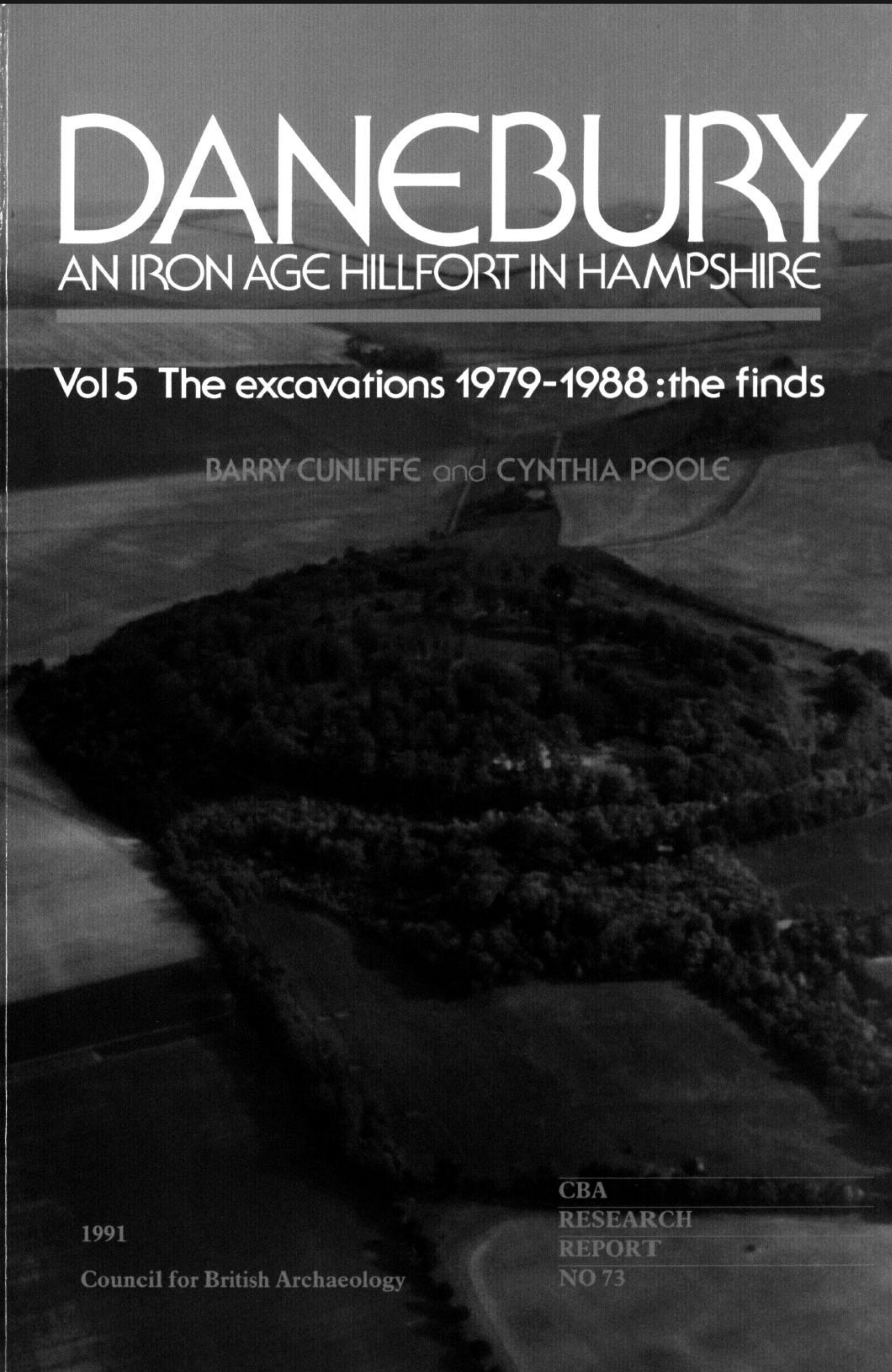
DANEBURY

AN IRON AGE HILLFORT IN HAMPSHIRE

Vol 5 The excavations 1979-1988 : the finds

BARRY CUNLIFFE and CYNTHIA POOLE



1991

Council for British Archaeology

CBA
RESEARCH
REPORT
NO 73

Danebury
an Iron Age hillfort in Hampshire

Volume 5
The Excavations, 1979–88: the finds

by Barry Cunliffe and Cynthia Poole

with contributions from Lisa Brown, John Evans, Annie Grant, Julian Henderson, Tim Hewitt, Bari Hooper, Martin Jones, Martyn Jope, Kathy Laws, Gary Lock, Peter Northover, Jennifer Nye, Natalie Palk, Cynthia Poole, Christina Rush, Val Rigby, Fiona Roe, Chris Salter, R. Van Arsdell, David Williams

and illustrations by
Alison Wilkins and Simon Pressey

1991

Research Report 73

Council for British Archaeology

ISBN Volume 4: 1 872414 02 8
ISBN Volume 5: 1 872414 20 6
ISBN Volumes 4 and 5: 1 872414 21 4

Published 1991 by the Council for British Archaeology,
112 Kennington Road, London SE11 6RE

British Library Cataloguing in Publication Data
Cunliffe, Barry *1939–*
Danebury : an Iron Age hillfort in Hampshire – (CBA research report).
Vol. 4. The excavations, 1979–1988 : the site
1. Hampshire. (England). Antiquities. Fortified buildings
I. Title II. Poole, Cynthia III. Series
936.22732

ISBN l–872414–20–6

The publishers wish to acknowledge with gratitude a grant from English Heritage towards the cost of publishing this report

Printed in Great Britain

Link to Next Section

Contents of Volume

Link to Previous Section

Contents of microfiche

List of figures

Link to Next Section

6 The Iron Age Pottery *by Lisa Brown*

6.1 Introduction

The pottery from the first ten years of excavation was treated in considerable detail in Volume 2 and it is not intended here to do more than simply to update the record. The following report is therefore brief. To understand the context in which it is written it should be read in conjunction with the first pottery report (Vol 2, 231–331).

Now that the full dataset has been assembled a range of new analyses can be undertaken. The results of these together with general comments about the assemblage as a whole will appear in Volume 6.

6.1.1 The size of the problem

The excavations of 1979–88 produced a total 49,533 sherds weighing 735 kgm from 810 pits (645 totally excavated), 722 layers, 262 post-holes and 148 other features. This brings the total assemblage from the site to about 158,000 sherds weighing *c* 1400 kgm. Every sherd from the site has been retained, washed, marked and stored according to context. All pottery from contexts other than post-holes has been quantified according to form, fabric, surface decoration, weight and number in accordance with the scheme laid out in Volume 2 and all the data has been entered into the computerized record. Of the pottery from post-holes only that from years 1984–8 has been computerized.

6.1.2 Approaches to analysis

The methods used to record the pottery have been described in some detail in Volume 2 (p 231) and need not be repeated here. In dealing with the 1979–88 assemblage, however, certain modifications have been made to provide additional detail for the pottery recovered from 1985–8. The additional fields of data recorded include:

a) a separate listing of basal sherds
b) condition, i.e. degree of abrasion on a scale of 1–3
c) presence of residue, e.g. limescale, soot, carbonized organic material and the extent of the residue
d) diameter of outer rim, inner rim and base.

In addition joins between sherds were noted at primary record level although all sherds continued to be counted individually.

The separate quantification of the basal sherds, the measurements of diameters and the recording of the joins were undertaken so that some attempt could be made to assess the number of individual vessels represented. Sherd condition was recorded to provide data relevant to deposition processes while the noting of the presence and type of residue was designed to allow function to be considered. The synthesis of this additional data will be given in Volume 6.

The present report is intended simply to update the report on the 1969–78 assemblage. It therefore follows the previous format as closely as possible. A number of new analyses are currently being undertaken on the entire dataset. These will be the subject of a detailed discussion in Volume 6.

6.2 The typological categories defined

6.2.1 Vessel forms

The system evolved for the classification of vessel forms found during the first ten years of excavation has been retained here but with minor additions (Vol 2, 232). The essence of the scheme was the adoption of four levels of classification:

Basic class
Type
Form
Variety

Four basic classes were recognized:

Jars (J)
Bowls (B)
Dishes (D)
Saucepan pots (P)

To this has been added a new class to accommodate base sherds (BS) which can be subdivided into types, forms and varieties. A detailed classification, developed for the pottery recovered from Hengistbury Head (Cunliffe 1987,212–3), has been adopted here. The majority of the Danebury bases belong to type BS5.0 – plain flat bases.

A second new class has been created for lids (L). Ceramic lids are rare at Danebury but the 1979–88 assemblage produced three certain examples and the discovery of a jar type with rim moulded to accommodate a lid suggests that ceramic lids were used albeit rarely. It is possible that some sherds classified as dishes were in fact lids.

One further modification has been a redefinition of jar type JE to incorporate a number of wheel-made vessels discovered during the recent excavations. Some of these are directly comparable to the forms recorded from Hengistbury Head.

6.2.2 Fabrics

In the first pottery report eight main fabric types were defined. No new types have been added but a few minor additions have been made to the range of varieties in some of the types. These are laid out in full in Appendix 2 below (pp 298–90).

The only new petrological work undertaken has been the examination of a small sample of furrowed bowls by Andrew Middleton of the British Museum. Since the results reflect more directly upon questions of surface treatment they will be discussed in Section 6.2.3.

Further petrological analyses will be undertaken as part of the continuing research programme designed to study questions of sourcing and form/fabric relationships.

6.2.3 Surface treatment

The five basic types of surface treatment, recognized as the result of the study of the first ten years' assemblage, still hold good and were used as a basis for classifying two other large Iron Age assemblages from Hengistbury Head and Maiden Castle. In the first report we also defined five methods of decoration. To accommodate the Hengistbury and Maiden Castle pottery the list was extended by adding:

6. Burnished decoration (e.g. lattice patterns, stripes, etc.)

Link to Previous Section

7. Rouletting
8. Rilling
9. Incision
10. Deep grooved decoration (typical of Maiden Castle-Marnhull/Durotrigan styles).

These additions are listed here for convenience though few apply specifically to Danebury.

Method 5 (shallow-tooled decoration) has been extended by adding two new varieties, discussed in Appendix 3 (pp 290–300),

The results of the examination of 'haematite-coated' wares from Danebury and other Wessex sites by Andrew Middleton (1987, 250–61) has enhanced our understanding of the range of techniques used to achieve a red glossy surface. In the case of the Danebury examples analyzed the finish was created by the application of an iron-rich clay slip. Thus the phrase 'haematite-coated' is not too misleading. But the work has shown that other methods were used in Wessex and it may be that some of the untested Danebury vessels conform to these categories. It is better therefore to introduce the less specific term 'red-finished ware' (see Appendix 3).

6.3 The ceramic sequence

6.3.1–2 Current schemes

The sequence laid out in the first report (Vol 2, 233–4) needs no modification as the result of the recent study: the nine *ceramic phases* (cps) there defined fairly reflect the enlarged assemblage.

The additional material belongs mainly to cps 3–8 but a small stratified assemblage of cp 1–2 was recovered from the primary core of the rampart sectioned in 1987 and is described in detail in Appendix 5. Useful deposits containing pottery of cp 9 have added to a phase previously ill-represented at Danebury.

6.3.3–6.3.9 Tests

There is nothing further to add to the detail given in Volume 2.

Further testing is outlined in the following section.

6.3.10 Quantifying problem areas

by Gary Lock

This short report is intended to draw attention to two problem areas that have been recognized for some time within the Danebury phasing procedure. The work is still in progress and will be reported more fully in Volume 6. Its inclusion here is seen as a measure of the importance of its implications. The two areas concern the quantity and nature of apparent residual ceramic material and the misassignment of contexts to a particular ceramic phase (cp).

The phasing methodology

Section 6.3 in Volume 2 presented the phasing methodology in some considerable detail and need not be repeated here. In essence, each sherd is assigned a cp according to the presence or absence of certain characteristics and the highest of these cps for each context provides the preferred cp (pcp) for that context. One proviso is that the context could belong to any cp higher than the pcp but does not contain any characteristic material of that higher cp.

Having established the pcp for every context (with minor empirical adjustments), this variable then forms the basis of all future quantification and analyses involving any change through time. The processes of identifying and interpreting temporal patterning within different classes of material are fundamental to the explanation of the site (see Lock 1987). The accuracy of the phasing methodology, therefore, is of extreme interest.

Before moving on to look at the two problem areas in detail it is important to make explicit three potentially influential factors.

The first is the well documented problem of pottery quantification, what is it that we are actually counting? It has been argued that sherds are not complete artefacts and only form an arbitrary representation of the number of complete pots in use, and it is these which should form our real focus of interest. Despite many years of theoretical discussion concerning different methods of pottery quantification (see Orton 1975 and 1980), the usual methods remain sherd count and/or sherd weight. On practical grounds alone these are the methods used here together with the derived mean sherd weight (MSW established by weight/number).

Secondly, we must accept the severe limitations as to what we are actually dating within the history of a particular context. The life of a pit for example, is a linear scale of unknown length extending from its initial digging to its final filling. The pcp assigned to a pit probably does not represent its time of digging or, if the conventional wisdom suggesting storage is accepted, a point within its unknown length of primary use. What it probably does represent, therefore, is some unknown point within an unknown span of secondary use.

Thirdly, and related to the last point, is the fact that the diagnostic material establishing the pcp for a context may well only be a small percentage of all the material within that context. If a pit has three cp 7 sherds in its top layers and 500 cp 3 sherds in its bottom layers it will be assigned to cp 7. The over simplification of this approach has always been recognized and it is not difficult to introduce complications – perhaps much of the cp 3 material was still in use in cp 7 thus justifying this pcp or perhaps the pit was dug and used in cp 3 and cp 7 material was introduced into it later suggesting a pcp 3 for the initial phase.

The current work in preparation for Volume 6 is attempting to incorporate some of the points mentioned above in establishing a reliability index for pcps. This will allow the selection and use of more reliably phased contexts for certain analyses. It is believed that none of the problems mentioned so far detract from the validity of the pottery typology which underpins the cp system as this has been thoroughly tested (see Section 6.3 of Volume 2). The problems arise in correlating the cps with the depositional processes involved in the discarding of pottery and the formation of contexts. The work described below forms a beginning in striving to understand the size of the gap that exists between the two halves of this correlation.

Quantifying apparent residuality

The problem of residuality was recognized in Volume 2 but remained unquantified, the potential for cp 3 material ending up in contexts with later pcps is implicit in the following statement: 'to be assigned to cp 1–3 does not require sherds of cp 1–3 to be present – merely those distinctive of the later ceramic phases to be absent' (Vol 2,234). The implication is that sherds without characteristics distinctive of any cp later than 3 will be assigned to cp 3 by default.

Table 6.1 The presence of cp 3 sherds in layers and pits by ceramic phase, 2,517 contexts

	LAYERS				**PITS**			
	A	*B*	*C*	*D*	*A*	*B*	*C*	*D*
PCP	*total no of sherds*	*% sherds of pcp*	*% sherds cp 1–3*	*MSW (gm)*	*total no of sherds*	*% sherds of pcp*	*% sherds cp 1–3*	*MSW (gm)*
8	271	9.0	79.0	10.8	4197	5.4	77.7	13.8
7	8057	6.3	84.3	10.9	9157	7.9	80.0	13.6
6	2688	14.5	82.1	9.6	3910	14.1	78.1	10.2
5	1166	7.8	88.5	11.2	1953	13.3	82.9	12.1
4	311	15.1	84.9	7.7	1531	8.5	91.5	15.4
	total =12,493			Mean =10.1	total =20,748			Mean =11.5

Table 6.2 The presence of cp 3 rim sherds in layers and pits by ceramic phase, 2,517 contexts

	LAYERS				*PITS*			
	A	*B*	*C*	*D*	*A*	*B*	*C*	*D*
CP	*cp 1–3 rim sherds as a % of all cpn sherds*	*cp 1–3 rim sherds as a % of all cpn rim sherds*	*% rim sherds of pcp*	*total no of cpn rim sherds*	*cp 1–3 rim sherds as a % of all cpn sherds*	*cp 1–3 rim sherds as a % of all cpn rim sherds*	*% rim sherds of pcp*	*total no of cpn rim sherds*
8	13.3	11.0	36.0	36	11.8	17.3	16.9	497
7	12.1	12.1	22.2	972	13.3	11.2	20.1	1220
6	11.4	19.0	54.4	305	11.8	26.4	34.2	462
5	11.5	23.1	61.9	134	11.2	36.5	46.1	219
4	8.4	30.8	69.2	26	8.1	45.2	54.8	124

Table 6.1 shows a breakdown of the 1979 to 1988 pottery from 2517 contexts to show the percentages of pcp material and cp 3 material. Each row represents all of the material from contexts assigned to a particular cp divided into layers and pits. Note that all tables in this section use sherd count only as results with sherd weight are very similar.

It is possible to make a number of observations. There is a high degree of homogeneity in the percentage figures both between phases and between context types despite considerable variation in the actual counts of sherds (columns A). It would be reasonable to expect a change through time in the amount of residual material and also a difference between the contents of layers and pits. Between phases the sherd count in layers varies from 271 to 8,057 and yet the percentages of pcp sherds and cp 3 sherds remain remarkably constant. The implication here is that the material which is not of the pcp is residual, with the bulk of this being of cp 3. This constancy also applies when comparing the two context types, the ranges for pcp sherds and cp 3 sherds (columns B and C) are very similar for material from layers and pits. Again, this is despite the much higher actual sherd counts in pits. The same appears to apply to the size of the sherds with MSW showing surprisingly little variation both between phases and between context types. The difference in mean MSW between layers and pits is, in fact, surprisingly small.

It appears from Table 6.1 that the formation processes responsible for these figures were not only stable through time but also the same for both layers and pits. The stability is suggested by the row-wise and column-wise comparisons giving the impression of a constant level of 85% to 95% residual material (100% – column B). Another interpretation is that pits dug and filled in cp 7 and cp 8 contain as much cp 3 material as pits dug in cp 4, several centuries earlier.

It has already been stated above that sherds with no diagnostic features are assigned to cp 3 by default. As these are more likely to be body sherds, Table 6.2 presents figures for rim sherds only. Again, despite the large variation in the actual numbers of sherds (columns D) there are comparable trends between context types and phases. The first point to make is that the dominance of cp 3 material shown in Table 6.1 (columns C) does not occur in rim sherds (Table 6.2 columns A), the difference being made up of body sherds. There are also interesting differences in the proportions of rim sherds (columns B and C). The percentage of rim sherds of the pcp within each cp shows an increase from cp 8 to cp 4 (columns C), in layers of cp 8, for example, 36% of all rim sherds are cp 8 sherds whereas in cp 4 69.2% of all rim sherds are cp 4 sherds. The proportion of cp 3 sherds decreases from 30.8% in layers of cp 4 to 11.0% in layers of cp 8. Similar trends are visible for material in pits. While Table 6.2 still indicates a high level of residual material for rim sherds only within each phase (100% – column C) it does show the expected trend of increasing residuality in later phased contexts. It also shows that the residual material is not dominated by cp 3 sherds but consists of other phases as well (100% – (column B+column C)). Using layers of cp 8 as an example again, it can be seen that 36.0% of all rim sherds are of cp 8, 11.0% are of cp 3 so the remaining 53% must be of cp 4 to cp 7.

The initial conclusions are that rim sherds alone are a much more sensitive indicator of residuality. This applies not only to gross proportions of residual material and their changes through time (compare Table 6.1 columns B with Table 6.2 columns C) but also to the make up of the residual material. Comparisons between the two tables show just how large the number of non-diagnostic body sherds is and because they have all defaulted to cp 3 within the phasing procedure a false impression of residuality is created. Comparison with rim sherds alone

Table 6.3 The MSW (gm) of cp 1–3 rim sherds in layers and pits

	LAYERS	PITS
PCP	*MSW of cp 1–3 sherds*	*MS W of cp 1–3 sherds*
8	13.0	14.6
7	12.0	13.7
6	12.2	11.6
5	12.5	12.7
4	8.6	16.6
l/3	11.1	12.0
	Mean = 11.6 gm	Mean = 13.5 gm

suggests that many of the body sherds are not cp 3 and this will cause bias problems in quantified analyses.

One conclusion that remains to be drawn from both Tables 6.1 and 6.2 is the similarity in proportions and trends between material from layers and pits. It could be reasonably expected that the depositional processes responsible for the formation of layers and pits will be sufficiently different to result in discrimination patterns within the archaeological record. Using the more securely phased rim sherds only, Table 6.2 negates this expectation as does Table 6.3 which shows MSW for rim sherds.

The homogeneity between phases and between context types is again remarkable with the difference in mean size of sherds from pits compared to those from layers being smaller than perhaps would be expected. It is again easy to draw implications from these results although they are not so comfortable to accept. It appears that cp 3 rim sherds ending up being deposited in cp 7 and cp 8 pits were just as big, if not bigger, than those deposited in cp 3 pits several centuries earlier. This suggests very little breakage of material after its primary deposition in either a layer or a pit, and very regular breakage before primary deposition. It could also suggest that pottery which ends up in both layers and pits is derived from the same source and is broken into its final state at that source.

Alternative explanations could be that cp 3 material remained in use into cp 4 and after. This would allow the primary deposition of apparently cp 3 material in later contexts and thus reduce the apparent residuality. Another explanation could be that some contexts assigned to cp 3 are incorrectly assigned and actually belong to a later cp, this would also have the effect of reducing the apparent residuality. It is this problem of misassignment that the next section addresses.

Quantifying misassignment

In the ten years of excavation covered by the present volumes, many more contexts, particularly layers, were excavated within the quarry hollows thus enabling their stratigraphical relationships to be established. Of the 2,517 contexts quantified here a total of 925 (37%) have a cp based upon material contained within them and a cp based upon their stratigraphic relationship. This allows a comparison of results from the two methods and an assessment of the reliability of the phasing procedure based on contained pottery alone. It also allows an opportunity to quantify an already acknowledged problem: ‘because a ceramic phase is assigned on presence of characteristics there will always be a tendency for some contexts, particularly those containing only a few sherds, to be assigned to an earlier ceramic phase than they deserve’ (Vol 2, 234). Figures 6.3 and 6.4 show misassignments at a crude level of analysis for layers and pits respectively.

Assuming that the cps according to stratigraphy represent the true phasing, the tendency for the phasing by contents to be biased towards the lower phases is visible in both the bar charts and the ogives. Figures 6.3a and 6.4a show the considerable shift of contexts from cp 3 to cp 7 in both layers and pits while 6.3b and 6.4b illustrate the differences in the accumulating frequencies resulting from the two methods. The actual breakdowns of reassignments (from contents cp to stratigraphic cp) are as follows:

Reassignment of layers (total of 647):

no movement	–33.8%
movement upwards	–63.0%
movement downwards	–3.2%

Reassignment of pits (total of 155):

no movement	–40.7%
movement upwards	–58.1%
movement downwards	–1.2%

The implications of this are immediate, approximately 66% of layers and 59% of pits have been incorrectly assigned to a cp by the contents method. Again it is interesting to note that whatever processes are responsible for this misassignment they seem to be constant between layers and pits. It is possible to refine the analysis and look at the number of cps that contexts have moved in the reassignment procedure.

Table 6.4 quantifies the reassignment of contexts by the number of cps moved either up or down, it can be seen, for example, that 9.8% of the layers have moved up two cps compared to 8.4% of the pits. Using the last column in each table the accumulative percentage movement for a number of cps and higher can be established. The size of the problem is shown by 36.0% of the layers and 32.8% of the pits having been reassigned by three or more cps. In other words, approximately one third of all contexts were assigned to a cp at least three phases too early according to the pottery contained within them.

Finally it is possible to take the analysis one stage further and look at the actual reassignment movements. Table 6.5 is in the form of a bivariate contingency table with rows representing cps according to the contents method and columns the cps according to stratigraphical relationships.

The row totals show the number of contexts that started as that particular cp (by the contents method) and the column totals show the number of contexts that finished as that particular cp (by the stratigraphical method). Taking Table 6.5a, the layers, it can be seen that 293 started as cp 3 but only 82 finished as cp 3 (and of those only 71 started and finished as cp 3). Each cell within the tables shows the number of contexts that started and finished at that row and column value. Looking at Table 6.5a again, the first row shows that 56 layers started as cp 3 and finished as cp 6 and 155 started as cp 3 and finished as cp 7, the figures in parenthesis are row percentages showing 19.1% and 52.9% of all original cp 3 layers respectively. The final point to notice about the tables is that the left to right diagonal shows the contexts that were correctly assigned by the contents method. It can be seen that only 24.2% of cp 3 layers were correctly assigned, 8.7% of cp 4 and 7.6% of cp 5, etc.

Table 6.5 reinforces the earlier conclusions of large movements of contexts upwards, specifically showing movements into cp 7 from all earlier cps but especially cp 3. Both cp 7 and, to a lesser extent, cp 6 are seriously under represented in the contents method of phasing. The implication is that these contexts were deposited in cp 6 and cp 7 but contain no contemporary material and

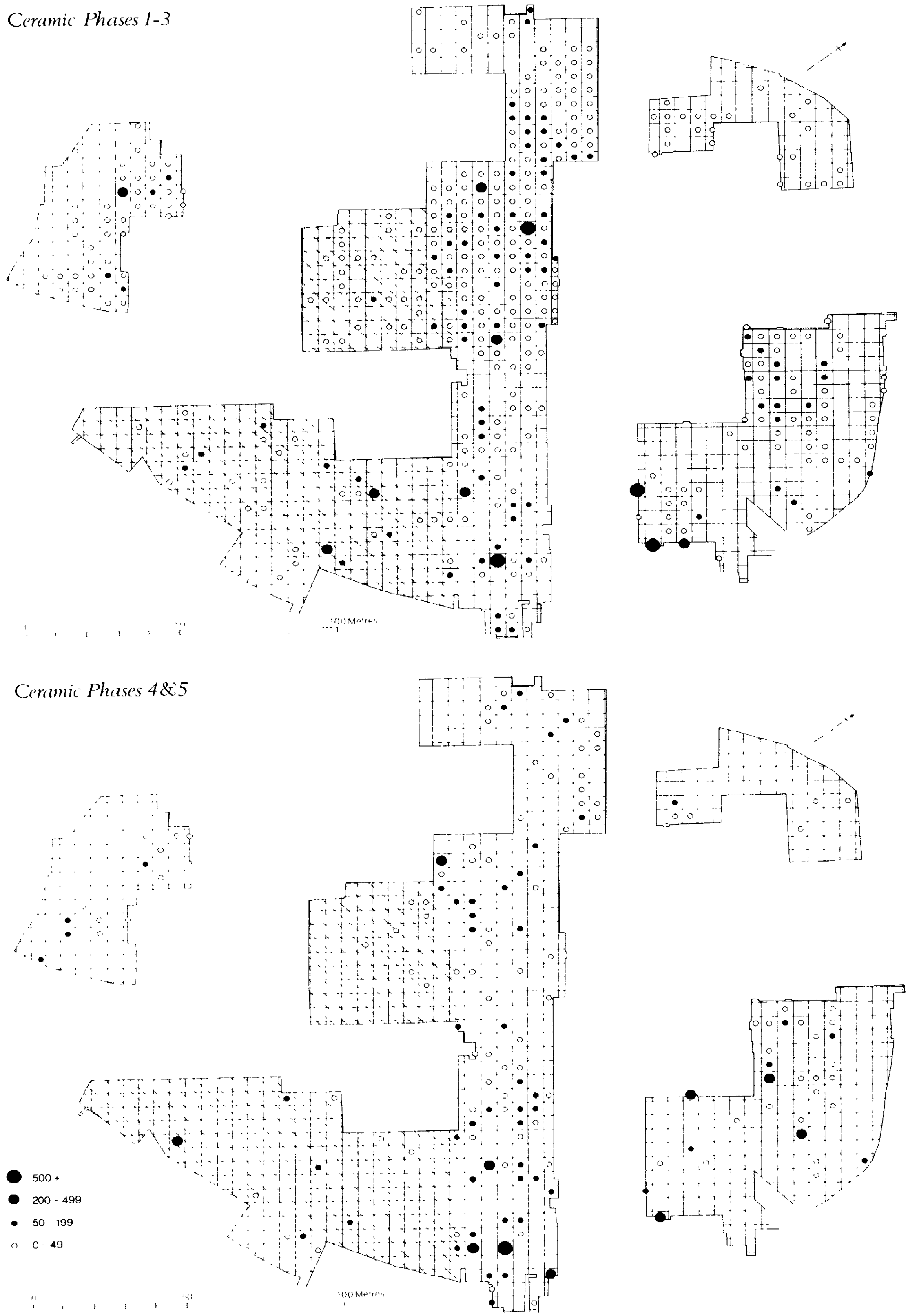


Figure 6.1 *Distribution of pottery within the fort by quantity: cp 1–3 and cp 4 and 5. (NB in the areas crosshatched only a sample of pits were excavated)*

Link to Next Section

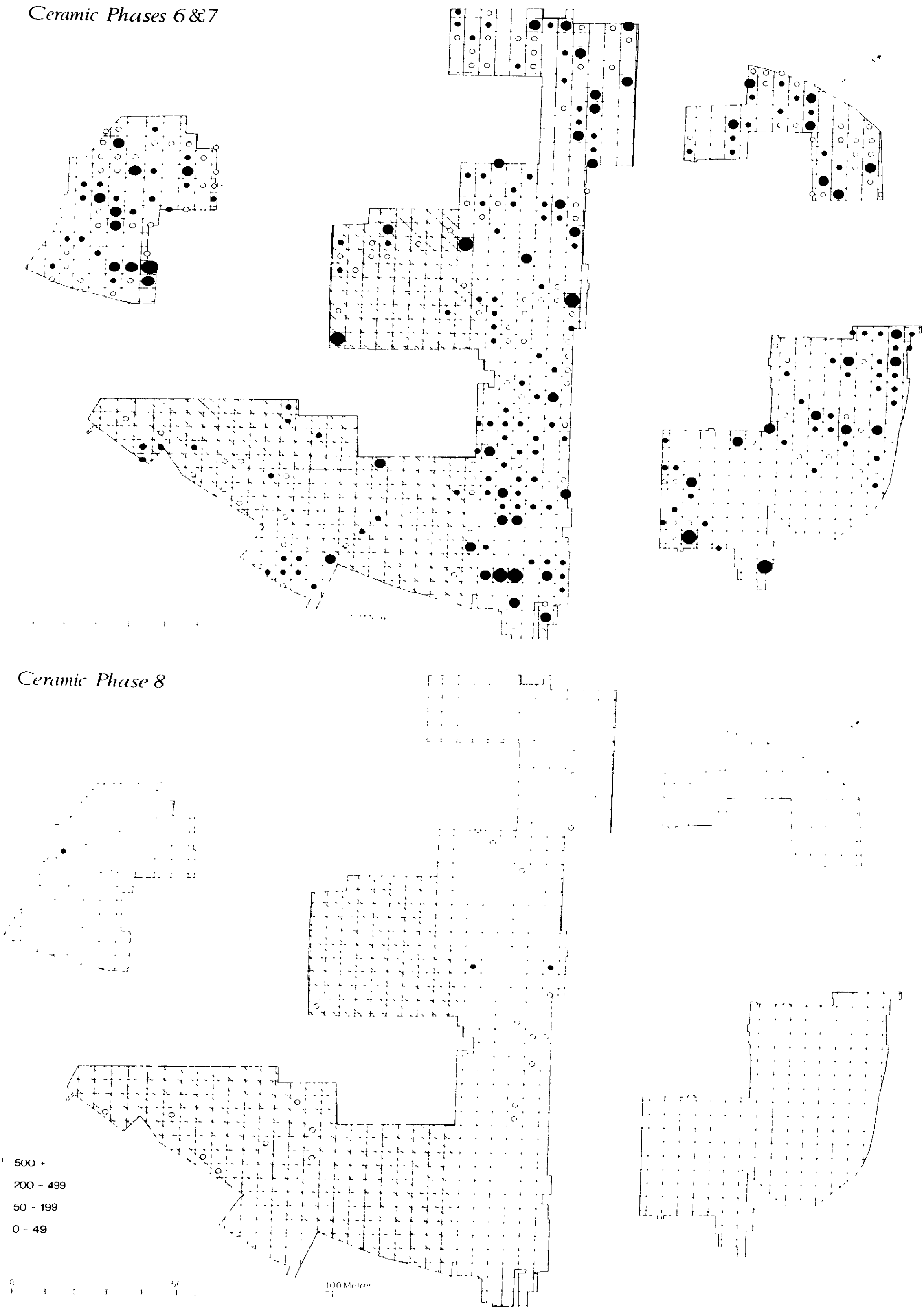


Figure 6.2 Distribution of pottery within the fort by quantity: cp 6 and 7 and cp 8. (NB in the areas crosshatched only a sample of pits were excavated)

Link to Previous Section

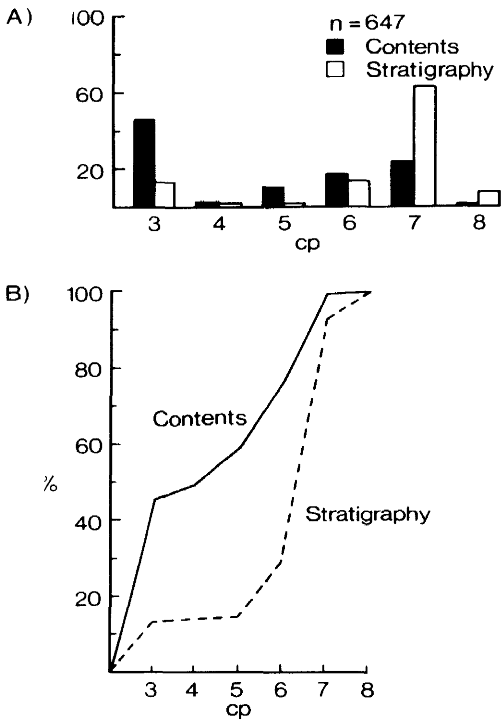


Figure 6.3 Misassignment in layers (647) showing cps by contents and stratigraphy.

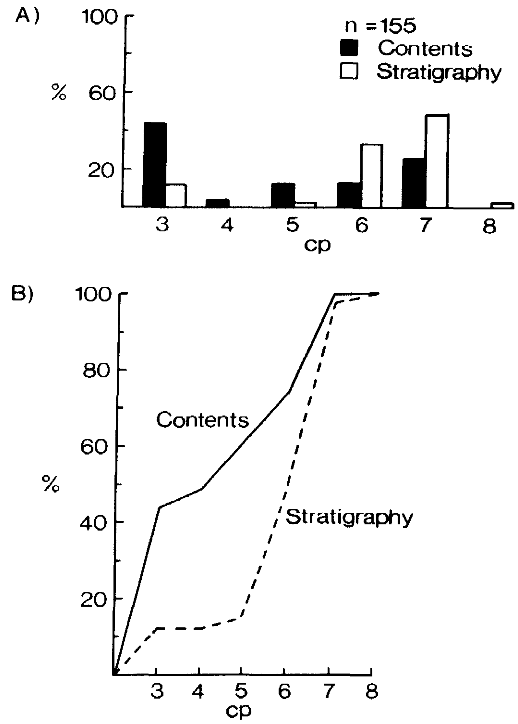


Figure 6.4 Misassignment in pits (155) showing cps by contents and stratigraphy.

Table 6.4 The number of cps moved in the reassignment process, a) layers and b) pits

A) LAYERS					B) PITS			
No of cps moved	*count*	%	*Accumulative % movement*		*No of cps moved*	*Count*	%	*Accumulative % movement*
–4	1	0.2	0.2		–4	0	–	–
–3	2	0.3	0.5	Down	–3	0		–
–2	3	0.5	1.0	↑	–2	1	0.6	0.6
–1	14	2.2	3.2		–1	1	0.6	1.2
0	219	33.8	–	← Non-movers →	0	63	40.7	
+1	111	17.2	63.0	↓	+1	26	16.9	58.1
+2	64	9.8	45.8		+2	13	8.4	41.2
+3	67	10.4	36.0	Up	+3	31	20.0	32.8
+4	155	24.0	25.6		+4	19	12.2	12.8
+5	11	1.6	1.6		+5	1	0.6	0.6

entirely material of earlier cps, in some cases several centuries earlier.

While reasons for movements upwards are perfectly easy to understand, why a small percentage of contexts need to be moved downwards is, on the face of it, more difficult to understand.

In all, however, only 29 contexts are involved and each case has been individually examined. Three causes can be identified:

a) one pottery type, JB4, has to be rephased;
b) there is occasional uncertainty as to precisely the

Table 6.5 The actual movements of contexts from cps according to contents to cps according to stratigraphy, a) layers and b) pits

A) LAYERS

Non movers → (3, 3); total → (8, 8)

cp according to contents	*cp according to stratigraphy* 3	4	5	6	7	8	row total
3	71 (24.2)	0	0	56 (19.1)	155 (52.9)	11 (3.8)	293
4	8 (34.8)	2 (8.7)	0	3 (13.1)	10 (43.5)	0	23
5	0	0	5 (7.6)	9 (13.6)	51 (77.3)	1 (1.5)	66
6	2 (1.8)	0	2 (1.8)	20 (18.4)	75 (68.8)	10 (9.1)	109
7	1 (0.7)	0	(2.30)	4 (2.6)	119 (77.3)	27 (17.5)	154
8	0	0	0	0	0	2 (100.0)	2
column total	82	2	10	92	410	51	total =647

B) PITS

Non movers → (3, 3); total → (8, 8)

cp according to contents	*cp according to stratigraphy* 3	4	5	6	7	8	row total
3	18 (26.5)	0	0	30 (44.1)	19 (27.9)	1 (1.5)	68
4	0	0	0	6 (85.7)	1 (14.3)	0	7
5	0	0	(1578)	9 (47.4)	7 (36.8)	0	19
6	0	0	0	7 (33.3)	14 (66.6)	0	21
7	0	0	1 (2.5)	1 (2.5)	35 (87.5)	3 (7.5)	40
8	0	0	0	0	0	0	0
column total	18	0	4	53	76	4	total =155

level from which a feature is cut especially if layers above are faulted into it;

c) in a few cases of layers a late cp is based on only one or two distinctive sherds which, when the stratigraphy is examined, must be regarded as strays introduced from above by burrowing animals, root disturbance or features unnoted in the excavation.

Clearly such anomalies will only be detected and corrected in situations where there is strong stratigraphical control – a point which demonstrates the value of well-stratified contexts over areas where features are simply cut into natural.

A conclusion

The interim conclusions from this work must concern not only the implications for the Danebury phasing methodology but for any site that phases discrete contexts by pottery contained within those contexts. It has been shown that potentially 60% of contexts phased by such a methodology could be incorrectly assigned to a cp. As stated above, current work on the Danebury material is attempting to establish new methods of phasing that involve a reliability factor.

6.4 The fabrics and their origins

6.4.1 Resources

There is nothing to add to the comments in the first report (Vol 2, 244).

6.4.2 Ceramic phases 1–7: local fabrics

Two fabrics were selected for discussion in the first report, *'haematite-coated'* bowls made from brickearth, probably that remaining north of Salisbury and *glauconi-*

tic sandy wares probably made from clays exposed in the Nadder valley. Some further comments are now possible on the glauconitic sandy wares. The fabric (D15) was only distinguished from other sandy fabrics part way through the process of recording the 1969–78 assemblage and quantification was therefore incomplete. However the entire 1979–88 assemblage of glauconitic sandy wares was distinguished and quantified. In total 359 individual sherds representing a maximum of 250 vessels were identified in hand specimen. No new forms were identified within this fabric group: the majority belong to saucepan pot (PB1.1) and dish (DA1.1) forms.

When listed by the apparent ceramic phase of the context in which they were found the following figures were produced

cp 3	15	
cp 5	2	
cp 6	112	(15 individual vessels)
cp 7	212	(200 individual vessels)
cp 7/8	18.	

No sherds belonged to vessel types pre-dating cp 6. The occurrence of 17 body sherds in contexts assigned to cp 3–5 is therefore best explained by assuming that these contexts were really of cp 6–8 phase but were given the earlier dating on the basis of lack of distinctive later forms. The example neatly illustrates the problem posed by having to phase features producing very little distinctive pottery. This is a question we intend to address in detail in Volume 6.

6.4.3 Ceramic phases 1–7: imported fabrics

Two imported fabric groups have been identified: oolitic limestone-tempered and Glastonbury wares, now more accurately known as South Western Decorated ware.

Oolitic limestone tempered

Only 9 sherds of this fabric were recognized in the 1969–78 assemblage most of them coming from cp 7 contexts. A proportionately much larger quantity was found in 1979–88. There were 84 sherds phased as follows:

cp 1–3	16
cp 4	3
cp 5	48
cp 6	9
cp 7	7
cp 8	1.

Since 57% came from cp 5 contexts it may fairly be assumed that this was the principal period of importation. It is probable that all or most of the sherds from cp 6 and later contexts represent rubbish survival while the apparent earlier contexts may in fact be subject to the distortions noted in Section 6.4.1.

The ware was common at Maiden Castle and derived from the nearby Jurassic deposits. The small quantity of imports at Danebury may have come from this area possibly reflecting the same exchange network which later provided Maiden Castle with a small number of Hampshire-style decorated saucepan pots.

South Western Decorated wares

Only one sherd of this type was found between 1979–88 bringing the total from the site to six (Fig 6.13, no 1273). It came from a cp 7 context in one of the quarry hollows. The sherd belongs to Peacock's group 1 probably originating from the Gabbroic rocks of the Lizard peninsula in Cornwall (Peacock 1969, 44).

6.4.4 Ceramic phases 8–9: local fabrics

The local fabric types of this late period are predominantly sandy. The majority of them were made or finished on the wheel and fired to a hard finish. Examination of the 1979–88 assemblage suggests that these fabrics were accompanied by grog-tempered wares made both by hand and on the wheel. Most examples represent large storage jars. Smaller necked jars and bowls sometimes cordoned, are also present. The fabrics have not been securely sourced but they can be distinguished in hand specimen from the Alice Holt/ Farnham variety (see Appendix 6 and Fiche 26:A5–7).

These grog-tempered wares can be shown by association to begin in cp 8 but the type and fabric combination continues locally until after the Roman invasion.

6.4.5 Ceramic phases 8–9: imported fabrics

In the first report the occurrence of imported vessels made in Poole Harbour fabrics was noted (Vol 2, 247). The 1979–88 assemblage has produced more wares of this type together with a small quantity of sherds from the Alice Holt region. Most are poorly provenanced, deriving from silts which had accumulated in pit tops associated with cp 8 and Roman vessels and with quantities of residual sherds. However a distinctive, though small, assemblage dating to cp 9 has been recovered and is illustrated and catalogued in Appendix 7 (p 319, and Fig 6.37).

Poole Harbour wares

Only 47 sherds of Wareham/Poole Harbour wares were identified in the 1979–88 assemblage. Most were small indeterminate sherds but three can be assigned to vessel forms: one was a bead-rim jar (Fig 6.9, no 1150) and two were copies of terra nigra platters (Fig 6.37, nos 1561, 1562). The extreme paucity of these wares suggests that Danebury was outside the general distribution area of the industry.

Alice Holt wares

A small quantity (less than 100 sherds) of Alice Holt wares was recovered. Most were indeterminate body sherds but amongst the classifiable sherds were imitations of Gallo-Belgic types dating to the mid first century AD. These include devolved butt beakers (Fig 6.37, nos 1540, 1542, 1560) associated with bead rim jars (Fig 6.37, nos 1548, 1549, 1553) all in grog-tempered wares. A number of platters, copying terra nigra forms, in sand-tempered wares may also be products of the same centre (Fig 6.37, nos 1543, 1544, 1558) (Lyne & Jefferies 1979, 25 and 31).

In addition to the wares ascribed to these two industries a number of other imports from unidentified sources were present. These include a butt beaker sherd (Fig 6.37, no 1541), a ring-necked flagon (Fig 6.37, no 1551) and carinated cups and girth beakers (Fig 6.37, nos 1547, 1550, 1552, 1563).

Amphorae

Three sherds of Mediterranean amphorae were recovered in 1979–88 bringing the total from the site to ten. They came from late silts sealing pit-tops. One was a Dressel 1B form characteristic of the Campanian, Latium and Etrurian district of Italy manufactured in the first century BC. Part of the spike in a similar fabric may belong to the same vessel but was found some distance away. A body sherd discarded in the same general area as the rim is possibly part of an earlier Dressel 1A type. A full report on these sherds by Dr David Williams can be found in the fiche report, Fiche 26:A8–9.

6.5 Technological change

There is nothing new to add to the first report (Vol 2, 248–9).

6.6 Forms and function

Questions of the relationship of form to function were considered in some detail and, in an attempt to produce some statistically valid conclusions, the assemblage recovered between 1985–8 was recorded in more detail. Measurements were taken of the outer and inner rim diameter and of base diameter while the presence and extent of three residues, carbonized organic matter, limescale and soot or ash were noted.

Table 6.6 indicates the range of outer rim diameter. Since most of the rim sherds were too small for accurate measurement the sample was very small and the results added little to the more subjective conclusions drawn previously, namely that the larger jars were probably used for storage, the smaller, finer vessels for food consumption. Systematic measurements of a larger sample will however be taken for consideration in Volume 6.

The recording of residues has been more informative. Table 6.7 indicates the presence of various types of residue adhering to different vessel types. The second column refers to total minimum numbers of vessels examined, as opposed to numbers of sherds. In the recording process care was taken to differentiate between genuine limescale and post-depositional accumulation of calcareous salts – a common feature of pottery recovered from chalk sites. Similarly, sherds thought to have acquired a soot or ash deposit after being discarded were eliminated from the quantification. While analysis of a larger sample is proceeding, it may be said at this stage that a surprisingly large percentage of small fine bowls (types BB and BC) and of well-finished or decorated vessels (types JC, JD, PB) show evidence of cooking or boiling water. This phenomenon was paralleled at Maiden Castle where a significant number of South-West Decorated wares appear to have been used in this way (Sharples, forthcoming).

The question of the use of lids has been partially resolved with the recovery of three ceramic lids and three lid-seated jar rims. The numbers are very small and suggest that lids were commonly of wood, fabric or leather.

6.7 The distribution of pottery within the fort (Figs. 6.1 and 6.2)

A systematic approach to the questions posed by spatial distribution of pottery within the fort must await the re-assessment of the problems of deposition of pottery and other finds and of phasing methodology in general. This will be undertaken as part of the preparation for Volume 6 using the combined data from the twenty years of excavation.

For the purposes of the present report, all that has been attempted has been an updating of the distribution maps published in Volume 2 (fig 6.20) to include the areas excavated between 1979 and 1988. Phases 6 and 7 have been amalgamated and cp 8 presented separately in keeping with the format of Vol 4. The new maps are presented in Figs 6.1 and 6.2 with a caveat on four levels:

a) only pottery recovered from pits has been represented;
b) in some areas only a small sample of the pits were excavated so that ‘inter-area’ comparison is impossible;
c) the pits within areas of surviving stratigraphy have undergone a second level of phasing, the stratigraphic date assigned in preference to the ceramic date; and
d) there has been no attempt to distinguish between pottery of different chronological types within each pit so that the figure presented within each 5 metre square includes redeposited earlier material as well as that produced in the relevant ceramic phase.

The maps, by definition, lack the internal consistency and uniformity required for an unbiased assessment of spatial patterning, but the exercise presents the same general picture which emerged from the earlier plans (Vol 2, 250–1). Until we understand more clearly the mechanisms of context formation and deposition, and can translate these notions to a spatial format, maps of this type are all that can be offered.

6.8 Regional implications

The broader implications of the Danebury assemblage were considered in some detail in the first report (Vol 2, 251–8). The work on the 1979–88 assemblage adds nothing new. Current work, however, will allow more detailed inter-site comparisons to be made. These results will be presented in volume 6.

6.9 Other approaches to analysis

This report has been prepared simply to augment the report on the pottery from the first ten years of excavation. The complete computerized dataset is now considerable and is currently being used to approach a far wider range of questions than were previously considered. Principal among them are aspects of deposition, vessel function and status (with particular regard to ‘special deposits’), residuality, sourcing, trade and exchange, spacial patterning within the site and inter-site comparisons. The results of these studies will appear in Volume 6.

6.10 Summary

The summary given in Volume 2 (pp 258-9) remains valid. This is an interesting comment on the sample size necessary to provide an adequate reflection of the ceramic component of a site. Simply stated – if the 1969–78 sample, derived from an excavation of about 25% of the site provides the same basic picture as the 1979–88 sample which represents 57% of the site what is the smallest sample needed to provide the same level of information?

The question is one which can be approached by taking random samples of the existing dataset to find out at what point information fall off begins.

These comments should not be taken to imply that the large dataset now available is of only limited value. On the contrary we believe that we can now begin to approach a totally different range of questions which will considerably extend our understanding of the Danebury community in particular and Iron Age studies in general.

Link to Next Section

Table 6.6: Range of outer rim diameters

```
(cm)    60  70  80  90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 360 370 380 390 400

JB1                                 |--------------------------------------------------|(15)
JB2                             |-----------------------------------------------------------------------------------------------|(51)
JB3                                                 |-------------------------------------------|(8)
JB4                     |------------------------------------------------------|(15)
JCl                                         |------------------------------------------------------------------------------------------------|(19)
JC2                         |----------------------------------------------------------------------------------------------|(151)
JC3                         |---------------------|(2)
JDl                                         |-------------------------------------------------------------|(5)
JD3                         |-------------------------------------------|(18)
JD5                                                                                                   |---------------------------------------------|(3)
JE1/4                                                              |----------------------|(2)
BA2                                 |------------------------------------|(14)
BB1           |--------------------------------------------------------------------|(17)
BCl                                                                          + (1)
BC2                         |-----------------------------------------|(5)
BC3                                 + (1)
BDl                                         + (1)
BD6                         + (1)
DA1                                                                                                           + (1)
DB3                                                     + (1)
PA1                         |---------------------------------------------------------------------|(9)
PA2                                         |--------------------------------------|(25)
PA3                |-------------------------------------------|(3)
PBl                         |-------------------------------------------------------------------------------------|(149)
```

The numbers in brackets represent number of rims measured.

Link to Previous Section

Table 6.7. Presence of residue by vessel form

	Form	*Organic*		*Limescale*		*Soot/Ash*	
Type	*No of vessels examined*	*No*	*% of total*	*No*	*% of total*	*No*	*% of total*
JB	339	16	4.7	4	1.2	13	3.8
JC	578	17	2.9	11	1.9	8	1.4
JD	75	7	9.3	1	1.3	1	1.3
PA	110	9	8.2	4	3.6	7	6.4
PB	447	9	2.0	4	0.9	7	1.6
BA	60	3	5.0	–	–	4	6.7
BB	125	1	0.8	–	–	3	2.4
BC	19	2	11.0	–	–	1	5.3
LID	3	–		–	–	1	33.0

Appendix 1: The ceramic forms described and illustrated

The type series, presented in some detail in the first report (Vol 2, 259–307), has been found to be entirely satisfactory in categorizing the 1979–88 assemblage. It can therefore stand as it was originally set out with the addition of a few varieties and sub-varieties listed below.

The material from the last ten years of excavation has produced some better examples of types listed and illustrated in the first report. A selection of these are presented here in Figs 6.5–6.15 as a supplement to the illustrations published in Volume 2 (figs 6.25–6.78).

Finally to update the fabric quantifications given with each of the form descriptions in the first report a set of additional data is provided in Table 6.8.

New varieties and sub-varieties identified in the 1979–88 assemblage

JB1.3 (Fig 6.5, no 1510)
A high shouldered jar with upright or slightly flaring rim and fingertip or finger-nail decoration on the shoulder, sometimes in combination with similar decoration on the rim top. The type was very rare at Danebury but occurs more commonly at Hengistbury Head (Cunliffe 1987, 208 and Ill 214).

Ceramic phases 1–3.

JB4.2 (Fig 6.6, no 1289)
A slack shouldered jar generally similar to type JB4.1 but with the addition of a lug type handle. The single example is well stratified within a cp 3 pit.
Ceramic phases 3–4?

JC3.11 (Fig 6.9, no 1260)
This vessel is a sub-variety of JC3.1 with an out-turned bead and a lid-seating. The single example is in a fine sandy ware. The finish is obscured by heavy abrasion, so there is some uncertainty as to whether the vessel is wheel-finished. The fabric and form generally more closely resemble form JC3 than JC2, but in view of the fact that the sherd was recovered from a context containing no other material later than cp 6, the date remains uncertain at present.
Ceramic phases 5–7 or ?8.

JD3.11 (Fig 6.10, no 1261)
This jar is a lid-seated variety of JD3.1. One example only in Fabric B with shallow-tooled decoration, from a cp 7 pit.
Ceramic phase 7.

JE1/4 (Fig 6.11)
The 1979–88 assemblage produced several new types which fit generally into this category? but in insufficient numbers to warrant further subdivision. It should be noted that the category is very general, and includes varieties of necked, ovoid and bead-rim jars, with and without cordons. No 1568 is a single example of Form JE1.0 which is present in small numbers at Hengistbury Head (Cunliffe 1987, 209 and Ill 152). It is almost certainly a Poole Harbour copy of the Armorican type. No 1164 is a similar sort of vessel with an inverse cordon, but is neither an Armorican import nor a Poole Harbour product. No 1163 is in the same fabric and same general form but may be more accurately described as a bowl corresponding to Hengistbury Head type BD5.1 (Cunliffe 1987, 212 and Ill 177, 354). All illustrated sherds are from cp 8 contexts or the top fill of cp 7 pits.
Ceramic phase 8.

BC2.2 (Fig 6.12, no 1521)
Hemispherical bowl with small everted rim. Very similar to BC2.1 in all other respects. One example only.
Ceramic phase 7.

Lids (Figs 6.29, no 1453 and 6.35, no 1240)
Three lids have been recovered, all undecorated, one each from contexts dated to cp 5, cp 7, cp 7–8. It is possible that very fragmentary lid rims may be mistaken for bowl or saucepan pot rims, allowing for the probability that lids are less rare than has been previously thought.

Appendix 2: The fabrics

In the first report a series of eight major fabrics was presented, A-H (Vol 2, 308), subdivided into a number of sub- types which were described in detail in the fiche section. The examination of the 1979–88 assemblage necessitated no change to the main series but one sub-type was added and it was thought desirable to provide two previously recognized sub-types with revised numerical codes. For convenience of reference these minor modifications are described here rather than in the fiche section.

The changes made are to the D series of sandy fabrics. In the original publication glauconitic sandy fabric, though recognized late in the process of analysis and described in detail was not assigned a distinguishing number but was included within the category D0. This has now been designated as Dl5. Products of the Wareham-Poole Harbour industry previously noted within the category D0 have now been called D17.

