5.8%		15.0%	32.8%		

1 = misc. debitage
2 = cores
3 = core rejuvenation flakes
4 = flakes
5 = blades
6 = retouched

Table 35: Overall composition of worked flint assemblage, 'off-terrace' columns 102-3, 112-3

Type	*1*	*2*	*3*	*4*	*5*	*6*	*total*	*burnt*	*broken*	*flint:sherds*	
Zone										*no.*	*wt(g)*
1	3	1	-	4	-	-	8	-	3		
2	1	1	-	1	-	1	4	-	1	1:39	1:10
3	3	-	-	9	-	1	13	1	6	1:20	1:15
4	1	1	-	8	-	2	12	1	4	1:36	1:312
5	-	1	-	3	-	2	6	-	2	1:47	1:82
6	-	-	-	6	-	1	7	3	2	1:40	1:117
7	-	-	-	14	-	-	14	4	3	1:19	1:29
8	-	1	-	10	-	1	12	1	4	1:23	1:16
9	-	-	-	22	-	-	22	2	12	1:18	1:13
10	1	2	-	27	-	2	32	14	5	1:16	1:14
11	-	3	1	8	-	-	12	3	3	1:12	1:11
13	-	2	-	2	-	-	4	-	1	1:10	1:1
14	1	1	-	1	-	-	3	-	-	-	
Totals	10	13	1	115	-	10	149	29	46		
	6.7%	8.7%	0.7%	77.2%	0.0%	6.7%		19.5%	30.9%		

1 = misc. debitage
2 = cores
3 = core rejuvenation flakes
4 = flakes
5 = blades
6 = retouched

platform preparation or core rejuvenation is rare and hinge fractures are common.

Retouched forms

These are confined to scrapers, borers, coarse denticulates, an atypical 'fabricator', and miscellaneous forms (Table 37). Scrapers are characteristically thick and steep, with their modified edge formed by a few relatively large removals. The bulbar ends of two otherwise unmodified flakes have been thinned by the removal of Janus flakes.

Sequence

The most obvious change through time is that struck flint became progressively less frequent. This is evident in absolute numbers, and there is a distinct drop in the frequency of flint in relation to pottery between Zones 7 and 6 (Tables 34–5; Fig. 77).

High frequencies of miscellaneous debitage in Zones 3–1 (Tables 34–5) reflect the presence of small fragments of flint, from which unusually small flakes have apparently been removed. The fragments have maximum dimensions of 20–30 mm, with correspondingly small flake scars. A very few small flakes

Table 36: Flint cores by zone

	Columns 21-2, 26-7, 36-7, 46-7						*Columns 102-3, 112-13*					
Zone	*1*	*2*	*3*	*4*	*5*	*Totals*	*1*	*2*	*3*	*4*	*5*	*Totals*
1	1	-	2	1	-	4	-	-	1	-	-	1
2	-	1	-	-	-	1	-	-	-	1	-	1
3	-	-	1	-	1	2	-	-	-	-	-	-
4	-	1	-	1	-	2	-	-	-	-	1	1
5	1	-	1	-	2	4	-	-	-	-	1	1
6	-	-	2	2	1	5	-	-	-	-	-	-
7	-	-	1	-	3	4	-	-	-	-	-	-
8	-	1	-	-	-	1	1	-	-	-	-	1
9	-	1	-	-	1	2	-	-	-	-	-	-
10	-	-	1	1	-	2	-	-	-	-	2	2
11	-	-	-	-	-	-	-	-	1	-	2	3
12	-	-	-	-	-	-	-	-	-	-	-	-
13	-	-	1	-	-	1	-	1	-	-	1	2
14	-	-	-	-	-	-	-	-	-	-	1	1
Totals	2	4	9	5	8	28	1	1	2	1	8	13

1 = tested nodule, etc.
2 = single platform flake core
3 = multiplatform flake core
4 = keeled, non-discoidal flake core
5 = unclassifiable/fragmentary core

Mean weight of complete core, excluding tested nodules, 48g.

Table 37: Flint; retouched forms by Zone

	Columns 21-2, 26-7, 36-7, 46-7							*Columns 102-3, 112-13*						
Zone	*1*	*2*	*3*	*4*	*5*	*6*	*Totals*	*1*	*2*	*3*	*4*	*5*	*6*	*Totals*
1	-	-	-	-	1	-	1	-	-	-	-	-	-	-
2	-	-	-	-	1	-	1	1	-	-	-	-	-	1
3	-	-	-	-	-	-	-	1	-	-	-	-	-	1
4	-	-	-	-	1	2	3	-	1	-	-	-	1	2
5	1	-	-	-	1	1	3	-	-	-	1	1	-	2
6	-	-	1	-	1	-	2	-	1	-	-	-	-	1
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	1	-	-	-	2	-	3	1	-	-	-	-	-	1
9	-	1	-	-	2	-	3	-	-	-	-	-	-	-
10	-	-	1	-	1	-	2	-	-	1	-	1	-	2
11	-	-	-	-	1	-	1	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	1	-	-	-	1	-	2	-	-	-	-	-	-	-
14	-	-	-	-	-	1	1	-	-	-	-	-	-	-
Totals	3	1	2	-	12	4	22	3	3	-	1	2	1	10

1 = scrapers
2 = piercers
5 = misc. retouched
4 = 'fabricator' or rod
3 = denticulates
6 = hammerstones

are also present. Such material is absent from the lower zones. It may have resulted from tillage rather than from deliberate human action.

Affinities

The overall technology and typology of the sample match those of the Bronze Age industries of southern England, summarised by Ford *et al.* (1984) and exemplified locally at several sites on the Marlborough Downs (Harding 1992). The identification of Late Bronze Age industries is a matter of caution, since residual lithic material is often present in deposits of this period. Given the generally fresh condition of the Potterne material and its appearance throughout the Deposit, however, the bulk of it is likely to be contemporary with the other material with which it was excavated.

The contemporaneity of similar flint industries with post-Deverel-Rimbury pottery is indicated by the coincidence of their distributions with those of Late Bronze Age material in the ditches of North Ring, Mucking (Bond 1988, 23–5, figs 28–9) and Lofts Farm (Brown 1988, 276–80, figs 18–20), both in Essex. A Late Bronze Age industry also seems to have been present at Queen Mary's Hospital, Carshalton, Surrey (Adkins and Needham 1985, 41), and another has been excavated from Runnymede Bridge, Egham, also in Surrey (S. Needham, pers. comm.).

Some earlier material, however, was present. Special Finds from Cutting 12 include two leaf arrowheads (SF730 and SF1122), a form most usually

Table 38: Burnt flint from Cutting 12 by Zone

Zone	*Total*		*'On-terrace'*			*Intermediate*			*'Off-terrace'*		
	no.	*wt (g)*	*no.*	*wt (g)*	*no. of conts.*	*no.*	*wt (g)*	*no. of conts.*	*no.*	*wt (g)*	*no. of conts.*
1	32	115	5	32	4	-	-	-	27	83	18
2	139	656	8	58	5	2	14	1	129	584	62
3	41	339	7	255	5	1	7	1	33	77	26
4	30	444	16	246	11	2	34	2	12	174	9
5	53	496	15	136	9	2	78	2	36	282	21
6	50	658	32	517	12	1	5	1	17	136	14
7	97	1066	51	503	16	3	15	3	43	548	26
8	171	1699	60	658	15	5	82	4	106	959	49
9	303	2684	39	1018	12	7	71	3	257	1595	60
10	328	2554	15	134	8	8	53	5	305	2367	79
11	205	1997	8	55	2	1	2	1	196	1990	62
12	64	396	1	1	1	-	-	-	63	395	23
13											
con 350	59	520	-	-	-	-	-	-	59	520	19
con 3514	78	818	-	-	-	-	-	-	78	818	26
sub-total	137	1338	-	-	-	-	-	-	137	1338	45
14	8	65	-	-	-	-	-	-	8	65	2
Total	1658	14507	257	3553		32	361		1369	10593	

found in Early or Middle Neolithic contexts (Green 1980, 93), a ripple-flaked oblique arrowhead (SF 813), most usually associated with Grooved Ware (Green 1980, 115–16) and six 'thumbnail' scrapers (SFs 553, 876, 1194, 1626, and 1768), such as are most usually associated with Beaker pottery (Smith 1965, 107). The few blades and blade-like flakes, also likely to represent an earlier technology, are more often glossed or edge-damaged, or both, than is the bulk of the collection. The total volume of such material seems slight, however, unless it was concentrated outside the area of Cutting 12.

11 Burnt Flint, by Elaine L. Morris

A total of 1658 fragments of burnt flint (14,507 g) was recovered from Cutting 12 (Table 38). The majority of this material occurred in Zones 13–8 'off-terrace' (Fig. 78) and Zones 9–6 'on-terrace', and is likely to have been associated with the occupation activities and subsequent pyrotechnic activities at the Deposit itself or from occupation nearby. The significant decrease in the presence of burnt flint from 'off-terrace' Zones 7–3 suggests that the activity represented by the burnt flint was no longer occurring there, or at the source of the other artefactual material found in the Deposit. Perhaps not coincidentally, the decrease in occurrence of burnt flint in the upper zones follows a similar decrease in the use of flint-tempered pottery (Fig. 43). The burning of flint may well have been part of the process of producing suitably sized grains for inclusion as temper in pots. The particular interest with the Potterne assemblage lies in the fact that all the flint found on the site was brought to it, albeit only a short distance, since Potterne lies on Greensand (Fig. 1).

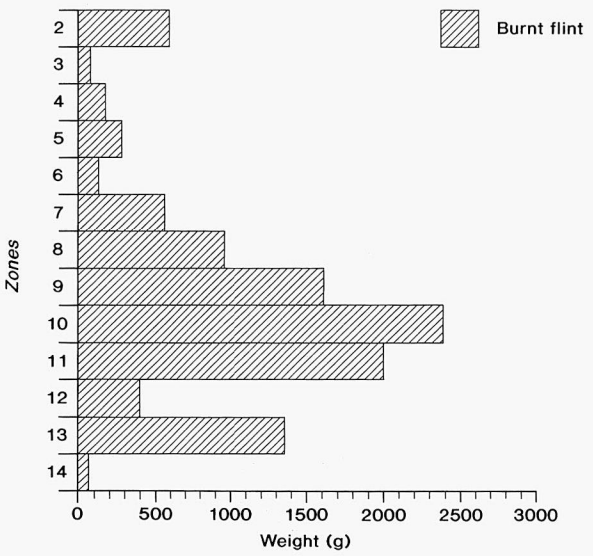


Fig. 78 Burnt flint: relative frequency by Zone

12 Shale and Jet, by Sarah F. Wyles

A total of 88 shale artefacts was recovered. The objects consist of 67 bracelets, 3 beads, 2 pendants, parts of 2 vessels, and 14 roughouts and fragments. Table 39 shows the occurrence of material type by Zone and Figure 79 the distribution of objects by Zone. Full descriptions of the objects are in archive. The bracelet type series and a selection of other objects are illustrated in Figures 80 and 81. The assemblage is described here as being shale, but in the absence of X-ray fluorescence (XRF) analysis (Bussell *et al.* 1981), the identification must remain uncertain. The Isle of Purbeck, Dorset, would be the most likely source. Only one small bead (Fig. 81, 23) has the appearance of jet.

Beads

Two shale and one ?jet bead (Fig. 81, 22–4) were found, one during wet sieving. They differ in shape but

Table 39: All shale objects, totals by Zone

Zone	*Beads*	*Bracelets*	*Pendants*	*Rough-outs/ fragments*	*Vessels*	*Total per zone*
1	-	2	-	-	-	2
2	-	7	1	-	-	8
3	-	6	-	2	-	8
4	-	8	1	3	1	13
5	2	4	-	1	-	7
6	-	6	-	1	1	8
7	-	5	-	1	-	6
8	-	8	-	1	-	9
9	-	3	-	1	-	4
10	-	7	-	-	-	7
11	-	1	-	-	-	1
12	-	-	-	-	-	0
13	-	5	-	4	-	9
Unzoned	1	5	-	-	-	6
Total	3	67	2	14	2	88

are typical of others in glass and amber. One (Fig. 81, 24) is disc-shaped with slightly concave top and bottom surfaces. It is similar to the shale bead found at the Manton barrow (Annable and Simpson 1964, fig. 203). Another disc-shaped bead (Fig. 81, 22) has an uneven thickness and is similar to a shale bead from Danebury (Cunliffe 1984, fig. 7.41, 4.6). Both shale beads were retrieved from 'off-terrace' Zone 5, about 4 m apart.

The third bead (Fig. 81, 23) is much finer, more spherical in shape and probably made from jet. It is similar in style to one from a bell barrow inhumation burial at Upton Lovell (Annable and Simpson 1964, fig. 341). It is noteworthy that this bead was found in a stratigraphically early, pre-Deposit, linear feature (235) 'on-terrace' in Cutting 2.

Bracelets

The 67 bracelet fragments comprise 76% of the assemblage. Most appear to be of a typical shape for the period and are sub-divided into ten groups on the basis of their cross-sections (Fig. 80, 1–10): plano-convex (15 frags), lenticular (9), rectangular (4), square (4), triangular (4), quadrant section (4), rectangular-radial (9), circular (6), triangular with conical inner surface (2), and trapezoidal (10). All the types with more than four examples occur throughout the Deposit and it is impossible to identify changes within the type series through time.

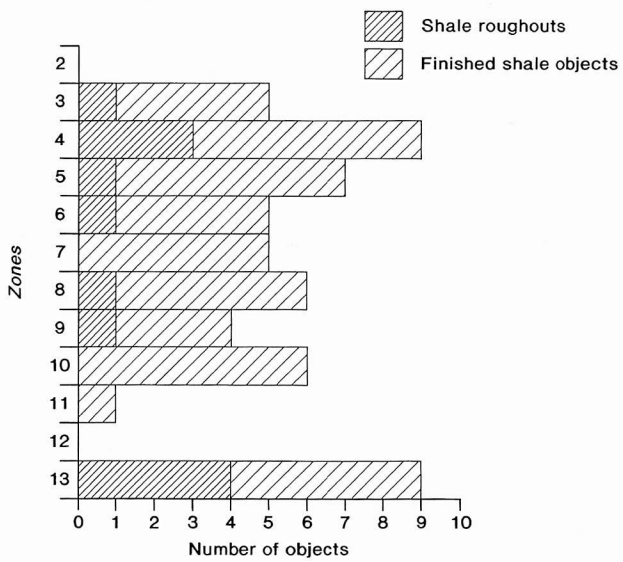


Fig. 79 Shale objects, relative frequency by Zone

The diameters of the bracelets range from 40 mm to 85 mm, with a mean of 61.3 mm. Approximately 65% of the bracelets had diameters greater than 60 mm, by comparison with 80% of measurable examples from the Early–Middle Bronze Age production site of Rope Lake Hole, Dorset. This is presumably the minimum size which could fit over an adult hand (Cox and Woodward 1987, 165).

Only three bracelet fragments were decorated, all from the upper zones of the Deposit. One piece, of ?trapezoidal section (Fig. 81, 13), appears to have had a simple grooved line running centrally around the outer face, although the bracelet had split along that line and only half the object was recovered. There was similar decoration on a shale bracelet (with a complete cross section) of Iron Age date from Meare Lake Village, Somerset (St George Gray 1948, pl. liii, K100).

The second decorated piece (Fig. 81, 12) has a triangular cross-section with raised ridges at the edges, creating parallel grooves along the edges of the outer face, and a pronounced peak in the middle. It is similar to a bracelet found at Rope Lake Hole (Cox and Woodward 1987, fig. 93, 128).

The third piece (Fig. 81, 11) has two deep parallel grooves running around the outer face, creating narrow ridges at either edge, and a wide central ridge which bears an incised dog-tooth pattern. The shape and grooving are similar to that on a decorated bracelet at All Cannings Cross (Cunnington 1923, pl. 26, fig. 5) and on another with the same cross-section, found in a pit at Meon Hill, Hampshire in association with Early Iron Age pottery and bone tools (Liddell 1933, fig. xv, V3).

Pendants

Two bracelet fragments (Fig. 81, 15, 16) are not included in the bracelet statistics. Both have holes drilled at one end, that end being smoothed, suggesting that the pieces had been reworked for reuse as pendants, rather than being repaired bracelets. Both pieces are *c.* 50 mm long and were found towards the top of the Deposit (one in Cutting 3, the other in intermediate Zone 4). There was a similar object, comparable to the thicker of the two pieces (Fig. 81, 15), from All Cannings Cross (Cunnington 1923, pl. 26, 2). Two examples from Meare Lake Village (St George Gray 1948, pl. liii, K58, K54) had holes at both smoothed ends and it was suggested that they were made intentionally as handles or as the central components of necklaces. A perforated bracelet fragment from Eldon's Seat, Dorset, with the hole bored at a right-angle to the plane of the bracelet, may have been intended to take a strap cord in order to join two free ends to form a composite bracelet (Rule 1968, fig. 21, 57).

Roughouts and Fragments

Fourteen roughouts, or part-worked shale fragments, were recovered. Seven of the pieces are roughouts for bracelets (Fig. 81, 17–20), the others are probably so. All of this material is consistent with the handworking of shale.

Evidence for the manufacture of roughouts from unworked raw material, involving either the bifacial chiselling of a circular central core or the gouging of a small circular hole from one face, and then the extension of the hole outwards, is known from excavations on the site of the shale industry on the Isle of Purbeck (Cox and Woodward 1987, 165), and at Eldon's Seat (Cunliffe and Phillipson 1968, pl. vi, 197). Potterne, however, produced only roughouts, and finished or semi-finished bracelets, with no examples of any circular central cores, and no small waste fragments being recovered during wet-sieving. The material was recovered throughout the Deposit, with particular concentrations in 'off-terrace' Zones 4 and 13.

Vessel Fragments

Two vessel fragments (Fig. 81, 21), both decorated with an irregular hole and groove pattern, are thought to belong to the same vessel. Dot and groove patterns are present in the range of pottery decorations at Potterne but no ceramic vessel appears to have been decorated in the same way. The fragments are well-finished although the object they represent was probably not lathe turned, a technique for vessel manufacture making its first general appearance in the Middle Iron Age, around 300 BC. The object was not necessarily a closed vessel as no base is known. However, it was perforated and grooved, possibly to receive an inlay. If that were the case, its closest analogue might be the remarkable boat model from Caergwrle, Flintshire (Savory 1980, 69) which is thought to be of Late Bronze Age date. Similarly, the shale armlet with tin inlay from Flag Fen, Cambridgeshire may also provide another example of the possible form of decoration (Coombs 1992, fig. 6, 10). Rather than being purely functional, the piece is likely to have had a prestige value, and to have been admired for its aesthetic qualities and craftsmanship, like the small cups of gold and shale of the earlier prehistoric periods (Barrett 1985, 115). So unusual are the two fragments from Potterne that they must belong to the same object and, on the assumption that they were discarded at the same time, they demonstrate a stratigraphic link between contexts in Zone 4 'on-terrace' and Zone 6 'off-terrace'.

Discussion

Despite the large quantity of material, it is not possible to determine whether the Potterne shale and jet assemblage is unusually large or particularly diverse in range, because the data necessary for creating a comparative index of material between sites (for example, the number of shale objects to the number of pottery sherds) are rarely available from other excavation reports. However, while the jet/shale bead (Fig. 81, 23) and the vessel (Fig. 81, 20) may be considered prestigious items, the majority of the assemblage is not exceptional.

Exchange

Shale could have reached sites in Wiltshire in an number of forms during the 1st millennium BC: as blocks of unworked shale, as semi-finished artefacts and roughouts, or as finished artefacts. As at Brean Down (Foster 1990) and All Cannings Cross (Wyles 1986), the raw material was probably acquired, via a trading system, from Kimmeridge in Dorset, some 80 km from Potterne. The assemblage is dominated by personal ornaments which were presumably highly desirable and easily transportable. Indications that the trade or exhange of shale artefacts was mostly in the form of ornaments (in a rough or finished state) can be found by comparing the composition of assemblages close to the source of the material with those further afield.

Sites located close to the source of the raw material have produced high percentages of roughouts and non-personal ornaments. Of the 739 fragments retrieved at Eldon's Seat, for instance, only 15 (2.0%) appear to have been bracelets (Rule 1968, 226), the remainder being roughouts and waste. This trend continued in the Early–Middle Iron Age (period 1, phases II and II) shale assemblage at Rope Lake Hole, less than 1 km from Eldon's Seat, where only 3 of 129 artefacts (2.3%) were bracelets (Cox and Woodward 1987, fig. 87).

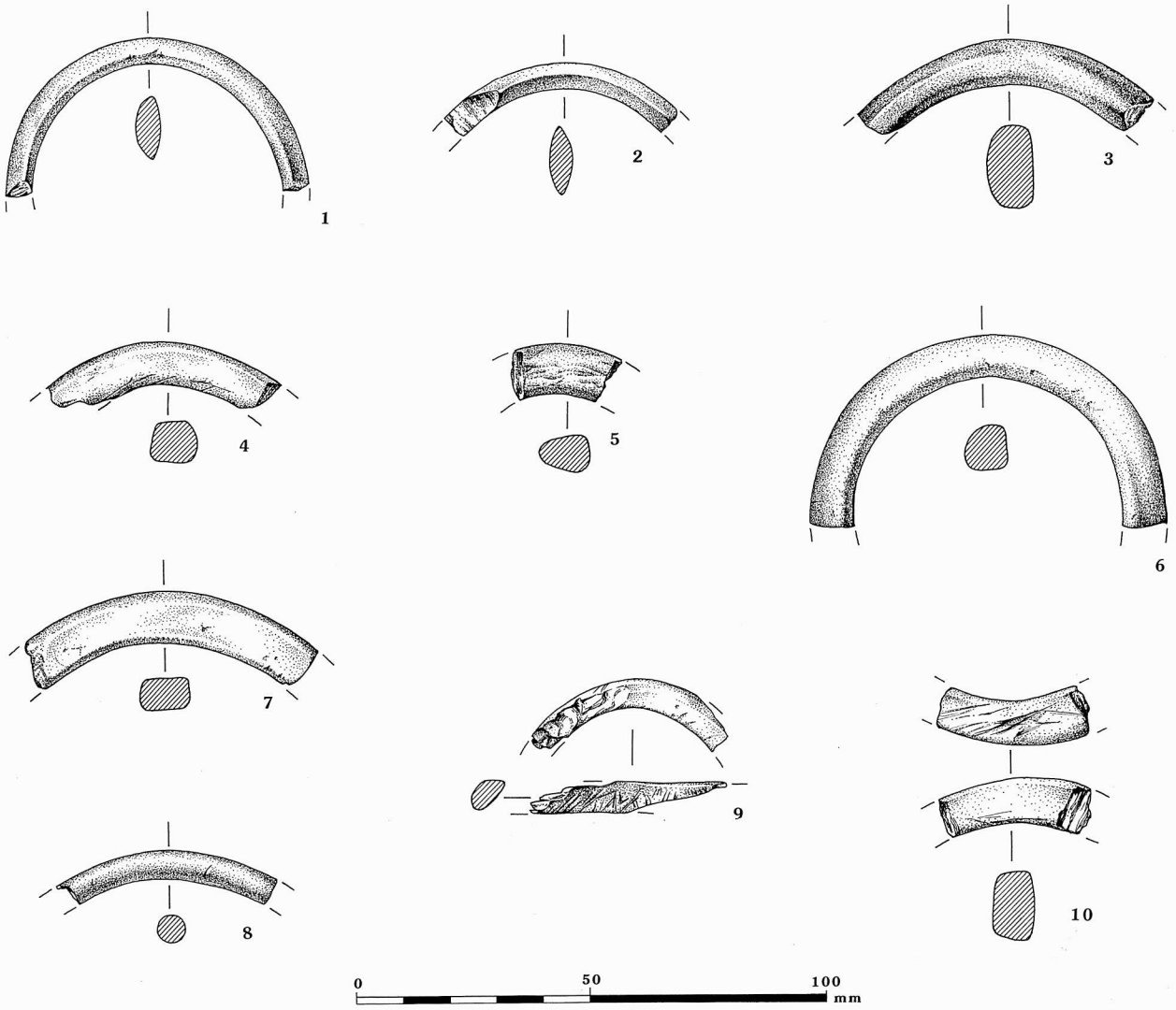


Fig. 80 Shale objects, 1-10. Scale 2:3

Assemblages of shale artefacts have been recovered at a number of later prehistoric sites in Wiltshire (Wyles 1986) including the broadly contemporaneous assemblage from All Cannings Cross (21 artefacts). Like the Potterne Deposit, the site at Cold Kitchen Hill also has its origins in the later Bronze Age, but the midden and temple were also in use in the Romano-British period, so that it is not certain at what date items in the shale assemblage (33 artefacts) first appeared on the site. Of these sites, Potterne has the lowest percentage of decorated bracelets (3%), Cold Kitchen Hill having the highest (30%) (Wyles 1986, table 4) and all the assemblages are very much smaller than those close to the source of the raw material. Beyond Wiltshire, the three plain shale bracelets from Runnymede Bridge, Egham (Needham and Longley 1980) fit into the Potterne type series. A single shale bracelet was also recovered at Petters Sports Field, Egham (O'Connell 1986), and a single decorated bracelet fragment at Meon Hill (Liddell 1933, 153).

The general trend, therefore, seems to be that the further a site was from the source of the shale, the smaller the assemblage of shale artefacts and the higher the proportion of finished objects, including bracelets, to roughouts and waste. It is also possible that great care was exercised in finishing objects from imported roughouts, thus leaving few broken fragments to be discarded.

Manufacture

The presence on some sites of roughouts and fragments indicates that at least some of the shale was imported either as unworked blocks or in a semi-finished state (Cunliffe 1984, 396). The shale assemblage at All Cannings Cross, for instance, included four roughouts and fragments (19% of the material) (Wyles 1986). At Potterne, the similarly small number of roughouts (16% of the assemblage), as well as the total absence either of unworked shale blocks and large lumps of waste material from the excavation, or small waste fragments from the wet sieving, suggest

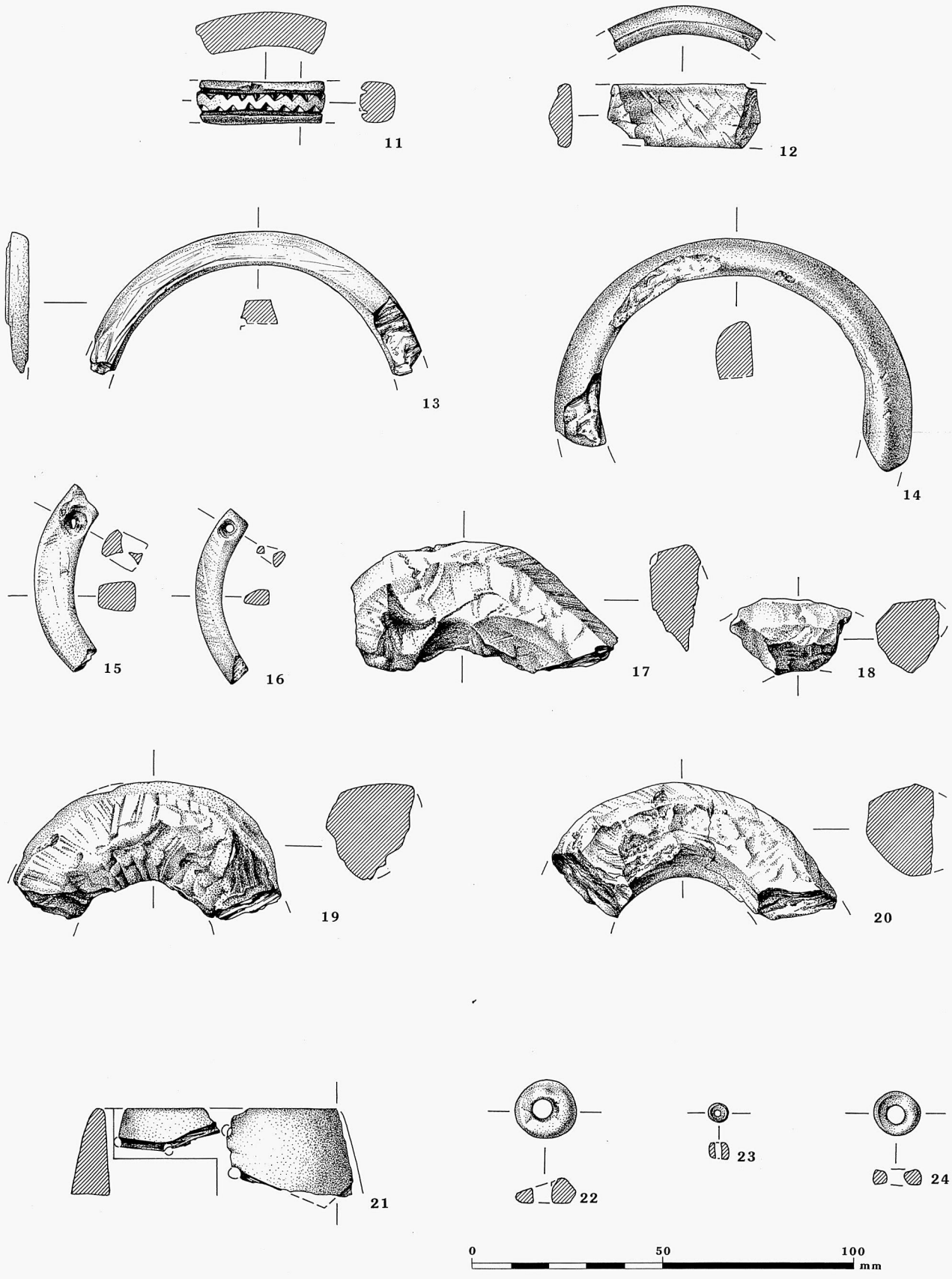


Fig. 81 Shale and possible jet objects, 11-24. Scale 2:3

that most of the artefacts were manufactured elsewhere. Only a small amount of unfinished shale seems to have been imported for working on site, apparently into bracelets, fragments of which were found in trimmed but not fully smoothed or polished forms. The total lack of shale spalls and waste fragments could be explained either by the fact that shale burns well, and/or because the fragments were quickly reduced by lamination. It is not possible to determine whether the vessel or highly decorated bracelet were manufactured locally and there is no evidence that any of the pieces were lathe turned.

Discard and distribution

The distribution of the shale objects within the Deposit is summarised in Table 39. The roughouts and fragments tended to recorded in or near the loose clusters of shale artefacts which were apparent in most zones. The sample, however, is too small to allow more than general patterns to be discerned. Apart from the fine jet/shale bead recovered from a pre-Deposit feature, all the finer pieces, ie, the beads, the decorated bracelets, and the vessel, came from the upper part of the Deposit in Zones 6–3. The remaining bracelets and roughouts, however, were present throughout the Deposit.

For the 'off-terrace' area, it is clear that there was an initial peak of nine objects (5 undecorated bracelet fragments and 4 roughouts), in the concreted layer of Zone 13 at the interface between the Deposit and the underlying Greensand. These possibly reflect pre-Deposit activity on the site. The frequency of shale objects then falls markedly with a single item in Zone 11, at the base of the Deposit, to a peak of nine objects in Zone 4 (Fig. 79), suggesting a gradual, although uneven, increase in the deposition of shale objects over time. Roughouts constituted four of the nine items in Zone 13 (44%), but did not occur again until Zones 9–5 in which there were only single incidences, followed by three pieces in Zone 4.

These distributions may suggest a break in the supply of the raw material, which in turn affected the availability of finished shale artefacts. However, if the supply of the raw material to Potterne did dry up, the high social value given to this exotic product may have stimulated alternative trade networks circulating primarily finished items and producing, after only a short break, a relatively steady supply of shale personal ornaments.

List of illustrated shale and jet objects

Fig. 80

1. Bracelet frag.; plano-convex section; context 2020, 'on' Zone 6
2. Bracelet frag.; lenticular section; SF801, context 2581, 'off' Zone 9
3. Bracelet frag.; rectangular section; SF439, context 1773, 'off' Zone 5
4. Bracelet frag.; square section; SF511, context 1993, 'off' Zone 6
5. Bracelet frag.; triangular section; SF675, context 2368, 'off' Zone 8
6. Bracelet frag.; quadrant section; SF426, context 1614, 'off' Zone 4
7. Bracelet frag., rectangular-radial section; SF440, context 1565, 'off' Zone 4
8. Bracelet frag.; circular section; SF977, context 2426, 'off' Zone 8
9. Bracelet frag.; triangular with conical inner surface section; SF999, context 1519, 'off' Zone 4
10. Bracelet frag.; trapezoidal section; SF957, context 2418, 'off' Zone 8

Fig. 81

11. Bracelet frag.; incised dog-tooth decoration; SF1224, context 1521, 'off' Zone 4
12. Bracelet frag.; concentric ridge and groove decoration; SF419, context 1421, 'on' Zone 3
13. Bracelet frag.; incised concentric grooved decoration; SF445, context 1520, 'off' Zone 4
14. Bracelet frag.; manufacturing marks on inner surface; SF514, context 1829, 'off' Zone 5
15. Pendant; reused bracelet frag.; SF136, context 61, 'off' Zone 2
16. Pendant; reused bracelet frag.; SF1055, context 1650, intermediate Zone 4
17. Bracelet roughout; SF1176, context 3464, 'off' Zone 13
18. Bracelet roughout; SF1145, context 3366, 'off' Zone 13
19. Bracelet roughout; SF510, context 1977, 'off' Zone 6
20. Bracelet roughout; SF896, context 2228, intermediate Zone 7
21. Vessel frags; hole and groove decoration; SF 1067, context 1635, 'on' Zone 4; SF1240, context 1923, 'off' Zone 6
22. Bead; SF 429, context 1710, 'off' Zone 5
23. Jet/shale bead; 1983, SF1949, context 218, sample 60
24. Bead; SF425, context 1719, 'off' Zone 5

13 Worked Stone,
by Rachael Seager Smith

A total of 234 worked stone objects was recovered. The assemblage consists of a wide range of objects including quernstones, hammerstones, rubbers, whetstones, spindle whorls, loomweights, and axe fragments as well as a variety of miscellaneous types. The terminology used to describe the worked stone is based on that defined by Gingell (1992) for the Marlborough Downs project. Of these only the 22 selected for illustration (Figs 83–5) are described here, although a catalogue of all stone artefacts is in archive

A total of 165 worked stone objects (70% of the assemblage) was recovered during the 1984 season and can be assigned to a particular Zone in the Deposit

Table 40: Worked stone objects from 'off-terrace' contexts

Zone	*Querns*	*Whetstones*	*Hammers/rubbers*	*Other*	*Miscellaneous*	*Total*
2	1	2	1	-	-	4
3	2	1	2	-	-	5
4	3	-	2	1 spindle whorl	1	7
5	4	2	6	-	3	15
6	4	2	2	-	3	11
7	9	1	1	-	1	12
8	18	-	3	1 loomweight	1	22
9	10	2	4	2 burnishers	3	21
10	10	-	3	-	2	15
11	4	-	-	-	1	5
12	1	-	-	-	-	1
13	1	-	-	-	1	2
Total	67	10	24	4	16	121

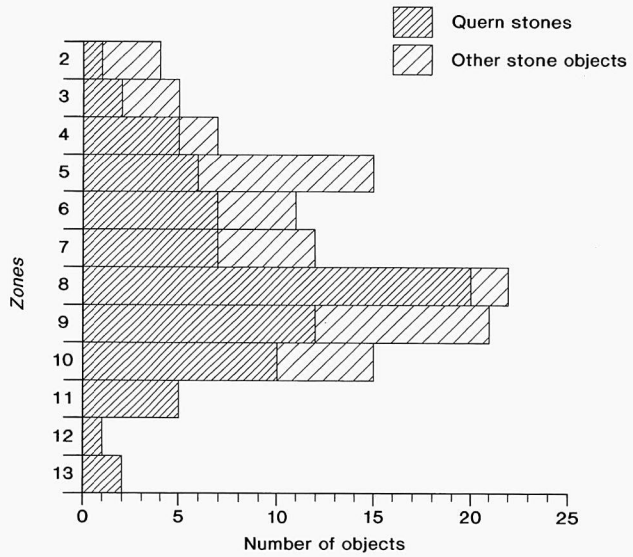


Fig. 82 Worked stone: relative frequency by Zone

(Table 40). Five objects cannot be assigned to zones, two being unstratified and the other three (two saddle quern fragments and a rubber/hammerstone) being recovered from features at the base of the Deposit. The distribution of the worked stone by zone is shown in Figure 82.

Unworked stone was also collected on site, because it was unusual in the otherwise fine homogeneous matrix of the Deposit, and because at times it formed part of the visible spreads of material. No geological identifications were made, but it is probable that the bulk of this assemblage consists of Greensand and sarsen stone types. This material is not discussed further here, but details of the contexts and quantities collected can be found in the archive.

Raw materials

Limited geological identifications were undertaken by C.J. Gingell, and by D.F. Williams, but the rock types utilised for the bulk of the assemblage remain unidentified and, consequently, this report concentrates on a discussion of the object types present. However, from the restricted identifications available, it seems that the majority of the objects were made from the local resources of sarsen and Greensand. Potterne itself lies on Gault and Upper Greensand and the harder Lower Greensand outcrops some 2.5 km north-west of the village (Fig. 1). Chalk was also used for items such as spindle whorls and loomweights for which a less durable rock type would suffice. Of the non-local stones, such as the quern fragments of probable Pennant Sandstone from the South Wales/Bristol area (Fig. 83, 1) and the tourmaline granite from Devon or Cornwall (ident. D.F. Williams), sources in the south-west of Britain appear to predominate. This situation is paralleled at a variety of other sites in the region, including those on the Marlborough Downs (Gingell 1992) and at All Cannings Cross (Cunnington 1923, 24–8).

Quernstones

Fragments of 116 quernstones were recovered. Quern fragments occurred in every level of the Deposit (Fig. 82) and are the single most common worked stone object present in the assemblage.

With the exception of one fragment of a rotary quern which may be of Romano-British date (1983, Cutting 4, SF77, context 11) all the pieces appear to be derived from saddle querns. No complete lengths or widths were preserved but a selection of the fragments present is illustrated in Figures 83 and 84. Fragments of both upper and lower stones were identified, lower stones being far more numerous, although the fragmentary nature of the assemblage makes many of these identifications tentative. In general, the lower stones can be characterised by having at least one heavily modified, flat or slightly hollow surface which is pecked, worn but granular, or highly polished with wear of the 'stone-on-stone' type. The upper stones, however, generally have a convex grinding surface with polished wear as for the lower stones. Where identified, sarsen and Greensand seem to be the most common

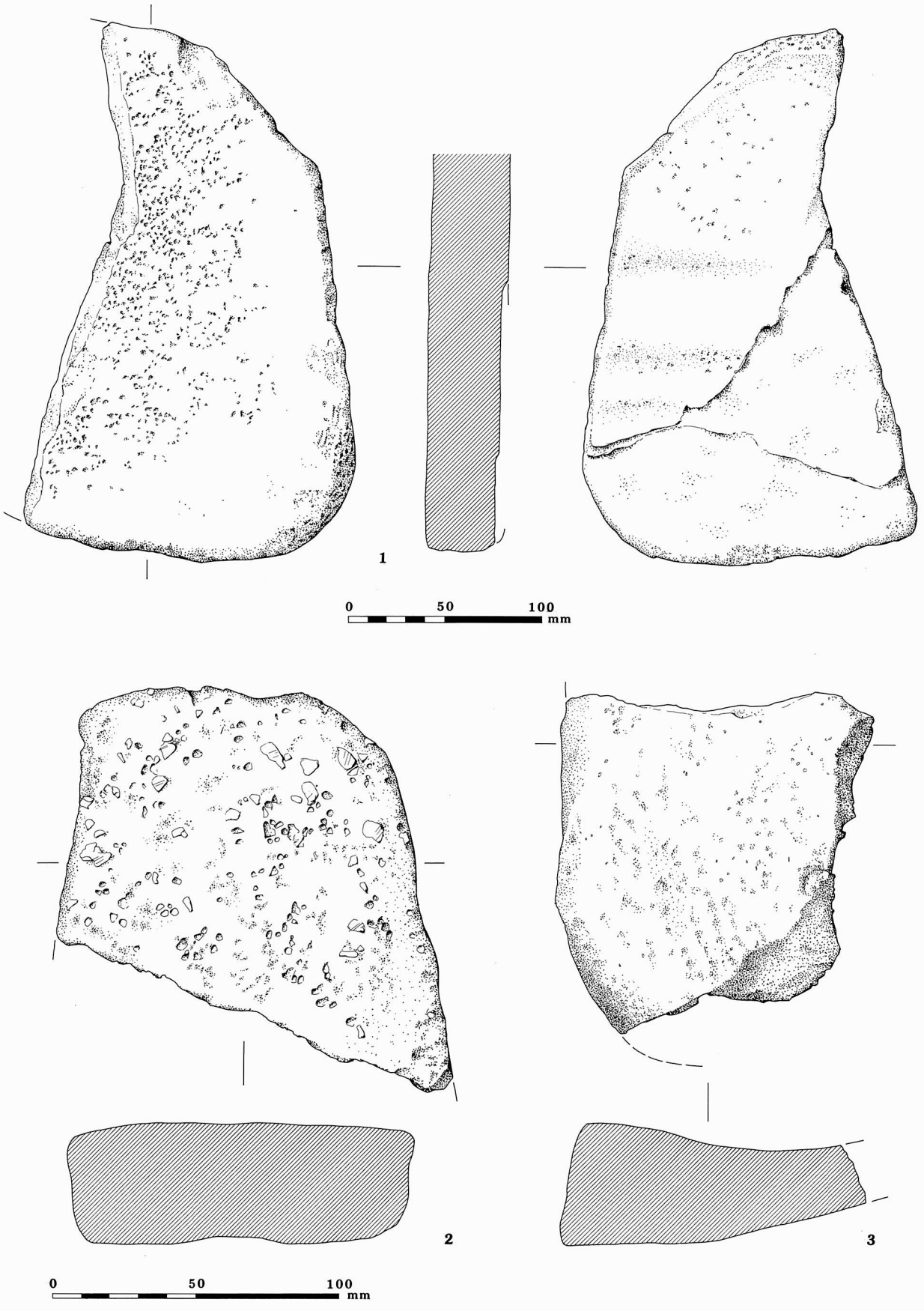


Fig. 83 Worked stone objects, 1-3. Scale 1:2

stone types used. Smith (1977, 108) has already noted the possibility of Greensand quern production in the Vale of Pewsey, although it is interesting to note the range of other imported rock types at this site, such as the Pennant Sandstone and the granite from south-west England.

Mullers, Rubbers, and Hammerstones

This group consists of 43 objects which, although differing in appearance, are considered together as being hand-held abrading, smoothing, polishing or hammer tools (Figs 84–5, 7–13). Again, sarsen and other sandstones probably from the Greensand series predominate, although hammerstones of quartzite pebbles also occur. Mullers (Fig. 84, 7) are frequently found wherever sarsen saddle querns are abundant (Gingell 1992, 118). Cunnington (1923, 24–6) suggested that these implements were used to dress the working surface of saddle querns once the original surface had lost its abrasive quality through excessive wear, although, as Gingell (1992, 118) notes, the high polish on some areas of these stones may indicate a different, secondary function for at least some of these tools. Rubbers (Fig. 84, 12; Fig. 85, 13) generally have at least one flat or convex working surface and may have served as the upper stones of querns, although the occurrence of facets of more intensive wear on at least some of these objects may indicate their use against smaller objects (*ibid.*, 118).

A variety of hammerstones was also recovered. Simplest among these are unaltered quartzite pebbles, generally roughly oval in shape and of convenient size to be held in the palm of the hand, with areas of battering around the edges. These are probably associated with flint or possible sarsen working. More frequent were the group of sarsen hammerstones, generally cylindrical, ovoid or cuboid in shape (Fig. 84, 8–11). Sarsen cylindrical hammers also occur in mid and west Wiltshire; there are examples, in Devizes Museum, from the Avebury area in the W. Browne collection, from the Avebury Downs in the Brooke collection, and from Wedhampton, Cold Kitchen Hill, and Brixton Deverill. Pecked and ground cuboid hammers also occur in the Avebury area (W. Browne collection) at the Early Iron Age site at Westbury Ironworks, and at Cold Kitchen Hill. The use of these objects remains uncertain, although the occurrence of pecked and grooved facets and stone-on-stone type polish on the flat surface may indicate an abrasive rather than hammering function.

Burnishing Stones

Three examples of burnishing or other rubbing stones were also recovered, one (Fig. 85, 14) in 1983 from near the top of the Deposit in Cutting 3, the other two in 1984 from 'off-terrace' Zone 9. While of irregular shape, all three examples have at least one highly polished working surface and this, in the case of the illustrated example, is overlaid by heavy scoring produced by a round pointed implement such as an awl. All three examples are of iron ore, probably derived from the Lower Greensand. A similar although more regularly shaped 'haematite burnisher', with parallels in Neolithic and later prehistoric examples from Orkney, the Western Isles and the Scottish mainland, is known from Bishops Cannings Down (Gingell 1992, fig. 86, 13).

Whetstones

Nineteen whetstone fragments were recovered (Fig. 85, 15–19) from Zones 9–2. Most are roughly rod or pillow-shaped and of a hard, fine-grained material, mainly from sources in south-west England, with the entire surface showing signs of use. However, one object within this group (Fig. 85, 16), from 'off-terrace' Zone 9, is of Greensand and has its wear confined to five regular, cylindrically-shaped, abraded hollows. It is possible that this form of wear is the result of smoothing cylindrical castings, such as sockets or ferrules (C.J. Gingell, pers. comm.). Another example of this sort of wear on a Greensand whetstone can be found in the assemblage (not illus.; SF517, 'off-terrace' Zone 7).

Spindle Whorls

Three chalk spindle whorls were recovered, one (Fig. 85, 20) in 1983 from Cutting 2, and two in 1984 from intermediate Zone 6 (Fig. 85, 21) and Zone 4. Given the large number of spindle whorls of other material types, especially baked clay and reused pottery (Hall, above), the low number of stone spindle whorls is not surprising. At All Cannings Cross (Cunnington 1923, 28) where 15 chalk spindle whorls were recovered, those of other material types were outnumbered by more than 2:1.

Weights

There were two fragments of chalk weights, one (Fig. 85, 22) from 'off-terrace' Zone 8, the other (SF1580) from 'on-terrace' Zone 12 (a depth which would probably place it in an unidentified feature). It is difficult to determine the actual shape of these. The presence of stone weights in addition to clay loomweights at the site (Hall, above) places the total number of weights at seven. Whether these were used in weaving, as thatch weights or for another purpose is not certain.

Ground Stone Tools

Fragments of three ground stone tools were recovered; none is illustrated. An axe fragment identifed as being made of tuff (Implement Petrology no. 897; Clough

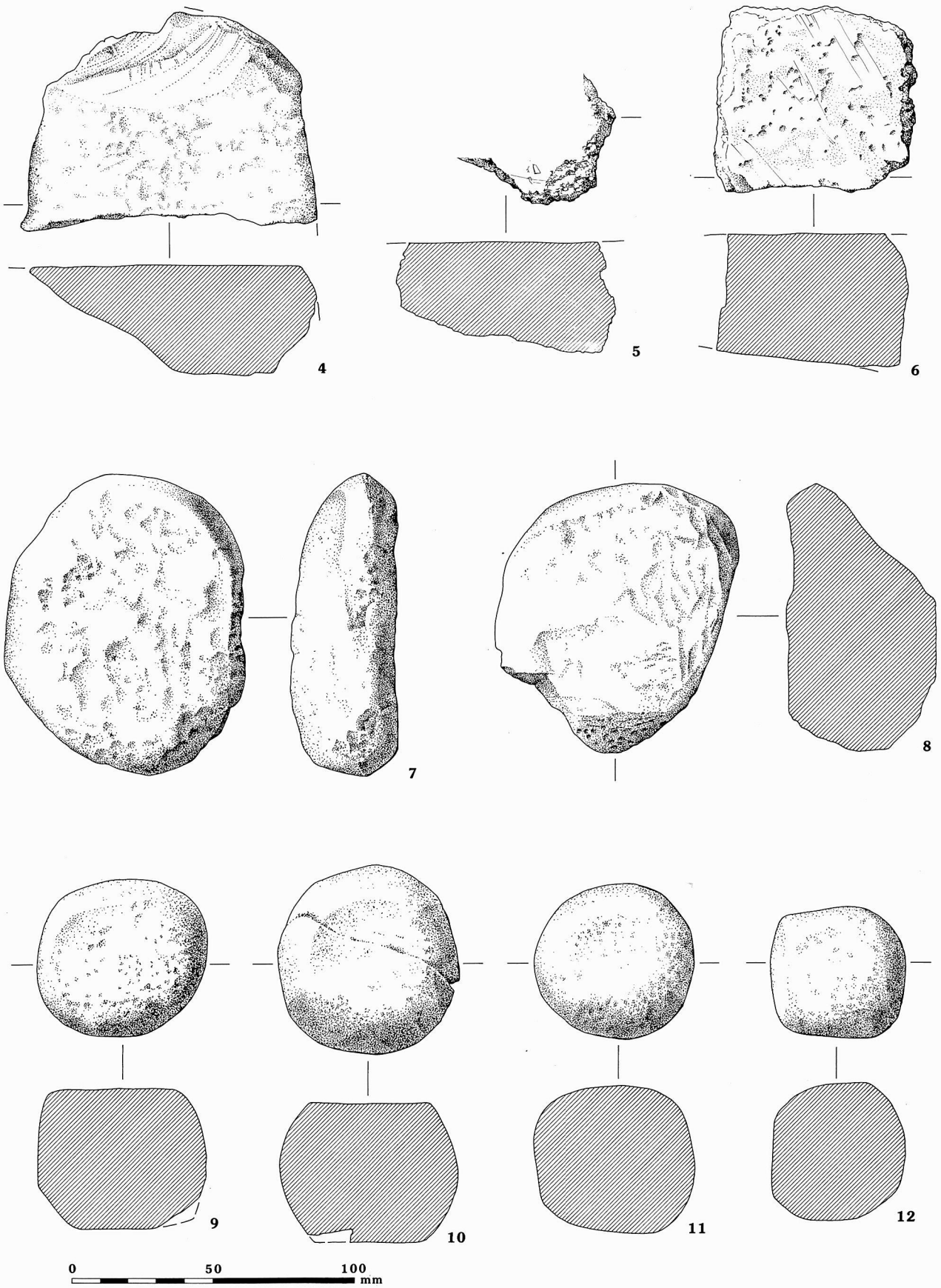


Fig. 84 Worked stone objects, 4-12. Scale 1:2

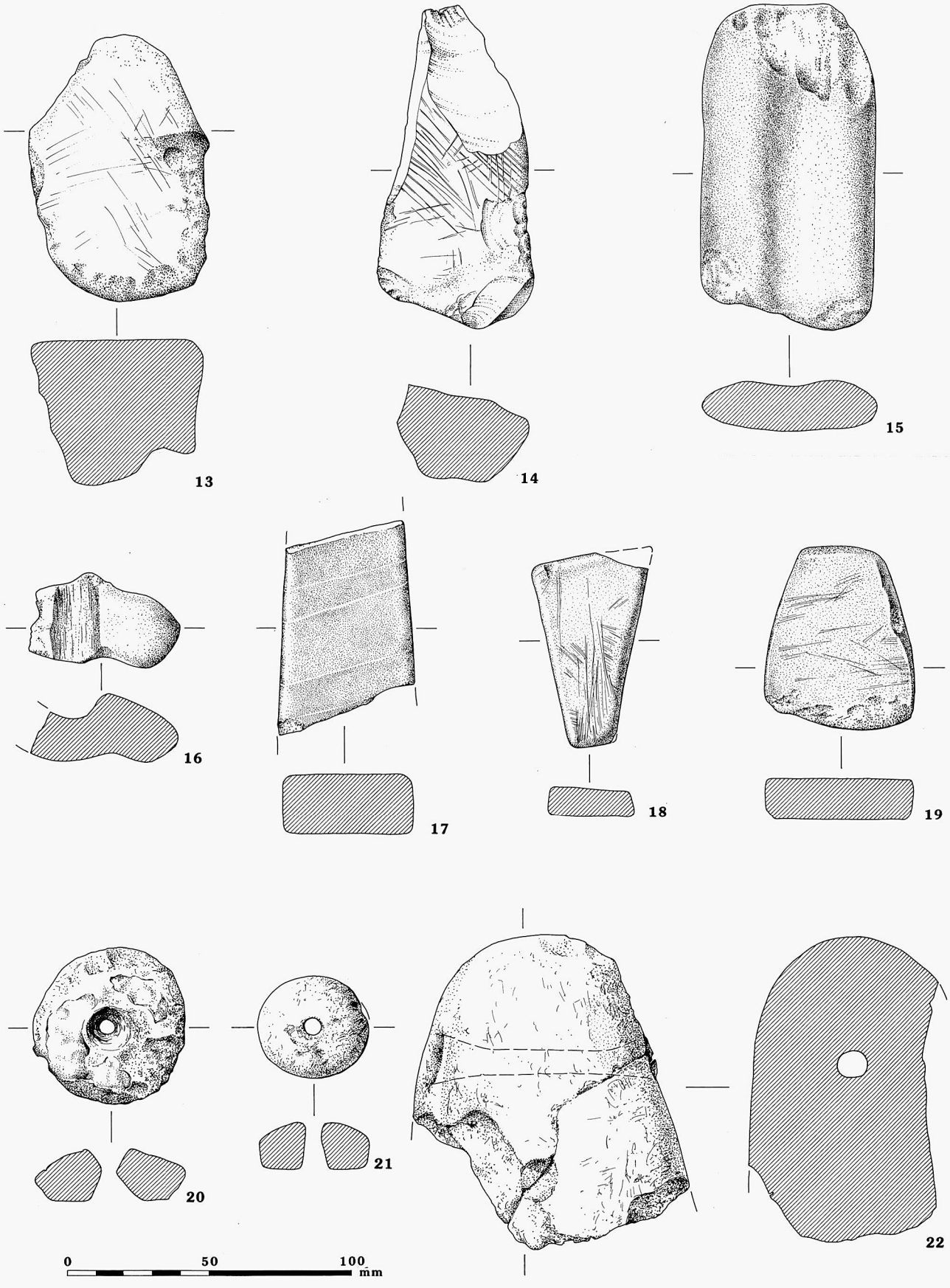


Fig . 85 Worked stone objects, 13-22. Scale 1:2

and Cummins 1988) and a chalcedony flake, possibly from an axe (Imp. Pet. no. 899), were recovered during grave digging. The axe fragment at least is likely to be of Neolithic date. In addition, part of a perforated pebble hammer with traces of battering around the outer edge and a highly polished, slightly waisted perforation was recovered from 'on-terrace' Zone 5. Although this object type is best known for its Mesolithic associations, Neolithic and Bronze Age examples are also known (Roe 1979, 36).

Miscellaneous Worked Stone Fragments

Two groups of miscellaneous worked stone fragments were identified. The first group consists of 27 objects, each with one smoothed surface. Most probably derive from tiles or paving slabs, although it is possible that this group also includes pieces of very fragmentary quernstones. Examples occurred throughout the Deposit, although a small group of tufa fragments, each with one worn surface, was concentrated in Zones 5–7.

The second group of ten pieces consists largely of fragments too small to identify but which show signs of having been utilised in some way, although not clearly worked. Fragments of three unidentified objects are also present; descriptions of these can be found in the archive.

Conclusion

The worked stone assemblage from Potterne represents a large and varied collection containing all the typical elements of later Bronze Age/Early Iron Age date. The presence of the ground stone tools is probable indication of some earlier activity, as also suggested by the presence of leaf shaped flint arrowheads of Neolithic date (Healy, above). The potential of this assemblage clearly lies in more detailed consideration of the geology of the stone types utilised, facilitating the examination of the variation between local and non-local products as well as possible changes in these through the Deposit.