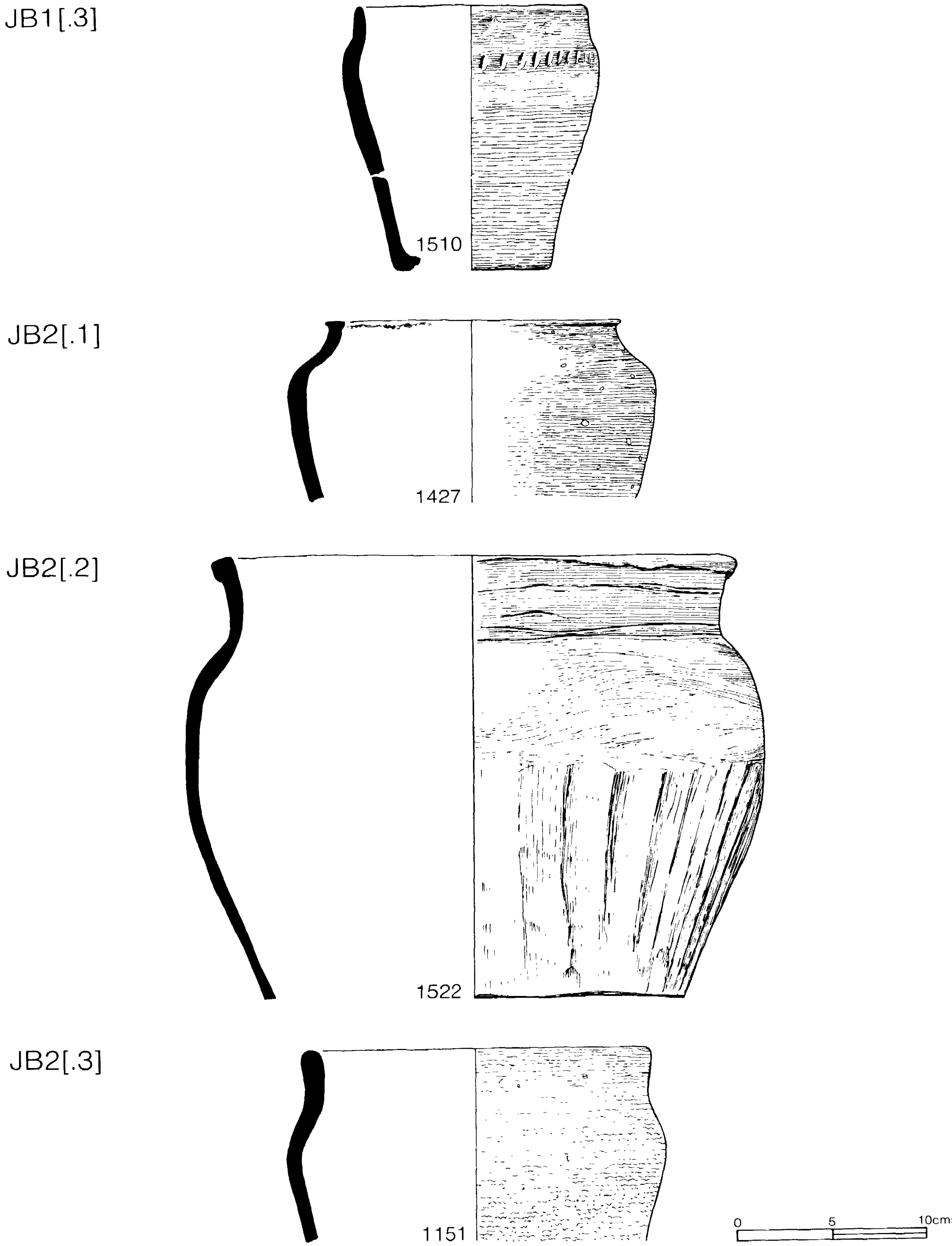


Figure 6.5 Pottery types.

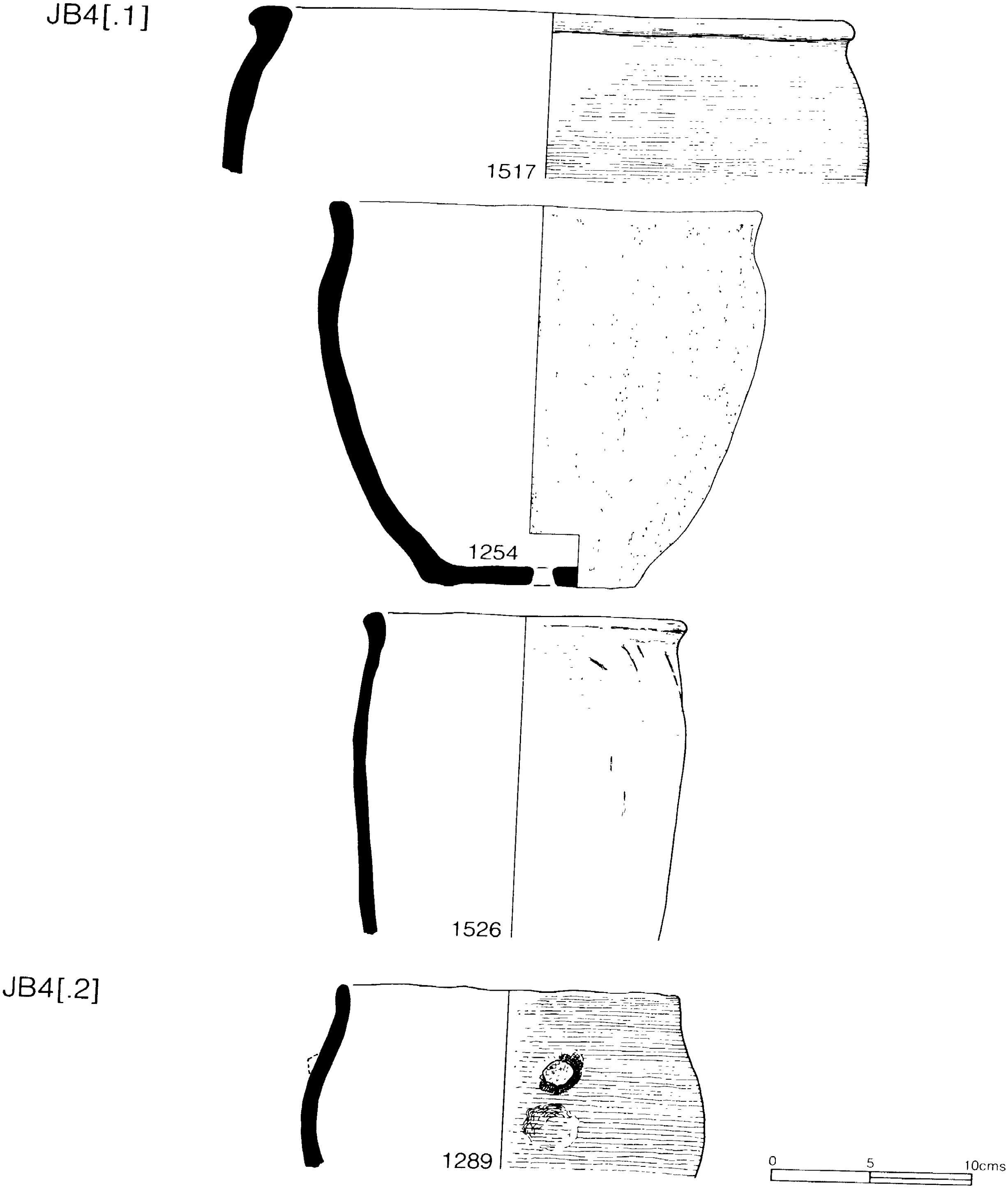
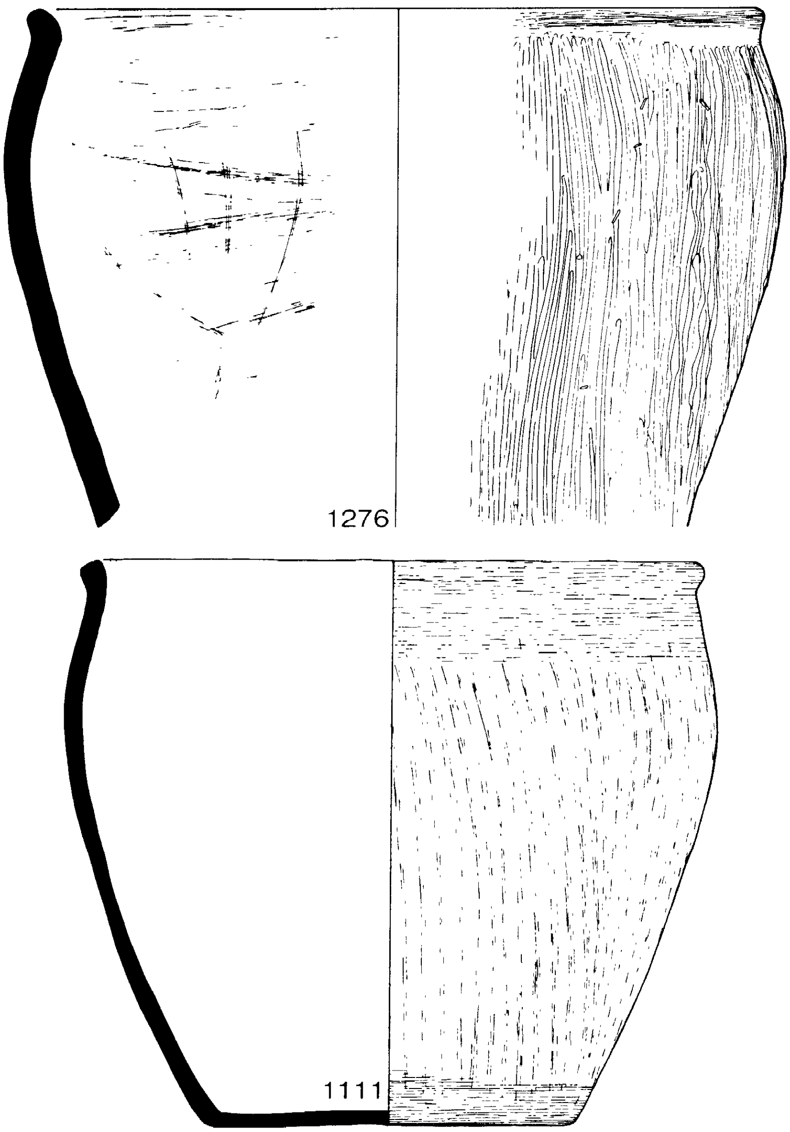


Figure 6.6 Pottery types.

JC2[.1]



JC2[.2]

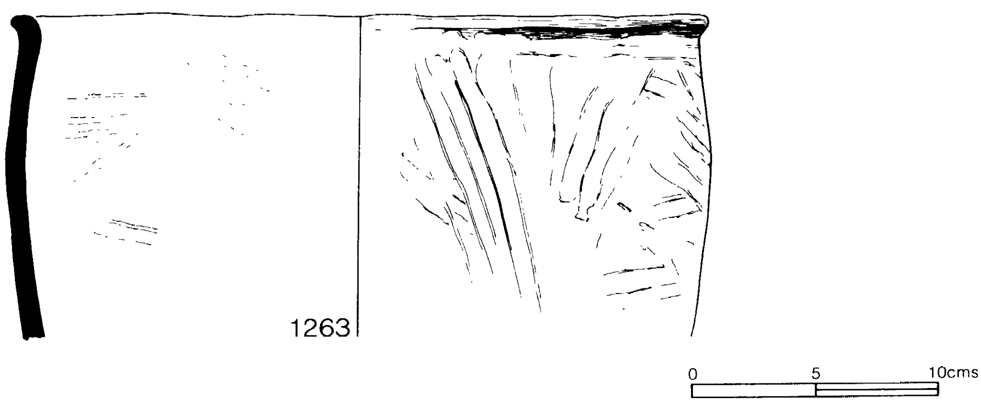


Figure 6.7 Pottery types.

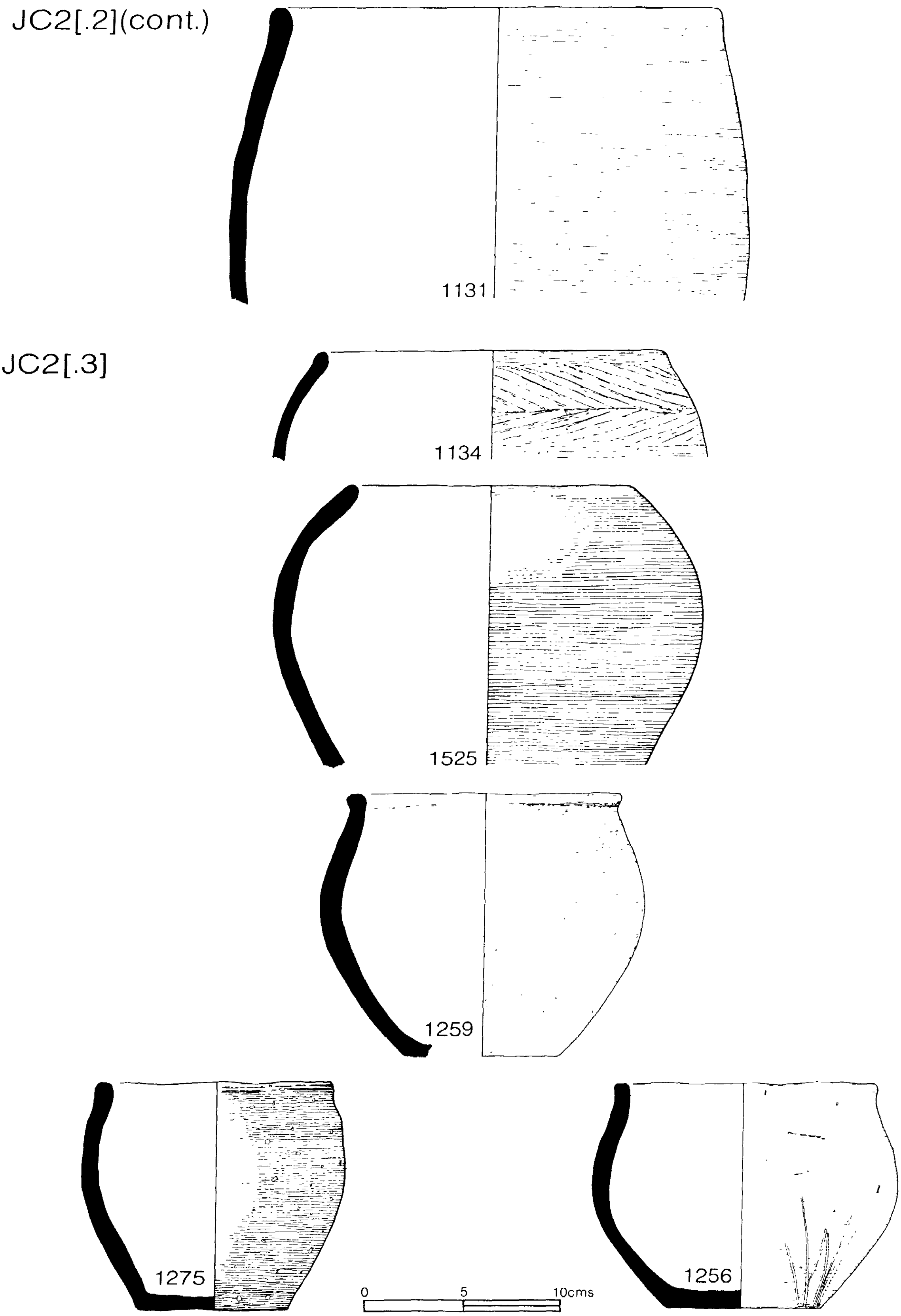


Figure 6.8 Pottery types.

Link to Previous Section

JC3[.1]

JC3[.11]

JC3[.2]

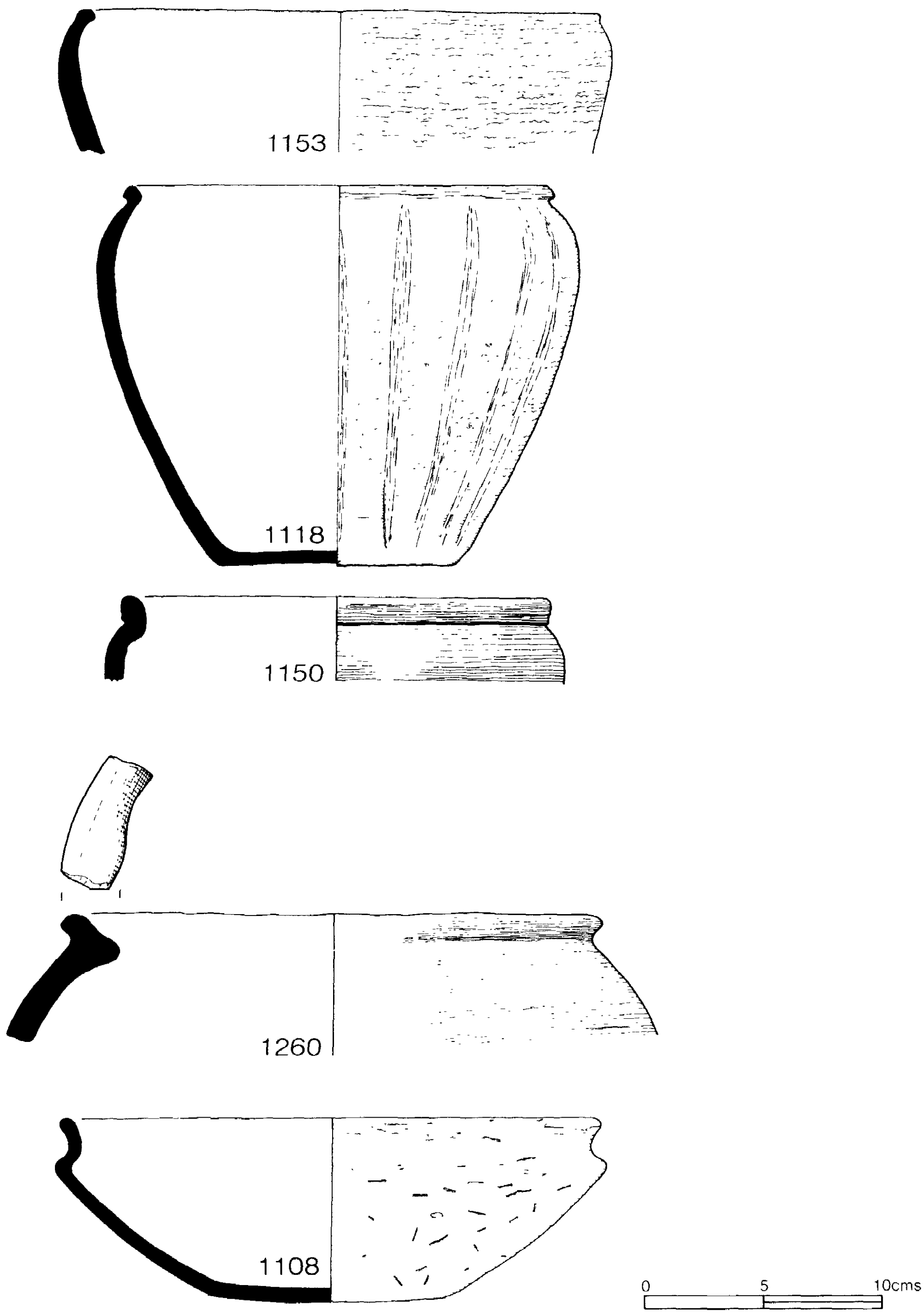


Figure 6.9 Pottery types.

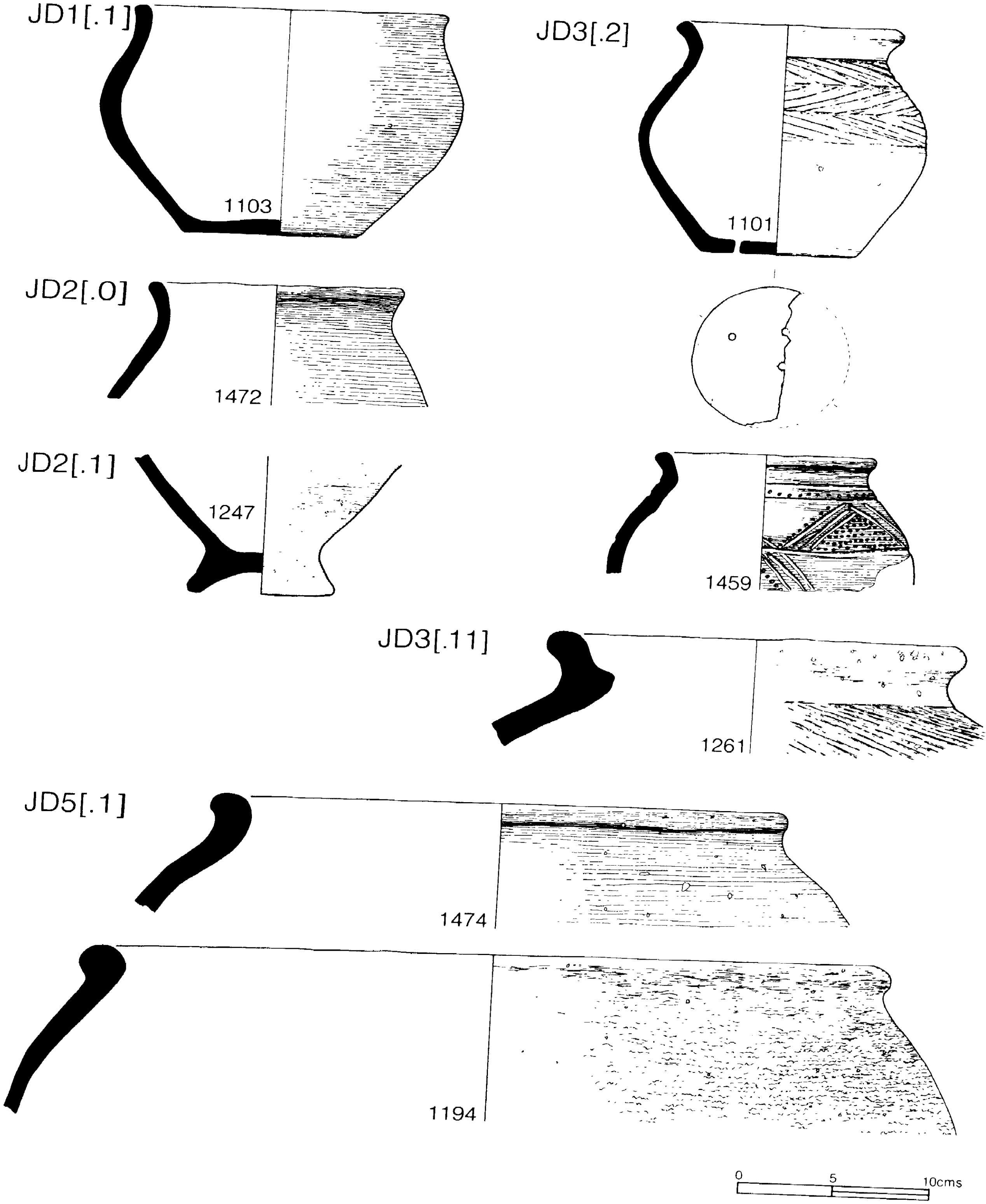


Figure 6.10 Pottery types.

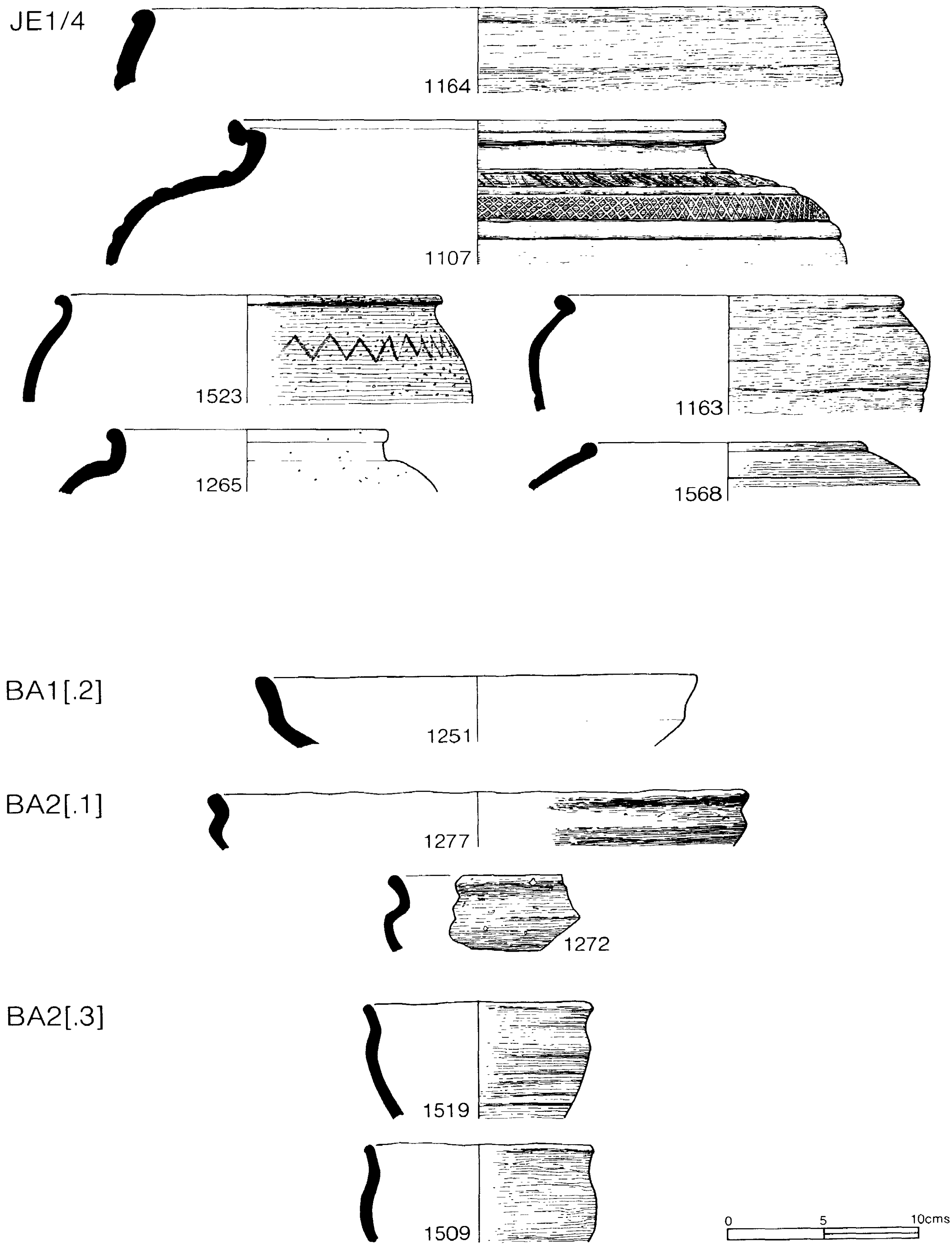


Figure 6.11 Pottery types.

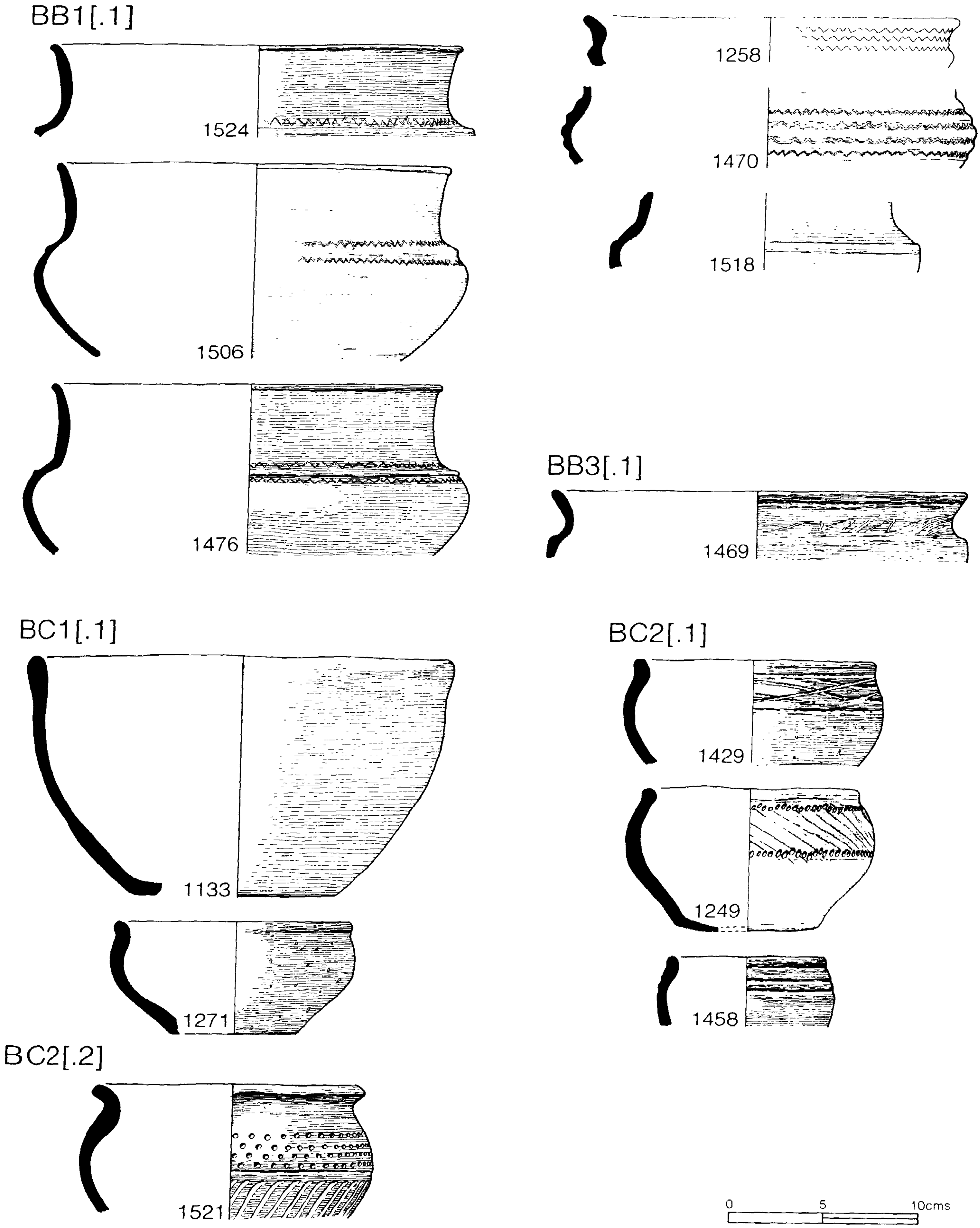


Figure 6.12 Pottery types.

Link to Next Section

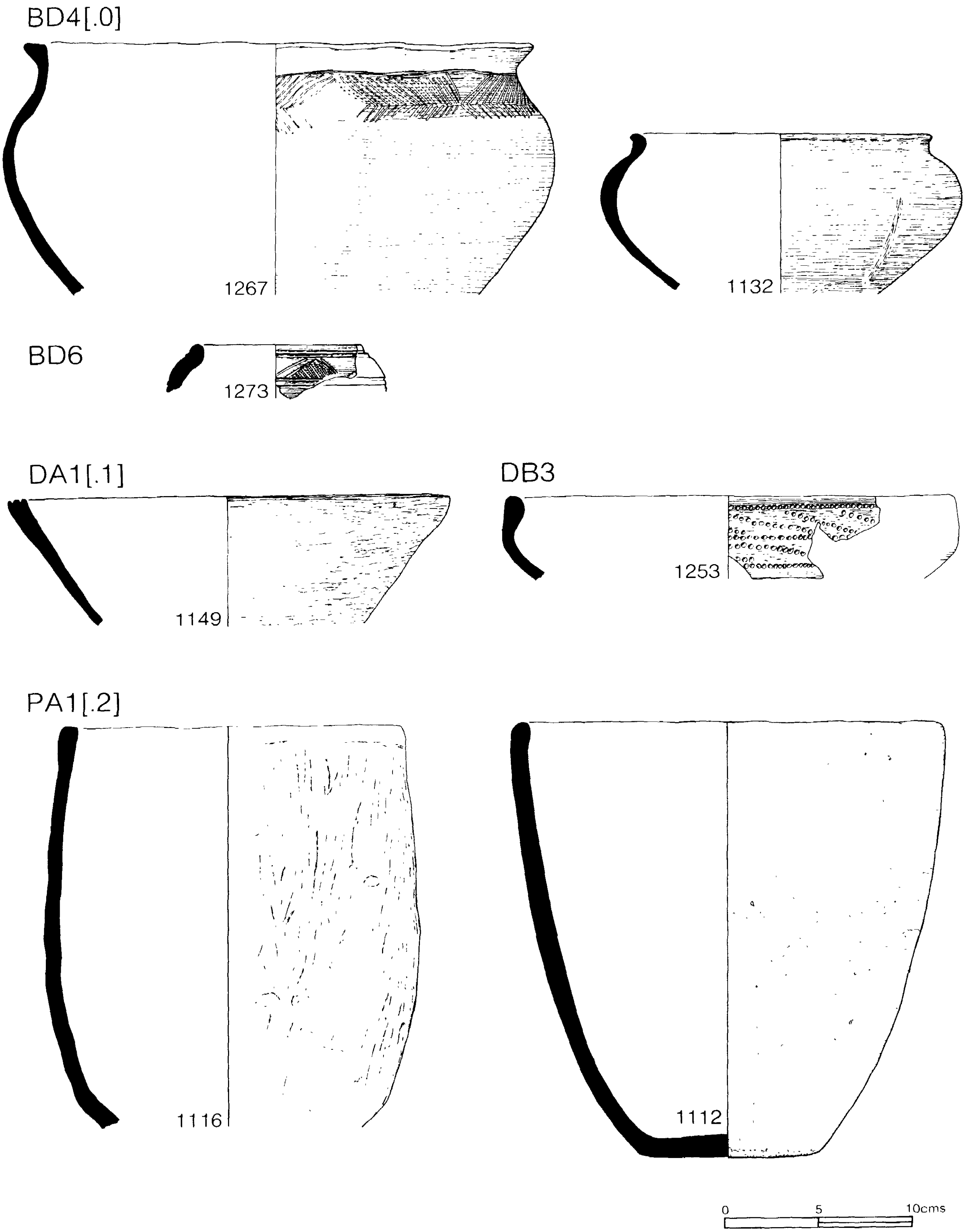


Figure 6.13 Pottery types.

Link to Previous Section

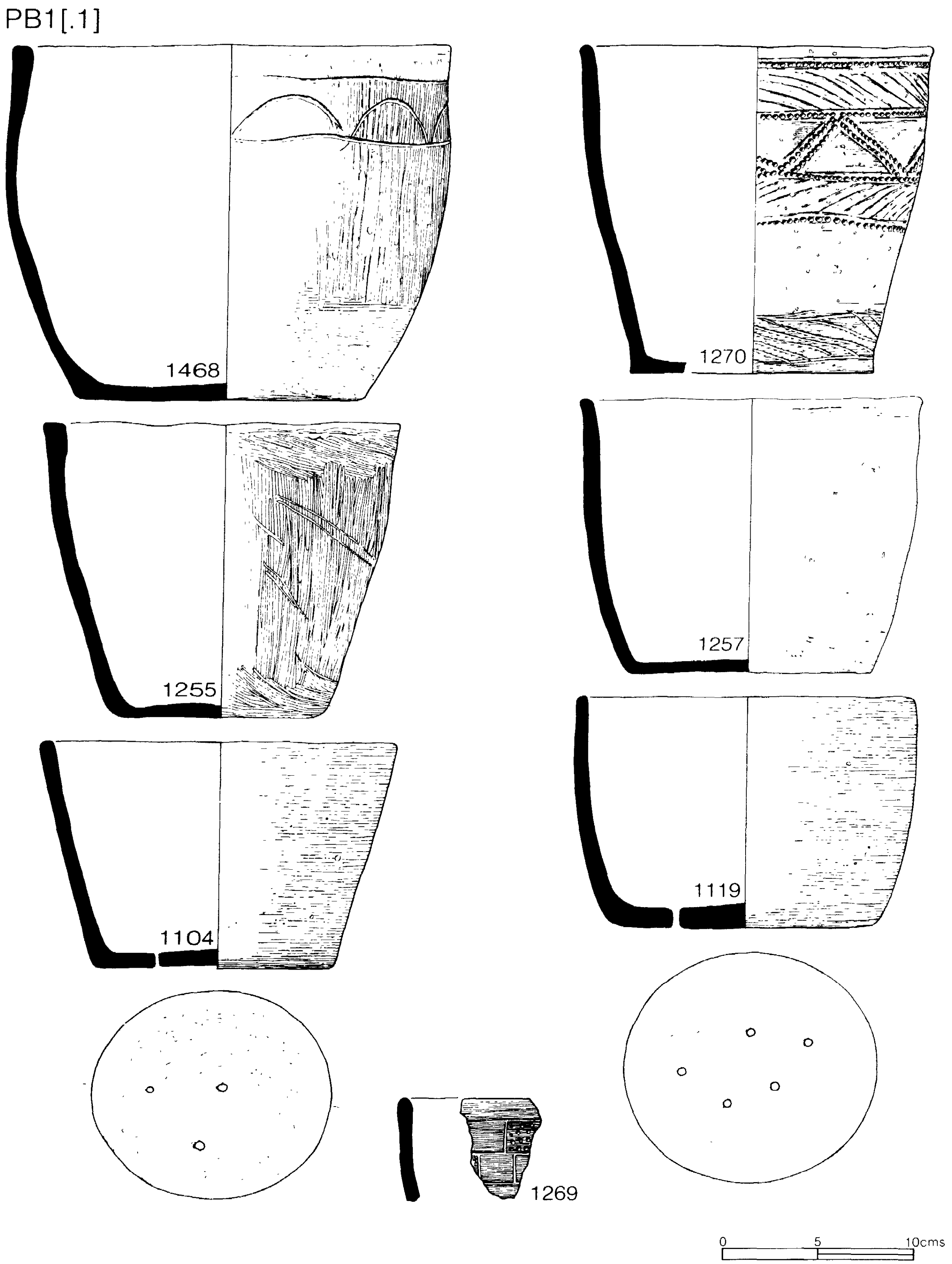


Figure 6.14 Pottery types.

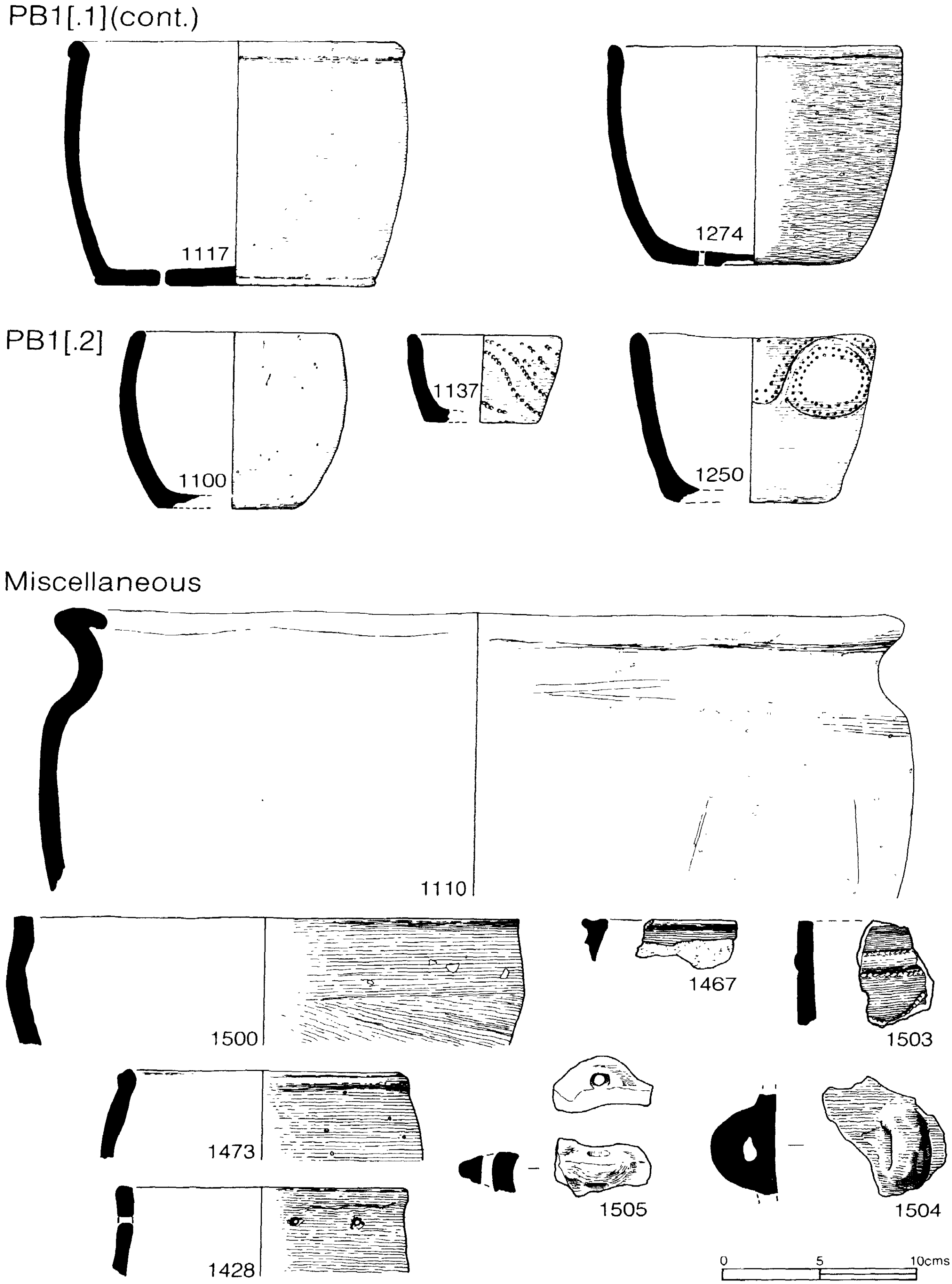


Figure 6.15 Pottery types.

Table 6.8 Quantification of form and fabric for the years 1979–88

Form	Fabric (sherd count)
JA1	A (3); D (1)
JA2	–
JB1	A (3); C (6); D (71)
JB2	A (58); B (20); C (13); D (461); H (1)
JB3	A (38); B (10); C (56); D (152)
JB4	A (78); B (3); C (2); D (255); E (1)
JC1	A (22); B (77); D (103); G (11)
JC2	A (2); B (1373); C (4); D (722); E (13)
JC3	B (16); D (209); G (4)
JD1	D (20)
JD2	B (1); C (1); D (14)
JD3	B (207); D (47)
JD4	D (1)
JD5	B (4); D (7); G (1)
JE1/4	D (25); G (12)
BAl	A (3); D (8); H (1)
BA2	B (1); D (119); E (10)
BBl	D (5); E (348)
BB2	E (1)
BB3	E (7)
BCl	N (1); D (25); E (3)
BC2	B (20); D (42); E (1)
BDl	D (1)
BD2	D (12); G (6)
BD3	–
BD4	D (12)
BD5	–
BD6	Gabbro (1)
DA1	B (3); D (25)
DA2	–
BBl	–
DB2	–
DB3	D (1)
PA1	A (13); B (1); P (160); H (49)
PA2	A (8); B (2); C (3); D (186); E (1)
PA3	A (3); B (1); C (1); D (21); E (2)
PBl	A (1); B (1280); C (6); D (712); E (4)
LID	B (1); D (1); G (1)

One new fabric, D16, has been recognized. It is a sandy fabric with medium grade quartz sand and sparse to moderate quantities of small black pellets (below 0.5 mm) which may be iron oxide.

Appendix 3: Surface treatment and decoration

The range of surface treatment and decoration recognized within the 1969–78 assemblage was fully discussed in the first report (Vol 2, 308–13). Modifications necessitated by a study of the 1979–88 assemblage are few and may be briefly listed here.

The overall surface treatment

Five categories of surface treatment were described. One of these, Category C, was referred to as 'haematite coating'. Petrological analysis has shown that there were a variety of methods used to achieve a red glossy surface in addition to coating with a haematite-rich slip. These include applying crushed iron oxide and simple wet burnishing which may bring a haematite-rich component of the clay to the surface. Since the actual technique used is not easily recognizable without petrological analysis it is thought preferable to use the phrase 'red finishing' without attempting further definition.

The method of applying decoration

Five methods of applying decoration were distinguished. Of these method 5 involved linear and curvilinear patterns shallow tooled onto the leather hard fabric. In an attempt to describe the decorative elements used a code was devised. The 1979–88 assemblage has added two new patterns: a square which may be filled with dots or lines (Fig 6.34, no 1182 and Fig 6.14, no 1269) and a circle within a swag or wave (Fig 6.15, no 1250). The code for the decorative motifs has therefore been expanded.

1. lines only
2. dots only
3. lines and dots
4. South Western Decorated ('Glastonbury') style deep tooling
   - a horizontal
   - b diagonal
   - c cross hatching
   - d zig-zag
   - e chevron
   - f arc
   - g swag
   - h wave
   - i dimple
   - j square
   - k circle

Appendix 4: Some typical stratified groups

In the first report the discussion of the pottery was enhanced by the publication of 33 stratified groups (11 in the main text and 22 in the fiche) chosen because they displayed a typical range of associations. From the 1979–88 assemblage an additional 25 groups have been selected. Of these 18 assemblages are published in the text to follow: the remaining seven will be found in Fiche 26:B1–10.

The basis of the current selection differed slightly from that adopted in the first report largely because excavation policy had changed. Fewer pits were dug but many more stratified contexts behind the ramparts were extensively excavated. This difference is reflected in the contexts chosen for discussion. Groups normally contain more than 50 sherds and about half contain more than 100.

Description follows the format set out in Volume 2.

Pit 1346 cp 3 (Fig 6.17)

Contains 205 sherds, all of cp 1–3 type. Fabrics: A, 11 (5.4%); B, 1 (0.5%); D, 162 (79.0%); E, 31 (15.1%). Jar and bowl fragments present in equal proportions but most jar rims are very fragmentary and not all are illustrated. Twenty-five sherds are red-finished.

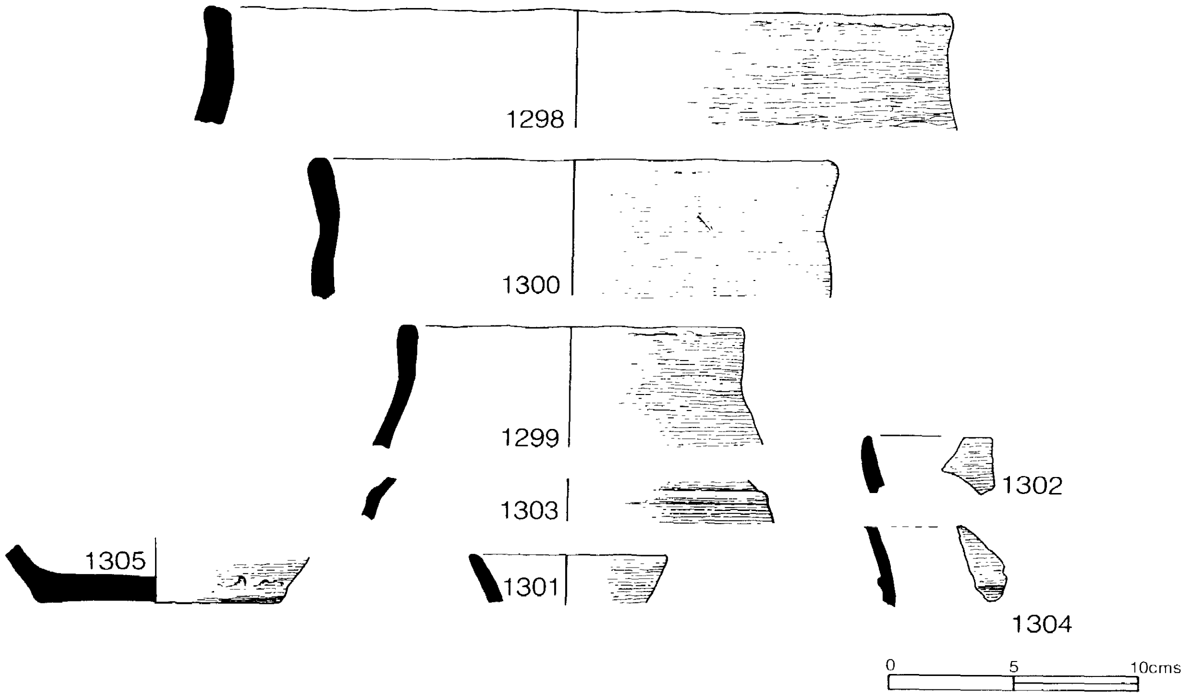


Figure 6.16 Key group: pit 1930.

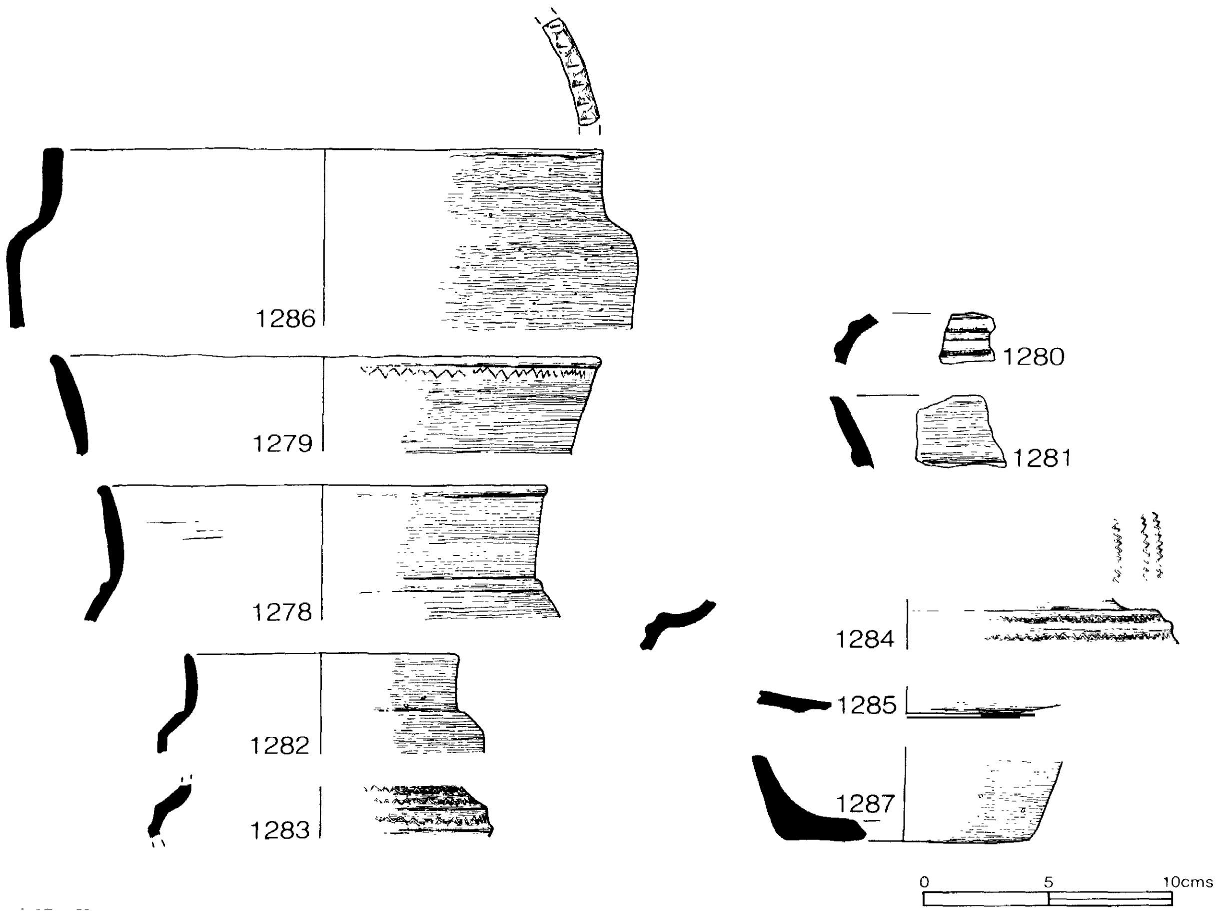


Figure 6.17 Key group: pit 1346.

Link to Next Section

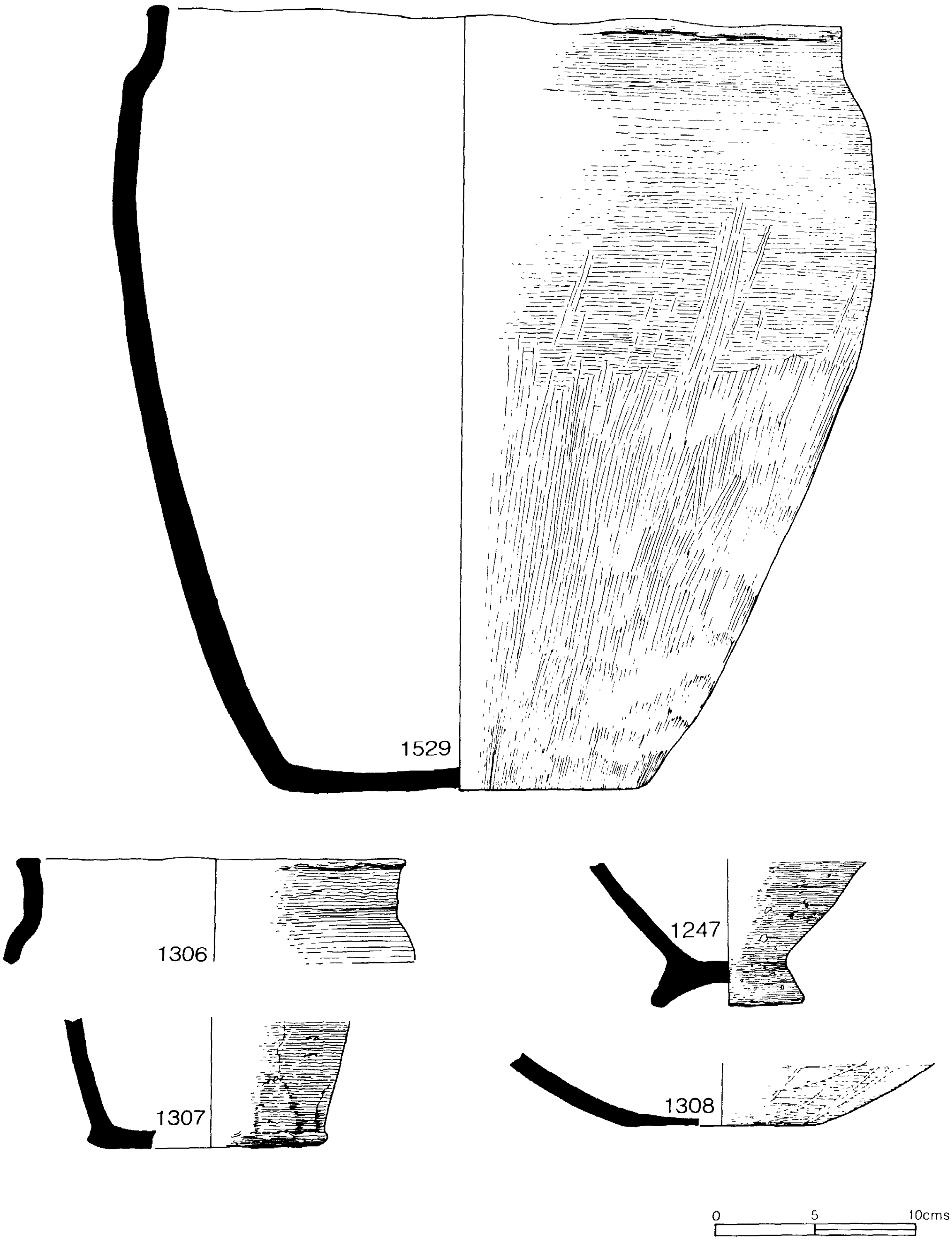


Figure 6.18 Key group: pit 2200.