List of illustrated stone objects

Fig. 83

1. Flat quernstone; grey micaceous sandstone; SF1704, context 1141, 'off' Zone 1
2. Saddle quern frag.; unidentified conglomeritic sandstone; SF756, context 2406, 'off' Zone 8
3. Saddle quern frag.; grey micaceous sandstone; SF487, context 1822, 'off' Zone 5

Fig. 84

4. Saddle quern frag.; quartzitic silicrete sandstone of 'sarsen'type; SF1061, context 4008, Cutting 13
5. Quern frag.; stone unident.; 1983, SF299, context 81
6. Quern frag.; stone unident.; SF779, context 2571, 'off' Zone 9
7. Muller; cherty ferruginous sandstone from the Greensand; 1983, SF264, context 86
8. Crested hammerstone; sarsen (fine grained quartzitic silicrete); SF106, context 81
9. Cylindrical hammerstone; sarsen; SF57, context 44
10. Frag. ovoid hammerstone/rubber; sarsen; SF403, context 444
11. Sub-cylindrical hammerstone; sarsen; SF1066, context 1903, 'off' Zone 6
12. Cuboid hammerstone/rubber; feldspathic sandstone; SF278, context 404

Fig. 85

13. Hammerstone/rubber; buff limonitic sandstone, ?from the Greensand series; SF390, context 411
14. Rubber or burnishing stone; iron ore from Lower Greensand; SF270, context 19
15. Whetstone; hard indurated micaceous sandstone; SF26, context 12
16. Whetstone frag.; greensand; SF819, context 2581, 'off' Zone 9
17. Whetstone frag.; paleozoic indurated quartzitic sandstone with some mica, probably from a source in south-west England; SF28, context 35
18. Whetstone; hard mudstone from a source in western Britain; SF8, context 7
19. Whetstone; partly metamorphosed slate, from a source in south-west England; grave digging
20. Spindle whorl with hour-glass perforation; chalk; SF178, context 162
21. Slightly bun-shaped spindle whorl; conical perforation; chalk; SF830, context 2019, intermediate Zone 6
22. Weight (?loomweight) frag.; straight sided perforation below top corner; chalk; SF934, context 2404, 'off' Zone 8

14 **Amber,** by Frances Healy

The amber objects from the excavation comprise five beads (Fig. 86, 1–5) and two minute fragments (not illustrated). All the beads are of simple, sub-circular form, one (Fig. 86, 4) having a straight edge, forming sharp angles with upper and lower faces, the remainder having rounded edges. The four complete samples (Fig. 86, 1–4) are all of asymmetrical section.

Two were excavated in 1983, one (Fig. 86, 1), although apparently unburnt, from the upper surface of hearth 472, and the other (Fig. 86, 2), one face of which is burnt, from beside hearth 258. The position of the latter is shown in Figure 14. Two others (Fig. 86, 4, 5) and the fragments were recovered during sieving in 1984, from 'off-terrace' Zones 4, 10 and 8 respec-

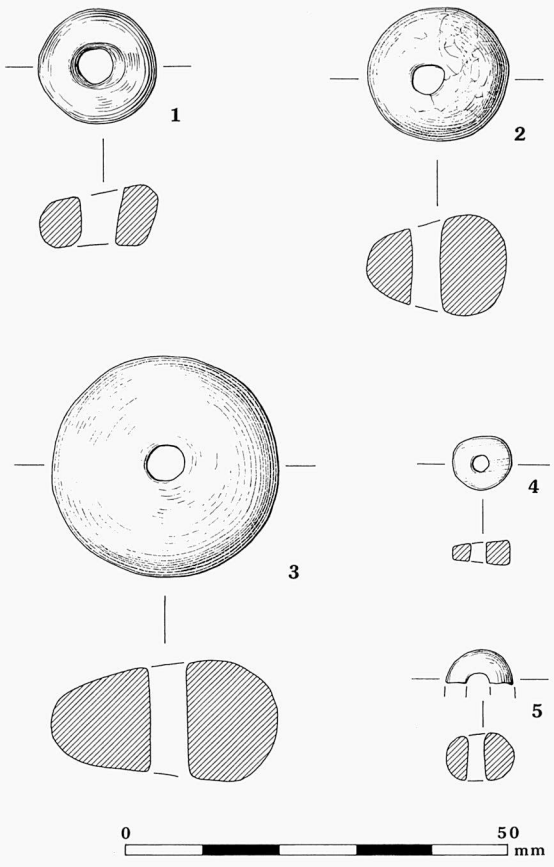


Fig. 86 Amber beads. Scale 1:1

tively. The fifth (Fig. 86, 3) was recovered during grave digging.

Possible sources of amber would have included the beaches of eastern England, as well as more distant sources in the lands fringing the Baltic (Shennan 1982, 40; Beck and Shennan 1991, 15–27). In Britain, amber beads are best represented in Early Bronze Age burials, from which a variety of forms has been recovered (eg, Annable and Simpson 1964, nos 295–8, 310–2, 342, 392–3, 402–3, 407–9, 411–3, 467–9, and 518; Shennan 1989). Late Bronze Age examples are rarer, with a narrower typological range, although beads of asymmetrical section, such as Figure 86, 1–4, and particularly large beads, such as Figure 86, 3, are more frequent in the later period (Beck and Shennan 1991). These authors see asymmetry as probably being a deliberate feature to ensure that the beads hung in a regular, compact fashion when strung. The large beads and several smaller asymmetrical beads in a Late Bronze Age hoard from Llengwyllog, Anglesey, can be arranged into a graduated necklace (Lynch 1970, fig. 68). Broadly contemporaneous settlement finds from southern England include one small asymmetrical example from Queen Mary's Hospital, Carshalton and others from Runnymede Bridge, Egham, both in Surrey (Adkins and Needham 1985, 41, fig. 15, 417; Longley 1980, 31, fig. 18, 69, 70) and one cylindrical bead from Lofts Farm, Essex (Brown 1988, 281). Three beads were recovered from different phases at Danebury but amber beads are rare in Iron Age contexts (Cunliffe 1984, 396, fig. 7, 42).

List of illustrated amber beads
Fig. 86

1. Complete, asymmetrical; SF1239, context 503 (upper surface of hearth 472), Cutting 2, 'on'
2. Complete, asymmetrical; SF378, context 503 (beside hearth 258), Cutting 2, 'on'
3. Complete, asymmetrical; SF1933, grave digging
4. Complete, asymmetrical; SF477, context 1623 (S.534), 'off' Zone 4
5. Incomplete; SF919, context 2777, 'off' Zone 8

15 Glass, by Julian Henderson

Seventeen pieces of glass were recovered; these comprise 11 beads, 2 fragments of Romano-British vessel glass, 1 of modern window glass, and 3 amorphous lumps or 'dribbles'. Seven pieces (4 beads, 1 piece of vessel glass, 2 'dribbles'), were selected for chemical analysis by the author at the Research Laboratory for Archaeology and the History of Art, Oxford and this report compiled in 1991. A full catalogue is available in archive.

Chemical Analysis

As a material ancient glass is very complex. Its chemical analysis can provide clues about its period of manufacture, the raw materials used to make it, the colourants used, and the small quantities of opacifiers or clarifiers incorporated in the glass. The chemical composition of glass can be used as a way of refining the typology of artefacts, which for undecorated annular or globular beads is particularly important. The data obtained from analysis, when related to patterns of manufacture, use, and discard in the archaeological record, may eventually generate a relative value for the material in specific archaeological contexts.

Chemical analysis of the stratified glass from Potterne has revealed an interesting range of compositions. Very few Bronze Age settlement sites in Britain have produced glass (Guido 1978; Henderson 1989), so the existence of it here is very important in providing rare evidence which will help establish the source of such glass, and possibly its social/economic function. At present the analysis of European Late Bronze Age glass has established that there were two principle compositions in use; it is possible that both were manufactured in Europe (Henderson 1988a), although industrial evidence would be needed in order to prove this. Currently, only Rathgall, County Wicklow, Ireland, and Frattesina, northern Italy, have produced evidence for a European Bronze Age glass industry, although the compositions of the worked glass at these

Table 41: Quantitative chemical analyses of glass (expressed as weight % oxide)

Analysis no.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
SF no.	*952*	*880*	*424*	*2155*	*1408*	*1451*	*1395*
Context	*2963*	*2032*	*1741*	*1191*	*1175*	*1075*	*4008*
Zone	*11*	*6*	*5*	*2*	*2*	*1*	*[cutting 13]*
Colour	*tr. turq.*	*tr. turq.*	*tr. yel-br*	*'black'*	*'black'*	*tr. purple*	*colourless*
Artefact	*bead*	*bead*	*bead*	*bead*	*dribble*	*dribble*	*vessel frg.*
Na2O	17.0	18.8	17.1	16.9	1.2	19.1	19.5
MgO	3.0	3.2	0.6	2.5	3.1	0.1	0.6
Al2O3	1.6	1.2	0.4	2.1	9.7	1.0	2.2
SiO3	70.0	70.3	70.7	60.0	37.9	66.1	69.9
P2O5	0.3	0.3	ND	0.4	0.3	0.1	ND
SO3	0.2	0.3	0.1	0.3	ND	0.1	0.3
Cl	-	-	1.5	-	-	-	-
K2O	1.9	1.3	0.1	1.1	0.9	1.2	0.6
CaO	4.2	4.8	9.1	6.8	22.7	7.6	6.2
TiO2	0.1	0.1	ND	0.1	0.3	ND	0.1
MnO	0.2	ND	ND	7.1	0.3	5.7	0.2
Fe2O3	0.6	0.4	0.2	1.2	19.5	0.3	0.5
CoO	ND	ND	ND	ND	ND	0.1	ND
NiO2	ND	ND	ND	ND	0.1	ND	ND
CuO	0.8	1.2	ND	0.2	ND	ND	ND
ZnO	ND	ND	ND	ND	ND	ND	ND
As2O3	ND	ND	ND	ND	ND	ND	ND
SnO2	ND	ND	ND	0.1	ND	ND	ND
Sb2O3	ND	ND	ND	0.1	ND	0.1	0.4
PbO	ND	ND	ND	3.5	0.1	ND	ND

tr = translucent; turq = turquoise; yel-br = yellow-brown

sites is different from the Late Bronze Age glass analysed from Potterne (*ibid.*).

Glass compositions

Chemical compositions of the glass (Table 41) were produced using an electron microscope (Henderson 1988b). The translucent turquoise beads from definite Late Bronze Age contexts (analyses 1 and 2; Zones 11 and 6 respectively) have compositions in common with glass of the Late Bronze Age in Europe and the Mediterranean, characterised by relatively high magnesium oxide (MgO) and potassium oxide (K_2O) levels. These compositional characteristics, in particular, distinguish Bronze Age from Iron Age and Romano-British glass (Henderson 1990). Indeed, the composition of the colourless Romano-British glass vessel fragment from Potterne (analysis 7; Cutting 13) shows this difference, since its composition is typical of post-2nd century BC Iron Age glass. It can be seen that both magnesium and potassium oxide levels are lower in the Romano-British glass, together with the level of phosphorous pentoxide (P_2O_5). The composition of firmly dated Late Bronze Age glass shows minimal variation, which is interesting in itself. While there is limited evidence for the use of Bronze Age glass in Britain as early as the 13th century BC, comparison with the data for Continental European glass of that period shows that, in general, the earlier glass contains higher MgO contents than in the Potterne glasses.

For the translucent pale brown bead fragment (analysis 3; Zone 5), the composition is appropriate to the period, lying just at the interface between the Late Bronze Age and Early Iron Age, both in terms of its date and chemical composition. At this time the new soda-lime-silica glass composition with low magnesia was introduced. The composition of the brown glass is of the low magnesia soda-lime-silica type with a slightly higher calcium oxide content. It is one of very few dated glasses from Britain of this period.

Three of the remaining four artefacts analysed have very interesting chemical compositions, even if they were derived from disturbed archaeological layers (Zones 1 and 2). The small 'black' annular bead (analysis 4) is similar in shape to another from Zone 3 (SF2156; too small to sample and analyse). It is 'black' because it contains 7.1% manganese oxide (MnO) in a composition which mainly displays the characteristics of Late Bronze Age glass, relatively high potassium and magnesium oxides. There are no published compositions or typological parallels (at the time of writing) for this bead.

The compositions of the two 'dribbles' of glass, one apparently 'black' and the other translucent purple, are of interest, their compositions differing significantly. Analysis 5 is characterised by high aluminium and low sodium oxides, and very high calcium and iron oxides. In some respects this might be considered to be of medieval composition (particularly the high calcium oxide content), but in other ways (such as the low potassium content) it is ambiguous. Because it is so unusual, it is unfortunate that the artefact is derived from a disturbed context. The second 'dribble' (analysis 6) has a composition which is typical of Romano-British glass with a soda-lime-silica composi-

tion. However, the question still remains: why do these 'dribbles'of glass occur at this site at all, and why do they have entirely different chemical compositions? The high aluminium glass is exceptional and is considered to be of Romano-British date. The 'dribbles' may in fact result from the manufacture of minute 'black'-glass beads, one of which was found in Zone 3 (but not necessarily securely stratified there; see below). We are therefore confounded by the fact that the 'dribbles' of glass derived from disturbed archaeological contexts.

Archaeological Implications

Chemical analysis of the glass, dating from the Late Bronze Age through Romano-British and possibly into the medieval period, has shown a number of interesting features. These beads, which derive from stratified Late Bronze Age deposits, fall into the compositional grouping established for Late Bronze Age Europe with a high magnesia soda-lime-silica tradition. It is typical of much Bronze Age glass found in Europe, and is quite distinct compositionally from the high concentrations of glass found in Ireland, Switzerland, and northern Italy (Henderson 1988a, fig. 3). The Potterne Bronze Age glass is also quite distinct from Iron Age European glass. The distinctive composition is partly due to the use of a different alkali source. The Potterne Bronze Age glass has a composition which is comparable with glass from the Near East of 2nd millennium BC date, with the same high magnesia content, but this does not necessarily mean that it was imported over that distance as beads. There are other possibilities: the glass could have been manufactured in Europe with established technology and using imported raw materials, or the glass could have been imported as raw lumps and made into beads in Europe.

The translucent yellow–brown bead fragment (analysis 3) has a composition which is considered to fall in the earliest Iron Age and therefore its stratigraphical position agrees well with its composition. It is unusual and valuable evidence for the use of glass in Britain at that time.

The 'black' bead (analysis 4; Zone 2) would be very unusual in a Bronze Age context, and would probably have been missed without a programme of sieving. A very similar bead from Zone 3 is not necessarily securely stratified since such tiny objects could have been transported, for example down through worm action. The 'black' colour is due to a high manganese oxide content (7.1%), and with 3.5% lead oxide is as yet an unparalleled composition for Bronze Age glass. The two 'dribbles' of 'black' glass have different compositions from each other and from the analysed bead, but both may result from the manufacture of black glass beads on the site or nearby. The evidence for this is somewhat ambiguous and is not definitely tied to the Late Bronze Age.

16 Worked Bone and Antler, by Rachael Seager Smith

A total of 247 worked bone and antler objects was recovered. The assemblage consists of a wide range of tools and fittings characteristic of the range of bone implements utilised by Late Bronze and Early Iron Age communities in Wiltshire and the surrounding areas.

Worked bone and antler objects were recovered during each season of excavation while a small number of items (27 pieces) have also been collected during the course of grave digging and other salvage work at the site. The distribution of the worked bone and antler objects through the zones of the Deposit is shown in Figure 87.

Species and bone identifications were undertaken by A. Locker and C. Gamble, and the objects have been grouped according to the classification system set out by Smith (1982) in his review of the Late Bronze and Iron Age worked bone from sites in Wiltshire. Because of the problems inherent in dealing with a large and often fragmentary assemblage, however, some minor modifications and additions to the classification system have had to be made. These, together with brief descriptions of those of Smith's categories represented in the Potterne assemblage, are outlined below.

The Importance of the Assemblage

Although the worked bone and antler industries of Late Bronze and Iron Age Wiltshire are comparatively well known (1032 items having been classified by Smith up until the early 1980s), the importance of the Potterne assemblage lies in its size and deeply stratified origin. In southern Britain, most sites of this date lack vertical stratigraphy, the majority of artefacts being derived from the fills of negative features. However, at All Cannings Cross (Cunnington 1923), some vertical stratigraphy was preserved and a very large number of artefacts was recovered (in all 528 pieces of worked bone and antler). Although this site therefore serves as the best comparison for the Potterne assemblage, the material from the 25 other sites examined by Smith forms the basis for the comparison of these two unusual assemblages (Fig. 88).

Raw Materials

Of the 247 pieces of worked bone and antler recovered, 184 pieces (74% of the assemblage) could be assigned to bone type and species. The range of skeletal parts utilised is summarised by species in Table 42. Fifty-three pieces (21%) were of antler, primarily of red deer, while the worked bones were largely derived from the principal domesticated species, cattle, sheep/goats, horses and pigs. Dogs were represented by only four objects (Fig. 93, 56, 60, 64, 5). Of the wild species, deer were represented, in addition to antler, by only two bones (Fig. 90, 14; Fig. 93, 62), while single bones

Table 42: Number of bone and antler objects by species and bone type

	large ungulate	*small ungulate*	*sheep/ goat*	*horse*	*ox*	*pig*	*goat*	*deer: unspec.*	*red*	*roe*	*fallow*	*dog*	*fox*	*eagle*	*goose*
rib	12	10	-	-	-	-	-	-	-	-	-	-	-	-	-
metatarsal	-	1	17	-	-	-	1	1	-	-	-	-	-	-	-
long bone	8	7	4	9	-	-	-	-	-	-	-	-	-	-	-
metapodial	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-
fibula	-	-	-	-	-	12	-	-	-	-	-	-	-	-	-
metacarpal	-	-	6	-	2	-	-	-	-	-	-	-	-	-	-
tibia	-	1	7	-	-	-	-	-	-	-	-	-	-	-	-
humerus	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
ulna	-	-	-	-	3	-	-	-	-	-	-	-	-	-	1
inicisor	-	-	-	1	-	2	-	-	-	-	-	-	-	-	-
scapula	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-
unident.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
fused	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
tib./fib.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
mandible	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-
canine	-	-	-	-	-	-	-	1	-	-	-	4	-	-	-
phalange	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
radius	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
horn core	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
antler	-	-	-	-	-	-	-	21	26	5	1	-	-	-	-
Total	24	24	39	11	8	14	2	23	26	5	1	4	1	1	1

Table 43: Worked bone and antler object types by 1984 'off-terrace' Zone

	pointed tools								*bladed*	*toothed*	*dress/dec./ gaming*	*miscellaneous*				*antler*	*Total*
Zone	*1.1*	*1.2*	*1.3*	*1.4*	*1.5*	*1.6*	*1.9*	*1.10*	*unspec.*	*unspec.*	*unspec.*	*6.4*	*6.6*	*6.7*	*6.10*	*unspec.*	
2	1	-	2	-	-	-	2	-	-	-	-	-	1	1	-	-	7
3	1	2	-	-	-	-	1	1	5	-	1	1	1	2	-	1	16
4	2	1	1	1	-	-	3	-	2	-	-	-	2	1	-	-	13
5	2	-	1	-	-	-	1	-	3	-	1	-	-	3	-	4	15
6	2	1	1	1	-	-	2	-	1	1	1	-	2	2	-	1	15
7	3	-	-	-	-	-	2	-	2	-	1	-	2	1	1	1	13
8	3	-	-	2	-	-	-	1	4	-	1	1	-	-	-	2	13
9	1	-	1	1	-	-	-	-	1	1	3	-	2	1	-	3	14
10	2	-	-	-	1	1	3	2	2	-	1	-	-	1	-	2	15
11	2	-	-	2	-	-	-	1	1	-	-	-	1	-	-	1	8
12	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	3
13	2	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	4
Total	21	4	6	7	1	1	16	5	21	2	9	2	12	13	1	16	136

from a fox (Fig. 93, 58) and a goose were also recovered. The only 'exotic' species was represented by a perforated talon from a white tailed sea eagle (*Haliaetus albicella*) (Fig. 93, 61) from 'off-terrace' Zone 8 of the Deposit.

Table 42 also shows some preferences in the choice of bone types and species utilised. Straight, solid bones with a relatively thick cortex, such as long bones, metacarpals, and metatarsals from the principal domesticates, seem to have been especially favoured. Pig bones, which are more porous and tend to splinter more easily than those of the other domesticates (Grant 1984, 531), have only been used where their natural shape could be exploited, in the production of needles for example. Other instances of the exploitation of the natural shape of the bone are especially clear in the preferential use of metapodials for the various pointed tools and in the use of rib fragments for bladed items.

The Classification System

Smith's classification system defines seven major groups of worked bone objects which are then subdivided to allow for the more specific characterisation of individual tool types. These major groups are defined as follows:

1. Pointed tools
2. Bladed tools
3. Toothed tools
4. Spatula tools
5. Dress, decorative or gaming artefacts
6. Miscellaneous bone objects
7. Antler objects

Groups 1–5 consist of tools or objects of a specific, well-defined nature (points, pins, weaving combs, etc),

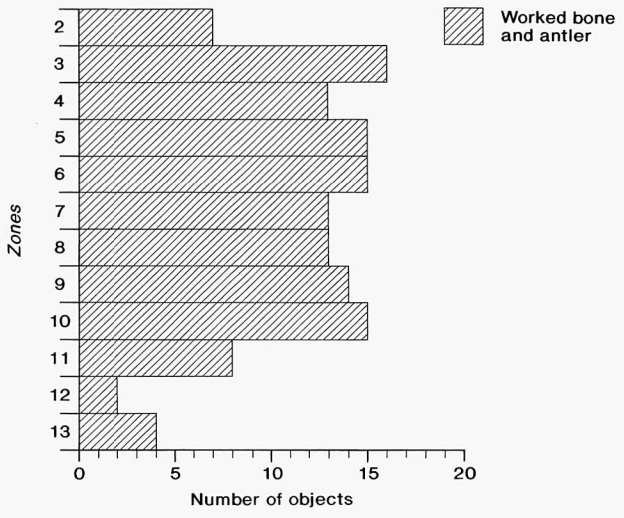


Fig. 87 Worked bone and antler: relative frequency by Zone

and include items of bone and antler, while any objects not classified in this way can be subsumed in Groups 6 and 7. With the exception of spatula tools (Group 4), examples of all the major tool types were represented amongst the Potterne assemblage. The sub-types present are briefly described below.

Group 1: Pointed tools

Large pointed tools (1.1)

A great variety of both form and bone type are used, but they are characteristically more than 75mm long and worked to a point at one end of either a splinter or a complete bone. There are 32 examples, of which 16 are complete (Fig. 89, 1–7). Bone types include horse metapodials, large ungulate-sized long bone fragments, pig fibulae, and various ovicaprid bones.

Small pointed tools (1.2)

When complete, these are less than 75 mm long and worked to a point at one end. There are seven examples, all complete (Fig. 89, 8, 9). Bone types represented include large and small ungulate-sized bone fragments, horse metapodials, ovicaprid metatarsals and metacarpals, and a pig incisor.

Shuttle tips or gouges (1.3)

These consist of bones with an oblique, diagonal cut across the shaft in a longitudinal direction; the tip is then pointed and worn to a variety of shapes. There are nine examples (Fig. 90, 10–15), three complete. Ovicaprid metatarsals are preferred but other bone types are used and include an ovicaprid tibia and a deer metatarsal.

Awls (1.4)

These implements are *c.* 40–110 mm long, with a rounded section and points at one or both ends. There are nine examples (Fig. 90, 16–20). They are most commonly produced on splinters probably derived from various long bone fragments.

Pins (1.5)

These objects have slender polished shanks of rounded cross-section, the heads varying from completely plain to highly

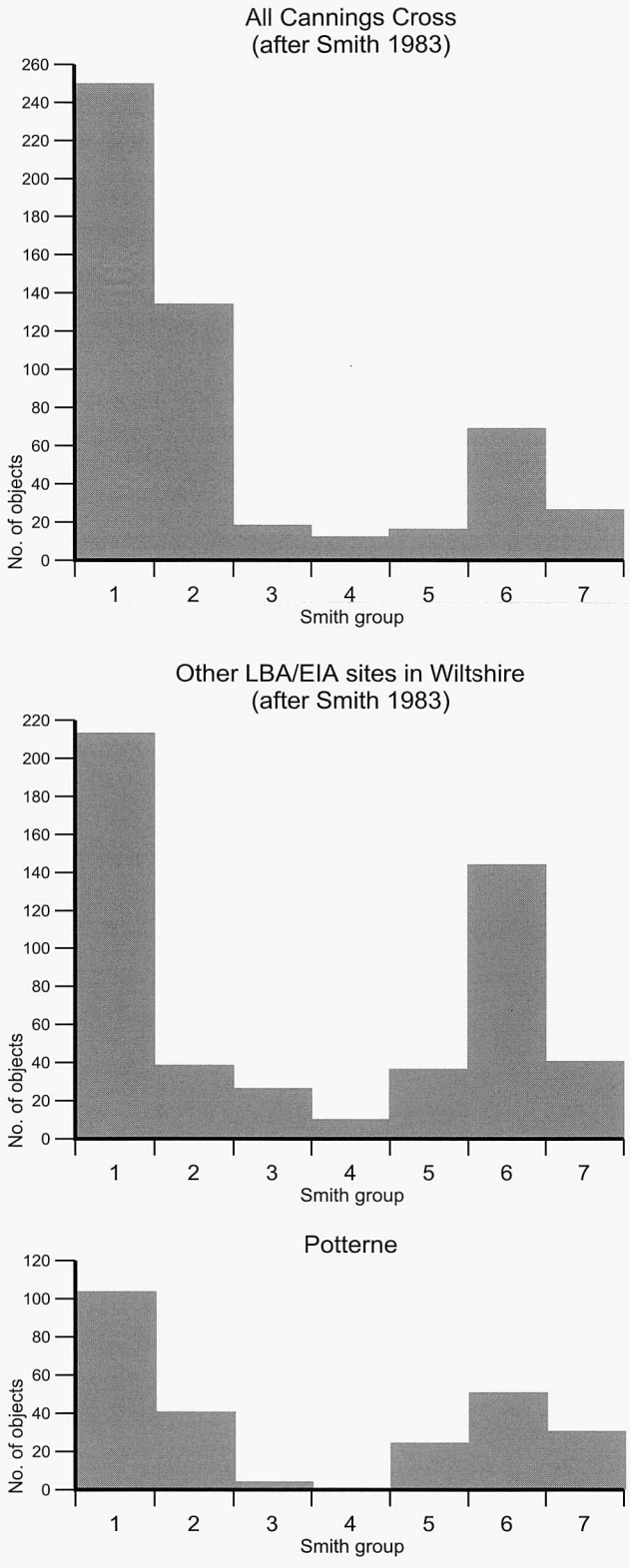


Fig. 88 Comparison of the Potterne worked bone and antler assemblage with those from All Cannings Cross and other contemporaneous Wiltshire sites

elaborated. Two fragmentary examples were found (Fig. 90, 21). Bone types are unidentifiable.

Needles (1.6)

They are generally 40–90 mm in length, with slender pointed

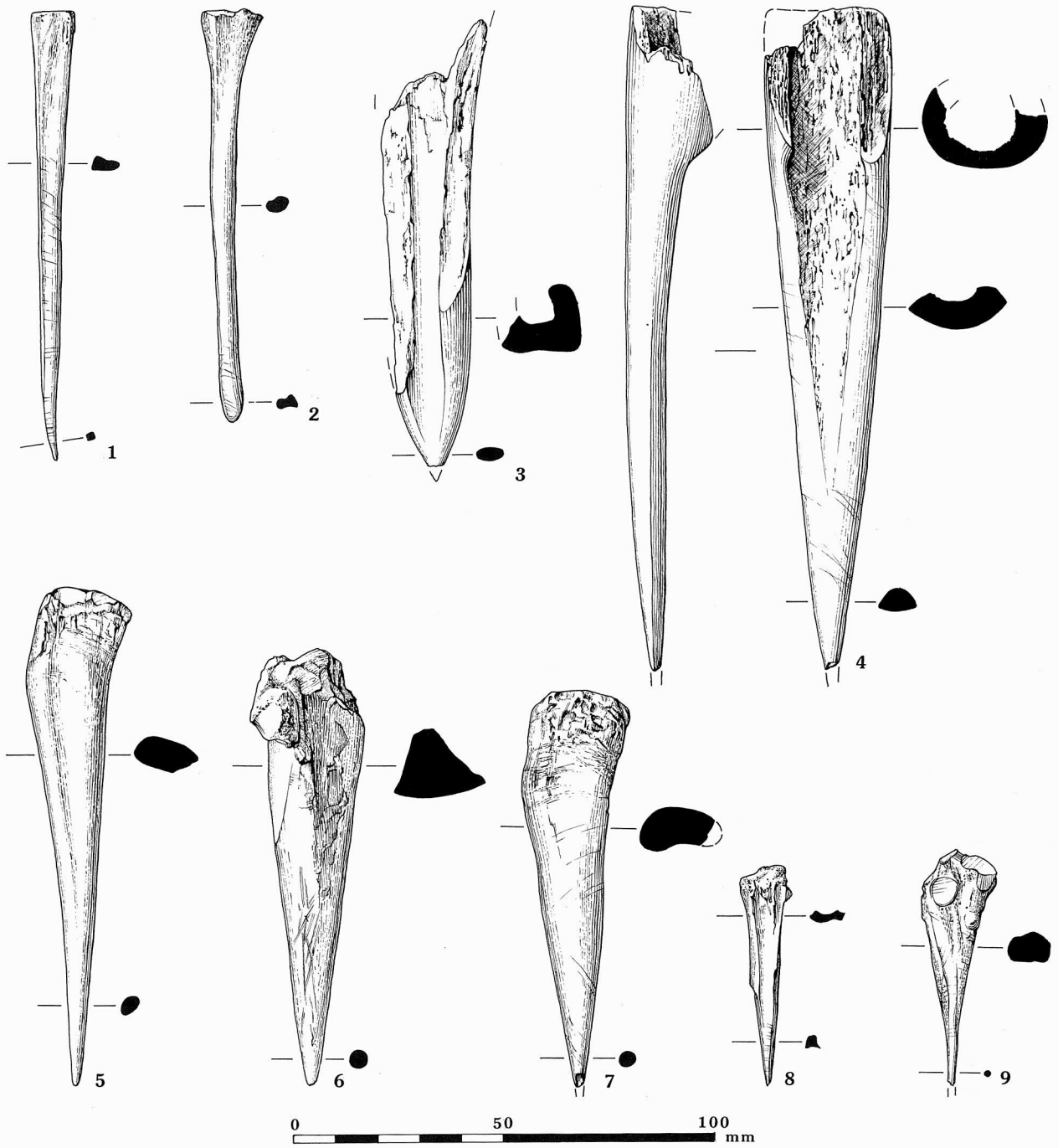


Fig. 89 Worked bone objects, 1-9. Scale 2:3

shanks and a perforation through the broad end. They are often polished, and may be worked on a splinter or by shaving a complete bone. There are five examples, three complete (Fig. 90, 22–6). Bone types include pig fibulae and one indeterminate fragment.

Miscellaneous bone points (1.9)
This sub-type has been added to Smith's classification to encompass the wide range of fragmentary bone points which could not be confidently assigned to any of the above sub-types. A total of 30 examples was found (Fig. 90, 27, 28). Bone types include long bone fragments from large and small ungulate-sized animals, a variety of ovicaprid bones, as well as an antler and many indeterminate bone fragments.

Miscellaneous shank fragments (1.10)
This additional sub-type encompasses a variety of shank fragments, polished and rounded in cross-section, which probably derive from awls, pins, or needles but which cannot be confidently assigned to any of the above sub-types. There are nine examples (Fig. 90, 29, 30). Bone types are largely indeterminate.

Group 2: Bladed tools

Rib knives (2.1)
These consist of a rib, partially split longitudinally to form a blade and handle. Two incomplete examples were found made from large ungulate-sized rib fragments (not illustrated).

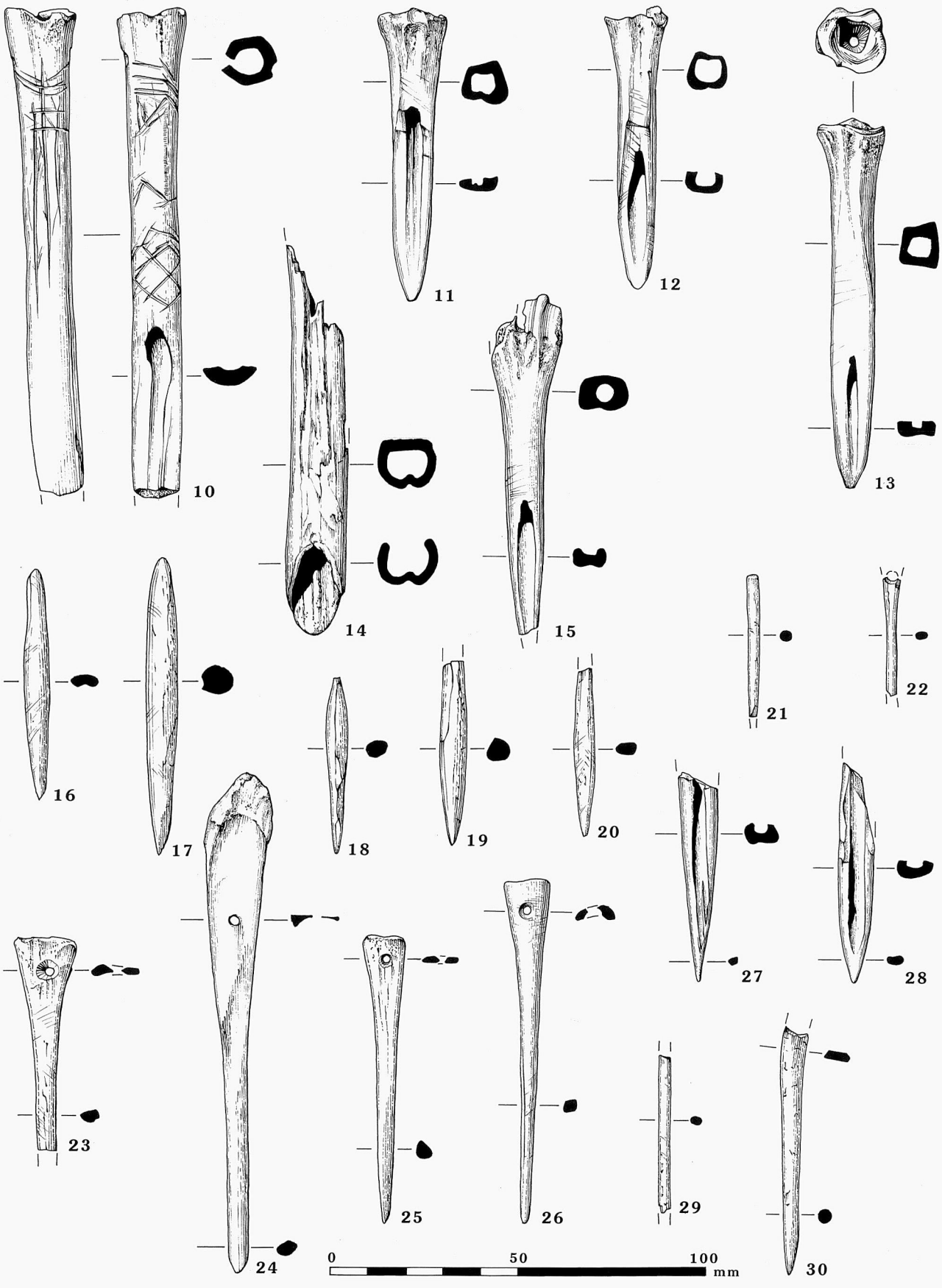


Fig. 90 Worked bone objects, 10-30. Scale 2:3

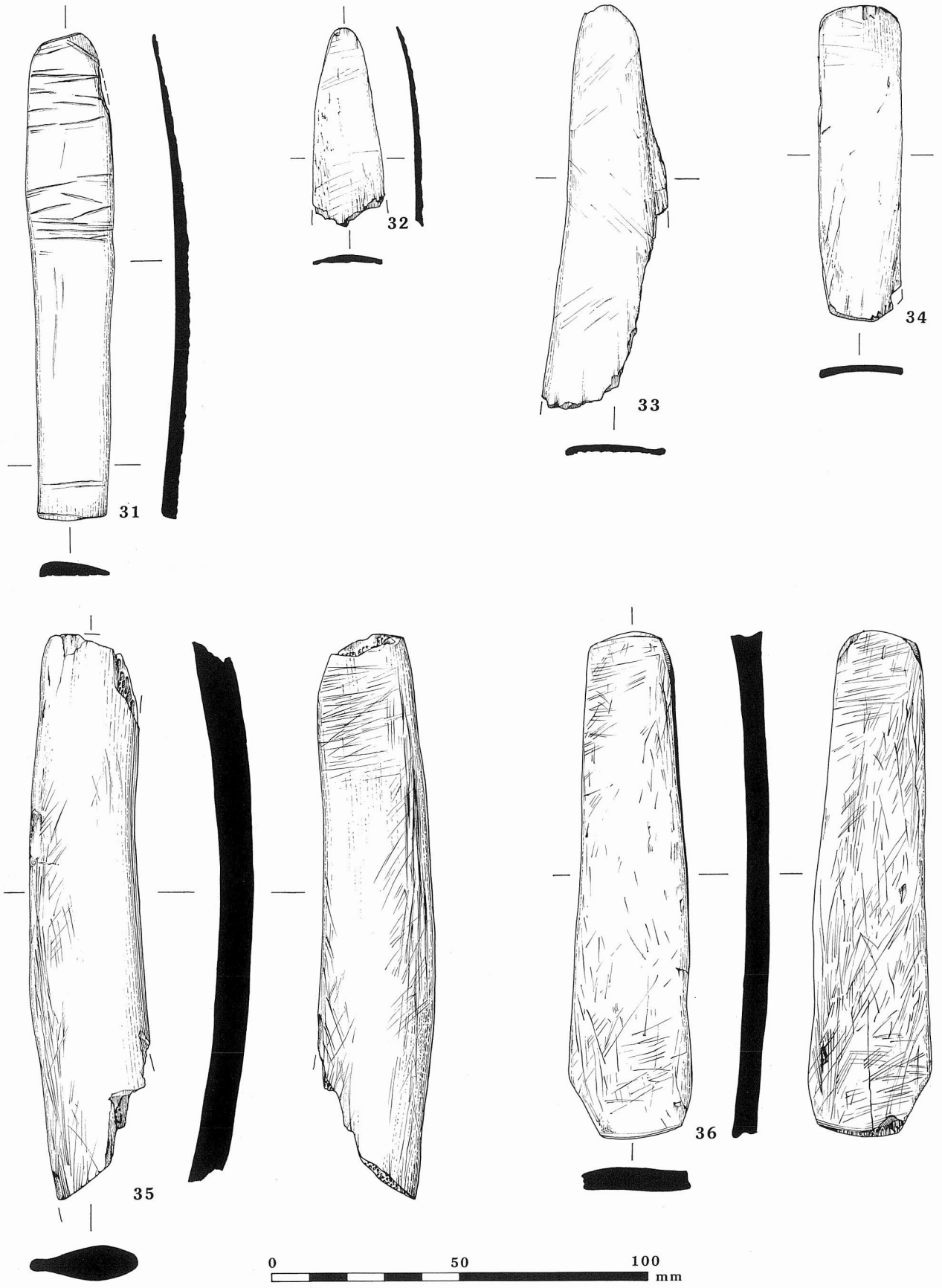


Fig. 91 Worked bone objects, 31-6. Scale 2:3

Rib blades (2.2)
These are formed by splitting a rib along its length, one end possibly being ground to a rounded point. There are six examples (Fig. 91, 31–4), one of which is complete. Bone types are largely unidentified.

Worked ribs (2.5)
As defined here, these have cut and usually smoothed ends, and frequently have ground edges. Their surfaces are smooth and polished, but they often have areas of parallel knife cuts that are transverse towards the ends, usually concentrated to one side, and longitudinal on the central surface. These can be so abundant that hollowed areas may result. Five examples were found (Fig. 91, 35, 36), all utilising ribs from large ungulate-sized animals.

Thin blades with perforation (2.6)
These consist of split rib pieces ground to produce a thin, flat rectangular, or more commonly elongated leaf-shaped blade (Fig. 92, 37–44). They are usually pierced near one end, an unfinished example (Fig. 92, 43) suggesting that this was done before final shaping. Another example has an incomplete perforation below a small terminal notch. There are 28 examples. The species were largely unidentified.

Group 3: Toothed tools

Weaving combs (3.1)
Only two examples were found (Fig. 92, 45, 46). Both are of antler and are substantially complete.

Rib pieces with teeth at edge (3.4)
These consist of split rib pieces ground to produce a thin, flat blade with notched teeth running longitudinally down the edge of the rib. One incomplete example was found (Fig. 92, 47).

Group 5: Dress, decorative, or gaming artefacts

Rings of bone or antler (5.1)
These encompass a wide variety of forms. The Potterne examples (Fig. 93, 48, 49) are *c.* 10–20 mm in diameter and less than 15 mm thick. There are three examples, all of them complete. Two are of an unidentifiable bone type and the third was made from a short section of ovicaprid humerus.

Toggles (5.2)
These are formed from a round bone or antler fragment. Most have a longitudinal hole although none of the Potterne examples has, and all have a transverse slot which normally, but not invariably, pierces both faces of the bone. There are three examples (Fig. 93, 50–2), all produced from shaved antler tines.

Sliders (5.3)
These are distinguished from toggles by their greater length, sliders having a rectangular longitudinal perforation and lenticular transverse perforations. A single complete example was found (Fig. 93, 53) made from the metatarsal of a juvenile ovicaprid.

Buttons (5.4)
These come in various shapes, but are characterised by having at least two holes bored through them. There are two examples, one being complete (Fig. 93, 54, 55). The bone types are unidentified.

Decorations pierced for suspension (5.5)
This group includes beads and perforated bone fragments, antler, teeth, and tusks. At Potterne ten examples were found (Fig. 93, 56–65), seven of which are complete. Perforated teeth predominate, dog, horse, and deer being represented, while other bone types include a fox mandible, an antler tine, and the talon of a white-tailed sea eagle.

Group 6: Miscellaneous bone objects

Bones with longitudinal holes (6.3)
These are similar to gouges (1.3), but bones of this class have only been hollowed out and are not pointed, although they sometimes have a square or rounded section. There are two fragmentary examples (not illustrated), both of ovicaprid tibia.

Incised or decorated fragments (6.4)
Incised lines or ring-and-dot motifs are the most common. Items in this class are probably fragments of other implements, for example rib knives (2.1) or combs (3.1). There are two examples (not illustrated), one on a fragment of bovid mandible, the other on an indeterminate bone type.

Other pieces of worked bone (6.6)
This is a miscellaneous group consisting of a variety of objects that do not fall easily into the other groups. Although most are difficult to describe, being 'one-offs', fragmentary or possibly off-cuts produced during the manufacture of other objects, the group does include a fragment of a bone cheek-piece, similar to the antler example illustrated in Figure 95, 95. There are 23 such objects (Fig. 93, 66–72), seven of which are complete. Bone types reflect the rest of the worked bone assemblage and are predominately of the principal domesticates, although one object (not illustrated) utilises a goose ulna.

Antler and bone handles (6.7)
This sub-type has been added to Smith's classification system. The majority of the objects have smoothly polished surfaces, often decorated, with an indentation, as of a tapering square tang, resembling those of bronze awls or tanged-chisels, made into the cancellous tissue from the narrow end. A few examples are perforated throughout their length. There are 22 handles (Fig. 94, 73–81, Fig. 95, 82, 83), of which four are complete. Most are of antler, although six examples are made of bone.

Horn cores (6.10)
This sub-type has been added to Smith's classification system. One incomplete horn core (Fig. 95, 84) from a goat

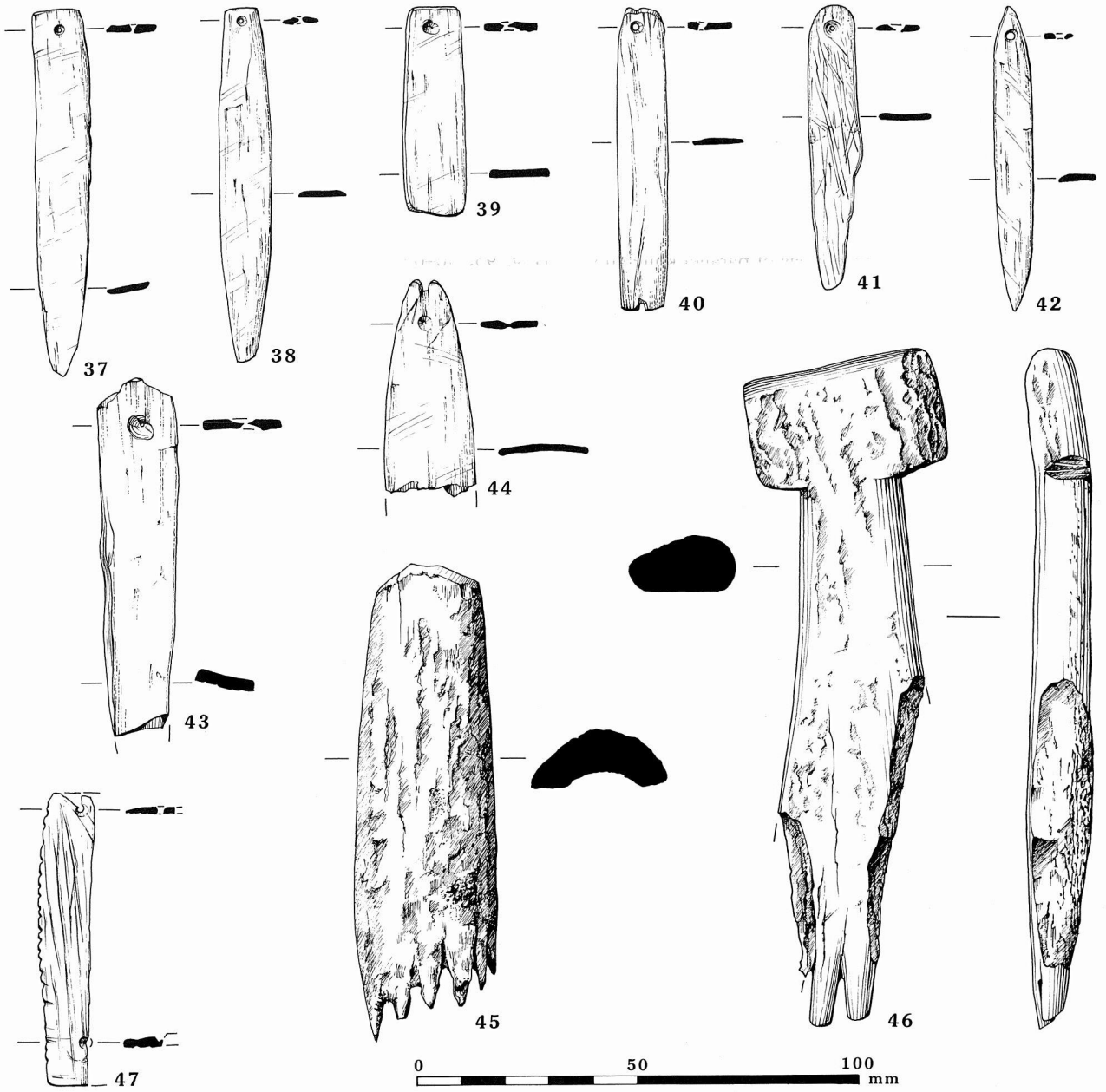


Fig. 92 Worked bone objects, 37-47. Scale 2:3

was recovered. Cut marks were probably caused by the removal of the horn.

Group 7: Antler

Antler tines (7.1)

These show the cut-and-snap technique of removal. Some (eg, Fig. 95, 87) also show subsequent working, while others may be waste left after the removal of pieces selected for use as handles, toggles, etc. A total of 15 examples was found (Fig. 104, 85–90), mostly from red deer.

Antler picks and beam fragments (7.2)

These all show evidence of working. The four examples (Fig. 96, 91–4) are all from roe deer.

Miscellaneous worked antler fragments (7.3)

This category consist of nine objects (Fig. 97, 95–101), four of which are complete. Included among them are a cheek-piece from a horse bridle (Fig. 97, 95), a small mount or plate with surviving bone or antler pegs (Fig. 97, 96) probably from a composite object, and a very delicately produced, bobbin-shaped object (Fig. 97, 98), possibly an item of personal ornament or balance arm.

Antler waste (7.4)

These have only slight evidence for working in the form of cut and chopping marks. Three such pieces were recovered (Fig. 98, 102, 103), all from red deer antler.

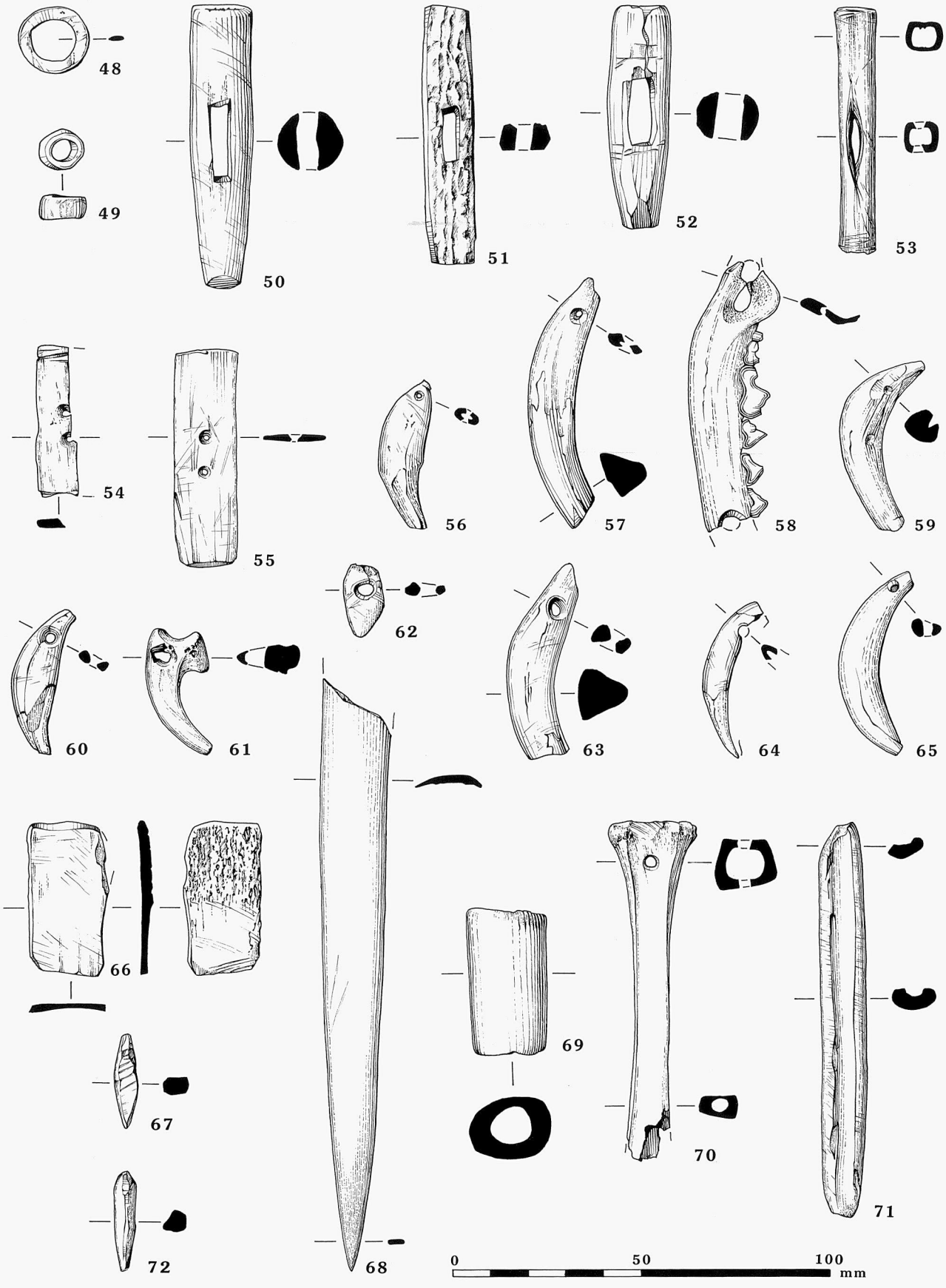


Fig. 93 Worked bone objects, 48-72. Scale 2:3

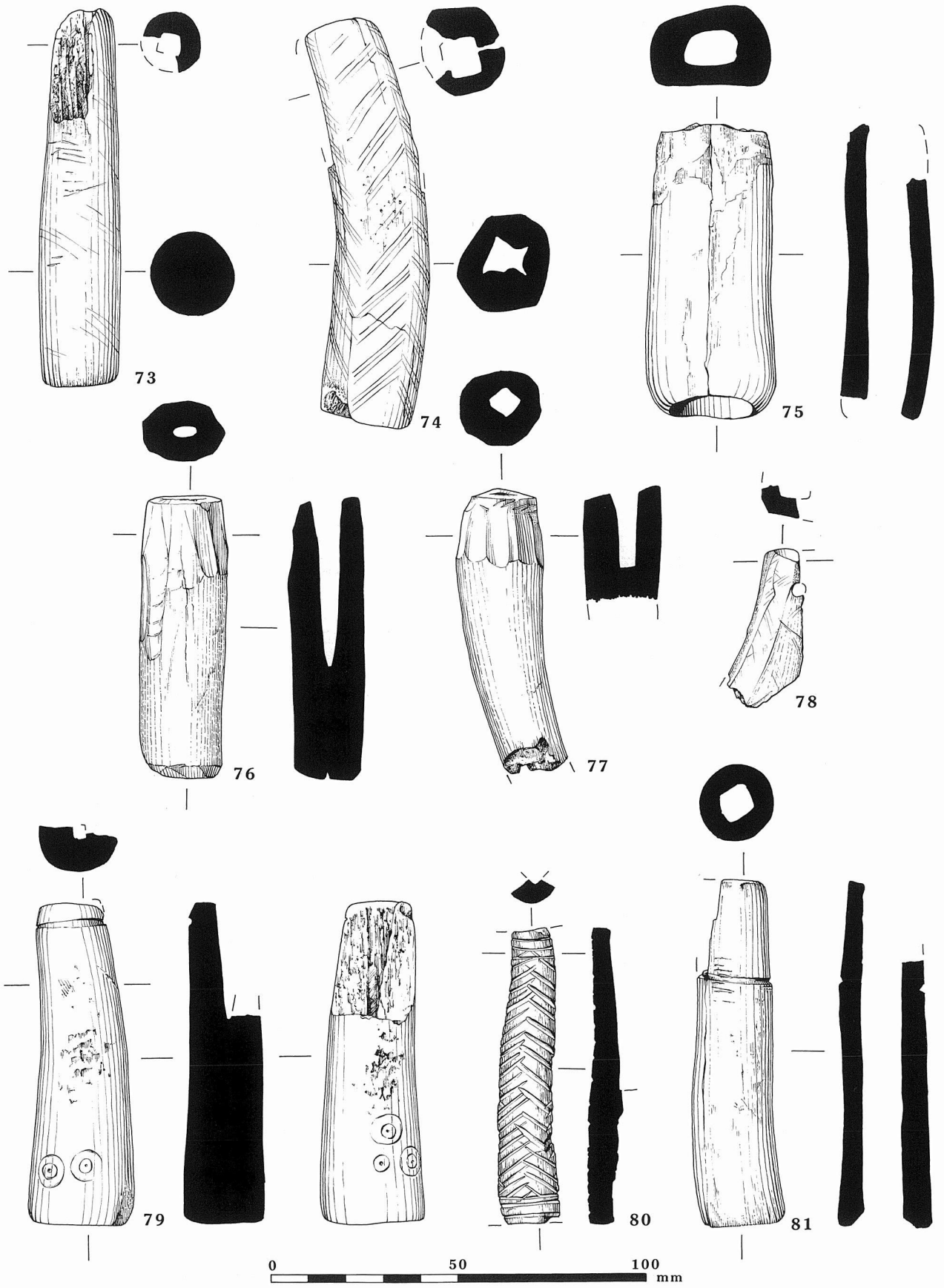


Fig. 94 Worked bone objects, 73-81. Scale 2:3

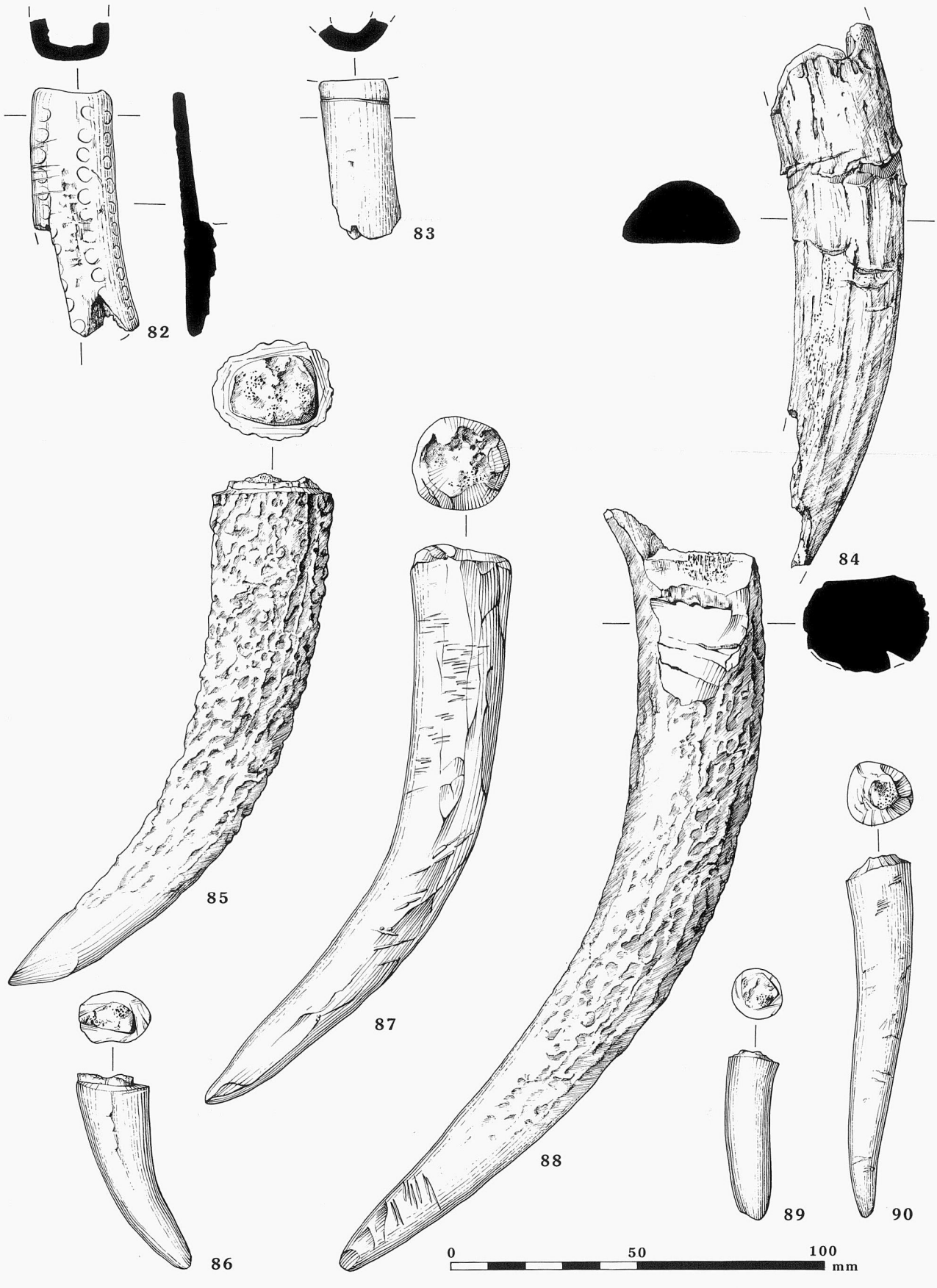


Fig. 95 Worked bone objects, 82-90. Scale 2:3

Discussion

The assemblage

Although the assemblages recovered from All Cannings Cross (528 pieces) and 25 other Late Bronze and Iron Age sites in Wiltshire (504 pieces) (Smith 1982) are double the size of that recovered from Potterne, the composition of the assemblages, in terms of major tool groups, is broadly comparable (Fig. 88).