Link to Previous Section

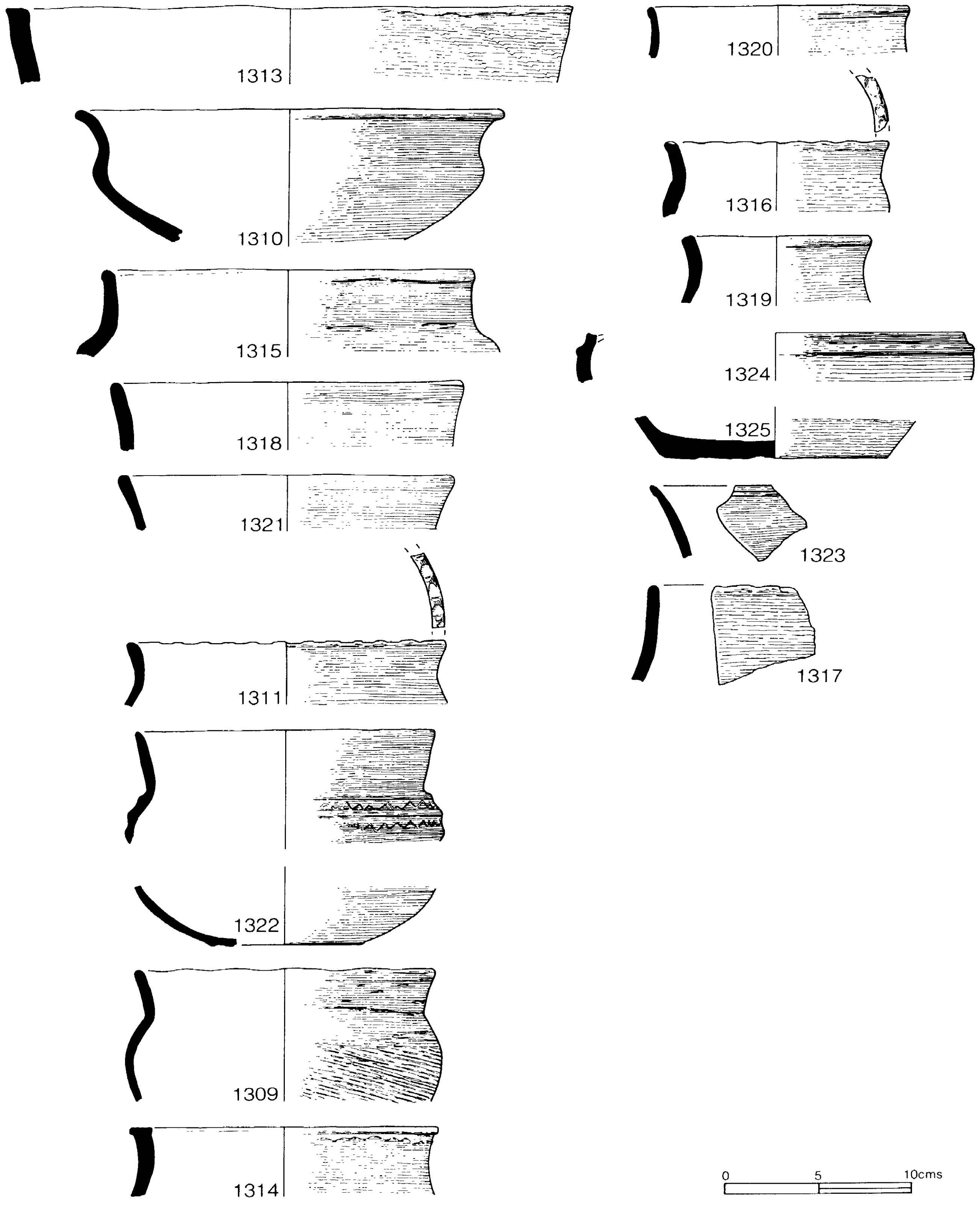


Figure 6.19 Key group: layers 730/731.

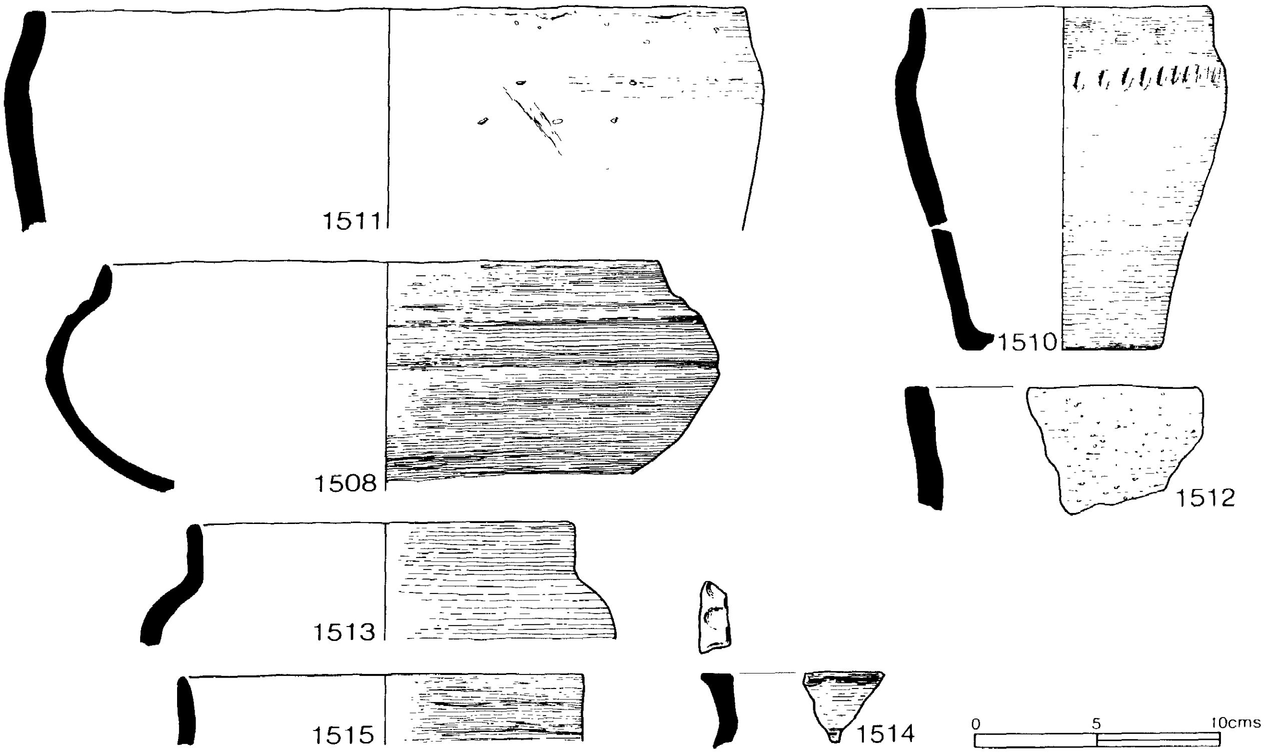


Figure 6.20 Key group: layer 2047.

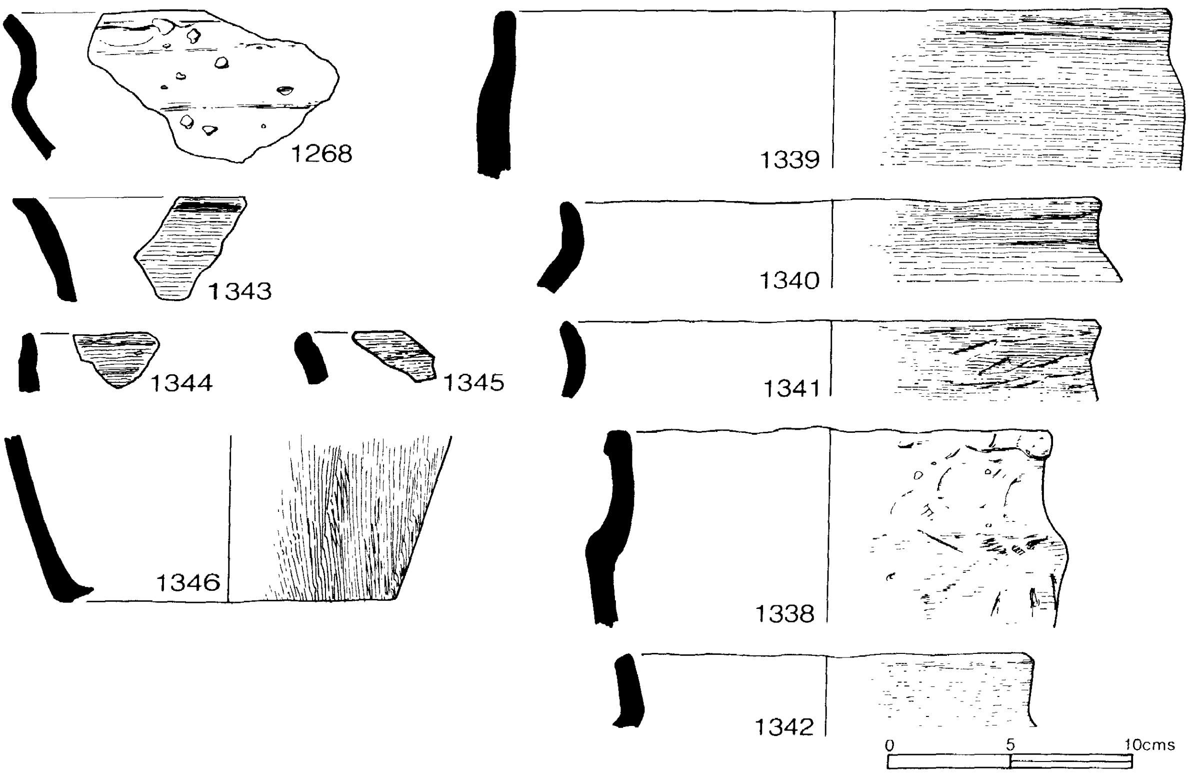


Figure 6.21 Key group: pit 2498.

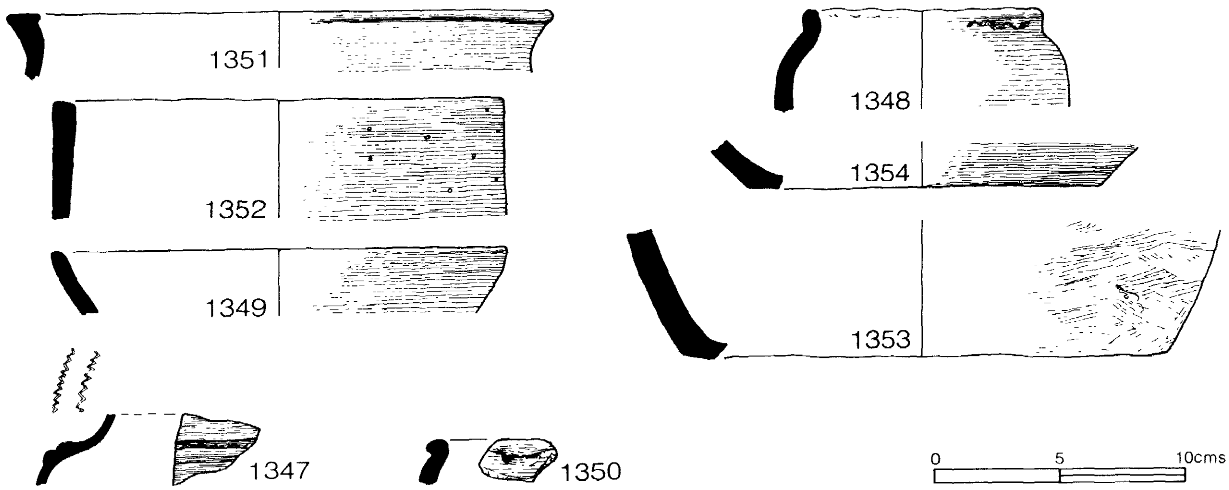


Figure 6.22 Key group: pit 2510.

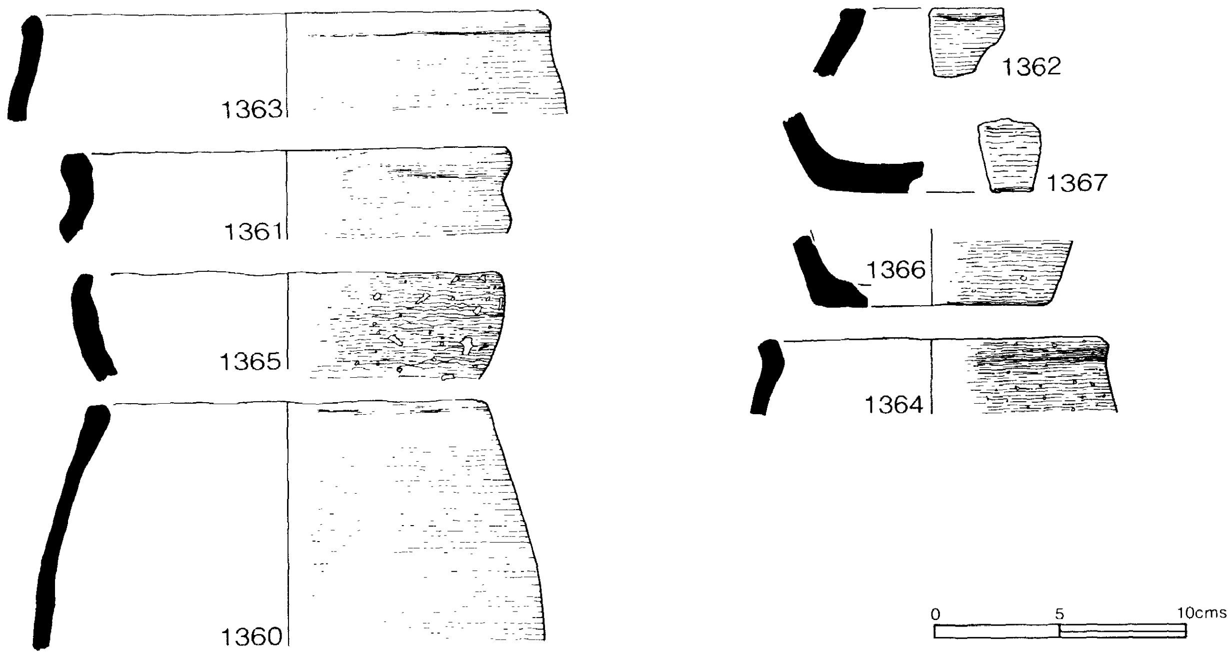


Figure 6.23 Key group: pit 2530.

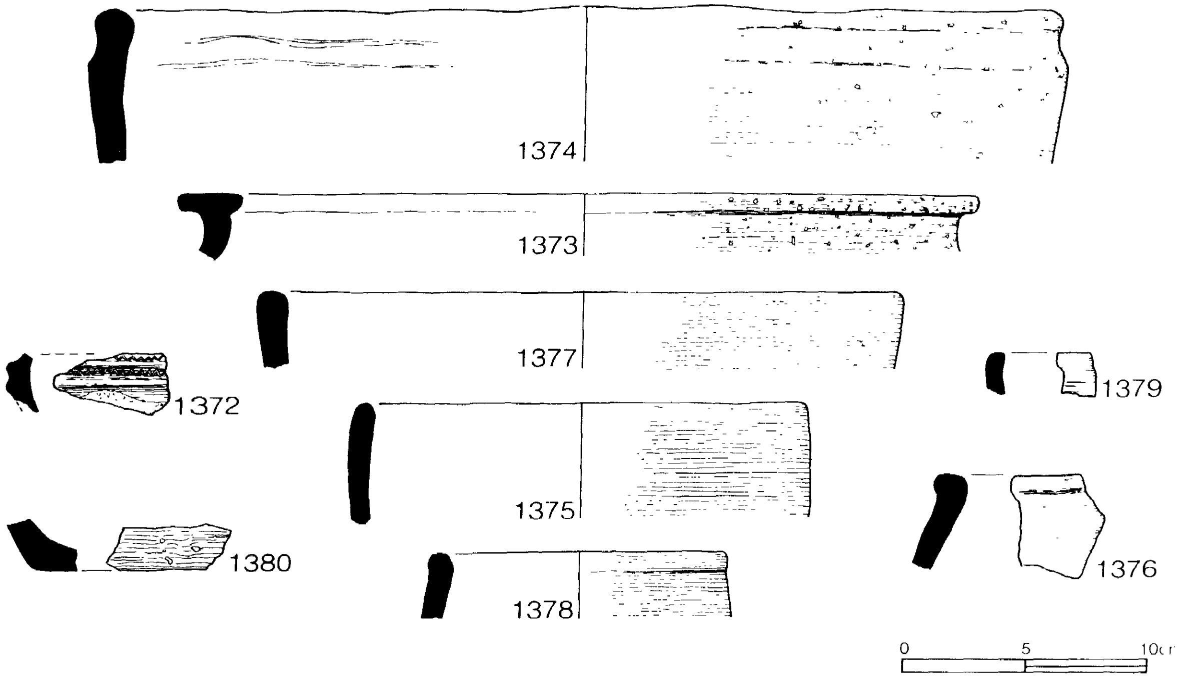


Figure 6.24 Key group: layer 773.

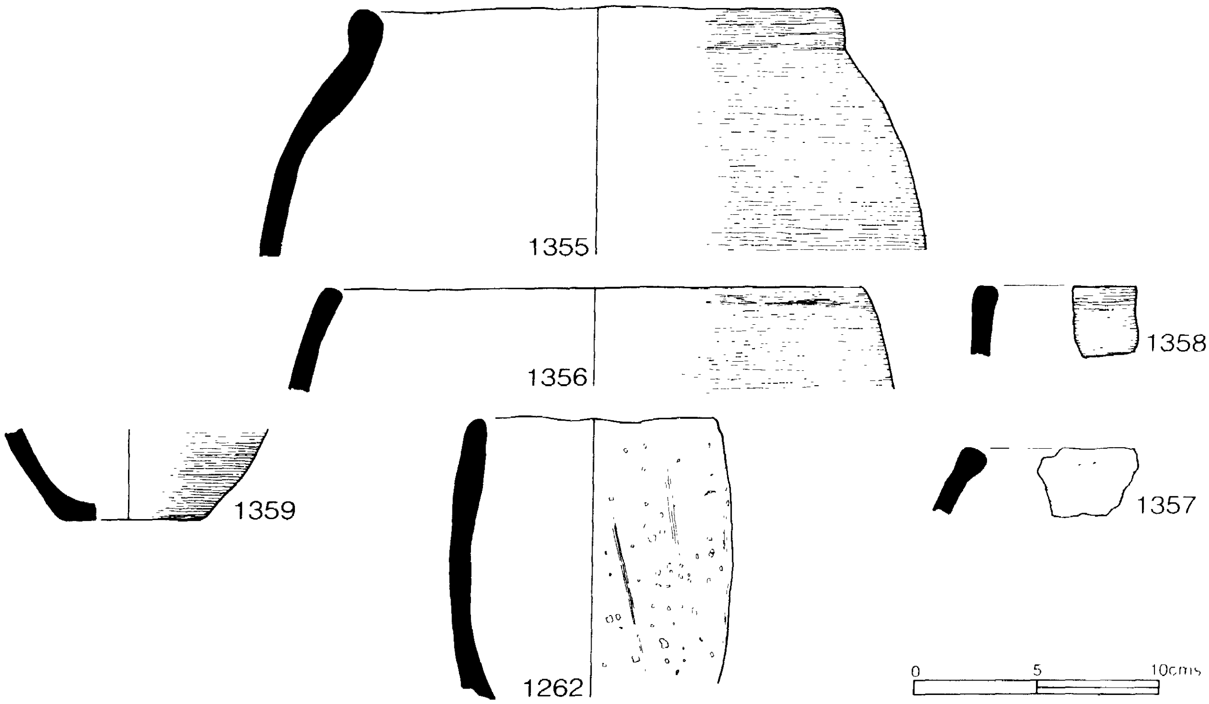


Figure 6.25 Key group: pit 2427.

Link to Next Section

	Form	Fabric	Surface	Layer
1278	BBl.1	E0	E	7
1279	BB1.l	E0	C1	6
1280	BBl.1	E0	C4	5
1281	BB1.l	E0	C4	6
1282	BB1.l	D0	C	5
1283	BBl.1	E0	C1,4	3
1284	BB3.1	E0	C4	5/6
1285	BS3.3	E0	E	6
1286	JBl.1	D8	B	5/6
1287	BS5.1	D0	D	4

Pit 1930 cp 3 (Fig 6.16)

Contains 55 sherds, all of cp 1–3 date. Fabrics: D, 45 (81.8%); E, 10 (18.2%). Jars and red-finished bowls are present in roughly equal proportions. No 1301 is an unusually small variety of the BBl type and could be better described as a cup.

	Form	Fabric	Surface	Layer
1298	JB2/3	D0	–	1
1299	JB3.0	D0	A	10
1300	JB3.1	D0	A	9
1301	BBl.l?	E0	C?	9
1302	BB1.1	E0	C	1
1303	BBl.1	E0	C4	1
1304	BB1.l	E0	E4	U/S
1305	BS5.1	DO	A	10

Pit 2200 cp 3 (Fig 6.18)

Contains 36 sherds, all of cp 1–3 date. Fabrics: A, 46 (12.6%); C, 1 (0.3%); D, 319 (87.1%). No certain bowl sherds, although no. 1308 is a common bowl base form. No red-finished wares present. The large jar, no 1529, is virtually complete.

	Form	Fabric	Surface	Layer
1306	JB2.2	D0	B3	3
1307	BS5.5	D0	A	3
1308	BS5.2	D0	D	3
1529	JB2.2	D0	D	2

Layer 730/731 cp 3 (Fig 6.19)

Contains 201 sherds, all of cp 1–3 date. Fabrics: D, 181 (90%); E, 20 (10%). Contains red-finished and coarse ware bowls. These slightly outnumber jar forms, most of which are relatively small, fine examples. [Subsequent to the excavation of these layers and the recovery of the pottery, it was decided that layer 730 should, on the basis of stratigraphic evidence, be subdivided, The period of deposition for all sherds cannot, therefore, be regarded as strictly contemporary. The majority of sherds derived from occupation layers within the quarry hollow (layer 730B) rather than rampart make-up. Some sherds joined with others from layer 731.]

	Form	Fabric	Surface	Layer	
1309	BA2.3	E0	D	730	
1310	BA2.2	D0	E	730	
1311	JBl.0	D0	B3	730	
1313	JB2/3	D0	B	730/731	
1314	JB2.0	E0	B	730/731	
1315	JB3.1	D0	B	731	over-fired
1316	JBl.2	D0	B3	730	
1317	BA2.3	D0	B	731	
1318	JB2/BA2	D0	D	730	
1319	BA2.3	D0	B	730	
1320	BA2.3	D0	D	730	
1321	BA2.3	E0	C	730	
1322	BBl.1	E 0	C4	731	
1323	BBl.1	E0	C	731	
1324	BB3.0	E0	C4	731	
1325	BS5.1	D16	A	731	

Layer 2047 cp 3 or 4 (Fig 6.20)

Contains 215 sherds of which four (1.9%) are probably of cp 4 date, and the remainder of cp 1–3 date. Fabrics: A, 21 (9.8%); C, 7 (3.2%); D, 180 (83.8%); E, 7 (3.2%). The cp 4 sherds belong to one vessel, no 1511, which is probably a PA2 form. No 1510, with finger-nail decoration on the shoulder, is virtually unique at Danebury. The layer produced sherds in fresh condition and several near complete profiles.

	Form	Fabric	Surface	Layer
1508	BB1.1	E0	C4	–
1510	JB1.3	C0:1	A3	–
1511	PA2.1	D0	A	–
1512	JB2/3	D0	A	–
1513	JB3.1	D0	B	–
1514	JBl.0	D0	B3	–
1515	BB1.l	E0	C	–

Pit 2498 cp 3 or 4 (Fig 6.21)

Contains 112 sherds all of cp 1–3 date with the exception of no 1339. Fabrics: A, 9 (8.1%); D, 101 (90.1%); E, 2 (1.8%). This is essentially a cp 3 assemblage dominated by coarse jars, but the presence of 1339, a JB4 type of cp 4 date, and a lack of red-finished wares may indicate a slightly later date.

	Form	Fabric	Surface	Layer
1268	BA2.2	D5	B	4
1338	JB2.2	A1	A	7
1339	JB4.1	D5	D	1
1340	JB2/3	D0	A	7
1341	JB2/3	D0	D	1
1342	JB2/3	D0	B	1
1343	JB2/3	D0	D	U/S
1344	BA2.0	D8	B	1
1345	BA2.3	D0	B	3
1346	BS5.1	D0	A	3

Pit 2510 cp 4 or 5 (Fig 6.22)

Contains 79 sherds of which one is of possible cp 5 date. Fabrics: A, 6 (7.6%); B, 1 (1.3%); D, 70 (88.6%); E, 2 (2.5%). The possible cp 5 sherd, no 1350, is very fragmentary so its form is not certain. A large quantity of cp 3 pottery is present and includes shouldered jars and red-finished bowls.

	Form	Fabric	Surface	Layer
1347	BB3.1	E0	E4	9
1348	JB4.1	D8	B	7
1349	BA2.3	D0	D	5
1350	JC2.0?	D0	A	3
1351	JB2/3	D0	D	3/5/6
1352	PA2.1	D0	D	2
1353	BS5.1	D0	B	5
1354	BS5.1	D0	D	3

Pit 2530 cp 5 (Fig 6.23)

Contains 75 sherds of which five (6.7%) are cp 5 forms. Fabrics: A, 15 (20.0%); B, 5 (6.7%); D, 54 (72.0%); E, 1 (1.3%). There are few apparent derived cp 3 sherds present and only one vessel, no 1361, need date as early as cp 4. The hemispherical dish, no 1365, is a rare form at Danebury.

Link to Previous Section

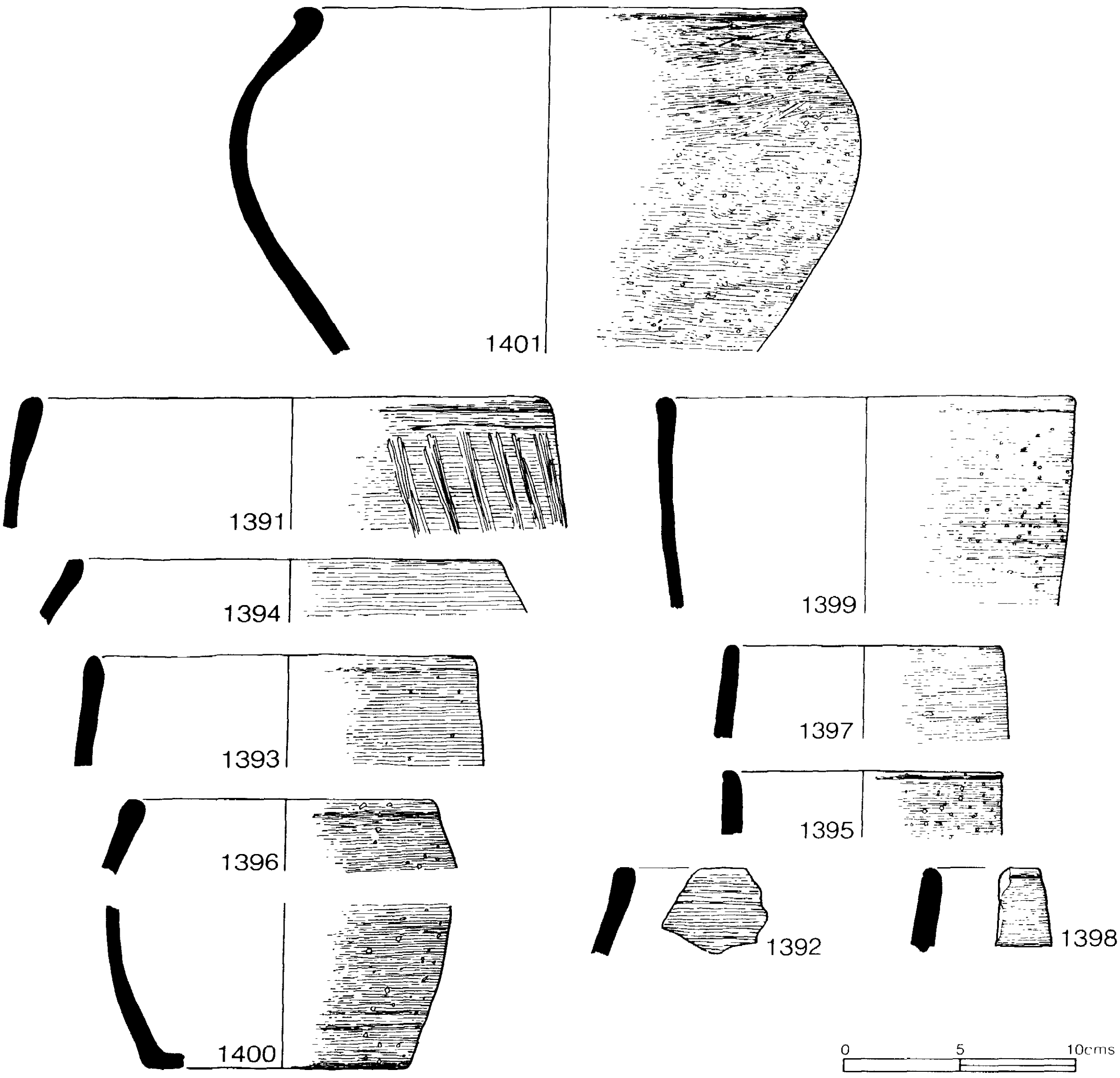


Figure 6.26 Key group: pit 2184.

	Form	Fabric	Surface	Layer
1360	JC2.2	D0	B	5
1361	JB2.3	D 0	B	5
1362	JC2.0	D 0	A	5
1363	JC2.2	D 0	E	5
1364	JC2.3	B 1	D	5
1365	DB3	A1	A	5
1366	BS5.1	D0	D	5
1367	BS5.1	D 5	A	1

Layer 773 cp 5 (Fig 6.24)

Contains 52 sherds, of which six (11.5%) are of cp 5 date. Fabrics: A, 11 (21.2%); B, 5 (9.6%); C, 1 (1.9%); D, 34 (65.4%); E, 1 (1.9%). The cp 5 vessel is a fragmentary bi-partite jar. Redeposited material includes tri-partite jars and scratched-cordoned red-finished bowls. The context represents occupation build-up in the base of a quarry hollow.

	Form	Fabric	Surface	Layer
1372	BBl.l	E0	Cl,4	–
1373	Misc.	C0:1	B	–
1374	JB4.1	A1	D	–
1375	JC2.2	D0	E	–
1376	JC2.0	B4	B	–
1377	PA2.1	D0	E	–
1378	JC2.3	D0	D	–
1379	JC2.0	DO	B	–
1380	BS5.1	Al	A	–

Pit 2427 cp 5 (Fig 6.25)

Contains 161 sherds of which 25 (15.5% – all belonging to one vessel) are of cp 5 date. Fabrics: A, 5 (3.1%); B, 5 (3.1%); C, 1 (0.6%); D, 150 (93.2%). The majority of vessels are early saucepan pot forms (PA2 and PA3), the obvious exception being the cp 5 example, no 1355, a bi-partite jar.

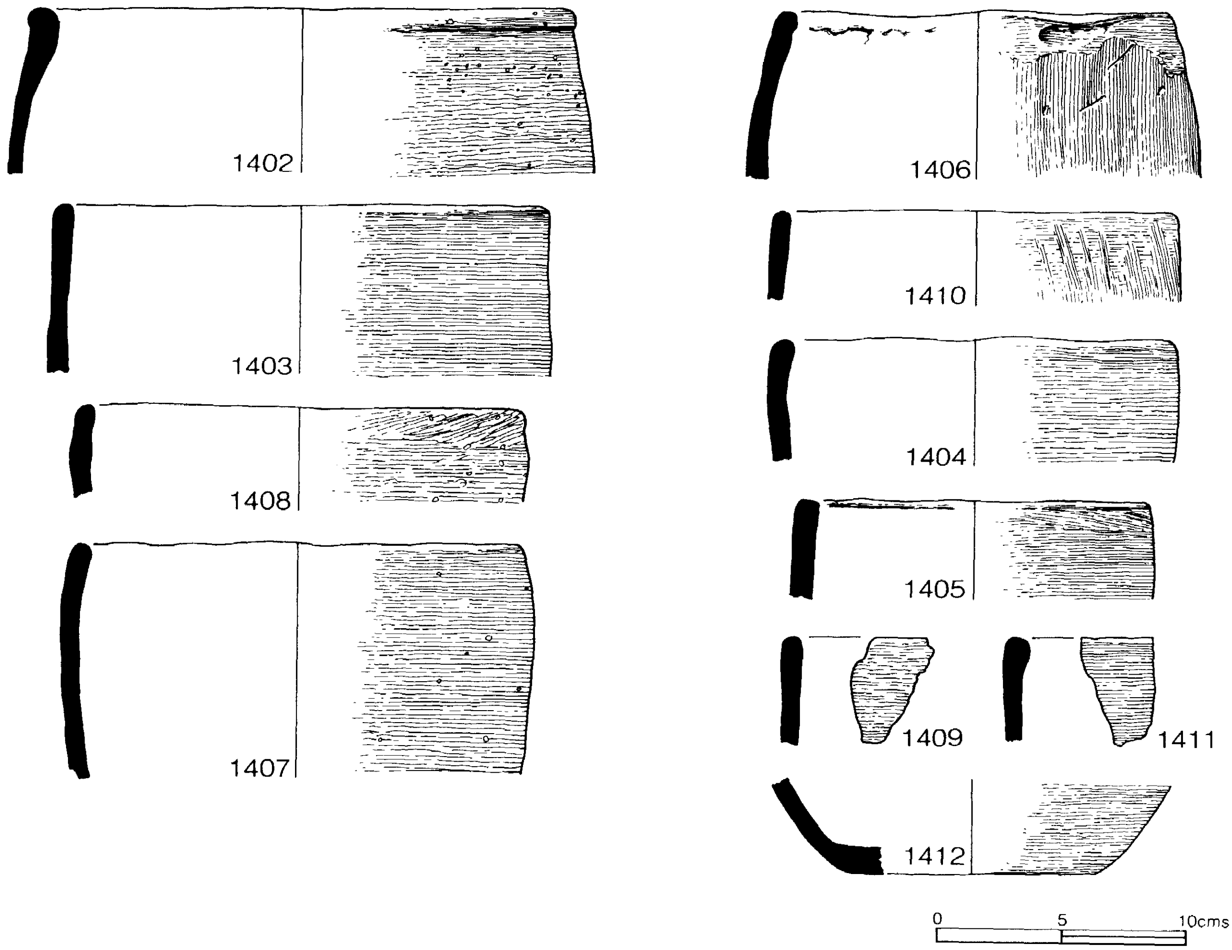


Figure 6.27 Key group: pit 2426.

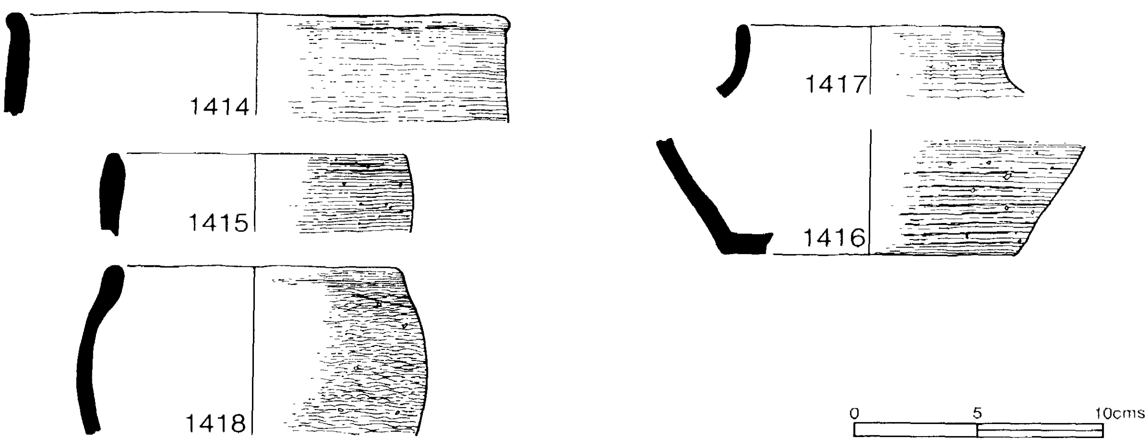


Figure 6.28 Key group: pit 2531.

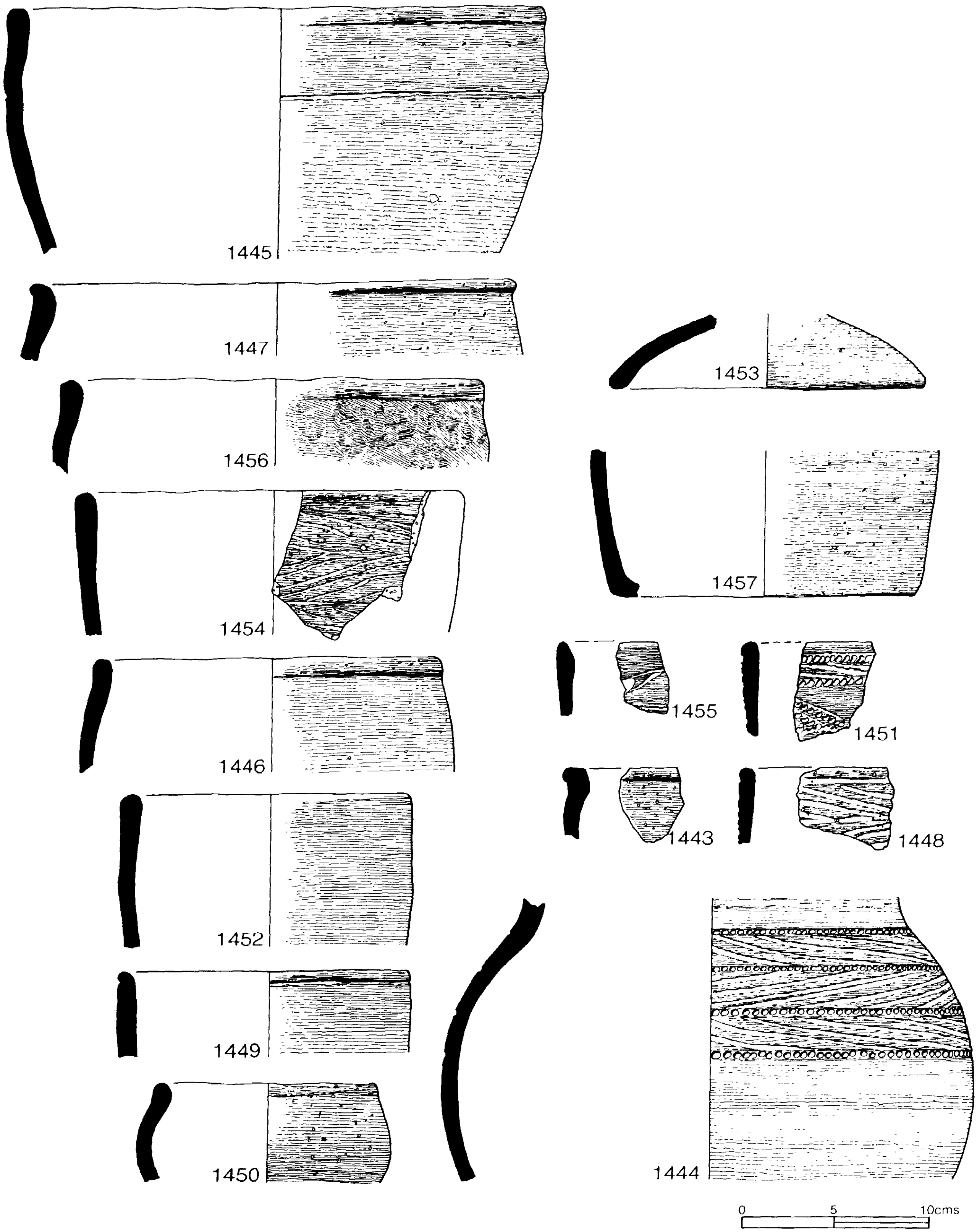


Figure 6.29 Key group: pit 2269.

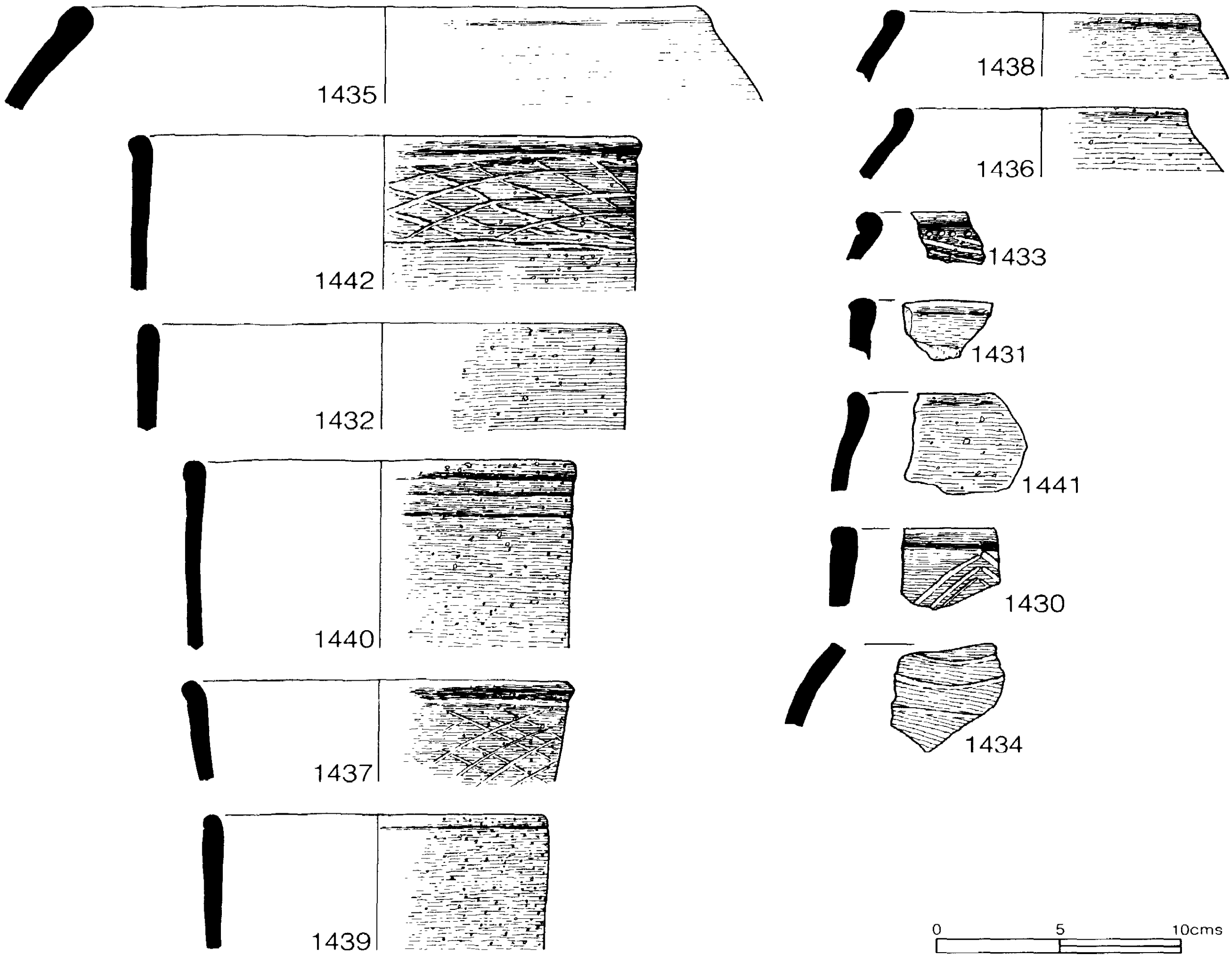


Figure 6.30 Key group: pit 2444.

	Form	Fabric	Surface	Layer
1262	PA3.1	A2	B	11
1355	JC2.1	D0	E	9
1356	PA2.1	D8	D	9
1357	PA2.1	D0	E	9
1358	PA2.1	D0	E	U/S
1359	BS5.l	D0	B	9

Pit 2184 cp 6 (Fig 6.26)

Contains 82 sherds, of which 77 (93.9%) are characteristic of cp 6. Fabrics: B, 76 (92.7%); D, S (6.1%); E, 1 (1.2%). A typical middle period pit group containing undecorated saucepan pots and bi-partite jars in flint-tempered fabrics. There is very little obvious redeposited material.

	Form	Fabric	Surface	Layer
1391	PB1.1	Bl	E	3
1392	JC2.0	B1	E	1,2,3
1393	PBl.1	B1	E	3
1394	JC2.0	B1	E	3
1395	PB1.l	B1	E	3
1396	JC2.3	B1	D	1
1397	PB1.l	B1	E	1
1398	PB1.l	D0	E	3
1399	PB1.l	Bl	E	1
1400	BS5.l	B1	E	7
1401	JC2.3	B1	B	7

Pit 2426 cp 6 (Fig 6.27)

Contains 99 sherds, of which only three (3.0%) are of cp 6 date. Fabrics: A, 8 (8.1%); B, 2 (2.0%); C, 1 (1.0%); D, 88 (88.9%). The majority of classifiable forms are saucepan pots of the early variety (PA). This, coupled with the low percentage of sherds in Fabric B, should indicate a deposition date very early in cp 6.

	Form	Fabric	Surface	Layer
1402	JC2.2	B1	E	2
1403	PA2.1	D0	E	5
1404	PA2.1	D0	D	18
1405	PA2.1	D0	E	10
1406	PAl.2	D0	B	9/10
1407	PAl.2	D0	D	18
1408	PA1.2	D 5	E	5
1409	PB1.l	D0	E	10

Link to Next Section

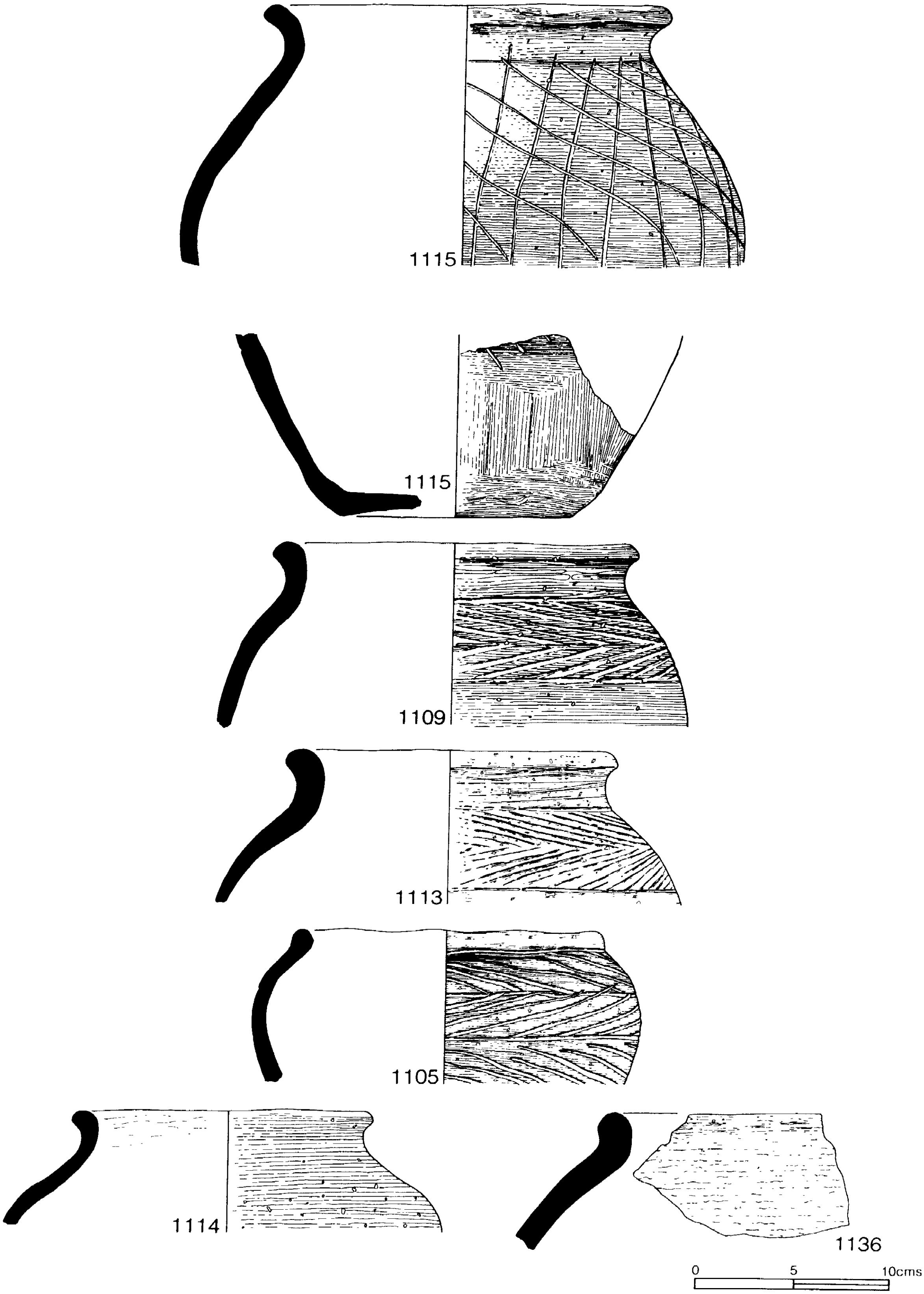


Figure 6.31 Key group: pit 2110.

Link to Previous Section

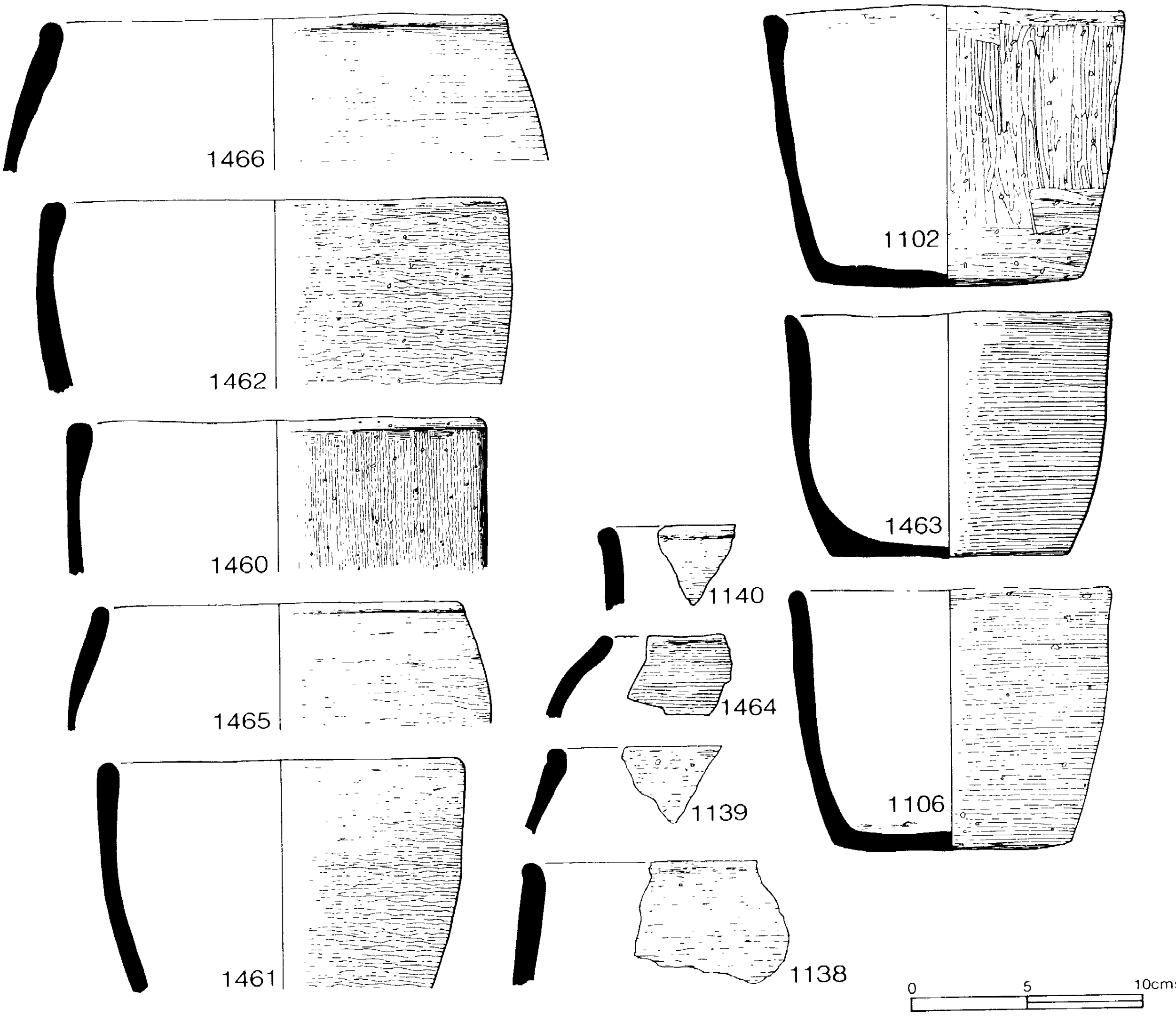


Figure 6.32 Key group: pit 2110.

1410	PBl.l	DO	E	7
1411	PA2.1	DO	E	9
1412	BS5.2	D5	D	18

Pit 2531 cp 6 (Fig 6.28)

Contains 90 sherds of which two (2.2%) are of cp 6 type. Fabrics: A, 1 (1.2%); B, 67 (74.4%); D, 22 (24.4%). This small assemblage contains typical cp 5 and 6 types – undecorated saucepan pots and bi-partite jars.

	Form	*Fabric*	*Surface*	*Layer*
1414	PB1.l	D0	–	2
1415	PB1.l	B1	E	3
1416	BS5.1	Bl	E	2
1417	JD1.l	B1	B	3
1418	JC2.3	D0	E	2/3

Pit 2269 cp 7 (Fig 6.29)

Contains 141 sherds of which 15 (10.6%) are characteristic only of cp 7. Fabrics: B, 126 (89.4%); D, 14 (9.9%); E, 1 (0.7%). A typical late group with a high percentage of sherds in Fabric B and a variety of shallow-tooled vessels. The lid is a rare type at Danebury.