The dominant items of the Potterne assemblage, as at the other sites, are the pointed tools of Group 1 (103 pieces or 41% of the assemblage). Most common among these are the simple bone points of Smith Classes 1.1–1.4 and 1.9 (Figs 89–90, 1–28). The majority were probably general- or multi-purpose tools, fulfilling a wide variety of functions from prickers to borers, spoons to gouges, spindles to shuttle tips or weavers' beaters. Such objects are very common elements in almost all worked bone assemblages in Wiltshire (Smith 1982) and elsewhere (Longley 1980, fig. 14; Sellwood 1984, fig. 7.33–6). Pins (Fig. 90, 21) were not common at Potterne, only two definite fragments being recovered, but they do not appear to have been common at All Cannings Cross (Cunnington 1923, 74) or at the other Wiltshire sites (Smith 1982). Needles too (Fig. 90, 22–6) are comparatively poorly represented, only five examples being recovered compared to totals of 38, 40, and 41 from Danebury (Sellwood 1984, 380), Glastonbury Lake Village (Bulleid and Gray 1917, 40), and All Cannings Cross (Cunnington 1923, 74) respectively. None of the Potterne examples is of the double-pointed variety noted at the other sites.

Bladed tools (Group 2) form 16% of the Potterne assemblage. Most find good parallels on many pre-Roman Iron Age sites in Wiltshire (Smith 1982), including All Cannings Cross (Cunnington 1923, pl. 7, 12, and 15). Rib knives (Smith Class 2.1) are present in period 1 contexts at Eldon's Seat (Cunliffe and Phillipson 1968, 225, pl. vb, 15–17), indicating their development in the later Bronze Age, whilst wear patterns similar to those observed on the Potterne examples (Fig. 91, 35, 36) were also noted at All Cannings Cross (Cunnington 1923, 109, pl. 15). Blades pierced for suspension (Fig. 92, 37–44) find parallels at All Cannings Cross (Cunnington 1923, 74, pl. 6, 1–7) and, like the All Cannings Cross examples, were found singly, scattered throughout the Deposit.

Smith (1982) notes that toothed tools (Group 3) never formed more than 5% of the assemblage of worked bone and antler objects from Late Bronze and Iron Age sites in Wiltshire and these items are also very poorly represented at Potterne. The two weaving combs (Fig. 92, 45, 46) conform to Bulleid and Gray's (1911, 274) type 3 (square or oblong enlargement at the handle end) and type 4 (squared or roughly rounded handle without any enlargement). At All Cannings Cross, at least ten such combs were recovered (Cunnington 1923, 92, pl. 11), while a single, plain fragment was recovered from a period 1 context at Eldon's Seat (Cunliffe and Phillipson 1968, fig. 20). The number of examples at Gussage All Saints, Dorset, increased from two in phase 1 to six in phase 2 (Wainwright 1979, figs 90, 92) and among the later Iron Age assemblage from Danebury, weaving combs were represented by 39 items, the frequency of their occurrence increasing markedly during the later phases (Sellwood 1984, 371).

Although a difference in site function may account for the paucity of these objects at Potterne, it is also possible that chronological differences are, at least in part, responsible, such items having their roots in, and occurring in small quantities during, the Late Bronze Age but only becoming common items during the Iron Age. The stratified combs from the 1984 season (Fig. 92, 45, 46) were recovered from 'off-terrace' Zones 6 and 9 respectively. The function and nature of the small fragment of rib, notched along one edge (Fig. 92, 47) is uncertain although similar objects are known from All Cannings Cross (Cunnington 1923, 106, pl. 15, 6, 7, 12). The similarity between this object and bone combs thought to be used for impressing Beaker pottery (Clarke 1970, fig. 1) has been noted, although the Potterne example is almost certainly of Late Bronze Age date.

The dress, decorative, and gaming artefacts of Group 5 account for 8% of the Potterne assemblage, in contrast to All Cannings Cross where they form only 3% of the total (Smith 1982). The items within this group are generally carefully made and are decorative as well as being functional. Two buttons (Fig. 93, 54, 55) are of Bronze Age date. The slider (Fig. 93, 53) has a parallel at All Cannings Cross (Cunnington 1923, 78, pl. 6, 38) and in phase 1 (Early Iron Age) contexts at Gussage All Saints (Wainwright 1979, fig. 90, 5019, 5083). A similar object was also found close to the hip of a skeleton in a Bronze Age barrow in Cranborne Chase (Pitt-Rivers 1898, 140, fig. 1), leading to the suggestion that these objects were used as belt-fasteners. Many examples of teeth and other bone fragments perforated for use as ornaments or charms (Fig. 93, 56–65) are known from Late Bronze and Early Iron Age contexts in Wiltshire and beyond (Smith 1982), a practice which appears to have continued from later Palaeolithic times onwards. Perhaps the most interesting of these is the use of the white-tailed sea eagle talon (Fig. 93, 61). This species is no longer found in Great Britain but examples are known from a variety of archaeological sites (Locker, above), including another perforated talon found in indirect association with biconical urn pottery among surface collection material from the Fenlands of East Anglia (Healy 1996, 158, fig. 106, B1).

The miscellaneous worked bone (Group 6) and antler (Group 7) represent 20% and 12% respectively of the assemblage. These groups largely consist of uncommon or fragmentary items that fit none of the

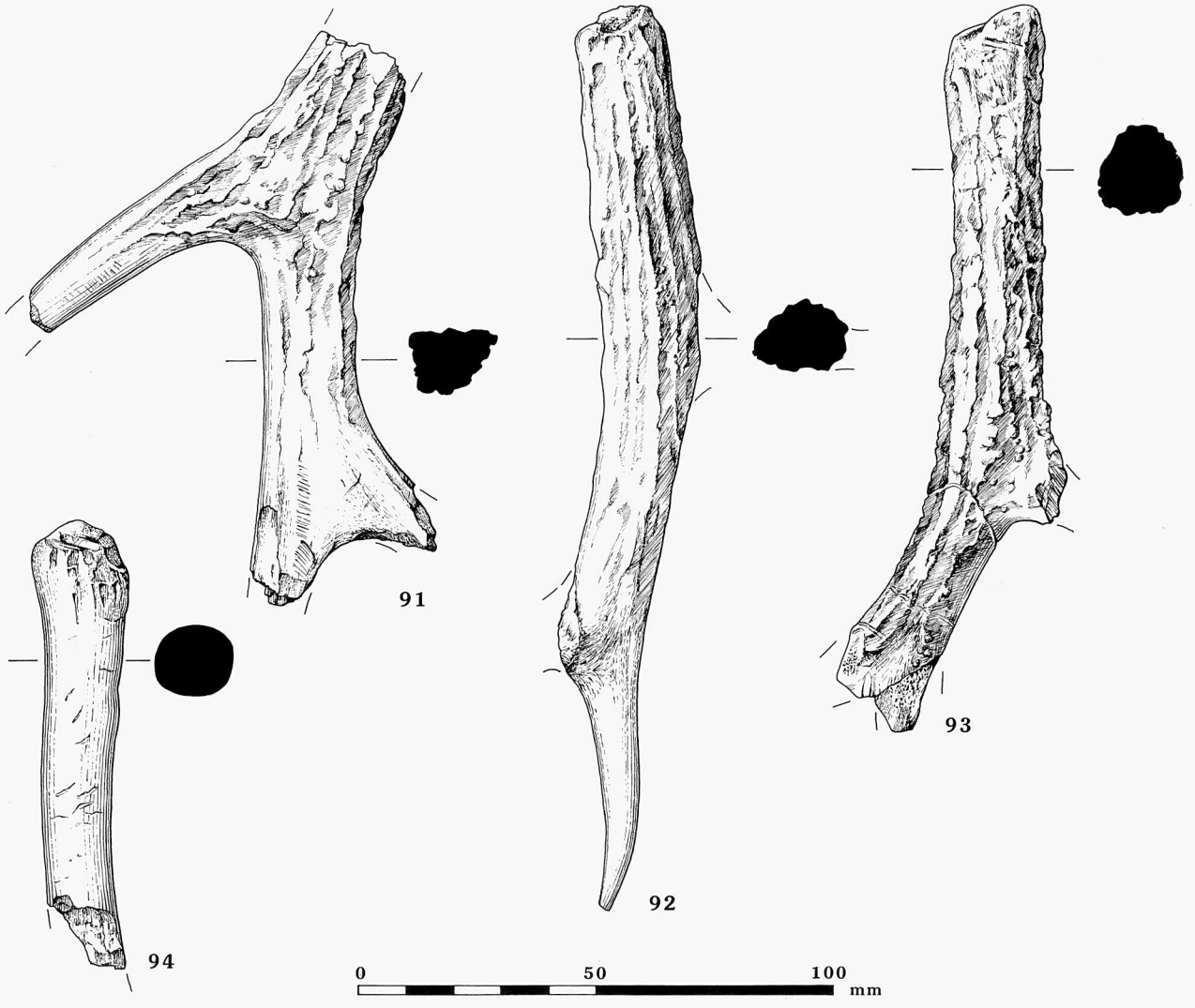


Fig. 96 Worked bone objects, 91-3. Scale 2:3

preceding classes, unfinished objects, off-cuts or waste, some of the latter worked only in that they result from the manufacture of other items. Handles (Figs 94–5, 73–83) are comparatively common and there are parallels at All Cannings Cross (Cunnington 1923, 106, pl. 15, 1–5). One fragmentary example (Fig. 94, 78) has a rivet or peg hole, while in another (Fig. 94, 77), the tang hole is in the broad end. Other examples (Fig. 94, 79, 81–3) have grooves near the end in which the tang was inserted which may have held a binding or wire ferrule to stop the handle splitting. Of the other items in these groups, the two cheek-pieces (one, not illustrated, in bone; the other of antler Fig. 97, 95), find parallels at Runnymede Bridge (Longley 1980, 29, figs 14–15) and probably indicate the use of horses for riding or as draught animals. Other interesting pieces include the small antler mount or plate with surviving bone or antler pegs (Fig. 97, 96), and the very delicate possible balance arm (Peake *et al.* 1999) (Fig. 97, 98), also of antler.

Manufacture

The local manufacture of the wide range of bone and antler objects recovered from the Deposit is indicated by the presence of both manufacturing debris, most of it from antler working, and unfinished, presumably abandoned, artefacts. Both domesticated and wild animals were exploited, with suitable bones from all the main agricultural animals, ie sheep/goats, pigs, horses, and cattle, being utilised, in contrast to the much more limited use of wild resources, primarily red deer antlers. Ready sources of both types of raw material, reflected in the large animal bone assemblage (Locker above), would have been available in the local cultivated and wild landscapes, much being acquired as secondary products from slaughtered animals within the local contexts from which the Deposit may have derived. Only the eagle talon, used for personal ornament, is likely to have originated from outside the local area.

Bone and antler working debris appears to form a small but significant element within the assemblage.

Evidence for bone working takes two forms, firstly the presence of unfinished items, presumably discarded or lost during manufacture. These include a number of incompletely perforated or poorly shaped items perforated for suspension (Smith Classes 2.6 and 5.5) (Fig. 92, 44; Fig. 93, 59) and an unfinished toggle (Fig. 93, 52), while a number of objects in the 'miscellaneous worked bone' category, especially of Smith Class 6.6, may also fall into this group. Other evidence for bone working derives from a range of objects which were either off-cuts from the manufacture of other items, or have been worked from off-cuts. Almost all the Group 7 antler objects fall into this category. Examples include Figure 93, 69 and a fragment of bone working waste (not illustrated) resulting from the separation of the proximal and mid-shaft sections of an ovicaprid metacarpal (A. Locker, pers. comm.) from 'off-terrace' Zone 12 of the Deposit, while items such as the bones with longitudinal holes (Smith Class 6.3) may represent either unfinished objects or manufacturing waste.

Function

The limited area excavated, coupled with our relatively limited knowledge of the specific functions of worked bone implements, make it difficult to suggest a range of activities for the Potterne assemblage. No clusters of individual artefact types, potentially indicative of activity zones, were apparent and while a broad function can be suggested for some items (the pins, needles, toggles, buttons, etc), much of the assemblage consists of general or multi-purpose tools. As noted above, while the paucity of weaving combs may indicate that weaving was not an important activity (see Sellwood 1984, 378, for a discussion of possible alternative uses), and although this may be in part a chronological problem, it is interesting to note the large collection of spindle whorls which was recovered (Hall, above, Figs 64–5, 1–16; Seager Smith, above, Fig. 85, 20, 21).

Discard and distribution

A total of 174 (70% of the total assemblage) worked bone and antler pieces was recovered during the 1984 excavation season, of which 164 can be assigned to a particular zone. Of the remaining ten pieces, two (Fig. 89, 6; Fig. 90, 25) were recovered from the fills of features at the base of the Deposit, five (including Fig. 92, 41; Fig. 93, 66; Fig. 93, 72) were unstratified, one (Fig. 90, 22) was incompletely recorded, and single pieces were recovered from an auger hole and grave digging respectively.

Although the distribution of worked bone and antler objects was plotted both vertically by zone, and horizontally by column, no significant clustering was apparent (details in archive). Of the 164 objects assignable to zones, 136 were from 'off-terrace' contexts, their distribution through the Deposit being shown in Table 43 and Figure 87. The frequency of objects remained largely consistent in Zones 10–3, only varying from 13 to16 pieces, but fell sharply both at the top of the Deposit through Zones 2 and 1, and at the base in Zones 13–11. The distributions by object type and by species, showed similar patterns although with minor variations. Pointed tools (Group 1), for instance, although absent in Zone 12, did not display the same level of fall-off at the top and base of the Deposit. However, given the small number of objects in individual groups, caution should be taken when assessing the statistical significance of such distribution patterns.

Because most items have uncertain or generalised functions it is not possible to identify significant changes in the structure of the assemblage through time, other than to note that there were few bone and antler objects at the base of the Deposit in Zone 13, but that, as with most of the other artefact categories, the number increased steadily in the zones above. However, unlike the other materials, the number of bone and antler objects did remain noticeably consistent between Zones 10 and 3.

Conclusions

In general terms, the worked bone and antler from Potterne appears to represent a broad, multi-purpose collection which includes a wide range of tool, fitting, and ornament types, as well as manufacturing waste. Although the chronology of worked bone assemblages is difficult to establish, the majority of tool types continuing unaltered over several centuries, the Potterne assemblage is closely comparable to that of other Late Bronze and Iron Age sites in Wiltshire, and is characteristic of the range of implements available to prehistoric communities over a much wider region.

List of illustrated worked bone objects

Group 1: Pointed tools

Fig. 89

Large pointed tools (1.1)

1. Pig fibula; narrowed with pointed shaft; SF498, context 1959, 'off' Zone 6
2. Pig fibula; narrowed with pointed distal end; SF1808, context 1808, 'off' Zone 8
3. Bovid metatarsal; pointed distal end; SF1188, context 3401, 'off' Zone 13
4. Large ungulate-sized long bone; pointed distal end; SF442, context 1557, 'off' Zone 4
5. Horse metapodial; pointed distal end; SF494, context 1961, 'off' Zone 6
6. Bovid ulna (left); pointed distal end; SF1191, context 3715
7. Horse metapodial; pointed distal end; SF530, context 2128, 'off' Zone 7

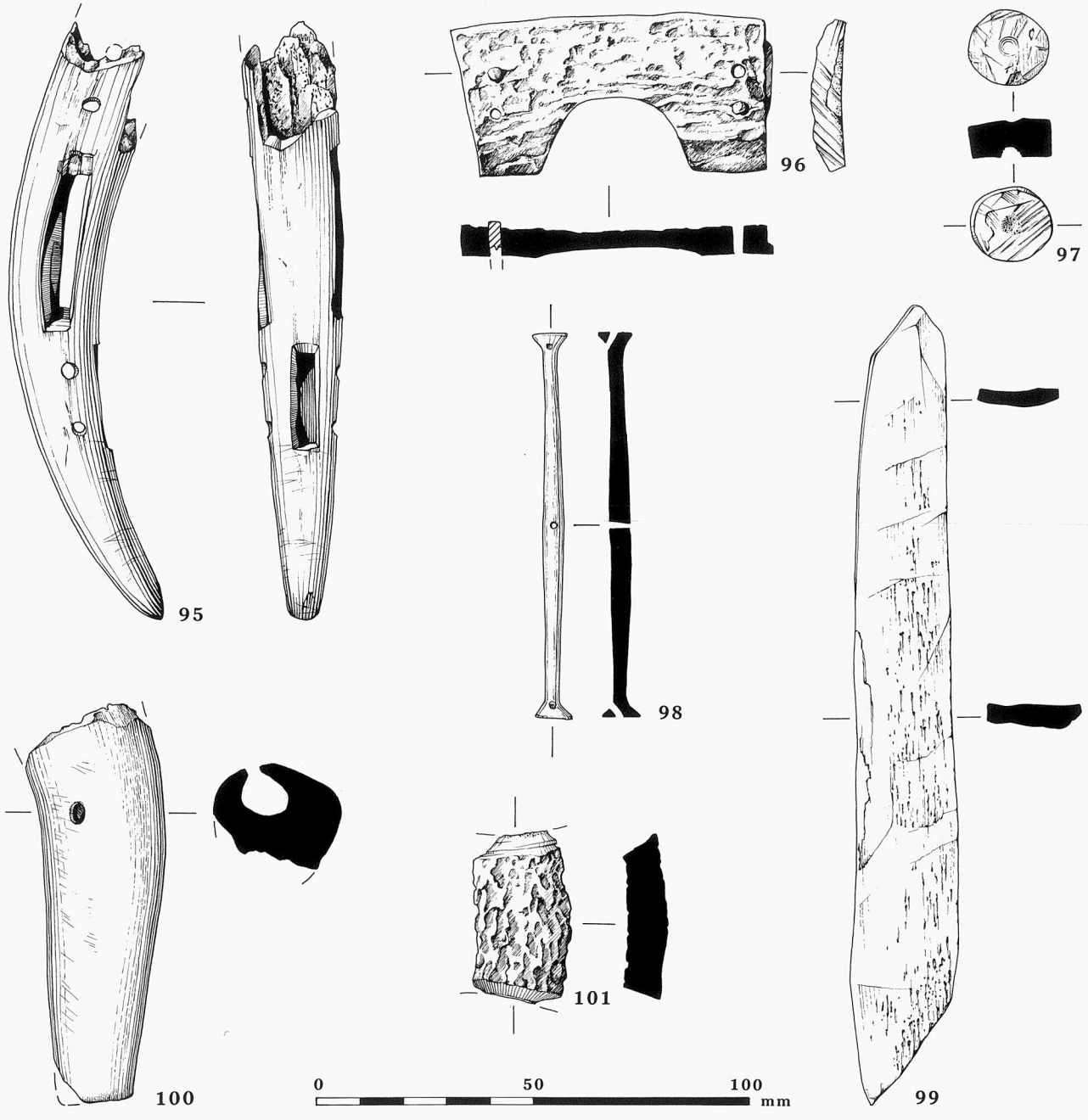


Fig. 97 Worked bone objects, 95-101. Scale 2:3

Small pointed tools (1.2)

8. Ovicaprid metatarsal; pointed distal end; SF529, context 1837, intermediate Zone 5
9. Horse metapodial; pointed distal end; SF1236, context 1580, 'off' Zone 4

Fig. 90

Shuttle tips or gouges (1.3)

10. Ovicaprid tibia; worked at distal end; incised decoration; perforated; SF491, context 1819, 'off' Zone 5
11. Ovicaprid metatarsal (left); perforated proximal end; pointed distal end; grave digging, SF3G
12. Ovicaprid metatarsal; worked distal end; SF480, context 1649, 'off' Zone 4
13. Ovicaprid metatarsal (right); worked distal end; shaved anterior surface; SF1226, context 1393, 'on' Zone 3
14. Possible immature red deer metatarsal; worked distal end; SF1215, context 1909, 'off' Zone 6
15. Ovicaprid metatarsal; worked distal end; SF1026, context 2626, 'on' Zone 9

Awls (1.4)

16. Ovicaprid-sized long bone splinter; pointed both ends; SF2107, context 2934, 'off' Zone 11

17. Large ungulate-sized animal; pointed both ends; SF1251, context 1956, 'off' Zone 6
18. Species unident.; bone splinter; SF432, context 1516, 'off' Zone 4
19. Species unident.; bone splinter; SF714, context 2378, 'off' Zone 8
20. Species unident.; bone splinter; SF992, context 2989, 'off' Zone 11

Pins (1.5)

21. Species unident.; plain, unelaborated head; gently tapering shaft; SF890, context 1860, 'on' Zone 5

Needles (1.6)

22. Indeterminate bone frag.; highly polished; 'eye' only partially preserved; SF2111, unstratified
23. Pig fibula; proximally perforated; polished; SF2212, context 2749, 'off' Zone 10
24. Pig fibula; perforated proximal end; pointed and polished; SF2016, context 3
25. Pig fibula; perforated proximal end; SF1111, context 3576, location uncertain
26. Pig fibula; perforated proximal end; polished; SF14G, grave digging,

Miscellaneous bone points (1.9)

27. Small ungulate metatarsal; cut marks at distal end and sides; SF891, context 2770, 'off' Zone 10
28. Ovicaprid long bone midshaft frag.; longitudinally split; polish at point; SF536, context 2148, 'off' Zone 7

Miscellaneous shank fragments (1.10):

29. Indeterminate bone type; polished; SF2109, context 2969, 'off' Zone 11
30. Possible pig fibula; polished; evidence of rodent gnawing; probably from needle; SF452, context 1394, 'off' Zone 3

Group 2: Bladed tools

Fig. 91

Rib blades (2.2)

31. Species unident.; longitudinally split rib; surface polished with lateral cut marks; 1985, SF1914, context 4047
32. Species unident.; rounded at one end; polished; SF441, context 1713, 'off' Zone 5
33. Large ungulate rib; longitudinally split; SF457, context 1323, 'off' Zone 3
34. Large ungulate rib; longitudinally split; both ends rounded; SF383, context 259

Worked ribs (2.5)

35. Large ungulate rib; knife cuts; smoothed and polished; grave digging, SF16G
36. Large ungulate rib; rounded ends; repeated knife-cuts; SF437, context 1400, 'off' Zone 3

Fig. 92

Thin blades with perforation (2.6)

37. Small ungulate rib; perforated; SF559, context 2009, 'off' Zone 6
38. Possibly small ungulate rib; perforated; SF763, context 2406; 'off' Zone 8
39. Indet. bone type; polished; perforated; SF1780, context 1857, 'on' Zone 5
40. Possibly small ungulate rib frag.; cut marks and polished; notched and perforated; SF1767, context 2571, 'off' Zone 9
41. Indet. bone type; polished and pointed; perforated; repeated cut marks; SF507, unstratified
42. Possible small ungulate rib; polished; perforated; SF878, context 1850, 'on' Zone 5
43. Unfinished split rib frag.; species uncertain; perforated; SF1807, context 2214, 'off' Zone 7
44. Indet. bone type; broad blade; notched at one end; incomplete 'perforation'; SF920, context 3101, 'off' Zone 11

Group 3: Toothed tools

Fig. 92

Weaving combs (3.1)

45. Antler; plain, rounded 'handle'; six short teeth; polished all over, including surfaces of teeth; SF478, context 9141, 'off' Zone 6
46. Antler; rectangular, expanded terminal forming handle; two surviving teeth with ground, bevelled ends; all surviving surfaces, including teeth, are polished; SF676, context 2515, 'off' Zone 9

Rib pieces with teeth at edge (3.4)

47. Species unident.; longitudinally-split rib frag.; surfaces polished; longitudinal scoring; perforated at one end with incomplete boring at the other; shallow V-shaped notches on the preserved long edge; SF1913, context 4071

Group 5: Dress, decorative or gaming artefacts

Fig. 93

Rings of bone or antler (5.1)

48. Indet. bone type; polished; SF35, context 85
49. Indete. bone type; polished; SF973, context 2619, intermediate Zone 9

Toggles (5.2)

50. Antler; shaved and polished surfaces; rectangular, transverse slot; SF392, context 432
51. Antler; longitudinally-split tine frag.; narrow sides shaved but broad surface left unfinished; rectangular, transverse slot; SF1173, context 2512, 'off' Zone 9
52. Antler; shaved; knife-cuts; rectangular, transverse slot; possibly unfinished; SF129, context 85

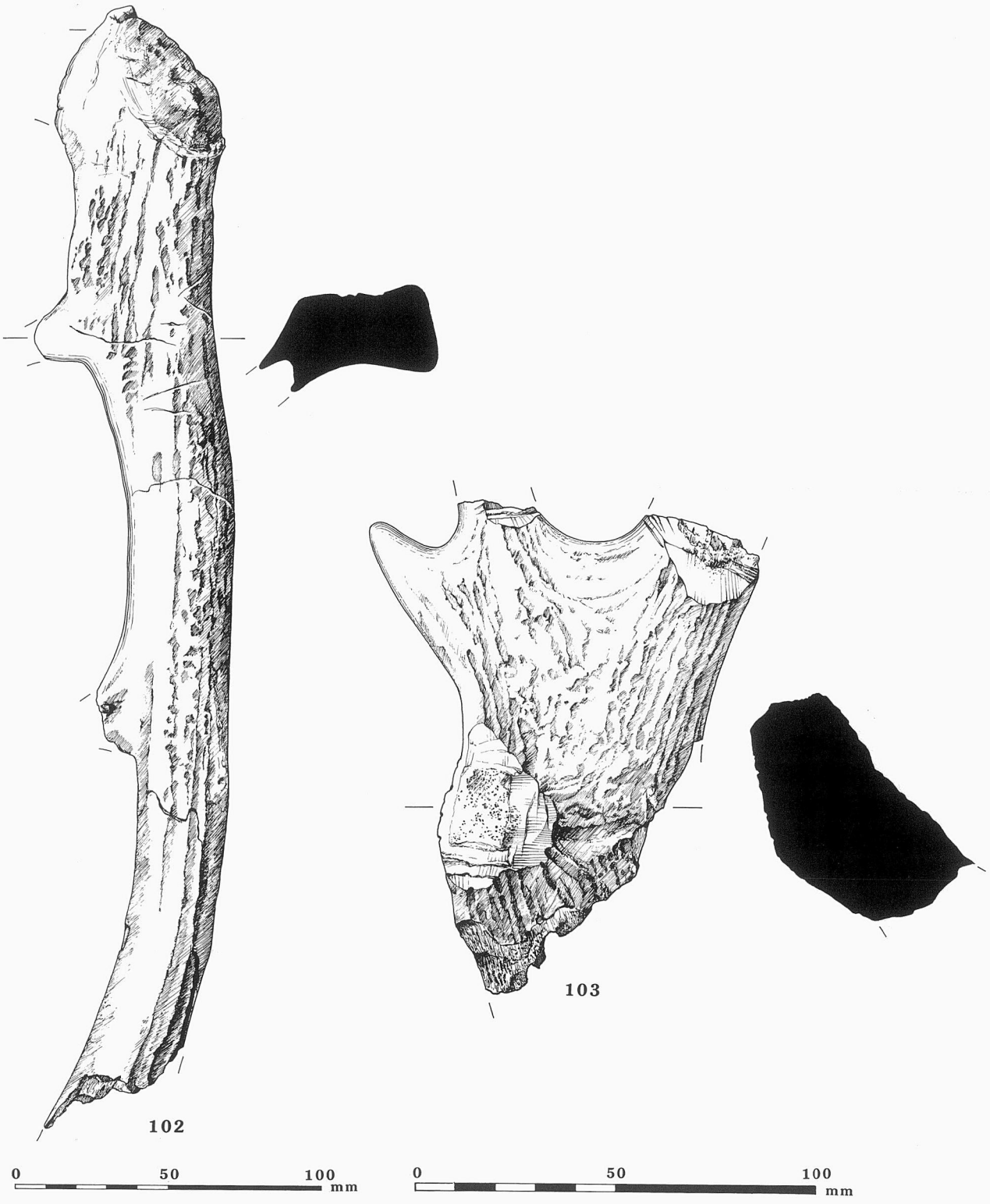


Fig. 98 Worked antlers 102 (scale 1:2) and 103 (scale 2:3)

Sliders (5.3)

53. Ovicaprid metatarsal (juvenile); longitudinal perforation and lenticular transverse perforations; fine worn grooves radiating from ends of the transverse perforations; SF1901, context 4047

Buttons (5.4)

54. Indet. bone type; two perforations; cut-marks near each end; SF2017, context 4

55. Species unident.; possible split rib frag.; two perforations; ground and polished surfaces; SF803, context 1556, 'off' Zone 4

Decorations pierced for suspension (5.5)

56. Dog canine tooth; perforated at root; SF11, context 24

57. Horse incisor; perforated at root; SF47, context 105

58. Fox mandible (right); perforated through gonion and possibly in front of premolar 2 but broken in this area; polished; SF2118, context 178

59. Possibly antler tine; attempted perforation in proximal end; second, incomplete boring; unfinished; SF504, context 1979, 'off' Zone 6

60. Dog canine; perforated at root; SF558, context 2174, 'off' Zone 7

61. White-tailed sea eagle talon; perforated; SF708, context 2386, 'off' Zone 8

62. Deer canine; perforated at root; polished; SF1000, context 2812, 'off' Zone 10

63. Horse incisor (mature individual); well-worn; perforated at root; SF1056, context 2634, 'on' Zone 9

64. Dog canine tooth; perforated at root; SF2119, context 2534, 'off' Zone 9

65. Dog canine tooth; perforated at root; SF2120, context 1822, location uncertain

Group 6: Miscellaneous

Other pieces of worked bone (6.6)

66. Possibly split rib from large ungulate-sized animal; short ends slightly rounded; polished; SF489, unstratified

67. Indet. bone type; roughly fashioned; SF562, context 2182, 'off' Zone 7

68. Large ungulate rib frag.; cut marks and polish; ground point; SF929, context 3104, 'off' Zone 11

69. Ovicaprid humerus; cut at both ends; SF979, context 2042, 'on' Zone 6

70. Ovicaprid tibia; extreme distal articulation cut off to give a flat surface; longitudinally perforated; transverse perforation also at distal end; shaft shaved; SF1141, context 1614, 'off' Zone 4

71. Possible small ungulate long bone; longitudinally-split; cut marks, abrasion and polish; SF1214, context 3004, 'on' Zone 11

72. Indeterminate bone fragment; roughly pointed at both ends; SF1792, unstratified

Fig. 94

Antler and bone handles (6.7)

73. Antler; cut marks; polished surfaces; broken at tang hole; grave-digging, SF23G

74. Red deer antler; incised design of feathered chevrons; highly polished surfaces; SF20, context 29

75. Bovid metacarpal shaft; cut marks at one end succeed polished wear; SF40, context 77

76. Red deer antler; cut marks through polished surfaces at end with tang holes; incomplete drilling at butt end; SF343, context 259

77. Antler, probably red deer; original end with tang hole broken off; polished; cut marks trimming butt end which has a replacement tang hole; SF380, context 307

78. Antler; shaved surfaces; single perforation near butt end; SF430, context 1149, 'on' Zone 1

79. Antler; incised decoration; broken at tang hole; part of unworn binding groove; SF493, context 1960, 'off' Zone 6

80. Antler; deeply incised decoration; SF588, context 2333, 'off' Zone 8

81. Indet. bone type; polished; square-sectioned socket throughout length; unworn binding groove; SF1095, context 1577, 'off' Zone 4

Fig. 95

82. Antler; punched decoration; part of square socket survives; SF1132, context 1540, 'off' Zone 4

83. Antler; polished; part of unworn binding groove near surviving end; SF2127, context 2945, 'off' Zone 11

Horn cores (6.10)

84. Horn core (left) of goat; cut marks; SF549, context 2188, 'off' Zone 7

Group 7: Antler

Fig. 96

Antler tines (7.1)

85. Red deer antler; removed by sawing and snapping; natural wear at tip; SF537, context 1842, 'off' Zone 5

86. Red deer tine tip; removed by cutting and snapping; SF598, context 2503, 'off' Zone 9

87. Red deer tine; removed by cutting and snapping; shaved; SF681, context 2516, 'off' Zone 9

88. Red deer tine; removed by chopping; cut marks at tip; SF1015, context 2425, intermediate Zone 8

89. Possible red deer tine frag.; detached by cutting and snapping; SF1216, context 1809, 'off' Zone 5

90. Red deer tine detached by cutting and snapping; natural polish at tip; SF1618, context 1450, 'off' Zone 3

Fig. 96

Antler picks and beam fragments (7.2)

91. Roe deer antler (mature); rodent gnawing and some working on one tine; SF2019, context ?4

92. Roe deer antler (mature); three points; two tines removed; base of antler worn; SF24G, grave digging

93. Roe deer; cast antler; three points; tines removed; knife cuts at tine junctions; possibly some smoothing around end of pedicule junction; SF2132, context 403

94. Antler; probably cast roe; smoothed main beam, cut at pedicule; two knife cuts across main beam; SF2131, context 2781, 'off' Zone 10

Fig. 97

Miscellaneous worked antler pieces (7.3)

95. Red deer antler tine; cheek piece; perforated at proximal and distal ends; large rectangular slot cut right through for bit; smaller rectangular slot cut through to middle of antler towards distal end, and part of corresponding slot at broken end; twin peg holes; SF29G, grave digging

96. Red deer antler; mount; four perforations, two with surviving bone or antler pegs; saw cuts at ends, ground sides and a slight hollow in the centre of the reverse surface; SF334, grave digging

97. Antler; roughly trimmed and polished; slight depressions in both flat surfaces; SF758, context 2366, 'off' Zone 8

98. Possible antler frag.; bobbin-like form; transverse perforations at both ends and in centre; polished on all surfaces; SF895, context 2916, 'off' Zone 11

99. Antler; longitudinally split and shaved fragment of beam; abraded and polished; SF1791, context 2764, 'off' Zone 10

100. Antler; hole drilled in one surface; abraded; polished; SF1813, context 2183, 'off' Zone 7

101. Antler; probably red deer; split and rounded at one end; cut marks and polish at other; SF2129, context 1710, 'off' Zone 5

Fig. 98

Antler waste (7.4)

102. Cast red deer antler; possibly a pick but key pieces are missing; no certain evidence of deliberate working; SF502, context 1979, 'off' Zone 6

103. Red deer antler; main beam frag.; tines removed by chopping and snapping; SF1205, context 1539, 'off' Zone 4

Overview of the Artefactual Assemblage, by Lorraine Mepham and Andrew J. Lawson

Potterne has generated one of the largest collections of later prehistoric finds in Britain. The artefactual assemblage recovered, by virtue of its size and range, and the means by which it was excavated, offers a unique opportunity to examine a chronological sequence of activity on the site from the Middle Bronze Age to the Early Iron Age. This section aims to provide an overview of the complete artefactual assemblage, summarising the main strands of evidence which may be used to inform three main themes:

- the extent to which Potterne can be regarded as anomalous within the known range of sites for this period, in terms of the size and range of artefacts;
- the range of activities which were taking place on site, any chronological changes in these activities, and to what extent these can inform an understanding of the economy of the site and the lifestyle of those who used it;
- the position of Potterne within the local and regional production and distribution networks, through a consideration of the local and non-local resources exploited.

Activities

The artefactual assemblage can be used to suggest some of the range of activities which were being carried out on and around the site. Table 44 summarises the artefactual evidence for 'off-terrace' activities from the pre-Deposit levels (Zones 14–11) and throughout the accumulation of the Deposit (Zones 10–2).

Direct evidence for metalworking occurs in the form of crucibles, mould fragments, hearth lining, and ferrous slag. From the pre-Deposit levels and into the lower part of the Deposit ('off terrace' Zones 13–9) this activity has been characterised as the casting of leaded bronzes. Small fragments and droplets of lead, and copper alloy fragments which may be regarded as scrap material, are presumably associated with this activity. The copper alloy objects themselves from these levels, which may therefore have been made on site, are dominated by tools (awls, tweezers, and blades) and pins, while vessel fragments are better represented in the upper levels (Zones 7–4).

Above Zone 8 evidence for bronze casting is supplemented by more ambiguous traces of ironworking in the form of miscellaneous iron fragments and a small quantity of ferrous slag, found in Zones 7–5. The possibility that this material could be regarded as of later (Romano-British) date and intrusive in these levels has been considered but, given the growing body of evidence for ironworking at this date (*c.* 7th century BC and onwards) from other sites in central southern

Table 44: Overall trends in assemblage composition through the Deposit, 'off-terrace' only

Zone	*Pottery*	*Fired clay*	*Flint*	*Iron*	*Cu alloy*	*Metalworking debris/lead*	*Burnt flint*	*Other*
1			misc. debitage (tillage)			very little evidence for metalworking of any kind		shale bracelets throughout ('fineri'; pieces – beads, bracelet, vessel – [3-6]) bone objects throughout (but (but mostly [3-10])
2	shell and flint tempered fabrics residual; dominance of sandy and oolitic fabrics	'peak' in evidence for textile production (loomweights; spindle whorls)					variable but fairly small quantities of burnt flint	more stone objects, but more smaller objects (whetstones, hammers/rubbers)
3				punch ?awl				
4				?tang	generally less scrap, but more vessel frags. (65%)			
5		apparent 'hiatus' in evidence for textile production		?RB toilet set rod		slight evidence for iron smithing (crucible, hearth lining, slag)		
6			[6] drop in quantity of flint	no ironwork?				
7	[7-10] flint and shell tempered fabrics declining; more sandy, partic. glauconitic; some oolitic						huge increase in burnt flint, perhaps linked to pottery production	many more querns in lower deposit than upper
8		'peak' in evidence for textile production (loomweights; spindle whorls)			tools, pins, some vessels; more scrap (sheet, wire, lumps)			
9						casting of leaded bronzes (crucibles, mould frags.)		
10								
11	flint-t, shell-t and sandy fabrics, all prob. local	very little evidence for textile production					burnt flint tails off	
12								
13								'peak' in shale objs. prob. deriving from pre-Deposit activity
14								

England, there is no reason to doubt it here. It should perhaps be noted in this context that the use of a metal-detector to aid the recovery of metal objects was restricted to Zones 14–7, and this may have affected the overall quantities recovered between upper and lower levels of the Deposit.

Textile production is demonstrated by a range of artefacts for spinning (ceramic spindle whorls), weaving (ceramic loomweights, bone combs), and sewing (bone needles). There are two apparent 'peaks' in this activity, in 'off-terrace' Zones 10–8 and Zones 4–2. Only one loomweight was recovered from pre-Deposit levels (the presence of a few flax seeds in these levels is probably insignificant here), and there is an apparent hiatus in Zones 7–5, although it should be stressed that overall numbers are not great. The changes in the ratio of fired clay to potsherd spindle whorls has been noted as a possible indication in changes in the mode of textile production (Hall, above), and the slightly lighter potsherd whorls, concentrated in the later 'peak', are perhaps associated with the production of finer textiles than the heavier fired clay whorls of the earlier 'peak' (see Øye 1988, 54–5). The use of the ratio of spindle whorls to loomweights (59:4) to suggest the greater importance of spinning over weaving, however, should be treated with caution.

The use of hides can be inferred from the large quantities of animal bone, as well as bone points, and bronze awls, which could have served for perforating the hides.

Other craft activities include bone/antler working and shale working, both of which seem to have been carried on throughout accumulation of the Deposit and, in the case of shale working, in pre-Deposit levels also. Both the bone/antler working and shale working evidence includes both unfinished objects and miscellaneous waste fragments or off-cuts. While the bone and antler objects are most likely to have been manufactured from raw materials readily available on site or in the immediate vicinity, the on-site shale working represents the exploitation of a non-local resource (ie, from Kimmeridge in Dorset), imported to the site probably as rough-outs for finishing rather than unworked blocks. In addition, one goat horn core ('off-terrace' Zone 7) shows cut-marks resulting from horn removal.

There is a hint at the production of pottery in the form of a peak in the quantities of burnt flint recovered in 'off-terrace' Zone 10, slowly declining to Zone 7 and subsequently tailing off. This could have been used as tempering material, but any such activity was presumably fairly short-lived, since flint-tempered fabrics were in decline during Zones 10–7 after predominating in pre-Deposit levels, where the quantities of burnt flint recovered were much lower. Another possibility is that the great quantities of burnt dung recognised in the soil micromorphology indicate the production of reduced wares in clamps fuelled by dung (cf. Orton et al. 1993, 116). Such low temperature firing is unlikely to leave a severely burnt base as a record of the activity, while the remains of the clamp, once raked away, might blend into the other debris, thereby leaving no discernible trace.

Stone is utilised throughout, although querns are most frequent in the lower part of the Deposit ('off-terrace' Zones 10–7), possibly representing a temporary period of increased cereal-processing. The evidence from plant macrofossils is not adequate to support this suggestion, however, despite a noticeable peak in the occurrence of charred remains, especially chaff, in two contexts (in Columns 88 and 89) in Zone 10. In upper zones of the Deposit, smaller stone implements are more common – whetstones, hammerstones, and rubbers. At least one of the whetstones ('off-terrace' Zone 9) may be related to the finishing of cast metal objects, and other rubbers or 'burnishing stones' may also have had a function connected with metal-working. The more common mullers, rubbers, and hammerstones have a possible connection with quern manufacture; they are commonly found on other Late Bronze Age and Early Iron Age sites in north Wiltshire in association with sarsen saddle querns (eg, Gingell 1992, 118). All Cannings Cross, in particular, produced large quantities of such objects (over 1300), for which a potential function in dressing quernstones was suggested (Cunnington 1923, 24–6). The evidence from Potterne, however, is not so convincing since the numbers of these objects are much lower.

Perhaps the most obvious evidence for on-site activity, however, occurs in the form of the large pottery assemblage which, with the faunal assemblage, represents the preparation and consumption of foodstuffs on a massive scale. Residues on pottery sherds in the form of sooting and carbonised food were well preserved. Vessel function has not been explored here, but it may be observed that the proportion of bowl forms increases through the Deposit at the expense of jar forms, becoming more frequent by Zones 5–2. Associated with this is an overall increase in decoration. Both these trends reflect more widespread changes in Late Bronze Age and Early Iron Age pottery in southern England (eg, Barrett 1980). Whether these trends reflect corresponding social or symbolic changes in the preparation, serving and consumption of food is a question which might fruitfully be pursued.

It is worth stressing that while comparisons with other contemporaneous sites show that most have produced evidence for some of the activities described above, at none of the sites is the full range represented. On the other hand, some have produced evidence for other specialised activities not found at Potterne, utilising locally available raw materials, for instance, salt extraction at Brean Down and flax retting at Reading Business Park (Bell 1990; Moore and Jennings 1992). All Cannings Cross provides the closest comparison, with shale working, antler working, textile production, metalworking (unspecified), quernstone manufacture, grain processing, and possibly leather working represented along with the more visible remains of food preparation and consumption.

Detailed data from other potential midden sites are not yet available for comparison, but at Bishops

Cannings large numbers of worked bone/antler and stone implements, including some sarsen tools probably made on site, suggest textile and/or leatherworking and possibly quernstone manufacture (Robinson and Swanton 1993).

Lifestyle

The range of objects recovered from the Potterne Deposit demonstrates that those who were responsible for its creation in the first half of the 1st millennium BC were furnished well beyond the basic needs of subsistence. Personal attire probably included woollen, linen, and leather clothing, fastened by thongs, toggles, or buttons. Decoration included bronze pins, shale and jet amulets, glass beads, and bone pendants, amongst which was the 'exotic' talon of a white-tailed sea eagle. Precious metals were available, as the loss of the gold bracelet (and other fragments) demonstrates.

Working practices were assisted by a wide range of tools, including bronze knives, awls, and tweezers, etc, bone points, needles and gouges, whetstones, mullers and querns, and so forth. Ceramic vessels were abundant, and doubtless the range of surviving daily objects was matched by organic items which have subsequently perished.

The interpretation of some objects as non-utilitarian, such as bone 'gaming pieces', implies a degree of leisure beyond the labours of daily life. Whereas the prevailing lifestyle was probably very much a matter of routine if not ritualised, there is only very limited evidence for ceremonial activities; even the remains of the dead appear to have become incorporated in the accumulating Deposit in a rather casual fashion (but see Brück 1995).

The volume of accumulated deposits at Potterne might imply a wealthy site afforded high status by the community, but there appears to be little evidence in terms of material culture, structural remains, or ritual activity that could not be found on other contemporaneous sites. The fact that the assemblage at Potterne embraces the full range of the things that might be expected on such sites is possibly only a product of scale, rather than of status and perhaps more important is a consideration of how the site functioned and the role it played in relation to its neighbours (below).

Exploitation of Resources and Exchange Networks

The most prolific finds were pottery sherds. Although the form and fabric of the vessels they represent changed through the life of the site, analysis of the fabrics has demonstrated that most were locally produced and only a smaller proportion imported; the proportion of non-local wares increases dramatically with the appearance of ceramic styles characteristic of the Early Iron Age (from 'off-terrace' Zone 6). The vessels themselves would in part be used on site, but would also form a supply of containers for other products (milk, yoghurt, cheese, etc). Imported vessels, now recognisable from their 'non-local' fabrics (eg, oolitic), may once have been containers for products brought to the market, rather than being solely exotic pots imported as such.

The existence of a trade and exchange network goes well beyond the pottery and is reflected in other productive industries on the site. The geology of the site's location is such that all the raw materials for bronze production must have been imported, from the West Country or from south Wales. Bronze casting relied either on a supply of scrap or ingot metal, but the droplets of lead recovered suggest that it may have been brought to the site in an unalloyed form for addition to molten bronze. In the later part of the site's use, iron-smithing was introduced, which would have necessitated a new network of contacts exploiting different metal sources.

Full geological identifications were not made for the stone objects, but it seems that the majority of the objects were made from the local resources of sarsen and greensand. Local chalk was also utilised. Non-local stone types include quern fragments of probable Pennant Sandstone from the south Wales/Bristol area and granite from the south-west peninsula.

Shale derived from the deposits in Purbeck, Dorset. Finished objects were acquired as well as raw materials in the form of either unworked blocks or unfinished objects. There is slight evidence of a possible break in the supply of raw material after an initial peak in pre-Deposit levels.

Other non-local materials are represented by the rare occurrence of 'exotics' such as the glass and amber beads, and the gold bracelet and fragments.

Comparison with Other Sites

In terms of the overall size of the assemblage, Potterne exceeds most Late Bronze Age and Early Iron Age sites in Britain, and is unsurpassed in its density. Table 45 summarises the numbers of artefacts recovered and compares them with those from broadly contemporaneous sites, and this exceptional density of artefacts is highlighted when the area excavated is considered. Table 46 presents the areas excavated on the same sites, the numbers of sherds found as an example of finds recovery, the density of sherds in excavated areas, and the ratio between the density of sherds per square metre excavated from Potterne and the other sites. The majority of the sites chosen are regarded as settlements of a variety of different forms and are from a range of topographic locations. It is clear that where stratigraphy is well preserved and post-depositional loss has been slight, as at Brean Down and Runnymede Bridge,

Table 45: Comparison of numbers of artefacts recovered at Potterne and other contemporary sites

Site	*Special/rare*	*Gold*	*Cu alloy*	*Metal working*	*Shale*	*Querns / whetstones*	*Worked bone / antler*	*Clay / stone weights*	*Spindle-whorls*	*Pottery*
Potterne	7 glass beads 3 amber beads	1 bracelet 1 frag. 1 razor	163 objects tweezers	crucibles moulds hearth lining	67 bracelet frags. 3 beads 2 pendants 1 vessel	116 querns 19 whetstones 43 mullers rubbers etc.		4	40 clay 19 pot 3 stone	92,894 sherds (537 kg)
Brean Down	salt production equipment	2 bracelets 1 scrap	1 bracelet 1 sheet frag.	no	2 bracelet frags. 2 rough-out frags.	none	1 pin 3 awls 2 gouges 1 chisel 4 smoothers 4 others	2	1	2,300 sherds (c. 16 kg)
All Cannings Cross	2 glass beads IA or RB?	no	1 razor 4 bracelets or earrings 1 socketed axe 1 tweezers 1 sheet 2 other	crucible frags.	21 artefacts, including 4 rough-outs	9 saddle 12 whetstones (non-local fine-grained)	464 bone 50 antler	?	5 chalk 30 clay 16 pottery	<300 vessels
Reading Business Park	flax retting flints	no	1 pin shaft	1 mould frag.	no	1 whetstone 5 rubbers 3 hammer-stones 3 querns	6	8	no	7,100 sherds + 10 complete
Aldermaston	no	no	no	3 crucibles 4 mould frags	no	9 querns	bone does not survive	20	2 clay	6,849 sherds + 3 complete
Knights Farm	waterlogged plank	no	none	no	no	1 quern	bone does not survive	>3	no	2,700 sherds

Table 45: Comparison of numbers of artefacts recovered at Potterne and other contemporary sites

Site	*Special/rare*	*Gold*	*Cu alloy*	*Metal working*	*Shale*	*Querns / whetstones*	*Worked bone / antler*	*Clay / stone weights*	*Spindle-whorls*	*Pottery*
Runnymede Bridge (1976)	2 clay slabs 3 amber beads	no 2 razors	1 weapon 3 tweezers 6 pins (2 dec.) sheet 14 misc.	globules & droplets	2 bracelets	no	15	5	4	c. 480 vessels
Runnymede (1978)	3 wooden objects 2 clay slabs	no	2 knives 2 rings 1 pinhead 5 sheet frags. 4 misc.	crucible mould	1 bracelet	both	13	2 frags	7 clay	6,886 sherds
Mucking North Circle	salt production equipment 14 clay slabs	2 rings	1 axe 1 sheet frag. 1 bar	4 moulds 1 crucible	no	2	no	11	2 clay 1 pottery	(13.3 kg)
Springfield Lyons	no	no	no	deposit of mould debris crucibles	no	no	no	3	3 clay	9356 sherds (55.9 kg)
Lofts Farm	perforated clay slabs amber bead frag.	no	1 socketed axe frag.	no	no	no	no	no	1	4,019 sherds 46.4 kg
Petters Sports Field	3 clay slabs	no	4 socketed axes 1 pins 4 ingots	plate casting jets waste and ingot material	no	no	no	no	5 pottery	218 sherds

Table 46: Comparison of excavated areas and quantities of pottery recovered at Potterne and other contemporaneous sites

Site:	*Area excavated (m^2)*	*Number of sherds (weight)*	*Sherds per m^2 (weight)*	*Potterne: site density ratio*
Potterne	150	92894 (537 kg)	620 (3.6 kg)	1
Brean Down (Unit 4)	120	2,300 (16 kg)	101 (0.1 kg)	33
All Cannings Cross	*c.* 3500	c. 300 vessels	0.1 vessel	-
Reading Business Park	25,290	7100 (+10 incomplete)	0.3	2067
Aldermaston Wharf	1350	6849 (+3 complete)	5	124
Knight's Farm	22,000	2700	0.1	6200
Runnymede Bridge Area 6	*c.* 200	6886	*c.* 35	*c.* 18
Runnymede Bridge Area 16	13	9505 (c. 70 kg)	731 (5.4 kg)	0.85
Mucking North Ring	2184	(133 kg)	(0.06 kg)	-
Springfield Lyons	*c.* 3200	9356 (55.9 kg)	2 (0.02 kg)	310
Lofts Farm	*c.* 2000	4019 (46.4 kg)	2 (0.02 kg)	310
Petters Sports Field	*c.* 1200	218	0.2	3100

sherd density is high. Nonetheless, the recovery rate from Potterne was still 33 times higher than the contemporary stratigraphic unit at Brean Down, for example. Area 6 at Runnymede Bridge, excavated in 1978, produced 6887 sherds from an area somewhat less than 200 m^2 and comprising channel infill as well as occupation layers and features (Needham 1991, 123–4). Although this density is considerably less than at Potterne, one selected part (Area 16) of the Runnymede Bridge site, excavated in 1985–6, has produced an even greater density than Potterne: 9505 sherds from only 13 m^2 (Needham in Needham and Spence 1996, 107). The extraordinarily high figures for Potterne are, of course, a result of the thickness of the Deposit at Potterne, but also serves to identify two of its most distinctive characteristics, namely the nature of the 'soil' matrix and the concentration of finds.

A third characteristic of the site is the continuity of depositional practice throughout the duration of the site. Had the site only been in use for a period that would have permitted the accumulation of 0.1 m of Deposit (one zone) the concentration of sherds would still be between 53 (in Zone 10 'off-terrace') and 81 sherds per square metre (in Zone 5 'off-terrace'; detail in archive) or at least three times as dense as the finds in Brean Down Unit 4 and at least 170 times as dense as Reading Business Park.

Potterne, then, stands out as anomalous amongst contemporaneous sites in terms of the size and density of its artefactual assemblage, and might therefore be considered to represent a distinct site type defined on the basis of dense quantities of artefacts, an accumulation of dark earth, and continuity of practice which enabled the accumulation to reach monumental proportions. May any other such sites be identified? In the intervening period since the excavation of Potterne, comparable sites have begun to be recognised, and it now appears that Potterne is potentially just one of several such sites of the Late Bronze Age to Early Iron Age transition period in central Wiltshire, the best known of which is East Chisenbury, where a substantial 'midden' survives as a low mound 3.5–4 ha in extent (Brown *et al.* 1994; McOmish 1996). This site, although as yet investigated only on a very small scale (*c.* 0.05% of the total midden area) and awaiting full publication of the preliminary results, has produced several thousand sherds of pottery, spindle whorls, worked and decorated bone, and stone, shale, and glass objects, as well as a large faunal assemblage. The density of the artefacts appears to be comparable to Potterne, and there is evidence for selective disposal and structured deposition of the artefacts.

Other sites are less well understood, although McOmish's (1996, fig. 1) list of six other potential 'midden' sites (1996, fig. 1) does include All Cannings Cross which was possibly a Potterne-like deposit but has been truncated by modern ploughing. The excavator noted that artefacts were found within a layer of dark soil of varying thickness which, she remarked, seemed unusually extensive (Cunnington 1923, 14). This site, which has given its name to the characteristic decorated pottery finewares of the Early Iron Age found in quantity in the upper zones at Potterne (eg, Cunliffe 1991, figs A:2, A:6), otherwise produced a broadly similar artefactual assemblage to Potterne, although there are potentially significant differences which have already been explored (see above).

More recently, a substantial spread of black soil covering roughly 5 ha has been found at Bishops Cannings (Robinson and Swanton 1993; McOmish 1996). The extensive artefactual assemblage includes pottery of Late Bronze Age to Early Iron Age date, and large numbers of bone and antler tools, as well as a range of whetstones, polishing stones, and sarsen artefacts, some at least resulting from on-site production.

Recurring traits amongst the artefactual assemblages from all these sites, where known, are large quantities of material in a wide range of types, particularly pottery, with worked bone/antler and stone implements also common, and with less common, 'exotic' materials, such as glass, occurring in small but nevertheless significant quantities. Potterne is as yet the

only such site to produce either gold or amber objects.

Leaving aside the question of quantity, are these artefactual assemblages representative, in terms of the range and quality of material, of Late Bronze Age and Early Iron Age sites in general? Table 45 indicates the range of material types found at a selection of such sites across southern England for which quantified data are available; none of these sites has produced the full range of artefact types recovered from Potterne. When other settlement sites from the region are included, such as Burderop Down on the Marlborough Downs (Gingell 1992), Boscombe Down West, Amesbury (Richardson 1951), and Old Down Farm, Hampshire (Davies 1981), and larger hillfort sites, such as Budbury, Bradford-on-Avon (Wainwright 1970), a similar pattern emerges. These sites have all produced assemblages more limited than that from Potterne, and these limitations are evident not just in the range of material types, amongst which the 'exotic' materials are most notably absent, but also in the range of artefact types. If this evidence is to be taken at face value, it has two main implications, first that a more limited range of activities was being undertaken on these sites and, secondly, that these sites had a more restricted access to non-local products via trading networks.

Section 4. Synthesis

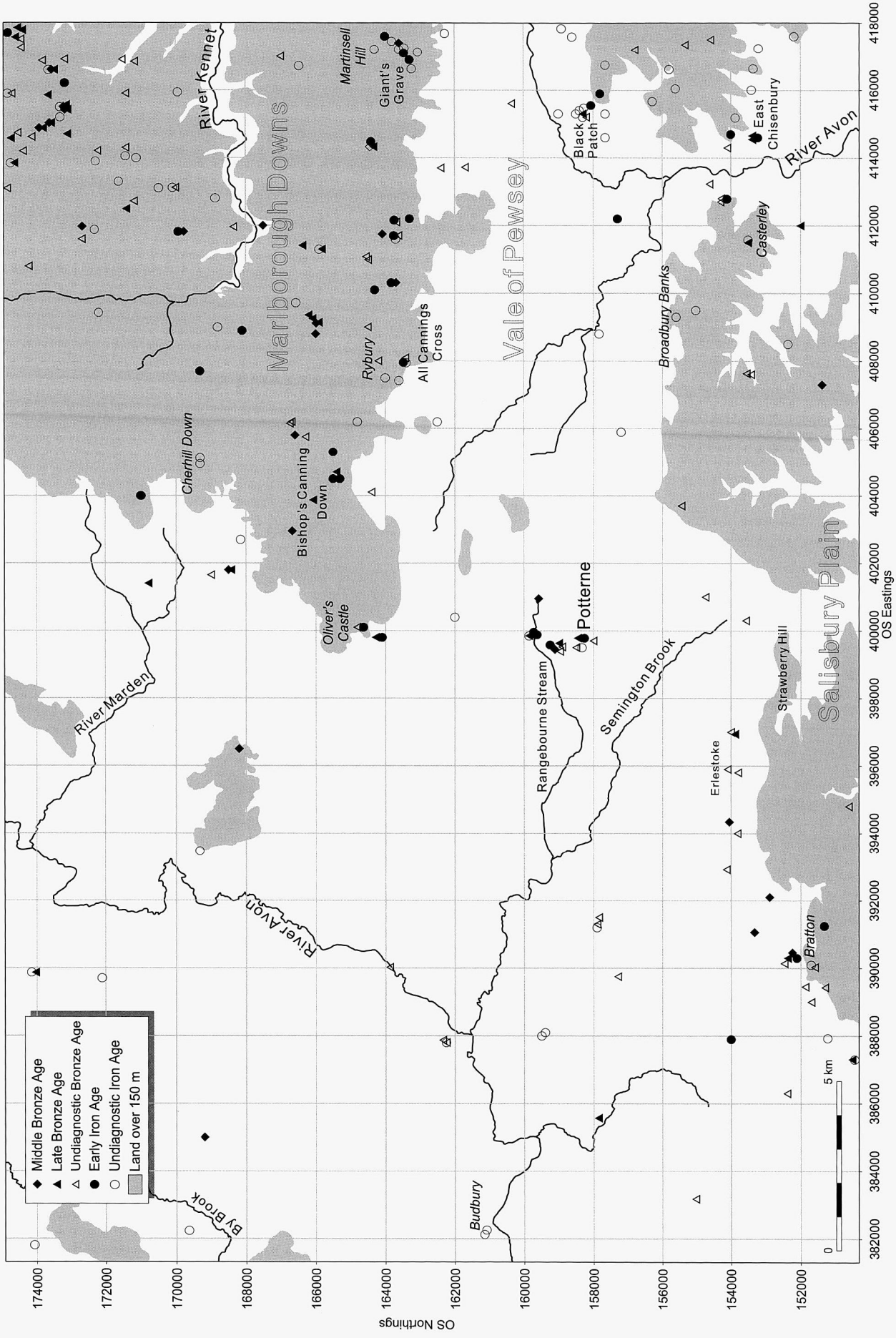


Fig. 99 Later prehistoric sites in the Potterne area (information from Wiltshire SMR)

7. Discussion *by Andrew J. Lawson, Andrew Powell, and Roger Thomas*

Potterne is, in many ways, a remarkable site. In one of the most thoroughly explored regions in Britain, a hitherto unrecognised major prehistoric monument type has been identified. The extent of the site is surprising. The sheer volume of the deposits is astonishing, and the volume and density of artefacts and animal bones which they contain is prodigious and unprecedented. The site does not fit easily into our existing conceptions of the nature of later Bronze Age settlement in Wessex, and the discoveries at Potterne therefore pose a significant challenge to interpretation.

The previous chapters have described the circumstances of excavation at Potterne, the physical characteristics observed, and the artefacts and environmental remains recovered. The purpose of this chapter is to draw together, to summarise and to review the evidence presented in the earlier sections of this report, and then to consider how the Potterne site can be interpreted within the framework of our current understanding of later Bronze Age settlement and society in southern Britain. Possible comparanda for the Potterne site will also be discussed. Finally, some consideration will be given to the contribution which Potterne has to make to our understanding of social change in the later Bronze Age of southern Britain.

1 The Location of the Site

In attempting to interpret Potterne, its wider context is important, in terms of both geography and archaeology. Potterne is located at the western end of the Vale of Pewsey which has formed as a breached anticline where the chalk has been eroded down to the underlying Greensand. Although the village is on a low hill, this is subordinate to the scarps of Salisbury Plain to the south (Pl. 1) and the extension of the Marlborough Downs to the north (Pl. 2) The site is elevated, commanding distant views to the limestone hills in the west, yet is beneath the hilltop and is on the side of a small valley. The floor of the valley carries a small stream, one of many that feeds the River Avon.

2 The Archaeological Context: Later Bronze Age Settlement in North Wiltshire

As a result of the long period of archaeological enquiry in Wiltshire, the number of recorded later prehistoric sites in the county is great. The County Sites and Monuments Record (SMR) maintained by Wiltshire County Council is comprehensive and contains some 250 entries attributed to the periods between the Middle Bronze Age and the Iron Age in the area around Potterne alone (as shown in Fig. 99). The value of the evidence is naturally variable but the extensive record, enhanced by continuing work, enables us to place Potterne in a reasonably well-understood context.

Although the majority of Middle Bronze Age (MBA) finds from the area are either unassociated collections of sherds (9 findspots) or bronzes (2 findspots), their distribution, which follows the flanks of the Vale of Pewsey and spreads onto the Downs, suggests a considerable human presence at the time. The nature of land use and settlement is best demonstrated by earthworks of extensive field systems recorded on the Marlborough Downs to the north and on Salisbury Plain to the south. Recent fieldwork by the RCHME has demonstrated that coaxial field systems, thought to originate in the MBA, once covered much of Salisbury Plain (*pace* Bradley *et al.* 1994, 139), the survival of the evidence being affected by subsequent agriculture. In some areas the evidence has been seriously eroded by Romano-British and medieval agriculture, as for example in the central block of the Plain (D. Field, pers. comm.). Similarly, the field systems of the Marlborough Downs were already established by the MBA. In this part of Wiltshire, as for example at Bishops Cannings Down, excavations by Chris Gingell have demonstrated the form of the post-built round-houses and the material culture within the settlements which accompanied the field systems (Gingell 1992). Such evidence compares well with other Deverel-Rimbury sites from the county, the structures of which embrace enclosed, unenclosed and partially enclosed settlements (Piggott 1973; Ellison 1987).

The distribution of the local evidence is strongly biased in favour of the Chalk downland and it seems probable that different farming practices were conducted on the Greensand, where they were apparently less constrained by formalised field systems. We can envisage a Chalk downland environment which contained a scatter of small settlements, each with arable fields and open pasture broken by tracts of deciduous woodland on heavier soils (patches of clay-with-flints) and in the valleys. Paucity of information means that the model is less well developed for the Greensand but evidence from a deep soil sequence at Strawberry Hill (Allen 1992, figs 4.2, 4.4) suggests that, during the Bronze Age, these areas were also free from woodland. The range of finds from the MBA sites implies a network of contacts with other communities, some of them distant. For example, the analysis of pottery has identified oolitic limestone in a particular MBA fabric. Although this is only present as a minor

component, it remains a consistent part of the assemblage, being more numerous later and illustrating a long-lasting contact across the Vale of the Avon.

The rather equivocal evidence of Deverel-Rimbury activity at Potterne seems more secure when viewed against the recorded level of local activity, the situation of the site being advantageous to exploit the economies of both the well-drained Chalk and the Greensand vales.

During the later Bronze Age the downland landscape of Salisbury Plain was reorganised and linear earthworks were cut across the coaxial systems (Bowen 1975; 1978). A series of rectangular enclosures may be associated with these events and seem unconnected to the existing field systems (D. Field, pers. comm.). Similar features exist on the Marlborough Downs (Piggott 1942) and elsewhere in the county (Piggott 1973). As a result of his excavations at Boscombe Down East, near Salisbury, Stone (1937), following Hawkes, suggested that such enclosures were 'kraals'. The absence of pits and scattered objects had prompted the conclusion that the enclosures were for the maintenance of stock rather than for human occupation. Thus, the reorganisation of the landscape suggests a different system of apportionment and control, and a greater value in the protection of stock. At the same time, in some instances, open settlements replace the earlier enclosed sites (Bradley *et al.* 1994). It is in this context that the development of both the Deposit at Potterne and the range of finds, 'midden' site and earlier enclosure at East Chisenbury, 15 km to the east, (Brown *et al.* 1994) must be placed.

The number of local sites attributable to this period is greater than for earlier periods (Fig. 99). In addition to the enclosures and settlements of the downland, a further 25 findspots with unassociated finds of Late Bronze Age pottery are recorded (source: SMR). Similarly, 37 sites and findspots are attributed to the Early Iron Age, mainly on the basis of ceramics comparable with those from the local type-site, All Cannings Cross. A large number of other sites, such as that at Erlestoke, have produced quantities of pottery ascribed only to the Bronze Age or Iron Age. All these sites potentially signify the locations of contemporaneous settlements or even Potterne-like deposits but the majority have not been tested by modern investigative fieldwork.

The only excavated sites in the area are Blackpatch, Pewsey, investigated by Ken Annable between 1969 and 1976, and Black Field, Bishops Cannings, investigated by Paul Robinson and Gill Swanton in 1990 but full details of the results are not currently available. Such sites undoubtedly hold the key to understanding the relationship between different forms of potentially contemporaneous sites, including the open settlements of the later Bronze Age and the initiation of the strongly defended hilltop sites such as Rybury, Oliver's Castle, Giant's Grave, and Martinsell Hill which dominate the northern scarp of the Vale of Pewsey, or Bratton Castle, Broadbury Banks, and Casterley Camp in the south. Wider links also existed as the local occurence of more exotic finds demonstrate, certain pottery fabrics linking Potterne with the fortified site at Budbury, Bradford-on-Avon, for example. Such relationships are complex and, as Bradley *et al.* (1994) have lamented over the well preserved sites of Salisbury Plain, a high level of chronological and cultural precision would be necessary to unravel the relative histories of these closely related sites. The true prehistory of the area cannot be charted from a series of unstratified (largely surface) assemblages and limited sondage excavations but the recognised sites hold great potential for future research.

Nonetheless, Potterne is situated in an area which was clearly well utilised. Although the history of settlement within the landscape was long established, its organisation was subject to significant changes, the physical expression of which probably reflected changes in social order, economy, and symbolic meaning (Thomas 1997). The changes imply significant alterations in the economic base of society possibly reflecting changes in the perception of landownership and wealth. Hence, the formalised field systems of the MBA were supplanted by LBA ranch boundaries and stock enclosures. The evidence for the pounding of cattle at Potterne and the consequent development of the Deposit fits well within this broad model of land use.

Elsewhere in the county the form of small settlements during the early 1st millennium BC is suggested by sites such as Longbridge Deverill Cow Down (Chadwick Hawkes 1994) and their evolution by the enclosure at Little Woodbury (Bersu 1940). An innovation in sites of the Early Iron Age is the regular use of storage pits which may themselves signify further development of the economy with an emphasis on the storage of grain, which, together with an increasingly sheep-biased husbandry, typifies the Early Iron Age (Cunliffe 1991, 380). Such changes are also linked to developments in ideology, ritualistic behaviour and political organisation (Hill 1995).

3 The Condition of the Archaeological Remains at the Site

While archaeological material has been collected from the Blackberry area of Potterne for over a century, the four seasons of fieldwork which followed the discovery of the gold bracelet have demonstrated the presence of archaeological remains, the richness, scale and importance of which had not previously been suspected. These remains cover some 3.5 ha to a depth of up to 2 m. At a conservative estimate, they may presently consist of some 40–50,000 m^3 of deposited material. The likely decay of organic components and the compaction of the Deposit over three millennia mean that the original volume was once significantly more. However, of this material, only some 0.75% by area has been archaeologically excavated.

The processes by which the Deposit accumulated in a gradual and recurrent manner are largely responsible for the good condition of the Deposit and its contents, as well as of the underlying features. The destruction of the original land surface recognised in the soil analysis appears to have been a result of early activity itself (rather than being the result of some intervening arable episode). Moreover, while there was some horizontal displacement of material of the Deposit, there appears to have been no deliberate substantial reworking of it, so that as it accumulated, it protected the underlying layers. In addition, post-depositional chemical processes within the Deposit led to the rapid mineralisation of botanical and zoological environmental remains, and other organic material, which might have been lost under other conditions, resulting in a level of preservation exceptional outside a wetland environment.

A number of factors, however, have had a negative impact on the condition of the site. Ploughing in the Romano-British and medieval periods, and the 19th century cultivation of the Blackberry allotments, reworked and destroyed the stratigraphic integrity of the upper levels of the Deposit. Had any stratigraphic evidence existed relating to changes in the structure or composition of the Deposit which might help explain why the site went out of use, it has been degraded. The impact of cultivation on the Deposit has not been uniform across the site. The presence of a field boundary along what is now the south-eastern boundary of the cemetery led to the formation of a lynchet, truncating the Deposit on its downhill side. Ploughing may also have displaced much of the periphery of the Deposit. Similarly, some features on the crest of the ridge above the site may have been truncated, while the marked indent in the area of the Deposit at its northern side (see Fig. 8), as revealed by the auger survey, may also be the result of truncation by ploughing, with eroded Deposit material being redeposited further down the slope of the hill towards the edge of the valley floor, as indicated by the possible positive lynchet material observed at the deer farm.

Developments in the 20th century are responsible for the other significant impacts on the site. The results of the auger survey suggest that the most northerly houses on Brownleaze Lane impinge upon the south-west edge of the Deposit. The most serious impact on the site, however, results from grave-digging within Potterne cemetery. Ironically, it was this activity which led to the archaeological investigation of the site. The digging of closely spaced graves to a depth of *c.* 2 m will have effectively destroyed the integrity of the Deposit and any underlying features. The section of the cemetery currently occupied by graves amounts to some 5% of the known area of the archaeological site, but should the proposed extensions to the cemetery be fully utilised in the future, the area of potential destruction would rise to around 20%.

Although, following the discovery of the gold bracelet, an intermittent watching brief has been kept during the digging of graves, individual finds recovered on these occasions have not been recorded in context and so add limited useful information. Nonetheless, some observations reported to Devizes Museum (P. Robinson, pers. comm.) give tantalising hints of types of evidence not witnessed during the excavations. For example, some of the finest cast bronze metalwork has been recovered from a restricted area close to Cutting 1, possibly indicating a place of production or disposal: stone flags reported in another area may have formed deliberately laid floors made of materials specifically brought to the site for the purpose: a child burial (McKinley above, Chapter 5.8) may have been from an isolated grave or may have been accompanied by other inhumations. These discoveries, if contemporary with the Deposit or the preceding occupation, suggest a greater complexity to the site structure than was encountered during the controlled excavations of 1982–5.

Integrity and Post-depositional Alteration

The question of the stratigraphic integrity, or otherwise, of the Deposit is of critical importance to the use which can be made of the Potterne evidence.

The dark soil of the Deposit was distinctly different from the lighter coloured 'terrace-soil' and the truncated Greensand subsoil beneath it. However, when the exposed sections were allowed to weather some variation was apparent, especially with the visible thin, darker layers in the southern section (Fig. 10). Subsequent micromorphological analysis has demonstrated subtle variations in the Deposit, including a greater degree of layering than was observed during excavation and a broad integrity for the stratigraphy across the site; that is to say, the specific characteristics of the lower part are found consistently in the lower part in different locations of the site and the specific characteristics of the median part are also found consistently in different places.

This is of fundamental importance because the site only has value for demonstrating changes in material culture or social and economic practices through time if it has stratigraphic integrity. Had there been major disturbance of the Deposit whereby material of considerably greater age had been mixed with that of younger age then the suggested trends in the changing currency of pottery or husbanded animals, for example, would be invalid and, hence, of limited use in the assessment of wider archaeological questions.

This issue was considered as part of the computerised analysis of trends in the ceramic assemblage undertaken by Phil Williams (archive). Although it is acknowledged that the sampling strategy places severe limitations on the statistical significance of these analyses, the dataset describing the ceramic assemblage recovered from the site has responded

remarkably well to initial evaluation. All selected attributes of the pottery which are present in significant quantities demonstrate variation in respect to the depth at which the pottery was found. This has been taken to imply that the Deposit is relatively tightly stratified with very little post-depositional vertical disturbance. The refits data (see Chapter 6.2) confirm this hypothesis but are suggestive of considerable lateral displacement of sherds, most demonstrably within the later Zones of the Deposit where pattern recognition was easiest because of the occurrence of distinctive decorated sherds.

The sample sizes within the lowest Zones have precluded any statistical investigation there; indeed, any Zone containing less than 5% of any given attribute was eliminated from the analysis. This lowest part has therefore only been examined in a more selective manner.

There are no significant discontinuities in the presence of any attributes, which could lead to suggestions of a major hiatus in the practices of deposition. It is, of course, possible that the vertical subdivision of the Deposit is too coarse-grained for any hiatus to be discernible (see below), and it would also be extremely difficult to identify any such horizons which lie in a plane not aligned with the Zones.

In comparing the behaviour of the same variables in the 'on-terrace' assemblage with those in the 'off-terrace' assemblage, the same broad trends may be observed (albeit that the zoning of the 'on-terrace' material is less secure than that 'off-terrace' by virtue of the topography of the Greensand: see Chapter 4.2). However, when comparing points of detail, significant differences are apparent. For example, changes within the percentages of each of the groups of sherds belonging to different fabric groups within Zones 8–2 show that the 'on-terrace' assemblage changes relatively uniformly throughout the depth of the Deposit (Fig. 43). By contrast, the 'off-terrace' curves show rapid and uniform change in Zones 10–6 but very little change is exhibited within Zones 5–2. Similarly, an examination of changes in the decoration of sherds (for example, Fig. 42) and of the incidence of decoration *per se* (Table 24) shows a general increase in the frequency of occurrence at progressively higher zones 'on-terrace' but, by contrast, 'off-terrace' the frequency decreases through the highest zones of the Deposit (ie, Zones 5–2).

This leads to the inevitable conclusion that the 'on-terrace' Deposit has been quite extensively truncated and material displaced down-slope to the 'off-terrace' area. The most likely explanation for such soil movement is post-depositional ploughing (during the Roman and medieval periods). This interpretation is supported by the recognition of pottery sherds of late date in the uppermost Zones of the 'on-terrace' Deposit and to a greater degree within the 'off-terrace' area (see Chapter 6.2). An examination of the variation from mean sherd size within the upper zones of both areas of the Deposit lends credence to this viewpoint: 'on-terrace' the mean sherd size continues to increase nearer the surface, whereas 'off-terrace', after a relatively smooth increase in sherd size from Zones 12–5, progressively smaller sherds are found in Zones 5–2 (Fig. 41).

This interpretation also explains the apparent decrease in the frequency of pottery decoration in the uppermost Zones of the Deposit. As more material was progressively removed from the 'on-terrace' area and mixed with the 'off-terrace' assemblage, then greater quantities of plain rather than decorated pottery would have been transferred. An inverted sequence would thus be created and there would appear to be a reduction in the overall percentage of decorated pottery within the uppermost Zones of the 'off-terrace' deposit.

This post-depositional sherd movement will also have affected the apparent occurrence of vessel form types in the uppermost zones (ie, Zones 4–2) of the 'off-terrace' assemblage. The effect will have been compounded by the degradation in sherd size within these zones, which will have made particular vessel forms less easy to discern.

All of these lines of evidence suggest a consistent depositional practice which led to the site's formation over a considerable time period during which gradual changes in material culture are apparent. During the Roman and medieval periods the top of the Deposit was ploughed, displacing material to the downhill parts of the site.

4 The Sequence of Events at Potterne

Earliest Activity: Residual Remains

The earliest finds from the site consist of single sherds of Peterborough Ware and Beaker pottery and a limited assemblage of flint artefacts of distinctive forms. The latter include two leaf arrowheads, an oblique arrowhead, and six 'thumbnail' scrapers usually associated with Neolithic or Beaker remains. Although it is not possible to associate these early finds directly with any feature and it is likely that the contemporary soil was later eroded (below), it is tempting to regard them as residual evidence for an undefined Neolithic and Early Bronze Age presence on site.

Soil Erosion and Terrace Formation

Excavation of Cutting 2 and its extensions in Cuttings 10 and 12 revealed a terrace-like feature, its edge running diagonally across the main opened area. The ground beneath this 'terrace' was an eroded subsoil and it is apparent that much, if not all, of the area

covered by Cutting 12 and beyond had lost its overlying soil prior to the development of the Deposit. Either the original topsoil had eroded, presumably as a consequence of the loss of vegetational cover and disregard for the soil, or it was deliberately removed. There is no evidence from the current work to suggest that soil was gathered up to create an earthwork. However, it may have been removed to create a clean area either to facilitate activities such as transportation (below) or as a conscious decision to relocate refuse. Certainly, the later overlying Deposit has a significant component of *ex loco* dumped material (*sensu* Needham and Spence 1996, 19–26), and there is no reason to think that the practice of 'cleaning' a site did not have an early origin. The date of this erosion event will be considered below.

The 'soil' from which the terrace was formed was visibly different from both the overlying Deposit and the paler subsoil beneath and was recorded as such in section (Figs 5 and 10). Soil with a similar description was noted elsewhere, notably in Cuttings 1 and 7, but this may not be of the same character as that in the terrace, only that in Cutting 12 having been subject to detailed soil analysis.

The soil micromorphology report indicates that this 'terrace soil' is not a buried topsoil but is an accumulation, in part colluvial, which was created in unroofed areas by the hooves of animals, their dung and slurry.

A series of cut features, comprising a variety of pits, post-holes, and stake-holes, was found at both ends of the main cutting (and in other test-pits) as well as built features such as hearths, a line of greensand boulders, and patches of imported chalk. These features did not all belong to a single phase of settlement. Although the limited area investigated precludes detailed discussion of spatial patterning, the stratigraphic relationship of these features is important. The 'terrace soil' at the southern end of Cutting 12 both seals and is penetrated by cut features and whereas some of these may be coeval with activity on its surface or later (below), others are contemporary with its formation or earlier (see Chapter 3 and Figs 13 and 15). The fact that most of these features contain finds which include later Bronze Age pottery means that they should not be associated with the Neolithic and Early Bronze Age activity suggested by residual finds.

It seems unlikely that an area stripped of soil would remain bare for long and, hence, although the removal of soil, the erection of posts and the formation of the terrace may have been sequential events, and there may have been pauses in activity between them, the overall duration of these events need not have been prolonged.

Structures

The distribution of features identified in the main excavation indicates that activity on the site was both concentrated and, perhaps as a consequence of this, spatially organised. The blank area revealed in Cuttings 2 and 12, which ran across the slope, and separated two areas of structural activity, was followed by roughly parallel gullies, and it seems reasonable to propose that they were artificially induced, most probably by the feet of stock animals or the wheels of vehicles, and exacerbated by rain water, rather than being caused directly by the run-off of excess surface rainwater (in which case they would be expected to run directly downslope). The blank area is interpreted, therefore, as a road (Fig. 13).

To what extent the use of this area as a thoroughfare was responsible for the erosion of the original topsoil cover is difficult to assess because it appears that even beneath the 'terrace soil' any anticipated argillic brown earth topsoil had either been removed before the accumulation of that soil, or was so thoroughly transformed by trampling as to be unrecognisable.

Nonetheless, the terrace edge appears to have formed prior to the construction of the fence-lines which follow it because the series of stake-holes which comprise the fence appear to straddle the terrace edge. The fence and its replacements appear to have been a means of demarcating different activity areas and consequently, to the north of the fence 'terrace soil' may never have developed, although more likely it was later eroded away.

Whether the road caused an adverse impact on a once more widely-developed 'terrace soil' or whether the terrace originally developed within a restricted area such as a pound, cannot now be demonstrated. The facts that the road may have truncated some backfilled features and the fenceline appears to straddle the terrace edge imply that the course of the road resulted from periodic reconfigurations of the land allotment. It is probable that the fence was difficult to maintain due to the notoriously mobile Greensand base, the continuing erosion caused by the roadway and possibly damage by passing animals. In the later stages of its life, the fence appears to have been shored up, the raking shores anchored with large Greensand boulders, the line of which would also have served to distance traffic from the line of the fence and the terrace edge. No fenceline which may have marked the northern limit of the road was noted in Cuttings 3 or 12.

The small area of the main excavation, almost half of which was occupied by the roadway and was essentially empty of structural features, did not allow the recognition of regular patterns of features which might identify the disposition of individual houses, structures or buildings. However, a variety of pits and post-holes were cut through the 'terrace soil' and hearths and occasional deposits, such as patches of chalk, placed upon it. The clear demarcation of two concentrations of features separated by the road points to dense and varied activity on the site.

The lack of a large finds assemblage securely tied to this early structural activity, as distinct from one associated with the basal layers of the Deposit, means that

the full range of activities associated with the structures can only be guessed at. The activities might be regarded as 'occupation', including metalworking as the recovery of a possible mould fragment and a copper alloy droplet from Hearth 285 suggest. Metalworking is also indicated by a crucible rim from Pit 3704. Concentrations of artefacts did not occur in the pits which do not appear to have been used for the deliberate concealment of material placed in them. Instead, they remained open for some time and were colonised by weeds before attracting occupational waste.

The carbonised seeds recovered from pre-Deposit features include a wide range of cereals including spelt, emmer, and free-threshing wheat as well as barley. The weed component includes more taxa of arable land than in the Deposit, all this evidence implying the exploitation of the different geology in the site's hinterland, especially the Greensand and Gault Clay (Carruthers and Straker above, Chapter 5.6). The combined environmental and economic evidence clearly indicates mixed farming with the herding of cattle, the consumption of sheep and pigs and widely-dispersed arable areas for the growing of grain.

The total extent of the structural evidence, as witnessed by pits and post holes, is only partially known. Observations during grave digging, Cutting 1, and other test-pits (from Cutting 8 in the north to Cutting 15 in the south) suggest that it covered at least 1 ha. To the east, a steep-sided combe affords a natural barrier, and the distribution of features revealed by fieldwork suggests that the site, which commanded extensive views to the north and west, was situated deliberately above the valley bottom on the slopes of the escarpment. It is possible, however, that features continued beyond the area sampled at higher levels on the Greensand scarp, but have been completely eroded by later ploughing.

The surface of the terrace was covered with dumped material different from the underlying accumulation. The 0.04 m thick 'primary Deposit', characterised by Richard Macphail, was composed of coarse charcoal, 'fused ash', heavily burned bone and coprolitic material. It also contained strongly burnt soil and daub, possibly relic hearth material. It seems likely that the activities which created this differentially weathered, ash-rich soil should be associated with some of the structural features and the lowest hearths, albeit that the material is dumped from domestic fires and crop-processing and not burnt *in situ*. However, such structures, or indeed visible thin black horizons in the stratigraphic sequence (Fig. 10), are not confined to the interface between the 'terrace-soil' and the Deposit, because some features were demonstrably cut from a higher level (Figs 7 and 15). If post-holes originated at such a high level in the Deposit that they did not penetrate the pre-Deposit layers, they will not have been detected because they would have been totally invisible. A similar situation has been observed at the contemporaneous site of Runnymede Bridge, Surrey (Needham and Sørensen 1988, 113–7). With hindsight, it is clear that an important element of the well-known site of All Cannings Cross has been overlooked by many archaeologists, namely the fact that most of the 'pottery and other relics were all found in a layer of dark soil' up to 0.56 m (22 in) thick. The excavators' illustrations (Cunnington 1923, pl. 4) show that some pits cut the dark soil, while built features were surrounded by it. The origin of the dark soil itself was explained by the topographic situation of the site and was thought to be 'due in great measure to rain wash off the higher slopes behind' (*ibid.*, 14). As the interpretation of Potterne developed, this characteristic of the All Cannings Cross site became increasingly significant.

Hearths, such as 479 in Cutting 10, had Deposit layers *beneath* them. Floor surfaces were not positively identified and, as seems to have been common practice in many British later prehistoric settlements, the occupants appear to have found trampled earth to be adequate. However, occasional spreads of comminuted chalk may have been the remnants of materials imported and incorporated in floors. The clearest example is the spread, some 1 m wide and up to 0.14 m thick occurring in the upper part of the Deposit at the north end of Cutting 12 (Fig. 11). The dumps of chalk found at East Chisenbury (Brown *et al.* 1994, 48) may have served a similar function prior to post-depositional alteration, as may the stone flags reported from grave-digging at Potterne or the 'pavements' at All Cannings Cross (Cunnington 1923, 57).

The adjacent roadway appears to have continued in use for some time, possibly with a reduced volume of traffic which permitted the build-up of deposits rather than extensive erosion. The gullies within the area of the roadway were not covered by concreted sediment, possibly implying continued use or localised freer drainage, while the soil micromorphology report emphasises the concentration of amorphous staining and secondary vivianite formation over the concreted areas ('cobbling') resulting from localised defecation. Animal bones here show a higher degree of fragmentation, possibly the result of more trampling, while pottery sherds are also at their smallest. The greensand boulders thought to have supported the fence had a small amount of the Deposit beneath them.

It can be concluded, therefore, that the basic activities of digging pits, erecting posts, and building hearths and floors, continued throughout the development of the Deposit, the absence of postholes at higher levels possibly being more apparent than real. That is not to say that activities on site, or their locations, were static, as there were clearly variations in soil structure, artefact and ecofact content which suggest that the various activities which contributed to the Deposit shifted through time, and that on occasion accumulation may have ceased temporarily (below).

Dating the terrace and the structures

The sequence of deposits identified at Potterne clearly spans a considerable period of time. The dating of the start and end of that sequence (and, derived from this, an estimate of the duration of activity at the site) are central issues for our understanding and interpretation of the site.

The dating of the loss of the original topsoil cover of the site, of the activities (management of stock animals) associated with the formation of the 'terrace soil', and of the excavation of the various pits and post-holes which penetrate it, are best gauged from the artefacts recovered from these contexts. However, the finds assemblage securely tied to these events is relatively small, especially in comparison with that drawn from the basal layers of the Deposit. The majority of the pottery is considered to be typical of the plain-ware traditions of post-Deverel-Rimbury assemblages. Also among this pottery are small quantities of sherds with fossil shell inclusions and thick-walled vessels of grog-tempered fabric, both of which have been recognised in Deverel-Rimbury assemblages, for example at Bishops Cannings Down (Tomalin 1992).

The bronze objects recovered from basal layers include a rapier or spearhead fragment (Fig. 69, 2, from Zone 11 'off-terrace') and a blade fragment (Fig. 69, 9, from the base of Cutting 2) possibly of the Penard metalworking tradition. These pieces would not be out of place on a site which experienced the transition from the earlier Deverel-Rimbury tradition to the developing plainware assemblages shortly after 1200 BC. By this date, Late Bronze Age metalwork of Wilburton tradition might also be anticipated (Needham 1996).

Three radiocarbon dates from the site fall within the 2nd millennium BC. Two of these (HAR-6982, 3130±100 BP; HAR-6983, 3430±110 BP) are from contexts within the base of the Deposit (Zone 11), while the third (HAR-8938, 3000±90 BP) is from a post-hole. The earliest of these falls comfortably within the date range of Deverel-Rimbury ceramics (Needham 1996, Period 5), while the others lie at a time beyond the floruit of that tradition and at the start of the post-Deverel-Rimbury tradition (*ibid.*, period 6).

The evidence of ceramics, metalwork, and radiocarbon dates, therefore, accord. Although it is not possible within the area excavated to isolate specific structures or deposits to associate with the users of Deverel-Rimbury pottery *per se*, the presence of this pottery and of a contemporaneous radiocarbon sample may be taken to imply a presence very close to the excavated area. Bearing in mind the fact that the 'terrace soil' is thought to result from trampling by animals, it is most unlikely that coarse Middle Bronze Age pottery would survive such treatment long. More certainly, it appears that the accumulation of 'terrace soil' and the building of post-built structures was underway by the late 12th century BC, that is early in the plain ware post-Deverel-Rimbury tradition (*ibid.*).

The Deposit

The character and genesis of the Deposit

The upper, and greater, part of the Potterne sequence is characterised by deposits (termed here 'the Deposit') of a character which had not, at the time of the excavations, previously been recognised on prehistoric sites in Britain. The depth, composition, and richness (in terms of artefacts and faunal remains) of the Deposit were unparalleled, and it is only in the light of the excavations at Potterne that examples of possibly comparable phenomena have been identified at other later prehistoric sites in Britain. An understanding of the character of the Potterne Deposit, and of the processes which resulted in its formation, is essential to any wider interpretation of the site, and a significant part of analytical programme has been directed at the elucidation of these issues.

Despite its subtle variations (both horizontal and vertical), the Deposit is of anthropogenic origin throughout and includes dumped soil, phytolith rich ash, burned soil, fused ash, charcoal, burnt bone, and coprolitic material resulting from domestic, agricultural, and herding activities. The considerable quantities of artefacts and ecofacts are also an important constituent of the Deposit. It is suggested by Macphail that, throughout, the Deposit was disturbed by animals, such as pounded cattle, which produced large amounts of liquid waste, while charred byre waste was also being dumped. Coprolites were found and demonstrate that pigs and dogs were present, probably scavenging on the refuse, while cess-affected soil, some possibly cleared from temporary storage areas, contributed to the 'soils'.

The presence of so much animal waste created conditions which led to rapid mineralisation of seeds within the Deposit. The mineralised seeds indicate some of the vegetation growing on the disturbed surface of the Deposit as well as material dumped on it. Wendy Carruthers concludes that the variation in species composition may reflect the patchy distribution of the dumping of water-retentive organic waste, with arable weeds growing in lighter soils around the organic areas. The change in dominance from that of nitrophilous plants to that of annual weeds of lighter soils in the upper part of the Deposit may reflect the diminishing effect of impeded drainage (caused by the hard-pan layer at the base of the Deposit) as the Deposit grew, but may also possibly reflect a reduction in cattle dung as sheep became more dominant in the economy. The relative proportion of annual and perennial plants suggests that there were occasional periods of stabilisation when deposition ceased for a while before the plants were once again buried.

The nature of the settlement evidence

Detailed study of the soils suggests a sequence of different events on the site. Following the development of the 'terrace soil' and the 'primary Deposit' (above),

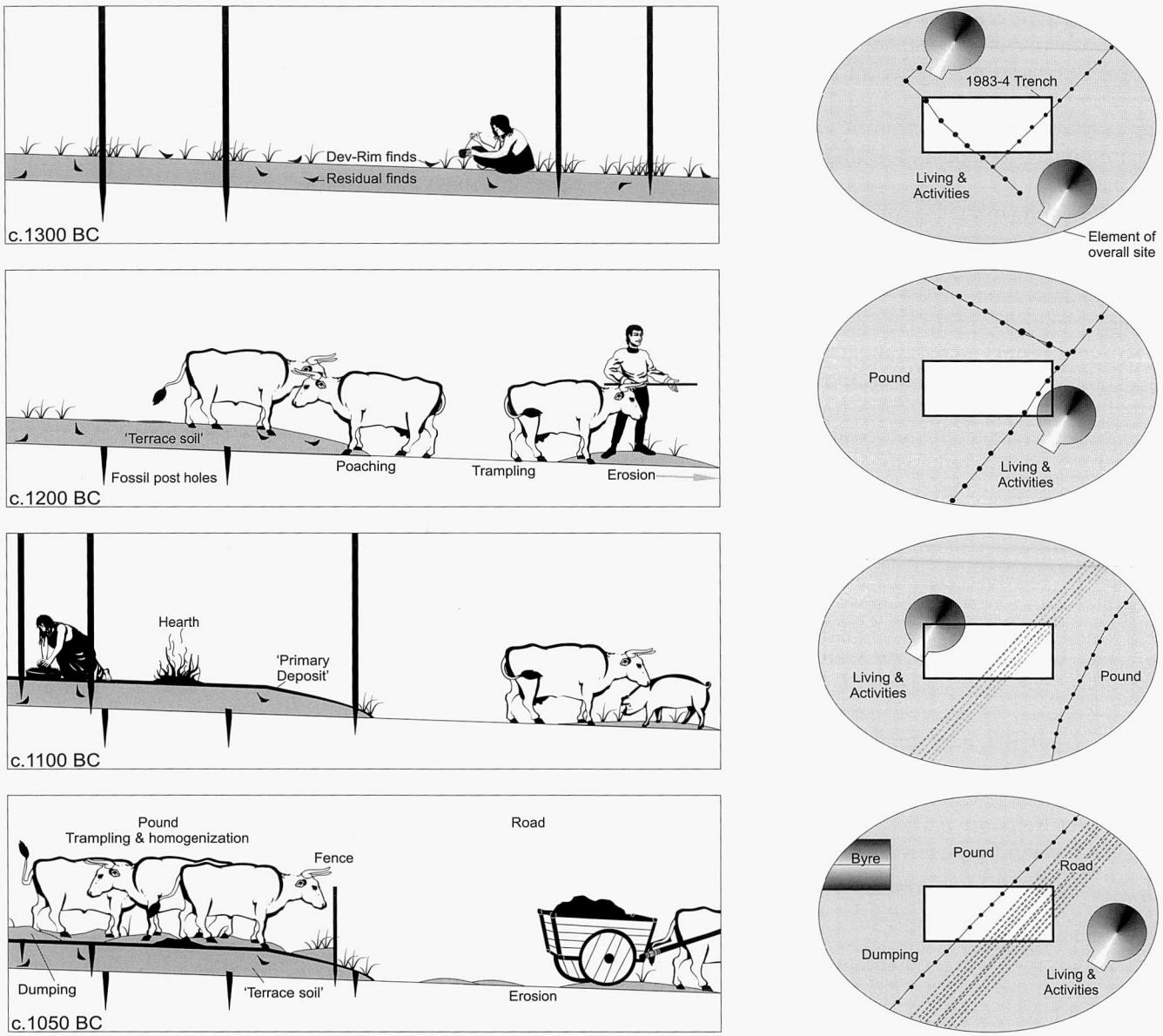


Fig. 100a *Schematic interpretation of stages in the development of the site.*

successive dumps of partially-burned waste from roofed cattle stables (including fused soil) and from the high temperature burning of cereal material (including fused ash), with coprolitic residues (both human and animal), and incorporating prodigious quantities of cultural material, slowly built up the ground level. Trampling from stock, inputs of dung and urine, and attention from scavenging dogs and pigs, also continued. The occasional presence of weed seeds and pottery spreads suggest occasional breaks in deposition and use, sufficiently long to enable plants to grow.

In the earlier parts of this sequence at least, these activities can be associated with a series of post-built structures and hearths, and, after a time sufficiently long for a limited amount of Deposit to accumulate, new post-built structures appear to have been erected. We might, therefore, envisage repeated cycles of use for cattle pounding, building, industrial activity, abandonment, dumping, etc, as changing needs and cycles of decay led to the shifting of activity areas within the overall site limits. In such an organic process, the removal of stock from a pound might provide a suitable site for a new building with all its associated activities. Once that building had served its function, it might be dismantled and the area given over to a different activity, or revert to use as a pound for a time, and so forth (Fig. 100). Depending upon the specific activity, greater or lesser amounts of refuse might accumulate or be dumped. Although different forms of utilisation of any particular plot on the site might produce distinctive signatures through their respective residues, subsequent use, especially the pounding of animals, would blur the distinctions and lead to the homogenisation of the deposits. There is no need to abandon any idea of good housekeeping (below) whereby unwanted material was efficiently removed from living areas but

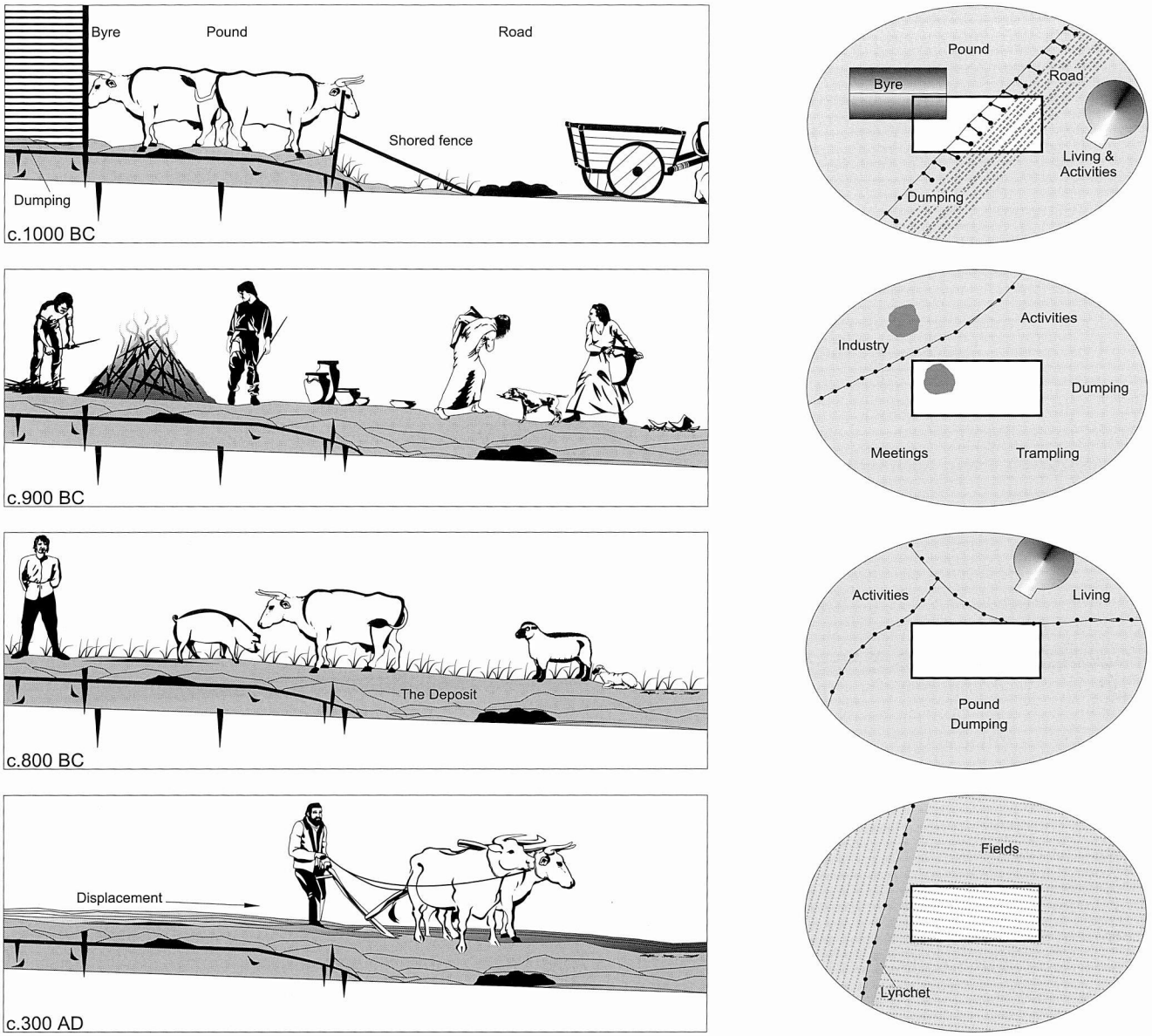


Fig. 100b *Schematic interpretation of stages in the development of the site.*

merely to modify the presumed site of disposal of discarded waste from one in the open fields to one at a site available or designated within the overall settlement. Living areas that were kept meticulously clean and were not furmished with floors of imported material would be impossible to distinguish in subsequent archaeological investigation, not least when overwhelmed by dumped material and trampled by stock.

There are many sites where the drifting of activities with time can be demonstrated and the later erection of a building on a similar site observed. The time interval between successive 'replacements' of round-houses, for example, may be difficult to gauge, but frequently some interval between two successive buildings is implied because the second building is displaced from the first. All trace of the first may have long been removed but its general site remained favourable for a later building within the overall structure of the settlement.

The extensive excavations at Reading Business Park, Berkshire, serve as an example. From a study of the pottery, Bradley and Hall (1992, 80) were able to demonstrate changes in the spatial patterning of the different areas of the extensive site occupied by round-houses. Three broad phases of Deverel-Rimbury and post-Deverel-Rimbury occupation were recognised. In Area 5, sherds of Deverel-Rimbury pottery came from the positions of two houses identified from circles of post-holes (10 and 12), plainware was widely distributed, while pottery of the later, decorated tradition had a more restricted distribution (south of building 9). Thus, paired buildings (buildings 14 and 17) could be shown to replace earlier examples (buildings 2 and 18), and other replacements demonstrated. Bradley and Hall concluded that there was a shift of the nucleus of

activity through time and that the latest ceramic phase was most abundant where there was evidence for the repeated replacement of structures. Although it is argued from the patterns of postholes that some buildings may have had up to five replacements, floors did not survive and indeed the buildings may never have been furnished with them. Unlike Reading Business Park and many other sites which lack vertical stratigraphy, the site formation process at Potterne appears to have been different and led to a relatively rapid accumulation of the Deposit between phases of building and other activity, rather like a 'tell'.

The soil micromorphological analysis from Potterne implies the keeping of considerable numbers of cattle. (The soil microfabrics would have been distinctly different if sheep, for example, had been raised on the site.) Although in southern England we are today used to seeing herds of cattle roaming freely in fields, this is not always the normal stock management regime employed. Elsewhere, cattle may spend much of their existence either in byres or in adjacent pounds rather than being allowed into the fields where they would rapidly degrade the grass cover through trampling and churning of wet soil. In some areas of Europe it is a regular scene to see grass and hay being cut, stored, and transported to the stalled beasts. The byres are an integral part of the farmer's living quarters and from time to time are mucked-out, the heap of muck being temporarily stored outside the door. Some of this material may be used as manure but the rest might be burned or thrown in the pound.

Observation of the pounds adjacent to byres shows that they become heavily trampled and weeds grow only at the periphery or on protected areas. Where enclosing fences are insubstantial or may be moved or become knocked over, there is little opportunity for vegetation to become established, other than for rapidly growing shrubs such as elderberry. However, a greater diversity of plant species may be apparent from seeds because of the introduction of fodder which, in the absence of a growing food supply, is rapidly and effectively consumed by the penned animals.

Even in parts of Britain it was common practice until very recent times for farmers to share buildings with their stock, there being economy of effort in both the construction of the buildings and in daily activities, and a measure of security for the animals. In winter, the warmth of the animals would offer a degree of heating, while fermentation processes in deep litter would also provide a source of background warmth. The soil micromorphology report suggests that the source of some of the burnt material identified at Potterne is burnt byre floor bedding material with a large proportion of ashed dung residues. The burning was at low temperature, sufficient to destroy the organic matter but leaving phytoliths unaltered. Thus, some of the refuse was reduced to ash rather than being used as manure. If bedding material had been dumped, we might expect grassland seeds to be better represented but Macphail has also suggested that biological decomposition in manure heaps may be a cause of the loss of seeds from the archaeological record.

Dung may have been used for a variety of different purposes which could have included flooring or walling. Fenton (1972; 1981) has drawn attention to the use of dung as a fuel in northern Europe since at least Viking times, and to the vitrified cow-dung ash at an Iron Age site at Hawk's Hill, Surrey (Evans and Tylecote 1967, 22–3). Fenton also cites the use of ash in Orkney and Norway for bedding cattle in byres to absorb excess liquid. A combination of these practices would provide explanations for the bedding materials and ash seen in the micromorphological samples from Potterne and for the wet, urine-rich conditions required for the rapid mineralisation of some seeds, fly puparia, and worm cocoons.

If a regular cycle of stock management included the provision of vegetation as bedding material, its mucking-out, the burning of stabling waste, and the use of ash on other occasions before this was finally cleared out, it is possible also to imagine the creation of temporary kitchen middens of other domestic refuse, which accumulated until such time as they were cleared away with the end-product of the animal maintenance activities.

It is suggested that this pattern of stock keeping might serve as a model for the site formation process at Potterne where a cycle of the establishment, shift and re-establishment of living, working, and pound units may have occurred both simultaneously over the 3.5 ha identified by the auger survey and repeatedly over several centuries, leading to the accumulation of the Deposit. Instead of dairy cows being led daily from the pasture to milking parlours, we can imagine them being released for watering rather than large quantities of water being carried to the stalls; the Potterne site is not far from a stream, so the journey would not have been a lengthy one. Similarly, comparable sites (below), such as East Chisenbury and Cold Kitchen Hill are sited above rivers. The resident population engaged in the management of stock may not have been large (below), the number of cattle kept on the site far outnumbering their owners. It would not be surprising, therefore, given the difficulty of identifying structural remains, that evidence for buildings is difficult to isolate in the stratigraphic record at Potterne, even employing soil micromorphology.

It is normally considered that the round-houses ubiquitously found on Bronze Age and Iron Age sites were used as dwellings, albeit that other domestic, industrial, and routine activities also occurred within them. Without the examination of *in situ* floors it is difficult to prove that they were also used for the stabling of animals, but this may well have been the case for some, as phosphate enhancements indicate (Pryor 1984). It has long been recognised that the use of internal space within European prehistoric longhouses was zoned to allow both human and animal

occupancy of such buildings (eg, Waterbolk 1995, 9), and certainly such a configuration might be more practical for the accommodation of larger herds than a series of round houses. In recent years a number of long-houses of Middle or Late Bronze Age date have been discovered in Britain which might signal an intensification of the practice of stabling in that period. These include Down Farm, structure F, Dorset (Barrett *et al.* 1991, 183–211), Easton Lane area D, Hampshire. (Fasham *et al.* 1989, 38–43), Loft's Farm structure 2, Essex (Brown 1988, 260), and Barleycroft Farm, Cambridgeshire (Evans and Knight 1996). It may be possible in future to examine the floors for the type of stabling crusts produced under experimental conditions at Butser Hill, Hampshire, or from other archaeological sites (eg, Macphail and Goldberg 1995). Nonetheless, certain components of the soil microfabrics at Potterne suggest that circumstances existed at Potterne for the formation, occasional clearing out and burning of such crusts, implying that roofed buildings were being used for the stabling of animals, probably cattle.

What can be said of the physical structure of buildings of this period is limited by the surviving evidence. Where this is restricted to post-holes cut into basal layers, it is normally concluded that the buildings were supported on wooden posts. However, this leaves open the question of the materials used for both walling and roofs. Turf and dung may have played a major part in both, and the latter may also have been used in floors or as fuel, being in plentiful supply if large numbers of animals were maintained.

Date and continuity within the accumulating Deposit

It has been suggested (above) that the terrace formation and early occupation had commenced by the late 12th century BC. Immediately thereafter the Deposit began to accumulate and continued to do so without significant interruption. Four radiocarbon determinations from the central part of Cutting 12 help to date the accumulating Deposit: two (HAR-6978; 2590±80 BP, and HAR-6979; 2490±70 BP) from Zone 4 and two (HAR-6980; 2650±80 BP and HAR-6981; 2630±70 BP) from the stratigraphically lower Zone 7. As Alex Bayliss has pointed out if, as is reasonable, the stratigraphy is assumed to have chronological significance, then the interval between the two zones can be calculated to be 0–280 years at the 95% level of confidence (see table 1). However, the radiocarbon evidence would not conflict with the suggestion that the median layers of the Deposit in Zone 7 belong approximately in the 9th century BC, and that the accumulation ceased at a height slightly above Zone 4 in about 600 BC. Such dating accords well with the conclusions derived from the artefact studies, themselves based on cumulative evidence from a range of comparable assemblages, some with their own radiometric dates. Hence, it would appear that the Deposit accumulated over a period of several centuries, but it is unlikely that the period much exceeded 500 years.