	Form	Fabric	Surface	Layer
1443	JC2.0	B1	D	2
1444	JD3.1	B1	E5.3b	7
1445	JC2.0	Bl	E	8
1446	JC2.3	B1	E	U/S
1447	JC2.2	B1	D	1
1448	PB1.1	B1	E5.1b	4
1449	PB1.l	D0	E	7
1450	BC2.1	Bl	E	4
1451	PB1.l	B1	5.3b,d	3
1452	PB1.l	B1	E	U/S
1453	Lid	B 1	E	2
1454	PBl.1	B1	E5.1	b
1455	PB1.1	D0	E5.lb	8
1456	JC2.3	Bl	E	4/8
1457	BS5.3	Bl	E	1

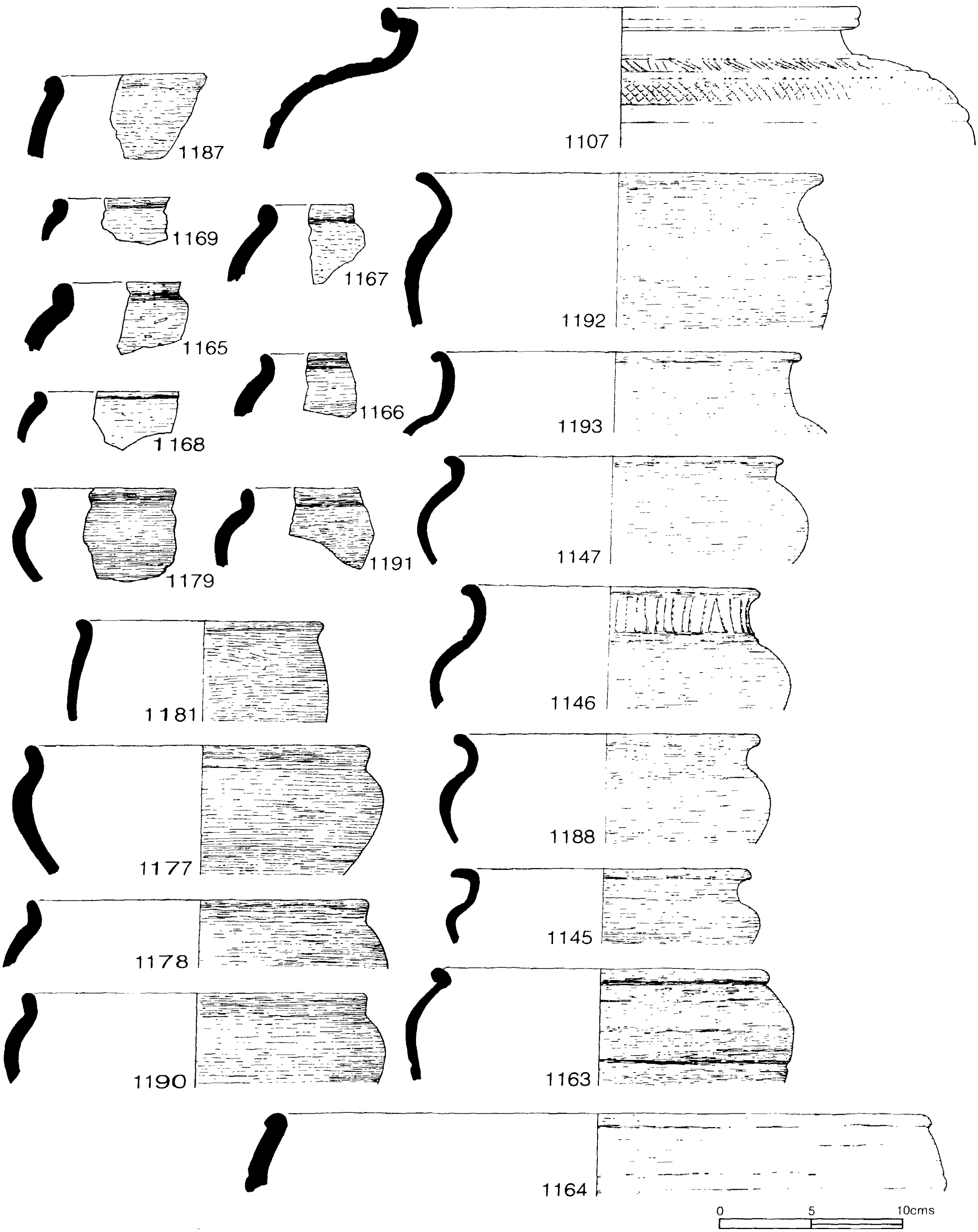


Figure 6.33 Key group: pit 1481.

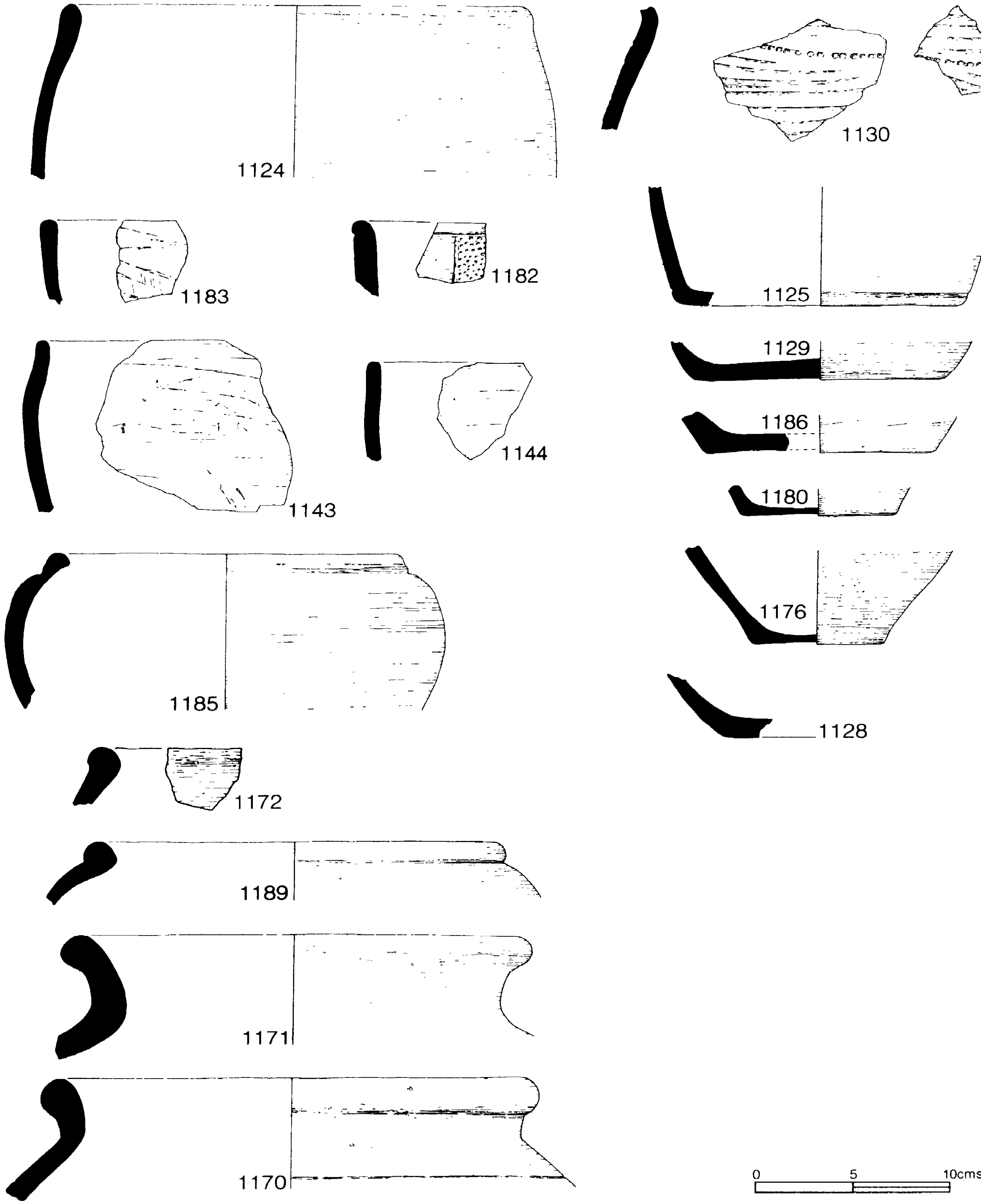


Figure 6.34 Key group: pit 1481.

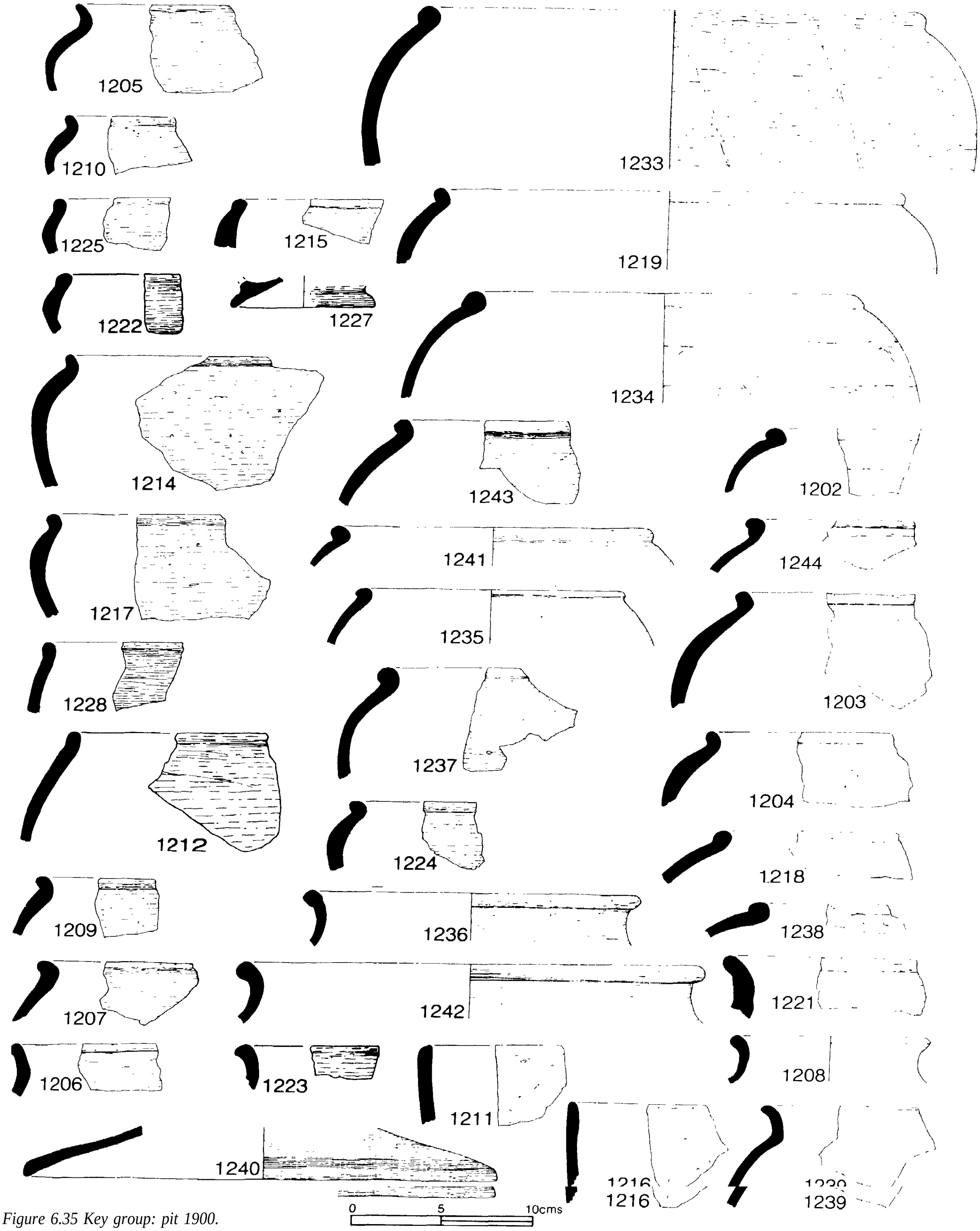


Figure 6.35 Key group: pit 1900.

Link to Next Section

Pit 2444 cp 7 (Fig 6.30)

Contains 186 sherds of which nine (4.8%) are cp 7 types. Fabrics: A, 2 (1.1%); B, 162 (87.1%); D, 22 (11.8%). This group appears to contain only a small proportion of redeposited early (pre-cp 6/7) pottery. Bi-partite jars and saucepan pots are present in roughly equal quantities.

	Form	*Fabric*	*Surface*	*Layer*
1430	PB1.1	Dl5	E5.1d	6
1431	JB2/3	D0	B	5
1432	PB1.1	B3	E	4
1433	JC2.3	B1	E5.3b	?
1434	–	D15	E5.1f	6
1435	JC2.1	D0	E	2
1436	JC2.3	B3	D	1
1437	PB1.l	B1	E5.1c	1/3
1438	JC2.3	B1	E	3/4
1439	PB1.l	B1	E	l/6
1440	PBl.l	B1	E5.la	6
1441	JC2.3	B1	E	2
1442	PB1.l	Bl	E5.lc	l/2

Pit 2110 cp 7 (or 8?) (Figs 6.31 and 6.32)

Contains 848 sherds of which one (0.1%) is a possible cp 8 vessel. Fabrics: B, 750 (88.4%); D, 98 (11.6%). A very fragmentary sherd of a possible JC3 form (unillustrated) in glauconitic sandy ware was recovered from the primary fill of the pit but the assemblage is otherwise a typical cp 7 group with a high percentage of sherds in Fabric B.

	Form	*Fabric*	*Surface*	*Layer*
1102	PB1.l	B1	E	5
1105	JC2.3	B1	E5.lb	5
1106	PB1.l	B1	E	5
1109	JD3.1	B1	E5.lb	5
1113	JD3.1	B1	E5.lb	5
1114	JD3.1	B1	E	5
1115	JD3.1	Bl	E5.lc	5
1136	JD5.1	D0	E	5
1138	PB1.l	B 1	E	5
1139	JC2.0	B3	–	5
1140	PBl.1	B3	E	5
1460	PB1.l	B1	E	5
1461	PB1.l	D8	E	5
1462	PB1.1	B1	E	5
1463	PB1.l	D0	E	5
1464	JC2.3	B1	E	5
1465	JC2.3	D15	E	5
1466	JC2.3	D0	E	5

Pit 1481 cp 7–8 (Figs 6.33 and 6.34)

Contains 386 sherds of which 28 (7.3%) are of cp 8 type. Fabrics: B, 96 (24.9%); C, 1 (0.3%); D, 270 (69.9%); E, 2 (0.5%); G, 17 (4.4%). A relatively large number of cp 8 forms and a preponderance of sand-tempered fabrics recovered from layers 1, 2 and 5 indicate a late date for the deposition of this assemblage. The top layer produced a quantity of cp 9 wares but this almost certainly represents material accumulated in the subsidence hollow.

	Form	*Fabric*	*Surface*	*Layer*
1107	JE1/4	D0	E5.6	1
1124	JC2.2	D15	E	11
1125	BS5.3	Bl	E	11
1128	BS5.1	D0	E	11
1129	BS5.1	D0	E	11
1130	–	B1	E5.3b	11
1143	JC2.2	D0	D	11
1144	PB1.l	B 1	E	11
1145	BD4.0	D0	E	1B
1146	BD4.0	D0	E5.1	1A
1147	BD4.0	D0	E	1A
1163	JE1/4	D0	E	1
1164	JE1/4	D0	E	1
1165	JC3.1	D8	E	1
1166	JC3.1	D0	E	1
1167	JC3.1	D0	E	1
1168	JC3.0	D0	E	1
1169	JC3.0	D 0	E	1
1170	JE1/4	D13	E	7
1171	JE1/4	D13	E	7
1172	JC2.0	D 0	E	7
1176	BS5.1	D0	E	2
1177	JC3.2	D 0	E	2
1178	JC2.3	D0	E	2
1179	JC3.2	D0	E	2
1180	BS5.1	D0	D	2
1181	JC2.3	D 5	E	11
1182	PB1.1	D0	E5.3j	11
1183	PBl.1	D0	E5.1b	11
1185	JC3.1	G0	B	5
1186	BS5.1	D0	E	5
1187	JC2.3	D0	D	5
1188	BD4.0	D0	E	5
1189	JC3.1	G 0	E	5
1190	JC3.1	D13	E	5
1191	JC3.0	D 0	E	5
1192	BD4.0	D0	E	5
1193	JE1/4	D0	E	5

Pit 1900 cp 7/8-9 (Fig 6.35)

Contains 589 sherds of which 29 (4.9%) are of cp 8 date. Fabrics: A, 1 (0.2%); B, 78 (13.3%); D, 462 (78.4%). The pit, which was not completely excavated, divides into two parts. Layers 1–3 produced cp 8 pottery (with some Roman and cp 9 examples in the top layer). The lower layers produced cp 3–7 pottery in much smaller quantities.

	Form	*Fabric*	*Surface*	*Layer*	
1202	JC3.1	D 0	D	1	
1203	JC3.1	D8	E	1	
1204	JC3.1	G 0	E	1	
1205	JC3.2	D17	D	1	
1206	BD4.2	D 0	D	1	
1207	JC2.3	D0	E	1	
1208	JE1/4	D0	E	1	
1209	JC2.3	D0	E	1	
1210	JC3.2	B 1	E	1	overfired
1211	PB1.1	D5	E	10	
1212	JC2.3	D0	E	10	
1214	JC3.2	B 1	E	3	
1215	JC3.1	D0	E	3	
1216	PB1.l	B 1	E	3	
1217	JC3.1	G0	E	3	
1218	JC3.1	D0	E	3	
1219	JC3.1	G0	E	3	
1221	JE1/4	D13	E	3	
1222	JC3.1	D 0	E	3	
1223	JE1/4	D0	E	3	
1224	JC3.1	G 0	E	3	
1225	JC3.1	D0	E	3	
1227	BS2.1	D 0	E	1	
1228	JC2.3	D0	E	5	
1233	JC3.1	D 0	E	2	
1234	JC2.3	D0	E5.1b	2	

Link to Previous Section

1235	JC2.3	D 0	E	2
1236	JE1/4	D0	E	1
1237	JC3.1	D17	E	2
1238	JC3.0	D 0	E	1
1239	JE1/4	D17	E	1
1240	Lid	D0	E	2
1241	JC3.0	D0	E	1
1242	JE1/4	D0	E	1
1243	JC2.3	D 0	E	1
1244	JC3.0	D0	E	1

Appendix 5: The nature of the available archive

The pottery from the 1969–78 excavation is housed by the Hampshire Museum Service. The 1979–88 collection is at present stored at the Institute of Archaeology at Oxford pending transfer to Hampshire.

The written archive consists of the following:

a. Catalogue of all illustrated sherds (whether published or not) including all basic data. Arranged in order of unique sherd number.
b. Recording proforma. One or more A4 sheets for each context recording sherds and sherd groups by form, fabric and surface decoration giving number of sherds and weights. For the assemblage recovered in 1985–8 additional characteristics were listed including count and type of base sherds, condition, extent and type of residue if any, and diameter of inner and outer rim and base.
c. Computerized data file. All information recorded on the context sheets has been transferred to computer and sorted in a variety of ways producing a collection of print-outs.

Appendix 6: Early Iron Age pottery from the primary rampart

A small group of some 95 sherds weighing 588 gm was recovered from the primary rampart sectioned in 1987. The sherds came from a pile of turves (layers 1738 and 1756), presumably derived from the immediate neighbourhood. The particular interest of this group lies in the fact that it pre-dates the construction of the main fort defences and can most simply be accommodated in ceramic phase 1–2.

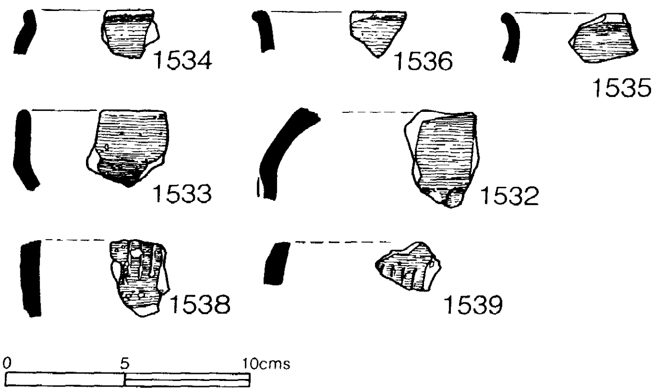


Figure 6.36 Pottery of cp 2 from within the primary rampart.

Eight fabrics could be identified. Most of them can be equated roughly with the main fabric series but they have been separately categorized and are described in detail in Fiche 26:A3–4. In summary Fabrics 1–7 are flint tempered and differ only in the nature of the sandy clay used as a base. Fabric 8 was an untempered sandy ware.

Only seven sherds could be categorized by form and decoration (Fig 6.36).

Catalogue of illustrated sherds (Fig 6.36)

1532 Shoulder fragment with fingertip decoration. Fabric 7. Form JA1.0
1533 Fabric 3. Form BA1.2
1534 Fabric 3. Small bowl unclassified
1535 Fabric 4. Form BA2.2/3
1536 Fabric 4. Form BA2/3
1538 Fabric 1. Shoulder fragment with vertical stabbing
1539 Fabric 1. As 1538, possibly part of same vessel.

Appendix 7: Catalogue of cp 9 pottery

A small collection of pottery of cp 9 type was recovered from a variety of contexts usually the uppermost silts sealing pit tops in the area excavated in 1979/80. A selection of these are illustrated here (Fig 6.37). Three, nos 1564–6, are Gallo-Belgic imports identified by Valerie Rigby, the rest are local products, the majority coming from the Alice Holt region (see above p 285). Detailed descriptions will be found in Fiche 26:A5–7.

Bibliography

CUNLIFFE, B. 1987: *Hengistbury Head, Dorset. Volume I: The Prehistoric and Roman Settlement, 3500 BC–AD 500* (Oxford: OUCA Monog 13).

LOCK, G.R. 1987: Aspects of quantification. In Cunliffe B. 1987, 282–9.

LYNE, M.A.B. & JEFFERIES, R.S. 1979: *The Alice Holt/Farnham Roman Pottery Industry* (London: CBA Research Report 30).

MIDDLETON, A. 1987: Technological investigation of the coatings on some 'haematite-coated' pottery from southern England. *Archaeometry* 29(2), 250–61.

ORTON, C.R. 1975: Quantitative pottery studies: some progress, problems and prospects. *Science and Archaeology* 16, 30–5.

ORTON, CR. 1980: *Mathematics in Archaeology.*

PEACOCK, D.P.S. 1969: A Contribution to the Study of Glastonbury Ware from South-Western Britain. *Antiq. Journ.* 49, 41–61.

RIGBY, V. 1981: The Central Gaulish Imports. In Partridge, C., *Skeleton Green, a late Iron Age and Romano-British Site* (London: BMS 2), 159.

SHARPLES, N. forthcoming: *Excavations at Maiden Castle.*

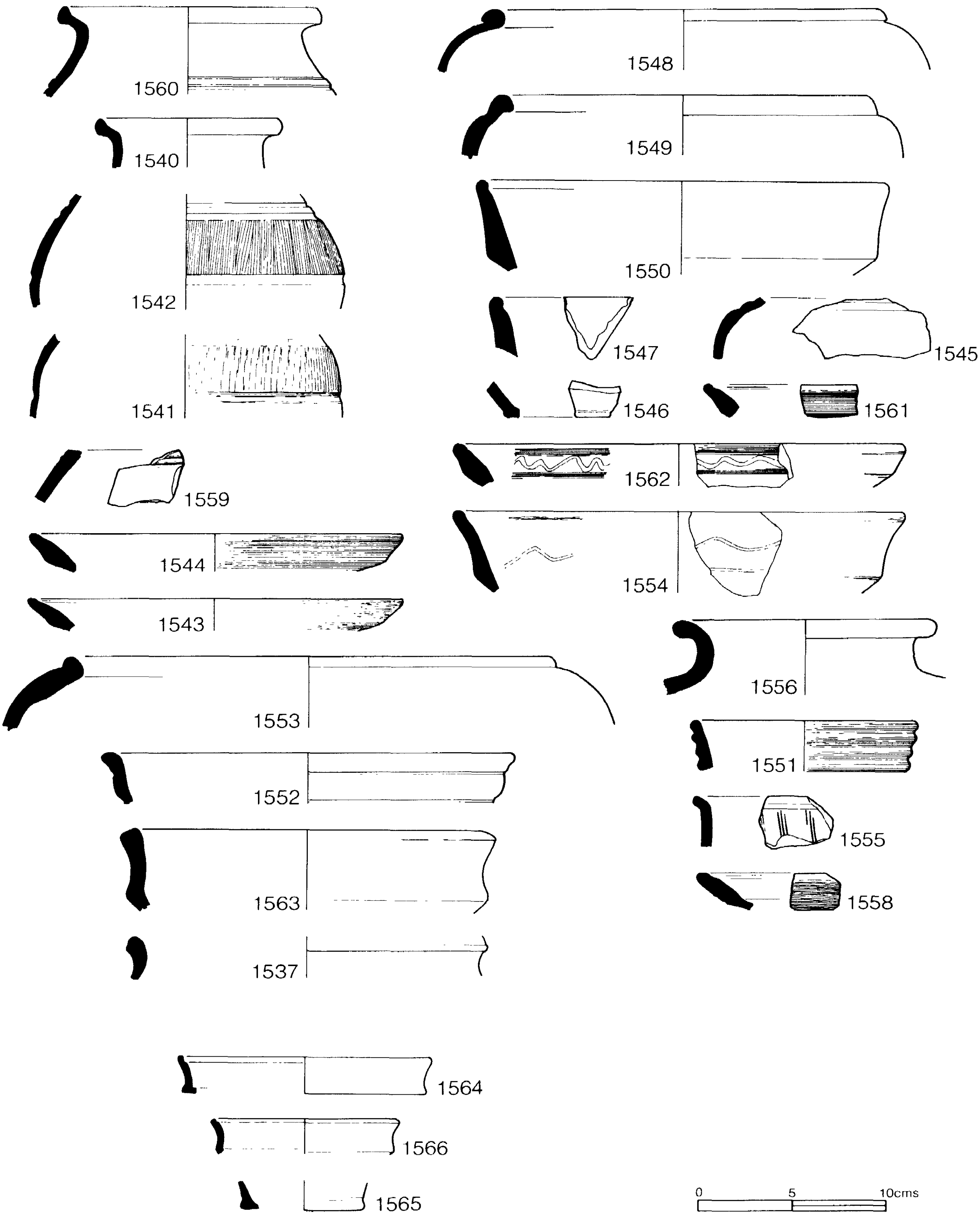


Figure 6.37 Pottery of cp 9 from various contexts.

Link to Next Section

7 The material remains

7.1 Small finds

7.1.1 Introduction

In this section we consider first the collection of coins brought together by metal detector users working fields outside the scheduled area of the fort. Then follows a catalogue of items found in the excavations. As in the first series of reports these small finds are arranged according to the material of which they are made. Each group has been given a prefix, thus:

1 bronze
2 iron
3 bone and antler
4 Kimmeridge shale
5 coral and amber
6 glass
7 baked clay
8 stone
9 wood.

Within each group the illustrated finds are numbered consecutively, the first number in this report following on from the last number in the first finds report (Vol 2). In this way every illustrated find has a unique number. The majority of the finds are illustrated here. The amount of descriptive detail given in the main text varies according to perceived importance of the item. While a few individual pieces are considered in detail, for the most part the discussion focuses upon groups of like finds. No attempt has been made to reiterate points already made in the first report.

The finds report contains some basic statistics which might be helpful in considering the relative frequency of artefacts. Phasing is based on *preferred ceramic phase* ie the ceramic phase derived by accepting the latest pottery as reflecting the ceramic phase of the context unless stratigraphical evidence from intercutting features or from horizontal stratigraphy demands a later ceramic phase. The question has been explored in more detail above (Section 6.3.10). The *frequency index*, used in Volume 2, has not been employed here. Once a system of establishing a reliability index for each context has been developed matters of frequency can be more profitably addressed. In the fiche report (Fiche 26:B11–30:A4) a full listing of all finds is given and each item, whether illustrated or not, is individually described, the description noting details of context and weight. It is very simple, therefore, for a reader wishing to explore details of an illustrated find or category of finds to go straight to the relevant fiche frame.

7.1.2 Coins (Figs 7.1–7.4)

by R.D. Van Arsdell

More than 75 Celtic coins have been found at Danebury, but only two of these were discovered during excavations. The others include one chance find from within the fort, and a group of over 70 pieces found by a metal detector user outside the fort to the east (Vol 4, 21). Of the three coins found inside the fort, the Gallo-Belgic C and Verica plated staters were found during the 1969–1978 excavations, while the Durotrigan silver stater was found before 1858. These have been discussed in the second volume of the excavation report (Vol 2, 332–5). Two were ancient forgeries. The high percentage of false coins is also not surprising. Forgeries would be thrown away as worthless objects once detected.

One large group of coins, described as a 'hoard', was found early in 1984 by a metal detector user in the field immediately to the east of the outer earthworks just to the south of the trig point dispersed throughout the plough-disturbed top soil. The hoard was recorded as the Andover Hoard (number 94) in *Celtic Coinage of Britain* (Van Arsdell 1989). The listing in this report is more accurate, and replaces that in *Celtic Coinage of Britain.*

The group was broken up and sold shortly after discovery. The British Museum obtained 50 pieces for its collection, and the Museum of the Iron Age, Andover received seven. The balance were sold into private collections. Eleven of these were sent to the United States and were recorded before they were sold. Six others were reported to the Index of Celtic Coins in Oxford. Eight additional pieces, which appeared between 1986 and 1989 without findspot provenances, may have come from the group.

During the 1987 excavations, the area identified by the finder was sampled to determine the context of the find, and to see if additional coins remained. Twenty square trenches, two-by-two metres each, were excavated. These were chosen from a grid array using a randomized test programme. No coins were found, nor were there

Table 7.1. Summary of the coin assemblage

Type	*Count*	*Date of manufacture*
Atrebatic B	40	50–45 BC
Atrebatic C	2	45–30 BC
Atrebatic E	2	25–20 BC
Atrebatic F	1	20–10 BC
Atrebatic I	4	AD 10–20
Atrebatic J	3	AD 20–25
Atrebatic K	2	AD 25–35
Atrebatic L	1	AD 35–43
Durotrigan C	1	58–57 BC
Durotrigan E	4	58–45 BC
Durotrigan G	1	45–40 BC
Cantian F	3	50–45 BC
Dobunnic C	1	15–10 BC
Uncertain	9	Gallic War dates primarily
TOTAL	74	

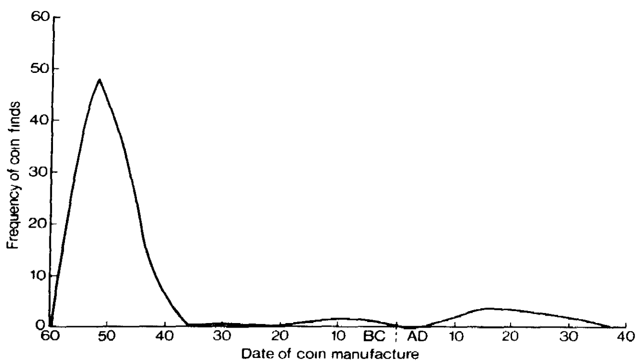


Figure 7.1 Frequency of types of Celtic coins.

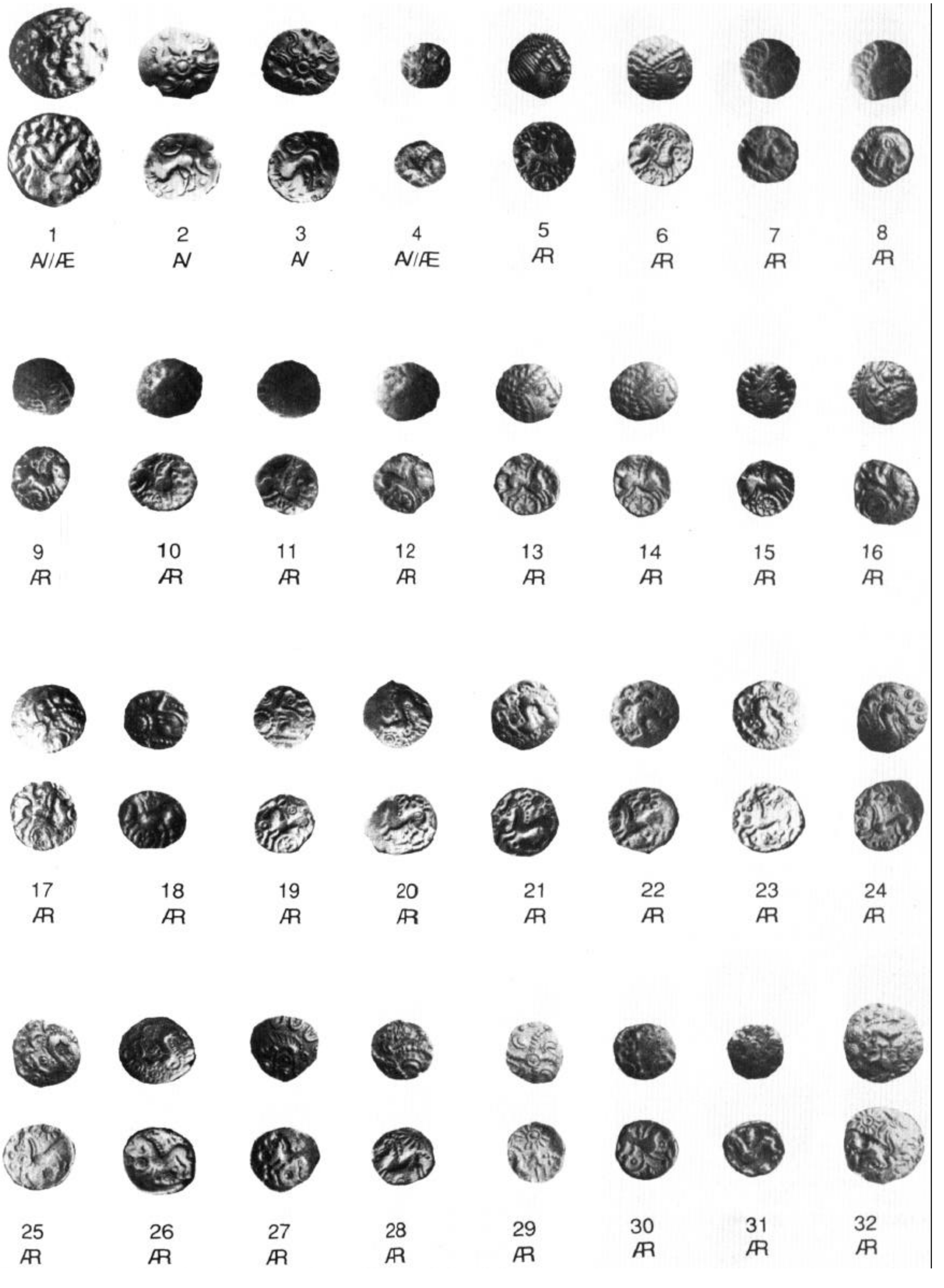


Figure 7.2 Celtic coins: scale 1:1.

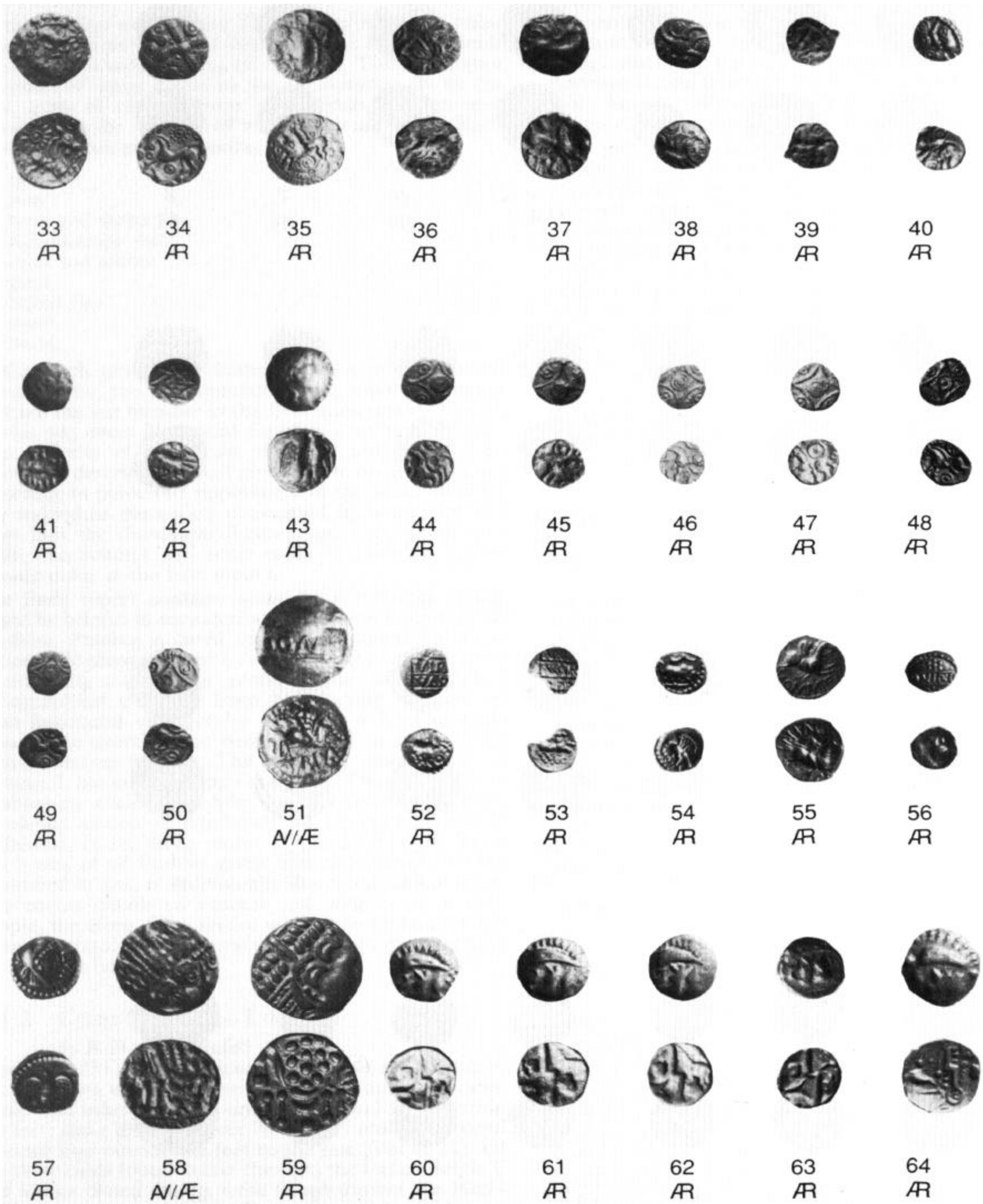


Figure 7.3 Celtic coins: scale 1:1.

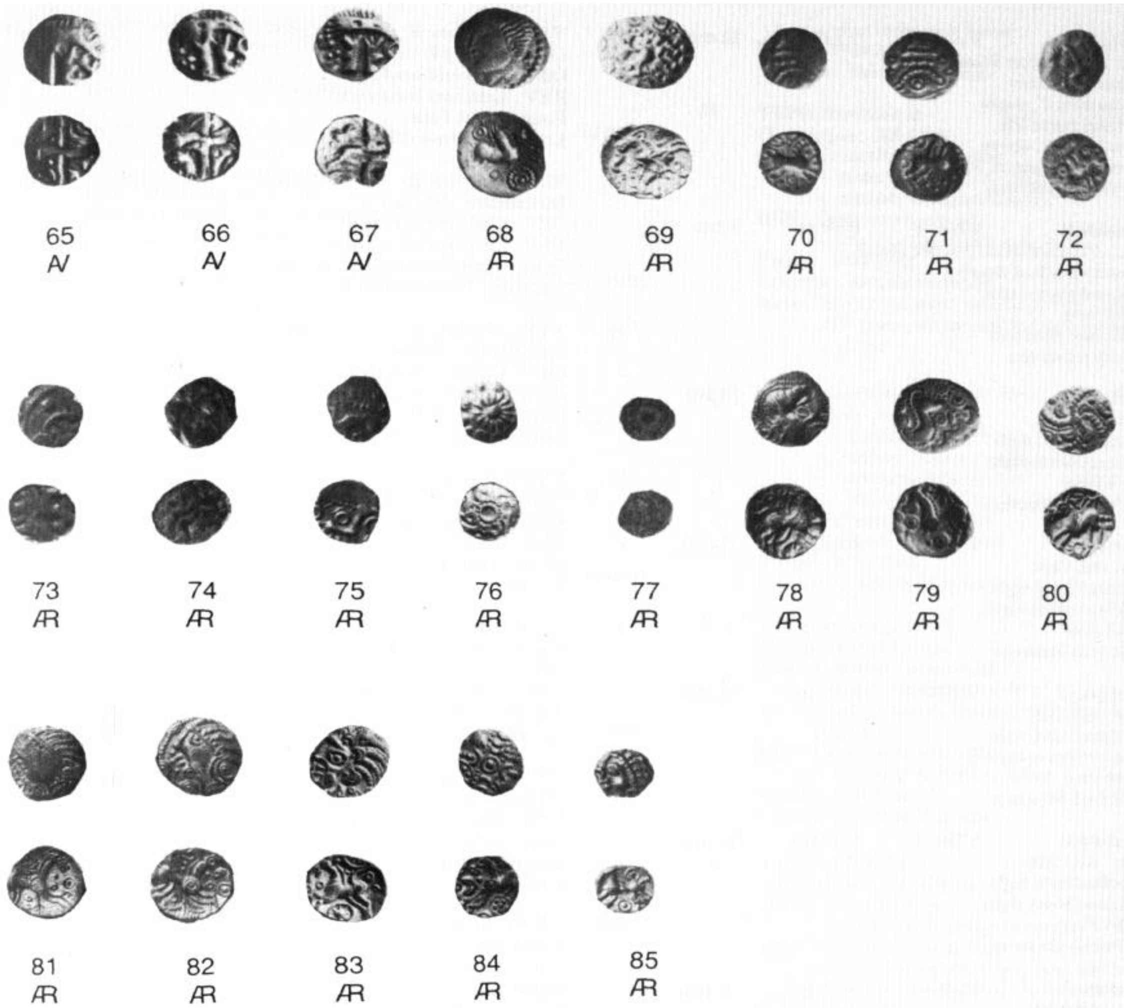


Figure 7.4 Celtic coins: scale 1:1.

any indications of a market or temple site. A possible boundary ditch was identified just outside the area of the trial trenches (Vol 4, 21).

The eight additional coins reported to the Index of Celtic Coins and possibly from the group, included seven Atrebatic B types and one Atrebatic C type.

Two of the coin classifications are problematic. First, the Cantian attribution of Cantian F is not absolutely established: the type could be an Atrebatic issue, instead. Secondly, the Atrebatic I type is one traditionally attributed to Verica, but could instead be an earlier Atrebatic B issue.

The frequency histogram in Fig 7.1 shows the vast majority of the coins were manufactured during or just after the Gallic War. The balance of the finds are stragglers manufactured over the next 90 years. The long span of time suggests the coins were casual losses at a market site, or perhaps deposits at a temple. The large group of coins dating to 50–45 BC, however, may be a single deposit dispersed by the plough. Whether the group represents a hoard, single deposits, or some combination of these cannot be decided until the context of the find is better understood.

Note: a Roman fourth century AD coin, included with the 'Danebury Hoard' coins at the British Museum is not part of the find. The piece was purchased at the same time as the Danebury coins (and is a Hampshire find) but was definitely identified by the seller as not part of the group.

Catalogue (Figs 7.2–7.4)

1. TYPE: Gallo-Belgic C V42–3 4.24gm 17 mm
Description: AV/AE Plated Stater
OBV: Abstracted head of Apollo right
REV: Disjointed horse right
Found: Inside hillfort during excavations
Location: Museum of the Iron Age, Andover
Notes: Gilt via mercury-gilding process

2. TYPE: Atrebatic B V— 1.14gm 12mm
Description: AV Quarter Stater
OBV: Geometric Pattern
REV: Celticized horse left
– eight-spoked wheel above horse
– dahlia below horse
Found: 1984 Find
Location: British Museum

3. TYPE: Atrebatic B V— 1.138gm 12mm
Description: AV Quarter Stater
OBV: Geometric Pattern
– as number 2, above
REV: Celticized horse left
– as number 2, above
Found: Reported as part of 1984 find
Location: Private collection

4. TYPE: Atrebatic B V244–3 0.69gm 8mm
Description: AV/AE Plated Quarter Stater
OBV: Crossed wreath of Apollo
REV: Celticized horse right
Found: 1984 Find
Location: British Museum
Notes: Poorly preserved

5. TYPE: Atrebatic B V264–1 13mm
Description: AR Unit
OBV: Celticized head right
REV: Celticized horse right
Found: 1984 Find
Location: Private collection

6. TYPE: Atrebatic B V280–1 0.88gm 11mm
Description: AR Unit
OBV: Celticized head right
REV: Celticized horse right
Found: 1984 Find
Location: British Museum

7. TYPE: Atrebatic B V280–1 0.80gm 11mm
Description: AR Unit
OBV: Celticized head right
REV: Celticized horse right
Found: 1984 Find
Location: British Museum

8. TYPE: Atrebatic B V280–1 0.74gm 11mm
Description: AR Unit
OBV: Celticized head right
REV: Celticized horse right
Found: 1984 Find
Location: British Museum

9. TYPE: Atrebatic B V280–1 0.75gm 11mm
Description: AR Unit
OBV: Celticized head right
REV: Celticized horse right
Found: 1984 Find
Location: British Museum

10. TYPE: Atrebatic B V280–1 0.82gm 11mm
Description: AR Unit
OBV: Celticized head right
REV: Celticized horse right
Found: 1984 Find
Location: British Museum

11. TYPE: Atrebatic B V280–1 0.69gm 11mm
Description: AR Unit
OBV: Celticized head right
REV: Celticized horse right
Found: 1984 Find
Location: British Museum

12. TYPE: Atrebatic B V280–1 0.83gm 10mm
Description: AR Unit
OBV: Celticized head right
REV: Celticized horse right
Found: 1984 Find
Location: British Museum

13. TYPE: Atrebatic B V280–1 11mm
Description: AR Unit
OBV: Celticized head right
REV: Celticized horse right
Found: 1984 Find
Location: Private collection

14. TYPE: Atrebatic B V280–1 11mm
Description: AR Unit
OBV: Celticized head right
REV: Celticized horse right
Found: 1984 Find
Location: Private collection

15. TYPE: Atrebatic B V280–1 0.791gm 10mm
Description: AR Unit
OBV: Celticized head right
REV: Celticized horse right
Found: Believed to be part of 1984 find
Location: Private collection

16. TYPE: Atrebatic B V282–1 0.78gm 12mm
Description: AR Unit
OBV: Celticized face right
REV: Celticized horse right
Found: 1984 Find
Location: British Museum

17. TYPE: Atrebatic B V282–1 12mm
Description: AR Unit
OBV: Celticized face right
REV: Celticized horse right
Found: 1984 Find
Location: Private collection

18. TYPE: Atrebatic B V284–1 0.70gm 11mm
Description: AR Unit
OBV: Celticized head left
REV: Celticized horse left
Found: 1984 Find
Location: Museum of the Iron Age, Andover

19. TYPE: Atrebatic B V284–1 0.81gm 10mm
Description: AR Unit
OBV: Celticized head left
REV: Celticized horse left
Found: 1984 Find
Location: British Museum

20. TYPE: Atrebatic B V286–1 0.94gm 11mm
Description: AR Unit
OBV: Celticized dragon right
REV: Celticized horse left
Found: 1984 Find
Location: British Museum

21. TYPE: Atrebatic B V286–1 0.98gm 12mm
Description: AR Unit
OBV: Celticized dragon right
REV: Celticized horse left
Found: 1984 Find
Location: British Museum

22. TYPE: Atrebatic B V286–1 0.95gm 11mm
Description: AK Unit
OBV: Celticized dragon right
REV: Celticized horse left
Found: 1984 Find
Location: British Museum

23. TYPE: Atrebatic B V286–1 14mm
Description: AR Unit
OBV: Celticized dragon right
REV: Celticized horse left
Found: 1984 Find
Location: Private collection

24. TYPE: Atrebatic B V286–1 13mm
Description: AR Unit
OBV: Celticized dragon right
REV: Celticized horse left
Found: 1984 Find
Location: Private collection

25. TYPE: Atrebatic B V286–1 12mm
Description: AR Unit

Link to Next Section

OBV: Celticized dragon right
REV: Celticized horse left
Found: 1984 Find
Location: Private collection

26. TYPE: Atrebatic B V286–1 12mm
Description: AR Unit
OBV: Celticized dragon right
REV: Celticized horse left
Found: Probably part of 1984 Find
Location: Private collection

27. TYPE: Atrebatic B V288–1 1.01gm 11mm
Description: AR Unit
OBV: Celticized boar left
REV: Celticized horse left
Found: 1984 Find
Location: British Museum

28. TYPE: Atrebatic B V290–1 0.90gm 10 mm
Description: AR Unit
OBV: Crossed wreaths
REV: Celticized horse left
Found: 1984 Find
Location: British Museum

29. TYPE: Atrebatic B V290–1 12mm
Description: AR Unit
OBV: Crossed wreaths
REV: Celticized horse left
Found: 1984 Find
Location: Private collection

30. TYPE: Atrebatic B V292–1 12mm
Description: AR Unit
OBV: Celticized head left
REV: Celticized horse right
Found: 1984 Find
Location: Private collection

31. TYPE: Atrebatic B? V— 0.92gm 11mm
Description: AR Unit
OBV: Geometric pattern
REV: Celticized horse left
Found: 1984 Find
Location: Museum of the Iron Age, Andover
Notes: Very poorly preserved, plausibly an Atrebatic type

32. TYPE: Atrebatic B V— 0.79gm 14mm
Description: AR Unit
OBV: Two boars
– boars oriented stomach-to-stomach
REV: Celticized horse right
– horse has triple-tail
– anemones, dahlias in field
– pellet-in-ring motif below horse
– pellet-in-ring motif on horse's breast
Found: 1984 find

33. TYPE: Atrebatic B V— 0.79gm 13mm
Description: AR Unit
OBV: Two boars
– as number 32, above
REV: Celticized horse right
– as number 32, above
Found: 1984 Find
Location: British Museum

34. TYPE: Atrebatic B V— 0.37gm 11mm
Description: AR Unit
OBV: Cross of 'feathers'
– pellet-in-ring motif in centre
– pellet-in-ring motifs in angles
– sunflower in one angle
REV: Celticized horse left
– anemone above horse
– pellet-in- ring motif above and in front of horse
– ring in front of horse
Found: 1984 Find
Location: British Museum

35. TYPE: Atrebatic B V— 0.69gm 12mm
Description: AR Unit
OBV: Unintelligible pattern
– pattern made up of rings
– possibly a degraded head
REV: Celticized horse left
– ring-in-ring motifs in field
Found: 1984 Find
Location: British Museum
Notes: Horse has some affinities to ones on Addedomaros AV types, but overall the coin appears to be Atrebatic in style

36. TYPE: Atrebatic B V— 0.73gm 10mm
Description: AR Unit
OBV: Celticized head left
– outline crescent behind head
– sunburst above head
– 'coffee-bean' for eye
REV: Celticized horse left
– wheel below horse
Found: 1984 Find
Location: British Museum

37. TYPE: Atrebatic B V— 0.59gm 11mm
Description: AR Unit
OBV: Celticized horse right
– head turned back to left
– above horse, crescent with three lines emanating from it
REV: Celticized horse right
– sunburst in front of horse
Found: 1984 Find
Location: British Museum

38. TYPE: Atrebatic B V— 0.40gm 9mm
Description: AR Minim
OBV: Spiral pattern
– pellet in two rings in centre
REV: Celticized horse right
– two concentric rings above and below horse
– pellet-in-ring motifs in front of horse
Found: 1984 Find
Location: British Museum

39. TYPE: Atrebatic C V— 0.36gm 8mm
Description: AR Minim
OBV: Celticized head left
– 'coffee bean' for eye
– pellet-in-ring motifs in front of head
REV: Celticized horse left
– pellet-in-ring motif above and below horse
Found: 1984 Find
Location: British Museum
Notes: A silver minim of Commius

40. TYPE: Atrebatic C V— 0.29gm 8mm
Description: AR Minim
OBV: Celticized head left
– as number 39, above
REV: Celticized horse left
– as number 39, above
Found: 1984 Find
Location: British Museum
Notes: A silver minim of Commius

41. TYPE: Atrebatic E V383–1 0.26gm 9mm
Description: AR Minim
OBV: Geometric pattern
REV: Animal right
Found: 1984 Find
Location: Museum of the Iron Age. Andover

Link to Previous Section

42. TYPE: Atrebatic E V383–1 0.33gm 8mm
Description: AR Minim
OBV: Geometric pattern
REV: Animal right
Found: 1984 Find
Location: British Museum

43. TYPE: Atrebatic F V397–1 1.36gm 12mm
Description: AR Unit
OBV: Romanized head right
REV: Eagle
Found: 1984 Find
Location: Museum of the Iron Age, Andover

44. TYPE: Atrebatic F V482–1 0.22gm 8mm
Description: AR Minim
OBV: Geometric pattern
REV: Celticized horse left
Found: 1984 Find
Location: British Museum

45. TYPE: Atrebatic F V482–1 0.29gm 8mm
Description: AR Minim
OBV: Geometric pattern
REV: Celticized horse left
Found: 1984 Find
Location: British Museum

46. TYPE: Atrebatic F V482–1 8mm
Description: AR Minim
OBV: Geometric pattern
REV: Celticized horse left
Found: 1984 Find
Location: Private collection

47. TYPE: Atrebatic F V482–1 8mm
Description: AR Minim
OBV: Geometric pattern
REV: Celticized horse left
Found: 1984 Find
Location: Private collection

48. TYPE: Atrebatic I V482–1 0.323gm 9mm
Description: AR Minim
OBV: Geometric pattern
REV: Celticized horse left
Found: Probably part of 1984 find
Location: Private collection

49. TYPE: Atrebatic I V482–1 0.26gm 8mm
Description: AR Minim
OBV: Geometric pattern
REV: Celticized horse left
Found: Probably part of 1984 find
Location: Private collection

50. TYPE: Atrebatic I V482–1 8mm
Description: AR Minim
OBV: Geometric pattern
REV: Celticized horse left
Found: Probably part of 1984 find
Location: Private collection

51. TYPE: Atrebatic J V500–3 3.07gm 18mm
Description: AV/AE Plated Stater
OBV: Inscription in tablet
REV: Celtic warrior on horse right
Found: Inside hillfort during excavation
Location: Museum of the Iron Age, Andover
Notes: Ancient forgery of a Verica Stater

52. TYPE: Atrebatic J V511–l 0.30gm 8mm
Description: AR Minim
OBV: Inscription in tablet
REV: Pegasus right
Found: 1984 Find
Location: British Museum

53. TYPE: Atrebatic J V511–l 0.26gm 8mm
Description: AR Minim
OBV: Inscription in tablet
REV: Pegasus right
Found: 1984 Find
Location: British Museum

54. TYPE: Atrebatic J V512–1 0.36gm 8mm
Description: AR Minim
OBV: Bull right
REV: Eagle standing left
Found: 1984 Find
Location: British Museum

55. TYPE: Atrebatic K V530–1 1.31gm 11mm
Description: AR Unit
OBV: Celtic warrior on horse right
REV: Celtic warrior on horse right
Found: 1984 Find
Location: British Museum

56. TYPE: Atrebatic K V564–1 0.30gm 8mm
Description: AR Minim
OBV: Inscription in tablet
REV: Boar’s head right
Found: 1984 Find
Location: British Museum

57. TYPE: Atrebatic L V580–1 1.29gm 11mm
Description: AR Unit
OBV: Bust right
REV: Eagle facing
Found: 1984 Find
Location: British Museum

58. TYPE: Durotrigan C V— 3.62gm l6mm
Description: AV/AE Plated Stater
OBV: Abstracted head of Apollo right
REV: Disjointed horse left
Found: 1984 Find
Location: British Museum
Notes: Chute/Cheriton Transitional Type, represents transition between V1210–1 and Vl215–1

59. TYPE: Durotrigan E V1235–1 5.33gm 17mm
Description: AR Stater
OBV: Abstracted head of Apollo right
REV: Disjointed horse left
Found: Inside hillfort before 1858
Location: British Museum

60. TYPE: Durotrigan E Vl242–1 1.16gm 11 mm
Description: AR Unit
OBV: Pattern
REV: Geometric pattern
Found: 1984 Find
Location: British Museum

61. TYPE: Durotrigan E Vl242–1 1.16gm 11 mm
Description: AR Unit
OBV: Pattern
REV: Geometric pattern
Found: 1984 Find
Location: British Museum

62. TYPE: Atrebatic E Vl242–1 0.94gm 11 mm
Description: AR Unit
OBV: Pattern
REV: Geometric pattern
Found: 1984 Find
Location: British Museum

63. TYPE: Atrebatic E Vl242–1 0.97gm 10 mm
Description: AR Unit
OBV: Pattern
REV: Geometric pattern
Found: 1984 Find
Location: British Museum

64. TYPE: Atrebatic G Vl249–1 0.82gm 12mm
Description: AR Unit
OBV: Pattern
REV: Geometric pattern
Found: 1984 Find
Location: British Museum

65. TYPE: Cantian F V143–1 1.52gm 12mm
Description: AV Quarter Stater
OBV: Large crescent and uncertain shapes
REV: Large cross-motif with pellets
Found: 1984 Find
Location: Museum of the Iron Age, Andover

66. TYPE: Cantian F V143–1 1.37gm 11mm
Description: AV Quarter Stater
OBV: Large crescent and uncertain shapes
REV: Large cross-motif with pellets
Found: 1984 Find
Location: Museum of the Iron Age, Andover

67. TYPE: Cantian F V143–1 1.39gm 10mm
Description: AV Quarter Stater
OBV: Large crescent and uncertain shapes
REV: Large cross-motif with pellets
Found: 1984 Find
Location: British Museum

68. TYPE: Dobunnic C V1057–1 1.03gm 14mm
Description: AR Unit
OBV: Celticized head left
REV: Celticized horse right
Found: 1984 Find
Location: British Museum
Notes: Bodvoc

69. TYPE: Unknown V— 0.70gm 12mm
Description: AR Unit
OBV: Unintelligible pattern
– pattern made up of crescents
REV: 'Two Celticized horses left
– horses form a pinwheel
Found: 1984 Find
Location: British Museum
Notes: Uncertain origin. possibly Gaulish

70. TYPE: Unknown V— 0.81gm 10mm
Description: AR Unit
OBV: Geometric pattern
REV: Celticized horse right
– horse has long, spindly legs
– pellet-in-rings around horse Found: 1984 Find
Location: British Museum
Notes: Uncertain origin, possibly Gaulish

71. TYPE: Unknown V— 0.92gm 11mm
Description: AR Unit
OBV: Geometric pattern
– as number 70, above
REV: Celticized horse right
– as number 70, above
Found: 1984 Find
Location: British Museum
Notes: Uncertain origin, possibly Gaulish

72. TYPE: Unknown V— 0.35gm 10mm
Description: AR Unit
OBV: Unintelligible pattern
REV: Celticized horse left
Found: 1984 Find
Location: British Museum
Notes: Uncertain origin, poorly preserved

73. TYPE: Unknown V— 0.92gm 10mm
Description: AR Unit
OBV: Celticized head left
REV: Uncertain. possibly a horse
Found: 1984 Find
Location: British Museum
Notes: Uncertain origin

74. TYPE: Unknown V— 0.79gm 11mm
Description: AR Unit
OBV: Uncertain
REV: Uncertain
Found: 1984 Find
Location: British Museum
Notes: Uncertain origin, poorly preserved

75. TYPE: Unknown V— 0.44gm 10mm
Description: AR Minim
OBV: Boar left
– pellet-in-ring motif below boar
REV: Celticized animal right
– rings in field
Found: 1984 Find
Location: British Museum
Notes: Uncertain origin. possibly Continental

76. TYPE: Unknown V— 0.37gm 8mm
Description: AR Minim
OBV: Windflower
– windflower surrounded by pellet-in-ringmotifs
REV: Spiral pattern
– sunflower with spiral arms
– pellet-in-ring motifs in field
Found: 1984 Find
Location: British Museum
Notes: Uncertain origin

77. TYPE: Unknown V— 0.14gm 7mm
Description: AR Minim
OBV: Large pellet. ring around?
REV: Uncertain
Found: 1984 Find
Location: British Museum
Uncertain origin poorly preserved Possibly not a coin

The following Atrebatic coins are of the types found at Danebury, but their findspots are not known. The coins appeared singly from 1986 to 1989, and were placed in private collections. Some of these may have been part of the 1984 find.

78. TYPE: Atrebatic B V264–1 0.98gm 11mm
Description: AR Unit
OBV: Celticized head right
REV: Celticized horse right
Found: Findspot unknown
Location: Private collection

79. TYPE: Atrebatic B V286–1 0.98gm 12mm
Description: AR Unit
OBV: Celticized dragon right
REV: Celticized horse left
Found: Findspot unknown
Location: Private collection

80. TYPE: Atrebatic B V290–1 0.80gm 12mm
Description: AR Unit
OBV: Crossed wreaths
REV: Celticized horse left
Found: Findspot unknown
Location: Private collection

81. TYPE: Atrebatic B V292–1 0.72gm 12mm
Description: AR Unit
OBV: Celticized head left
REV: Celticized horse right
Found: Findspot unknown
Location: Private collection

82. TYPE: Atrebatic B V292–1 0.855gm 13mm
Description: AR Unit
OBV: Celticized head left
REV: Celticized horse right
Found: Findspot unknown
Location: Private collection

83. TYPE: Atrebatic B V— 0.74gm 11mm
Description: AR Unit
OBV: Celticized head left
– as number 39, above
REV: Celticized horse left
– as number 39, above
Found: Findspot unknown
Location: Private collection

84. TYPE: Atrebatic B V— 0.792gm 10mm
Description: AR Unit
OBV: Crossed wreaths
– pellet-in-ring motif in centre
REV: Celticized horse left
– outline crescent in front of horse
– pellet in front of horse
– six pellets in a ring below horse
Found: Findspot unknown
Location: Private collection

85. TYPE: Atrebatic C V— 0.35gm 8mm
Description: AR Minim
OBV: Celticized head left
– as number 39, above
REV: Celticized horse left
– as number 39, above
Found: Findspot unknown
Location: Private collection
Notes: A silver minim of Commius.

7.1.3 The late Bronze Age hoard (Fig 7.5 no 1.88)

Twenty-three items, once probably constituting a hoard of late Bronze Age date, were described in the earlier report (Vol 2, 335–40). One further item (no 1.88) was found in 1987 in redeposited topsoil on the east side of the fort not far from the location of the original discovery. While it cannot be shown to have belonged to the hoard the likelihood is that it once formed a part of the original deposit.

1.88 Fragment from the handle end of a dirk or rapier

With prominent mid rib and two rivet holes close to the end of the hilt. The fragment conforms to a generalized mid Bronze Age type. If it once belonged to the hoard then, like other items included in the deposit it must have been ancient scrap when buried.

7.1.4 Other objects of copper alloy (mainly bronze) (Figs 7.5–7.8)

Brooches (1.89, 1.90 and 1.92)

by Martyn Jope

La Tène I fibula (1.89)

An excellent example of the British La Tène I 'Wessex' type (once known as 'Blandford' type; Fowler 1954; Hull & Hawkes 1987, 72, 95, 99; Jope & Jacobsthal forthcoming, pl 36). It has a mock 4-coil spring (1.7 mm thick) and hefty external chord; the pin projecting from a single ring inserted between two of the other three rings, which are of continuous construction with the bow. A neat axle of bronze 2 mm thick has been inserted into the 'spring' mechanism. The foot is returned parallel to the well-modelled catchplate at about half the height of the bow, and ends in a small snoutless disc 1 mm thick (with two-nick necking); the disc has a 2.2 mm central hole, perhaps intended for a peg to hold a setting, though there is no sign that there ever actually was such a setting. The bow is a rather flat-sectioned version of the characteristic low-arched swelling shape. Over the top it has medially two grooves about 3 mm apart, with nine small circlets 1 mm across set between them, equally spaced over the bow; each circlet has a small drilled hole inside, not always centrally placed (the circlets at the ends of the bow are only partially completed). The circlets are joined tangentially by pairs of slant-set lines (to hint scrolling), feathering to a point as they approach the circlets, and thus evidently worked with a file. The whole bow is given a neat finish by a further groove at each side towards the outer edge. All these grooves, and indeed the circlets themselves, seem to have been worked with a combination of file chisel and graver. Its fine cohesive patina raises the question whether it was ever kept cleaned down to bright metal during wear, but was rather retained in some such stable patinated state.

This Danebury brooch is constructionally of Type I Ba (Hull & Hawkes 1987, 95 ff). With its ornament, it is a fine example of the 'Wessex' group, a manner fairly closely confined to the Wessex area (map, Jope & Jacobsthal forthcoming, 15), and in use during the first half of the fourth century BC, a time-range deduced by extrapolation from the continental constructional evidence (Hull & Hawkes 1987, 96 ff).

The ornament is also informative; it is an expansive variant from the basic Wessex manner, a row of dots between two grooves, set medially across the top of the bow. This basic manner must be seen in the context of other items similarly ornamented. It is characteristic of work of the earliest La Tène phase in parts of western Europe, from the mid-fifth century BC, or even a little earlier (Jacobsthal 1944, pls 56, 107–8, 113–5, 118, 121; Hull & Hawkes 1987, 68–74). In Britain it is seen on three bronze openwork discs from the Thames bank at Hammersmith, which arc plain versions of continental trappings found again in Early La Tène contexts (Jacobsthal 1944, nos 180–8; Jope & Jacobsthal forthcoming, pls 30–1 and notes). The same ornamental device is seen on five of the La Tène I type daggers of the southern British series (Jope 1961, nos 14, 15, 16, 18, 19), which again must have been weapons of the later fifth and earlier fourth centuries BC.

These 'Wessex' brooches have been found over an area marginal to that of the daggers (mainly the Thames Valley, Jope 1961, 222, fig 10) and their ornament manner must have been developed out of the craft traditions of the Thames Valley dagger- (and disc-) makers.

The Danebury brooch has an expansive variant of the simple dot-row – circlets joined by slanting line-pairs, hinting at scrolling – and additional edging grooves along the bow, suggesting that it was made well on in the brooch series. (For a row of circlets see Oakley Down (Hull & Hawkes 1987, 101, pl 29, 9003).) But the slantwise lines tangential to the circlets (hinting at scrolling) is seen on the bow side of a probably somewhat earlier brooch from Woodeaton in Oxfordshire (Brailsford 1953, fig 2; Hull & Hawkes 1987, 60–1, 74, 79). We should not therefore strive to place this Danebury brooch too far towards the middle part of the fourth century BC.

The Type I A La Tène I brooch found at Danebury in the 1969 excavations must now be slightly reassessed

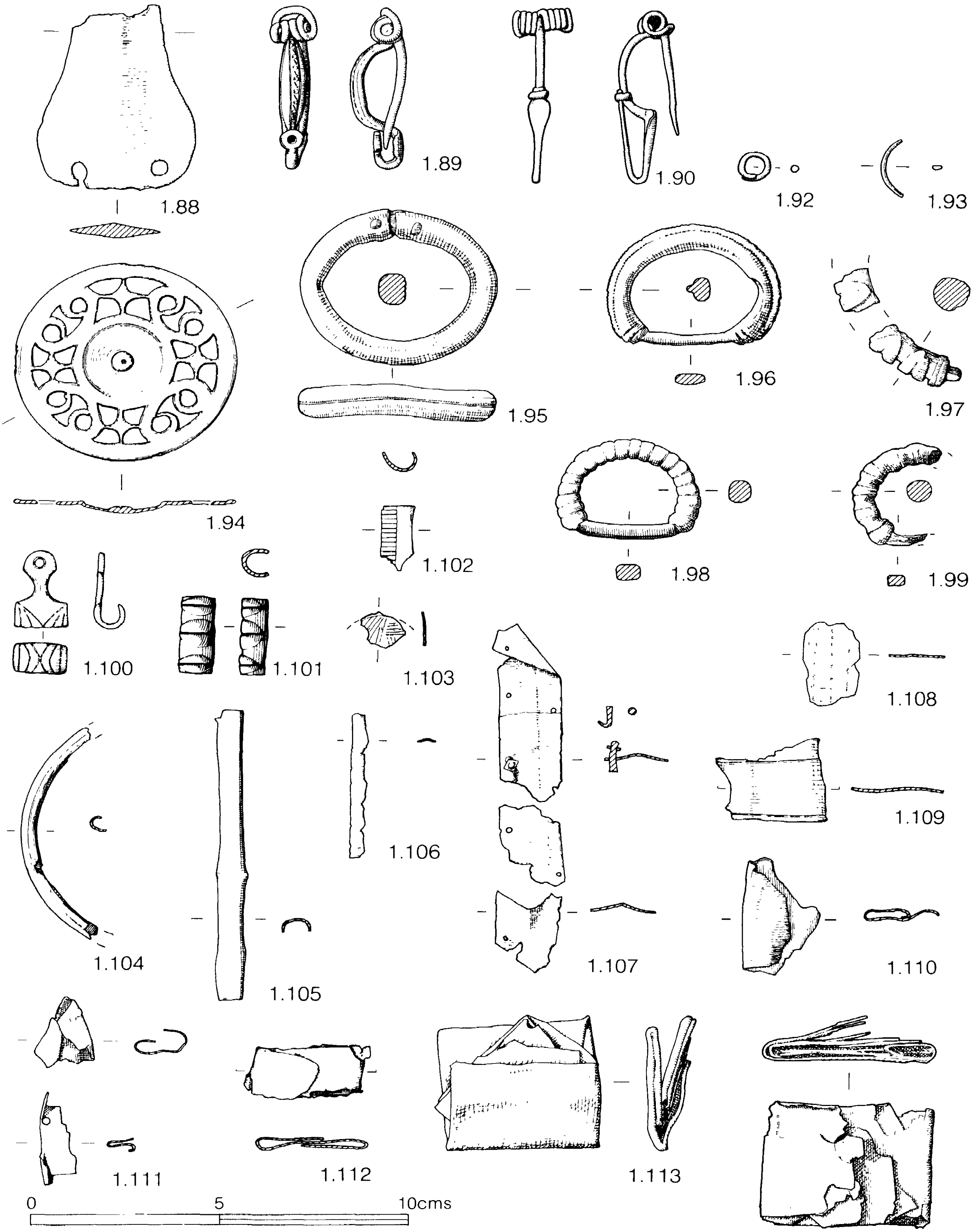


Figure 7.5 Bronze objects.

Link to Next Section

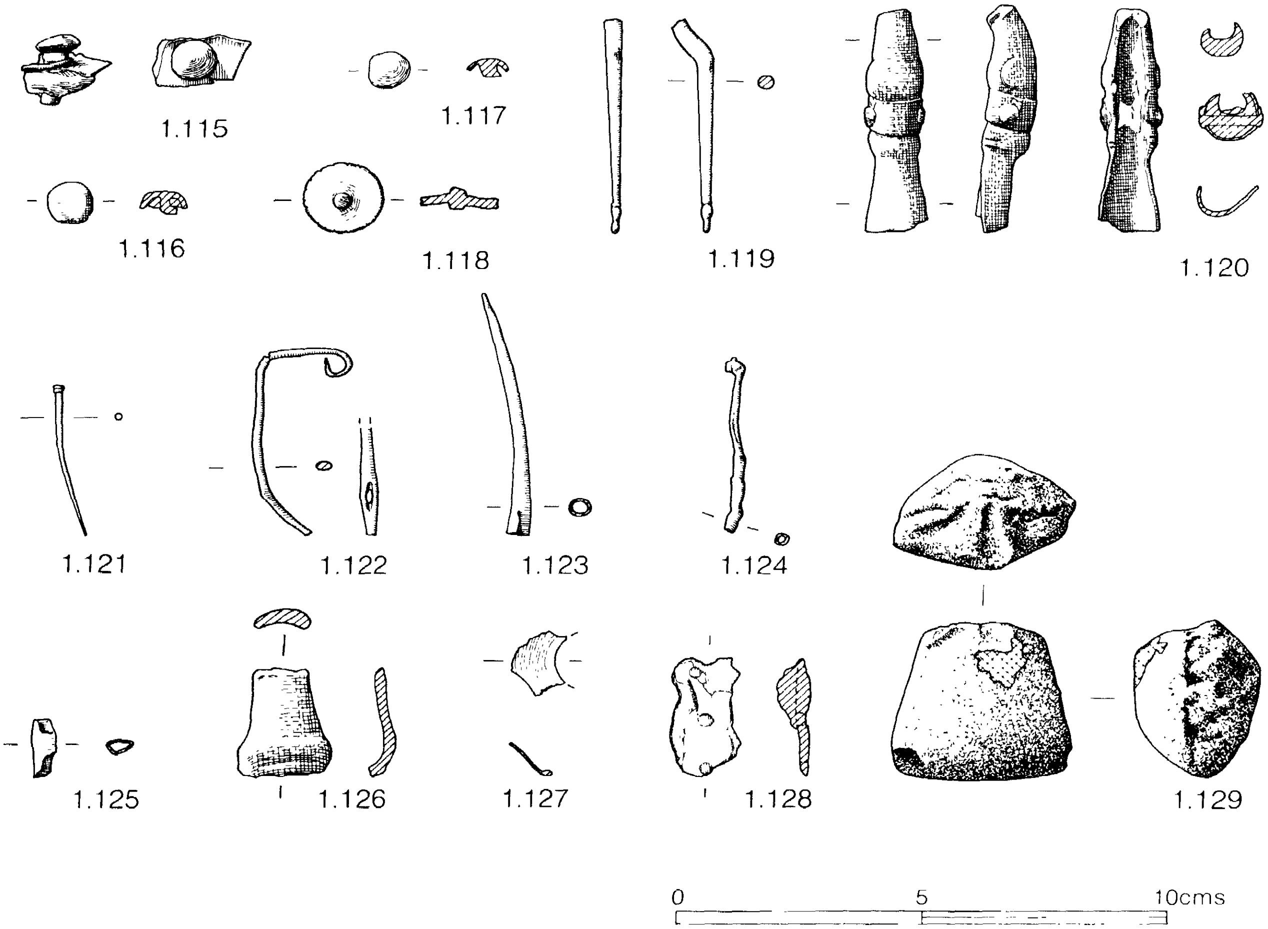


Figure 7.6 Bronze objects.

(Vol 1, 341–3). Hawkes (Hull & Hawkes 1987, 74, 76, 80) could well be correct in implying from this Danebury brooch and that from Hammersmith (both with wood axles inserted in the mock spring-hinge mechanism; Hodson 1971, 55–6) an experimental phase (cf for chapes, Jope 1970) in the insular broochmakers' coming to terms with inadequate skill in manipulating their 1–2 mm bronze rod (or choosing a suitable bronze alloy and annealing it) into a functional (sometimes tight-wound) spring of four or more turns, continuous with bow and pin. But these are not necessarily the very earliest 'spring' brooches made in Britain and according to insular design; some with real functional springs might just be a little earlier (eg Hull & Hawkes 1987, 80, no 3646 from Worth, Kent). Because of this concept of an experimental phase, the most likely date range during which this 1969 Danebury brooch was made is probably late fifth-early fourth centuries BC, and it would have belonged to a lady a generation earlier than the brooch reported here.

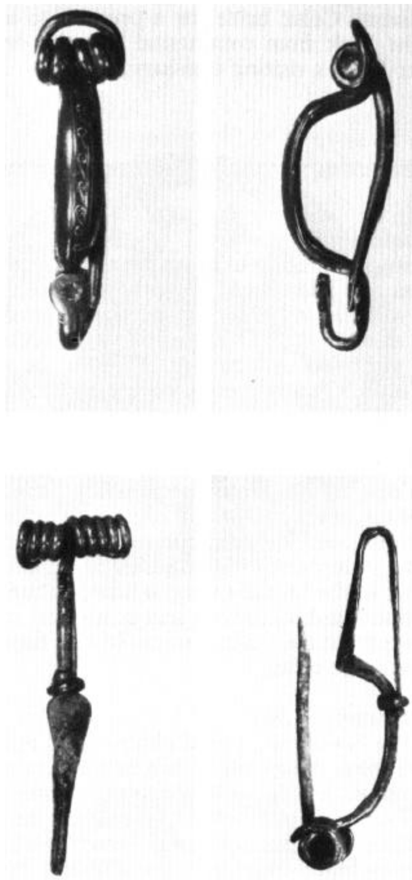
La Tène II fibula (1.90)

A beautifully made (and preserved) brooch of La Tène II construction. It has a tight-wound 9-coil spring (5 mm diam), with external chord. This spring and chord is continuous with the pin at one end and the bow, foot, and foot-return at the other end, making a continuous run of 26 cm of bronze rod (or wire) of thickness 2 mm in the bow, thinned to 1.4 mm in the spring and into the pin. The pin catch 1.8 cm long has been carefully shaped by beating to sheet of 0.3 to 0.1 mm; the foot-return also has been thinned to a long dagger-shaped leaf (an unusual feature), narrowed abruptly at the top to tuck under a small penannular ring made of 1.3 mm rod that secures it to the bow. The 9-coil spring has four turns on one side of the spring and five on the other, an asymmetric arrangement not unusual on analogous La Tène II brooches.

The whole brooch has thus been efficiently made out of one 26 cm length of bronze rod. It represents high skill in bronze working, expended with refined delicacy on one small brooch which would have been fairly inconspicuous on the wearer's attire. It has now a fine close-textured dark olive patina, and the question again arises, as with brooch no 1.89 above, whether such a brooch was ever kept cleaned down to bright metal for wearing, but was rather retained in some such stable patinated state.

This brooch takes its place among other La Tène II brooches of southern Britain, the long tight transverse spring being quite usual (Hull & Hawkes 1987, pl Sl, type 3B). A good parallel is seen from Pit 15c at Hod Hill (Richmond 1968, fig 51), differing only in its 7-coil spring, external chord, and lack of ambitious flattening of the foot return. This latter feature is more clumsily

1.89



1.90

Figure 7.7 Bronze brooches 1.89 and 1.90. Scale 1:1

executed on a comparable brooch from Maidstone in Kent (Hull & Hawkes 1987, no 2251, pp 173–8, pl 51). This Danebury brooch was probably made and in use during the earlier part of the first century BC.

Brooch spring (1.92)

A small bronze penannular ring (slightly overlapping), 7 mm across and of rod 1.5 mm thick, may be one coil of the spring of another brooch.

Finger rings and bracelets (1.93)

Finger rings and bracelets, rare in the first ten seasons of excavation, were even rarer in the second decade. Only one fragment was found which could fall into this category bringing the total to five. The fragment, of a small plain ring of subrectangular cross-section, was found in a cp 7 context.

Bronze openwork disc (1.94)

by Martyn Jope

This ornamental openwork bronze disc (diam 59 mm) found in 1988 has been made from sheet bronze about 0.8 mm thick. It has a slightly raised softly rounded rim, and within this a plain bordering annulus 25 mm wide, within which is the openwork annulus. The plain continuously moulded centre is 27 mm across; it has a Plain 2.5 mm outer annulus, within which it is plain, slightly dished, with a small central raised bun 4.0 mm across. In the centre of this bun is a small hollow 1.7 mm across, in which is set the head (apparently of bronze) 0.7 mm across, which implies a very slender pin-shank, 0.3 or at most 0.4 mm. This seems to have been the only mechanical means of attaching the disc, for there are no other holes traceable, and no marks of solder on the back.

The openwork annulus design is composed out of four boat-shaped -units at the cardinal points, joined by rather irregular stretched-out concave diamonds typical of such early Celtic openwork. The four-fold symmetry is not absolutely perfect (perhaps deliberately, for there does seem to be a perfect two-fold symmetry, and thus a real top and bottom). The whole layout is a little clumsy, though the elegantly extended diamonds do give some sense of style. The openwork has been worked largely by filing, but cut in the first instance with a chisel. The slight concavities of surface on the back show that the chiselling had in fact been done against a slightly yielding material, such as fine wood. There seems to have been no systematic attempt to splay the edges of the openwork (cf Jacobsthal 1944, nos 180, 192, 200), except possibly on the concave diamonds.

The openwork design has a somewhat provincial aspect, in the rather clumsy use of the boat-shaped|-motif, though the outer surface profile has a restrained elegance readily taken by the eye. The better pieces of early Celtic continental openwork are organized with rather more sense of proportion and taste. However, work such as items from a burial at Langenhain in the Taunus (Jacobsthal 1944, nos 181–3, now in Wiesbaden) provide reasonable comparanda for the composition, motif repertory and craftsmanship (note also work from a grave at Waldgallschied, Kr St Goar, which contained also a luscious gold openwork frieze). This Danebury piece does extend a little our known thematic repertoire of Early Celtic openwork, in its use of the boat-shaped |-unit as its main theme.

Careful scrutiny of the surface did not reveal any evidence of the double-line-and-dot-row bordering and streamers which give character to the best of the Early Celtic openwork in Europe (eg Jacobsthal 1944, nos 171, 180, 192, and dust-jacket). This device was also taken up in Britain at this time, and had some continuing influence (Jope & Jacobsthal forthcoming; Smith 1925), but it was not used to trick out the less resplendent continental Celtic openwork most comparable with our Danebury piece (notably Jacobsthal 1944, nos 181–3, 188, 193, 195). The absence of this feature is therefore no indication that this Danebury piece was not brought from Celtic Europe.

This openwork roundel seems to have been fixed to its host structure by a slender central pin with a shank of no more than 0.3–0.4 mm. Such openwork ornaments were usually nailed or riveted to metal, leather or wood by rivets or nails of much larger gauge, 2 mm or more (eg, on a leather-covered wood helmet from Guibiasco (Ulrich 1914, 432–3, pl 82.2) or the wood flagon from Malomerice, Czechoslovakia (Megaw 1971, nos 158–60, 165). But this slender pin does seem the only mechanical fixing provision on the Danebury disc; there is no evidence for a strap-loop on the back, nor any other rivet- or nail-holes.

This light central pin suggests that the disc was fixed to the surface of fine wood, the slenderness of the pin perhaps so that it would not split the wood grain. It would however have needed to have been bedded on a glue or resin interlayer (cf Jacobsthal 1944, nos 185, 186, p 186); such material might have been detectable by gas-chromatography or the fine structure of UV transmission spectra. The discs from Langenhain in the Taunus again offer good comparison (Jacobsthal 1944, nos 181–3); they show little evidence of attachment and no 183 especially has a central element with a tiny hole for a pin of about 0.5 mm shank. The disc from Lépine (Chalons-sur-Marne) (Jacobsthal 1944, no 188) is the same size as our disc, but has a central dome, and four fixing holes of about 0.7–1 mm gauge around the edge.

This remarkable exotic piece from Danebury opens up once again the problems of fifth-fourth century BC imports into Britain (Stead 1984). Bronze openwork ornament of this kind was characteristic of this age in Celtic Europe, and the manner was taken up a little in southern Britain (Jope & Jacobsthal forthcoming, pls 30–1). But this Danebury piece, though a little rustic in its openwork, can be well paralleled in continental graves, and its surface profiling is of such sophistication as to indicate work of a continental workshop. It is thus at home among continental Celtic openwork of the later fifth and fourth centuries BC; and the rustic openwork need not preclude a date in the second half of the fifth century. It may for instance be compared with some from the Waldgallschied burial (Kr St Goar; now in Wiesbaden), with its sumptuous gold (Jacobsthal 1944, no 26: cf Eygenbilsen, no 24, and Schwarzenbach, no 18), and also a beak-flagon now in Berlin (Jacobsthal & Langsdorff 1929, no 15: not illustrated but for its neck ornament, cf Besseringen, and attachment-plate palmette like Eygenbilsen, Jacobsthal & Langsdorff 1929, 42, nos 23, 28, 29). As to its continental origin, the metal composition may help towards a conclusion; work on this is in progress by J P Northover, and will be fully reported in the final Danebuy volume.

What object of fine wood might have carried this little ornament of bronze openwork? The slightness of fixing by the slender pm would seem to preclude any battle armament, such as a shield or heavy sword scabbard, though a mount on a parade shield or helmet are just possible (cf Ulrich 1914). Equally, the stress involved if it had been fixed by nothing but this pin to a chariot structure, or to flexible leather strapping of harness would seem too much for this slender pin alone. The fourfold/twofold symmetry of the openwork design suggests a centrepiece, with a hint of a top and bottom. The top-mount of a ceremonial sword-scabbard seems precluded because of the camber of the scabbard (cf the later scabbard of ash, from Stanwick, Wheeler 1942), which is not reflected in the shaping of the disc. However, some of the broad HaD/La Tène I daggers are scarcely cambered (Jope 1961, 309–10, pls XX, XXIII; Rieth *et al* 1969; Jope 1982), and this Danebury disc might have adorned the head of the sheath of such a dagger (the main sheath structure of which was usually of yew – occasionally birch or ash), especially as the openwork design has a hint of top-and-bottom polarity. The fact that the only possible imported daggers of this age known from Britain seem to have had their sheaths reconstructed in a British workshop (Jope 1982) might almost be seen as a supporting factor.

But there is a further possibility: a top mount on a little personal trinket-box, a fine wood version of the little bronze box found by John Dent at Wetwang Slack (Dent 1986; Megaw & Megaw 1988, pl 10), on top of which is a separate ornamental bronze disc of similar size to the Danebury disc.

The delicate nature of the fixing-pin suggests also that the circumstance of this continental item being brought into Britain in the later fifth-fourth centuries BC are to be seen not in the paraphernalia of warfare, but in aristocratic personal relations, as the treasured possession of a distant Celtic bride, or a present to a British lady, brought back from continental travels, or a present of honour from a visiting emissary.

Bronze fittings probably for horse harness (1.95–1.99)

by Natalie Palk

Five rings belonging to horse harness were found. Three of them, the plain ring 1.95 and the two terrets, 1.96 and 1.98, were found together on the bottom of pit 2261 which dates to cp 7. Of the other two terrets, no 1.99 was found stratified in sequence D (1986) in a cp 7 context while no 1.97 came from a cp 6 pit, P1579.

Simple terret (1.95)
Simple iron ring with bronze casing. The casing is fixed to the ring by two ?iron rivets which sit at either end of the casing, at the base of the ring in the area which would have been used for attachment. The external surface of the ring is decorated with a series of raised parallel lines. The join in the bronze casing is made at the centremost of these lines, and is crimped and crumpled in places. Wear is apparent on the inner surfaces of the ring, more on one side than the other.

Simple terret (1.96)
The ring has a high, raised ridge on its external surface. This ridge is decorated with a line of impressed dots on the apex of the ridge, with two similar lines on either side of it. The small mouldings which form the terminals also bear lines of impressed dots. Wear is apparent on the middle to lower internal surfaces of the ring, with much more wear on one side than the other.

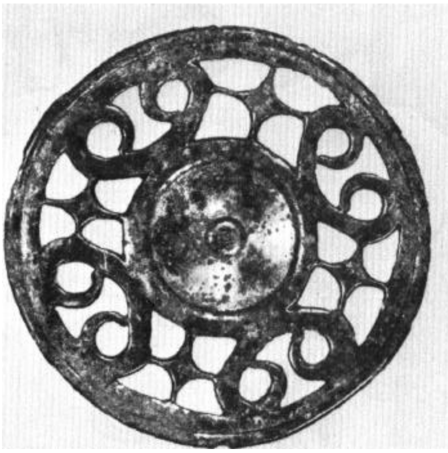
Lipped terret (1.97)
Two small fragments in a poor state of preservation. The larger fragment bears two pairs of lips and a terminal leading to a small section of strap bar. The smaller fragment bears one pair of lips. The strap bar section is flat and sub-rectangular. There are some indications of wear on the internal surfaces of the ring.

Ribbed terret (1.98)
Small ribbed ring with 20 segments. The strap bar is plain and of subrectangular section.

Ribbed terret (1.99)
Incomplete: about half of the ring and the strap bar remains. The strap bar is of iron and the ring of iron with a bronze covering.

Decorative attachments (1.100–103)

Four decorative attachments of different type were found: all came from cp 7 contexts. No 1.100 is an end attachment possibly once fitted to a thick leather strap and kept in place by a single rivet. Close parallels exist from Bredon Hill (Hencken 1939, fig 4, nos 2–4) and Hod Hill (Richmond 1968, fig 32). The same general type of object occurs at Glastonbury (Bulleid & Gray 1911, pl XLII, no E145). Nos 1.101 and 1.102 were both U-shaped bindings the lipped decoration on no 1.101 recalling that found on terret rings. The small fragment of disc(?), no 1.103, was decorated with punched dots.



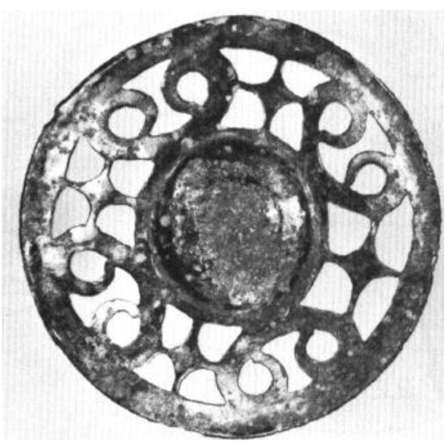


Figure 7.8 Bronze openwork roundel 1.94. Scale 1:1

U-sectioned bindings (1.104–1.106)

Five sections of U-bindings were recovered, no 1.104 came from a context producing only cp 3 pottery, the other two illustrated were found with cp 7 sherds. Two fragments, unillustrated, came from cp 6 and cp 7 contexts. The bindings were probably edge strips for composite objects of wood, leather or bronze. The regular curve of 1.104 might suggest that it was a mirror binding while no 1.105 could come from a sword or dagger sheath.

Bronze sheet (1.107–1.114)

In all 51 fragments or groups of fragments of bronze sheet are listed but the exact number is not particularly significant since some of the groups contain a number of fragments while others, though separately numbered, come from the same context. What is significant is that with the exception of no 1.107 all come from cp 6 or 7 contexts.

A selection of the larger and better preserved fragments are Illustrated here. The three fragments (no 1.107) from the same cp 3 context, and evidently part of the same item, belong to a strip of uncertain length ribbed down the centre and attached to a backing, perhaps wood or leather, by small closely spaced rivets. Nos 1.108 and 1.109 were simply decorated, the rest appear to be plain. Three domed rivets were also recovered (1.115–1.117).

Other bronze items (1.118–1.129)

The miscellaneous items may be briefly listed.

1.118 Disc with notched edge and central stud. Cp 7.

1.119 Pin with formed point. The bend is original and suggests that it may have been of sunflower or swan-neck type. Unphased.

1.120 Complex attachment to wood. Cp 7.

1.121 Pin with formed head. Unphased.

1.122 Needle. Cp 6.

1.123 Pointed tube. Cp 7.

1.124 Tube. Cp 7.

1.125 Tube or binding. Cp 7.

1.126–1.128 Fragments of castings. Cp 7

1.129 The contents of a small pouch consisting of filings and turnings now corroded together. The fabric has decayed but traces survive in the mineralized surface suggesting that it was of leather. The puckering at the mouth, where it was drawn together by a cord shows clearly. For further discussion see below (p. 412).

7.1.5 Objects of iron (Figs 7.9–7.26)

The iron objects are presented here in groups comparable to those used in the first report (Vol 2, 346–71). Where full discussion of a category group has already been given comment has been kept to a minimum but the rarer objects are more fully treated. A range of figures are provided to allow the comparative frequency of an object to be more readily appreciated.

Details of the illustrated items and their contexts are provided in Fiche 28:B6–E8). A few scraps of iron not illustrated or described here are also listed in the fiche.

A high percentage of the iron objects were found together in groups of which two broad categories can be recognized: hoards, deposited in small specially dug holes; and collections placed on the bottoms of abandoned storage pits. The hoards will be discussed fully at the end of this section (p. 354) and brief comments will be made on the pit groups. The pit groups will be more fully dealt with in Volume 6 where the 'special deposits' will be considered as a single phenomenon.

Hook-shaped cutting tools (2.206–2.225)

Twenty-three hook-shaped cutting tools were found in 1979–88 of which 20 are illustrated here, the remaining three being small fragments of socketed handles. The distribution of the entire collection by ceramic phase is as follows:

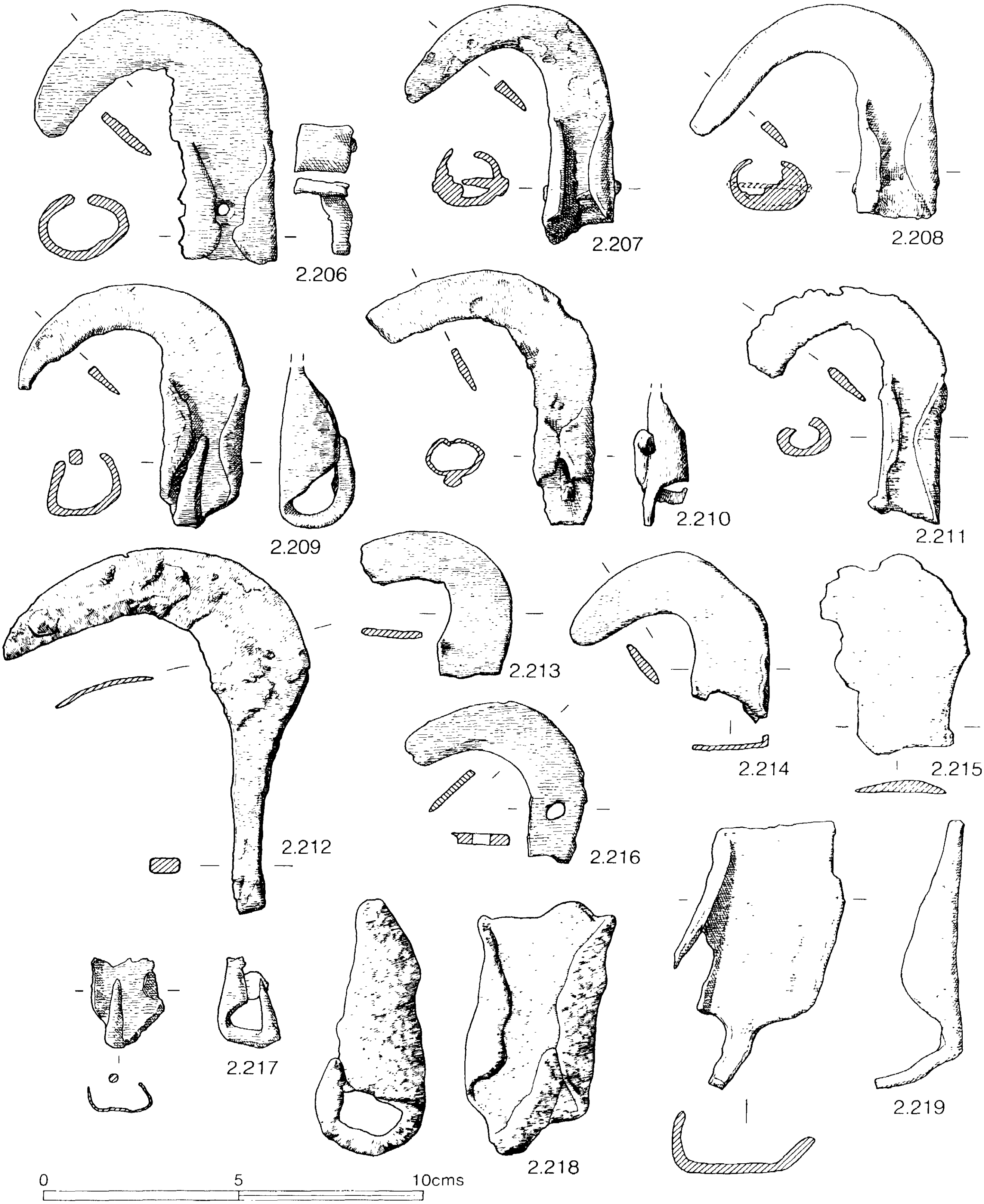


Figure 7.9 Iron hooked cutting tools.

Link to Next Section

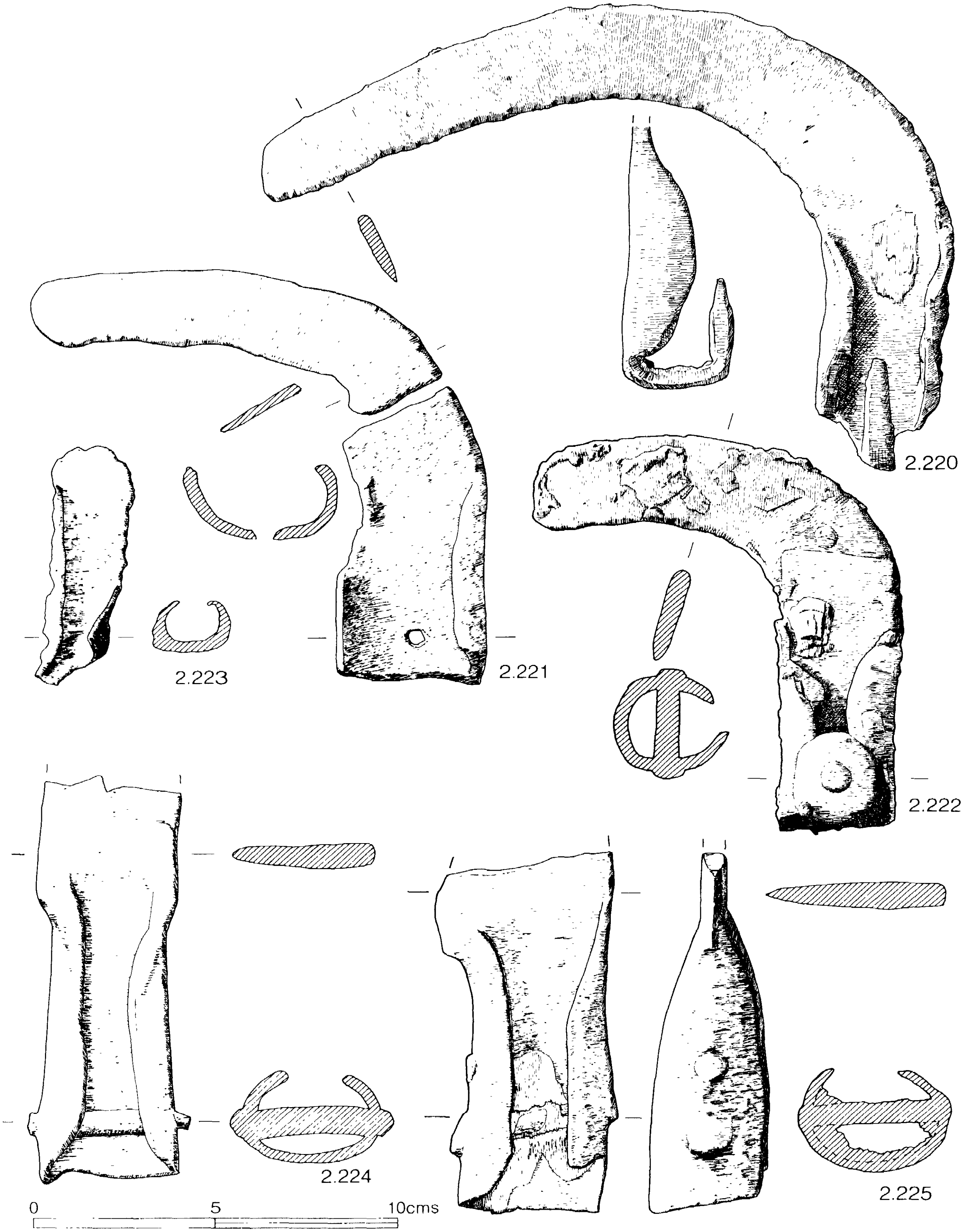


Figure 7.10 Iron hooked cutting tools.

Link to Previous Section

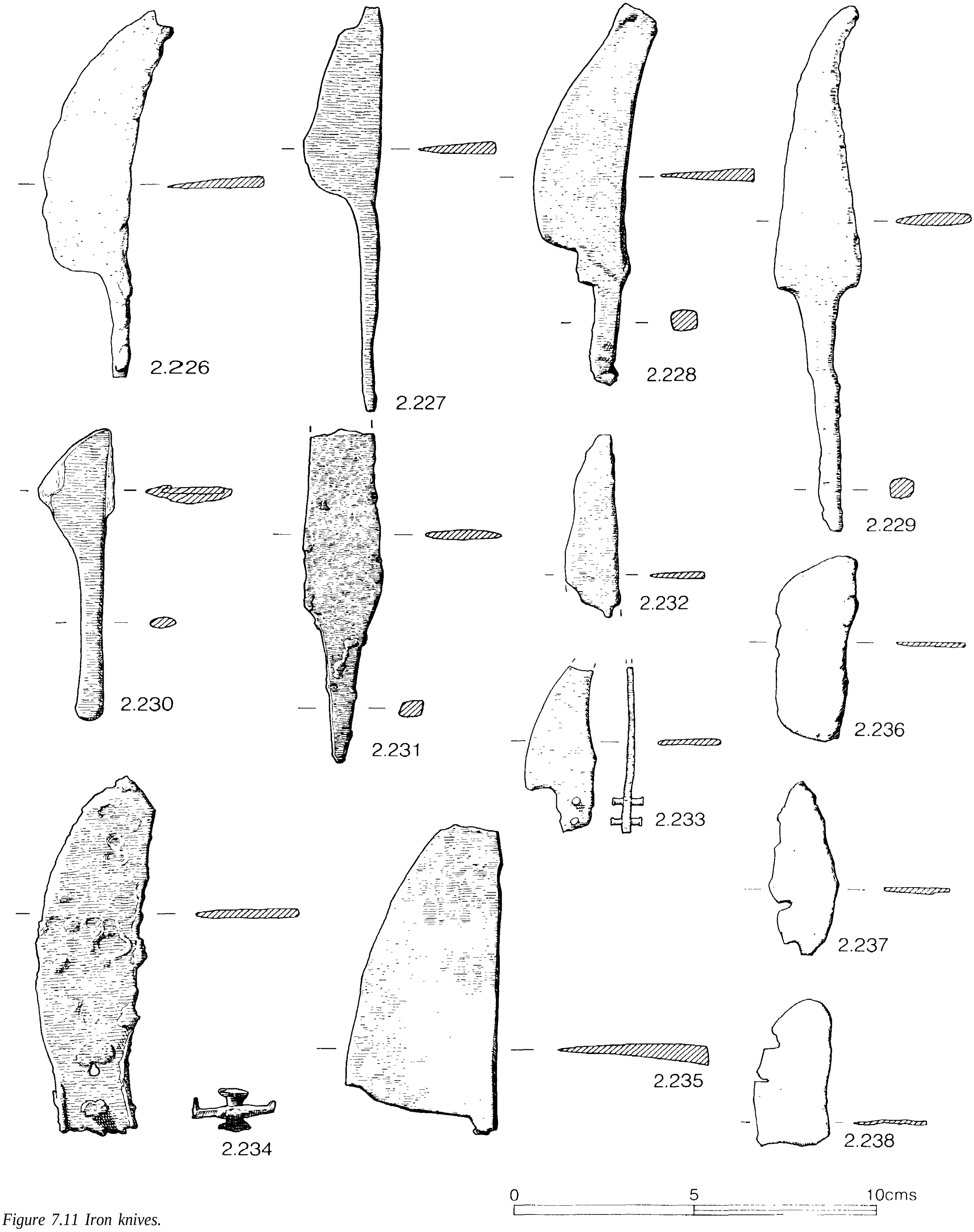
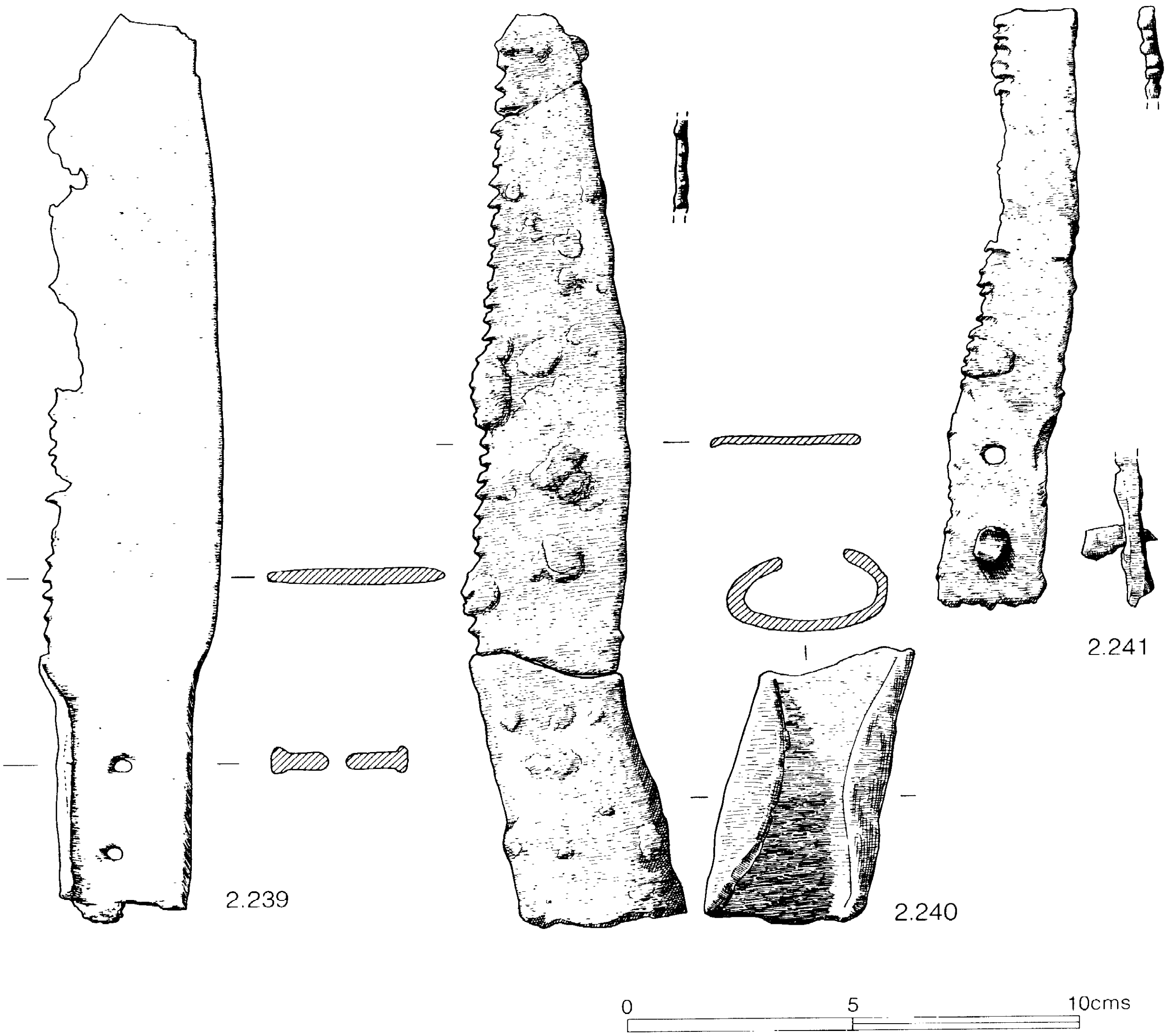


Figure 7.11 Iron knives.



Ftgure 7.12 Iron saws.

cp	*number* 1969–78	1979–88	*total*
1–3	4	1	5
4	0	0	0
5	1	0	1
6	2	0	2
7–8	14	20	34
unphased	0	2	2
	21	23	44

Although, as the illustrations will indicate, there is some variation of form within the category, all share common characteristics including a curved blade, usually with a single sharpened cutting edge on the concave inner side, and all were designed for the attachment of a wooden handle.

The principal variations lie in:

a) the degree of curvature of the blade
b) size
c) the nature of the handle attachment.

a) The degree of curvature of the blade varies. The majority of the implements are curved to create a semicircular cutting edge though the tightness of the curve differs between items. A few, eg no 2.4 (Vol 2, fig 7.8), seem to have been only slightly curved. This type is more likely to have served as a heavy bill hook and it may be to this category that nos 2.224 and 2.225 belong.

b) Two broad size groupings can be defined: a *small* group in which the maximum horizontal measurement from the tip of the blade to the outer edge of the handle is less than 700 mm and a *large* group in

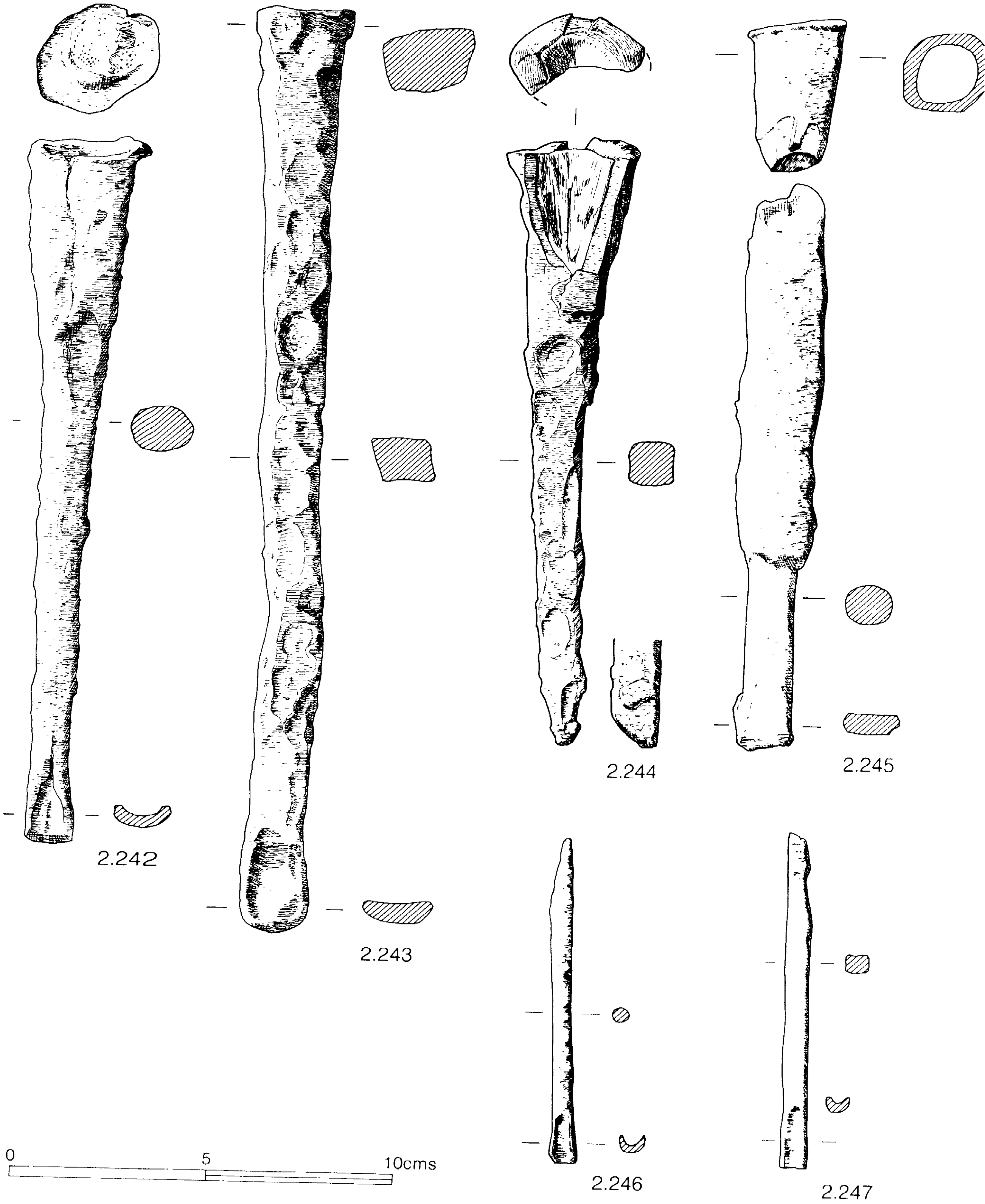


Figure 7.13 Iron gouges and chisels.