It is unlikely that the rate of accumulation remained constant: breaks in the Deposit between Zones 11 and 8 are implied from the character of the pottery assemblage, while pottery spreads or concentrations of preserved botanical remains demonstrate individual episodes of dumping when local accumulation would be rapid. In an attempt to identify phases in which accumulation ceased and trampling caused greater fragmentation Locker examined the faunal remains in some detail, but this proved inconclusive (Reilly et al. 1988). No detailed study of fragmentation patterns has been undertaken for the ceramic remains, although Williams (archive) has calculated the percentage variation from mean sherd size for different samples from the site and for different fabrics. His study clearly shows the effect of post-depositional fragmentation attributable to later ploughing of the upper zones of the Deposit, but it also shows a consistent diminution of sherd size with depth (above; Fig. 41). Although there are occasional fluctuations in the general trend, the mean sherd values do not oscillate in a manner which might reflect alternating periods of accumulation and crushing (*cf.* Needham and Sørensen 1988, 120). The greatest mean sherd size may occur at the top of the undisturbed Deposit, and the least at the base, but this may be due to a variety of causes, not merely increasing pressure beneath a greater bulk of overlying material or accelerating deposition.

If different parts of the site witnessed cycles of more intense use and abandonment (below), and each cycle were to last 25 years for example, then the method of excavation in 0.1 m spits would be insufficiently precise to observe the evidence. With a total life-span of some 500 years and, using the 25-year cycle as an example, each sample column would contain evidence for 20 cycles. Because there were normally less than ten spits of Deposit material in each column, each spit might contain the evidence for at least two cycles and, as all the material from each spit was considered together, the evidence for fluctuating conditions would be masked. This is not to say that such a regular cycle of shifting events actually occurred, but to demonstrate the difficulties of identifying fluctuations in a visually homogeneous matrix on a site where animal activity may have had an enhanced homogenising effect and reduced the resolution of the sequence.

Intra-site patterning

Such was the density of finds within the Deposit that it was impossible to record 3-dimensionally every find and subsequently to analyse fully the spatial relationship of related objects such as the sherds of individual vessels or the bones of single animals. Nonetheless, the sherd refitting exercise, the identification of pottery 'spreads' , the recording of articulated vertebrae, and the computer visualisation experiments on bone data enable us to draw certain conclusions about the patterning of finds.

There is little evidence that the individual components of this assemblage were recovered from the place at which they first fell. No consistent patterning that might indicate that they represent specific activity areas, for example for cereal processing, metalworking, potting, textile production, storage, or cooking has been identified, although the finds associated with structural features, and especially those in post-holes, might result from activities within or adjacent to structures. Instead, it appears that much of the material has been gathered up and then discarded with the waste products of other activities and superficially mixed as a result of trampling and scavenging in areas where additional liquid waste and manure continued to be added. This post-depositional movement has undoubtedly reduced the resolution of the stratigraphic record and assisted in the homgenisation of the Deposit.

By contrast, the circumstances of site formation in a riverside location, and the careful excavation at Runnymede Bridge have enabled the excavators to consider the history of groups of objects and to establish 'refuse cycles' (Needham and Sørensen 1988; Needham and Spence 1997). In their terms, the Potterne finds are *in situ*, not having been derived from another site. Some finds (for example associated with structures) might remain where they fell, and are *in loco*, but the majority are *ex loco*, having been gathered up from the place they first fell and placed on the Deposit. (They are 'secondary refuse' in Schiffer's (1987) terminology.) Pottery 'spreads', equivalent to the 'artefact groups' at Runnymede were identified throughout the Potterne Deposit: these had not been subsequently disturbed to a great degree, although some lateral dispersion on the surface of the growing Deposit is demonstrated by the sherd refitting exercise. The surface of the Deposit was regularly 'transformed', probably by trampling stock and scavenging animals. Rapid burial is also considered to be one of the prerequisites for the mineralisation of seeds and worm cocoons. Nonetheless, the general trends identified in the computer studies of the pottery (above) demonstrate that such interference with the Deposit did not include disturbance throughout its depth. At times the dumping of new material appears to have buried the pottery 'spreads', protecting them from the impact of animals. The Deposit thus has considerable vertical integrity, weakened only by the effects of earthworms (and possibly other burrowing creatures) which have caused the downward movement of the smallest objects such as seeds.

Examination of the pottery spreads and the absence of reconstructable vessels among the assemblage as a whole indicates apparently purposeful selection amongst the refuse before or when it was finally abandoned on the Deposit. The evidence echoes that from other sites where varied social practices which utilise and transform 'refuse' have been described (Parker Pearson 1996) and we can expect the Deposit to have formed from a wide series of inter-related activities which created, stored, utilised, transported, abandoned, and incorporated cultural material, some of which was regarded as 'refuse'.

5 On-site Activities during the Formation of the Deposit

The previous section has suggested that accumulation of waste from the keeping of stock in pounds or byres was largely responsible for the formation of the Deposit at Potterne. Stock keeping is thus identified as a principal activity carried out at the site, but the archaeological evidence testifies to a wide range of other activities at Potterne. Of course, this rests on the assumption that the artefacts and other materials from the site were actually being used there, rather than being used elsewhere and then brought to, and deposited at, Potterne. For the purposes of the following discussion, the former assumption will be made, but the possibility that material from other places might have been brought to Potterne and deposited will be considered later (below).

Animal Husbandry and the Production and Consumption of Animal Products

Farm animals exploited for food included cattle, sheep, and pig, with sheep increasing in importance at the expense of cattle during the period of the Deposit's formation. The reduction in the graminae ash component of the Deposit in the upper part of the sampled sequence (the median levels (Fig. 26)) may reflect the decreasing importance of cattle, and possibly the use of less intensive systems of husbandry during the accumulation of the Deposit. Both sheep and cattle were kept for milk production before being slaughtered for meat, their bones showing signs of intensive butchery (Table 18).

Throughout the Deposit the fragmentary bones of sheep (and small ungulates) are numerically greater than those of cattle (and large ungulates) (Fig. 29). Nonetheless, the meat value of cattle was always greater than any other source. Using the same calculation of different domestic animal weights as Done (1991, 340), each killed bovid might provide 14 times the meat of a single sheep, and each pig four times as much meat as a sheep. Thus, on the basis of the proportional representation of different mandibles (perhaps the most reliable indicator of species) within the assemblage (Table 16), the meat yield of the commonest animals would vary through the Deposit in the following proportions:

	Cattle	Sheep	Pig
Zone 5	126	41	72
Zone 10	697	75	60

Bearing in mind that each cow could produce more milk than each ewe, cattle remained as the principal

food source throughout the life of the Deposit, despite a reduction in their numbers in the latter part of the occupation.

Sheep could also have provided wool, while cattle produced hides and may have been used as draught animals. Pigs were of secondary importance, but were consumed at a relatively constant rate throughout the period. Horse bones were found in very small quantities throughout the Deposit, but do not appear to have been butchered and these animals were presumably kept for riding, as pieces of harness among the finds suggest. Dogs were kept, and may have been skinned, as is more likely the case for the few beaver, cat, polecat, and fox represented. Other wild animals such as red and roe deer and wild boar were exploited, but hunting appears to have contributed only marginally to the diet, while fishing and fowling appear to have played no significant role in the community's subsistence strategies.

There is little evidence that the Potterne site was only occupied seasonally. There is evidence, however, for phases of stock management, such as autumn culls of sheep, represented by peaks in the slaughter of animals at different stages of maturity (Fig. 38).

The large numbers of animal bones imply the provisioning of large numbers of people, but there is insufficient evidence to suggest that such a large number actually lived at the site. It is suggested, therefore, that while considerable quantities of meat were eaten, even larger quantities, together with other products (wool, milk, cheese, etc) and by-products (leather, horn, bone, etc), were taken away from the site by regular visitors (below). Despite the large quantities of animal bones, the site did not produce comparably large volumes of burnt flint which is commonly associated with later Bronze Age sites and thought to be a by-product of cooking. At Potterne, we must surmise different processes, possibly only butchery, with preservation through air-drying or cooking through roasting.

Cattle continued to be kept at Potterne, contributing to the site formation process, but the animal remains show that sheep became increasingly dominant. The increase in the numbers of sheep through time reflects a more general trend observed on later prehistoric sites. Whereas in the Bronze Age cattle may have been perceived as a source of wealth and to have played 'an essential role in social reproduction' (Barrett in Barrett *et al.* 1991) by the Iron Age sheep were favoured, their value supporting the role of some hillforts (Sharples 1991; Cunliffe 1995, 51). Macphail sees little evidence in the soil micromorphology at Potterne to suggest this, however, and it may be suggested that sheep were not permanantly penned on site. It is more likely that they were grazed on the drier soils of the nearby chalk and were brought to the site for slaughter, processing and consumption. By contrast, the comparable site at East Chisenbury contains soils with different characteristics (Macphail, pers. comm.) and different faunal remains, evidence suggesting that sheep were both kept and consumed there, and implying a different specialisation.

The Production and Consumption of Crops

Cereal production occurred nearby and limited amounts of processing took place, as witnessed by both botanical remains (Chapter 5.6; Table 18) and quern stones (Chapter 6.13). Although this may have served the needs of relatively few inhabitants, the carbonised remains are relatively few. However, Macphail (Chapter 5.2) has suggested that some seeds may have been lost due to decomposition in manure but also as a result of the high temperature burning of processing waste. The main cultivated crops, of roughly equal significance, were barley and wheat, with evidence of both autumn and spring sowings and thus of the institution of organised and systematic arable regimes exploiting different soils in the area but particularly the Greensand to the west. Weed seeds suggest that the harvest was cleaned, although plants such as oats and brome may also have been used as food or animal feed. Small numbers of fruits indicate that scrub woodland and possibly hedgerows were exploited seasonally, and plants such as wild turnip and wild carrot, if not growing on the site, were collected.

Artefacts and Industry

A wide variety of artefacts was recovered throughout the Deposit which enable local industries and wider social networks to be assessed. Although there are marked changes in form among the individual artefact categories reflecting changing needs and fashion through time, the overall composition of the assemblage changes more subtly. The most numerous artefactual finds were pottery sherds whose absolute numbers remain high throughout. The change in pottery fabrics is reflected in the general use of flint through the period of the Deposit and it is, hence, possible to associate burnt flint strongly with pottery manufacture (Chapter 6.11) which may have occurred on site, clamps being fuelled by dried dung.

A distinct change in the assemblage of bronze objects can be traced (Table 45): the lower part of the Deposit contains the best pins, awls, tweezers, and blades, while vessel fragments are better represented in the upper. Similarly, although non-ferrous metalworking debris is sparsely present throughout, the crucible base from Zone 9 is markedly different from the later style piece from Zone 5. We may conclude that there was a greater emphasis in the production and consumption of non-ferrous metals of a variety of different forms in the earlier stages of Deposit accumulation. This trend is complemented by the adoption of iron and evidence for its smithing from Zone 5 and later.

Various classes of material (shale, bone and antler, glass, amber, etc) are represented throughout, some in small numbers, however, and no striking trends are apparent. Nonetheless, a wide range of activities were clearly conducted including textile production, weaving, sewing, and the treatment of hides, the production of bone and antler tools, and so forth. The range of objects demonstrates that those who were responsible for the creation of the site in the first half of the 1st millennium BC were furnished well beyond the basic needs of subsistence and working practices were assisted by a wide range of tools and vessels.

The volume of accumulated deposits at Potterne might imply a wealthy site afforded high status by the community, but there appears to be little evidence in terms of material culture, structural remains or ritual activity that could not be found on other contemporary sites. The fact that the assemblage embraces the full range of the things that might be expected on such sites is possibly only a product of scale, rather than of status and, perhaps more important is a consideration of how the site functioned and the role it played in relation to its neighbours (below).

6 Specific Characteristics of 'Potterne type' sites

We may distinguish three main characteristics of the type of site represented at Potterne. The first is the accumulation of considerable quantities of dark, anthropogenic soil. In the case of Potterne this results from the maintenance of large numbers of animals within a restricted area. The second is the very great density of artefactual and ecofactual remains. In this instance, the remains include a wide range of material types and reflect both a number of productive industries and extensive contacts beyond the immediate area. The third is the continuity of practice which enabled the accumulation to reach monumental proportions. It is evident that although material culture and technology changed radically through the half millennium represented by the Potterne Deposit, the formation processes and depositional practices which led to the creation of the site remained largely the same.

Having established the basic characteristics of the Potterne site, it is possible to recognise potentially comparable sites from the archaeological literature. Whether all of these sites share the same formation process and function will, however, require closer scrutiny in the future.

There are two aspects to a search for comparanda for the Potterne site: the identification of sites which may have had comparable layouts or assemblages of structures, and attempting to identify other sites which are characterised by 'deposits' of the kind first clearly recognised at Potterne.

Comparable Settlement Layouts

Although the excavations appear only to have provided a keyhole insight into a much larger area of activity, they have revealed a large number of different elements of the original site. Post-hole structures may have spread over an area of at least 1 ha which was subdivided by roads and fences. Cattle were pounded, industrial activities occurred, and doubtless many of the post-holes held the supports for roofed buildings. There is no evidence that the site was enclosed nor have substantial defensive earthworks been identified. The suggested Deverel-Rimbury affinities of some of the ceramics in the earliest accumulation would place such events coeval with the potentially comparable sites at Itford Hill (Burstow and Holleyman 1957) and Black Patch, Sussex (Drewett 1982). These sites with their clusters of round houses surrounded by paddocks or fields serve as a useful model for the form of the early settlement at Potterne.

Extensively excavated areas of a slightly later date, such as at Reading Business Park (Moore and Jennings 1992) or at Shorncote, Gloucestershire (Hearne and Heaton 1994, and in prep.) demonstrate that open settlements of the later Bronze Age associated with post-Deverel-Rimbury pottery were not necessarily as cohesive nor restricted in area as the earlier Sussex examples. The form and scale of the identifiable structural evidence at Potterne are not without parallel, albeit that its preservation is enhanced by virtue of its protection by the overlying Deposit.

Sites with Comparable Deposits

At a number of sites, appreciable thicknesses of dark soils are associated with settlements of the later Bronze Age and Iron Age. Although it has not yet been subjected to full pedological analysis, what appears to be one of the closest comparanda for the Deposit at Potterne is the site at East Chisenbury. The true identity of this site was recognised in 1992 during the course of survey work on Salisbury Plain by the RCHME. The site, only some 15 km from Potterne, consists of a low mound, some 200 m across and covering some 3.5–4 ha. This mound overlies the north-western part of a sub-rectilinear enclosure. A number of linear ditches and other features appear to converge on the mound. Auger survey has shown that the mound consist of a deposit which is over 2 m thick in places; it is estimated that some 65,000 cubic metres of deposit survive. A small excavation showed the deposit to be 'midden material, dark and greasy in texture'. Compacted chalk spreads or surfaces were found within the midden, and pits and post-holes, associated with two clay ovens, were found cut into the underlying subsoil. A very large amount of pottery was recovered, along with other material including two human skull fragments, coprolites (including human

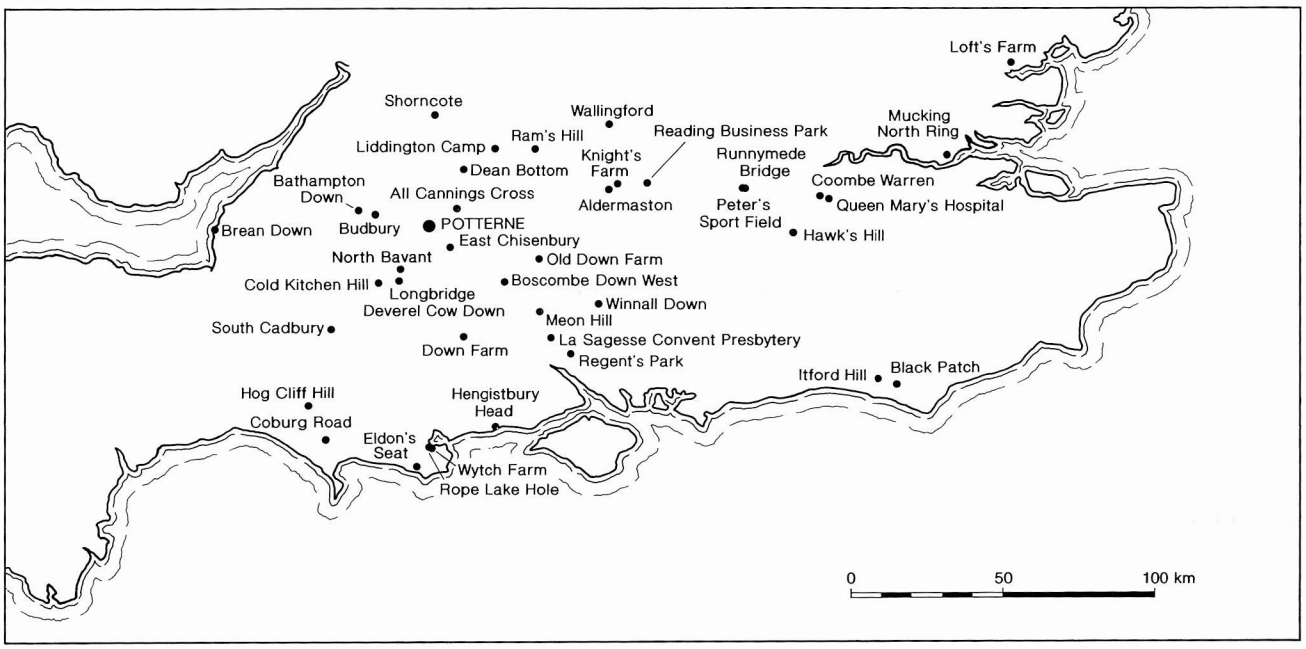


Fig. 101 Later prehistoric sites in southern England referred to in text

ones), the unsharpened blade-end of a bronze socketed axe, and a tanged chisel of Late Bronze Age type. Some of this material seemed to have been deliberately placed (McOmish 1996).

In the light of the findings at Potterne and East Chisenbury, it is possible to recognise 'dark soil' deposits as a recurrent feature on later Bronze Age settlement sites. Not far away, at All Cannings Cross, Mrs Cunnington (1923, 14) recorded that: 'With the exception of that from the pits, the pottery and other relics were all found in a layer of dark soil, or humus, that varies in thickness ... up to one foot ten inches' [0.56 m]. She also remarked upon the unusual nature of the deposits: 'The large amount of humus accumulated over a great part of the site seems quite out of proportion to the probable length of occupation'. Post-depositional alteration is also noted: 'The variation in the depth of the deposit is no doubt due in great measure to causes subsequent to the occupation, the levelling process of agriculture over a long period ... tending ... to obliterate inequalities of level'. Cunnington's illustrations (*ibid.*, pl. 4) show that some pits cut the dark soil, while built features were surrounded by it. The origin of the dark soil itself was explained by the topographic situation of the site and thought to be 'due in great measure to rain wash off the higher slopes behind' (*ibid.*, 14). The presence of this deposit at the All Cannings Cross site is of particular significance in the light of Potterne and East Chisenbury.

A number of other sites in the Vale of Pewsey, which have produced quantities of later prehistoric pottery and which are potentially comparable have been discussed above (Fig. 99). These include the extensive site with both Late Bronze Age/Early Iron Age and Romano-British finds, covering an area of 5 ha, at Bishops Cannings (about 15 km from Potterne). Elsewhere in Wiltshire (Fig. 101), we might also cite Cold Kitchen Hill, Brixton Deverill, where a complex of sites exists. Colt Hoare (1812, 40) reported that William Cunnington had investigated a 'tumulus' here but, as a result of later investigations (Goddard 1894; Kivel 1926) we might question the nature of the mound. An examination of SMR records reveals a number of sites, including barrows, a large spread of dark soil and several later temples on the summit of the hill. Many Late Iron Age and Romano-British finds have been collected but the objects also include a palstave and it appears that the finds made from a variety of locations on the hill have been conflated. Kivel, who conducted unsystematic investigations at the site, states: 'We have more or less proof that the site is of pre-Roman occupation. For instance, ... some of the haematite coated pottery and many fragments of the ware (are) similar to that found at the late Celtic settlement at Cannings Cross.' (Kivel 1926, 180)

Broadly similar phenomena have been noted further afield. Thomas *et al.* (1986) have noted, as had previous workers, that the 'occupation horizon' at the Late Bronze Age riverside site at Wallingford, Oxfordshire comprised an apparently structureless deposit up to 0.38 m thick and at least 37 m, and possibly up to 120 m across (*ibid.*, postscript). At another Thames-side site, Runnymede Bridge, 'midden' deposits of Late Bronze Age were also found, and have been examined by excavation in great detail.

Excavations just outside the hillfort of Wittenham Clumps, Oxfordshire located a dark occupation layer,

up to 0.40 m thick and thought to cover up to 1 ha (Hingley 1979–80). A stony spread, interpreted as a possible paved area, and a number of post-holes were identified within the layer. Hingley considers that the layer is a stratified deposit, spanning the Late Bronze Age and Iron Age. The layer was rich in pottery and animal bone, and also produced an iron ring-headed pin and iron blade. In salvage excavations at Grafton, Yorkshire, Waterman *et al.* (1955) encountered a dark deposit which they describe as follows:

'... a thick deposit of black occupation soil varying somewhat in thickness but about 12 ins. in average depth. ... The blackened nature of the soil was obviously due to constant burnings, and much charcoal together with many large numbers of cobble-stones, many split or disintegrated by heat, was recovered. Animal bones were fairly abundant and a considerable amount of pottery, which may be identified as Iron Age A, occurred throughout the layer'.

The animal bones included ox, horse, pig, and sheep/goat. In one place parts of an articulated skeleton of a sheep or goat, probably about a year old, were found. Other finds included a pair of bronze tweezers, part of a bronze bracelet and a curved fragment of jet which may have been part of a bracelet. Similarly, a build-up of dark soil is associated with the extensive later Bronze Age site at Salford, Bedfordshire (R. Macphail, pers. comm.) and an extensive 'dark earth' deposit of comparable age has recently been investigated at Welland Bank Quarry, Deeping St James, Lincolnshire (F. Pryor, pers. comm).

These deposits may be the result of contemporary processes or functions which inadvertently or deliberately led to the inclusion of materials which had a major effect on pedogenesis. For example, Bell (1990, 72) and Macphail (1990, 195) questioned the origin of grey silt which characterised the Late Bronze Age context 16 at Brean Down, Somerset. Bell noted that artefacts seemed to occur particularly in areas of denser grey material and suggested the possibility that the silt was dumped from elsewhere, possibly as floor material or 'was purposely added to help create a man-made soil', a practice also seen at Brean Down in the earlier Unit 6a. He draws comparison with such soils at Gwithian, Cornwall (Megaw *et al.* 1961).

Such deposits may also contain some components found in later 'dark earths'. For example, on the heathland soils of the Isle of Purbeck, Dorset, the excavators noted that 'deeper soil accumulations were consistently encountered in areas of archaeological settlement' of Iron Age, Roman and medieval date, so much so that 'archaeological activity was suspected whenever 'soil' depth in excess of 400 mm was recorded' (Staines and Allen in Cox and Hearne 1991, 197). Analysis suggested that much of the material was imported from local sources and might derive from turves with ash from fires. Although on these Purbeck sites it was considered to have accreted '(by whatever means) during, and subsequent to decay and abandonment', and possible comparisons with plaggen soils were explored, the use of turves as a building material in walls and roofs was also considered.

At Potterne, the 'terrace' and subsequent Deposit appear to develop as part of an active, dynamic, and continuing regime and not as the result of a period of site abandonment. However, such a statement oversimplifies complex sequences of events within the broader site history (below) in which the use and decay of turf (?as a building material), dung (as a highly versatile material for building, as fuel or manure), and ash may have played major roles but which can now only be identified microscopically as a result of the site formation process which led to alteration and comminution of the original components.

Finally, as another possible parallel for Potterne, mention may be made of a site identified by field-walking at Whitchurch in the Feldon area, Warwickshire (Hingley 1996, 12). Here, a 10–12 ha settlement of Late Bronze Age and Early Iron Age date was identified. Examination of about half the site produced 4700 pieces of prehistoric pottery, 2600 fragments of animal bone, and 24 querns. Hingley suggests, on the basis of the quantities of material, that this site may be comparable to the extensive late Bronze Age deposit at Potterne.

7 Overall Interpretation

It remains now to consider the overall interpretation of Potterne, in terms of the character of the settlement and its place in the local settlement pattern. It is of interest to know not only what material remains were discovered at Potterne or what the site's occupants may have done, but how they perceived the place as distinct from any other.

We can develop any number of models embracing current concepts, ranging from mundane or functional to ritual or non-rational, but in all probability the truth incorporated some of all of these since everyday life was probably highly routinised with some aspects of accepted belief systems being inseparable from daily life. Here we shall consider some of the more obvious possibilities, the discussion inevitably being influenced by current models of social structure in the later prehistory of southern Britain and the way in which economic processes are thought to have been embedded in political relations (Rowlands 1980; Barrett in Barrett *et al.* 1991, 227).

In broad terms, one can propose two possible types of interpretation for the Deposit at Potterne. The first is that it was essentially a large dump of material, much of which was generated elsewhere (not necessarily very far away) and which accumulated through repeated episodes of removal from its place of origin and dumping. The second broad possibility is that it was actually an activity site itself (a 'settlement' in conventional terms) which generated a large amount of debris,

within which (or on top of which) a range of activities took place. In either case, the practices which led to the accumulation of the deposit were long-lived, as the deposit grew up over a period of some 500 years.

Either interpretation must take account of the fact that the pre-Deposit activities at the site seem similar to those at other contemporaneous settlement sites, in that they resulted in the creation of post-holes and a range of other features of a kind regularly found at other sites of the period. It should also be noted that Needham and Spence (1997) have argued that the term 'midden' should only be used for deposits generated by deliberate dumping of material in a particular place, rather than calling any refuse-rich context 'a midden'.

'Midden' Interpretations

Current thinking about the British later Bronze Age suggests two possible variants on the 'midden' interpretation. The first would see the midden as a purely functional phenomenon, the second focuses more on the supposed symoblic importance of midden material.

The 'rubbish dump' model

It might be suggested that, instead of the normally accepted practice in later prehistory of manuring fields with farmyard and domestic waste (eg, Crowther 1983), refuse was assiduously collected and transported to a site set aside for the accumulation of unwanted waste. It was argued by the excavators of Itford Hill, for example, that although the compounds there were farmyards, they would have been periodically 'mucked out' and the dung 'carted to the fields', and that this practice 'would have considerably reduced the number of sherds littering the compound' (Burstow and Holleyman 1957, 199–200). If the practice of manuring were not uniformly carried out, alternative methods of refuse disposal might be envisaged whereby unwanted materials were collected up and taken to some out-of-the-way place, rather like the refuse tips administered by today's local authorities. At a conservative estimate the Potterne Deposit contains 40–50,000 m^3 of material. Originally, the inclusion of organic matter which rotted quickly might have given a greater bulk to individual dumps of waste, while compaction since the Deposit's formation may also mean that it was once of greater thickness. Late Bronze Age occupation areas, such as those at Reading Business Park or Shorncote include many hut sites and cover wide areas, indicating a considerable population which may have contributed collectively to such a rubbish tip. Neither of these sites has a large refuse mound associated with it, however, and it has not been demonstrated that the area surrounding the Potterne site contains satellite settlements which might have contributed to a rubbish tip.

It is tempting to suggest from a study of the overall nature of finds from later Bronze Age sites that objects were not abundant in everyday life. However, if the model of settlement cleaning is correct then the bulk of the unwanted cultural materials will have been removed from a settlement site. Potterne might be an example of the final resting place of the removed material.

In the early stages of the project it was conjectured that the Deposit may have derived from a substantial settlement on the brow of the hill to the south. However, the bank which forms the boundary of the modern cemetery was shown not to be an ancient defence but a later lynchet. The auger survey and test-pitting demonstrated the limited extent of the Deposit to the south and, although it is probable that features were truncated in this area by later ploughing, it seems most unlikely that a settlement of sufficient magnitude to produce the volume of material within the Deposit existed on the brow of the hill.

The concept of a 'corporation tip' may apply modern attitudes to cleanliness and sanitation, and imply a disregard of potentially reusable material which did not prevail in less urbanised societies. It also disregards some observations of behavioural studies. The generation, accumulation, distribution, or abandonment of refuse have been considered in detail by a number of authors (Murray 1980; Rathje 1974; Schiffer 1976; 1987) and recently by Needham and Spence (1996) for the purpose of interpreting the large quantities of material recovered from Runnymede Bridge, Surrey, a site roughly contemporary with Potterne. Needham and Spence conclude that large accumulations result from a series of inter-related activities not simply the concentration of refuse. Although the entire site at Potterne might be accommodated within their definition of 'midden' in that 'there was deliberate and sequential accumulation of refuse at one location' incorporating 'a significant component of refuse of short refuse history', this masks the overall extent of the 'one location' and the overall duration of activity during which originally separate activity areas shifted and their spreading signatures eventually coalesced, overlapped, or were superimposed. Certainly the pottery 'spreads' seem to be clear evidence of episodic dumping equivalent to Needham and Spence's (*ibid.*, 24) 'pot-groups', but this activity alone is insufficient to classify the entirety of the Potterne Deposit as merely a 'midden' or refuse heap. The term 'midden' is best reserved for a certain, specific, and identifiable component in a more complex site (Needham and Spence 1997).

From an environmental archaeology perspective the process which created the Deposit at Potterne relates directly to animal husbandry and the formation of the Deposit may be seen as a direct consequence of the concentrated management of stock. The soil micromorphological evidence suggests a dynamic process with trampling by stock, probably cattle, scavenging by pigs and dogs, all of which contributed large quantities

of liquid cess and coprolites, while large quantities of burnt stable refuse and dung, and cultural material were also discarded.

The interpretation of the site as merely a manure heap does not, however, take account of the fact that the dumping of refuse was not unrelated to domestic and industrial activities associated with post-built structures and hearths, and the colossal quantities of artefacts. The weight of evidence implies a far greater range of activities than merely the abandonment of waste.

Ritual rubbish

There is currently much interest in the possibly 'ritual' significance of waste material (including middens) in the British later Bronze Age and Early Iron Age. Some of the discussion has taken place specifically in relation to the sites at East Chisenbury (McOmish 1996) and Runnymede (Needham and Spence 1996). The significance of this debate for the interpretation of Potterne needs to be examined: if one accepts a 'midden' interpretation, as opposed to an 'activity site' interpretation for the site (see above) does a ritual explanation provide a convincing alternative to a 'functional' one?

Studies of the relationship between 'finds' and 'contexts' have also demonstrated the potential for reconstructing symbolic systems, notably the placing of deposits in pits (Hill 1989) or the spatial organisation of round-houses (Fitzpatrick 1994; Parker Pearson 1996). The data from Potterne do not lend themselves to this degree of interrogation because the few pits did not contain distinctive assemblages and discrete structures were not isolated. Nonetheless, the concept that symbolism extended from individual features to the structure of the entire site has been considered by a number of authors (Parker Pearson and Richards 1994). Of particular note is the application of such a concept to the Potterne-like site of East Chisenbury recognised in 1992.

McOmish suggests that 'the large midden sites ... include within their build-up the deliberate and structured deposition of a wide range of materials', recalling Barrett's (1989, 313) ideas that 'ritual ideology communicated through a series of symbolic events revolving around the preparation, display and consumption of food is linked ultimately with the structuring of age and gender relations, and the establishment of new forms of authority' (McOmish 1996, 75). McOmish sees such sites as 'one end product of ritual activity'.

Potterne offers considerable scope for the development of Barrett's ideas and may fuel debates related to the role of feasting, conspicuous consumption, the appreciation of wealth and social reproduction, not least because of the volume of discarded material, but we might question how deliberate or structured the Deposit was.

It may be true to say that the material which forms the Deposit at Potterne was not 'dispersed on to the fields as manure' but there seems less evidence that it was 'carefully curated'. The formation of the Deposit probably resulted from a variety of acts, some unthinking, but others very deliberate (Needham and Spence 1996) and although the deposition of waste material was probably a deliberate act of disposal, it may not have been 'structured' in the sense of a long term series of inter-related acts undertaken with the specific aim of consciously producing a symbolic structure.

That is not to deny that ritual and routine activities occurred at the site because we may infer that they did. For example, the occurrence of disarticulated human bones is consistent with other contemporaneous sites (Brück 1995). The association of these bones with settlement remains, the absence of inhumation burials, the selection of particular parts of the body, and their eventual loss hint at recurrent rituals incompletely understood but represented at Potterne. Similarly at other sites, deliberately-buried deposits (eg, Runnymede, Mucking North Ring, Essex, or Rams Hill, Berkshire) or areas set aside for non-utilitarian activities (as at Fengate Power Station, Cambridgeshire) have been identified (Needham 1990, 63). We do not know the circumstances of burial of the Potterne gold bracelet; it may have been deliberately, even symbolically, buried. Daily rituals doubtless abounded in the lives of the local population, but how far such practices extended to the development, appreciation and perception of place is a matter for discussion beyond this report.

The persistent use of the same area for activity which led to the accumulation of such large quantities of material that they altered the natural topographic profile is more likely to have been incidental than a deliberate act to create a lasting monument to the events. Throughout the past, reasons for the construction of highly visible mounds, their symbolism and even metaphoric purposes are extremely varied. The examples, reviewed by Whittle (1998), all imply the use of labour to dig, transport, and deposit the material used in the mound and the controlling influence of individuals within highly stratified societies to enable the monument to be constructed. These comparisons may be inappropriate for Potterne because the mechanism by which the site was created was quite different. It was not constructed from quarried material and by direct labour, but grew steadily from refuse and animal waste. The organisation of the site and acceptable practice within it may well have been controlled but its vertical growth is likely to have been so relatively slow as to have been imperceptible and without any conscious effort or deliberate desire to construct a mound.

It is probable that Potterne-like sites would have been conspicuous in the landscape by virtue of the pattern of enclosures, buildings, stock, fires, etc, upon them, but it is doubtful that the growing layers of material underneath would have contributed greatly to their visual prominence. The surface of the Deposit at

Potterne may eventually have been as much as 4–5 m above the underlying bedrock but as far as we can tell the outline of the developed 'mound' would have been diffuse, the growth of vegetation on it blending the edges into the natural landform. It is doubtful that it would have been visible as an exaggerated knoll from any quarter, being below the crest of the ridge when viewed from the south and subordinate to it when viewed from the floor of the vale to the west or opposing valley side to the north. Indeed, the fact that such sites have not been detected easily by skilled field-workers in modern times indicates how inconspicuous they now appear. Once abandoned and colonised by plants, they might have rapidly become lost and, even when in use, their limits may not have been well-defined.

The place may have been well-known even to distant communities but it is questionable whether the Deposit, as it accumulated over a number of centuries, was either perceived or intended to be a symbolic structure. Any connotations of affluence or significance which the site held are more likely to have derived from the events which took place there rather than the physical form of the Deposit or the character of its constituent parts.

'Settlement' Interpretations

The second main interpretative possibility for Potterne is that, rather than it being a midden of material generated by activities elsewhere, it was an activity site (or 'settlement') in itself, with activities being conducted among, or on, the waste generated by those activities. The range of activities being carried out at Potterne (as evidenced by the surviving residues from these) does not seem to be different from that found, albeit more dispersed, among other settlement sites of the period. What is unusual is, first, the great accumulation of material which appears to be largely related to animal maintenance; secondly, the volume of artefacts, especially pottery and animal bone; thirdly, the broad range of activities taking place at a single site; and fourthly, the access to non-local products (Chapter 6.17). The challenge is to construct an interpretation which accommodates these characteristics of the site.

A periodically-used site?

In the past, we seem commonly to have assumed (albeit implicitly rather than explicitly) that each element in the settlement pattern of the later Bronze Age was permanently (year-round) occupied, in an essentially sedentary and stable pattern of occupation. Recent work, however, has identified a range of different 'settlement' types at this period, and has suggested that these may have had a variety of specialised functions (Needham 1990). Leading on from this, it may be worthwhile to set aside for a moment our traditional assumptions about permanence and stability in the settlement pattern, and to consider a range of alternative models for the way in which the Potterne site could have been used within a more fluid pattern of settlement and habitation.

In theory, three broad possibilities for the use of the site may be identified:

i) that the site was permanently occupied by a fairly substantial population;

ii) that the site was periodically occupied by a rather larger population; or

iii) that the population of the site fluctuated periodically, with a small permanent population being joined at certain times by a much larger, temporary population.

The 'conventional' view of later Bronze Age settlement and economy would favour the first possibility. Leaving that aside, what might cause a site either to be occupied only periodically, or to see the number of its residents fluctuate considerably on a periodic basis, and why? The first issue to consider is what the 'periodicity' of such change might be. Two broad options seem to present themselves. The first is that of a primarily seasonal pattern, in which a changing pattern of occupation was related to the annual cycle of agricultural production. The second is of a pattern driven by social factors, not directly related to the seasonal cycle. In theory, social demands could lead to the gathering of people at a certain place at either regular or irregular intervals, and for any number of different possible reasons. These could include funerals, weddings, or 'political' gatherings.

Against that background, what are some of the main possible functions of Potterne as a settlement?

The specialised settlement

It has been suggested that the site was formed as a result of the recurrent pounding of animals, largely cattle, while copious quantities of unwanted artefacts, byre waste, and refuse were dumped in available areas. Structural evidence for buildings is restricted to the lowest levels of the stratigraphic sequence but it has been argued that such evidence would be difficult to detect at higher levels given the circumstances of the site formation process. The resident population of those managing the pounded animals may have been small and, hence, the likelihood of encountering the remains of their houses in an excavation of restricted area would be slight. It is not suggested that the inhabitants of Potterne existed in total isolation but that they were one element of a network of groups within a wider community, some of which may have specialised in their activities. Thus, those specialising in arable agriculture may have practised their farming in another part of the landscape, for example. If Potterne had a relatively small population and they depended upon others for their cereals, it would not be unsurprising to find little evidence of crop processing at the site.

A trend towards specialisation, or at least a restriction in the number of production centres, is suggested

in the ceramic assemblage: with time fewer sources of pottery are apparent, yet wider links to these sources are established.

Exchange centre

The area covered by the Late Bronze Age remains at Potterne is not unrivalled, the extent of activities exhibited at such sites as Shorncote, for example, spreading over at least 10 ha, far exceeding the footprint of the Deposit. However, as discussed above, it is the volume of accumulated cultural material and the matrix in which it is found that suggests a markedly different function to that of even the most extensive nucleated settlement. In comparison with most other Late Bronze Age sites, the users of the Potterne site may be considered to have been profligate in the extreme, and such is the consumption of artefacts and animal products that it is difficult to imagine that this could have been achieved solely by a resident population. The site exhibits a range of economic functions and industrial activities that might be anticipated on any settlement, but it is the volume of some remains that implies specialised and concentrated activity.

It has been suggested that the site formation resulted in part from the pounding of animals, principally cattle. The resident population who tended the herds may have been relatively small but their numbers could have been greatly enlarged with a regular influx of visitors. Because of the volume of accumulated material at Potterne, and the general absence of such deposits on other contemporaneous sites, it is suggested that it, and similar sites, were locations which not only specialised in the breeding of particular animals, but were centres of production, consumption, and industry, serving a much wider dispersed community. In effect, the site was a market place and, as a social centre, may have been a convenient and suitable venue for other important administrative and ceremonial functions, regularly attracting a wide cross-section of the population, both local and distant.

In essence, the Deposit is thought to result from the activities of a site which was primarily a settlement, the occupants of which were engaged in a wide variety of industrious activities based around the raising of cattle which were pounded on the site. The internal structure of the site shifted from time to time, in an organic fashion as structures and pounds needed to be replaced. Within the overall structure there was adequate scope to cater for, and to supply, large numbers of visitors who used the site for regular exchange, and as a centre for ceremony and social reproduction.

This specialised site did not function in isolation but was a nodal point within a broad network. The oolitic limestone fabric of some of the pottery and the site's topographical situation suggest that this social network stretched across the Vale of Pewsey to the Cotswolds beyond, while more local wares and the proximity of the chalk downland imply another source of contacts.

A periodic gathering place

A final possibility to be offered is that Potterne was a periodic gathering place for people engaged in a more mobile form of agriculture than that which is generally assumed for the British later Bronze Age; the conventional model envisages relatively small units (perhaps extended families) farming defined areas of land on a permanent and sedentary basis.

We have already noted that the Deposit at Potterne is composed largely of byre waste, and also that the animal bone indicates the butchering of very large numbers of animals. Abundant pottery may indicate an emphasis on feasting. There is rather little evidence for crop-processing at the site, suggesting that arable production was probably not a major activity of those who created the Deposit; it could also suggest that much of the grain was brought to the site already-processed, rather than being processed there.

Is it therefore possible that Potterne was a periodic gathering place for communities which had a particularly strong involvement in cattle-rearing? It is possible to envisage a model in which such communities would spread out over large areas of pasture in the summer months (perhaps the rich grazing lands of the Vale of Pewsey). They would then come together from time to time, possibly in the autumn or winter, slaughter some of the animals, over-winter others in byres or pounds, and engage in a range of activities, both practical (such as craft production) and social (such as feasting). Grain might have been obtained, already processed, from other communities who were heavily engaged in arable production, in return for animal products of a variety of kinds.

Such a model could explain the combination of a great concentration of material but what seems to be a rather unstructured process of rubbish accumulation. Use of the site could have been fairly fluid (see above) and could have involved the clearance and dumping of refuse at the end (or beginning) of each period of occupation, as use of the site resumed after a break of some months or so.

Current interpretations of the later Bronze Age in southern Britain, and of the nature of the transition to the 'Iron Age', provide a coherent context for such an interpretation, and for the end of the Deposit at around 600 BC. The later Bronze Age in Britain has been seen by Rowlands (1980) as being characterised by a competitive 'prestige goods economy' type system, in which surplus agricultural produce is used to secure prestige by obtaining prestige objects (such as bronze weapons), by gift-giving, feasting, and so on. A degree of regional economic specialisation is suggested, as is a possibly important role for cattle as a form of wealth (Rowlands 1980, 36).

More recently, Thomas (1997) has argued that, prior to the early 1st millennium BC, there may not have been any very strongly developed concept of land as a form of property, with patterns of settlement and kinship being correspondingly fluid. The kind of cattle rearing system involved in the seasonal model

proposed above implies that the community which created the Potterne Deposit was able to graze its cattle over quite a large territory; there could also have been local specialisation in the agricultural economy, with some groups concentrating on arable production in suitable locations within the territory, others on cattle-rearing. During the 1st millennnium BC, however, a series of changes took place which Thomas interprets as signalling the emergence of a strong concept of land as private property. These include various signs of agricultural intensification, and the appearance of enclosed and long-lived settlement sites. These are taken to indicate a more divided social landscape, with individual families emphasising their discrete identity and their attachment to particular tracts of land. (Hillforts, though, do seem to imply some higher level of communal identity and endeavour.)

The history of occupation at Potterne can be seen as consonant with such a model. The periodic gathering of groups which were otherwise perhaps quite dispersed would have provided the setting for feasting, sacrifices and other competitive activities (in addition to agricultural ones, such as the slaughter or overwintering of animals). Social activities of the kinds mentioned could lead to the loss of otherwise valued items, such as the Potterne gold bracelet, as well as the vast quantities of animal bone and pottery. The importance of the Deposit at Potterne, and the mound at East Chisenbury, may not have been (as McOmish suggests for East Chisenbury) as 'conspicuous landscape features'. Rather, they may have become important places by virtue of repeated use over many seasons, cycles or generations, and the traditions established thereby.

However, as noted above, during the early 1st millennium BC the established system seems to have begun to change. It seems unlikely to be coincidence that it was at this time – about 600 BC – that the accumulation of the Potterne deposit ceased after some 500 years of continuous activity. The particular traditions of communal gathering which gave rise to the Deposit, set in the context of a fairly open and fluid social and physical landscape, had ended as a society characterised by a more divided social structure and a more divided landscape took shape.

Conclusions

If we discount the possibility that the Deposit at Potterne was purely and simply a heap of waste material, then we have identified three broad possibilities for its interpretation: that it was a specialised settlement involved in cattle-rearing; that it played some kind of 'central place' function, acting as a centre visited by people who lived elsewhere; or that it was a periodic gathering place for otherwise dispersed communities which came togther there for part of the year. Of course, these three interpretations are not mutually exclusive; on any view, the keeping of cattle seems to have been an important activity at Potterne and the notions of central place and seasonal gathering place do not exclude each other. At this stage, the most important thing is probably to consider a range of different possibilities which can be tested in the future by further research.

8 The Place of Potterne in Social and Political Life in the 1st Millennium BC

The date of the Deposit at Potterne spans the Late Bronze Age (Needham 1990, 51) and, depending upon one's perspective, overlaps with the earliest Iron Age (Cunliffe 1984b, 13). This period witnesses marked changes in the form, scale and distribution of settlements.

During the preceding Middle Bronze Age, settlement was diffuse, with individual or small groups of houses occupying niches in formalised field systems within a wider scheme of formal land division (Burgess 1980, 198–209).

The Late Bronze Age, however, witnesses more nucleated settlement with a greater intensity and specialisation of site function (Needham 1990, 52–7) with the occupation of different topographical localities. For example, Barrett (1991, 228) comments on the notable absence of Late Bronze Age assemblages from his Cranborne Chase study area which 'must indicate some shift in the location and the organisation of settlement in the first half of the 1st millennium BC'. It is in this period that extensive settlement becomes visible in the Thames Valley while, elsewhere, upland areas become depopulated (Burgess 1980, 157–8), partly as a result of climate deterioration. The extent of sites such as Reading Business Park or Shorncote suggests either a rise in population or a concentration of settlement in certain sites. Small farmsteads, such as Longbridge Deverill Cow Down (Chadwick Hawkes 1994) continued to be built, but others demonstrate the developing need for defensive perimeters as at Rams Hill, Hog Cliff Hill (Dorset) or the ring-forts of Thwing (Yorkshire), and Mucking. Riverside locations, such as Runnymede or Wallingford may have been chosen for ease of communication and trade with other communities. While some wetland sites such as Flag Fen, Cambridgeshire, may have had a very special, perhaps ceremonial use, others such as Shinewater Park, East Sussex, may have been defensively located.

The social networks envisaged for the period were inherently competitive and, indeed, throughout this period there appears to have been increasing stress within society, possibly resulting from increasing pressure on usable land. This pressure manifests itself in a number of ways, including a greater emphasis on formal land allotment and defence, and the growth of boundary earthworks is matched by an escalation in the production of the increasingly efficient weapons seen in bronze hoards.

In this climate of tension, measures may have been taken to defray possible conflict, at social gatherings where communal activity (feasting, drinking, games) did more to resolve matters than aggravate them. Formal ceremony, with all its symbolic paraphernalia may have accompanied more social activities. It is easy to picture Potterne as a site of such events, where the everyday requirements of husbandry, trade, and exchange were enhanced by events of greater social importance.

The system of *dètente*, however, seems to have failed by 600 BC and sites like Potterne were abandoned, possibly in favour of sites which more aggressively displayed the need for separation and protection. The basic role of extensive enclosures in elevated positions, such as Martinsell and Casterley, east of Potterne, or Balksbury (Wainwright and Davies 1995) further afield may have been to accommodate and secure stock. Eventually, those who kept animals in the fashion which created the Potterne Deposit and established its links with other social groupings may have been spurned in favour of those who practised a more open form of animal management based rather on sheep than cattle. Similarly, other traditions associated with long-established ideas may have been rejected as signs of a once successful but ultimately failed system in favour of the newly-emerging ideas of the Iron Age.

Barrett (in Barrett *et al.* 1991, 227–8) has debated the conversion of agricultural production into political prestige, and the importance of establishing kinship alliances within the model of structured political institutions suggested for this period by Rowlands (1980). The economic processes identified at Potterne were undoubtedly embedded in the network of political relations and, therefore, our consideration of the economic activities offers clues to the broader structuring of society. Thus, the debate on later prehistoric society in southern Britain is better informed as a result of the definition and interpretation of the site at Potterne.

8. Review

The final section of this report takes a critical and retrospective view of the project in order to highlight a number of important aspects that are likely to confront researchers who might wish to investigate further the site at Potterne or to consider a potentially similar site. This review also identifies a number of important question about the broader archaeological context which need to be addressed as part of the research agenda for British later prehistory.

1 If the Gold Bracelet had not Focused Attention on the Site, Would We have Known it was There?

The presence of archaeological remains dating from the earlier part of the 1st millennium BC was predictable from a study of existing information, in particular the collection of sherds made from the 19th century onwards. Because the Wiltshire Sites and Monuments Record has incorporated both sites referred to in publications and those only represented in museum accessions, any comprehensive desk-based assessment of the area (eg, IFA n.d.) would have taken account of the site and (subsequently) of the more recent finds in the immediate area, such as those at Rangebourne Mill, the deer park and Cherry Court (above). However, the extent of the site and the nature of the Deposit could not have been foreseen from the documented evidence.

2 Were the Techniques of Field Investigation of Equal Value?

The field investigations at Potterne were highly successful in their fundamental aims of evaluating a site of previously unrecognised form. It has been possible to characterise or define a new type of site and, as a consequence, we are now able to make constructive suggestions for further work on comparable sites.

In the knowledge of the complexity and richness of this type of site it is imperative that, should investigation be considered, *the questions to be asked are clearly formulated at the outset.* The strategy of investigation and the methodology employed must be tailored to address the questions and not be overwhelmed by the volume of material available for study. This may necessitate the taking of difficult decisions to disregard large parts of the potential data. Naturally, the approach cannot be blinkered and it will be essential to ensure that progress towards the defined objectives is adequately reviewed on a regular basis. The programme of work will only succeed if adequate resources are secured for the entire programme and there is adequate continuity to ensure that the focus of the research is maintained and the resolve of the investigators not diminished (English Heritage 1991).

A field investigation strategy evolved as the complexity of the Potterne deposits unfolded: no technique employed was unsuccessful, but some might be regarded as having been more effective than others.

Basic information on the extent, profile, volume, variation, and date of this type of site could be established adequately from *minimally intrusive techniques.* In particular, an auger survey can collect samples for analysis and the results used to identify the most suitable area for further investigation. Greater resolution will obviously be obtained where the auger cores are most closely spaced. Samples taken during the auger programme at Potterne enabled analysis of phosphate levels, magnetic susceptibility and Munsell colour, as well as a preliminary assessment of artefacts and their state of preservation. Three-dimensional coordinates for all samples provided data for the computer-modelling of surface trends. There is considerable scope for developing the 'minimally intrusive' approach, including enhanced geophysical, geochemical and tomographic techniques.

It would not have been possible to develop the current understanding of the nature of the site or the integrity of its deposits without excavation. However, before any intrusive investigations at such a site is planned it is necessary to consider whether:

- the sample chosen is representative of the whole;
- the selected area is likely to provide the information necessary to answer the questions posed;
- the scale and methodology of the investigation will give sufficient resolution to identify individual events or general trends, depending upon the nature of the specific questions posed. Different parts of the site may have to be examined in different ways to offer greater or lesser resolution in order to address different suites of questions;
- there are adequate resources to deal with the consequences of intervention.

Such points are as pertinent for small scale investigations (evaluations) as for large scale works.

During excavation it would be essential to try to *establish surfaces and to recognise the activities which took place upon them.* The establishment of *contemporaneity* in different parts of the area under investigation would be equally important so that spatial variation in site use could be established. This was one of the most challenging aspects of the Potterne site: an absence of clear surfaces within the Deposit meant that it was

impossible to recognise certain events that may have taken place. Thus, for example, the distribution of artefacts on a house floor, the bones of individual, butchered animals, or the sites of maufacture of specific artefacts could not be recognised.

At Potterne, *soil micromorphology* was essential in establishing the nature of the matrix of the Deposit and variation within it. Similarly, *environmental sampling* exhibited variations in evidence. In future, it would undoubtedly prove helpful to phase an excavation so that the preliminary results of such investigations could be used to refine the excavation strategy. For example, soil analysis might identify distinctive horizons which could be followed or investigated in more detail; it might prove desirable to increase the number of environmental samples taken or to decrease the spacing between them (for example, a number of regular, closely spaced samples), to ensure that all samples relate directly to drawn sections, that they are taken in such a way as to ensure that results can be extrapolated statistically, and so forth. With the benefit of the results of Potterne, it should now be possible to consider such questions in advance of excavation and to ensure that the most appropriate methodology is formalised, and its logic understood by all participants, before the investigation commences.

The *volumetric control* exerted at Potterne through the spit-digging method was essential. Because of the numbers of finds, it would be impracticable in any sizeable area to record the 3-dimensional location of each find individually and to use the subsequent data for the re-establishment of individual objects, animals or events.

Although the trowelling of a defined number of spits was time consuming, the method resulted in the recognition of pottery spreads and surfaces. However, the technique of excavating with light picks proved to be expeditious with minimal loss of information amongst many classes of material: for example, by comparison with the picked areas, trowelling merely increased the number of indeterminate animal bone fragments and led to little increase in the number of human bones recovered. The control given by the programme of wet sieving provided a range of artefacts and ecofacts which could not have been recovered by picking or trowelling, and in the future it would be advisable to consider the more extensive use of this method so as to give greater resolution to spatial patterning of the results.

The controlled use of metal-detectors is essential to ensure the recovery of small metal objects and production waste.

In the absence of surfaces or layers within the Deposit which could be followed in the conventional manner, the excavation of contiguous units (spits) had the advantage that data recorded from them could be studied either separately or combined. With hindsight, it is possible to see that at Potterne there were flaws in the combinations of spits into the more extensive Zones. Despite imperfect judgement in the association of contexts, as noted above, the method has been successful in demonstrating certain trends, for example, in the changing material culture of the site, and the potential exists for more detailed study. The site archive is such that the whole assemblage could be re-analysed with different combinations of contexts without recourse to further excavation. For example, a new zoning could be configured working progressively upwards from the interface between the Deposit and the soils below. Similarly, assemblages associated with specific combinations of contexts, for example groups of post-holes, could be reassembled and analysed, thereby testing the conclusions reached in the current study.

The resolution of the results of analysis will in part be related to the size of the sample units (spits). Whereas the spit size adopted at Potterne enabled certain trends to be recognised, they were too large to address those questions requiring more precise locational information (such as re-assembling the bones from a specific animal).

The date and duration of the site's use have been established indirectly through typological studies of the artefacts recovered and directly using a number of scientific techniques. The complex sequence would be further elucidated by a much greater number of radiocarbon dates carefully constrained by stratigraphic relationships. In future, dating programmes should be based on materials which are functionally related: thus, for example, articulated bones may relate to a single episode of discarding; hearths and in situ deposits may relate to a specific structure: a stratigaphically based sequence may establish the duration of practice.

3 The Limits of Post-excavation Study

Inevitably, with such a large assemblage as that from Potterne, studies of the finds have not been exhaustive and it is possible to identify subjects that would merit future research. For example, the botanical remains may warrant further use of scanning electron microscopy, the use of ecologically-based computer analysis programs, or experimental work to better understand the process of mineralisation.

Similarly, the study of pottery could consider the analysis of design elements in the decoration, its symmetry, structure, and hierarchy (*cf.* Rice 1987, 244–73), or the symbolism of designs and motifs. Residues identified on the surfaces of vessels could be anlaysed (*cf.* Needham and Evans 1987), while neutron activation techniques might help in identifying the sources of clays used in a range of contemporaneous sites. Having established the sources of different wares, it may be possible to comment on the level of specialisation or inter-dependence of production centres. Future work might concentrate on the characterisation of fabrics from known vessel types so that additional information about form and function associ-

ated with specific fabrics can be accumulated. An examination of the engineering properties of different fabrics and forms in Middle and Late Bronze Age vessels may lead to a better understanding of ceramic developments at this time, and so on.

4 Establishing a Broader Context

The work reported upon in this volume was clearly focused on the Potterne site itself, yet even the most introspective view will identify the need to understand the site more fully and to appreciate it in a broader context. Not surprisingly, the current work has identified a series of questions which are as pertinent to the site at Potterne as to other similar sites and which pose a challenge to future research:
Site specific questions include:

- Are there variations in site structure that have not been identified?
- How does the dark soil deposit relate to earlier land use?
- What are the circumstances of the abandonment of the site?
- Is the Potterne site unique in its site formation and function? If not, what is different at superficially similar sites?

Regional context include:

- How widespread, and how common are comparable sites?
- Is the occurrence of dark earth, which might invite comparison with other contemporaneous sites, merely a product of certain activities (such as animal husbandry) which disguise the true purpose of the sites?
- Are all such sites of the same date and of similar duration?
- How do these sites articulate with other contemporaneous archaeological sites in the vicinity?
- What was the structure of the humanly-created and natural environment at the time?
- Can they be used to support the idea of specialised groups within a wider community?
- What was the status of cattle in the Bronze Age and was their value symbolic or economic?
- Can such sites be equated with the currency of post-Deverel-Rimbury pottery and, if so, what does that signify for the cultural identity of the site's users?
- How does the demise of these sites relate to the development of farming practices and the role of hillforts?
- What does the changing network of contemporary sites tell us about social and political structure?
- How do these sites and their contents relate to contemporaneous sites, practices and events in the neighbouring parts of Continental Europe?

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Appendices

Appendix 1: Soil components & microfabrics

Material	*Sample No.*	*Soil micromorphology (SM), bulk data (BD) SEM/EDXRA (XR), microprobe (Probe) & elemental map (EM)*	*Interpretation & comments*
Greensand	SM1(LM) cf.BD25, 32, 33, 37, 42	SM: very dominant very fine & fine sand-size subrounded to subangular quartz with frequent glauconite. BD: very fine & fine sandy (silt) loam XR & EM: very dominant Si, with Al & presence of K, Ca, Fe.	Natural Greensand subsoil.
Microfabric type 1	SM1(LM); cf. BD33, 42	SM: pale, dusty grey (PPL), very low-order interference colours (XPL), very pale grey (OIL) with rare to occasional fine organic matter. BD: poorly humic (0.5-0.6% organic carbon) & very weakly calcareous (1-1.6% CaCO3)	Slightly contaminated natural Greensand subsoil.
Microfabric type 2	SM2(KL) cf.BD25, 32 SM3(JK) SM4(HJ) (lower half)	SM: extremely dusty dark greyish-yellowish brown (PPL), very low-order interference colours (XPL)(weakly crystallitic); pale brown (OIL), with many brown amorphous (staining into matrix) & charred fine organic matter, many phytoliths & occasional whole & fragmented diatoms; rare-occasional probable calcitic ash residues. BD: 13% clay, 27% silt; humic (3.2% organic carbon) & weakly calcareous (2.1 % CaCO3). Associated features are; very abundant, very-extremely dusty dark yellowish brown-blackish (PPL), low-order interference colours (XPL)(weakly crystallitic), brownish (OIL) & sometimes autofluorescent under UVL 50-80 μm thick void clay coatings. XR: very dominant Si, with Al & presence of Ca, K, Fe & weak-strong trace of P.	Occupation soil composed of & producing slurries (coatings) of fine charred humic soil, rich in phytoliths & diatoms; other components are many sand-size yellow coprolitic residues (see below). Soil could well be the result of concentrated occupation & associated trampling, the phytolith-diatom association & high amounts of textural features possibly additionally resulting from inputs of dung & liquid waste (animal/cattle stocking).

Material	*Sample No.*	*Soil micromorphology (SM), bulk data (BD) SEM/EDXRA (XR), microprobe (Probe) & elemental map (EM)*	*Interpretation & comments*
Microfabric type 3	SM5(GH), **6**(FG) cf.BD23, 30 SM**13**, BD28 SM**14**, BD27 (SEM4b)	SM: extremely dusty, speckled greyish brown (PPL), low-order to moderate interference colours (XPL)(crystallitic), pale greyish brown (OIL), with many to very abundant probable ash residues, very abundant phytoliths, occasional diatoms, occasional-many fine charred & amorphous organic matter. BD: fine sandy (silt) loam-clay loam ;14-28% clay & 24-40% silt; weakly calcareous-calcareous (0.7-7.3% CaCO3) & moderately humic (1.7-2.9% organic carbon). XR: very dominant Si, with high Al & Ca; strong presence of K, Fe, P & Mg. EM: common patches of Ca & K & associated Ca-K.	Differentially weathered ash-rich soil, part resulting from the dumping of ash residues (Ca-K) from domestic fires, crop processing waste (see component **D**) producing a generally high Ca & K but low P & Fe matrix (see Primary Deposit). This material is probably related ash spreads originating from hearths present at the base of the Deposit. A small input of unburned & burned probable herbivore dung has been mixed into this.
Microfabric type 4	SM7(EF), SM**8**(DE) Cf. BD31 (SEM4a)	SM: dusty & speckled, pale grey (PPL), very low-order interference colours (XPL)(very weakly crystallitic), pale greyish brown (OIL), with extremely abundant phytoliths, occasional diatoms, occasional-many fine charred with fewer amorphous organic matter. (Brief diatom scan by Nigel Cameron found typical soil diatoms - *Hantzschia amphioxys, Navicula mutica*, with instance of freshwater *Aulacoseira* sp.; single valves & frags present) BD: clay loam, with 28% clay & 36% silt; moderately humic (1.7% organic carbon) & calcareous (4.8% calcium carbonate). XR: Very dominant Si, with Ca, P, Fe, K present; traces of Mn & Mg (occasional high P & Ca). EM: abundant coarse patches of P with Fe present throughout; a scatter of Ca & small patches of very high K with patches of associated Ca-K.	Major input of charred & non-charred probable herbivore dung (phytoliths, diatoms etc.) leading to relatively high P & Fe (cf. type 3 above). Ash residues (Ca-K) appear to be more weathered, & although some remains of possible herbivore/omnivore coprolites (coarse areas of P) are preserved (see **J** below), some of the soil organic matter appears to have been lost through oxidation. This with the general purity of the microfabric, suggests a period of exposure before renewed dumping on this part of the site, especially in the lower part, where dark textural features are the least common.
Microfabric type 5	SM**9**(CD) Cf. BD22	SM: extremely dusty & speckled very dark grey with dark yellowish brown (PPL), very low-order interference colours (XPL)(very weakly crystallitic), pale yellowish grey (OIL), with very abundant phytoliths, rare to occasional diatoms, abundant amorphous (staining matrix) & charred organic matter. BD: fine sandy loam, with 9% clay & 21% silt; moderately humic (1.7% organic carbon) & very poorly calcareous (0.3% CaCO3). XR: Dominant Si, with occasionally high Ca, P & K; presence of Fe & trace of Mg.	Here weathered ash residues are present alongside large amounts of amorphous & charred organic matter, possibly of herbivore coprolitic origin; associated local slurries (see component O, textural features) of this material into **8** could be a continued indication of liquid waste affecting the site. Large amounts of sand (71%, Table 2) could also have been brought in by animal trampling.

Material	*Sample No.*	*Soil micromorphology (SM), bulk data (BD) SEM/EDXRA (XR), microprobe (Probe) & elemental map (EM)*	*Interpretation & comments*
Microfabric type 5/6	SM10(BC) (SEM3a)	As microfabric 5, but with weakly crystallitic groundmass & many ash residues. Probe: Si (18-30%), Al (1%), Fe (().7-1.7%), Ca (1-5%), P (0.5-1.5%), K (0.4-0.5%). EM: general high scatter of Ca, scatter of P with occasional fine concentrations & patches of high K; occasional associated Ca-P & common Ca-K.	As above (general P) but with a slightly less weathered ashy component producing noticeable patches of ash (Ca-K).
Microfabric type 6	SM10(BC) SM11(AB) Cf.BD21 (SEM3b)	SM: very speckled & highly dusty, very dark greyish brown (PPL), low interference colours (XPL)(weakly crystallitic), greyish brown (OIL), with very abundant phytoliths & occasional diatoms, very abundant amorphous & charred fine organic matter. BD: fine sandy loam with 16% clay & 33% silt; humic (2.9% organic carbon) & moderately calcareous (3.0% CaCO3). Probe: Si (20-22%), Al (2-2.5%), Ca (3.5-4%), P (1.3-1.5%), K (1-1.2%). EM: common coarse patches of P (earthworm burrow fill) with general presence of Ca with lower amounts of Fe; fine concentrations of K; common associated Ca-K & few Ca-P.	Dominant in **11**; occurs as earthworm burrow fills in **10.** This soil is more highly weathered & because it is strongly earthworm-worked, it is well-aerated (lacks Mn nodules, component **L**). The soil is also generally phosphate-rich, which may indicate weathering & the concentration of P. Ash residues (Ca-K) & highly residual calcium-phosphatic frags (e.g. components **D, K, H** & **G**) (Ca-P) are still present.
Microfabric type 7	SM17, SM18 Cf: BD40, BD41	SM: very speckled & highly dusty, very dark greyish brown (PPL), moderately low-order interference colours (XPL)(speckled), darkish brown (OIL), with abundant phytoliths & occasional diatoms, very abundant charred & amorphous fine organic matter. BD: clay loam with 20-28% clay & 30-35% silt; moderately humic (1.1-1.5% organic carbon) & poorly calcareous (0.7-1.9% CaCO3).	Very dominant Romano-British colluvial ploughsoil characterised by being poorly calcareous but with a high clay content, both strongly indicative of marked weathering (exposure & "use" over some centuries?). This includes decarbonation (loss of CO3) & clay neoformation (enhanced by K content of Deposit).

Material	*Sample No.*	*Soil micromorphology (SM), bulk data (BD) SEM/EDXRA (XR), microprobe (Probe) & elemental map (EM)*	*Interpretation & comments*
Fused ash (Component **D**)	**SM20, SM21b** (2673/2227)	SM: a) colourless-pale yellow-dark greyish brown with fine black dots (PPL), non-birefringent (XPL)(rarely crystallitic), very pale grey, with few fine red material (OIL), with extremely abundant (siliceous) plant frags < 800 μm & phytoliths in general, occasional plant pseudomorphs & occasional long charred frags; common vesicular areas; occasional charred & amorphous organic matter; frequent quartz silt & very fine sand; contains pale yellow, cloudy (PPL), non-birefringent patches, except for fine blackened (XPL) & whitish grey (OIL) areas; all matrix is generally highly auto-fluorescent under UVL; includes patches of silt & fine sand, whereas areas of plant remains contains only a few fine silt-size quartz. (Macro-remains: awn frags of *Triticum* sp.; Carruthers, pers. comm.) (Pollen preparation: microscopic frags of uncharred organic matter, charcoal & unidentifiable nebulous 'ghosted bodies'; Wiltshire pers. comm.) b) associated material is dark greyish with black specks (PPL), non-birefringent (XPL) & grey (OIL), with coarse & fine vesicles; material is autofluorescent under non-UVL (except when vesicles are infilled with UVL autofluorescent material). XR & Probe: Si (10.5%), Al (0.73%), Fe (1.4%), Ca (14.8%), P (6.8%), K (0.4%), Mg (0.15%), Ti (0.007%), S (0.19%) & Mn (0.007%.)]	a) probable product of moderately low high temperature burning (500-600°C) of cereal-rich Poaceae material, with loss of calcitic ash, partial melting of the phytoliths (high Si) in places & their (yellow) staining probably with phosphate (hence high Ca & P & UVL autofluorescent appearance - calcium phosphate); blackish dots are probably composed of carbon; b) totally melted (above 650°C) silica (Poaceae phytoliths) to produce a vesicular glass-like material with staining by pure carbon; high temperature has probably driven off K found in lower temperature ashes(Courty, pers. comm.); Straker (personal communication) suggests such fused ashes probably formed under reducing conditions.

Material	*Sample No.*	*Soil micromorphology (SM), bulk data (BD) SEM/EDXRA (XR), microprobe (Probe) & elemental map (EM)*	*Interpretation & comments*
Cemented (and burned) soil (Component **K**)	**SM21c** (2568/2604)	Greensand (quartz & glauconite) rich, with either a) speckled & dotted, greyish brown to brown, or b) blackish-dark reddish brown patches in some areas (PPL), non-birefringent (XPL), greyish black & brown patches (OIL), which can be highly auto-fluorescent under UVL, except for brown patches; with a) occasional fine amorphous organic matter & b) very abundant phytoliths & occasional diatoms, occasional-very abundant brown-black (charred) fine organic matter; void space infilled with colourless, non-birefringent materail autofluorescent under UVL. (Associated burned soil is non-autofluorescent under UVL) (Pollen preparation: organic frags (possible structured plant elements), fungal hyphae & spores, fine to coarse charred frags: Wiltshire pers. comm.) (Brief diatom scan by Nigel Cameron found valves & frags of soil diatoms *Hantzschia* sp. & *Pinnularia* sp.) XR & Probe: Si (8.0%), Al (1.6%), Fe (2.1%), Ca (20.9%), P (1.3% - max. 3.3%), K (1.1%), Mg (0.2%), Ti 0.23%), S (0.07%) & Mn (0.9%.)] In sample **8** an example of component **K** contained a coarse fragment of charred small herbaceous stem tissue (Hather, pers. comm.).	Greensand soil & the Deposit (microfabrics 2-5) have been cemented by calcium phosphate (high Ca, moderately high P & autofluorescent under UVL) & then burned alongside associated organic inclusions. Some other cemented materials may have been burned first. It is a strong possibility that these materials were formed as a stable crust materials during animal/cattle stocking episodes, in part possibly also indicated by the presence of fungal material & diatoms. The *in situ* probable calcium phosphate cementation of parts of the deposit, the presence of probable calcium phosphate-rich dusty clay textural features & the mineral replacement of roots (Carruthers, this volume) also indicate the strong possibility of animals being stocked on the Deposit at some times.
Pale nodules (Component **H**)	**SM21a** (2672/3710),	SM: pale grey, speckled to dotted, with dark greyish margins (PPL), non-birefringent (XPL), colourless-grey (OIL), with occasional to very abundant silt & sand inclusions, but only rare phytoliths, charcoal & other organic matter; the last include pollen & possible very fine cellulose frags & possible *Ascaris* (Cruise pers. comm.); matrix & void infills are highly autofluorescent under UVL. (Contains no visible plant tissue; Carruthers, pers. comm.) (Pollen preparation: unidentifiable epidermal frags, algal spores & very sparse, highly degraded pollen of *Poaceae*, probable *Corylus*, & possible Caryophyllaceae, *Quercus* & cereal type; Wiltshire pers. comm.) Probe: Si (5.9%), Al (0.1%), 0.2%), Ca (27.7%), P (11.9%), K (0.06%), Mg (0.18%), Ti (0.59%), S (0.032%) & Mn (0.03%).	On the basis of colour, chemistry (Ca & P; calcium phosphate cement) morphology & autofluorescent under UVL, these enigmatic materials resemble 'cesspit nodules' (Carruthers & Canti, Ancient Monuments Laboratory reference material) & mineral replaced cess (Macphail, Wiltshire, Robinson & Allison unpublished). The presence of preserved pollen & possible *Ascaris* seen in thin section & the variety of pollen found in the pollen preparation may support this conjecture. These nodules appear to be rare components of the Deposit in the areas sampled. (Similar materials preserving large plant remains are present at East Chisenbury) The exact chemical & microbiological origins of these materials at Potterne remains enigmatic, although the phosphatisation of Greensand occupation soil in a cesspit-like situation & their rare importation into the Deposit seems much more likely than their neoformation within the Deposit.

Appendix 2: Mineralised and charred plant macrofossils

a: Mineralised plant macrofossils from 'off-terrace'

Total number of remains per zone (number of samples in which taxon is present); + = present in 1983 sample and/or flotation sample

Taxa 'off-terrace'	*Component*		*Habitat*	*Zone* 4	5	6	7	8	9	10	11
BORAGINACEAE	nutlets	corn gromwell	AD	3 (3)	4 (2)	1 (1)	+	+	1 (1)	3 (2)	3 (2)
Lithospermum arvense L.											
Myosotis sp.	nutlets	forget-me-not	BGMW	3 (1)	1 (1)	1 (1)	+	2 (1)	1 (1)	2 (2)	2 (2)
CAPRIFOLIACEAE											
Sambucus nigra L.	seeds	elder	DHSWn	2 (1)	1 (1)	3 (2)	3 (2)	2 (2)	+	5 (2)	+
CARYOPHYLLACEAE											
cf.*Cerastium* sp.	seeds	chickweed	ABDG	+	1 (1)		1 (1)	1 (1)	+		
Stellaria sp.	seeds	chickweeds	BCDHW	2 (2)	3 (1)	3 (2)	1 (1)	3 (2)	8 (1)	5 (1)	
Spergula arvensis L.	seeds	corn spurrey	ADc								
CHENOPODIACEAE											
Atriplex / Chenopodium sp.	seeds	orache/fat hen	ADn	19 (3)	6 (2)	26 (3)	51 (3)	56 (3)	126 (3)	34 (1)	32 (3)
COMPOSITAE											
cf.*Arctium lappa* L.	cypselas	great burdock	D								
Chrysanthemum type	cypselas	corn marigold etc.				+	+				
Lapsana communis L.	cypselas	nipplewort	DH	1 (1)	+				1 (1)		
cf. *Tripleurospermum maritimum* (L.)Koch	cypselas	scentless mayweed	AD			+	+				
gen. et sp. indet.											
CRUCIFERAE											
Barbarea vulgaris R.Br.	seeds	yellow rocket	BHd	+	2 (1)	+	1 (1)				
Brassica / Sinapis sp.	seeds		AD	18 (3)	10 (2)	1 (1)	3 (3)	+	2 (2)	1 (1)	+
Thlaspi arvense L.	seeds	field pennycress	AD	3 (2)	2 (2)	+	4 (3)		1 (1)		
gen. et sp. indet.									+		
CYPERACEAE											
Carex sp.	nuts	sedge	GMd	7 (2)	7 (2)	2 (2)	8 (1)	12 (3)	12 (3)	13 (3)	7 (2)
Eleocharis sp.	nuts	spike rush	MPd		1 (1)					1 (1)	
gen. et sp. indet.						+	+				

Taxa'off-terrace'	*Component*		*Habitat*	*Zone 4*	*5*	*6*	*Zone 7*	*8*	*9*	*10*	*11*
EUPHORBIACEAE											
Euphorbia peplus L.	seeds	petty spurge	CD								
FUMARIACEAE											
Fumaria sp.	nutlets	fumitory	CDl	+	+	+	+				
GRAMINEAE											
Bromus sp.	caryposes	chess type	CD		+						
Bromus sp.	caryopses	barren brome type	CD					1 (1)			1 (1)
Poa type	caryopses	annual poa etc.	DG	5 (2)	3 (2)	1 (1)	1 (1)	4 (1)	1 (1)	+	1 (1)
Triticum cf. *dicoccum* Schubl.	spikelet fork	emmer wheat									
gen. et sp. indet.	caryposes	grasses				+	+		2 (2)		
LABIATAE											
Galeopsis subg. *Galeopsis*	nutlets	hemp-nettle	A	+	1 (1)	+	4 (3)	1 (1)	+		
Lamium sp.	nutlets	dead nettle	AD	+	2 (1)		1 (1)	3 (2)	2 (1)	2 (1)	
Prunella vulgaris L.	nutlets	self-heal	DGWb								1 (1)
Stachys arvensis / sylvatica L.	nutlets	woundwort	A/HW			+	+		+		
LEGUMINOSAE											
cf. *Trifolium* sp.	seeds	clover	DG								
Vicia / Lathyrus sp.	seeds	vetch / tare	DGHW								
LINACEAE											
Linum usitatissimum L.	seeds	cultivated flax									
MALVACEAE											
Malva sylvestris L.	nutlets	common mallow	D								
PAPAVERACEAE											
Papaver dubium / hybridum L.	seeds	poppy	AD	+	2 (2)		1 (1)	+		1 (1)	
Papaver sp.	seeds	poppy	AD		2 (1)	+	+				
PLANTAGINACEAE											
Plantago lanceolata L.	seeds	ribwort plantain	Gb			1 (1)					
P. major L.	seeds	great plantain	CDGfo						+		
P.media L.	seeds	hoary plantain	Gb								

Taxa 'off-terrace'	*Component*		*Habitat*	*Zone* 4	5	6	7	8	9	10	11
POLYGONACEAE	nutlets	knotgrass	AD	+	+	+	+	4 (2)	2 (1)	2 (1)	+
Polygonum aviculare agg.											
P. convolvulus L	nutlets	black bindweed	AD	+	+	1 (1)	1 (1)		+		
P. lapathifolium L. / *nodosum* Pers.	nutlets	pale persicaria	CDP								
Rumex acetosella agg.	nutlets	sheep's sorrel	CEGc			+	+				
R. crispus type	nutlets	dock		1 (1)	+	+	+	1 (1)			
POLYPODIACEAE											
Pteridium aquilinium (L.)Kuhn	pinnules	bracken	EGWal			+	+				
PORTULACACEAE											
Montia fontana subsp. *chondrosperma*	seeds	blinks	ad		1 (1)	1 (1)	1 (1)	2 (1)	28 (1)	2 (2)	4 (2)
PRIMULACEAE											
Anagallis sp.	seeds	pimpernel	C		1 (1)	+	+	1 (1)			
RANUNCULACEAE											
cf. *Caltha palustris* L.		marsh marigold	MdW								
Ranunculus acris/bulbosus/repens	achenes	buttercup	DG	2 (2)	7 (2)	7 (3)	6 (3)	2 (1)	3 (2)	3 (2)	2 (2)
ROSACEAE											
Agrimonia sp.	achenes	agrimony	DH								
Malus sylvestris Mill.	seeds	crab apple	HSW								
M. sylvestris / *Pyrus communis* L.	seeds	apple / pear	HSW								
Potentilla sp.		cinquefoil	wide			1 (1)	1 (1)		1 (1)		
Prunus cf. *spinosa*	seeds	sloe	HSW					1 (1)			
Rubus fruticosus agg.	seeds	blackberry	EHSW								
Rubus sp.	seeds		EHSW								
RUBIACEAE											
Galium aparine L.	mericarps	cleavers	ADH				+		1 (1)		
Galium cf. *palustre* L.	mericarps	marsh bedstraw	BMd								
SCROPHULARIACEAE											
Odontites verna / *Euphrasia* sp.	seeds	red bartsia / eyebright	CD	1 (1)	+	+	+		+	+	+
Veronica hedrerifolia L.	seeds	ivy-leaved speedwell	C		1 (1)						

Taxa 'off-terrace'	*Component*		*Habitat*	*Zone* 4	5	6	7	8	9	10	11
SOLANACEAE	seeds	henbane	Dfln			+	3 (1)	5 (1)	24 (3)	10 (2)	2 (1)
Hyoscyamus niger L.											
Solanum nigrum L.	seeds	black nightshade	CDn		3 (1)	+	1 (1)		1 (1)		
Solanum sp.	seeds	nightshade		+	+	1 (1)					
UMBELLIFERAE											
Aethusa cynapium L.	mericarps	fool's parsley	C	+	+	+	+			+	+
Apium sp. / *Berula erecta* (Huds.)Coville	mericarps		Pd								
Chaerophyllum temulentum L.	mericarps	rough chervil	GH								
Daucus carota L.	mericarps	wild carrot	Gb							1 (1)	
Torilis sp.	mericarps	hedge-parsley	AGH			+	+	+	2 (1)	1 (1)	
gen. et sp. indet.	mericarps										
URTICACEAE											
Urtica dioica L.	achenes	stinging nettle	DGHWp	3 (2)	1 (1)	8 (3)	14 (1)	8 (2)	9 (3)	7 (1)	4 (2)
U. urens L.	achenes	small nettle	CDlp	110 (3)	75 (2)	17 (3)	21 (3)	31 (3)	20 (3)	5 (3)	4 (1)
VALERIANACEAE											
Valerianella sp.	fruits	corn salad etc.	AD	3 (3)	6 (2)	+	2 (1)	+	1 (1)	+	
VIOLACEAE											
Viola sp.	seeds	violet / pansy	wide	1 (1)		+	+				
Total				184	143	75	129	140	249	98	63
Total no. of seeds per 10 litre sample				61	48	25	43	47	83	33	21
No. of mineralised worm cocoons				1	2	1	3	3	2	17	16
No. of root frags per 10 litre sample				28	22	36	129	206	317	399	192
Total vol. of soil processed (litres)				30	30	30	30	30	30	30	30

b: Mineralised plant macrofossils from 'on-terrace'

Taxa 'on-terrace'	*Component*		*Habitat*	*Zone 4*	*5*	*6*	*7*	*8*	*9*	*10*	*Pre-Deposit*
BORAGINACEAE											
Lithospermum arvense L.	nutlets	corn gromwell	AD	+	+	1	1	+	+		82 (23)
Myosotis sp.	nutlets	forget-me-not	BGMW	+	+	1	1	+	+	+	20 (10)
CAPRIFOLIACEAE											
Sambucus nigra L.	seeds	elder	DHSWn	+	+	+	+	+	+	+	13 (8)
CARYOPHYLLACEAE											
cf.*Cerastium* sp.	seeds	chickweed	ABDG	+	+	+	+	+	+		5 (3)
Stellaria sp.	seeds	chickweeds	BCDHW			+	+	+	+	+	64 (16)
Spergula arvensis L.	seeds	corn spurrey	ADc								1 (1)
CHENOPODIACEAE											
Atriplex / Chenopodium sp.	seeds	orache/fat hen	ADn	4	7	5	4	2	1	+	319 (28)
COMPOSITAE											
cf.*Arctium lappa* L.	cypselas	great burdock	D			+	+	+	+		
Chrysanthemum type	cypselas	corn marigold etc.									2 (2)
Lapsana communis L.	cypselas	nipplewort	DH					+	+	+	7 (5)
cf. *Tripleurospermum maritimum* (L.)Koch	cypselas	scentless mayweed	AD								3 (3)
gen. et sp. indet.											5 (3)
CRUCIFERAE											
Barbarea vulgaris R.Br.	seeds	yellow rocket	BHd	+	+					+	
Brassica / Sinapis sp.	seeds		AD		2	+	2				43 (17)
Thlaspi arvense L.	seeds	field pennycress	AD	1				+	+		9 (6)
gen. et sp. indet.											3 (2)
CYPERACEAE											
Carex sp.	nuts	sedge	GMd	1	2	+	1	+	+	+	65 (19)
Eleocharis sp.	nuts	spike rush	MPd							+	
gen. et sp. indet.											

Taxa 'on-terrace'	*Component*		*Habitat*	*Zone* 4	5	6	7	8	9	10	*Pre-Deposit*
EUPHORBIACEAE	seeds	petty spurge	CD			+	+				1 (1)
Euphorbia peplus L.											
FUMARIACEAE											
Fumaria sp.	nutlets	fumitory	CDl								+
GRAMINEAE											
Bromus sp.	caryposes	chess type	CD	+	+						3 (2)
Bromus sp.	caryopses	barren brome type	CD					+	+		
Poa type	caryopses	annual poa etc.	DG	2	+	+	1	1	+		14 (9)
Triticum cf. *dicoccum* Schubl.	spikelet fork	emmer wheat									1 (1)
gen. et sp. indet.	caryposes	grasses			1			+	+		16 (7)
LABIATAE											
Galeopsis subg. *Galeopsis*	nutlets	hemp-nettle	A	+		+	+			+	13 (7)
Lamium sp.	nutlets	dead nettle	AD	+	1	+	+	+	+	+	5 (2)
Prunella vulgaris L.	nutlets	self-heal	DGWb			+	1				3 (3)
Stachys arvensis / sylvatica L.	nutlets	woundwort	A/HW	+	1					+	1 (1)
LEGUMINOSAE											
cf. *Trifolium* sp.	seeds	clover	DG								1 (1)
Vicia / Lathyrus sp.	seeds	vetch / tare	DGH W							+	
LINACEAE											
Linum usitatissimum L.	seeds	cultivated flax					5				6 (4)
MALVACEAE											
Malva sylvestris L.	nutlets	common mallow	D				+				2 (1)
PAPAVERACEAE											
Papaver dubium / hybridum L.	seeds	poppy	AD								8 (5)
Papaver sp.	seeds	poppy	AD								+
PLANTAGINACEAE											
Plantago lanceolata L.	seeds	ribwort plantain	Gb								1 (1)
P. major L.	seeds	great plantain	CDGfo				1				
P.media L.	seeds	hoary plantain	Gb								1 (1)

Taxa 'on-terrace'	*Component*		*Habitat*	*Zone* 4	5	6	7	8	9	10	*Pre-Deposit*
POLYGONACEAE	nutlets	knotgrass	AD	+	1	+	+	1	+	+	27 (9)
Polygonum aviculare agg											
P. convolvulus L..	nutlets	black bindweed	AD					+	+	+	23 (8)
P. lapathifolium L./*nodosum* Pers.	nutlets	pale persicaria	CDP								+
Rumex acetosella agg.	nutlets	sheep's sorrel	CEGc					+	+		6 (4)
R. crispus type	nutlets	dock		1	+	1		+	+	+	20 (9)
POLYPODIACEAE											
Pteridium aquilinium (L.)Kuhn	pinnules	bracken	EGWal			+	+	+	+	+	3 (2)
PORTULACACEAE											
Montia fontana subsp. *chondrosperma*	seeds	blinks	ad								7 (4)
PRIMULACEAE											
Anagallis sp.	seeds	pimpernel	C								3 (3)
RANUNCULACEAE											
cf. *Caltha palustris* L.		marsh marigold	MdW		1						
Ranunculus acris/bulbosus/repens	achenes	buttercup	DG	+	1	1	+	+	+	1	38 (16)
ROSACEAE											
Agrimonia sp.	achenes	agrimony	DH								1 (1)
Malus sylvestris Mill.	seeds	crab apple	HSW								2 (2)
M. sylvestris/Pyrus communis L.	seeds	apple / pear	HSW								1 (1)
Potentilla sp.		cinquefoil	wide	+	+	+	+	+	+	+	4 (2)
Prunus cf. *spinosa*	seeds	sloe	HSW								4 (2)
Rubus fruticosus agg.	seeds	blackberry	EHSW								3 (3)
Rubus sp.	seeds		EHSW					1			
RUBIACEAE											
Galium aparine L.	mericarps	cleavers	ADH								1 (1)
Galium cf. *palustre* L.	mericarps	marsh bedstraw	BMd								2 (1)
SCROPHULARIACEAE											
Odontites verna / *Euphrasia* sp.	seeds	red bartsia / eyebright	CD	+	+	+	+			+	22 (11)
Veronica hedrerifolia L.	seeds	ivy-leaved speedwell	C								

Taxa 'on-terrace'	*Component*		*Habitat*	*Zone 4*	*5*	*6*	*7*	*8*	*9*	*10*	*Pre-Deposit*
SOLANACEAE	seeds	henbane	Dfln			+	+	+	+	+	10 (7)
Hyoscyamus niger L.											
Solanum nigrum L.	seeds	black nightshade	CDn							+	+
Solanum sp.	seeds	nightshade				+	+	+	+		
UMBELLIFERAE											
Aethusa cynapium L.	mericarps	fool's parsley	C	+	+						3 (3)
Apium sp. / *Berula erecta* (Huds.) Coville	mericarps		Pd								+
Chaerophyllum temulentum L.	mericarps	rough chervil	GH								+
Daucus carota L.	mericarps	wild carrot	Gb	1				+	+		3 (2)
Torilis sp.	mericarps	hedge-parsley	AGH					+			9 (5)
gen. et sp. indet.	mericarps										2 (1)
URTICACEAE											
Urtica dioica L.	achenes	stinging nettle	DGHWp	2	2	+	+	+	+	+	42 (11)
U. urens L.	achenes	small nettle	CDlp	6	8	2	41	2	1	+	93 (28)
VALERIANACEAE											
Valerianella sp.	fruits	corn salad etc.	AD								24 (10)
VIOLACEAE											
Viola sp.	seeds	violet / pansy	wide				1				
Total				18	27	11	59	7	2	1	1066 (41)
No. seeds per 10 litre sample				"	"	"	"	"	"	"	22
No. mineralised worm cocoons				1	1		1				73
No. root frags per 10 litre sample				6	7	11	98	138	281	353	250
Total vol. soil processed (litres)				10	10	10	10	10	10	10	495

Habitat and soil preferences : A = arable; B = bankside, pond margins; C = cultivated; D = disturbed ground, wasteland; E = heathland; G = grassland; H = hedgerows; M = marsh; S = scrub; W = woodland; a = acidic soils; b = basic/neutral soils; c = calcifuge; d = damp soils; f = farmyards; l = light soils; n = nitrogen-rich soils; o = open habitats; p = phosphate-rich soils

c: Charred plant macrofossils from Zones 4-11 'off terrace'; combined data from Columns 19, 88, 89

Taxa	*Component*	*Common name*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
Avena sp.	grain	Oats .	2 (2)	5+ (2)	5 (2)	16 (3)	9	21 (3)	16+ (3)	-
cf. *Avena* sp.	grain		-	1	3 (2)	-	1	-	-	-
Avena sp.	awn fragments		-	-	-	-	++ (2)	+ (2)	+	+
Avena sp.	floret base		-	1	-	-	1	-	-	-
Avena sp./ *Hordeum* sp.	grain	Oats/ Barley	-	-	-	1	1	-	-	-
Hordeum sp.	grain, twisted	Barley	3 (2)	3 (2)	2	7 (1)	1	3+ (2)	3 (1)	2 (2)
Hordeum sp.,	grain, straight		20 (3)	4 (1)	9 (2)	3	3	3	19 (2)	-
Hordeum sp.	grain, hulled straight		-	10 (2)	2 (2)	4	9 (2)	3 (2)	7	1
Hordeum sp.	grain, hulled twisted		4 (2)	3 (2)	9 (2)	10 (3)	13	-	9 (3)	33 (3)
Hordeum sp.	grain, hulled		5 (1)	-	-	-	10+	5	12 (3)	-
Hordeum sp.	grain		53 (3)	22 (3)	38 (3)	43 (3)	31 (3)	35 (3)	40 (3)	33 (3)
cf. *Hordeum* sp.	grain		-	-	2 (2)	-	1	-	1	-
Hordeum sp.	rachis internodes		1	2	3	-	2	-	-	-
cf. *Secale cereale*	grain	cf. Rye	-	1	-	-	-	-	1	1
Triticum cf. *aestivum* s.l	grain	Bread Wheat	6 (3)	-	4 (3)	5 (2)	5 (3)	16 (3)	5 (2)	-
T. aestivum / dicoccum	grain	Bw/ Emmer	-	-	-	-	-	2	11 (2)	-
T. cf. *dicoccum*	grain	cf. Emmer	11 (3)	5 (3)	14 (3)	11 (3)	14 (2)	29 (2)	49 (3)	5 (3)
T. cf. *dicoccum*	glume bases	cf. Emmer	1	-	-	-	-	-	-	11
T. dicoccum	glume bases	Emmer	2 (2)	1	9 (2)	16 (2)	2 (3)	22 (3)	102 (3)	28 (2)
T. dicoccum	spikelet forks		-	-	2	1	-	-	11 (2)	1
T. dicoccum/ spelta	grain	Emmer/Spelt	-	1	-	6 (3)	3	-	7	6
T. dicoccum/ spelta	glume bases		-	9	4	2	2	4	16 (2)	3
T. dicoccum/ spelta	spikelet forks		-	-	8	13 (2)	-	1	1	-
T. monococcum/ dicoccum	grain	Einkorn/Emmer	1	-	2 (2)	-	1	2	1	-
T. monococcum/ dicoccum	glume bases		-	-	-	1	-	2	1	1
T. monococcum/ dicoccum	spikelet forks		-	-	-	2 (2)	-	1	1	-
T. cf. *monococcum*	glume bases	cf. Einkorn	-	-	-	-	2	-	-	-
T. monococcum/ Secale cereale	grain	Einkorn/Rye	-	1	-	-	-	-	-	-
T. cf. *spelta*	grain	cf. Spelt	5	-	-	9 (3)	19 (3)	2 (2)	33 (2)	9 (3)
T. spelta	glume bases	Spelt	23 (3)	28 (3)	22 (3)	49 (3)	37 (3)	36+ (3)	156 (3)	17 (3)
T. spelta	spikelet forks		-	-	-	1	1	-	1	-
T. spelta/ aestivum	grain	Spelt/ Breadwheat	-	-	-	-	1	-	1	-
Triticum sp.	grain	Wheat	35 (3)	30 (3)	29 (3)	38 (3)	60 (3)	6- (3)	95 (3)	28 (3)
Triticum sp.	glume bases		55 (3)	58 (3)	46 (2)	85 (3)	77 (3)	91 (3)	487 (3)	55 (3)
Triticum sp.	glume fragments		-	-	-	-	-	-	-	2
Triticum sp.	spikelet forks		2	2	8 (2)	8 (3)	11 (3)	3 (2)	25 (3)	-
Triticum sp.	spikelet fork bases		-	-	1	-	1	5 (2)	1	1

Taxa	*Component*	*Common name*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
Triticum sp.	tough rachis internodes	Wheat	-	-	-	1	-	-	-	-
Triticum sp.	rachis internodes		-	-	-	-	2	1	2	-
Triticum sp./ *Hordeum* sp.	grain	Wheat/ Barley	21 (3)	10 (3)	8 (3)	26 (3)	43 (3)	33 (3)	50 (3)	29+ (2)
Triticum sp./ *Secale cereale*	grain	Wheat/ Rye	5 (2)	-	3+ (2)	-	2 (2)	1	5 (2)	1
Cereal sp.	rachis fragments		-	1	-	-	-	-	4 (2)	1
Cereal sp.	grain		7 (3)	4 (3)	25 (3)	++ (3)	26 (3)	++ (3)	++ (3)	++ (3)
Cereal sp.	coleoptiles		-	-	-	-	1	1	-	1
cf. cereal sp.	culm nodes		-	-	-	-	-	-	+ (2)	-
WEEDS										
BORAGINACEAE										
Lithospermum arvense L.	nutlets	Corn gromwell	1	2	-	-	1	-	-	-
CAPRIFOLIACEAE										
Sambucus nigra L.	seeds	Elder	-	-	-	3 (2)	-	1	1	-
CARYOPHYLLACEAE										
Cerastium sp.	seeds	Chickweed	-	-	-	-	1	-	-	-
Silene sp.	seeds	Campion	1	-	-	-	-	-	-	-
Spergula arvensis L.	seeds	Corn spurrey	-	1	-	1	4 (2)	1	-	-
Stellaria sp.	seeds		-	-	-	-	-	-	1	-
Stellaria media agg.	seeds	Chickweed	-	1	-	-	-	-	-	-
gen. et sp. indet.			-	-	-	1	1	-	2	-
CHENOPODIACEAE										
Atriplex sp.	seeds	Orache	-	-	-	-	3	2	-	-
Atriplex sp./ *Chenopodium* sp	seeds	Orache/fat hen	-	-	-	-	9	4	4	-
Chenopodium album L.	seeds	Fat hen	-	4	1	-	-	-	-	2 (2)
Chenopodium sp.	seeds	Fat hen, goosefoot	2 (2)	3 (2)	4 (2)	3 (2)	5 (2)	2 (1)	6 (2)	-
COMPOSITAE										
Tripleurospermum maritimum (L.) Koch.	cypselas	Scentless mayweed	-	-	-	1	1	1	2 (2)	-
gen. et sp. indet.	cypselas		-	-	-	2 (2)	1	-	-	-
CORYLACEAE										
Corylus avellana L.	nutshell	Hazel	+	+ (3)	+ (2)	+ (2)	+ (3)	+ (2)	+ (2)	+
CRUCIFERAE										
cf. *Brassica* sp.	seeds		-	-	-	-	1	-	-	-
Brassica rapa ssp.*campestris* (L.) Clapham	seeds	Wild turnip	-	-	-	-	-	1	-	-
gen et sp. indet.	seeds		4 (2)	-	-	2 (2)	-	1	1	-

Taxa	*Component*	*Common name*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
CYPERACEAE										
Carex spp.	nuts	Sedges	-	-	-	-	6 (2)	5 (2)	7 (3)	2 (1)
Eleocharis uniglumis/palustris	nuts	Spike-rush	-	-	-	1	2	-	-	-
gen. et sp. indet	nuts		1	2	1	2	5	1	1	-
EUPHORBIACEAE										
Euphorbia helioscopia L.	seeds	Sun spurge	-	-	-	-	-	1	-	-
GRAMINEAE										
Arrhenatherum tuberosum (Gilib.) Shultz	bulbils	Onion couch	-	1	-	-	4 (2)	-	3	-
Avena sp./ *Bromus* sp.	grain	Oats/ Brome	3 (3)	1	1	-	3 (2)	2+	4+ (2)	1
Bromus mollis agg / *secalinus*	grain	Brome	7 (2)	2 (2)	6 (3)	43(3)	157 (3)	37 (3)	64+ (3)	11+ (3)
gen. et sp. indet.	caryopses	grass	10(2)	1	6 (2)	3	57 (3)	17 (3)	10 (2)	5 (2)
	glume bases	grass	-	1	-	-	-	-	-	-
	culm nodes	grass	-	-	-	-	1	-	+	-
	culm nodes	grass/cereal	-	1	-	1	1	3	-	2 (2)
LABIATAE										
gen. et sp. indet.	nutlets		1	-	-	-	-	-	-	-
LEGUMINOSAE										
Vicia sp./Lathyrus sp.	seeds	Vetch/Tare	2	2 (2)	8 (3)	11 (3)	19 (3)	18 (3)	28 (3)	3 (3)
gen. et sp. indet.	seeds		-	-	-	-	-	2	1	1
PAPAVERACEAE										
Papaver argemone L	seeds	Prickly-headed poppy	-	1	-	-	-	-	-	-
PLANTAGINACEAE										
Plantago lanceolata L.	seeds	Ribwort plantain	-	-	-	3	2	1	1	-
POLYGONACEAE										
Polygonum aviculare agg.	nutlets	Knotgrass	-	-	-	6 (2)	22 (2)	11 (3)	4 (3)	-
cf. *Polygonum convolvulus*	nutlets	Black bindweed	-	-	-	-	6	-	-	1
Polygonum convolvulus L.	nutlets	Black bindweed	-	-	1	4 (2)	21 (2)	14 (2)	7 (2)	1
P. lapathifolium / L. nodosum Pers.	nutlets	pale persicaria	-	-	-	-	5	-	-	-
Polygonum cf. persicaria L.	nutlets	Redshank	-	-	-	2	4	-	-	-
Polygonum sp.	nutlets		-	1	-	2 (2)	-	3	1	-
Rumex sp.	nutlets	Sorrel	3 (2)	2 (2)	3 (2)	7 (3)	17 (3)	3 (2)	6 (2)	3
Rumex acetosella agg.	nutlets	Sheep's sorrel	1	1	-	-	3	6 (3)	-	-
PORTULACACEAE										
cf. *Montia fontana* subsp. *chondrosperma*	seeds	Blinks	2	-	-	-	2	-	1	-

Taxa	*Component*	*Common name*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
ROSEACEAE										
Agrimonia sp.	achenes	Agrimony	-	-	1	-	-	-	-	-
Crataegus monogyna Jacq.	seeds	Hawthorn	2 (2)	-	1	-	-	-	-	-
Prunus spinosa L.	seeds	Blackthorn, Sloe	-	-	-	-	+	-	+ (2)	-
cf. *P. spinosa* L.	seeds	cf. Sloe	-	+	-	-	+	-	-	-
P. spinosa / avium	seeds	Sloe/Cherry	-	-	-	-	+	-	-	-
Rosa sp.	achenes	Rose	-	1	1	-	1	-	-	-
RUBIACEAE										
Galium spp.	mericarps	bedstraw, cleavers	5 (2)	1	5 (2)	2	16 (3)	3 (3)	9 (3)	4 (3)
cf. *Galium* sp.	mericarps	cf. bedstraw	-	-	-	-	-	1	-	-
Galium cf. *aparine* L.	mericarps	cleavers	5 (3)	3 (3)	3 (1)	3 (1)	7 (1)	1	5 (3)	1+
SCROPHULARIACEAE										
Euphrasia sp. / *Odontites verna* (Bell.) Dum.	seeds	Eyebright / red bartsia	-	-	-	-	2	6	-	-
Veronica hederifolia L.	seeds	Ivy-leaved speedwell	1	-	-	-	1	2 (2)	1	-
SOLANACEAE										
Hyoscyamus niger L.	seeds	Henbane	-	-	-	-	1	-	-	-
cf. *Hyoscyamus niger* L.	seeds	cf Henbane	-	1	-	-	-	-	-	-
Solanum nigrum L.	seeds	Black nightshade	-	-	-	-	1	-	-	-
gen. et sp. indet	seeds			1			1			
SPARGANIACEAE										
Sparganium erectum L.	fruit	Bur-reed	-	-	-	-	-	-	1	-
URTICACEAE										
Urtica dioica L.	achenes	Stinging nettle	-	-	-	-	1	-	2	1
VALERIANACEAE										
Valerianella dentata (L.) Poll	fruits	Corn salad	-	-	-	2	3	-	5 (2)	-
VIOLACEAE										
Viola sp.	seeds	Violet, pansy	-	-	2	-	21	-	3	-
cf. *Viola* sp.	seeds	cf. Violet, pansy	-	-	-	-	-	1	-	-
bud, indeterminate			-	-	1	-	-	-	-	-
unidentified items			23	8	16	34	66	31	33	8
sample size (litres)			493	358	398	393	432	479	368	113
cereals and chaff / litre			.67	.56	.65	1.04	.95	.80	3.20	2.14
weeds / litre			.18	.10	.15	.23	1.12.	.36	0.5	.39
total / litre			.68	.66	.80	1.27	2.07	1.16	3.7	2.53
total			335	236	320	498	894	558	1362	286

KEY: +: 1 - 10 fragments; ++: 10-30 fragments. Classification according to Clapham *et al.* (1962)
Numbers in brackets refer to the number of columns the specimens were recovered from; where there are no brackets, specimens were found in only one column.

d: Charred plant macrofossils from Zones 4-10 'on-terrace'; data from Column 143

Taxa	*Component*	*Common name*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Avena sp.	grain	Oats .	-	3	2	-	5	3	-
Hordeum sp.	grain, twisted	Barley	1	-	2	-	1	-	-
Hordeum sp.,	grain, straight		8	18	15	5	4	1	1
Hordeum sp.	grain, hulled straight		-	3	17	-	1	2	-
Hordeum sp.	grain, hulled twisted			2			1	3	1
Hordeum sp.	grain, hulled		1	3	2	1	-	-	-
Hordeum sp.	grain		21	39	49	6	9	17	5
Triticum cf. *aestivum* s.l	grain	Bread Wheat	-	2	-	1	1	7	-
T. cf. *dicoccum*	grain	cf. Emmer	5	15	27	3	6	28	14
T. cf. *dicoccum*	glume bases		-	27	-	-	-	-	-
T. dicoccum	glume bases	Emmer	-	-	11	-	-	-	-
T. dicoccum	spikelet forks		-	3	-	-	-	-	-
T. dicoccum/ spelta	grain	Emmer/Spelt	3	5	2	5	-	-	-
T. dicoccum/ spelta	glume bases		1	-	-	-	-	-	-
T. dicoccum/ spelta	spikelet forks		-	2	-	-	-	-	-
T. monococcum/ Secale cereale	grain	Einkorn/Rye	-	1	-	-	-	-	-
T. cf. *spelta*	grain	cf. Spelt	-	7	-	-	1	12	2
T. spelta	glume bases	Spelt	3	72	56	-	1	-	-
T. spelta	spikelet forks		-	1	3	-	-	-	-
Triticum sp.	grain	Wheat	7	33	38	7	8	30	15
Triticum sp.	glume bases		2	95	46	-	1	-	-
Triticum sp.	spikelet forks		1	9	7	-	7	-	-
Triticum sp./ *Hordeum* sp.	grain	Wheat/ Barley	3	8	20	5	3	11	8
Triticum sp./ *Secale cereale*	grain	Wheat/ Rye	-	1	-	-	-	-	-
Cereal sp.	grain		+	+	18	+	6	+	-
WEEDS									
BORAGINACEAE									
Lithospermum arvense L.	nutlets	Corn gromwell	-	2	-	-	-	-	-
CARYOPHYLLACEAE									
Stellaria sp.	seeds		-	1	-	-	-	-	-
Stellaria media agg.	seeds	Chickweed	-	1	-	-	-	-	-
gen. et sp. indet.			-	-	-	-	1	-	-
CHENOPODIACEAE									
Chenopodium ***album*** **L.**	seeds	Fat hen	-	-	-	-	1	-	-
C. ficifolium Sm.	seeds	Fig-leaved goosefoot	-	-	-	-	1	-	-
Chenopodium sp.	seeds	Fat hen, goosefoot	4	13	-	-	-	-	-

Taxa	*Component*	*Common name*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
COMPOSITAE									
Lapsana communis L.	cypselas	Nipplewort	-	1	-	-	1	-	-
Tripleurospermum maritimum (L.) Koch.	cypselas	Scentless mayweed	-	2	-	-	1	-	-
gen. et sp. indet.	cypselas		-	-	-	2	1	-	-
CORYLACEAE									
Corylus avellana L.	nutshell	Hazel	+	+	-	-	-	-	-
CRUCIFERAE									
Brassica rapa ssp.*campestris* (L.) Clapham	seeds	Wild turnip	-	8	-	-	-	-	-
Brassica sp./ *Sinapis* sp.	seeds	Turnip/rape/mustard	1	4	1	-	-	-	-
CYPERACEAE									
Carex spp.	nuts	Sedges	1	9	-	-	3	1	-
GRAMINEAE									
Arrhenatherum tuberosum (Gilib.) Shultz	bulbils	Onion couch	-	1	-	-	-	-	-
Avena sp./ *Bromus* sp.	grain	Oats/ Brome	-	-	1	-	-	-	-
Bromus mollis agg / *secalinus*	grain	Brome	+	16	5	1	1	1	-
gen. et sp. indet.	caryopses	grass	1	5	-	-	4	-	-
	culm nodes	grass/cereal	-	1	1	-	-	-	-
JUNCACEAE									
Luzula sp.	seeds	Woodrush	-	3	-	-	-	-	-
LABIATAE									
gen. et sp. indet.	nutlets		-	-	-	-	9	-	-
LEGUMINOSAE									
cf. *Trifolium* sp.	seeds	Clover	-	-	-	-	1	-	-
Vicia sp./Lathyrus sp.	seeds	Vetch/Tare	2	22	21	-	-	1	2
PLANTAGINACEAE									
Plantago lanceolata L.	seeds	Ribwort plantain	1	-	-	-	-	-	-
POLYGONACEAE									
Polygonum aviculare agg.	nutlets	Knotgrass	-	9	-	-	1	-	-
Polygonum convolvulus L.	nutlets	Black bindweed	2	-	5	-	4	2	-
Polygonum sp.	nutlets		-	1	-	-	-	-	-
Rumex sp.	nutlets	Sorrel	1	2	1	1	-	-	-
Rumex acetosella agg.	nutlets	Sheep's sorrel	-	1	-	-	1	-	-
POLYPODIACEAE									
Pteridium aquilinium (L.) Kuhn	pinnules	Bracken	-	-	-	-	4	-	-

Taxa	*Component*	*Common name*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
PORTULACACEAE									
cf. *Montia fontana* subsp.*chondrosperma*	seeds	Blinks	1	1	-	-	-	-	-
RANUNCULACEAE									
Ranunculus acris/bulbosus/repens L.	achenes	Buttercup	-	1	-	-	-	-	-
ROSEACEAE									
Aphanes arvensis agg.	achenes	Parsely Piert	-	-	-	-	1	-	-
Prunus spinosa L.	seeds	Blackthorn, Sloe	-	-	1	-	+	-	+
RUBIACEAE									
Galium spp.	mericarps	bedstraw, cleavers	-	4	5	-	-	1	-
Galium cf. *aparine* L.	mericarps	cleavers	-	4	6	-	-	-	1
SCROPHULARIACEAE									
Veronica hederifolia L.	seeds	Ivy-leaved speedwell	-	2	-	-	-	-	-
SOLANACEAE									
Hyoscyamus niger L.	seeds	Henbane	-	1	-	-	-	-	-
UMBELLIFERAE									
Berula erecta (Huds.) Coville	mericarps	Narrow-leaved water parsnip	-	1	-	-	-	-	-
Daucus carota L.	mericarps	Wild carrot	-	1	-	-	-	-	-
URTICACEAE									
Urtica urens L.	achenes	Small nettle	-	2	-	-	-	-	-
VALERIANACEAE									
Valerianella dentata (L.) Poll	fruits	Corn salad	-	-	-	-	-	2	-
unidentified items			3	37	5	1	5	3	4
sample size (litres)			138	150	159	128	128	136	176
cereals and chaff / litre			.41	2.43	1.97	.26	.43	.84	.26
weeds / litre			.13	1.06	.33	.02	.33	.07	.04
total / litre			.54	3.49	2.3	.28	.76	.91	.30
total			75	524	365	36	97	124	53

KEY: +: 1 - 10 fragments; ++: 10-30 fragments.
Classification according to Clapham *et al.* (1962)

e) Charred plant remains from specific pre- and early Deposit layers and features

Key: G: gully; L: layer; LF: linear feature; PH: posthole; P: pit; +: 1-10 fragments.