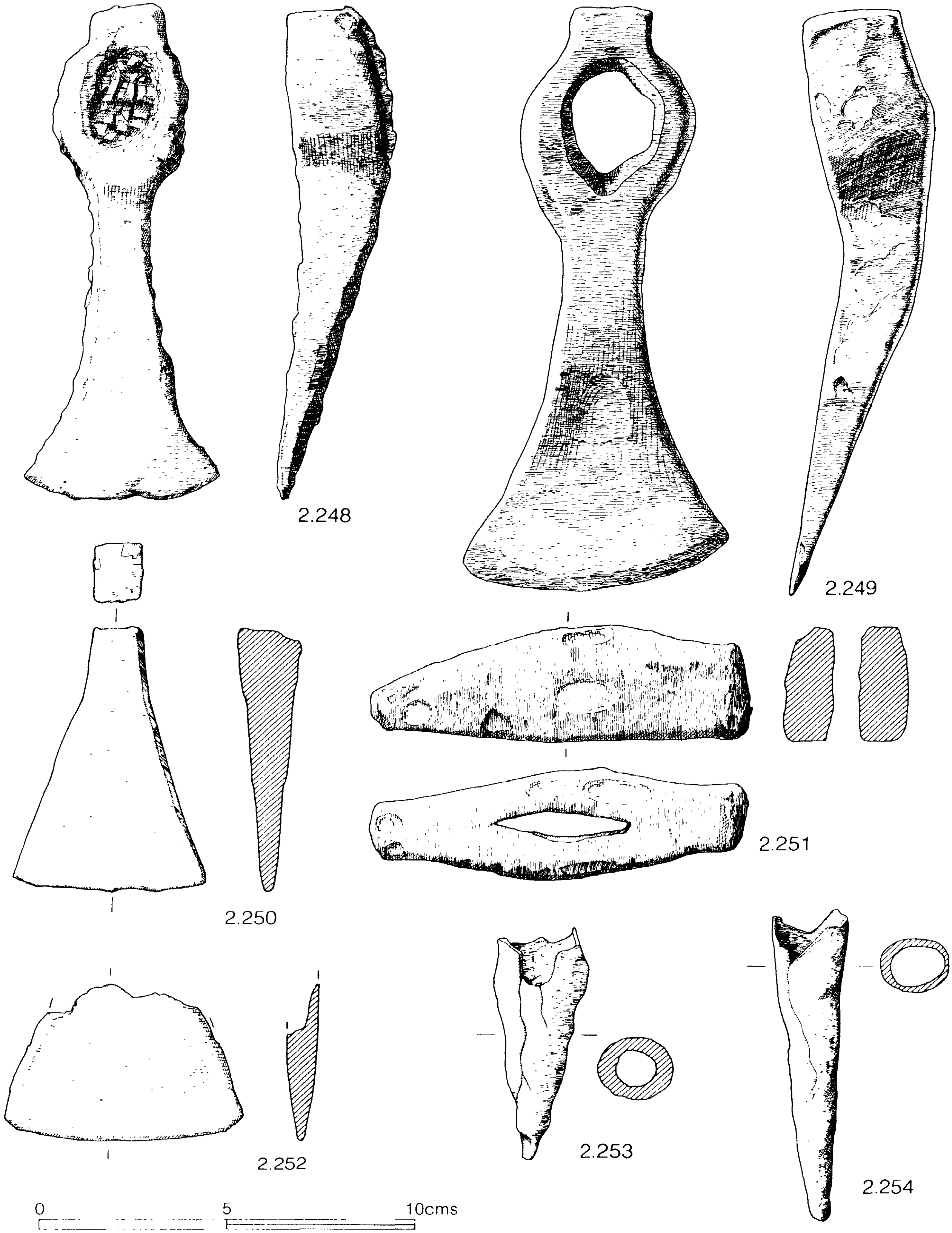


Figure 7.14 Iron tools.

Link to Next Section

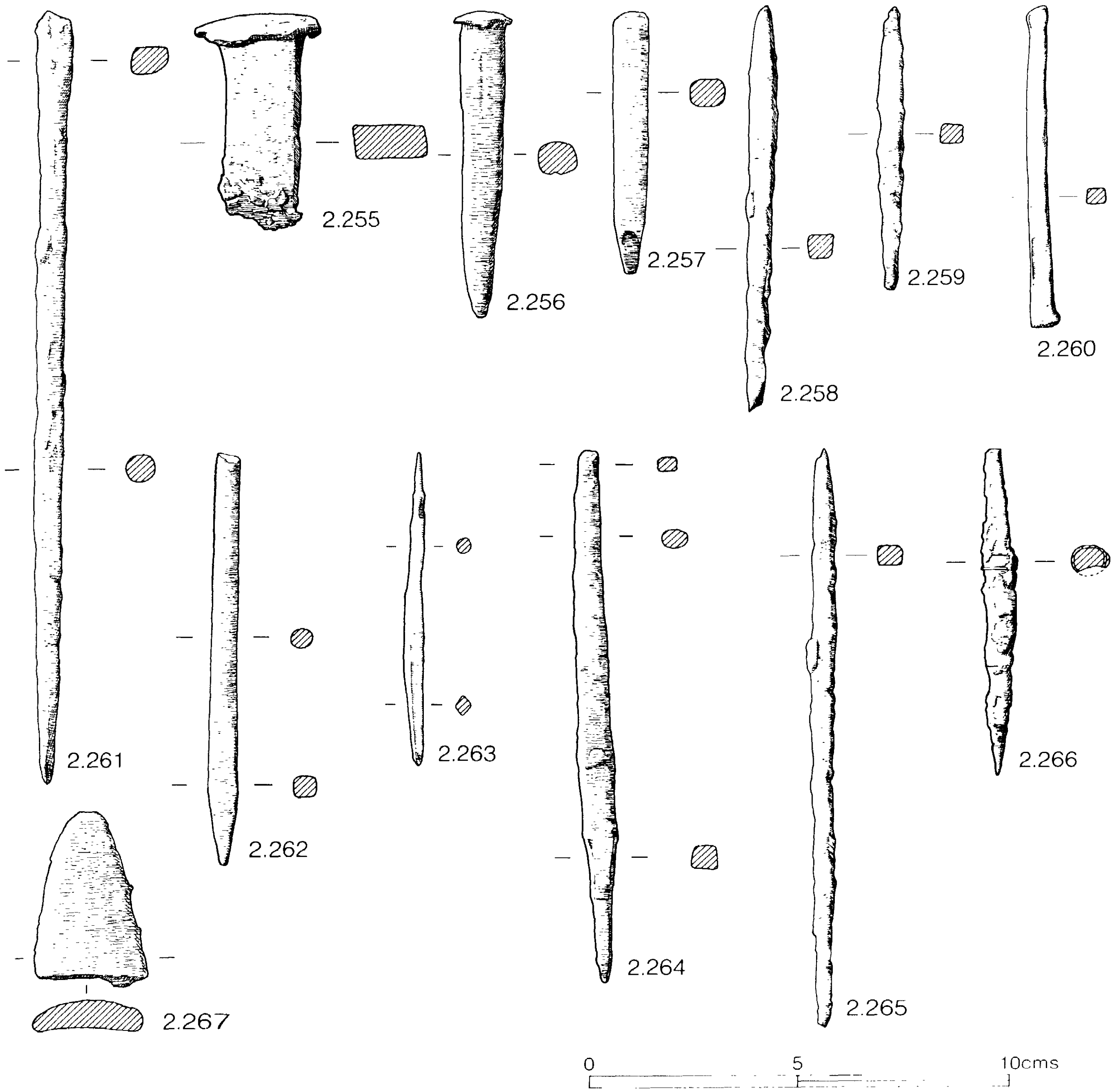


Figure 7.15 Iron punches and awls.

which it is in excess of that. This applies only to blades with a semicircular curve. The *small* group is the more common.

c) Four types of handle attachment are represented.

(i) Flanges beaten around the handle: handle held by pin, integral with the blade, bent at right angles to pass through the handle and bent over again to secure it (eg no 2.209).

(ii) Flanges beaten around the handle: handle held by separate pin(s) at right angles to the blade (eg no 2.206). Sometimes the flanges may be vestigial or missing but this may be the result of ancient breaks or corrosion.

(iii) Flanges beaten around the handle: handle held by a separate pin(s) through the flanges parallel to the blade (eg no 2.207).

(iv) Tanged flange. There are only two examples, the anomalous no 2.20 (Vol 2, fig 7.9), and no 2.212. There appears to be no direct correlation between variations of size, degree of curve and handle form.

Link to Previous Section

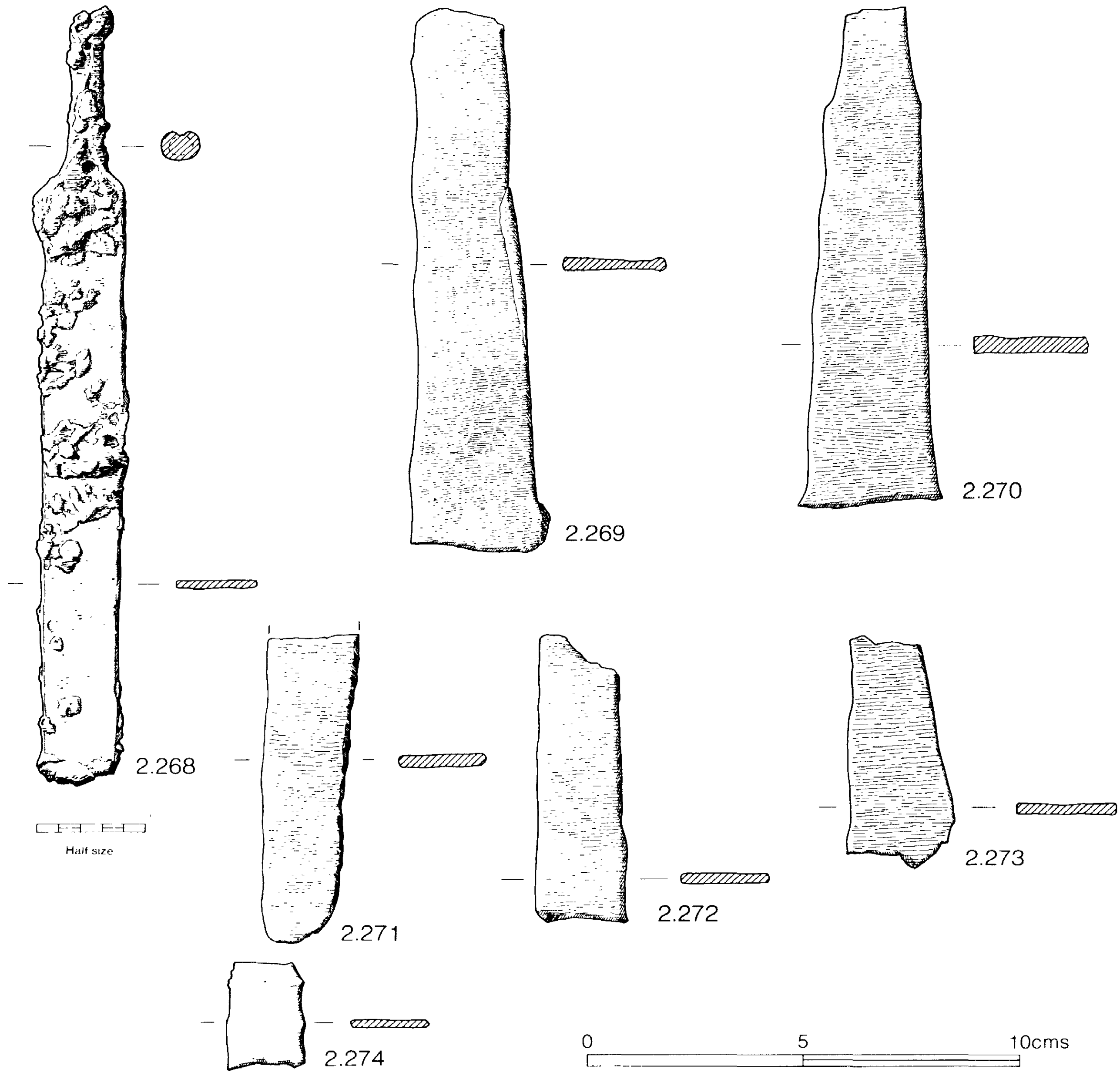


Figure 7.16 Iron currency bars.

The range of forms implies a range of functions. Most of the small hooks were probably general purpose tools used in cutting and stripping branches for hurdle work and basketry. The larger curved hooks would have been suitable for harvesting corn while the straighter blades were probably billhooks. For further discussion see Vol 2,346–9. Reaping and pruning hooks and similar cutting tools have been considered in a detailed discussion by Rees (1979, 450–73).

Knife blades (2.226–2.238)

Thirteen knife blades were found in the excavation of 1979-88. Taken with the 1969–78 collection the total figures are

cp	*number* 1969–78	1979–88	*total*
1–3	3	0	3
4	0	1	4
5	0	0	0
6	1	0	1
7–8	11	11	22
unphased	0	1	1
	15	13	28

The knives can be classified by handle type:

1 Knives in which the blade and handle were forged in

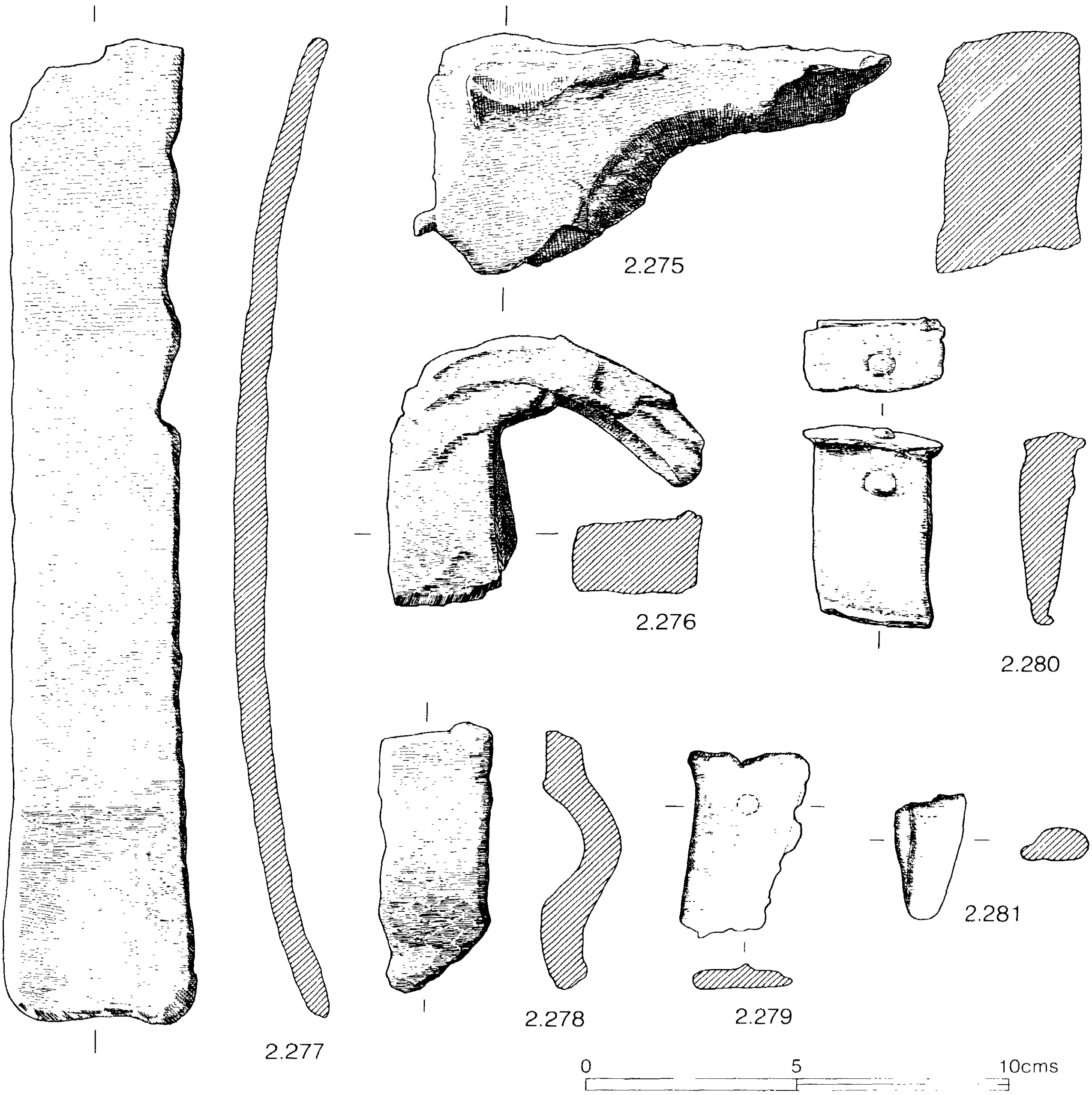


Figure 7.17 Iron objects.

one piece (eg 2.25 (Vol 2, fig 7.10)).

2 Knives with pointed tangs for insertion into a handle of wood or bone (eg no 2.227).

3 Knives with flat tangs to which handle plates of wood or bone were attached by rivets (eg no 2.233).

4 Knives with socketed terminals (eg 2.37 (Vol 2, fig 7.10)).

The present collection belongs to classes 2 and 3 the only notable example being no 2.233 which was fitted with copper alloy rivets. Although the blades vary in shape and size the present group were comparatively short and curved. There were no examples of the long straight blades published in Vol 2 (nos 2.26 and 2.28).

Saw blades (2.239–2.241)

Three saw blades were found in 1979–88 all from cp 7 contexts. This brings the total to five of which four were from cp 7 contexts and one was unphased.

One, no 2.239 had a well preserved handle attachment of the kind designed for wooden or bone plates to be attached to either side of the flange by rivets. The other, no 2.240 was less well preserved but seems to have had the blade set at an angle to the handle. The third example, no 2.241 was a much corroded fragment from a narrow blade.

For further discussion see Vol 2, 351.

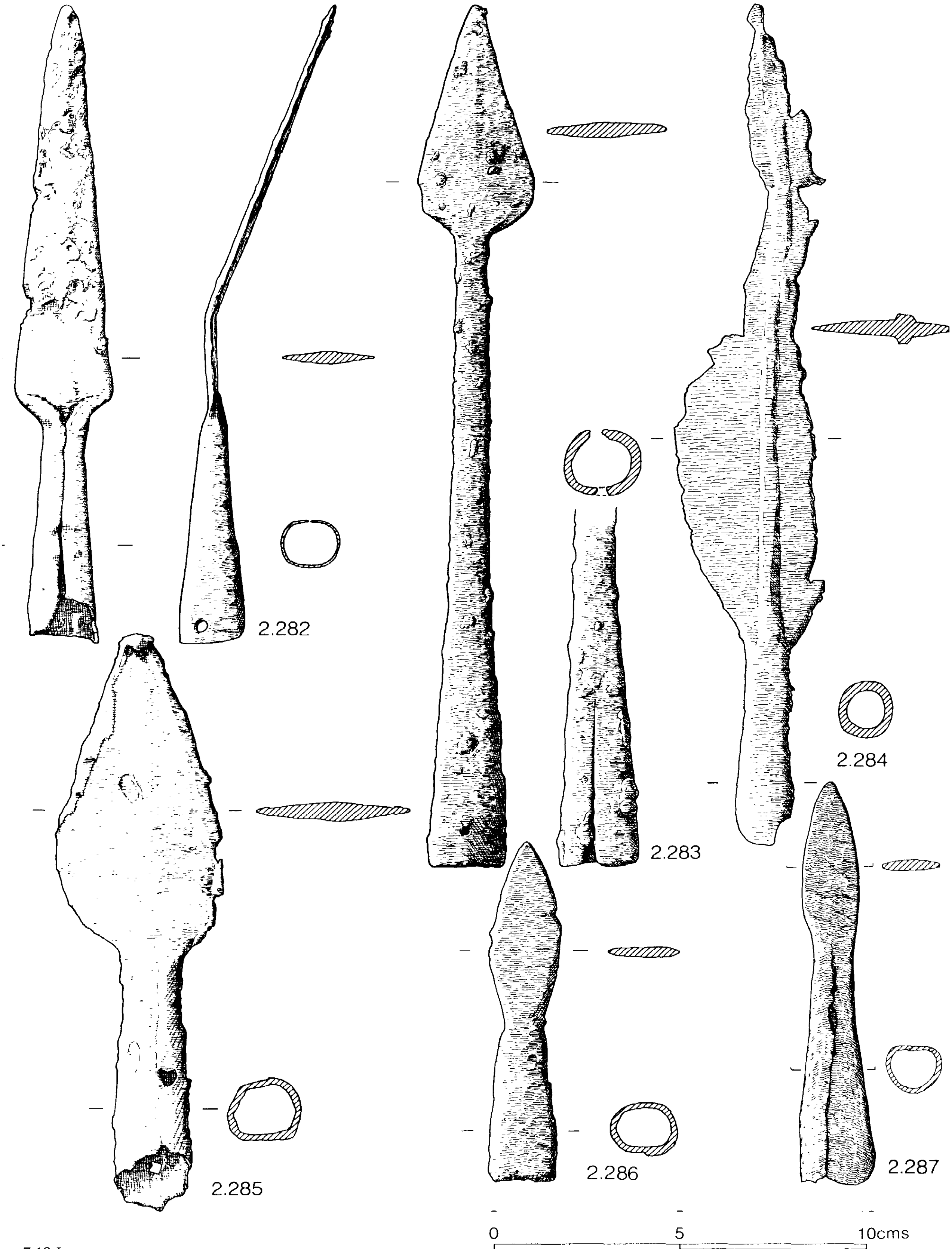


Figure 7.18 Iron spears.

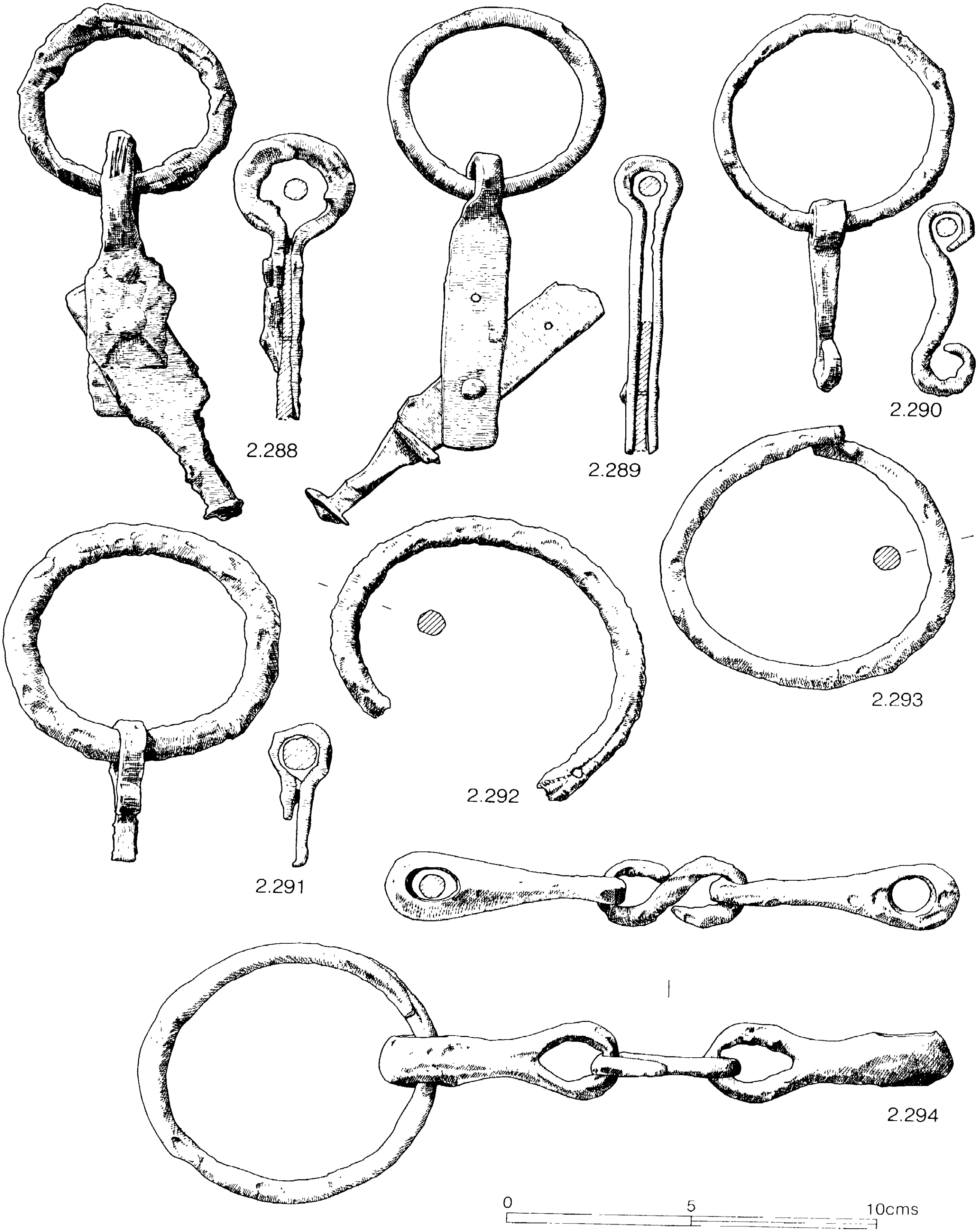


Figure 7.19 Iron bridles and other fittings.

Link to Next Section

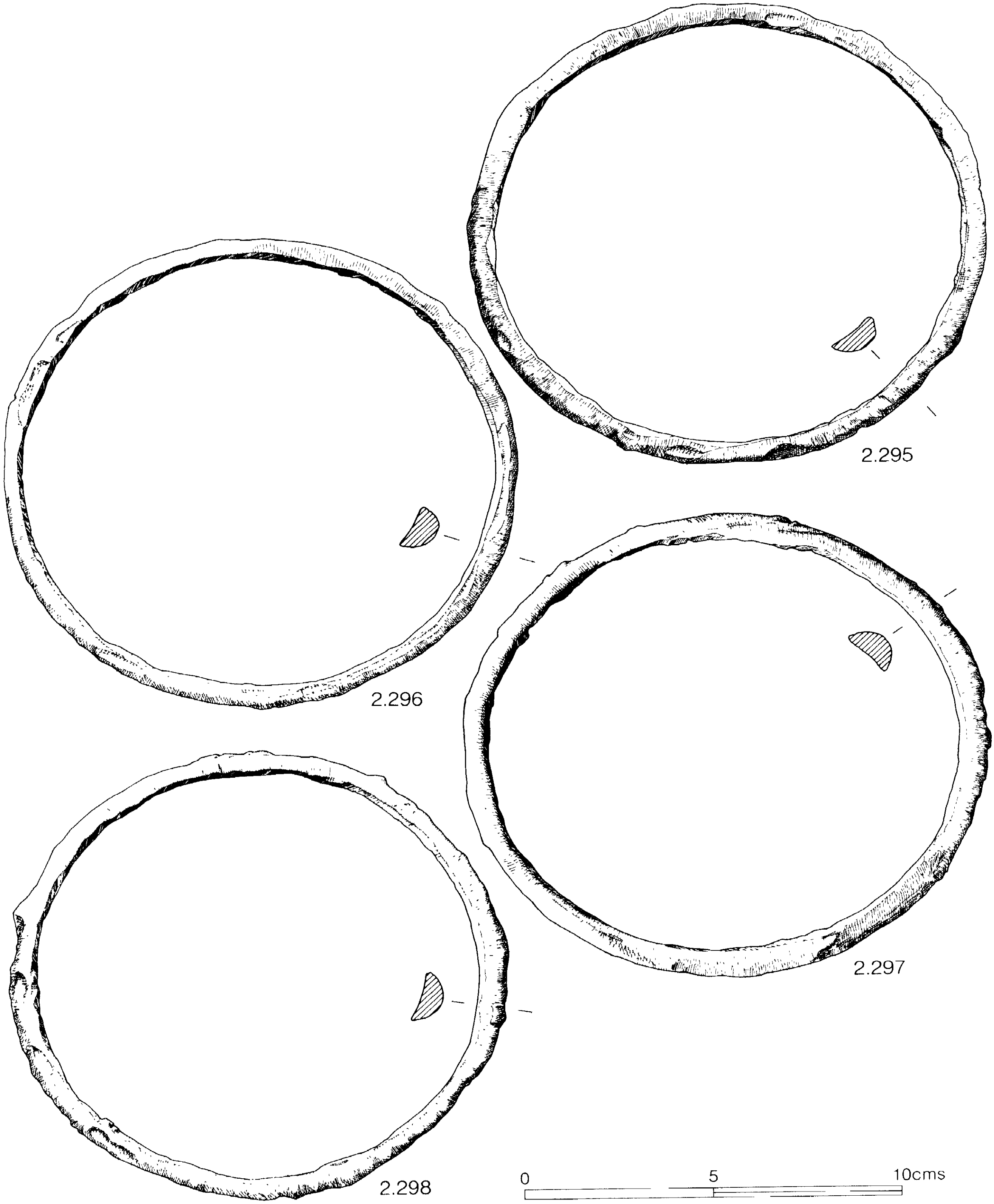


Figure 7.20 Iron nave bindings.

Link to Previous Section

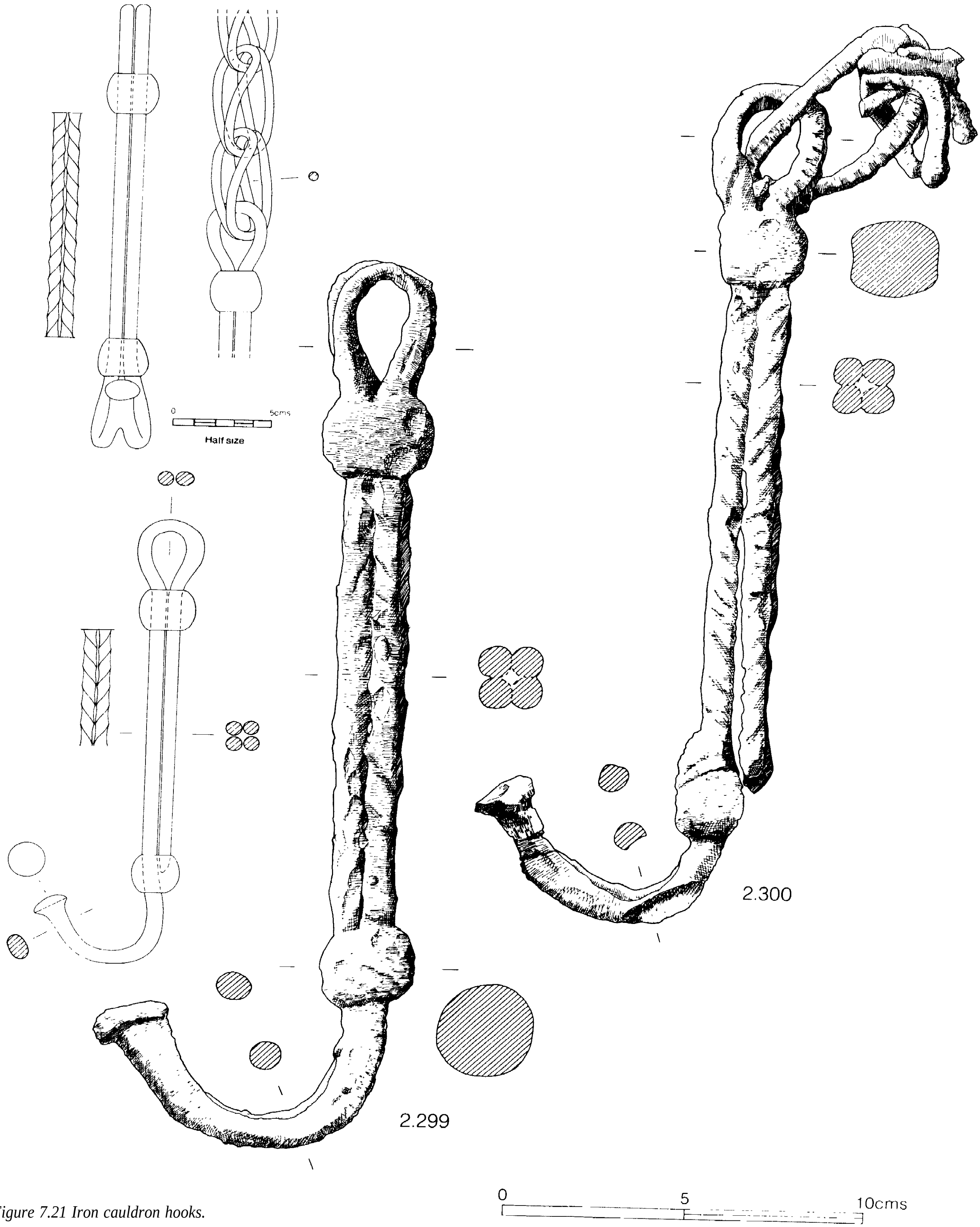


Figure 7.21 Iron cauldron hooks.

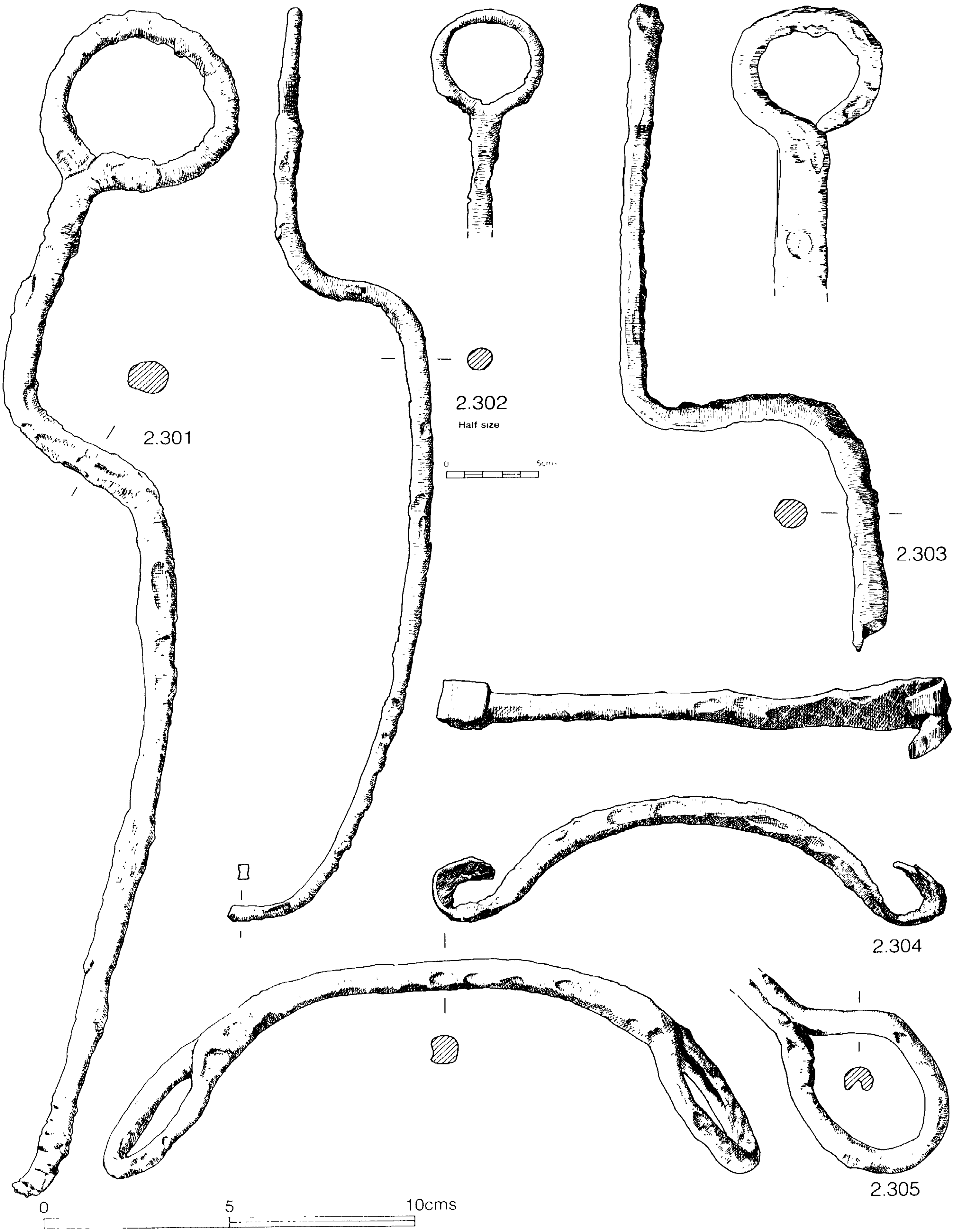


Figure 7.22 Iron latch lifters and handles

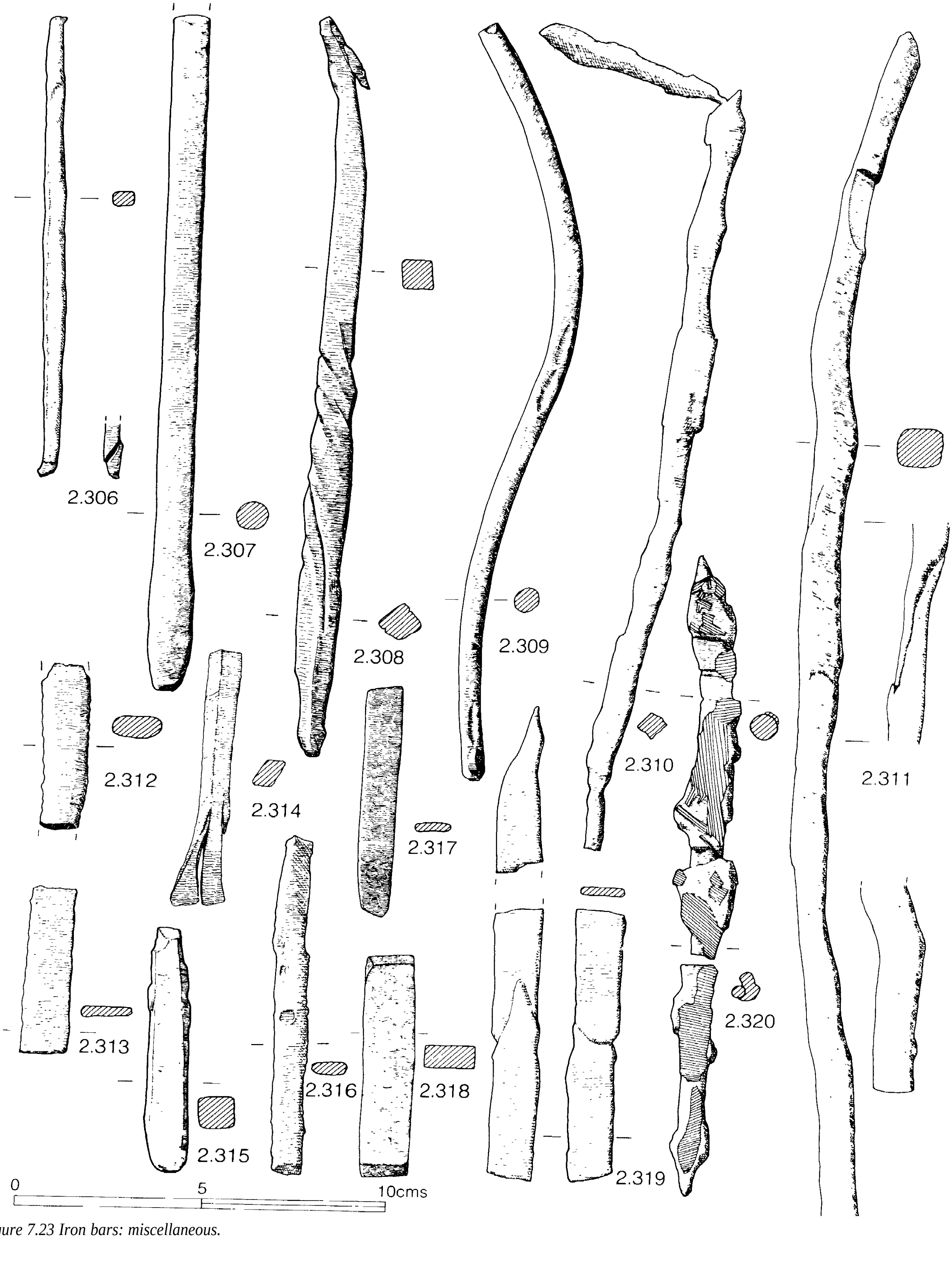


Figure 7.23 Iron bars: miscellaneous.

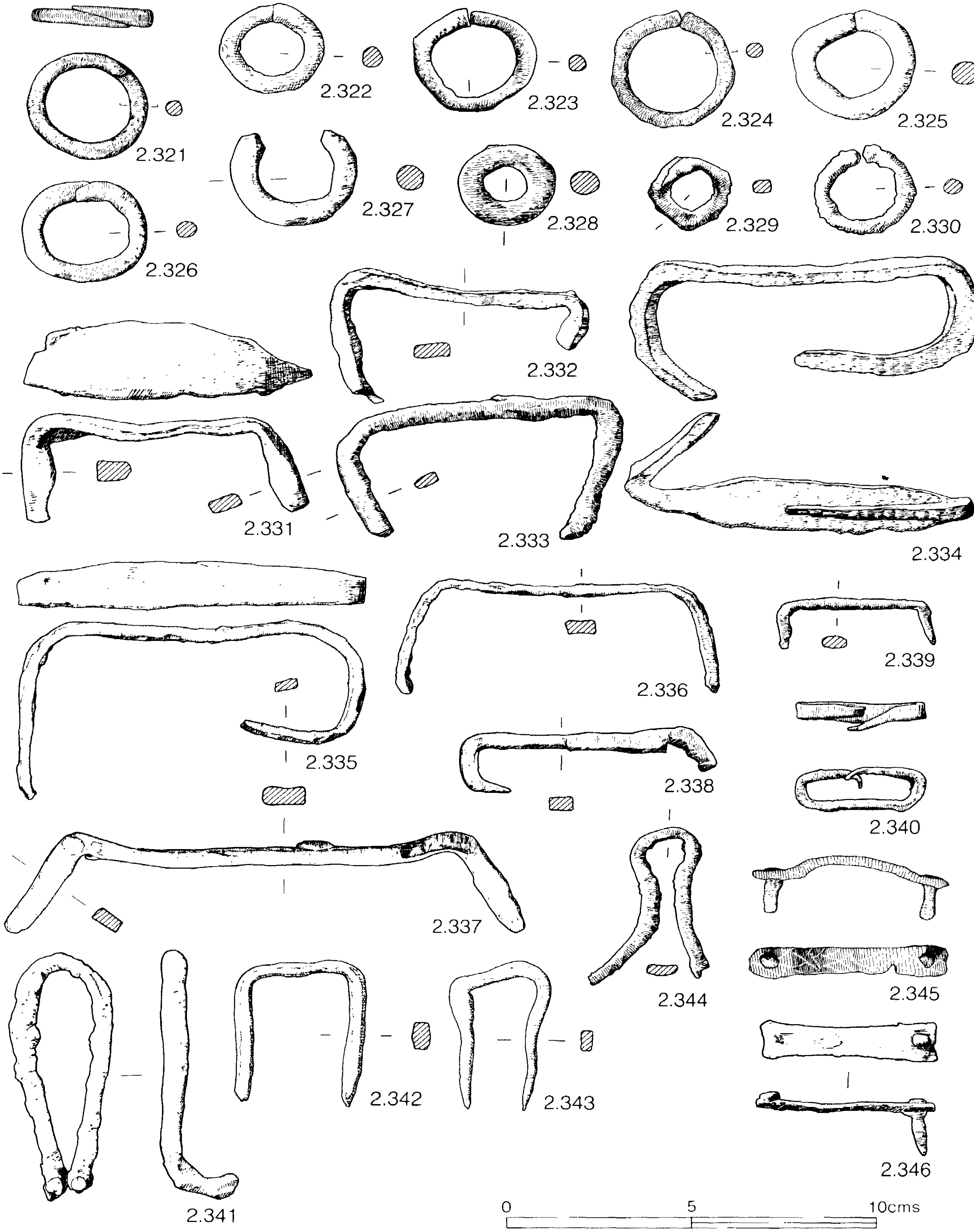


Figure 7.24 Iron fittings.

Link to Next Section

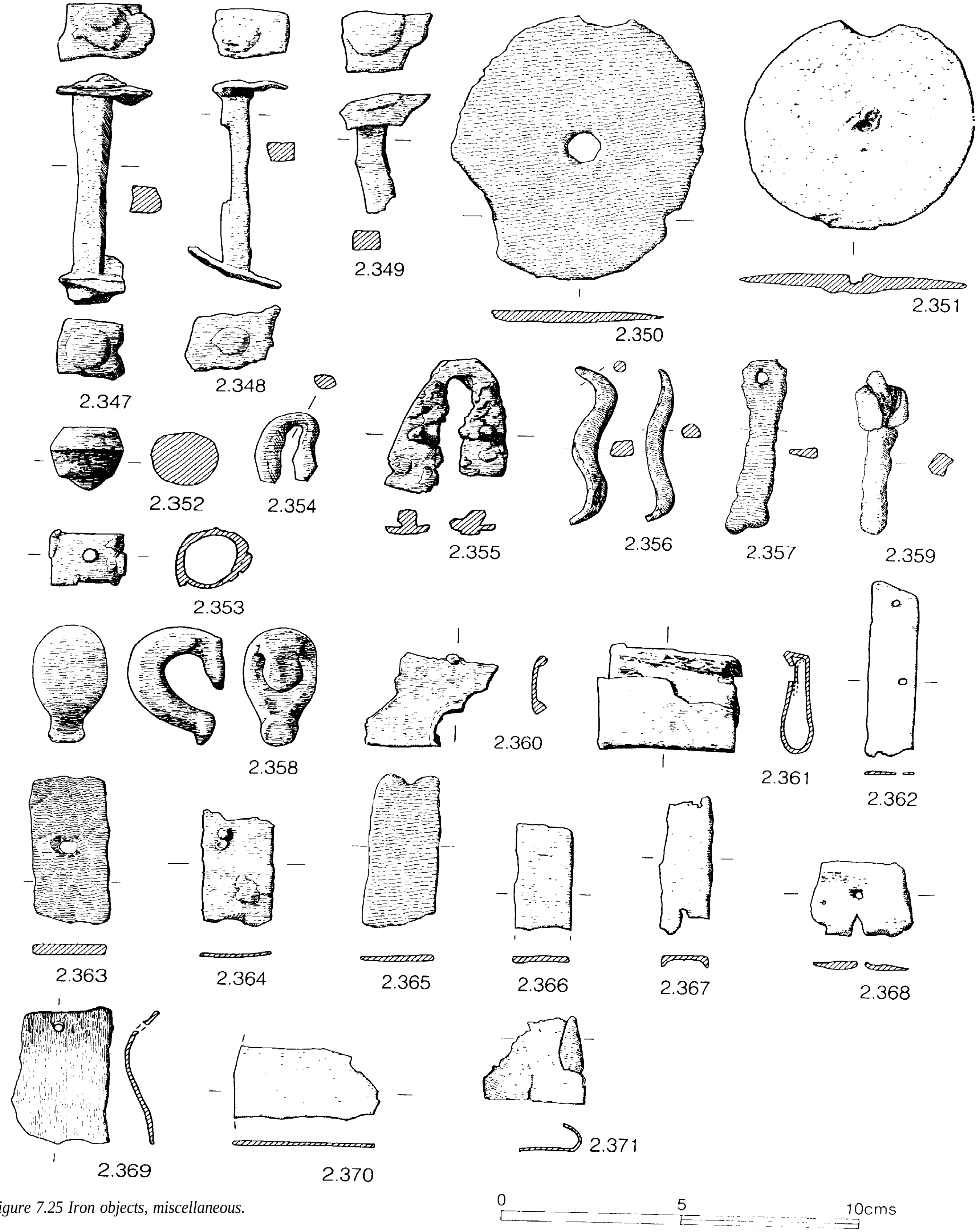


Figure 7.25 Iron objects, miscellaneous.

Link to Previous Section

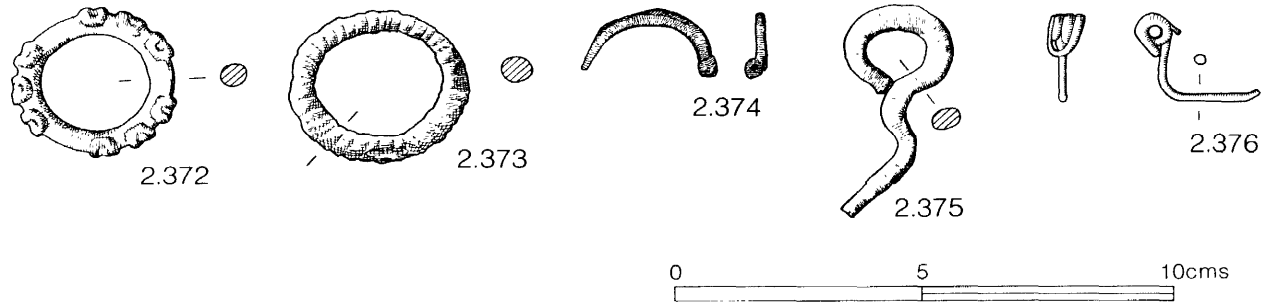


Figure 7.26 Iron ornaments.

Gouges (2.242–2.247)

Six gouges were found in the excavation of 1979–88, all from cp 7 contexts. Of these, three (nos 2.242, 2.244 and 2.245) are comparable to the three discovered in 1969–78 (Vol 2, fig 7.11). Five of this group of six large gouges were found in cp 7 contexts and only one in cp 5. No 2.243 differs from these in that it was solid and without provision for a wooden handle.

The two small gouges (nos 2.246 and 2.247) differ from the large ones not only in their size but also in their method of hafting. The small versions were probably fixed by a tang set in a wooden or bone handle while the large ones originally had handles set in sockets, though the burring on the socket ends of nos 2.44 and 2.242, 2.244 and 2.245 suggest that at one stage in the life of the tool the metal was being hammered directly. The gouges were most probably woodworking tools the smaller examples, by virtue of their weaker handle attachments, probably being used in the hand while the larger ones would be struck. The large gouges could also have been used to dig out chalk when post-holes were being created.

Socketed adzes and hammers (2.248–2.252)

Four adze-hammers were recovered from the excavation of 1979–88, three from cp 7 contexts and one from a cp 3 context. Two similar tools (2.49 and 2.51) were found in 1969–78 (Vol 2, fig 7.12) both from cp 7 contexts. The tools were designed to be used both as adzes and hammers and would thus have had a variety of uses largely as woodworking tools but tool marks on the walls and floors of pits show that they were also used for pit digging. Rees (1979, 308–9) has also suggested that implements of this kind could have functioned as hoes.

One hammer was found (no 2.251) from a cp 6-7 context. One end was of rectangular cross-section for hammering while the other was slightly sharper and though now blunted by use, may well have been originally more pick-like resembling no 2.50 (Vol 2, fig 7.12).

Ferrules (2.253 and 2.254)

Two ferrules were found both from cp 7 contexts bringing the total to four all from cp 7 contexts.

While this type of fitting need have been little more than the end of a spear shaft, in all probability they were used to tip digging sticks and crow bars. Marks made by just such items have frequently been seen around the sides of post-holes.

Pointed and bladed tools manufactured from rods (2.255–2.266) Twelve tools belonging to this rather amorphous category were found in the excavation of 1979–88, two from cp 3, one from cp 4, one from cp 6 and four from cp 7. Thirteen were found in 1969–78 all but one from cp 7–8 contexts.

A variety of forms and sizes exists but they share in common their rod shape. Two were evidently punches or chisels (nos 2.255 and 2.256) which had been hammered. The rest were probably punches hafted in handles of wood or bone suitable for lighter tooling perhaps associated with leather-working. Breakage and corrosion have obscured several of the working ends.

For further discussion of the type see Vol 2, 354.

Plough share (2.267)

Only one fragment of a possible plough share tip was recovered: it came from an unphased post-hole. It would appear to be of the same type as nos 2.70 and 2.71 (Vol 2, 356) discussed fully in Volume 2 (pp 355–7). This type has been considered in detail by Rees (1979, 50–7): it conforms to her type la.

Currency bars (2.268–2.274)

Seven fragments of currency bars were found in 1979-88, six from cp 7 contexts, and one unphased. All are of roughly similar proportions and bear evidence of having been cut from longer strips.

In 1969–78 a hoard of 21 complete bars were found together with three fragments from isolated contexts.

A full discussion of the type is given in Volume 2 (pp 357–61).

Anvils (2.275 and 2.276)

Two substantial blocks of iron (total weight 938 gm) both from the same cp 7 context.

No 2.276 is difficult to parallel but has similarities to anvils found at Manching in Germany (Jacobi 1974) and Meare East (Coles 1987, fig 3.53, no 140). Examples of the other type, no 2.275, have been found, though rarely, on several British Iron Age sites, eg at Meare West (Bulleid & Gray 1953, pl LI, nos I28 (and I32 not illustrated), Meare East (Coles 1987, fig 3.50, no I35), Barbury Castle, Wilts (MacGregor & Simpson 1963, fig 2, no 26) and Gussage All Saints, Dorset (Wainwright 1979, fig 80, no 1019). MacGregor considered the Barbury example to be an earth anvil but both Coles and Wainwright prefer to see the Meare East and Gussage examples as weights, basing their judgments on the carefully finished hooked end.

Tyre (2.277)

Strip of iron 40 mm wide and 8 mm thick evenly curved. Probably a fragment of the tyre of a wooden wheel. Comparable types have been found in the Arras burials of Yorkshire (Stead 1979, 40–4), Llyn Cerrig Bach, Anglesey (Fox 1946, 11–13) both authors providing extensive discussions referring to other British finds at Ham Hill, Somerset, Bar Hill and Newstead, Scotland, and Holme Pierrepont, Notts.

Bulk iron (2.278–2.281)

Collected together here, somewhat arbitrarily, are a number of heavy pieces of iron fashioned into various forms and all from cp 7 contexts. In the form in which they survive they were probably retained for their scrap value.

Spearheads (2.282–2.287)

Six spearheads were recovered from the excavation of 1979–88, one from cp 3, three from cp 7 and two from unphased contexts. To this may be added the four found in 1969–78 (one cp 3, one cp 6, one cp 7, one unphased). If the ceramic evidence provides a reliable indication of the date of deposition then spears do not concentrate in any single phase.

Taken together the collection presents a variety of forms, no two showing any marked degree of similarity. In all probability they reflect a variety of uses as javelins, lances, throwing spears and possibly hunting spears.

Ring-pivots (2.288 and 2.289)

Ring attachments from cp 7 contexts. No 2.288 was found with a pair of nave bindings (nos 2.297 and 2.298) in pit 2095. No 2.289 came from pit 2353.

Both attachments consist of three separate elements: a ring; a folded metal strip holding the ring; and a separate metal strip with a tang attached and riveted between the arms of the middle folded strip. The articulation of the three elements is most clearly demonstrated by no 2.289. The ring is intended to move freely through the loop of the middle strip, while the single rivet attaching the middle strip to the tanged strip allows the two elements to pivot. No 2.289 has an additional perforation through both strips presumably to allow a nail to be inserted when the shank was required to be straight and rigid. The tanged shank was attached to a timber *c* 80 mm thick the end of the tang being finished with a square washer to prevent it from being withdrawn.

No 2.288 is more corroded but is generally similar. In addition to the pivot, the second rivet was also in place but the tanged strip had swivelled suggesting that the end may have broken.

Closely similar items have been found at Hod Hill (Manning 1985, pl 64, no 56) and Maiden Castle (Wheeler 1943, fig 94, 2). The Maiden Castle example has only one rivet and therefore must have been free to pivot.

Bridle-bits (2.290–2.294)

by Natalie Palk

Parts of three bridle-bits have been recovered: no 2.290 consists of a ring and an attached link from P2353 (cp 7), while Hoard 2 (cp 7) produced two bridles, one composed of nos 2.291 and 2.292, the other of 2.293 and 2.294. Nos 2.293 and 2.294 comprised a double-jointed snaffle bit.