Taxa	*Component*	*Common name*	*G 3626*	*G 3626*	*L*	*L*	*L*	*P 3704*	*P 3605*
		context	*3373*	*3374*	*355*	*443*	*480*	*3710*	*3716*
CEREALS									
Avena sp.	grain	Oats	-	-	-	1	-	-	-
Hordeum sp.	grain, twisted	Barley	-	-	-	1	-	1	1
Hordeum sp.,	grain, straight	Barley		-	-	-	-	1	
Hordeum sp.	grain, hulled straight	Barley	1	-	-	-	-	2	-
Hordeum sp.	grain, hulled twisted	Barley	-	-	-	-	-	-	1
Hordeum sp.	grain, hulled	Barley	-	-	-	6	-	-	-
Hordeum sp.	grain	Barley	9	-	4	3	-	6	7
cf. *Hordeum* sp.	grain	Barley	-	-	-	-	-	1	-
Hordeum sp.	rachis internodes	Barley	-	-	-	-	-	1	-
Triticum cf. *aestivum* s.l	grain	Bread Wheat	1	-	-	-	-	4	-
T. aestivum / dicoccum	grain	Bw/ Emmer	-	-	-	-	-	-	1
T. cf. *dicoccum*	grain	cf. Emmer	5	-	1	4+	2	-	3
T. dicoccum	glume bases	Emmer	15	-	-	-	-	2	1
T. dicoccum	spikelet forks	Emmer	1	-	-	-	-	-	-
T. dicoccum/ spelta	grain	Emmer/Spelt	3	-	-	2	-	1	1
T. dicoccum/ spelta	glume bases	Emmer/ Spelt	7	-	-	-	1	2	2
T. monococcum/ dicoccum	glume bases	Einkorn/Emmer	-	-	-	-	-	1	-
T. cf. *spelta*	grain	cf. Spelt	-	-	1	1	-	1	4
T. spelta	glume bases	Spelt	22	-	-	-	-	8	2
Triticum sp.	grain	Wheat	10+	-	5	3	-	9+	6
Triticum sp.	glume bases	Wheat	-	-	1	-	-	7	9
Triticum sp.	spikelet forks	Wheat	2	-	-	-	-	-	1
Triticum sp.	spikelet fork bases	Wheat	-	-	-	-	-	1	-
Triticum sp.	rachis internodes	Wheat	-	-	-	-	-	1	1
Triticum sp./ *Hordeum* sp.	grain	Wheat/ Barley	6+	-	-	4+	-	4+	3+
Triticum sp./ *Secale cereale*	grain	Wheat/ Rye	-	-	-	-	-	2	1
Cereal sp.	rachis fragments		-	-	-	-	-	1	-
Cereal sp.	grain		5+	1	3+	1	-	8+	1
cereals and chaff / litre			3.1	.08	-	-	-	.5	.7
WEEDS									
BORAGINACEAE									
Lithospermum arvense L.	nutlets	Corn gromwell	-	-	-	3	-	-	-

Taxa	*Component*	*Common name* *. context*	*G 3626* *3373*	*G 3626* *3374*	*L* *355*	*L* *443*	*L* *480*	*P 3704* *3710*	*P 3605* *3716*
CARYOPHYLLACEAE									
Myosoton aquaticum (L.) Moench	seeds	Water chickweed	-	-	-	-	-	-	1
CHENOPODIACEAE									
Chenopodium album L.	seeds	Fat hen	-	-	-	-	-	5	1
C. murale L.	seeds	Nettle-leaved goosefoot	-	-	-	2	-	-	-
Chenopodium sp.	seeds	Fat hen, goosefoot	2	-	-	-	-	-	-
CRUCIFERAE									
Brassica rapa ssp.*campestris* (L.) Clapham	seeds	Wild turnip	-	-	-	31	-	-	-
Brassica sp./ *Sinapis* sp.	seeds	turnip/rape/mustard	-	-	-	3	-	-	-
CYPERACEAE									
Carex spp.	nuts	Sedges	-	-	-	1	-	-	-
GRAMINEAE									
Avena / *Bromus* sp.	caryopses	Oats / brome	-	-	-	-	-	1	-
Bromus mollis agg / *secalinus*	grain	Brome	2	-	-	1	-	1	1
gen. et sp. indet.	caryopses	grass	4	-	2	-	-	1	2
LABIATAE									
gen. et sp. indet.	nutlets		1	-	-	-	-	-	-
LEGUMINOSAE									
Vicia sp./Lathyrus sp.	seeds	Vetch/Tare	4	1	-	-	-	1	-
POLYGONACEAE									
cf. *Polygonum convolvulus*	nutlets	Black bindweed	-	-	-	-	-	1	-
Polygonum convolvulus L.	nutlets	Black bindweed	-	-	-	-	-	1	-
Rumex sp.	nutlets	Sorrel	-	-	-	1	-	1	1
RANUNCULACEAE									
Ranunculus acris/bulbosus/repens L.	achenes	Buttercup	1	-	-	-	-	-	-
RUBIACEAE									
Galium spp.	mericarps	bedstraw, cleavers	1	-	-	-	-	1	-
cf. *Galium* sp.	mericarps	cf. bedstraw	-	-	-	-	-	1	-
SCROPHULARIACEAE									
Euphrasia sp. / Odontites verna (Bell.) Dum	seeds	Eyebright / red bartsia	2	-	-	-	-	-	-
SOLANACEAE									
Hyoscyamus niger L.	seeds	Henbane	-	-	-	1	-	-	-
unidentified items			8+	-	2	2+	-	4	6+
sample size (litres)			28	12	-	-	-	130	64
weeds / litre			.9	.08	-	-	-	.13	.09
total / litre			4	.16	-	-	-	.63	.79
total			112	2	19	71	2	82	51

Taxa	*Component*	*Common name*	*PH 363*	*PH*	*PH*	*PH*	*PH*	*PH 6*	*PH*	*PH*	*PH*
				3523	*3523*	*3523*	*3527*		*3530*	*3537*	*3537*
		context	*372*	*3564*	*3566*	*3573*	*3528*	*3529*	*3531*	*3550*	*3563*
CEREALS											
Avena sp.	grain	Oats .	-	-	-	1	-	-	-	-	-
Hordeum sp.	grain, twisted	Barley	1	-	-	-	-	-	-	-	-
Hordeum sp.,	grain, straight	Barley	1	-	3	-	2	-	-	-	-
Hordeum sp.	grain, hulled straight	Barley	1	-	1	-	-	3	-	-	-
Hordeum sp.	grain, hulled	Barley	2	-	-	1	-	-	-	-	-
Hordeum sp.	grain	Barley	14	1	2	1	6	7+	-	1	1
Hordeum sp.	rachis internodes	Barley	1	-	-	1	2	-	11	-	-
Triticum cf. *aestivum* s.l	grain	Bread Wheat	1	-	-	-	-	-	-	-	-
T. aestivum / dicoccum	grain	Bw/ Emmer	-	-	-	-	-	-	1	-	-
T. cf. *dicoccum*	grain	cf. Emmer	5	-	1	1	1+	3	2	-	-
T. cf. *dicoccum*	glume bases	cf. Emmer	-	-	-	-	-	-	-	1	-
T. dicoccum	glume bases	Emmer	34	-	1	2	8	-	-	-	-
T. dicoccum	spikelet forks	Emmer	1	-	1	-	-	-	3	-	-
T. dicoccum/ spelta	grain	Emmer/ Spelt	3	-	-	-	-	3	-	-	-
T. dicoccum/ spelta	glume bases	Emmer/ Spelt	1-	-	-	3	-	-	-	-	-
T. dicoccum/ spelta	spikelet forks	Emmer/ Spelt	3	-	-	-	1	1	-	-	-
T. monococcum/ dicoccum	glume bases	Einkorn/Emmer	3	-	-	-	-	1	-	-	-
T. monococcum/ dicoccum	spikelet forks	Einkorn/Emmer	-	-	-	-	-	1	-	-	-
T. cf. *spelta*	grain	cf. Spelt	3	-	-	-	-	-	3	-	-
T. spelta	glume bases	Spelt	22	-	1	-	29	2	18	-	-
T. spelta	spikelet forks	Spelt	-	-	-	-	2	-	-	-	-
Triticum sp.	grain	Wheat	16	1	2	1	5+	4	12	-	-
Triticum sp.	glume bases	Wheat	179	2	3	5	87	11	36	-	1
Triticum sp.	spikelet forks	Wheat	5	-	-	-	3	3	3	-	-
Triticum sp.	brittle rachis internodes	Wheat	2+	-	-	-	4	2	-	-	-
Triticum sp.	tough rachis internodes	Wheat	-	-	-	1	-	-	-	-	-
Triticum sp./ *Hordeum* sp.	grain	Wheat/ Barley	14	-	-	-	-	-	5	-	2+
Cereal sp.	grain		2+	2+	2+	4+	1	3+	29+	-	-
cereals and chaff / litre			20.18	1.5	.43	1.6	15.1	4.4	6.27	.28	.33
WEEDS											
BORAGINACEAE											
Lithospermum arvense L.	nutlets	Corn gromwell	-	1	1	2	-	-	-	-	-
CARYOPHYLLACEAE											
Stellaria media agg.	seeds	Chickweed	1	-	-	-	-	-	-	-	-

Taxa	*Component*	*Common name*	*PH 363*	*PH*	*PH*	*PH*	*PH*	*PH 6*	*PH*	*PH*	*PH*
				3523	*3523*	*3523*	*3527*		*3530*	*3537*	*3537*
		context	*372*	*3564*	*3566*	*3573*	*3528*	*3529*	*3531*	*3550*	*3563*
CHENOPODIACEAE											
Atriplex sp./ *Chenopodium* sp	seeds	Orache/fat hen	1	-	-	-	-	-	1	-	-
Chenopodium album L.	seeds	Fat hen	9	-	-	1	-	-	-	-	-
C. ficifolium Sm.	seeds	Fig-leaved goosefoot	1	-	-	-	-	-	-	-	-
Chenopodium sp.	seeds	Fat hen, goosefoot	1	-	-	1	-	-	-	-	-
COMPOSITAE											
Tripleurospermum maritimum (L.) Koch.	cypselas	Scentless mayweed	2	-	-	-	-	-	2	-	-
gen. et sp. indet.	cypselas		-	-	-	-	1	1	-	-	-
CORYLACEAE											
Corylus avellana L.	nutshell	Hazel	+	-	-	-	-	-	-	-	-
CRUCIFERAE											
Brassica rapa ssp.*campestris* (L.) Clapham	seeds	Wild turnip	25	-	-	-	-	-	1	-	-
Brassica sp./ *Sinapis* sp.	seeds	turnip/rape/mustard	4+	-	-	-	-	-	-	-	-
CYPERACEAE											
Carex spp.	nuts	Sedges	-	-	-	-	-	1	-	-	-
GRAMINEAE											
Bromus mollis agg / *secalinus*	grain	Brome	3	-	-	-	+	+	-	-	-
gen. et sp. indet.	caryopses	grass	1	-	-	1	1	-	5	-	-
LEGUMINOSAE											
Vicia sp./Lathyrus sp.	seeds	Vetch/Tare	6	1	-	-	2	4	3	-	-
PLANTAGINACEAE											
Plantago lanceolata L.	seeds	Ribwort plantain	-	-	-	-	-	-	1	-	-
POLYGONACEAE											
Polygonum aviculare agg.	nutlets	Knotgrass	-	-	1	-	-	-	-	-	-
Polygonum convolvulus L.	nutlets	Black bindweed	2	-	-	-	-	-	-	-	-
Polygonum sp.	nutlets		1	-	-	-	-	-	-	-	-
Rumex sp.	nutlets	Sorrel	-	-	-	1	1	-	-	-	-
Rumex acetosella agg.	nutlets	Sheep's sorrel	1	-	-	-	-	2	-	-	-
POLYPODIACEAE											
Pteridium aquilinium (L.) Kuhn	pinnules	Bracken	1	-	-	-		-	-	-	-
ROSEACEAE											
Prunus spinosa L.	endocarp	Blackthorn, Sloe	1	-	-	-	-	-	-	-	-
RUBIACEAE											
Galium spp.	mericarps	bedstraw, cleavers	-	1	-	-	-	1	-	-	-
Galium cf. *aparine* L.	mericarps	cleavers	3	-	1	-	-	-	1	-	-

Taxa	*Component*	*Common name*	*PH 363*	*PH*	*PH*	*PH*	*PH*	*PH 6*	*PH*	*PH*	*PH*
				3523	*3523*	*3523*	*3527*		*3530*	*3537*	*3537*
		context	*372*	*3564*	*3566*	*3573*	*3528*	*3529*	*3531*	*3550*	*3563*
SCROPHULARIACEAE											
Euphrasia sp. / *Odontites verna* (Bell.) Dum.	seeds	Eyebright / red bartsia	-	-	-	-	-	-	1	-	-
unidentified items			14+	4	8	4	7	8+	6+	-	-
sample size (litres)			16	4	7	13	10	10	18	7	12
weeds / litre			4.94	1.76	2.42	1.02	.6	1	.82	-	-
total / litre			25.12	3.25	2.86	2.08	15.7	5.4	7.1	.28	.33
total			402	13	20	27	150	54	128	2	4

Taxa	*Component*	*Common name*	*PH*	*PH*	*PH*	*PH*	*PH*	*PH*	*PH*	*PH*	*PH*
			3545	*3545*	*3545*	*3545*	*3553*	*3554*	*3554*	*3561*	*3628*
		context	*3547*	*3549*	*3555*	*3556*	*3557*	*3565*	*3575*	*3562*	*3630*
CEREALS											
Avena sp.	grain	Oats .	-	-	-	-	-	-	-	-	1
Hordeum sp.	grain, twisted	Barley	-	1	-	1	-	-	-	-	-
Hordeum sp.,	grain, straight	Barley	2	-	3	-	-	-	-	2	-
Hordeum sp.	grain, hulled straight	Barley	1	-	1	1	-	-	1	-	2
Hordeum sp.	grain, hulled twisted	Barley	-	-	-	-	-	-	-	-	1
Hordeum sp.	grain, hulled	Barley	-	-	2	1	1	-	-	-	-
Hordeum sp.	grain	Barley	1+	5	3	3+	1	-	1	-	10
Hordeum sp.	rachis internodes	Barley	1	1	-	-	-	-	-	-	-
T. cf. *dicoccum*	grain	cf. Emmer	-	1	3	-	1	-	-	2	1
T. dicoccum	glume bases	Emmer	-	-	-	2	-	-	1	1	2
T. dicoccum/ spelta	grain	Emmer/Spelt	-	-	2	1	-	-	-	-	-
T. dicoccum/ spelta	glume bases	Emmer/ Spelt	1	1	-	-	1	-	3	-	-
T. dicoccum/ spelta	spikelet forks	Emmer/ Spelt	1	-	-	-	-	-	-	-	2
T. monococcum/ dicoccum	glume bases	Einkorn/Emmer	-	1	-	-	-	-	-	1	-
T. cf. *spelta*	grain	cf. Spelt	-	1	1	1	-	-	-	-	-
T. spelta	glume bases	Spelt	-	2	1	3	1	1	5	1	2
T. spelta	spikelet forks	Spelt	-	-	-	-	-	-	-	-	2
Triticum sp.	grain	Wheat	2	7	1-+	-	1	2	4	1	20

Taxa	*Component*	*Common name*	*PH*	*PH*	*PH*	*PH*	*PH*	*PH*	*PH*	*PH*	*PH*
			3545	*3545*	*3545*	*3545*	*3553*	*3554*	*3554*	*3561*	*3628*
		context	*3547*	*3549*	*3555*	*3556*	*3557*	*3565*	*3575*	*3562*	*3630*
Triticum sp.	glume bases	Wheat	4	17	6	2	9	2	9	3	31
Triticum sp.	spikelet forks	Wheat	-	-	1	2	-	-	-	-	-
Triticum sp.	brittle rachis internodes	Wheat	-	-	-	-	-	-	-	-	1
Triticum sp.	tough rachis internodes	Wheat	-	1	-	-	-	-	-	-	-
Triticum sp./ *Hordeum* sp.	grain	Wheat/ Barley	5	-	3	2	-	+	2	1	-
Cereal sp.	grain		+	3+	6+	+	-	-	2+	1+	4+
cereals and chaff / litre			1.7	2.05	-	1.9	1.5	.83	1.12	6.5	2.96
WEEDS											
CHENOPODIACEAE											
Chenopodium album L.	seeds	Fat hen	-	-	-	1	-	-	-	-	-
COMPOSITAE											
Tripleurospermum maritimum (L.) Koch.	cypselas	Scentless mayweed	-	-	1	-	-	-	-	-	-
gen. et sp. indet.	cypselas		1	-	-	-	-	-	-	-	-
CORYLACEAE											
Corylus avellana L.	nutshell	Hazel	1	-	1	-	-	-	-	-	-
CYPERACEAE											
Carex spp.	nuts	Sedges	1	-	1	-	-	-	1	-	-
GRAMINEAE											
gen. et sp. indet.	caryopses	grass	1	2	2	2	1	-	-	-	1
grass/cereal	culm nodes	grass	-	-	-	-	-	-	-	-	1
LEGUMINOSAE											
Vicia sp./Lathyrus sp.	seeds	Vetch/Tare	-	5	2	-	-	-	1	-	1
PLANTAGINACEAE											
Plantago lanceolata L.	seeds	Ribwort plantain	-	1	-	-	-	-	-	-	-
POLYGONACEAE											
Polygonum sp.	nutlets		-	3	-	-	-	-	-	-	-
Rumex sp.	nutlets	Sorrel	1	-	-	-	1	-	-	-	2
Rumex acetosella agg.	nutlets	Sheep's sorrel	-	1	-	1	-	-	-	-	-
POLYPODIACEAE											
Pteridium aquilinium (L.) Kuhn	pinnules	Bracken	-	-	-	1	-	-	-	-	-

Taxa	*Component*	*Common name*	*PH 3545*	*PH 3545*	*PH 3545*	*PH 3545*	*PH 3553*	*PH 3554*	*PH 3554*	*PH 3561*	*PH 3628*
		context	*3547*	*3549*	*3555*	*3556*	*3557*	*3565*	*3575*	*3562*	*3630*
RUBIACEAE											
Galium spp.	mericarps	bedstraw, cleavers	-	1	-	-	1	-	-	-	-
Galium cf. *aparine* L.	mericarps	cleavers	1	-	-	-	-	-	-	-	1
SCROPHULARIACEAE											
Euphrasia sp. / *Odontites verna* (Bell.) Dum.	seeds	Eyebright / red bartsia	-	-	-	-	-	-	1	-	-
UMBELLIFERAE											
Berula erecta (huds.) Coville	carpels	Narrow-leaved water parsnip	1	-	-	-	-	-	-	-	-
VALERIANACEAE											
Valerianella dentata (L.) Poll	fruits	Corn salad	-	-	-	-	1	-	-	-	-
unidentified items			5	6+	1	4	-	-	3	4	3
sample size (litres)			9	20	-	10	10	6	25	4	30
weeds / litre			.75	.65	-	.9	.4	-	-	-	.3
total / litre			3.1	2.7	-	2.8	1.9	.83	1	7.5	3.26
total			23	54	40	28	19	5	6	30	98

Taxa	*Component*	*Common name*	*LF 235* 129	*LF 235* 218	*LF 235* 477	*PH 308* 309	*PH 310* 311	*PH 353* 354	*PH 339* 341	*PH 345* 349	*PH 362* 371
CEREALS											
Avena sp.	grain	Oats .	1	0	0	0	0	0	1	0	0
Avena sp.	floret base	Oats	1	0	0	0	0	0	0	0	0
Hordeum sp.,	grain, straight	Barley	9	2	2	0	0	0	0	1	0
Hordeum sp.	grain, hulled straight	Barley	39	1	3	0	0	0	0	1	0
Hordeum sp.	grain, hulled twisted	Barley	14	1	0	0	1	0	0	0	0
Hordeum sp.	grain, hulled	Barley	62	2	2	0	0	0	0	0	0
Hordeum sp.	grain	Barley	36+	12	13+	2	3+	0	4+	2	0
Hordeum sp.	rachis internodes	Barley	1	0	0	0	0	0	0	1	0
Triticum cf. *aestivum* s.l	grain	Bread Wheat	0	1	0	0	0	0	0	0	0
T. aestivum / dicoccum	grain	Bw/ Emmer	1	0	0	0	0	1	0	0	0
T. cf. *dicoccum*	grain	cf. Emmer	25	3	2+	1	0	0	0	0	0
T. dicoccum	glume bases	Emmer	32	0	0	2	1	1	6	1	0

Taxa	*Component*	*Common name*	*LF 235* 129	*LF 235* 218	*LF 235* 477	*PH 308* 309	*PH 310* 311	*PH 353* 354	*PH 339* 341	*PH 345* 349	*PH 362* 371
T. dicoccum	spikelet forks	Emmer	2	0	0	0	0	0	0	0	0
T. dicoccum/ spelta	grain	Emmer/Spelt	26	6	5	1	0	0	0	0	0
T. dicoccum/ spelta	glume bases	Emmer/ Spelt	27	3	1	0	0	2	19	1	0
T. dicoccum/ spelta	spikelet forks	Emmer/ Spelt	2	0	0	0	0	0	0	0	0
T. monococcum/ dicoccum	glume bases	Einkorn/Emmer	3	0	1	1	2	0	2	0	0
T. cf. *spelta*	grain	cf. Spelt	39	0	0	0	0	0	3	0	0
T. spelta	glume bases	Spelt	27	1	0	9	2	0	0	0	0
T. spelta	spikelet forks	Spelt	3	0	0	0	0	0	0	0	0
Triticum sp.	grain	Wheat	48	9+	5+	6	0	1	2	0	1
Triticum sp.	glume bases	Wheat	37	0	6	38	8	8	68	9	3
Triticum sp.	spikelet forks	Wheat	4	0	0	1	0	1	1	1	0
Triticum sp.	brittle rachis internodes	Wheat	1	0	0	0	0	0	2	0	0
Triticum sp./ *Hordeum* sp.	grain	Wheat/ Barley	5	1	0	0	0	0	2+	0	0
Triticum sp./ *Secale cereale*	grain	Wheat/ Rye	1	0	0	0	0	0	0	0	0
Cereal sp.	grain		28+	12+	5+	+	0	+	1+	3+	2+
cereals and chaff / litre			15.8	5.4	4.5	3.3	2.12	.54	5.1	1	.6
WEEDS											
BORAGINACEAE											
Lithospermum arvense L.	nutlets	Corn gromwell	0	0	0	0	1	0	0	0	0
CARYOPHYLLACEAE											
Spergula arvensis L.	seeds	Corn spurrey	1	0	0	0	0	0	0	0	0
Stellaria media agg.	seeds	Chickweed	9	0	5	0	0	0	0	0	0
CHENOPODIACEAE											
Atriplex sp.	seeds	Orache	2	1	0	0	0	0	0	0	0
Atriplex sp./ *Chenopodium* sp	seeds	Orache/fat hen	20	0	6	0	0	0	0	0	0
Chenopodium album L.	seeds	Fat hen	9	0	1	0	1	1	0	0	0
C. ficifolium Sm.	seeds	Fig-leaved goosefoot	2	0	0	0	0	0	0	0	0
Chenopodium sp.	seeds	Fat hen, goosefoot	9	3	3	0	1	0	0	0	0
COMPOSITAE											
Tripleurospermum maritimum (L.) Koch.	cypselas	Scentless mayweed	2	2	1	0	0	0	0	0	0
CORYLACEAE											
Corylus avellana L.	nutshell	Hazel	0	0	0	0	0	0	+	0	0

Taxa	*Component*	*Common name*	*LF 235* 129	*LF 235* 218	*LF 235* 477	*PH 308* 309	*PH 310* 311	*PH 353* 354	*PH 339* 341	*PH 345* 349	*PH 362* 371
CRUCIFERAE											
Brassica rapa ssp.*campestris* (L.) Clapham	seeds	Wild turnip	278	11	28	0	0	0	0	0	0
Brassica sp./ *Sinapis* sp.	seeds	turnip/rape/mustard	6	0	0	0	1	0	0	0	0
Capsella bursa-pastoris (L.) Medic.	seeds	Shepherd's purse	0	0	1	0	0	0	0	0	0
CYPERACEAE											
Carex spp.	nuts	Sedges	4	0	2	0	0	0	0	0	0
GRAMINEAE											
Arrhenatherum tuberosum (Gilib.) Shultz	bulbils	Onion couch	0	0	0	0	0	0	1	0	0
Avena / *Bromus*	caryopses	Oats/Brome	2	0	0	0	0	0	0	0	0
Bromus mollis agg / *secalinus*	grain	Brome	5+	7+	2+	0	0	1	1+	0	0
gen. et sp. indet.	caryopses	grass	5	4	3	0	0	0	0	0	0
grass/cereal	culm nodes	grass	2	0	0	0	0	0	1	0	0
LEGUMINOSAE											
Vicia sp./Lathyrus sp.	seeds	Vetch/Tare	21	1	2	2	3	1	6	0	1
gen. et sp. indet.	seeds		0	1	0	0	0	0	0	0	1
POLYGONACEAE											
Polygonum aviculare agg.	nutlets	Knotgrass	1	0	0	0	1	2	0	0	0
Polygonum convolvulus L.	nutlets	Black bindweed	4	0	1	0	0	0	0	0	0
P. lapathifolium / *L. nodosum* Pers.	nutlets	pale persicaria	11	0	0	0	0	0	0	0	0
Polygonum sp.	nutlets		10	0	0	0	0	0	0	0	0
Rumex acetosella	nutlets	Sheep's sorrel	0	0	0	0	0	1	0	0	0
Rumex sp.	nutlets	Sorrel	0	0	1	0	0	0	1	0	0
POLYPODIACEAE											
Pteridium aquilinium (L.) Kuhn	pinnules	Bracken	0	0	0	0	0	0	1	0	1
RANUNCULACEAE											
Ranunculus acris/bulbosus/repens L.	achenes	Buttercup	2	0	0	0	0	0	0	0	0
RUBIACEAE											
Galium spp.	mericarps	bedstraw, cleavers	2+	0	2+	2+	0	1	4+	0	0
Galium cf. *aparine* L.	mericarps	cleavers	1+	0	1	5	0	0	2	0	0

Taxa	*Component*	*Common name*	*LF 235* 129	*LF 235* 218	*LF 235* 477	*PH 308* 309	*PH 310* 311	*PH 353* 354	*PH 339* 341	*PH 345* 349	*PH 362* 371
SOLANACEAE											
Atropa bella-donna L./ *Hyoscyamus niger* L	seeds	Deadly night-shade/ Henbane	0	0	0	0	1	0	0	0	0
URTICACEAE											
Urtica dioica L.	achenes	Stinging nettle	0	0	0	0	0	1	0	0	0
VALERIANACEAE											
Valerianella dentata (L.) Poll	fruits	Corn salad	1	0	0	0	0	0	0	0	0
bud, indeterminate			0	0	0	0	1	0	0	0	0
unidentified items			61	0	10+	6	4	9+	8	0	0
sample size (litres)			30	10	10	19	8	28	22	20	10
weeds / litre			15.5	3.4	2.5	0.75	1.62	0.6	1.12	0	0.3
total / litre			31.3	8.4	7	4.05	3.75	1.14	6.23	1	0.9
total			940	84	70	77	30	32	137	20	9

Appendix 3: Pottery Fabric Descriptions, Decorative Motifs and Illustrated Sherds by Fabric Group *by Elaine L. Morris*

(Flint is angular in shape and calcined in nature and mica is muscovite, unless otherwise indicated; glauconite is altered to limonite in most examples)

Fabric group: Unusuals (UU)

FT01 slightly sandy clay matrix; moderate (10–20% concentration) poorly-sorted, angular pieces of white and pink granite rock, made of quartz and felspar, and glittering biotite mica, 0.5–5.0 mm across, in a slightly sandy clay matrix containing glauconite pellets

FT02 very soft and soapy, extremely loosely-structured clay matrix; very common (30–40%) poorly-sorted, rounded to subrounded inclusions including flint, limestone, and large quartz frags up to 3.5 mm across

Fabric group: Non-specific calcareous matter, limestones (LM)

FT12 glauconite pellet-bearing, sandy clay matrix; common (20–30%) extremely fine, and also a few extremely large pieces (up to 20.0 mm), of subangular to angular limestone which are usually a crystalline or calcite-like limestone but can also include pieces of sandy limestone, or very rarely some fossil shell; subrounded to rounded iron oxide fragments, up to 0.4 mm across, are also visible in rare (<3%) to sparse (3–10%) concentration

FT13 clay matrix; abundant (40–50%) calcareous and non-calcareous, usually angular, inclusions such as calcite and recrystallised forms of limestone, fossil shell, calcareous sandstone, flint, and fine sandstone with the majority of inclusions up to 3.0 mm across but rare pieces over 6.0 mm; the most common inclusion is the limestone

FT16 glauconite pellet-free, very sandy clay matrix; rare shell, up to 0.6 mm across; macroscopically similar to FT65 but petrologically similar to FT46; not likely to be a tempered fabric due to the paucity of shell, and possibly the identical size range of shell and quartz sand

FT17 glauconite pellet-bearing, micaceous, sandy clay matrix; rare to abundant subrounded to angular rock and limestone inclusions, poorly sorted, up to 4.5 mm across, identified as glauconite pellet-bearing calcareous sandstone, flint, and tufa; the proportions of each of these inclusions is highly variable but the tufa is always more common; glauconitic, calcareous sandstones are also found in FT14, in very rare instances

FT19 soapy and smooth, glauconite pellet-free, only very slightly sandy clay matrix; rare–sparse limestone, up to 1.0 mm across, and a sparse amount of rounded, fine textured grog up to 2.0 mm across

FT49 very slightly sandy clay matrix; common–abundant limestone including shell frags of coral and pieces of calcite up to 4.0 mm but usually 2.0 mm or less in size, also frequent pieces of iron oxides up to 2.5 mm across; the shell frags do not look at all like those in the FT40s series below

Fabric group: grog-tempered (GG)

FT14 the clay matrix is sandy and 18 of the 20 thin sectioned samples contain considerable amounts of glauconite as part of the sand component; angular pieces (up to 3.0 mm) of flint (rare–moderate amount), shell, and shelly limestone (rare-moderate amount), and one or more types of grog (sparse–very common) dominate this fabric type but rare pieces of fine, glauconite pellet-bearing, calcareous sandstone and tufa limestone typical of FT17, sandy limestone, and organic matter with cellular structure (a special variation of FT64) also occur; the types of grog (crushed pieces of pottery) include FT05, FT41, FT42, FT62, FT67 and FT88 in addition to types which are not part of this fabric series including non-glauconitic sandy fabrics

FT15 fine, glauconite pellet-bearing, sandy and micaceous clay matrix; grog-tempered grog, up to 2.0 mm across, in moderate concentration

Fabric group: micaceous (MC)

FT20 very fine, well-sorted, dense, homogeneous and very micaceous clay matrix ; medium–fine (0.4–0 1 mm) and silt-sized (0.1 mm or less) grains of quartz and pellets of glauconite

FT21 medium–fine and silt-sized grains of glauconite and quartz in a very micaceous clay matrix which also contains rare–moderate pieces of flint up to 3.0 mm across but usually 1.0 mm or less in size

FT23 medium-fine and silt-sized grains of glauconite and quartz in a micaceous clay matrix which

also contains a rare–sparse amount of subrounded to angular pieces of limestone or shell frags, up to 1.00 mm

Fabric group: flint-gritted (FL)

FT31 defined by presence of common–abundant poorly sorted flint, up to 6.0 mm across macroscopically; in thin section, a considerable amount of variability within this fabric type was identified by the occasional rare presence of limestone and grog inclusions – the former up to 0.6 mm and the latter up to 2.5 mm across – by the irregular nature of the sand component which could be sparse–common, with or without glauconite pellets, and have fine or medium–coarse (0.4–0.8 mm) quartz grains, and by the quantity of mica; macroscopically it would be extremely difficult, if not impossible, to differentiate sub-fabrics within this range

FT32 usually glauconite pellet-bearing sandy clay matrix; moderate–common poorly sorted flint, up to 3.0 mm across in thin section; the amount and size range of the quartz grains and glauconite pellets varies considerably from a fine range similar to FT20 to a fine–medium/coarse range similar to FT62 and an unusual example with mainly medium-sized grains; such a range of variation suggests a variety of sources

FT33 usually glauconite pellet-bearing, sandy clay matrix; sparse–moderate (6–20%) flint, up to 3.0 mm but usually <2.0 mm and numerous pieces of iron oxides which can range up to 3.0 mm (but are not always visible in unoxidised conditions); it is usually quite easy to differentiate between FT33 and either FT32 or FT31; the variation within the sand component is as irregular as for FT32, with rare pieces of unusually coarse quartz being present in two examples, which suggests a variety of sources

FT34 coarse, glauconite pellet-bearing, sandy clay matrix; sparse–moderate poorly sorted flint up to 5.0 mm across with the majority of frags <3.0 mm; sand component is usually dominated by medium–coarse grains (0.2–2.0 mm) which makes the feel of this fabric quite harsh; similar to FT37

FT36 abundantly and coarsely (up to 9.0 mm), flint-tempered, very micaceous and glauconite pellet-bearing, sandy clay matrix; this is a very rare fabric type

FT37 very coarse (grains up to 2.0 mm but usually 1.0 mm or less), glauconite pellet-bearing, sandy clay matrix; moderate poorly sorted flint, up to 5.0 mm across but usually <3.0 mm; rare pieces of limestone occur in <1% concentration (0.3 mm or less across); similar to FT34

FT38 moderately coarse, glauconite pellet-bearing, sandy clay matrix; sparse–moderate poorly-sorted flint, up to 4.0 mm across but usually <2.00 mm; this fabric is similar to FT34 and FT37

FT39 glauconite pellet-bearing, sandy and micaceous clay matrix; sparse moderately well-sorted flint, up to 2.2 mm across, and rare pieces of limestone, up to 0.3 mm; this is not a common fabric; could easily be FT63 or FT21 depending upon the size range of sand component

Fabric group: fossil shell (SH)

FT41 glauconite pellet-free, only slightly sandy clay matrix; common–very common crushed pieces of iron-rich fossil shell and fossiliferous, calcitic limestone rock, up to 5.0 mm across; one example contained abundant fossil shell and rock frags up to 20.0 mm across; the quantity of shell and paucity of quartz sand differentiate this fabric from FT42 macroscopically and the absence of glauconite pellets differentiate it petrologically; the most distinctive fossil shells include Ostrea, Ammonites, and foraminifera which indicate a Kimmeridge clay deposit as the likely source for this fabric which may be a naturally-gritted clay

FT42 sparse–very common iron-rich, fossil shell frags, up to 5.0 mm but usually 3.0 mm or less, in a glauconite pellet-bearing, sandy clay matrix; the range of shells is the same as those found in FT41; moderate–very common quartz and glauconite pellets in this fabric which differentiates it from FT41

FT45 glauconite pellet-free clay matrix; very common finely-textured, recrystallised limestone and moderate organic matter with linear and oval vesicles; the organic matter displays unusual cellular structure in thin section and as vesicles provide a very porous structure to this fabric; may be similar to FT64 plant cellular structure

FT46 usually glauconite pellet-free, very sandy clay matrix; moderate–very common fossil shell frags, usually 4.0 mm or less in size; the quartz grains are well-sorted in the medium–coarse range (0.2–0.5 mm); only very rare examples have any glauconite pellets or pieces of mica; the fossil shells are the same as for FT41 and FT42

FT47 glauconite pellet-bearing, sandy clay matrix;

moderate finely crushed, angular pieces of fossil shell, up to 1.5 mm but usually <0.6 mm

Fabric group: oolitic limestone (OL)

FT51 common–abundant angular pieces of iron-rich oolitic and shelly limestone rock, up to 4.0 mm, and comminuted rounded ooliths and angular shell with irregular pieces of limestone and calcite matrix in a glauconite pellet-free, hardly sandy clay matrix; this fabric does not feel sandy

FT52 distinctively sandy or harsh to touch; sparse–common calcareous inclusions in same range as FT51 but in a glauconite pellet-bearing, sandy clay matrix; the inclusions range up to 3.0 mm across and the sand grains are in moderate–common concentration and usually medium–coarse in size or finer and subrounded to angular

FT53 glauconite pellet-bearing, sandy clay matrix; rare–sparse comminuted ooliths, shell, and limestone from oolitic and shelly limestone rock, up to 1.5 mm across; the sand component is medium–coarse-grained or finer in texture (usually 0.6 mm or less) and subrounded to subangular with rare examples being rounded or angular

FT54 slightly glauconite pellet-bearing, sandy clay matrix; moderate–common (18–24%) rounded iron oxides, up to 4.0 mm across, sparse–moderate comminuted ooliths, shells, calcite, and limestone, up to 4.0 mm but usually less than 2.0 mm; the range of sand grains is either similar to FT53 above or has a majority of grains in the coarser range (0.2–0.5mm)

Fabric group: glauconite pellet-bearing sandy (GS)

FT61 very coarse, glauconite pellet-bearing sandy clay matrix which may have rare pieces of limestone, up to 0.4 mm across; the sand component is always coarse with the majority of pieces between 0.9–0.3mm or less with rare pieces up to 2.0 mm

FT62 glauconite pellet-bearing, sandy clay matrix; common–abundant angular/subangular to subrounded/rounded grains of quartz, usually up to 0.8 mm across (and rare larger grains up to 1.5 mm) but the majority of grains are 0.3 mm or less, and subrounded–rounded glauconite in a micaceous fabric; this fabric has infrequent, but occasionally large, rounded pieces of iron oxide, up to 1.0 mm across; the sand components in this fabric are better sorted than those in FT61 and are generally coarser than those in FT67; the fabric has far fewer iron oxide frags than in FT71; FT62 is identical to FT68, FT69 and FT75

FT63 glauconite pellet-bearing, sandy clay matrix; rare–sparse subangular–angular flint, usually 1.7 mm or less in size (with rare pieces up to 3.0 mm); the size and shape range of the quartz and glauconite pellets is the same as for FT62 –ie, rare examples up to 1.4 mm but usually 0.7 mm or less across with the majority 0.3 mm or less; the low concentration of flint and its general similarity in size to the sand components suggests that the flint is not added temper but a natural inclusion in the sand and clay matrix

FT65 glauconite pellet-bearing, sandy clay matrix; rare–sparse fossil shell, shelly limestone, and limestone frags usually <2.0 mm across; the range of sand components is similar to FT63

FT67 fine, glauconite pellet-bearing sandy and micaceous clay matrix; no additional inclusions; the well-sorted sand component consists of medium–fine and silt-sized quartz grains, measuring up to 0.6 mm but usually 0.2 mm or less, which are angular to subrounded/rounded with varying quantities of subrounded to rounded pellets of glauconite

FT68 glauconite pellet-bearing, sandy and micaceous clay matrix which usually contains the same range of sand grains as for FT62 but one of the four sampled sherds is very similar to FT20; it would probably be best to exclude this fabric type from the list in future and make all present examples equal to FT62

FT69 glauconite pellet-bearing, sandy clay matrix which was differentiated by the presence of slipped, burnished, and oxidised surfaces; the fabric is, from two thin sectioned samples, identical to either FT62 or FT67 with coarse–medium and finer grains of quartz or medium–fine grains, and also an abundance of glauconite pellets

FT71 glauconte pellet-bearing, sandy clay matrix; moderate–common subrounded–rounded pieces of iron oxide, usually 4.0 mm or less in size; the range of sand is similar to FT62, FT53, FT54 and others have angular to subrounded grains usually less than 0.6 mm across with the majority 0.3 mm or less, except for one example which has mainly medium-coarse grains (0.5–0.2 mm)

FT75 probably equal to FT62; a glauconite pellet-bearing, sandy clay matrix; common–very poorly-sorted to average-sorted angular to subrounded grains of quartz and glauconite, up to 0.8 mm across but usually 0.3 mm or less

FT78 coarse, glauconite pellet-bearing, sandy clay matrix; rare pieces of subangular flint, up to 1.8 mm and limestone up to 0.2 mm; there is a very common amount of quartz grains and glauconite pellets in the sand which ranges up to 1.1 mm with a majority of grains between 0.1–0.6 mm

Fabric group: calcite (CT)

FT05 glauconite pellet-bearing, sandy clay matrix; common poorly-sorted, angular calcite fragments 0.1–5.0 mm across

FT88 glauconite pellet-free clay matrix; abundant calcite in prismatic, comminuted and irregular form, up to 5.0 mm across; there is only a very rare amount of silt-sized quartz in the fabric

FT90 glauconite pellet-bearing, sandy fabric; sparse angular pieces of calcite, up to 4.0 mm across; the sand component is variable from moderate–very common and from simply fine and subangular to poorly sorted and medium–coarse to fine

Fabric group: organic-tempered (OR)

(See also FT45)

FT22 glauconite pellet-bearing, sandy and very micaceous clay matrix; rare–common organic matter or linear vesicles, up to 7.0 mm across but usually less than 3.0 mm; the quartz and glauconite grains are medium–fine to silt-sized; this is a porous version of the dense and homogeneous FT20

FT64 glauconite pellet-bearing, sandy clay matrix; rare–moderate –organic matter, linear vesicles, or ovoid vesicles, up to 4.0 mm across; the sand component is very similar to FT62 with common quartz and glauconite pellets, up to 0.9 mm across (coarse-grained) and the majority 0.3 mm or less (fine sand-silt sized); two of the five samples displayed a range of plant cell structure cross sections which were not identifiable by Carruthers (see FT45 for similar structures)

Fabric group: rare or irregular (IR)

FT81 glauconite pellet-bearing, sandy clay matrix; moderate angular flint, up to 2.2 mm and fossil shell, up to 2.5 mm; there is a common amount of poorly sorted quartz and a very small amount of glauconite as the sand component

FT82 unusual, soft and soapy feeling, glauconite pellet-free, hardly sandy fabric; moderate rregularly-shaped vesicles

FT84 unusual, very coarse sandy fabric with a bimodal quartz component: 10% large subrounded to rounded grains, 0.4–2.0 mm and 30% silt-sized, subrounded to angular grains, <0.1 mm; glauconite pellets are present only in the finer group and the clay matrix is very micaceous; there was a single piece each of calcite and limestone in the one sampled sherd; the finer sand and the mica content suggest that this part is FT23, while the larger grains are added temper

FT87 probably equals FT63; a glauconite pellet-bearing, sandy clay matrix; rare pieces of angular flint, 0.5–0.9 mm across, and limestone, c.1.4 mm; the sand consists of a very common amount of subrounded –subangular grains of quartz and glauconite up to 1.2 mm across, but usually <0.4 mm

FT91 glauconite pellet-free, only very slightly sandy clay matrix; sparse flint, up to 1.3 mm across and moderate shell, calcite, and shelly limestone, up to 4.0 mm; the quartz sand is well-sorted and fine, up to 0.3 mm only with the majority 0.1 mm or less and sparse in quantity

FT95 either large, angular pieces of quartz or flint in a glauconite pellet-free, sandy clay matrix; thin section did not include any of the non-calcareous inclusions so identification and density of concentration impossible to determine

FT96 glauconite pellet-bearing, sandy clay matrix; sparse sandy, micaceous, glauconite pellet-bearing limestone which is poorly-sorted, rounded–angular in shape and measures up to 4.0 mm across

FT99 glauconite pellet-bearing, sandy clay matrix; sparse calcareous fine sandstone, 0.5–1.4 mm and moderate subrounded pieces of slightly sandy, glauconite pellet-bearing limestone, up to 4.0 mm across; the latter is similar to FT96 inclusions

FT101 glauconite pellet-bearing, sandy clay matrix; common angular–subrounded flint, up to 2.5 mm and sparse amount of ooliths, up to 2.3 mm; the flint appears to be on inner half of the sherd (unoxidised) and the ooliths on the outer half (oxidised); the sand component is common and well sorted, subangular–angular in shape, with a majority of silt-sized grains

Romano-British Fabrics (RB)

FT06 sparse–moderate rounded, unusually fired (isotropic), black grog frags, up to 2.0 mm across, in a glauconitic sandy clay matrix

FT94 moderate–common rounded, black grog, up to 1.5 mm across in a glauconite pellet-free, sandy clay matrix