The mouthpiece (L 152 mm) is composed of two side-links (L 67 and 64 mm) and a centre-link (L 40 mm). The rein-rings, one of which has subsequently become detached from the main bridle-bit, have external diameters of *c* 78 mm, and are now c 7 mm thick and of circular cross-section. Since all the elements are composed of iron, with no visible bronzing or tinning, this example can be allocated to Category F of British double-jointed snaffles (Palk 1984, 4, fig 2). However, morphologically this example has more in common with Category C bridle-bits (Palk forthcoming, 86). The bit's centre-link is formed from a single piece of circular cross-sectioned iron which has been fashioned into an S-shape. By passing through the side-link head perforations this joins the two side-links to form a complete mouthpiece. This centre-link bears no similarity to those of other Category F bits, having much more in common with the centre-link of a Category C bridle- bit from Bredon Hill, Gloucs (Palk 1984, 26 and fig C6). The side-links of this bit are joined by an S-shaped centre-link, though here the cross-section is sub-rectangular. Both these centre-links give the impression of having been fashioned at short notice to take the place of another centre-link which either was never cast or else needed replacing.

There are deep wear facets at the centre-link/side-link joints of the Danebury bit, and also to a lesser extent at the side-link/rein-ring joints.

The two rein-rings are formed in different manners: the ring still attached to the mouthpiece is completed by an overlapping scarf joint about 30 mm long, so keeping the thickness of the ring uniform. The loose ring has no joint, the two free ends abutting and now joined by corrosion.

Nave hoops (2.295–2.298)

Four nave hoops: one pair 2.295 and 2.296 were found together with a collection of other iron work which constitutes Hoard 2 (below, p. 354), the other pair 2.297 and 2.298 were found together in pit 2095. Both contexts belonged to cp 7.

All four hoops were of similar kind with a simple D-shaped section. The first pair measured 124 mm in internal diameter, the second between 118 and 122 mm. Hoops of this kind were used to bind the naves of two-wheeled vehicles. The type is well known in the Marnian graves of La Tène I and occurs among the Arras culture burials of Yorkshire (Stead 1979, 40–4). Close parallels to the Danebury examples with their D-shaped cross-section were found in the Lady's Barrow, the King's Barrow and the Charioteer's Barrow at Arras (*ibid*, fig 11). In the Lady's and King's Barrows the iron hoops had been covered by bronze sheet. Another example of a D-sectioned hoop was recovered with the Llyn Cerrig Bach hoard found in Anglesey (Fox 1946, pl XV, no 39). Other examples come from Hunsbury (Fell 1937) and Barbury (MacGregor & Simpson 1958, fig 2, no 12). The sizes may be compared:

		internal diameter
Danebury	2.295 and 2.296	124 mm
	2.297 and 2.298	118–122 mm
Lady's Barrow		124–130 mm
King's Barrow		125–130 mm
Charioteer's Barrow		130–150 mm approx.
Llyn Cerrig Bach		112 mm
Barbury		114 mm.

Cauldron hooks (2.299 and 2.300)

A pair of cauldron hooks found together in a hoard with other iron scrap in a cp 7 context.

The hooks were both made in the same manner. Two long rods of circular section were chosen each about 4,560 mm long. The rods were then marked into four sections of equal length. The second and fourth sections were twisted while the first and third were left plain. The rods were then placed together and forged into one at the plain end where a hook with a button terminal was formed. The rods were then bent back on themselves so that the twisted sectors came together and a loop was formed out of the plain sector at the bend. Finally bands of iron were wrapped around the bunch of rods at the junction of the loop and twisted sectors and at the junction of the twisted sectors and the hook. In the loop of one of the hooks the remains of four chain links are attached though this may have been done after the cauldron chain had been dismantled.

Iron Age cauldron chains have become well known following the discovery of two sets at La Tène (Vouga 1923, pl XXVII). In Britain five sets were found in the Bigbury hoard (Boyd Dawkins 1902, pl II) but these are somewhat less sophisticated than the Danebury set which is most closely paralleled by a single example of a chain hook found at Hunsbury (Fell 1937, pl VII, no 2). A general survey of the cauldron chains of Iron Age and Roman date in Britain has been recently provided by Manning (1983).

Latch lifters (2.301–2.303)

Three latch lifters were found during the 1979–88 excavation, all from cp 7 contexts. To these should also be added the single example found during the 1969–78 campaign (Vol 2, fig 7.14, no 2.76). Apart from size the only variation lies in the arrangement of the handle ring. In three of the Danebury examples it is horizontal to the implement (nos 2.76, 2.302 and 2.303) while in the fourth (no 2.301) it is at right angles.

Latch lifters are recorded from Iron Age contexts but are by no means common.

Handles (2.304 and 2.305)

Two handles both from cp 7 contexts.

2.304 Simple rod handle looped at each end for attachment to the bucket rings. Similar items were found in the 1969–78 campaign, nos 2.167–2.169 (Vol 2, fig 7.23).

2.305 Handle-shaped object terminating at each end with well formed rings. It is possible that the object served as a cart, saddle or harness fitting.

Bars and rods (2.306–2.320)

A selection of bars and rods of various types are illustrated here, all, where phased, come from cp 7 contexts. Most of the items bear signs of being worked in the forge in particular no 2,308 which was twisted in the central section. Nos 2.311 and 2.319 were both composite bars made up of two lengths hammered together. None show signs of wear and all are most likely in the form in which they survive to be scrap metal. Significantly three of the pieces, nos 2.309, 2.311 and 2.318 were found together with other items in a scrap metal hoard (pp. 354).

Rings (2.321–2.330)

Ten rings were found in 1979–88; one from cp 5, eight from cp 7 and one unstratified. There is little size variation and the collection is comparable to the ten rings found in 1969-78. A variety of functions are possible but the majority of the rings were probably attached to horse harness.

Bindings and clamps (2.331–2.346)

Sixteen bindings or clamps were found: one from cp 5, the rest from cp 7.

For the most part they were manufactured from rods of rectangular cross-section. No 2.334 was partially flattened. Nos 2.345 and 2.346 differ in that they comprised strips of metal each attached by means of two separate nails.

Bolts (2.347–2.349)

Three bolts with flat rivet heads at either end were found together in a pit of cp 7 date. The two complete bolts had been designed to pass through a timber 55 mm thick. The broken fragment was of comparable proportions.

Discs (2.350 and 2.351)

Discs with central perforations from cp 7 contexts.

Miscellaneous items (2.352–2.359)

Several fragmentary items were found which may be briefly listed:

2.352 Well-formed terminal: cp 5.

2.353 Ring binding: cp 7.

2.354 Loop attachment: cp 7.

2.355 Loop attachment: cp 7.

2.356 Fragment of a chain link: cp 3–5.

2.357 Perforated strip: cp 7.

2.358 Forged loop much corroded: cp 7.

2.359 Rod and ring: cp 7.

Sheet and strips (2.360–2.371)

A number of fragments of sheet or strip iron were found, some with perforations A selection of the better preserved pieces are illustrated. All are from cp 7 contexts.

Decorative items (2.372–2.375)

2.372 Lipped terret. Small and highly corroded.

2.373 Ribbed terret. Ribbed ring which has no definite strap bar although the ring is heavily corroded.

2.374 Part of a penannular brooch: cp 7.

2.375 Ring-headed pin: unphased.

2.376 Fibula, *by E M Jope*

The remains of an iron rod-bow brooch (1.5 mm thick) with a powdery green surface coating. It has a 4-coil mock spring 5 mm across, and an external chord with loop rising up the back of the bow. The pin coil is inserted at the second and an outer turn of the ‘spring’ coil, giving the effect of a 4-coil spring; there is no sign of an axle. The present roof-angle shape of the bow may be original (as the position of the pin-stub indicates), and the thinning just where the bow is broken towards the foot might possibly suggest that the foot-return was secured to the bow in a La Tène II manner.

Hoards and other deposits of iron work

Many of the iron objects described above were associated together in discrete contexts of which two broad categories can be recognized:

a) disused storage pits where the iron objects, together with items of other material, are found usually scattered on or close to the pit bottom;
b) small specially dug pits containing the iron objects tightly packed together.

Of the storage pits, we may list the following

	cp	*No of iron objects*	*Total wt of iron (gm)*
P1452	5	4	150.1
P1981	7	8	39.8
P2095	u/p	4	464.1
P2110	7	7	247.8
P2261	7	7	745.9(+)
P2346	7	3	14.2(+)
P2355	7	3	506.7
P2435	7	6	203.9

Depositions of this kind are part of a broader pattern of 'special deposits' which will be discussed in detail in Volume 6.

Turning now to the hoards proper – that is a group of iron objects buried together in small specially constructed pits – three can be listed from the entire excavation (Table 7.2):

Table 7.2 Hoards of iron objects

Hoard 1 (1969) CS22 cp 7
Twenty-one complete currency bars (Vol 2, 357–61).
Total weight 8567.4 gm.

Hoard 2 (1979) F68 cp 7

Cauldron hook	2.299 (sf 1515)
Cauldron hook	2.300 (sf 1517 and 1518)
Latch lifter	2.303 (sf 1520)
Rod handle	2.309 (sf 1521)
Punch?	– (sf 1522)
Currency bar fragment	2.270 (sf 1516)
Bar	2.311 (sf 1514)
Bar	2.318 (sf 1519)

Total weight 1324.9 gm

Hoard 3 (1983) ph 8857 cp 7

Nave hub binding	2.295 (sf 2063)
Nave hub binding	2.296 (sf 2064)
Bridle bit	2.294 (sf 2069)
Bridle ring	2.293 (sf 2663)
Handle	2.304 (sf 2664)
Ring	2.292 (sf 2068)
Ring	2.291 (sf 2067)
Clamp/bracket	2.335 (sf 2066)
Clamp/bracket	2.336 (sf 2065)

Total weight 638.3 gm

The three hoards are of totally different character. Hoard 1 contains ingots of iron in the state in which they were transported to the site. Hoard 2 is essentially a scrap hoard containing broken artefacts and various rods of unused metal. Hoard 3 on the other hand is a collection of fittings belonging to a cart.

All three hoards were buried beneath the floors of houses at some stage during their use, Hoard 1 in building CS22, Hoard 2 in CS40 and Hoard 3 in CS27. The contexts might then lead to the conclusion that they represented the personal 'wealth' of the owner. There are no unusual characteristics about the houses to indicate specialist activity. It is always possible, however, that the hoards were in some way propitiatory and designed to protect the building and its occupants.

It may be worth noting that of the 173 distinctive iron objects from 1979–88, 42 come from the eight pit groups and 18 from the two hoards. In other words more than one third of the iron objects come from recognizable special deposits.

7.1.6 Objects of bone and antler (Figs 7.27–7.39)

Items made from bone and antler will be discussed under the general headings adopted in the first report (Vol 2, 371) but in view of the lengthy discussions given there, the present report can be far more succinct. Quantification will be given but long descriptions and discussions of comparative material will be omitted at this stage. However, in the more general discussions to follow in Volume 6 some of these matters will be considered again in a wider regional context. For detailed descriptions of individual items see Fiche 28:A9–29:C3.

Combs of bone and antler (3.228–3.257)

Thirty-three whole or fragmentary combs were discovered (of which 30 are illustrated) bringing the total from the excavation to 71. The chronological distribution is as follows:

cp	*number* 1969–78	1979–88	*total*
1–3	8	3	11
4	3	0	3
5	0	0	0
6	3	2	5
7–8	24	24	48
unphased	0	4	4
total	38	33	71

Of the 33 combs, four were manufactured from bone, the rest from antler. The size range and form variation of the second sample conforms with that of the first, the only significant difference being that the round handled type was rather more common in the more recent collection (five examples).

Decoration lies wholly within the parameters defined in the first report. Aggregate figures for decorative style by phase may now be given:

Ceramic phase	*1–3*	*4*	*5*	*6*	*7–8*	*Total*
Undecorated (including fragments)	7	–	1	2	21	31
Linear decoration only	2	2	–	3	5	12
Circular decoration only	1	–	–	1	16	8
Combination of linear and circular	1	1	–	–	3	5

The only outstanding point to note is that circular decoration was more common in the later period but the

Link to Next Section

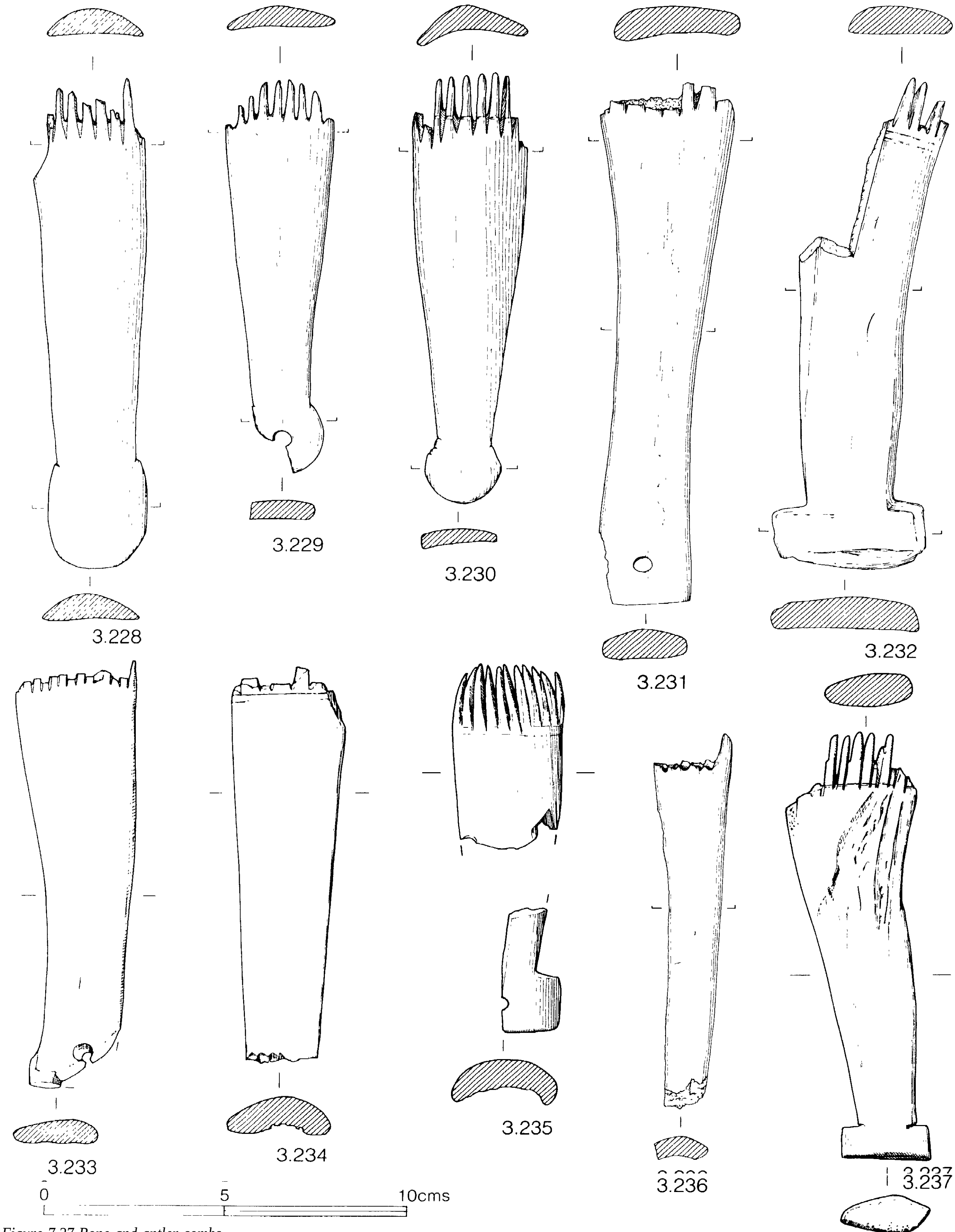


Figure 7.27 Bone and antler combs.

Link to Previous Section

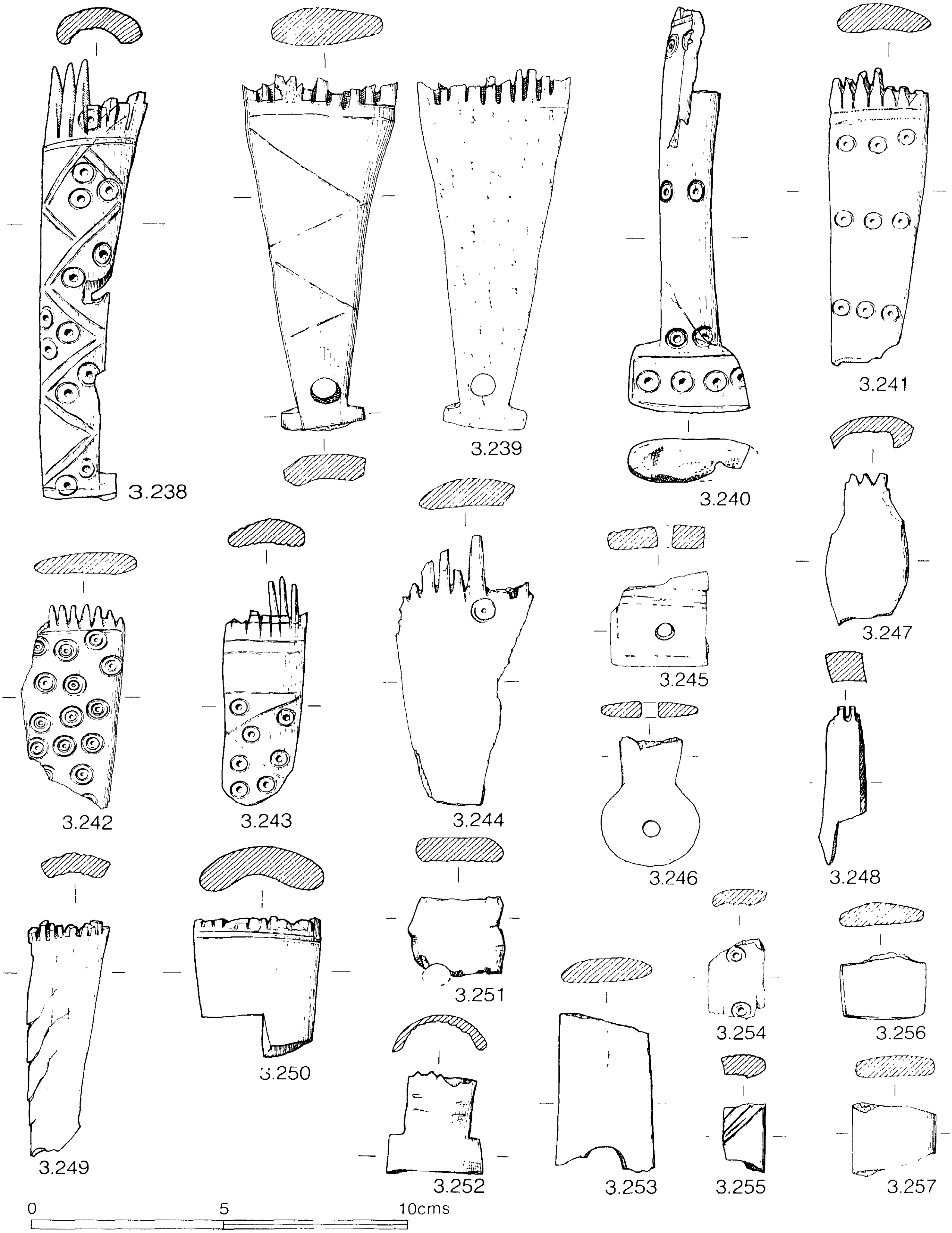


Figure 7.28 Bone and antler combs.

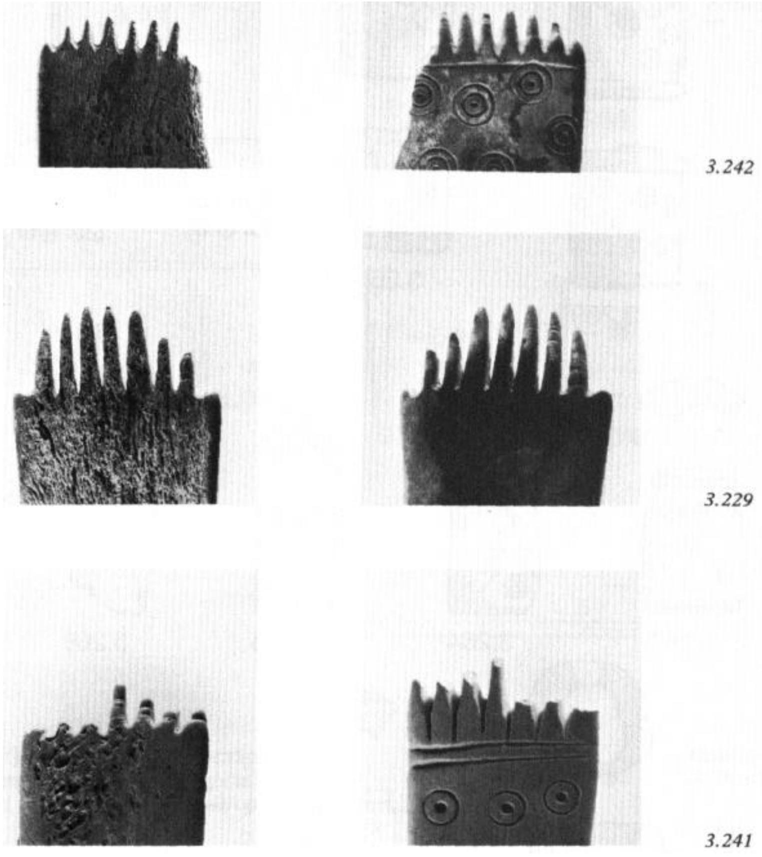


Figure 7.29 Wear patterns on the teeth of bone and antler combs: scale 1:1

recent sample has substantially increased the percentage of undecorated combs in this group.

In comparing butt form and ceramic phase a new set of figures may be offered for those that can be assigned to group:

Ceramic phase	*1–3*	*4*	*5*	*6*	*7–8*	*Total*
Square or rectangular enlargements	1	–	–	3	17	21
Butt and handle integrated	4	–	–	–	–	4
Handle tapers sharply towards butt	–	–	–	–	2	2
Ovoid/circular enlargements	4	1	–	–	–	5
Others	–	–	–	–	2	2

From these it will be apparent that undefined butts and circular or oval butts were frequent in the early period while square or rectangular butts were common in the later.

Wear patterns

The wear patterns described at length in the first volume (Vol 2, 375–8) fairly reflect those observed in the recent sample. Several examples of tooth wear occurred and a selection are illustrated here (Fig 7.29). Most notable was the wear on the outside teeth of several combs particularly the lateral grooving perhaps caused by using the comb as a pin beater (ibid, 378). There is little to add to the previous discussion but 90 more combs have since been published from Meare Village East (Coles 1987, 105–17) providing a valuable comparative collection showing many of the same wear characteristics.

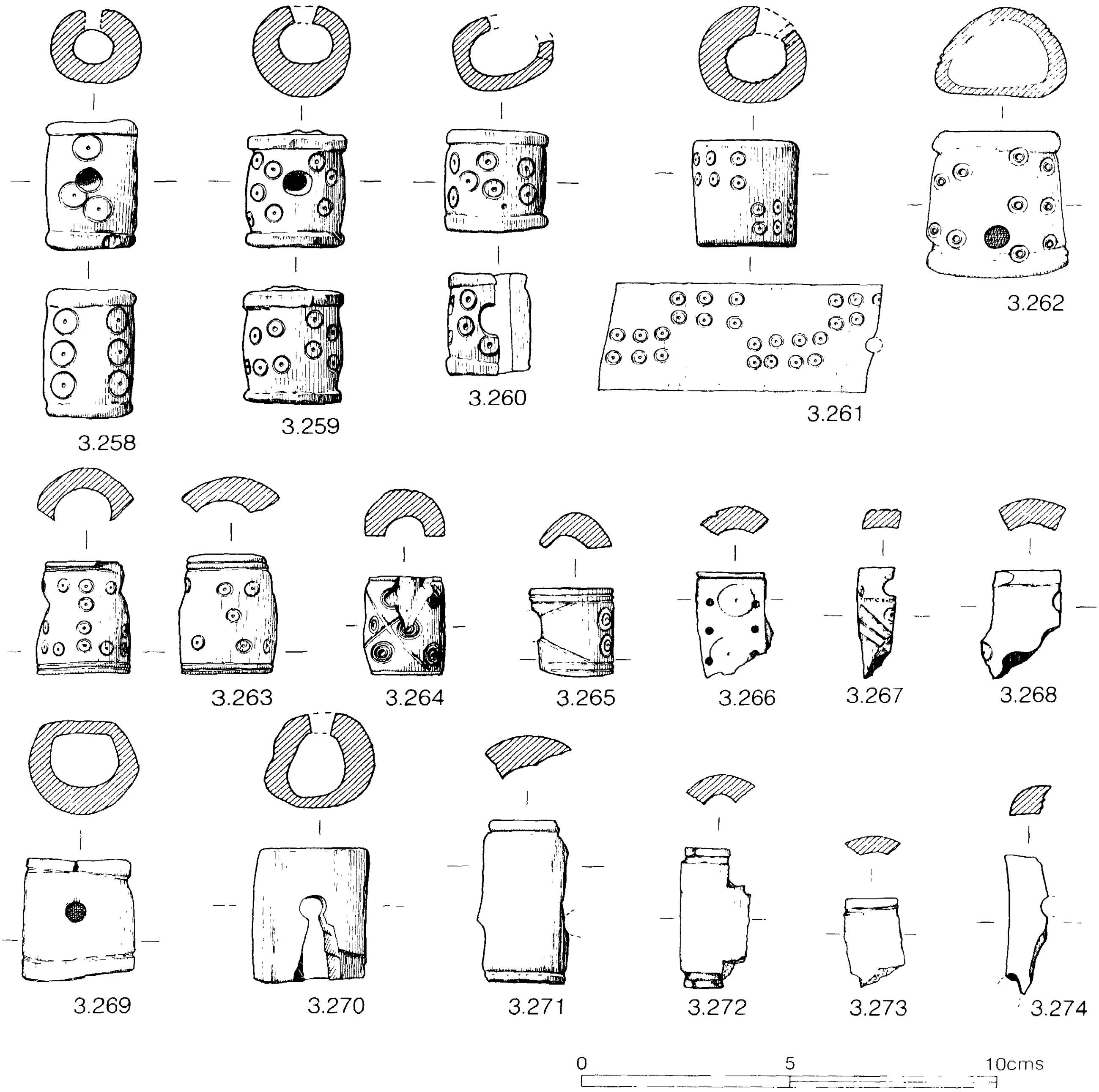


Figure 7.30 Bone and antler toggles.

Toggles of bone and antler (3.258–3.274)

Eighteen toggles, whole or fragmentary, were recovered from the recent excavation of which 17 are illustrated bringing the total from the site to 46. Their chronological distribution was as shown opposite:

	number		
cp	*1969–78*	*1979–88*	*total*
1–3	3	0	3
4	0	0	0
5	1	0	1
6	5	1	6
7–8	19	17	36
total	28	18	46

The majority of them were manufactured from hollow sections of bone or antler. Of the recent collection six were identified as antler and 12 as bone all from the long bones of cattle or horses.

The present group conforms to the characteristics of the earlier collection previously described (Vol 2, 378–80)

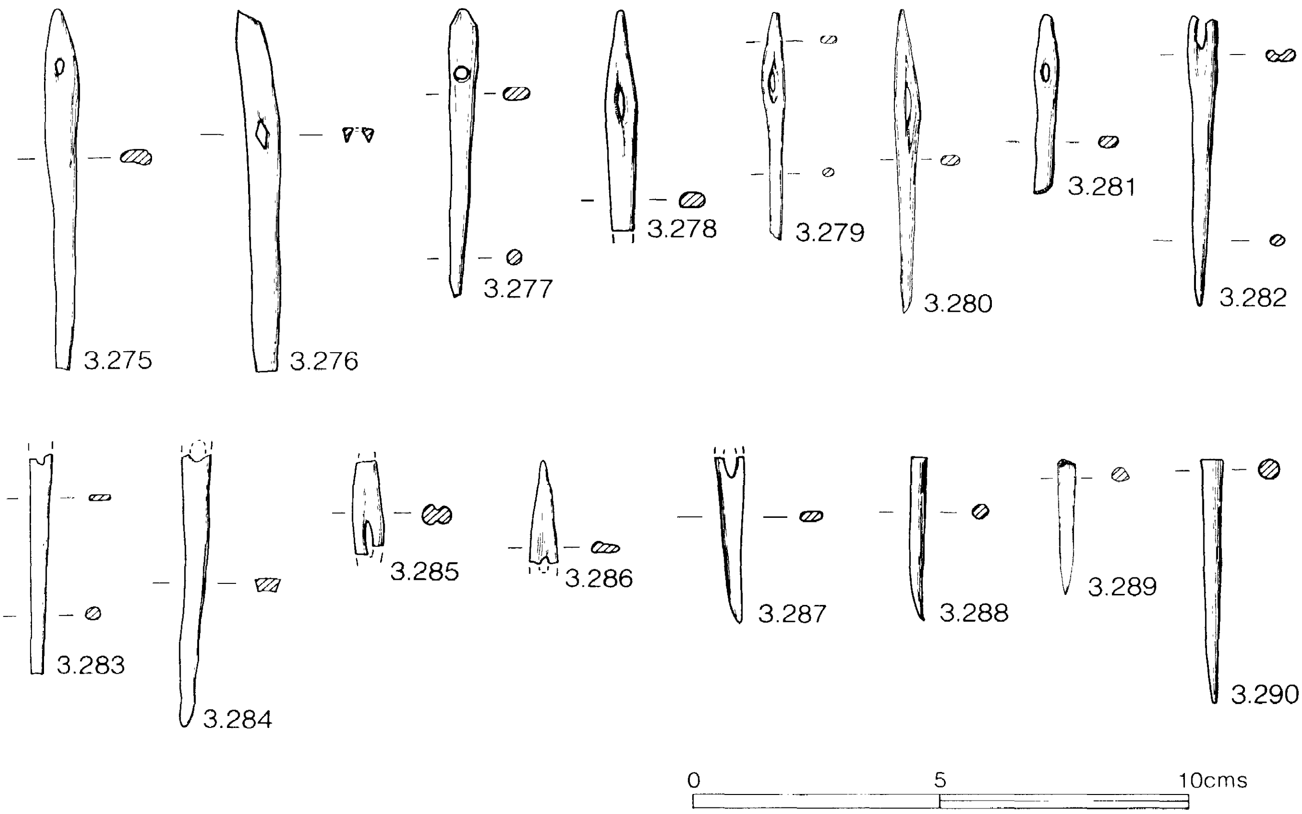


Figure 7.31 Bone pins and needles.

the only difference being that three of the new examples were decorated with composite patterns comprising ring-and-dot motifs combined with simple linear patterns

Needles and pins (3.275–3.290)

Seventeen needles and pins were recovered bringing the total to 55 distributed chronologically as follows:

cp	*1969–78*	*number* *1979–88*	*total*
1–3	6	2	8
4	1	0	1
5	4	3	7
6	6	0	6
7	21	12	33
total	38	17	55

Of the 17 examples 14 are certainly needles, the remaining three may be the points of needles or of pins. The recent collection does not differ significantly from the earlier collection (Vol 2, 380–2).

Gouges (3.291–3.314)

Twenty-eight bone gouges were discovered of which 24 are illustrated bringing the total to 66 distributed chronologically as follows:

cp	*1969–78*	*number* 1979–88	*total*
1–3	16	11	27
4	1	2	3
5	1	4	5
6	6	0	6
7–8	14	0	23
unphased	0	2	2
total	38	28	66

The new sample has significantly increased the percentage of gouges coming from early contexts and it is now evident that the type was evenly distributed throughout the duration of occupation.

The range of variation conforms to that observed from the earlier collection.

Awls, splinters and points (3.315–3.334)

Twenty-six pointed tools belonging to this general category have been recovered bringing the total to 63. The range of variation is apparent from the illustration. This is a general purpose category reflecting much variety in form and, presumably, in function. The classification suggested in the previous report (Vol 2, 387) should not be used too rigorously. The majority conform to the category of ‘awl’. Points are found in all phases but the majority come from cp 7 contexts.

Tools manufactured from sheep’s long bones (3.335–3.352)

Link to Next Section

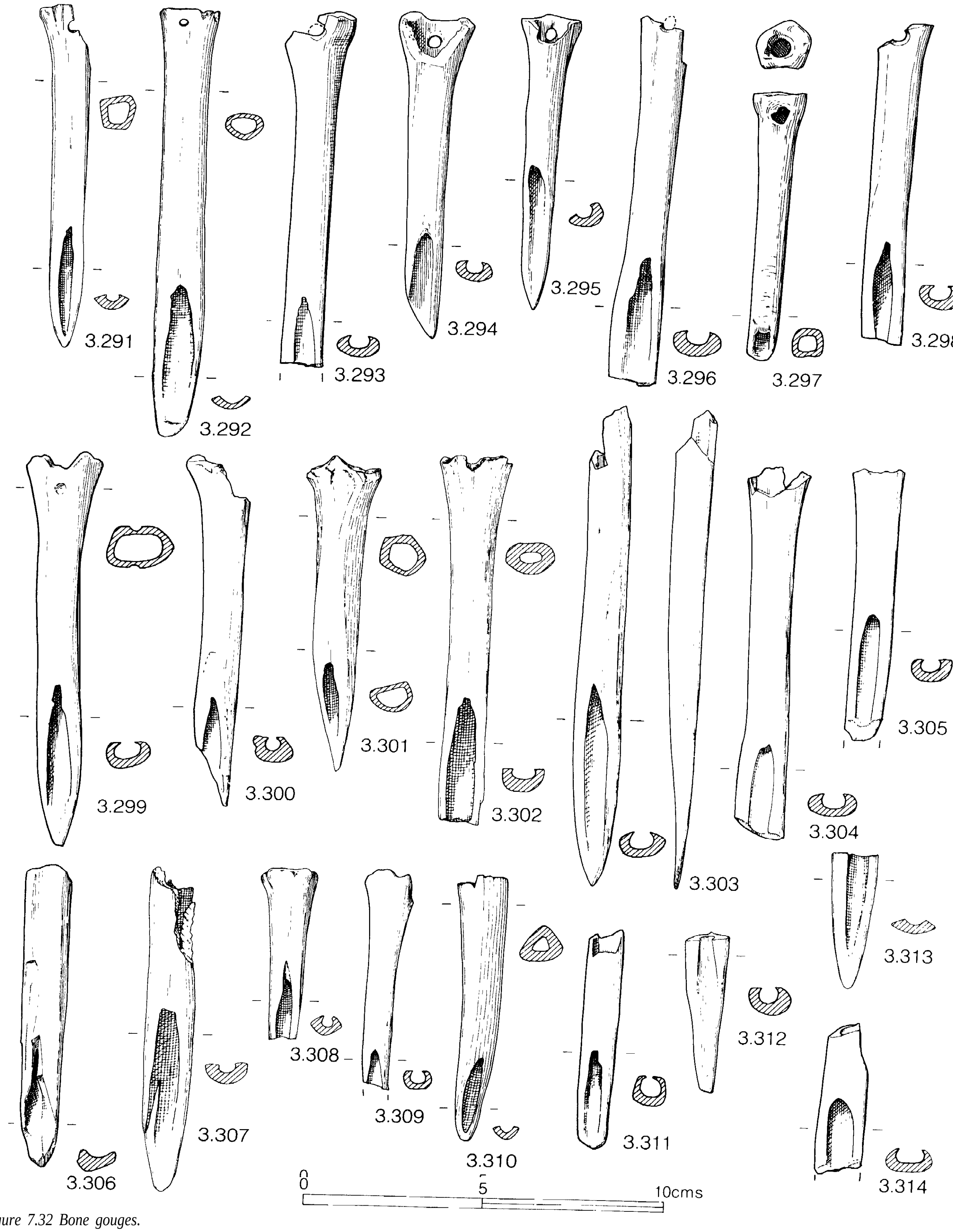


Figure 7.32 Bone gouges.

Link to Previous Section

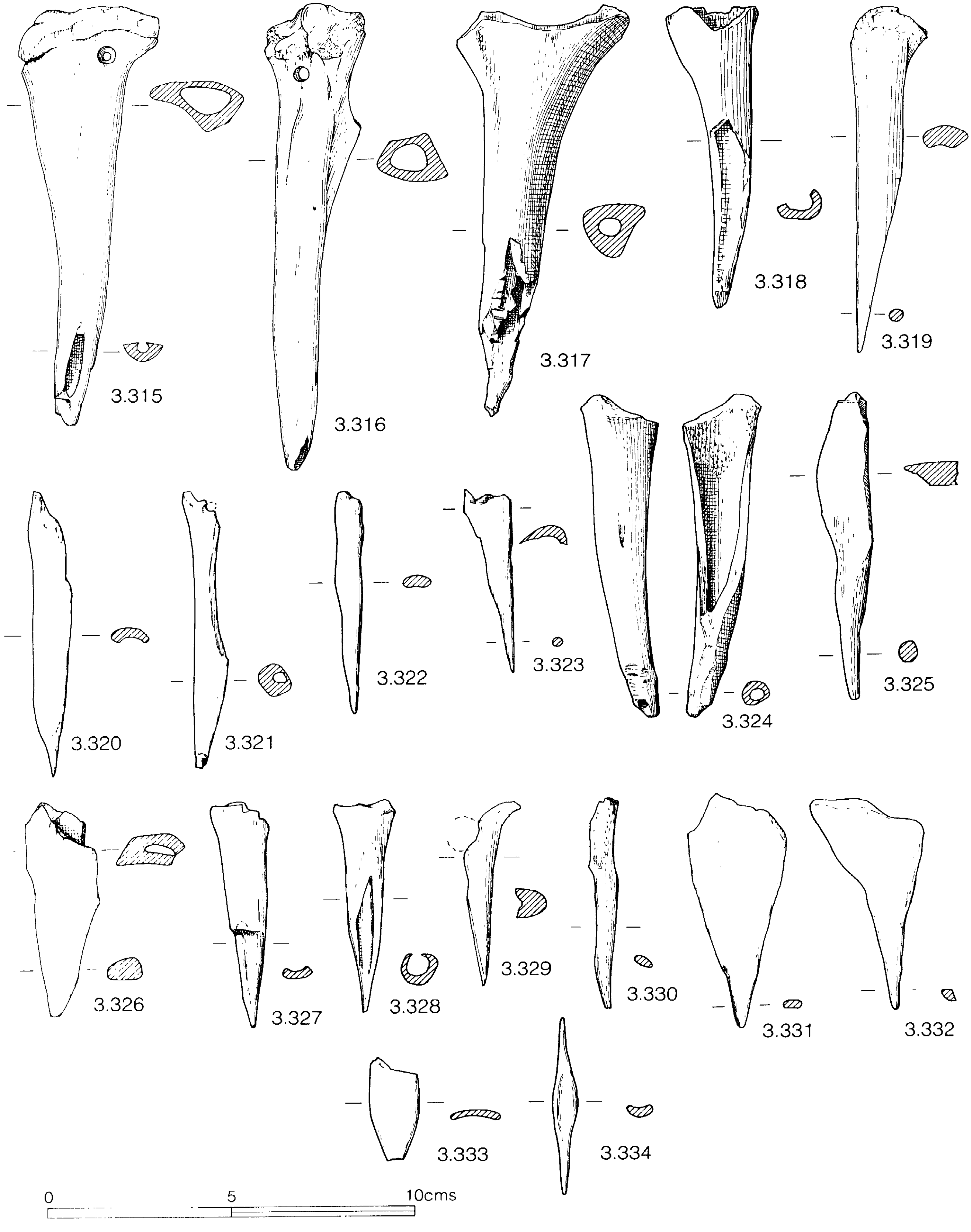


Figure 7.33 Bone points.

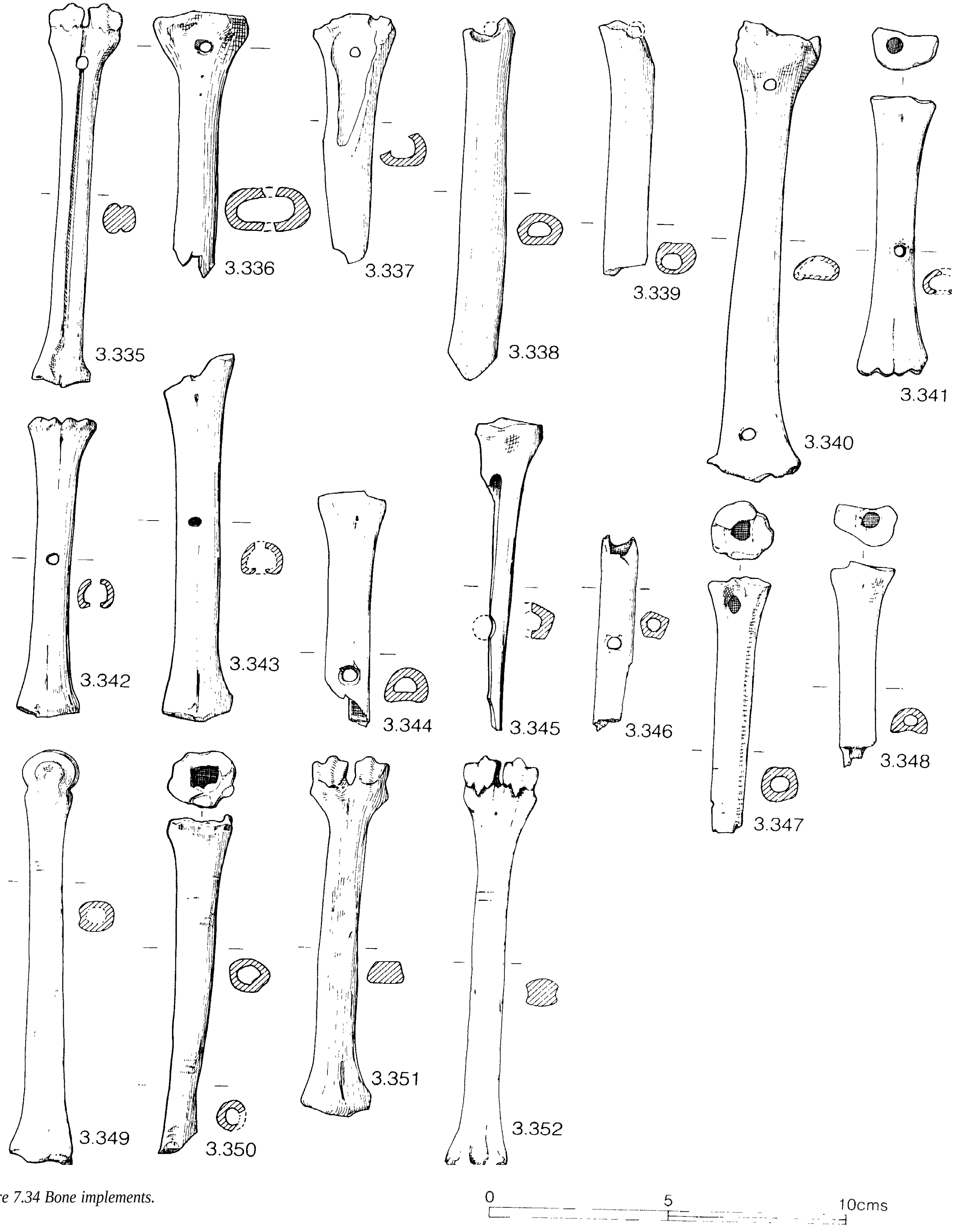


Figure 7.34 Bone implements.

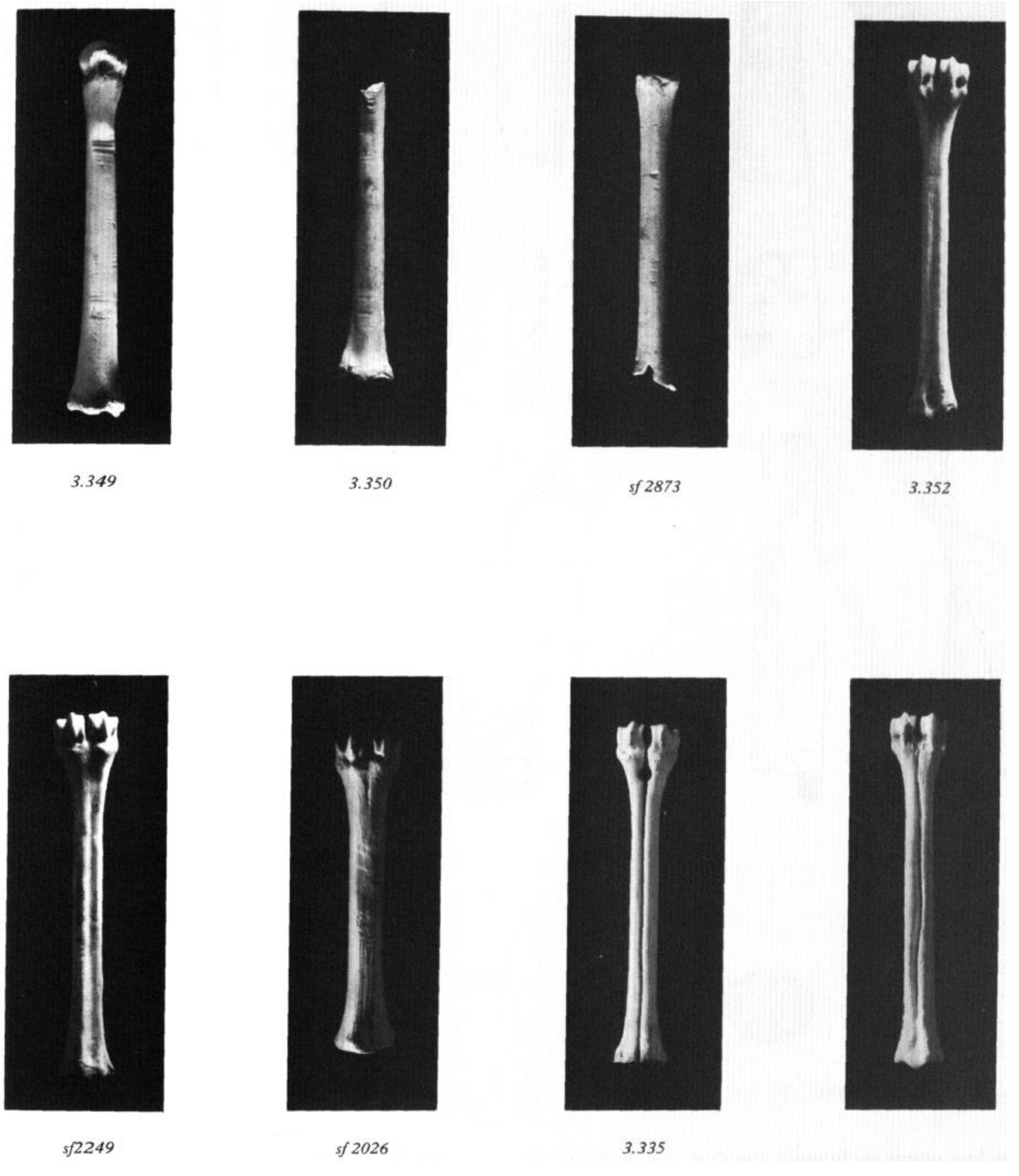


Figure 7.35 Wear patterns on bone implements: scale 1:2

Link to Next Section

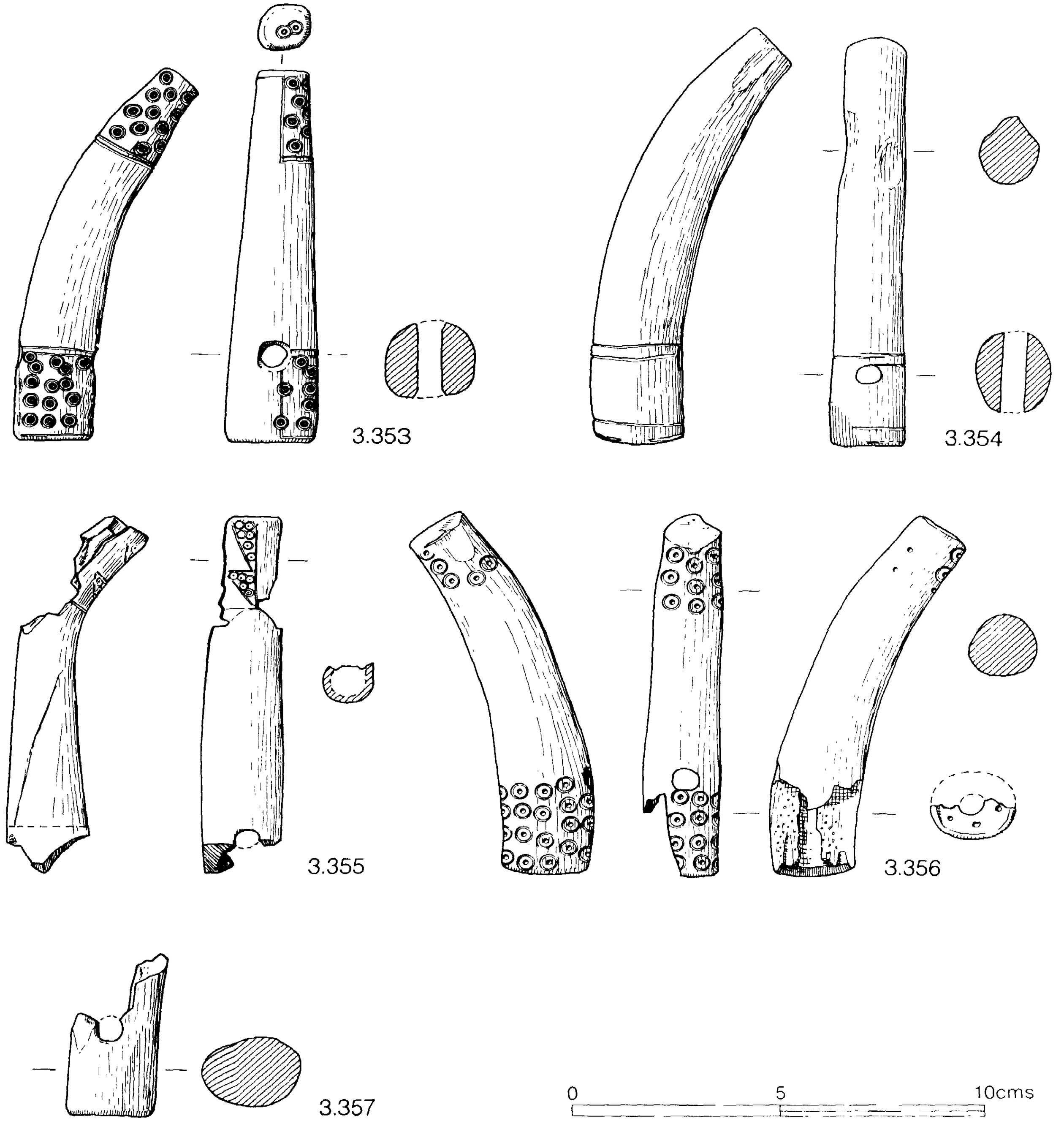


Figure 7.36 Utilized antler tines.

In the first report we brought together as a single group tools fashioned out of sheep's long bones excluding those classed as gouges or points. This general group was further divided into five categories:

1 Tools with a transverse perforation bored through the centre of the shaft.
2 Tools with transverse perforation elsewhere than in the centre.
3 Tools on which two opposite faces of the shaft have deeply incised grooves parallel with the long axis of the bone.
4 Tools with transverse grooves on either side of the shaft.
5 Artificially hollowed shafts with proximal ends intact.

Some tools shared more than one of these characteristics.

The present collection conforms with this classification and the following divisions can be made:

1 nos 3.341–3.346

Link to Previous Section

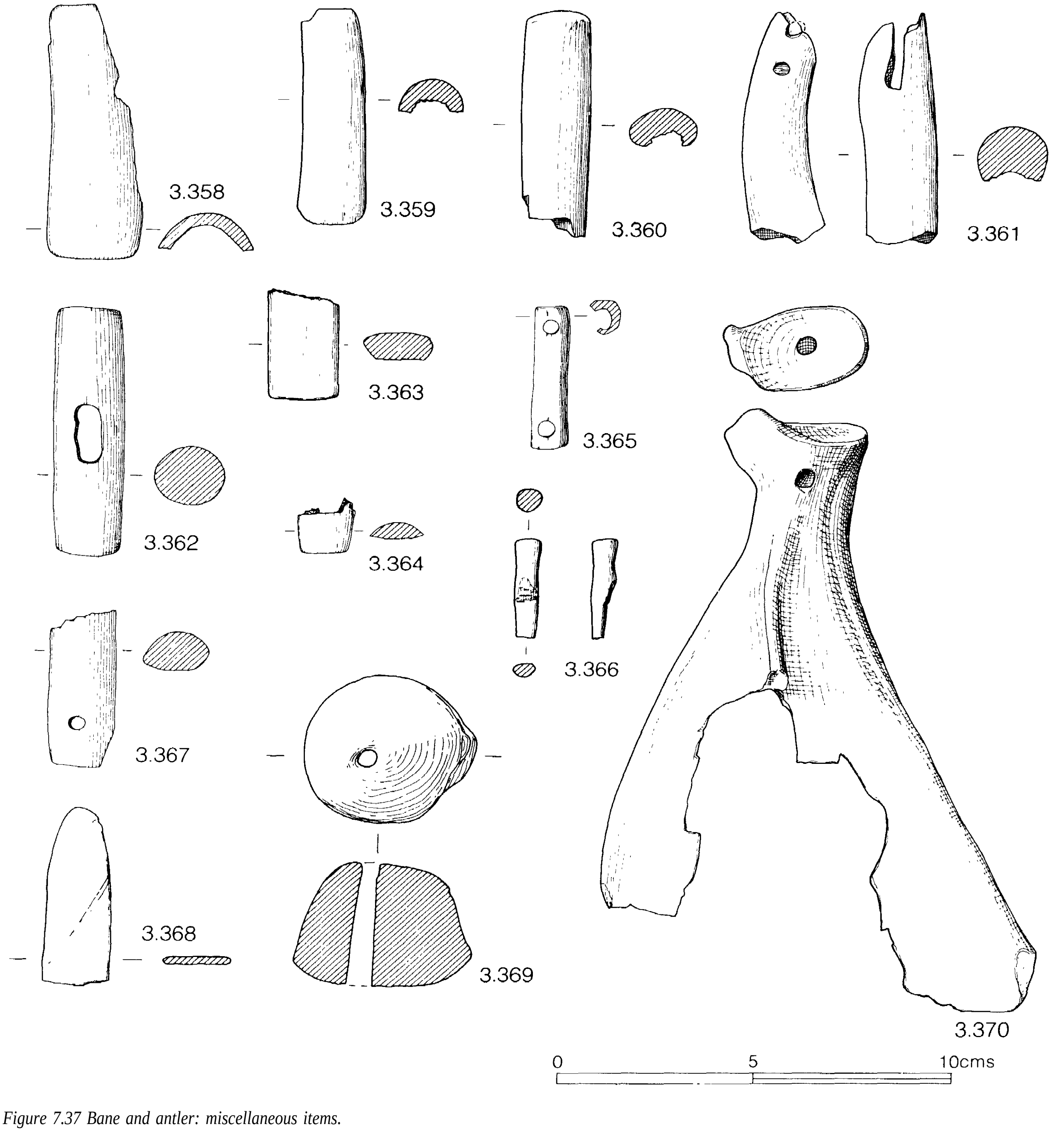


Figure 7.37 Bane and antler: miscellaneous items.