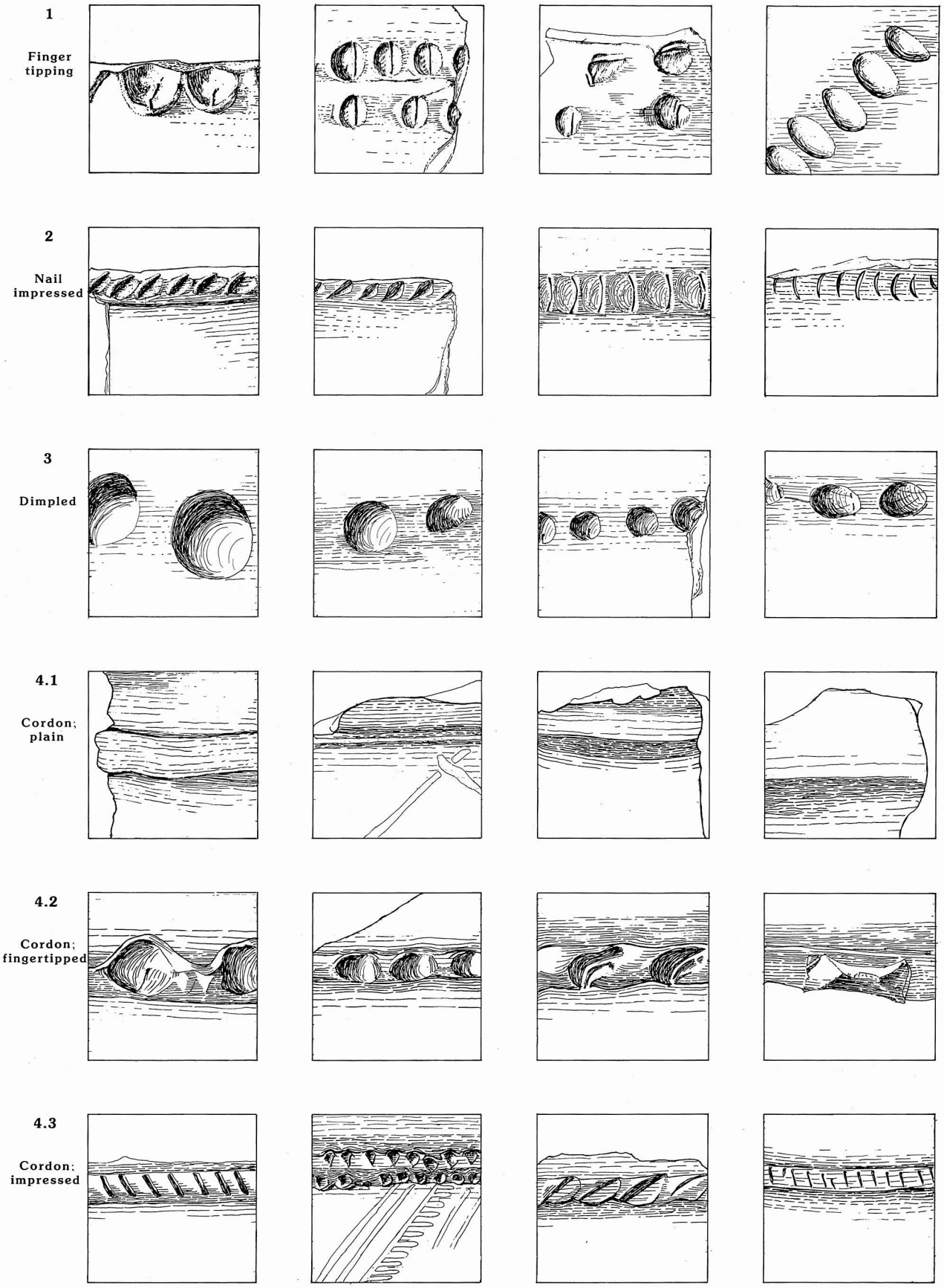


Fig. 102 Pottery: motif types 1–3, 4.1–4.3

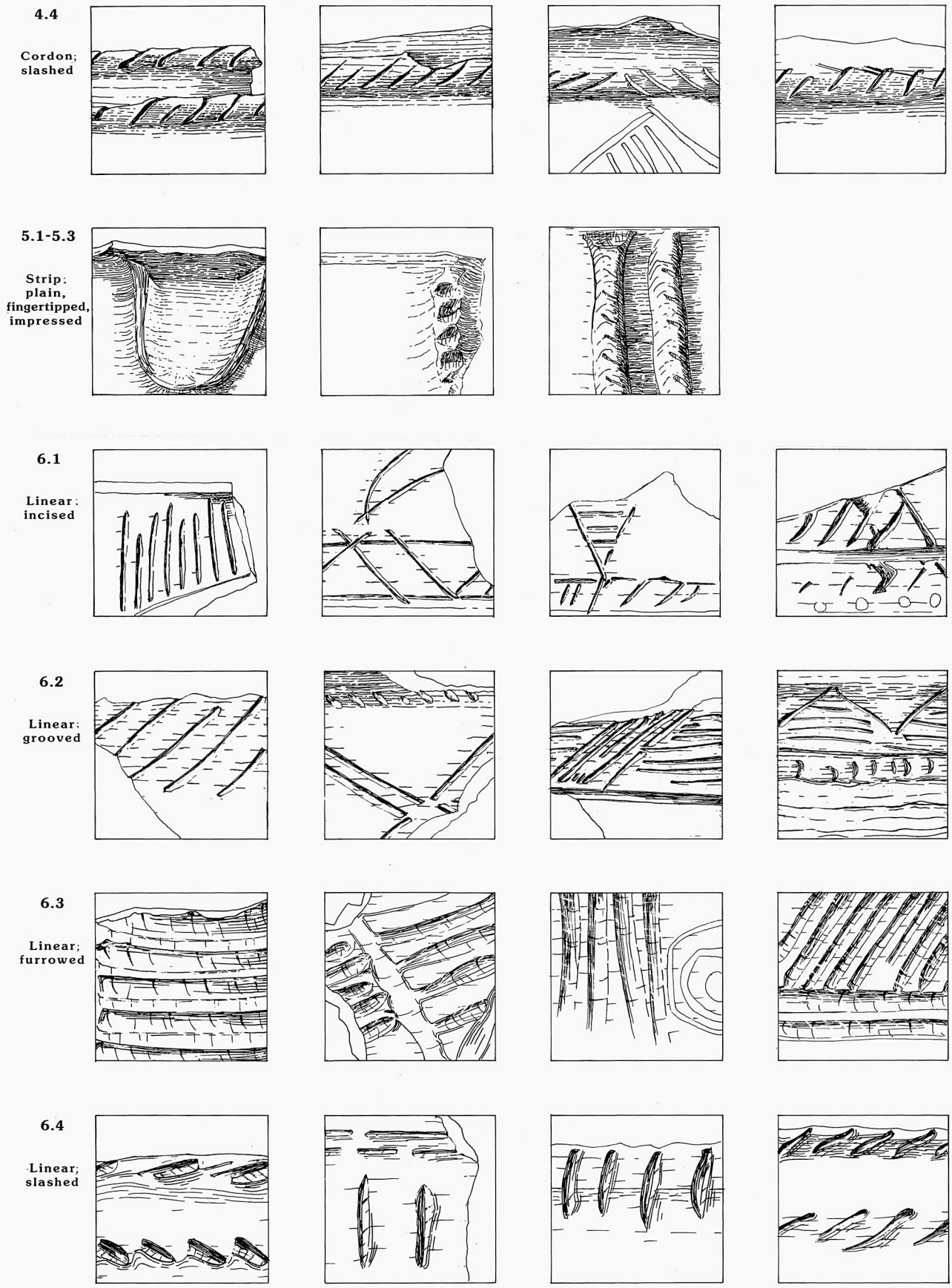


Fig. 103 Pottery: motif types 4.4, 5.1–5.3, 6.1–6.4

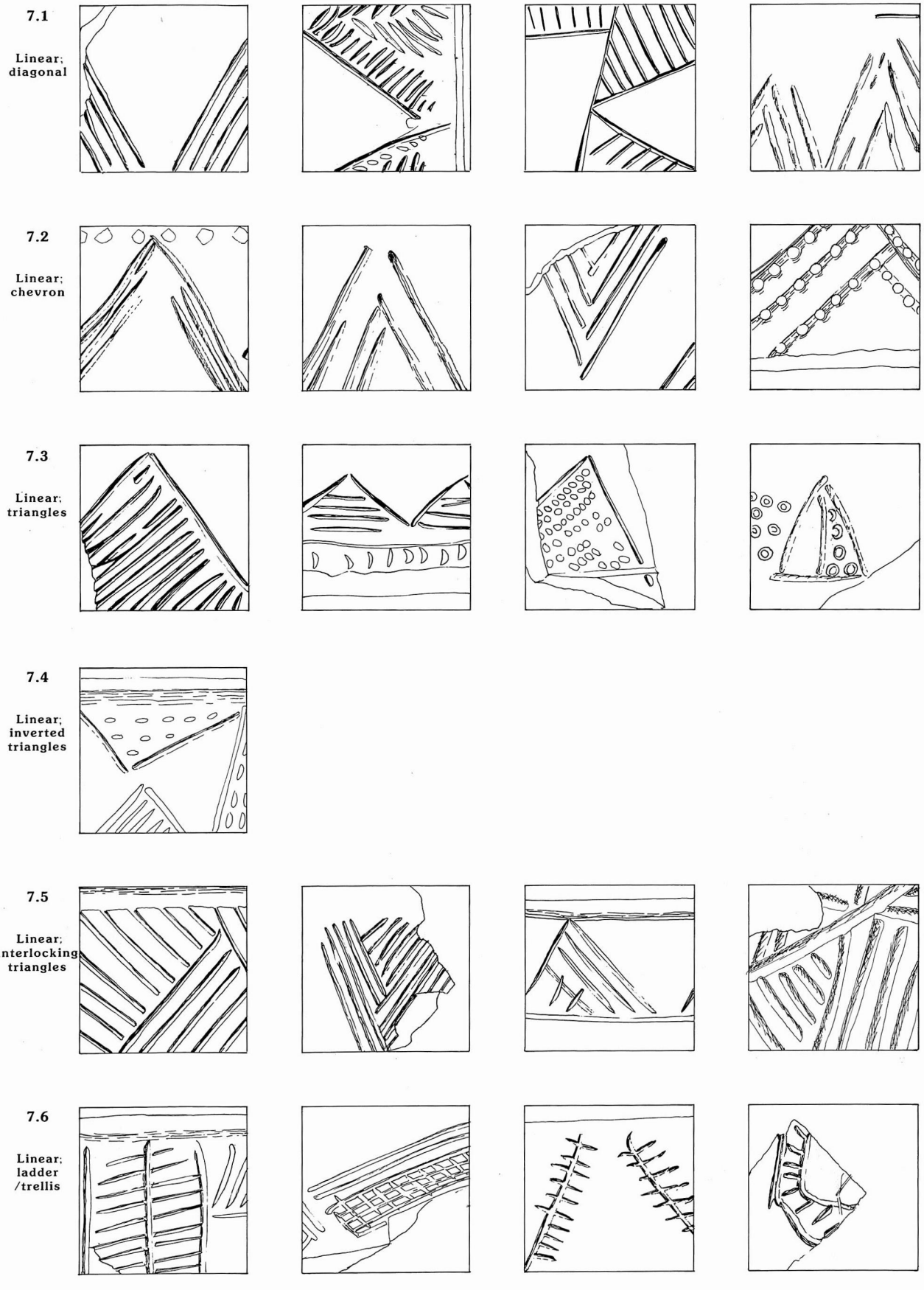


Fig. 104 Pottery: motif types 7.1–7.6

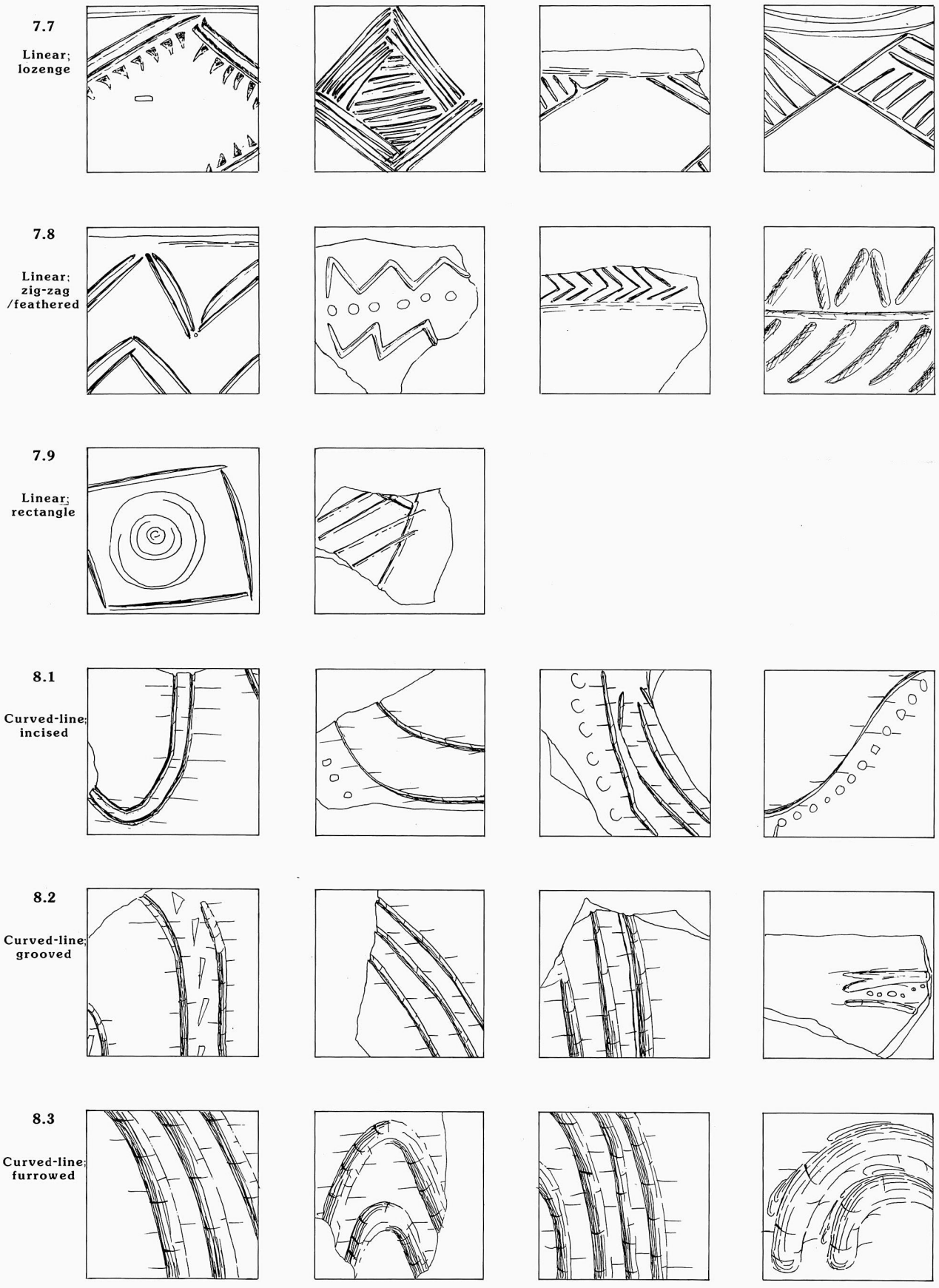


Fig. 105 Pottery: motif types 7.7–7.9, 8.1–8.3

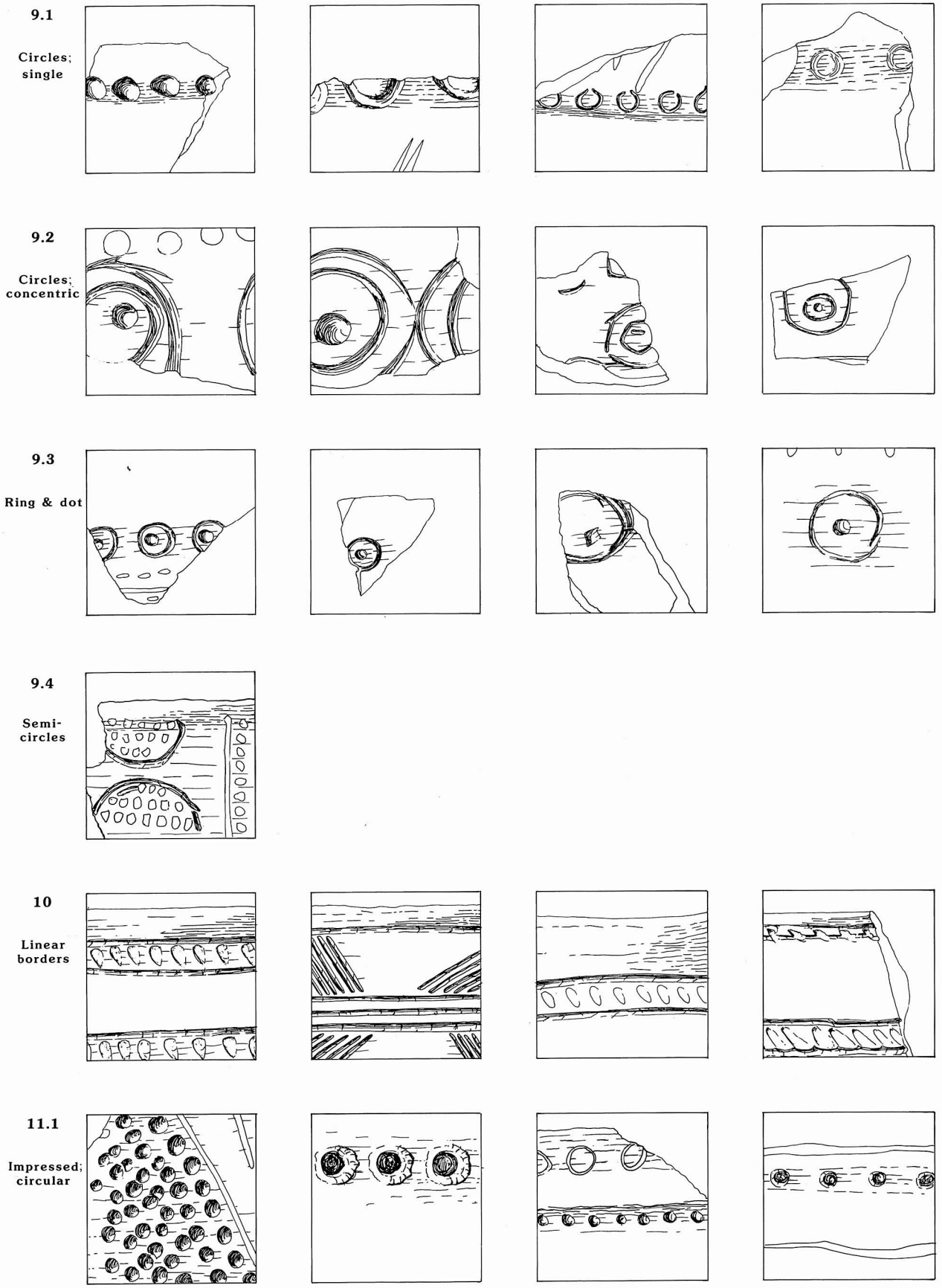


Fig. 106 Pottery: motif types 9.1–9.4, 10, 11.1

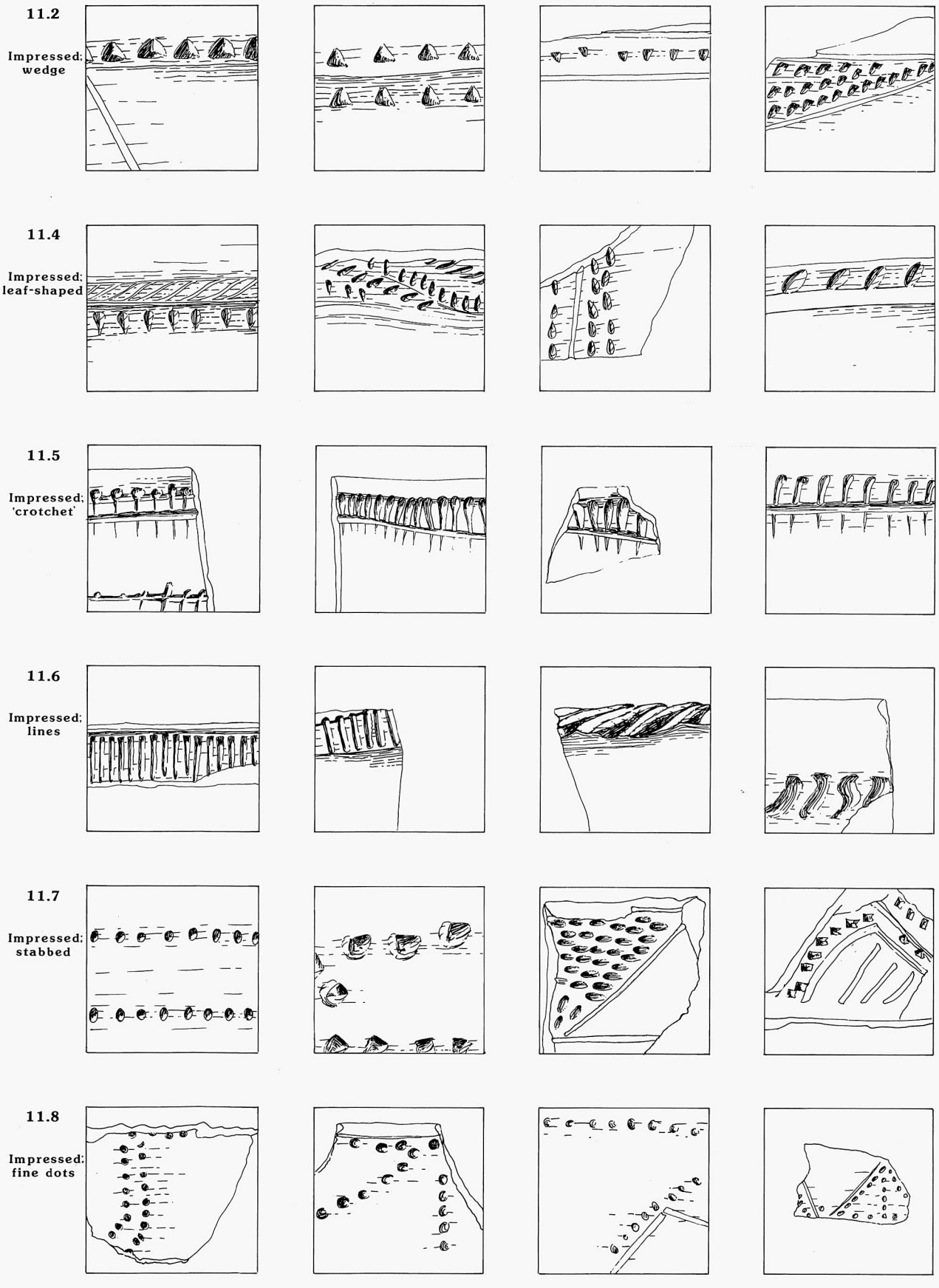


Fig. 107 Pottery: motif types 11.2, 11.4–11.8

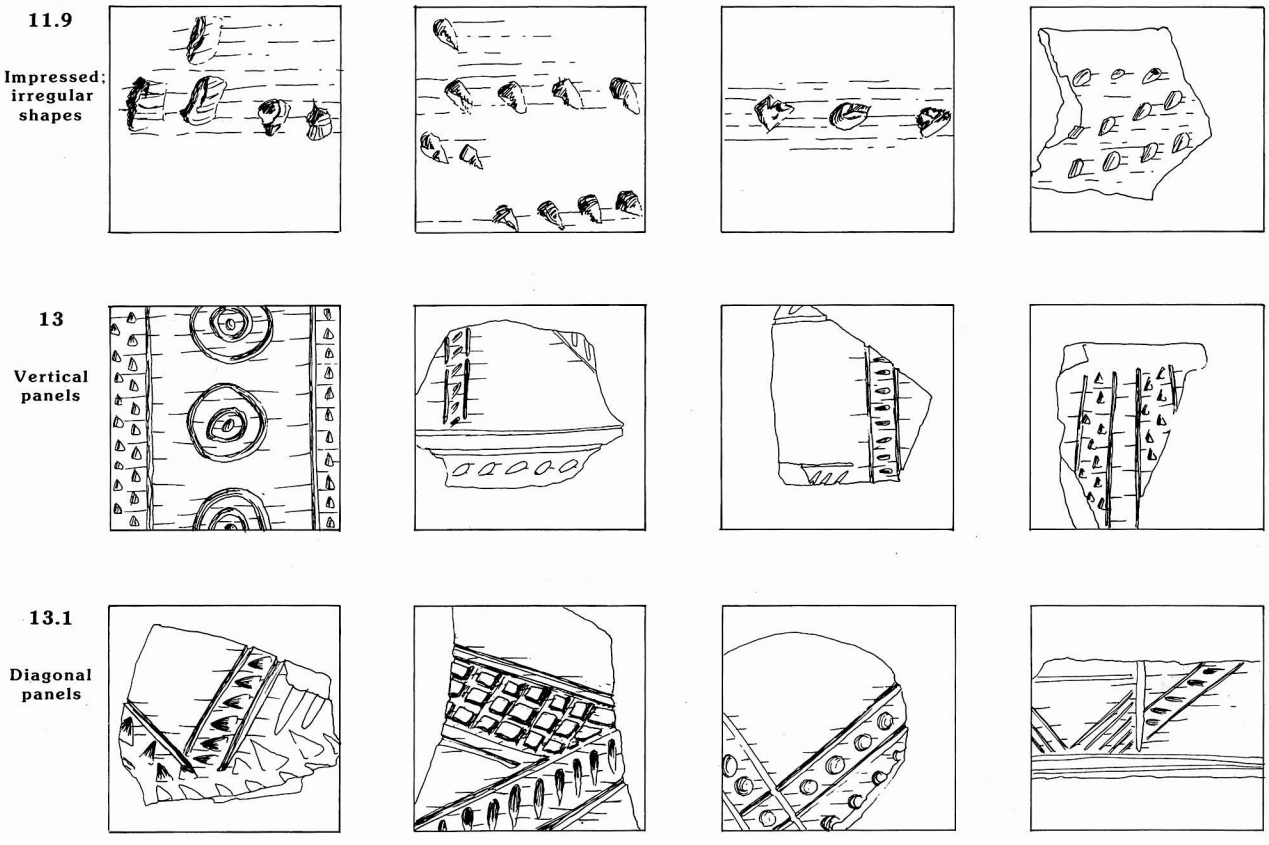


Fig. 108 Pottery: motif types 11.9, 13, 13.1

Illustrated Pottery by Fabric Group

Illust. no.	*Sherd no.*	*Motif*	*Context*	*Column*	*Zone*	*Terrace location*
Fabric Group: FL (flint).						
Fig. 109						
1	5968	1	2358	123	8	'OFF'
2	6677	1	2249	129	7	'ON'
3	8422	1.1	2597	36	9	'OFF'
4	4856	1.1	2994	97	11	'OFF'
5	1386	1.1	2540	16	9	'OFF'
6	6820	1.1	2503	125	9	'OFF'
7	7159	1.1	1847	145	5	'ON'
8	189	2	211 (1983)	-	-	-
9	1060	2	2367	102	8	'OFF'
10	7918	2	2385	22	8	'OFF'
11	3842	3	2013	87	6	'OFF'
12	367	3	2333	3	8	'OFF'
13	8933	4.1	2154	51	7	'OFF'
14	10040	4.2	2921	25	11	'OFF'
15	2658	4.2	2938	57	11	'OFF'
16	1392	4.2	2917	16	11	'OFF'
17	2099	4.2	2182	54	7	'OFF'
18	6010	4.2	2776	120	10	'OFF'
19	1608	4.2	2500	12	9	'OFF'
20	4673	6.4	2947	102	11	'OFF'
21	964	6.4	3104	46	11	'OFF'
22	1731	7.1	1763	34	5	'OFF'
Fabric Group: SH (fossil shell)						
Fig. 109						
23	380	1	2529	3	9	'OFF'
24	219	1	2138	1	7	'OFF'
25	154	1	81 (1983)	-	-	-
Fig. 110						
26	4020	1.1	2014	88	6	'OFF'
27	8417	4.1	2370	36	8	'OFF'
28	115	4.1	129 (1983)	-	-	-
29	10144	4.2	2806	61	10	'OFF'
30	1944	4.2	1937	33	6	'OFF'
31	1655	6.1	1809	32	5	'OFF'
32	3046	6.2	1921	67	6	'OFF'
33	3824	11.6	2417	86	8	'OFF'
Fabric Group: OL (oolitic limestone)						
Fig. 110						
34	2486	1	1802	57	5	'OFF'
35	1785	1	1605	35	4	'OFF'
36	499	2	1973	5	6	'OFF'
Fig. 110						
37	1439	3	2003	11	6	'OFF'
38	4676	4.2	3428	102	13	'OFF'
39	1014	4.2	2134	18	7	'OFF'
40	8539	6.1	1961	37	6	'OFF'
41	2464	6.1	1214	57	2	'OFF'
42	8794	6.3	1580	52	4	'OFF'
43	1937	6.4	1937	33	6	'OFF'
44	4689	6.4	1370	104	3	'OFF'
45	6880	6.4	1396	128	3	'ON'
46	7176	8.1	1420	143	3	'ON'
Fabric Group: GS (glauconitic sand)						
Fig. 111						
47	6697	1	1456	132	3	'ON'
48	2720	1	1426	63	3	'OFF'
49	10212	1	1782	82	5	'OFF'
50	502	1	1973	5	6	'OFF'
51	4329	1	2407	89	8	'OFF'
52	4629	1	2367	102	8	'OFF'
53	325	1	1711	3	5	'OFF'
54	6739	2	1393	136	3	'ON'
55	1418	2	1722	11	5	'OFF'
56	7719	2	2009	21	6	'OFF'
57	7737	2	2202	21	7	'OFF'
58	7671	2	1829	21	5	'OFF'
59	7762	2	2391	21	8	'OFF'
60	1591	3	2555	18	9	'OFF'
61	221	3	2138	1	7	'OFF'
62	8418	3	2370	36	8	'OFF'
63	916	4.1	1615	141	4	'ON'
64	2789	4.1	2181	63	7	'OFF'
65	8154	4.1	2601	26	9	'OFF'
66	1935	4.2	1937	33	6	'OFF'
67	6752	4.3	1393	136	3	'ON'
68	10016	4.3	2114	20	7	'OFF'
69	156	4.3	36 (1983)	-	-	-
70	2808	4.3	1776	64	5	'OFF'
71	609	5.1	2507	75	9	'OFF'
72	6055	6.1	1792	122	5	'OFF'
73	8065	6.1	1823	26	5	'OFF'
Fig. 112						
74	7575	6.1	1590	21	4	'OFF'
75	7284	6.2	1286	133	2	'ON'
76	10793	6.2	1567	113	4	'OFF'
77	246	6.2	2809	1	10	'OFF'
78	304	6.2	2126	2	7	'OFF'
79	6232	6.3	1329	125	3	'OFF'
80	5120	6.3	1257	115	2	'OFF'
81	9029	6.3	1755	52	5	'OFF'

Illust. no.	*Sherd no.*	*Motif*	*Context*	*Column*	*Zone*	*Terrace location*
Fig. 112						
82	8050	6.3	1833	26	5	'OFF'
83	8238	6.3	1820	27	5	'OFF'
84	237	6.3	2347	1	8	'OFF'
85	8096	6.3	1823	26	5	'OFF'
86	2567	6.4	2607	56	9	'OFF'
87	961	6.4	2597	36	9	'OFF'
88	2602	6.4	1955	57	6	'OFF'
89	8298	6.4	2002	27	6	'OFF'
90	7820	6.4	1827	22	5	'OFF'
91	293	7.1	2339	2	8	'OFF'
92	3649	7.1	2147	83	7	'OFF'
93	2310	7.1	1543	45	4	'OFF'
94	2326	7.1	1904	45	6	'OFF'
95	9054	7.1	1918	52	6	'OFF'
96	1947	7.1	1937	33	6	'OFF'
97	3217	7.1	1599	73	4	'OFF'
98	5584	7.1	1962	114	6	'OFF'
99	9075	7.1	2124	52	7	'OFF'
100	673	7.2	2417	86	8	'OFF'
101	8563	7.2	2173	37	7	'OFF'
Fig. 113						
102	10029	7.3	2162	23	7	'OFF'
103	7874	7.3	2012	22	6	'OFF'
104	10176	7.3	1554	71	4	'OFF'
105	4328	7.5	2407	89	8	'OFF'
106	10264	7.5	1645	108	4	'OFF'
107	161	7.7	124 (1983)	-	-	-
108	6175	7.7	1946	124	6	'OFF'
109	10123	7.8	1372	58	3	'OFF'
110	10081	7.8	2204	39	7	'OFF'
111	6297	7.8	2150	125	7	'OFF'
112	801	7.9	1755	52	5	'OFF'
113	10075	8.1	1976	39	6	'OFF'
114	10108	8.1	1824	48	5	'OFF'
115	147	8.1	78 (1983)	-	-	-
116	1168	8.1	1813	10	6	'OFF'
117	214	8.2	1729	2	5	'OFF'
118	671	8.2	1988	17	6	'OFF'
119	1018	8.2	1820	27	5	'OFF'
120	8126	8.2	2197	26	7	'OFF'
121	6174	8.2	1946	124	6	'OFF'
122	8558	8.3	2173	37	7	'OFF'
123	4206	8.3	1251	89	2	'OFF'
124	10671/ 10616	8.3	1771/ 1603	43/43	5/4	'OFF'
125	5346	8.3	1567	113	4	'OFF'
Fig. 114						
126	10125	9.1	1783	58	5	'OFF'

Illust. no.	*Sherd no.*	*Motif*	*Context*	*Column*	*Zone*	*Terrace location*
Fig. 114						
127	1875	9.2	1734	44	5	'OFF'
128	4697	9.2	1528	104	4	'OFF'
129	1526	9.2	2190	17	7	'OFF'
130	686	9.2	1343	105	3	'OFF'
131	10056	9.2	1926	30	6	'OFF'
132	8396	9.3	1966	36	6	'OFF'
133	1605	9.3	2314	12	8	'OFF'
134	5693	9.3	1259	117	2	'OFF'
135	5053	9.3	2120	103	7	'OFF'
136	3552	9.3	1749	84	5	'OFF'
137	7876	9.3	2012	22	6	'OFF'
138	6048	9.3	1527	122	4	'OFF'
139	8118/ 4825/ 2502	9.3	2006/ 1842/ 1744	26/97/ 56	6/5/ 5	'OFF'
140	5035	9.3	1929	103	6	'OFF'
141	7894	10	2199	22	7	'OFF'
142	8919	10	1938	51	6	'OFF'
143	2775	10	1989	63	6	'OFF'
144	2956	10	2145	66	7	'OFF'
145	167	10	127 (1983)	-	-	-
146	3728	10	2132	85	7	'OFF'
147	8341	10	2378	27	8	'OFF'
148	10656	10	1955	57	6	'OFF'
149	5167	10	1940	115	6	'OFF'
150	1513	10	2190	17	7	'OFF'
151	5765	10	1731	120	5	'OFF'
152	1010	11.1	2136	19	7	'OFF'
153	8546	11.1	1961	37	6	'OFF'
154	8117	11.1	2006	26	6	'OFF'
155	10006	11.1	2135	13	7	'OFF'
156	10014	11.1	1944	20	6	'OFF'
157	1767	11.1	1373	35	3	'OFF'
158	6294	11.2	2150	125	7	'OFF'
159	4281	11.2	1815	89	5	'OFF'
160	6034	11.2	1339	122	3	'OFF'
161	5827	11.2	1426	119	3	INT
162	1737/ 10121	11.2	1763/ 2179	34/50	5/7	'OFF'
Fig. 115						
163	712	11.2	1962/ 1956	114/93	6/6	'OFF'
164	6257	11.2	1787	125	5	'OFF'
165	6734	11.2	1269	136	2	'ON'
166	6779	11.2	1836	136	5	'ON'
167	8938	11.4	2154	51	7	'OFF'
168	1554	11.4	1535	18	4	'OFF'
169	8671	11.4	2123	46	7	'OFF'
170	7878	11.4	2012	22	6	'OFF'
171	4812	11.4	1646	97	4	'OFF'

Illust. no.	*Sherd no.*	*Motif*	*Context*	*Column*	*Zone*	*Terrace location*
172	2824	11.4	1977	64	6	'OFF'
173	1474	11.4	2723	11	10	'OFF'
174	3061	11.4	2189	67	7	'OFF'
175	6295	11.4	2150	125	7	'OFF'
176	1298	11.4	2180	12	7	'OFF'
177	2600	11.4	1955	57	6	'OFF'
178	10129	11.5	2200	58	7	'OFF'
179	3651	11.5	2147	83	7	'OFF'
180	9315	11.5	1821	131	5	'ON'
181	8426	11.6	2597	36	9	'OFF'
182	3253	11.6	2160	73	7	'OFF'
183	3654	11.6	2147	83	7	'OFF'
184	3192	11.7	2140	75	7	'OFF'
185	8270	11.7	2002	27	6	'OFF'
186	1742	11.7	1945	34	6	'OFF'
187	10046	11.7	2152	28	7	'OFF'
188	8239	11.7	1820	27	5	'OFF'
189	9059	11.7	1918	52	6	'OFF'
190	1176	11.7	2122	10	7	'OFF'
191	1575	11.7	2134	18	7	'OFF'
192	10672	11.7	1900	65	6	'OFF'
193	5272	11.8	2218	107	7	INT
194	2167	11.8	1975	19	6	'OFF'
195	2641	11.9	2608	57	9	'OFF'
196	8545	11.9	1961	37	6	'OFF'
197	5851	11.9	2404	47	8	'OFF'
198	10032/37	11.9	2348	23	8	'OFF'
199	6577	11.9	1849	141	5	'ON'
200	5961	13	2149	123	7	'OFF'
201	1943	13	1937	33	6	'OFF'
202	6173	13	1946	124	6	'OFF'
203	5168	13	1940	115	6	'OFF'
204	10162	13	2195	68	7	'OFF'
Fig. 116						
205	4301	13.1	2004 (s546)	89	6	'OFF'
206	8811	13.1	2198	47	7	'OFF'
207	6719	13.1	1850	132	5	'ON'
208	7675	13.1	1829	21	5	'OFF'
209	5227	13.1	2101	105	7	'OFF'
210	6165	13.1	1799	124	5	'OFF'
211	7655	13.1	1829	21	5	'OFF'
212	10034	1	1779	25	5	'OFF'
213	10033	1	2553	23	9	'OFF'
214	10084	1	1633	40	4	'OFF'
215	173	2	75 (1983)	-	-	-
216	10518	2	2977	7	11	'OFF'
217	1699	2	1603	43	4	'OFF'
218	5949	4.3	1934	123	6	'OFF'
219	114	6.1	260 (1983)	-	-	-
220	6290	6.1	2150	125	7	'OFF'
221	10036	6.1	2109	25	7	'OFF'
222	1793	6.2	1605	35	4	'OFF'
223	1977	6.2	1386	19	3	'OFF'
224	4783	6.3	1541	103	4	'OFF'
225	10048	6.4	1770	29	5	'OFF'
226	10037	6.4	2109	25	7	'OFF'
227	1786	6.4	11605	35	4	'OFF'
228	8102	7.1	2006	26	6	'OFF'
229	2773	7.1	1786	63	5	'OFF'
230	7396	7.1	1412	135	3	'ON'
231	2603	7.2	1955	57	6	'OFF'
232	2351	7.2	1404	55	3	'OFF'
233	730	7.2	2513	11	9	'OFF'
234	182	7.7	76 (1983)	-	-	-
235	171	7.8	127 (1983)	-	-	-
236	150	7.8	36 (1983)	-	-	-
Fig. 117						
237	5564	8.1	1807	114	5	'OFF'
238	168	9.1	124 (1983)	-	-	-
239	3244	9.1	1984	73	6	'OFF'
240	4435	9.3	1454	96	3	INT
241	7661	9.3	1829	21	5	'OFF'
242	8544	9.3	1961	37	6	'OFF'
243	5151	11.1	1804	115	5	'OFF'
244	7171	11.2	1420	143	3	'ON'
246	2085	11.4	1778	54	5	'OFF'
245	3168	11.4	1740	75	5	'OFF'
247	5030	11.6	1929	103	6	'OFF'
248	8904	11.6	1780	51	5	'OFF'
249	2571	11.7	2607	56	9	'OFF'
250	802	11.7	1778	54	5	'OFF'
251	389	11.8	2534	1	9	'OFF'
252	4761	11.8	1238	103	2	'OFF'
253	7400	11.8	1412	135	3	'ON'
254	1828	7.1	2301	35	8	'OFF'
255	3923	7.5	1430	88	3	'OFF'
256	5768	11.6	1731	120	5	'OFF'
257	1147	11.7	1519	10	4	'OFF'
258	1743	11.7	1945	34	6	'OFF'
259	8763	11.8	2123	46	7	'OFF'
Fabric Group: UU (uncommon)						
Fig. 117						
260	8596	1	2722	37	10	'OFF'

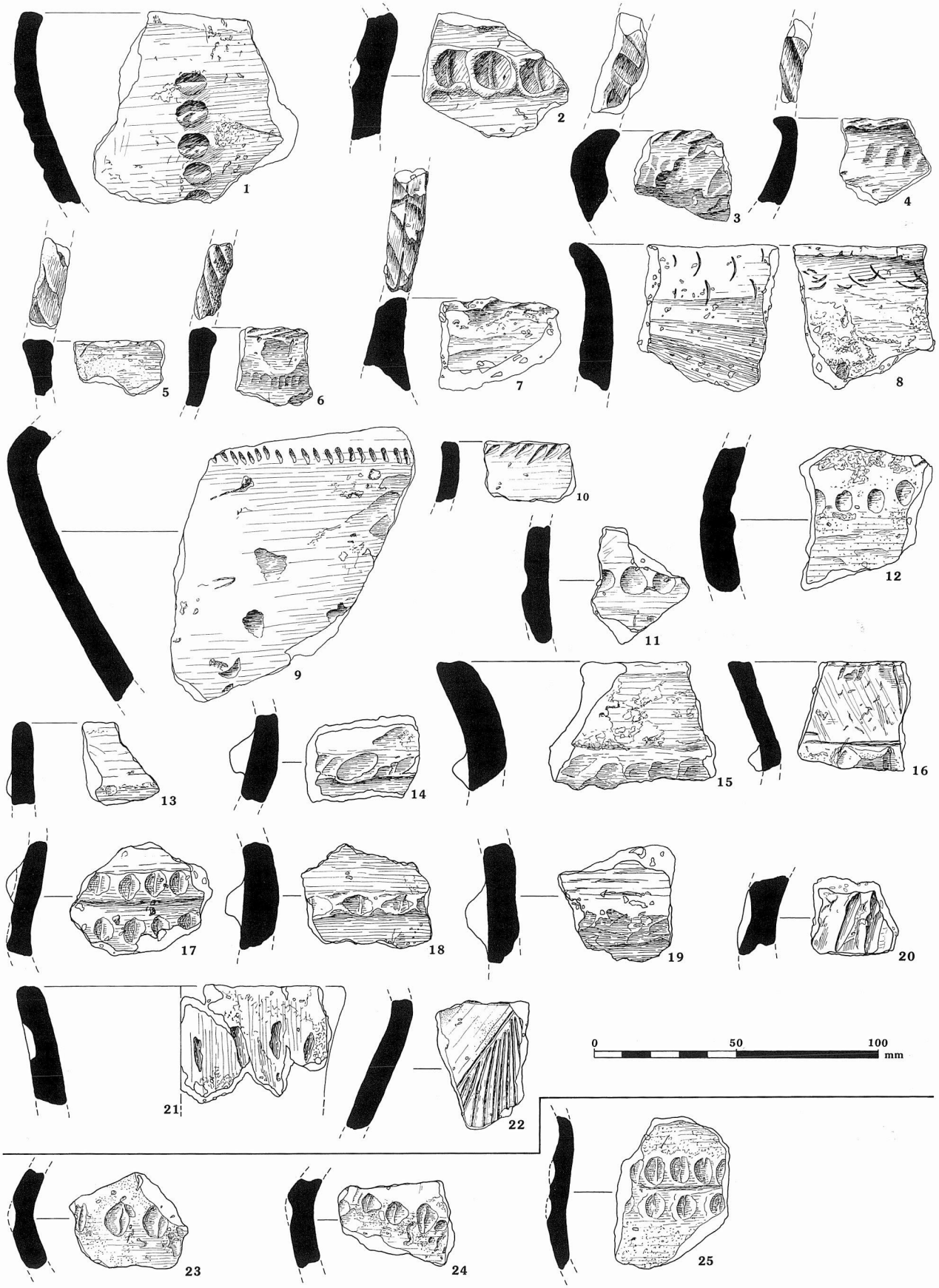


Fig. 109 Pottery: fabric groups: flint (FL), 1–22; fossil shell (SH), 23–5. Scale 1:2

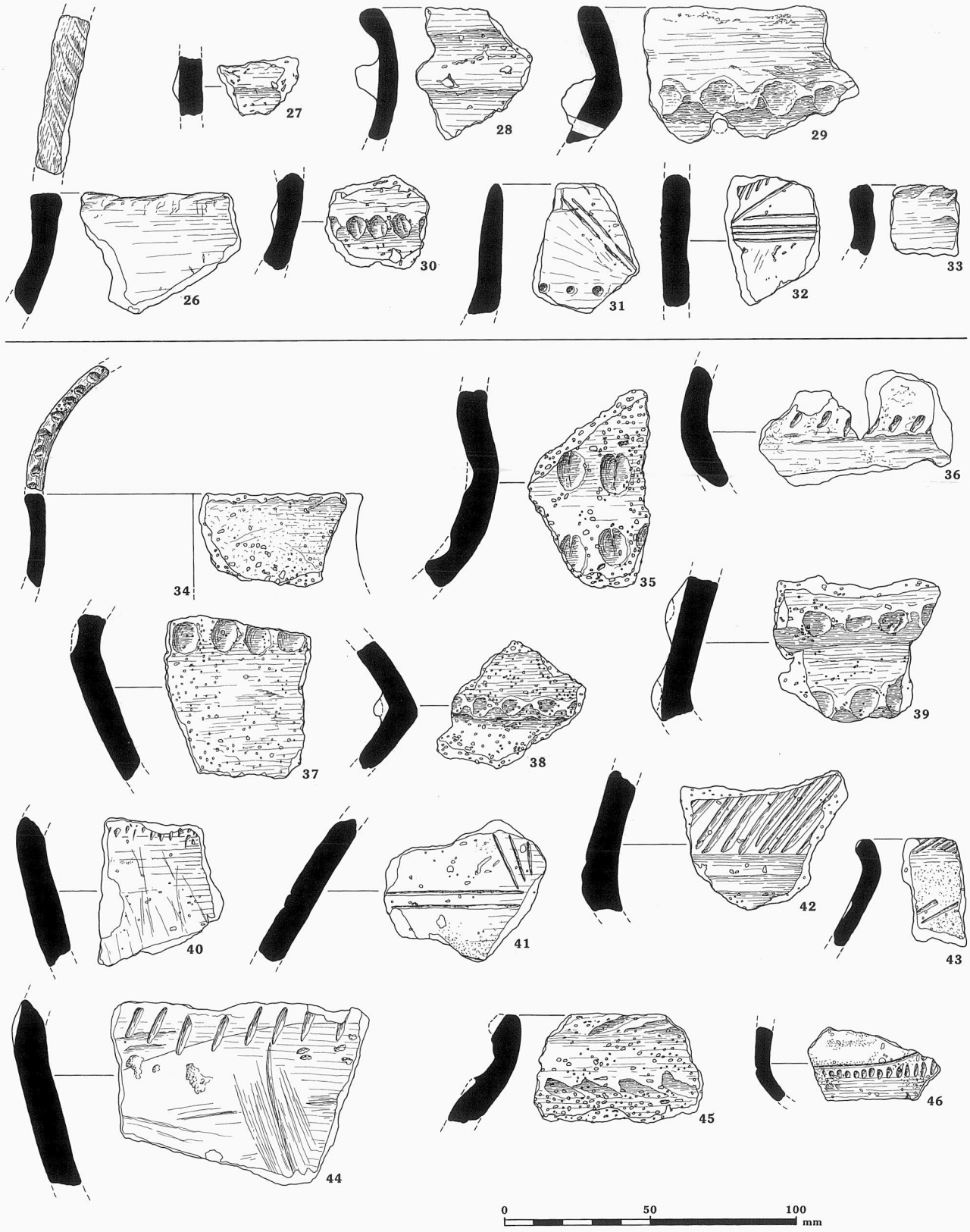


Fig. 110 Pottery: fossil shell (SH), 26–33; oolitic limestone (OL), 34–46. Scale 1:2

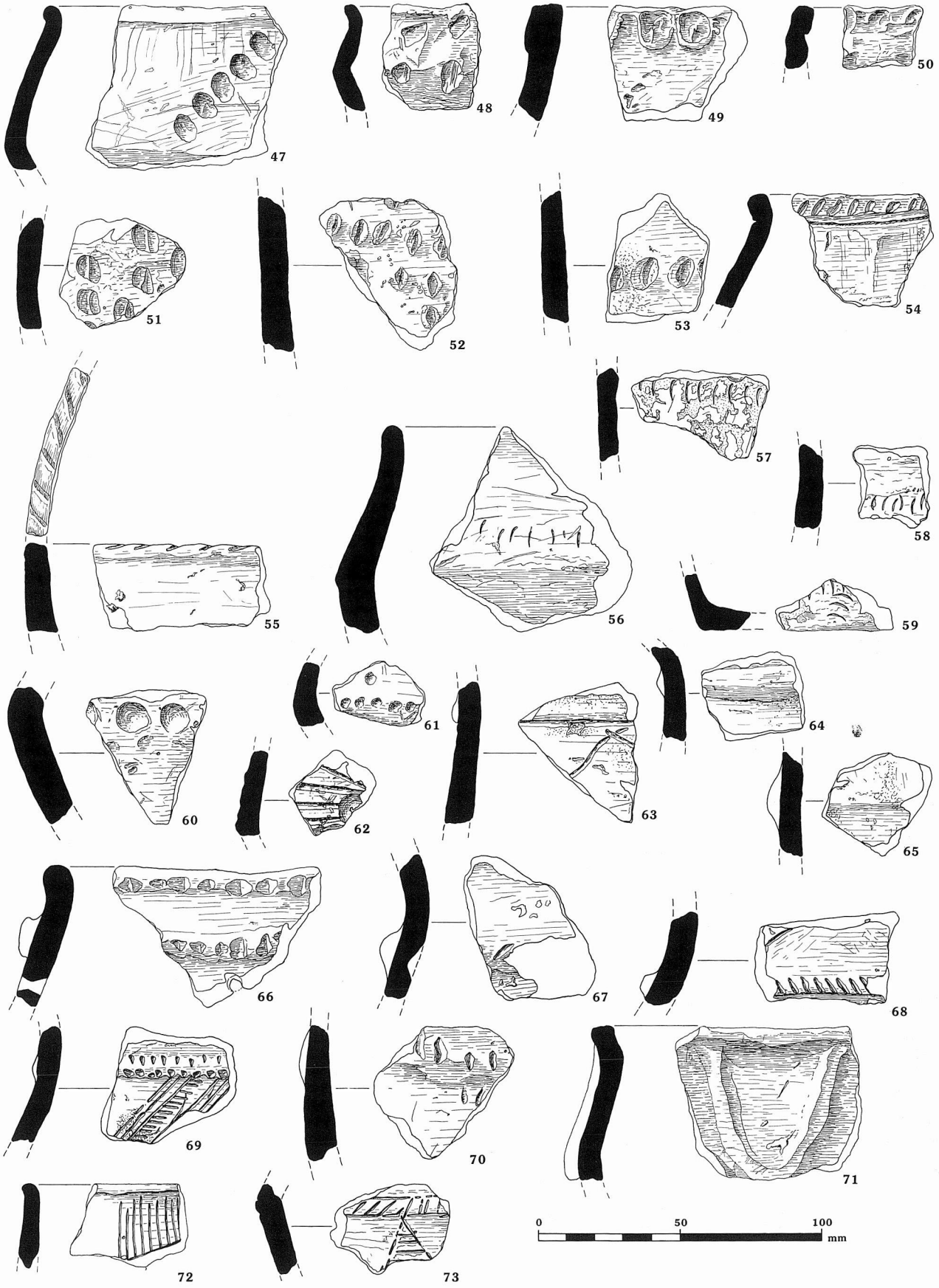


Fig. 111 Pottery: glauconitic sand (GS), 47–73. Scale 1:2

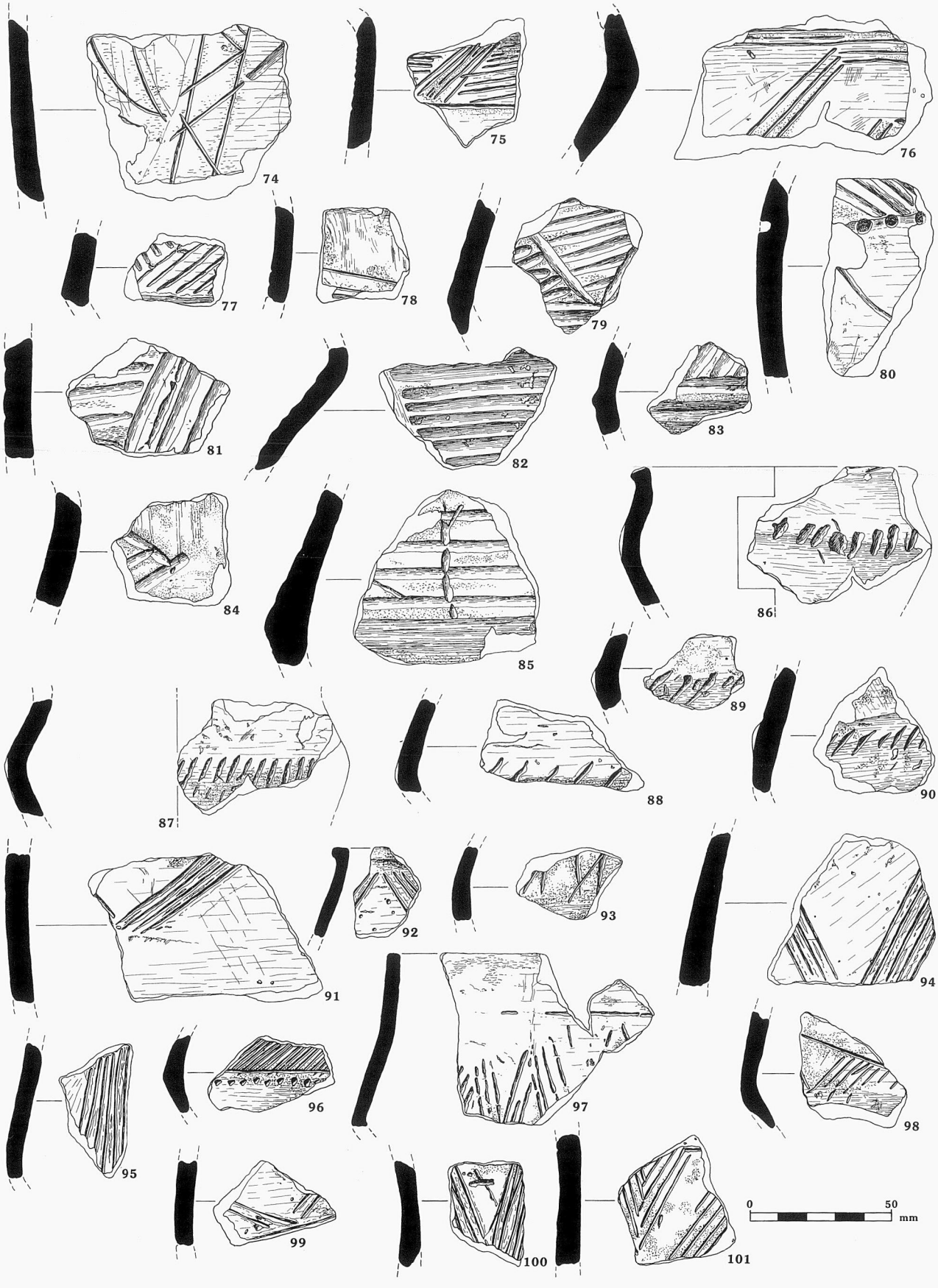


Fig. 112 Pottery: glauconitic sand (GS), 74–101. Scale 1:2

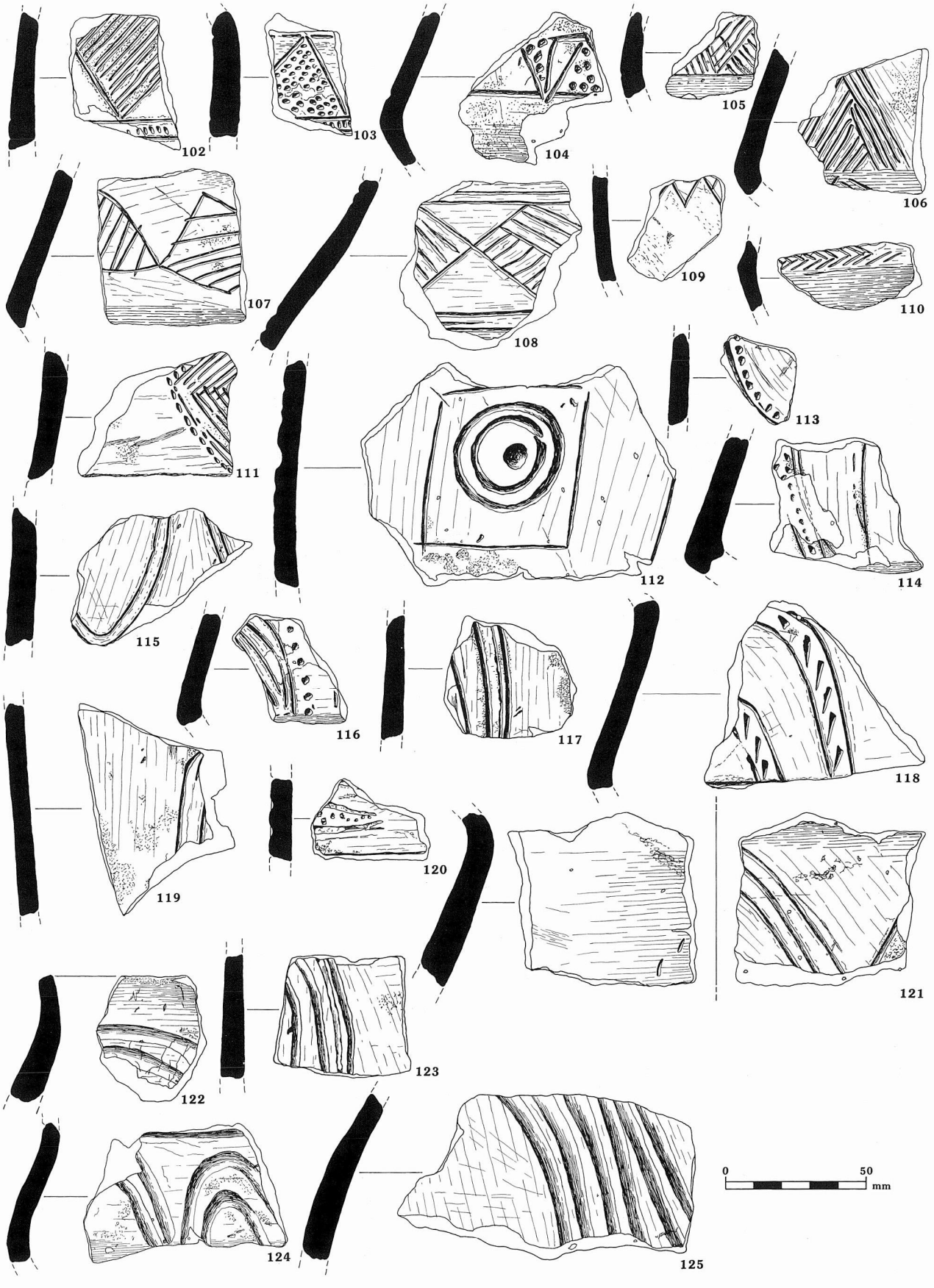


Fig. 113 Pottery: glauconitic sand (GS), 102–25. Scale 1:2



Fig. 114 Pottery: glauconitic sand (GS), 126–62. Scale 1:2



Fig. 115 Pottery: glauconitic sand (GS), 163–204. Scale 1:2

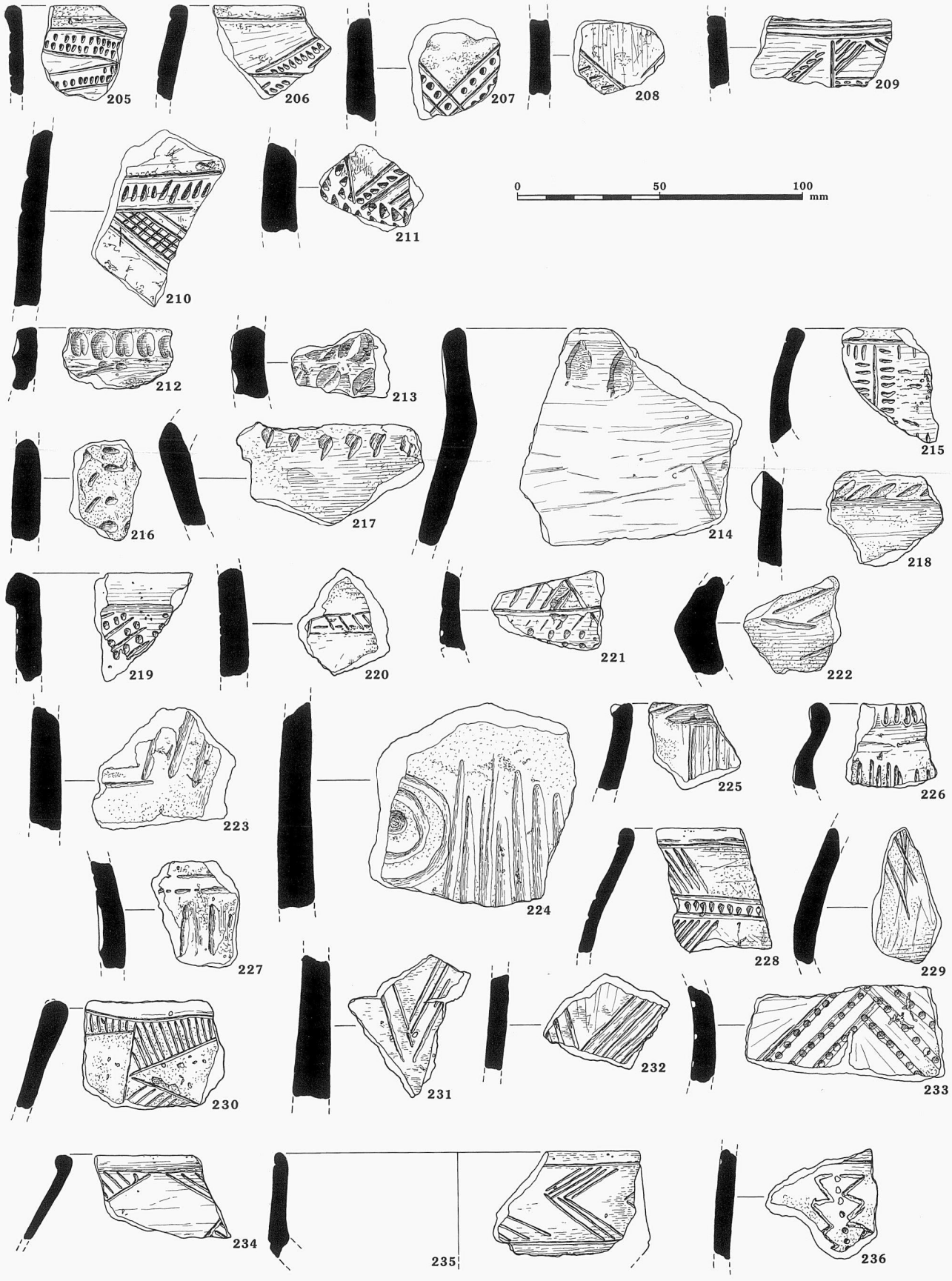


Fig. 116 Pottery: glauconitic sand (GS), 205–36. Scale 1:2

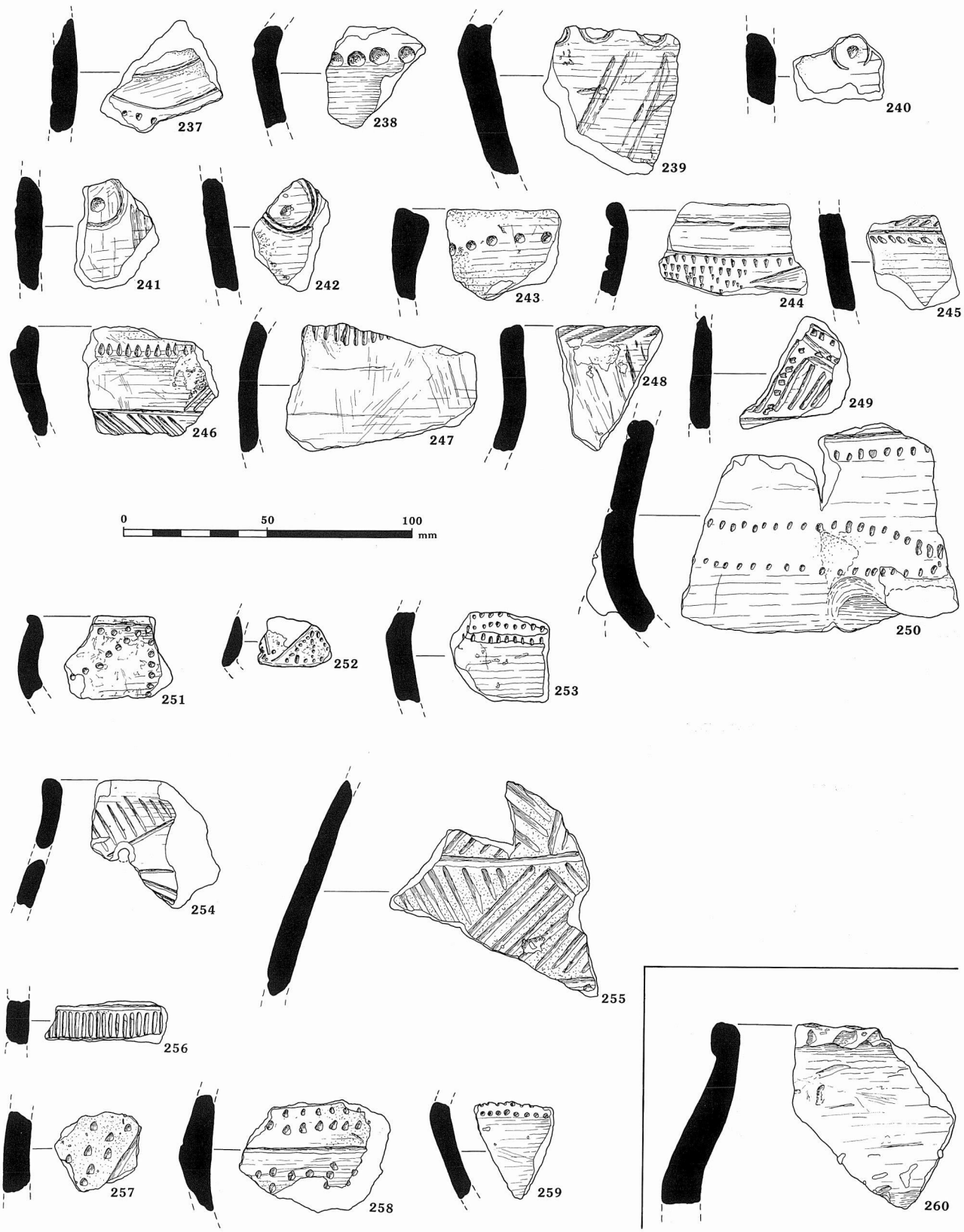


Fig. 117 Pottery: glauconitic sand (GS), 237–59; uncommon (UU) 260

Appendix 4: Index to the Potterne Project Archive

The project archive is divided into eleven major sections, as listed below. A full archive index is included within Section 1 of the archive.

Section	Contents
Section 1	Introduction and index to the archive Assessment reports and project designs Publication report
Section 2	Primary field records *Context Records* *Graphics Register* *Survey data* *Plans, sections and other site drawings* *Photographic Register*
Section 3	Auger survey *Auger Log Sheets* *Magnetic susceptibility data* *Plots and graphs*
Section 4	Primary finds records *Context Finds Records* *Special Finds Register* *Finds box indices* *Notes on grave finds*
Section 5	Primary environmental records *Sample Register* *Sieving Register*
Section 6	Synthesised field data *Explanations of field and post-excavation methodologies* *Documentation for columns, spits, etc* *Plans and sections (contexts and columns)*
Section 7	Finds post-ex (pottery) *Fabric Records* *Vessel Form Records* *Featured Sherd Records* *Pattern books (forms, decorative motifs)* *Sherd refitting exercise* *Scientific analyses on pottery* *Documentation, lists, tabulated data, etc* *Romano-British pottery data* Finds post-ex (gold, copper alloy, lead, iron, other metals, flint, worked stone, glass, shale/jet, fired clay and ceramic objects, worked bone) *Post-Excavation Special Finds Records* *Conservation records* *Quantification, lists, graphs, etc* *Specialist correspondence*
Section 8	Environmental post-excavation (soil micromorphology, animal bone, plant remains, parasites, insects, radiocarbon, human remains) *Post-excavation strategies* *Soil micromorphology and thin section photographs* *Mineralised seeds data* *Charred plant remains data* *Animal bone data* *Human bone data* *Radiocarbon dating* *Specialist correspondence*
Section 9	Computer analysis *Index to computerised data* *Computer analysis of pottery*
Section 10	Photographic archive *Colour slides* *Black & white prints* *X-ray plates*
Section 11	Miscellaneous (press and correspondence)

The project archive, along with the finds, have been deposited at Devizes Museum, under the site code W35.

A note on terminology

Within the project archive, particularly in the synthesised field data (Archive Section 6), the term 'Level' has been used to define stratigraphic units comprising contiguous spits. This term was subsequently superseded by the term 'Zone', which is used throughout this report.

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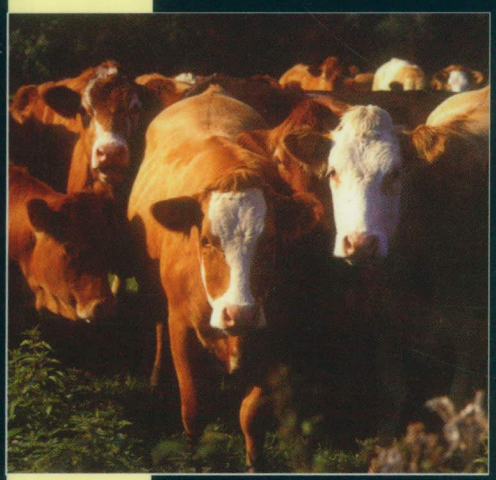
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For half a millennium, successive generations of Late Bronze Age and Early Iron Age farmers maintained their animals at the same site to the north of the modern parish of Potterne. Their specialised activities were served by an integrated social network through which contact was maintained with close and distant neighbours. Periodic communal meetings at the site provided the stimulus and opportunity for the exchange of agricultural produce, manufactured goods and at the same time developed social bonds.

The physical evidence at Potterne comprises a dark man-made soil, rich in artefacts, domestic and industrial waste, forming a collosal low mound 3.5 ha in extent and up to 2m thick. Exploratory excavations between 1982 and 1985 demonstrated the extent and unusual character of the site and have led to the definition of a previously unrecognised phenomenon. The progressive accumulation of such a vast quantity of material has necessitated a consideration of the role of farming, especially cattle husbandry, in the later prehistoric society of southern Britain.

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