2 nos 3.335–3.340
3 two not illustrated
4 none
5 nos 3.347–3.348

Strictly we should have added a sixth category:

6 long bones used in such a way that one face becomes notched and grooved.

A selection of this last type was illustrated in the first report (Vol 2, fig 7.38). Four more have been found in the recent excavation, nos. 3.349–3.352 (also Fig 7.35). The notches and groovings appear to be the result of deliberate cutting and wear often at two focal points along the shaft some 50 mm apart. No satisfactory explanation can yet be offered to account for the

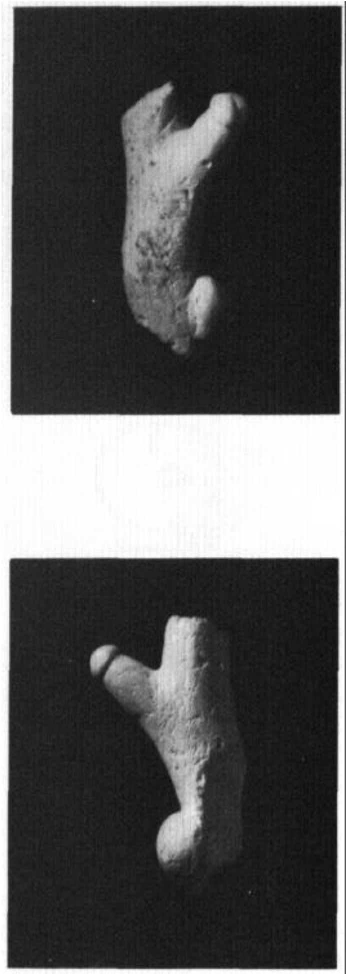


Figure 7.38 Bone phallus. Scale 2:1

phenomenon but various possibilities have been considered in relation to the collection from Meare Village East (Coles 1987, 145–7).

Tools manufactured from metapodials of horse and cattle

This category was not distinguished as such in the first report but it has become evident from a consideration of the bone debris from the more recent excavation that a number of horse and cattle metapodials had been extensively used resulting in a high polish. The polished areas were usually restricted to the shaft but sometimes extended over the articular ends as well. A full listing is given on Fiche 28:E12. Of the 23 metapodials showing signs of use in this way 16 were cow and seven were horse and all but one came from cp 6 and 7 contexts. Two pits were particularly prolific: pit 2261 produced seven examples while pit 2184 produced four. It may be relevant that pit 2261 also yielded four utilized antler tines and three bronze terret rings.

How the metapodials acquired their polish it is impossible to say but they must have been intensively used or constantly handled over a considerable time to acquire such a sheen.

Utilized antler tines (3.353–3.357)

This category was not defined in the earlier report. Five tines were found in the recent excavation all from cp 7 contexts. Four of these, nos 3.354–3.357, were found together in pit 2261.

These items were made from antler tines with the extreme point removed, the naturally curved and tapering shape clearly being a desired characteristic. Each has been perforated at the thicker end and the terminals have usually been selected for decoration. Although the pegs show signs of general overall wear resulting in smoothing there were no concentrated areas of the kind which might have indicated a particular use.

Various suggestions have been put forward for their function. Stead, in considering pegs from the Charioteer's burial at Arras (1979, fig 14,4 and pp 45–6), suggests that they might have been linch-pins. The generally accepted view, however, is that they were cheek pieces for horse bridle (see Bulleid & Gray 1917, 440–54. Their type E is equivalent to our type). In view of the lack of localized wear that might be expected on a linch-pin Stead's view seems less plausible. It is of some relevance to the discussion to point out that the group of four found in pit 2261 were associated with three bronze terret rings. This might be thought to support the traditional view of their use as harness fittings. Our type however differs from the Late Bronze Age antler cheek pieces discussed by Britnell and Longley (Britnell 1976; Longley 1980) in that there are no adequate attachments for straps unless they were looped around and sewn.

Miscellaneous items of bone and antler (3.358–3.370)

A number of items not belonging to the classes discussed above have been recovered. These may simply be listed individually.

3.358 Antler handle: unphased.
3.359 Antler handle: cp 7.
3.360 Antler handle: cp 7.
3.361 Antler handle slotted to take a wide tang which was held in place by two iron rivets: cp 7.
3.362 Antler toggle: cp 7. 3.363 Antler ?handle: cp 6.
3.364 Antler toggle fragment: cp 6.
3.365 Perforated bone: cp 7.
3.366 Bone peg or point: cp 7
3.367 Perforated antler: cp 7.
3.368 Bone 'knife': cp 7.
3.369 Bone spindle whorl: cp 7.
3.370 Perforated scapula: cp 7. Several other utilized scapulae were discussed and are listed in the fiche.

Phallic carving (3.387, Fig 7.38)

Fragment of bone carefully carved into the form of a phallus. Broken from a larger item. Cp 7 context.

Bone and antler working debris

Figure 7.39 illustrates a range of partially worked antler and bone selected from a somewhat larger sample recovered from the excavation.

Many chips and flakes of bone have been found which show signs of having been deliberately cut and though some of these could have resulted from butchery processes the majority are likely to have come from

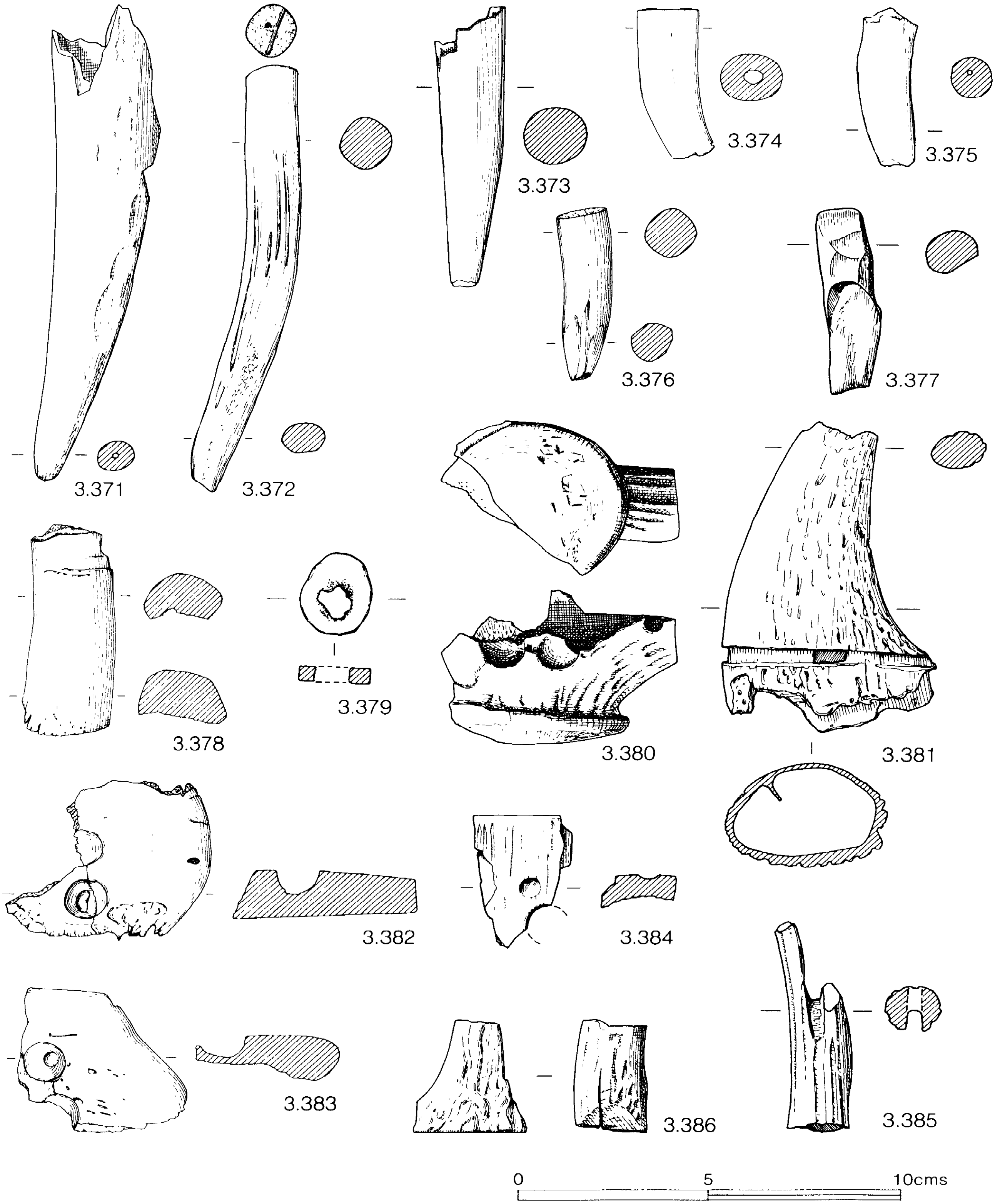


Figure 7.39 Antler and horn waste.

Link to Next Section

bone-working activities producing some of the range of tools illustrated above. No particular concentrations in time or location could be discerned. One item illustrated here, 3.381, the horn core of a cow, shows a deeply sawn groove towards the base the intention being, presumably, to free the horn from the core. This is an interesting reminder of the potential importance of horn as a raw material.

Apart from the horn core, the rest of the material illustrated in Fig 7.39 is antler in various stages of being worked. Nos 3.371–3.377 are tines sawn from the extremities of red deer antlers, two of which, nos 3.376 and 3.377, were roughly whittled at the tip. Nos 3.380, 3.382 and 3.383 are from the burr ends of shed antlers. All three show signs of saw trimming and all have been partially bored creating large shallow indentations. The holes are hardly functional and may have been cut in an idle moment by rotating a knife point. The other fragments all show evidence of sawing.

Worked antler of this kind has been found in some 22 of the pits excavated between 1979–88, mostly in cp 7 contexts. Of these, three pits produced a quantity of cut antler suggesting antler working in the immediate vicinity. Pit 1981 yielded eight fragments of waste (nos 3.374, 3.378, 3.380, 3.382, 3.383, 3.384 and two not illustrated) together with the finished handle no 3.360 while pit 1452 produced five waste fragments and pit 2261 produced four fragments. Of the remaining 19 pits, two produced two fragments the rest one each. Thus the quantity of worked antler is not large but reflects the need of the community for combs, toggles, handles and occasional side pieces.

7.1.7 Objects of Kimmeridge shale (Fig 7.40)

by Kathy Laws

Nine items were found in the excavation of 1979–88 and may be summarized as follows together with the collection recovered from 1969–78:

number *cp*	*1969–78*	*1979–88*	*total*
Bracelet	3	4	7
Bracelet roughout	2	1	3
Ring	0	1	1
Bead	1	1	2
Spindle whorl	2	0	2
Worked fragments	0	2	2
Totals	8	9	17

Bracelets and roughouts

The four bracelet fragments (nos 4.9–4.12) all appear to be hand cut though they are carefully finished and could, superficially, be mistaken for lathe-turned examples. However slight unevenness in cross section and an undulating inner edge demonstrate their knife-cut origin. One belongs to cp 6, the remaining three to cp 7.

The complete roughout (no 4.15) supports the view that shale was traded in this form. This does not, however, preclude the possibility that finished products were also traded from source. The roughout comes from a cp 7 context. Those found in 1969–78 were found in cp 5 and cp 6 contexts.

The average sizes can be estimated from the fragments.

publ no	*cp*	*int dia (mm)*
4.1	3	64
4.2	3	74
4.3	6	*c* 60 (unfinished)
4.9	6	80
4.10	7	80
4.11	7	80
4.12	7	60

The early examples appear to be slightly smaller than the later but with such a small sample it is impossible to be sure.

Ring (no 4.14)

well finished ring with circular section. Possibly a ring. Cp 7 context.

Bead? (no 4.13)

Circular disc with central perforation probably too light to be a spindle whorl: possibly decorative.

Miscellaneous (nos 4.16 and 4.17)

Two other fragments of shale survive. No 4.16 is an unworked slab while 4.17 is a flake, both from cp 7 contexts. They represent raw material brought to the site for working.

The Kimmeridge shale exposures are *c* 80 km away from Danebury almost the same distance as the villages of Glastonbury and Meare which have produced a much greater quantity of shale artefacts. That so little shale reached Danebury is therefore probably due to factors other than simply distance.

7.1.8 Beads of amber and coral

No items of amber or coral were recovered from the excavations of 1979–88.

7.1.9 Objects of glass (Fig 7.41)

by Julian Henderson

6.9 A roughly square bead (seen from above) with rounded corners in a deep purple-blue translucent glass. Decorated with white spirals trailed into place at the four corners of the bead. Guido (1978), class 6a (Oldbury type). Cp 3.

6.10 Globular pale translucent green bead in a cracked bubbled glass. Badly made with splintering around the central hole. Guido (1978), group 7. Cp 7.

6.11 Half a translucent blue ring bead with opaque yellow zig-zag decoration around the bead perimeter. Guido (1978), group 5a. Cp 7.

For the detailed description of the beads, the techniques of their manufacture and their chemical compositions produced using electron-probe microanalysis see Fiche 29:C4–C6.

Two out of these three glass beads from Danebury are of relatively diagnostic types (nos 6.9 and 6.11 above).

No 6.9, a type with distinctive marvered spirals, is found in relatively high concentrations in Britain during the last two centuries BC and into the first century AD, but not in these concentrations in contemporary European *oppida*. This particular bead is smaller than typical

Link to Previous Section

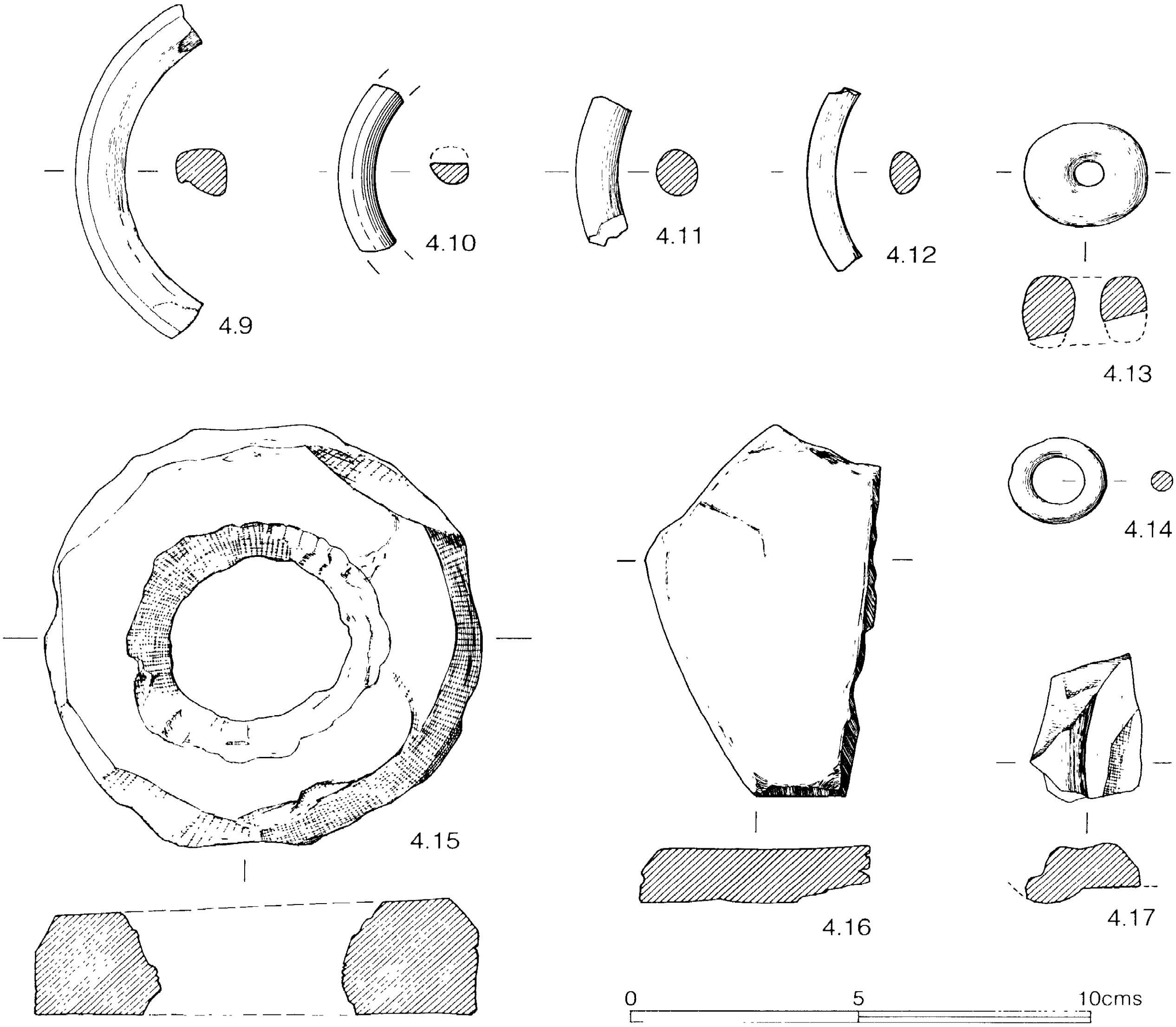


Figure 7.40 Kimmeridge shale objects.

examples and its squarish shape (when seen from above) also makes it unusual; the beads of this type are usually of a more globular shape. Both the blue and white glasses used are of compositions which place the bead in the Iron Age low magnesium (LMG) category, with cobalt and calcium antimonate being used for the colorant and opacifier respectively, in common with other examples of the type. The lack of detected manganese oxide in the white glass may infer that the glass used was manufactured in the early second century BC or earlier, and this could broadly agree with the contextual date of cp 3.

The second bead, no 6.10, a green globular type is made in a relatively unusual glass colour for the Iron Age when compared to the frequent use of cobalt blue glass (Henderson 1985, 279, n 12). The bead shape itself is undiagnostic and the presence of antimony in the glass (see Table of results in the Fiche 29:C5) may indicate that a basic glass of the second century or earlier was used.

The other diagnostic bead (no 6.11) combines a continental manufacturing technique, used in the production of many of the decorated ring beads found in continental oppida (for details see Fiche 29:C4) with decoration which is more commonly found in southern England and northern France. It is possible that while the production technique was inspired by glass artisans working in continental oppida, the bead itself was designed and manufactured in southern England or northern France. The chemical composition of this bead is again of the LMG type and cobalt has been used as the colorant in the blue glass. Analysis of the opaque yellow glass is more interesting in that the antimony-rich opacifier identified harks back to an older tradition of glass chemistry used for the production of opaque yellow glass at Meare Lake Village, Somerset. It can however be distinguished from the Meare recipe by the presence of relatively high manganese oxide and low lead oxide contents which, on

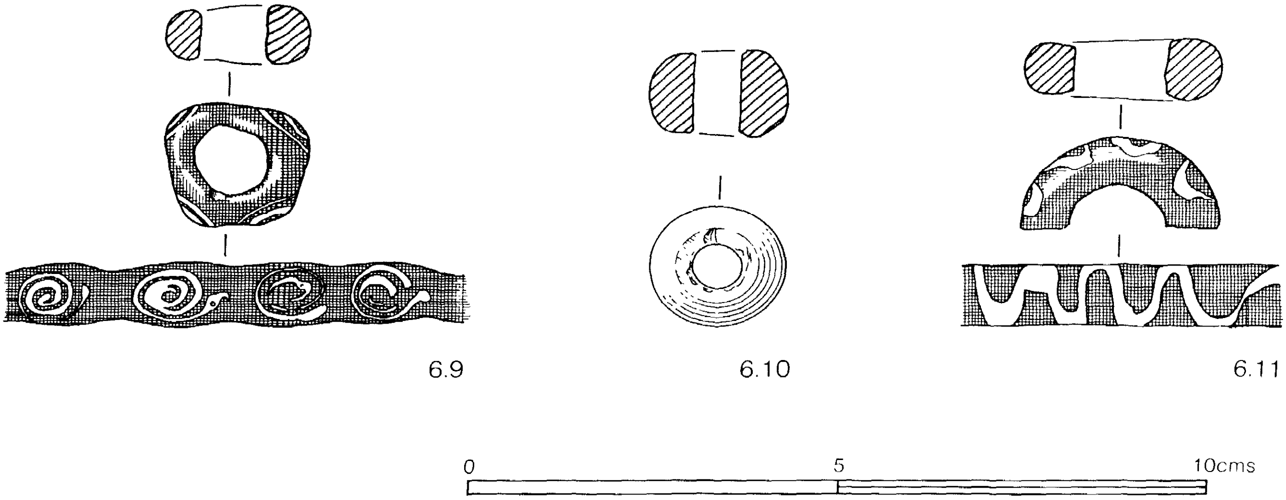


Figure 7.41 Glass beads

compositional grounds, allows one to group it with the beads found at Hayling Island (Henderson 1987, ill 128). (A semi- quantitative analysis was produced for this yellow glass and figures are therefore not given in the table of results in the fiche.)

In sum the three glass beads are representative of beads which are common to central southern England in the Iron Age. The ring bead (no 6.11) was manufactured using a technique used for the production of most ring beads found in continental oppida during La Tène C and D; a two component bead was produced with a core comprising a smaller ring bead to which a further gathering of glass was added, and the outer surface decorated. Although the bead was manufactured using this 'continental' manufacturing technique, decorated ring beads of this type are more commonly found in southern England and northern France and the chemical composition of the glass used confirms this as a likely area of production. The spirally-decorated bead is also more typical of late Iron Age England than the core area of Celtic Europe and its chemical analysis places it in the tradition of late Iron Age cobalt blue glass production. Compositionally it falls firmly into a grouping for this bead type based on the cobalt oxide to iron oxide ratio of the blue glass which makes up the matrices of the beads. This appears to be distinct from beads of the same type, some of which are found in France.

7.1.10 Objects of baked clay

by Cynthia Poole

The objects of baked clay found between 1979 and 1988 have been grouped into the same classes as those found in the previous ten years, namely:

- slingshots
- perforated clay balls
- beads
- perforated clay reels
- spindle whorls
- pottery discs (a new class)
- clay weights
- metal-working accessories.

Full descriptions of the individual objects will be found in Fiche 29:C7–F8.

Slingshots (7.72–7.77; Fig 7.42)

A further seven slingshots were found between 1979 and 1988 to add to the 11 found during the previous decade. Four of these came from the later phases of the 1984–85 stratigraphy (cp 6/7). Of the others two were from the west side of the fort, one unstratified and one from a cp 4 pit. The seventh came from the central area from a cp 3 pit.

Six were of the more common ovoid shape, pointed at both ends, whilst only one small fragment may have been part of a spherical example. Five were of very similar size: 40–43 mm long by 26–30 mm diameter. Only the one, from the early context, was smaller: 31 by 22 mm. The weights of the undamaged examples were 25 gm, 34 gm and 35 gm. Of the others that can be roughly estimated, two would be of *c* 40 gm and one *c* 20–25 gm.

Fabrics were more varied than previously noted and included types A, F, J and L.

The majority are in the same size range as those previously found. The one small example from an early context compares best with those from All Cannings Cross and the Meare and Glastonbury lake villages. It had previously been suggested that the small slingshots may have been used for hunting birds or small game, whilst the larger ones were used in warfare. However, if the larger slingshots are compared with the flint pebbles, generally interpreted as slingstones a considerable difference in size and weight is found, the slingstones weighing between 50 and 250 gm with a high proportion averaging 150 gm. This suggests the stones were more likely used in warfare, whilst the clay (and rare chalk) slingshots were for hunting small game.

Perforated clay balls (7.78–7.82; Fig 7.42)

Five objects can be grouped under the heading of clay balls in addition to the four found in 1969–78. Only one of these falls in the category of 'partly-perforated clay ball': no 7.81 which measured 22 mm in diameter and had a perforation 3.5 mm wide through half its width. It occurred in the occupation material on the floor of CS68 (cp 7). Of the others only one, no 7.80 appears to be a properly finished object being a small clay ball with no perforation or other feature.

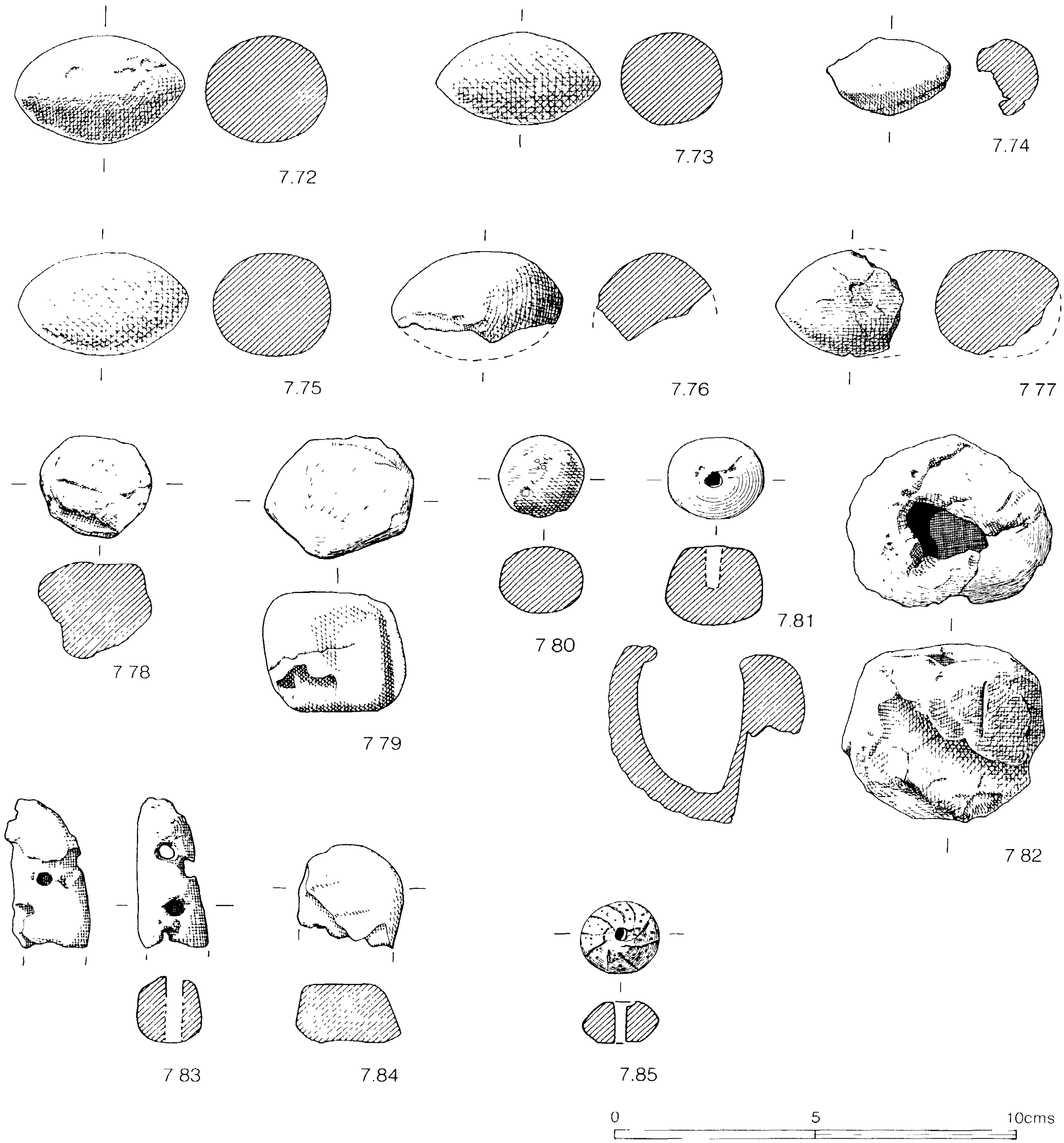


Figure 7.42 Baked clay objects.

All the others are either unfinished objects or of uncertain function. One, no 7.79 is of pentagonal drum shape with flattened sides and ends and has a large flint in the middle, which could have prevented it from being completed. It could possibly have been intended as a spindle whorl, slingshot or ball. No 7.78, a roughly made spherical ball, had one end pulled out to form a knob, possibly with the intention of shaping it into a slingshot while no. 7.82 was a roughly finished spherical ball 50 mm in diameter with a large hole in the middle which looks as though the clay had been wrapped round an object, such as a hazelnut or acorn, that has since rotted.

These last three objects may all have been casual mouldings with no specific function in mind.

Partly perforated balls have occurred previously at Danebury and have also been recognized on other sites. They were probably intended to be used as pommels on the end of wooden or metal rods. In addition to the functions previously suggested (Vol 2, 398), further possibilities are that they were placed on the end of knitting needles or alternatively on the ends of metal tools, like small iron points, to protect the hand during use.

Beads (7.85; Fig 7.42)

Only one bead was found, occurring in a cp 6 layer in stratified sequence H. It was biconical, measuring 19 mm in diameter and unlike the two previously found at Danebury had a simple decoration of lines scratched from the perforation out to the edge in an anticlockwise direction. Between them were numerous fine dots randomly arranged.

Perforated clay reels (7.83, 7.84; *Fig 7.42)*

Only two objects were found of the type classified as reels. Neither were complete, nor were they very similar to those found in 1978 as a group adjacent to CS7/8. The better preserved example, no 7.83, measured 18 mm in diameter and 42 mm length survived. It was pierced by two perforations and had two incomplete ones. It was found in a pit assigned to cp 6. The other (possible) end of a reel occurred in a pit of stratified sequence E in a cp 7 context.

Parallels for these reels are rare, but clay 'bobbins' similar to the reels reported in Volume 2 occurred in a Villanovan grave of the eighth century BC in the cemetery of Quattro Fontaneli, Veii where they were often associated with spindle whorls and other textile tools, always in female graves. Because of the associations they have been interpreted as bobbins for winding thread, the perforation being used to fasten the thread prior to winding. A small number of dumb-bell shaped objects made of chalk have been found at Danebury and could have had a similar function.

Spindle whorls (7.86–7.99; Fig 7.43)

Fifteen clay spindle whorls were found between 1979–88 compared to 18 found in the previous decade. Of these two were unstratified and the others date from all phases from cp 3 to cp 7. The majority were found in pits, but three came from layers and one from a gully.

Their spatial distribution appears to show a superficial concentration at the east and the west sides of the fort with fewer in the central and northern areas. However when amalgamated with those from 1969–78, the spread is more even over the whole site.

The spindle whorls compare to the three types described previously (Vol 2, 401):

Type 1: cylindrical (7.89, 7.90, 7.92, 7.94, 7.95). There were five cylindrical spindle whorls, one of which is probably an unfinished example. Three were made in fabric F and one each in fabrics A and K. Three occurred in cp 7 contexts, one in cp 3 and one was unstratified. An unstratified stone spindle whorl, sf 2737, is of the same form.

Type 2: disc-shaped subdivided into straight sided, curved and angular (7.93, 7.99). Only two new examples occurred. One was apparently an unfinished example made of fabric K, whilst a small fragment of perforated clay disc in fabric K, may also be of this type, but is not typical. Both examples are cp 7.

Type 3: This type is the most common divided into (a) spherical and (b) biconical. There are four examples of (a) (7.91, 7.96-8) and four of(b) (7.86–8). All are made of fabric A, except one in Fabric F. Four occur in cp 7 contexts, two in cp 5, one in cp 4 and one unphased.

The spindle whorls measure between 26 mm and 53 mm in diameter and 20 mm and 41 mm in height. They range in weight from 18 gm to 87.5 gm. The two unfinished examples measured 44 mm and 48 by 60 mm wide and 23 mm and 30 mm high. The larger one appears somewhat distorted and not the intended shape. Both were unbaked (fabric K).

There are two decorated examples. One, no 7.88, a biconical variety, had a series of shallow vertical incisions, possibly made with a finger nail, around the flat sides. Another, of cylindrical form, no 7.92, which narrowed slightly at the centre, had three parallel incised lines around the centre. This latter example is similar to decorated whorls from All Cannings Cross.

The perforations range from 4–10 mm, generally being 4–8 mm in the centre, widening slightly to 6–10 mm at the edges, where there has presumably been some wear from jamming the wooden spindle into position. All the perforations were cylindrical and no hour glass shapes were in evidence. In general they were centrally placed except one or two which were slightly off-centre. Only on the unfinished examples were the perforations incomplete or misplaced.

Pottery discs (7.100–7.103; Fig 7.43)

Five pottery discs have been found: all came from cp 7 pits. They are evenly scattered spatially across the site forming no concentration.

The discs had all been roughly chipped from potsherds to a circular shape and ranged in size from 53-87 mm diameter and 8–11 mm thick. Only one had a finished perforation 16 mm diameter, whilst on two an initial attempt had been made to drill a perforation, but in both cases it penetrated only about 2 mm deep. On the fourth there was no sign of a perforation having been attempted. Their weights ranged from 41 gm to 94 gm.

The perforated example is the largest and may have been used as a spindle whorl, but was perhaps more likely to have been some sort of drill weight. Those without perforations may have been discarded, unfinished weights or spindle whorls, but it is possible they had some other use perhaps as counters.

Clay weights (7.104–7.139; Figs 7.44–7.49)

A total of 106 weights (including 13 fragments only tentatively assigned to this group) were found during the excavations since 1979 compared to 62 in the previous decade. Of these 25% were complete or near complete, 18% about half surviving and the remaining 58% were smaller fragments.

Fourteen occurred in cp 1–3 contexts, three in cp 4, five in cp 5, 25 in cp 6, 26 in cp 7, seven in cp 8 and 21 from undated or unstratified contexts. Their spatial distribution shows them to be fairly evenly scattered across the site. However eight groups occurred ranging between two and nine weights in number and are discussed further below. Compared to the 1969–78 group the

Link to Next Section

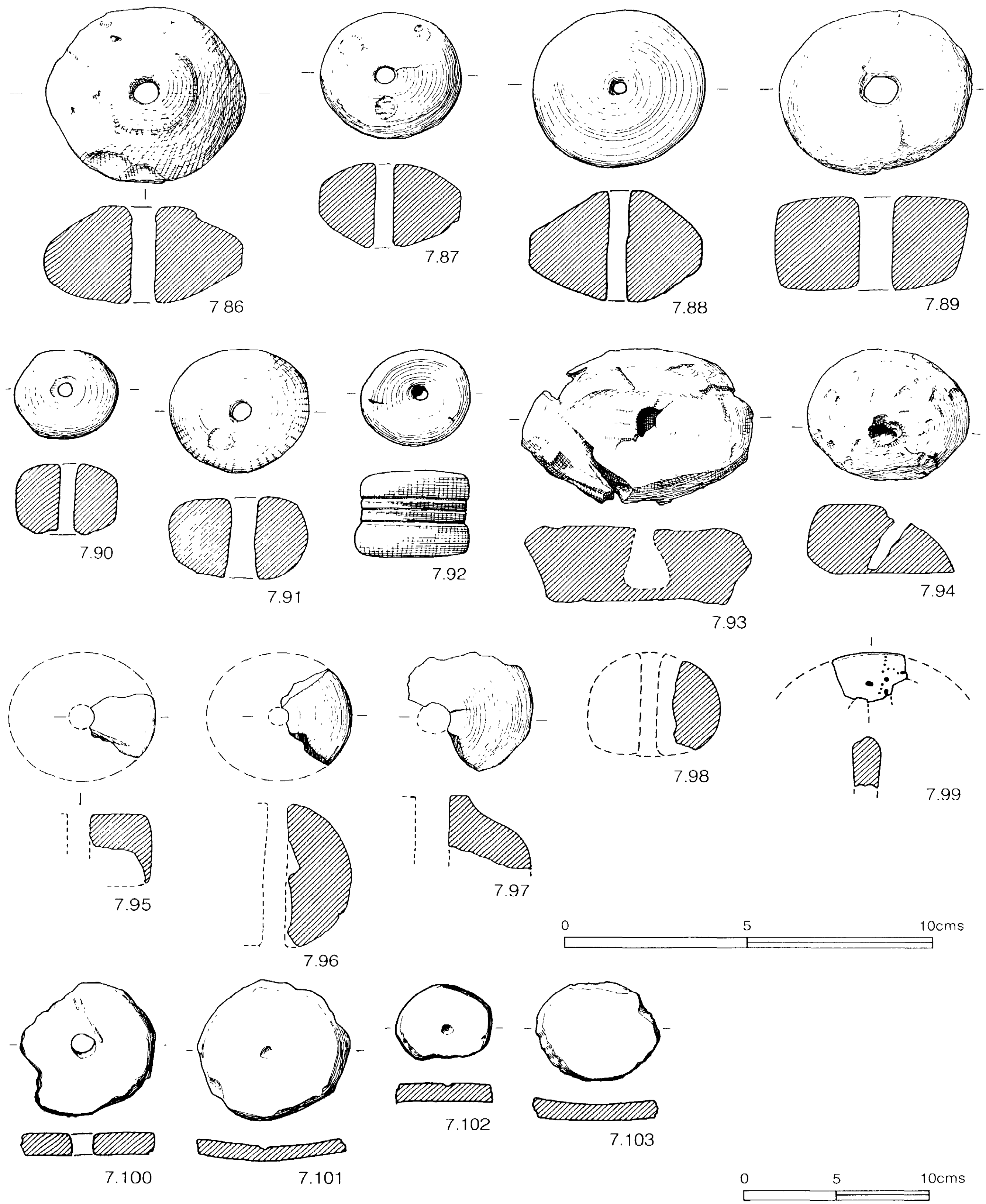


Figure 7.43 Baked clay spindle whorls and pottery discs.

Link to Previous Section

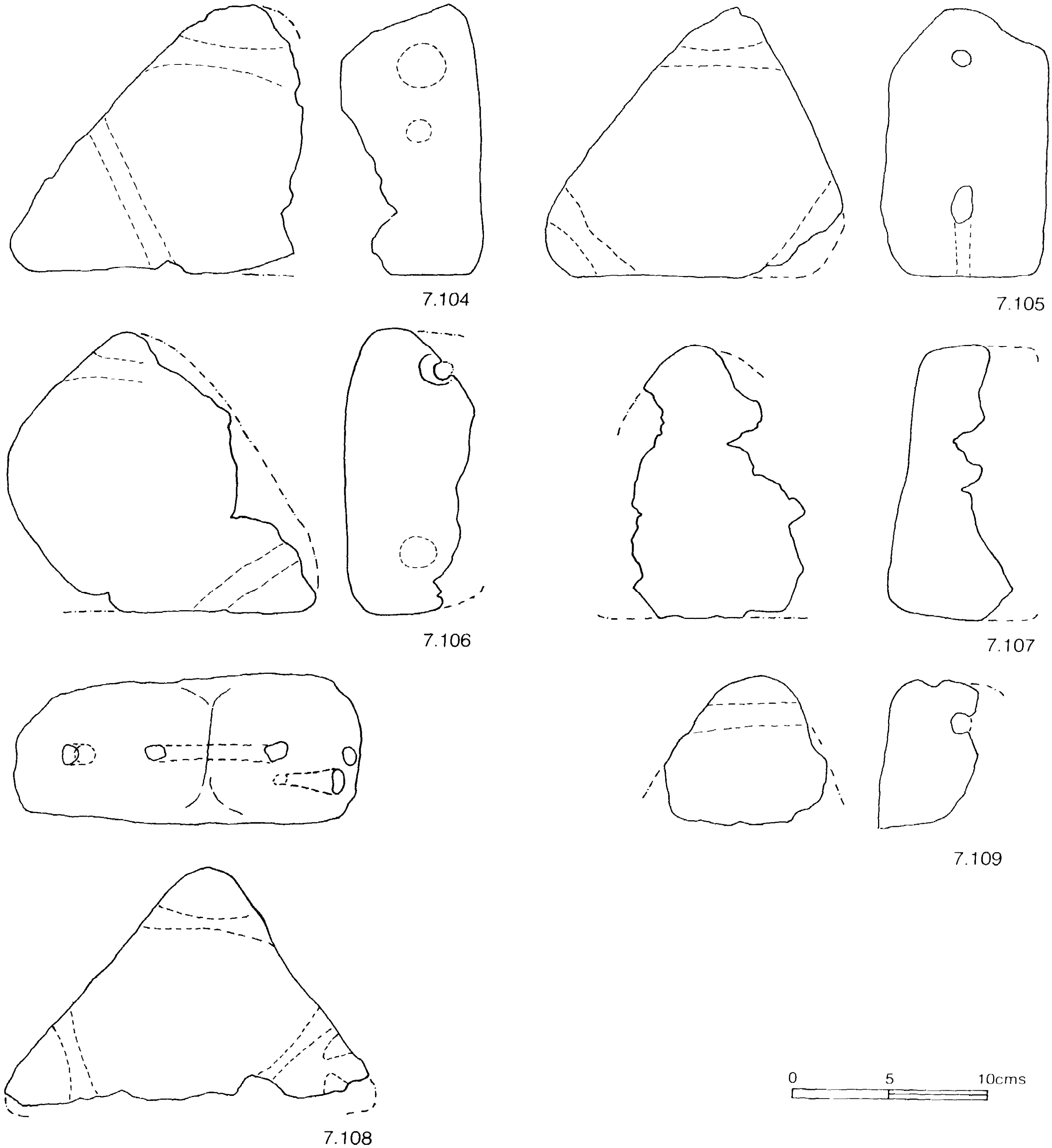


Figure 7.44 Loomweights of type 1: group 1.

largest number (62%) still occurred in pits, but a higher proportion was found in other features than previously: 18.5% from post-holes, 13% from layers, 3% from gullies and features and 3% unstratified. Of the types previously described in Volume 2 (pp 401–6) not all were represented in the 1979–88 collection but one new type occurred.

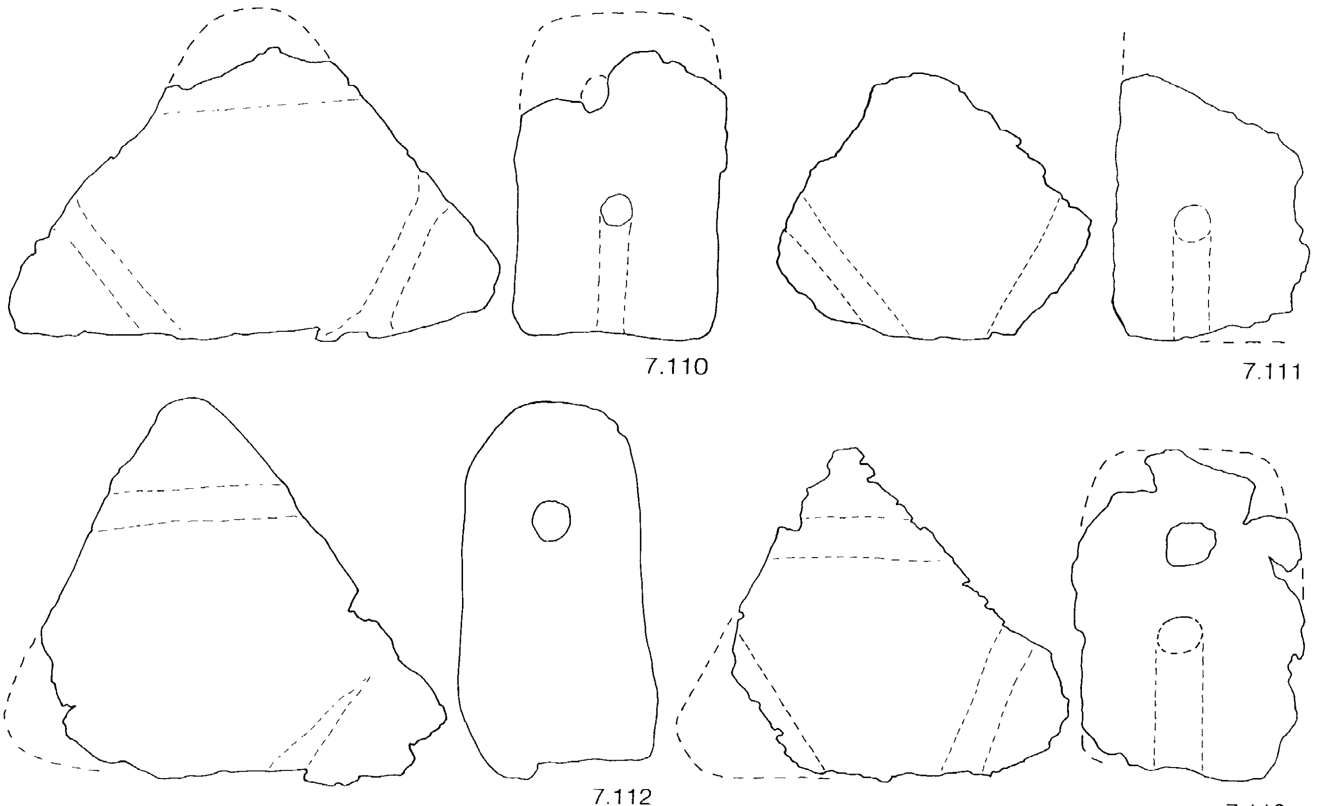


Figure 7.45 Loomweights of type 1: group 2.

Type 1 (7.104–7.134)

This remains the most common type with 97 examples (including all the uncertain examples). Of these six were complete, 13 near complete, six about half surviving, seven about a third surviving; in addition there were 24 corner fragments and 23 body fragments.

They occur in all phases, but with a higher proportion present in the later phases (cp 6–8). Their general characteristics are those described in Volume 2: essentially they are triangular with perforations generally across all three corners. The range in size also remains the same. The weight of the complete examples, and estimates for the near-complete examples, indicates a range from *c* 720 gm to *c* 2,080 gm with the main peak between 1,200 and 1,500 gm.

Perforations occurred in general across all three corners, though a small number of examples appear almost certainly to have had only one or two perforations. Parallels for the latter are more common at Hengistbury Head and the Glastonbury and Meare settlements. There are also a few examples amongst the Danebury weights of abortive perforations, where one has been left incomplete, eg no 7.112. None of the perforations appear to show any evidence of wear.

The fabric most commonly used was type F (32), followed by E (27), K (17), D (8), C (7), B (4), A and P (1 each). This covers the same range as previously found, with finer fabrics generally preferred; where type E was used the tempering was generally finer than that used for walls or ovens.

All the weights are described in the catalogue in the microfiche (Fiche), but some general comments will be made here on groups of weights. A total of 11 groups were identified, of which seven contained only two weights or partial fragments. In these cases, the occurrences could be coincidental or the fragments could be part of the same weight, so they are not further considered, except to say three of the groups had two weights each of different types.

Of the remaining four groups two occurred in pits, one in a post-hole and one in a pit and an associated level.

Group 1 (7.104–7.109): P1411 (cp 3) produced a total of six weights of which two were near complete, two about half complete and two more fragmentary. They were all made in the same fabric (something between C and E) and they were in general of similar size and shape. The length of sides were 165–180 mm, whilst the widths are slightly more variable, between 60 mm and 85 mm. The two complete examples weigh about 1,100 gm and 1,400 gm each. An estimate for the less complete examples suggests a weight in the same order, probably closer to the higher value. The perforations across the corners all measured between 10 mm and 15 mm.

It is likely that this group of weights was made at the same time, and presumably used as a group and finally disposed of together. They were placed on the base of a sub-rectangular pit, which had a completely deliberate fill.

Group 2 (7.110–7.113): A group of four weights occurred in P1768 (cp 6/7). They were all made in fabric K, except

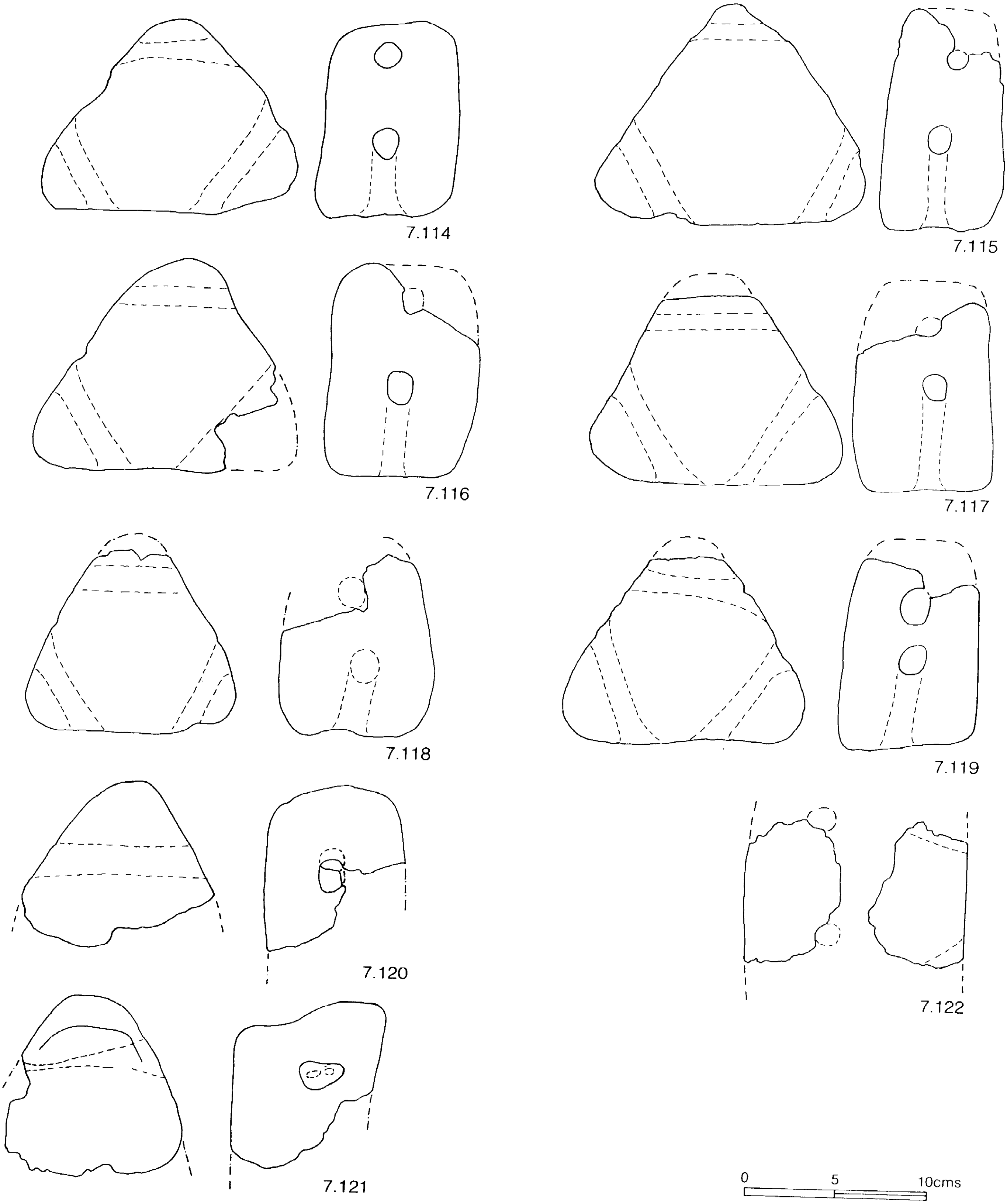


Figure 7.46 Loomweights of type 1: group 3.

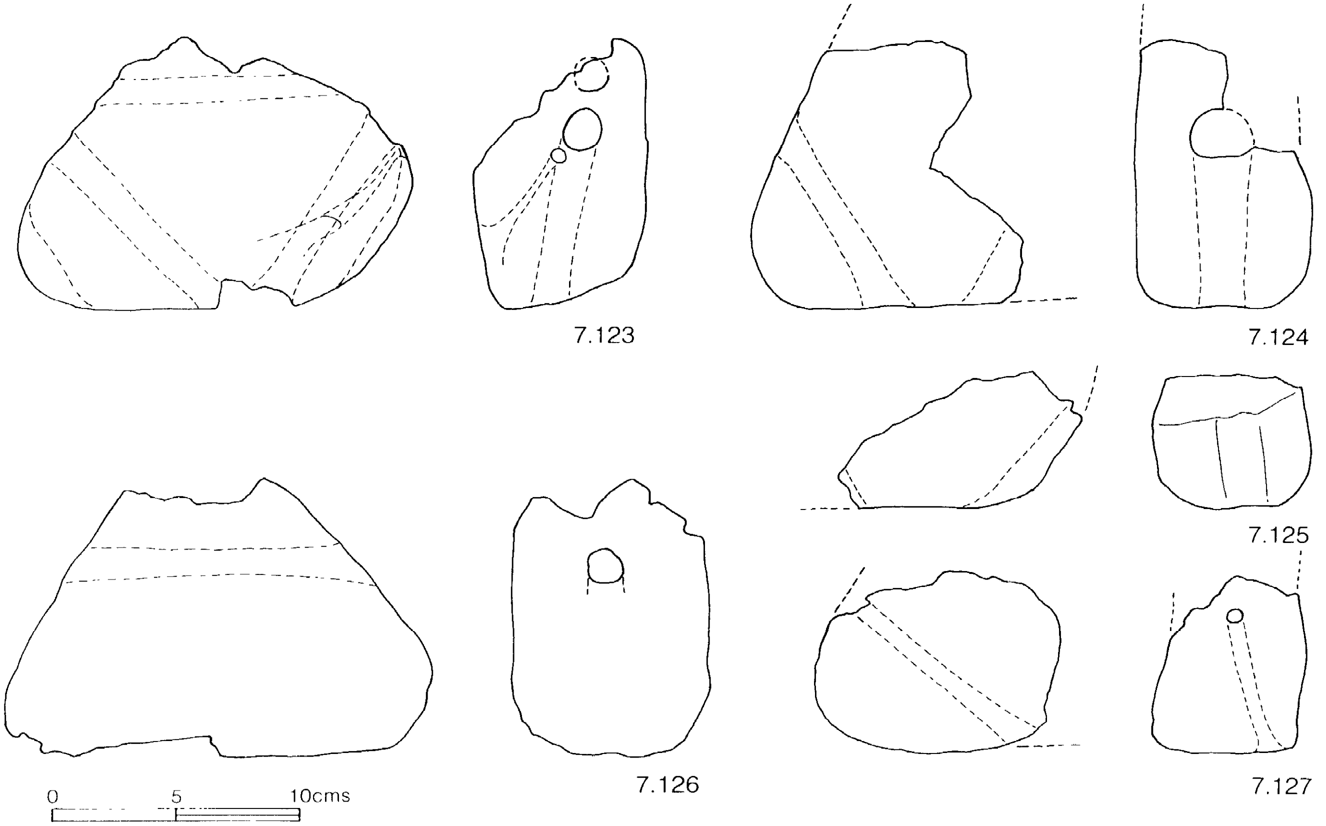


Figure 7.47 Loomweights of type 1: group 4.

for one in fabric P. There were two larger ones measuring *c* 185–200 mm along the sides and 70–80 mm wide: both weighed about two kilograms. The other two were smaller weighing *c* 1,300 gm with sides measuring 120–150 mm and width of 65–85 mm. Perforations occur across the corners measuring 12–15 mm in diameter. However one of the larger weights has only one completed perforation and one possibly unfinished, whilst the smaller one in fabric P has only two perforations.

Though all four weights are not identical there are similarities between them and it appears they were placed as a group close to the edge of the pit either on the pit base or possibly on top of the first layer of chalk shatter on the pit base.

Group 3 (7.114–7.122): The largest group surviving together came from ph 7474 and totalled nine clay weights, with an additional two chalk weights (p 397). All were of fabric F except one in type E, which may possibly have been a different form possibly type 6 (7.12 1). Six were complete or near complete with sides measuring 110–145 mm in length and the widths measuring 70–75 mm. Perforations occurred across all corners, where they survive, and measured 10–15 mm in diameter. Of the best preserved examples the weights were mostly clustered around 1,100–1,200 gm, with one slightly heavier, *c* 1,300 gm. This group was clearly made together as a group, presumably used together and finally disposed of in a shallow post-hole or perhaps a deliberately dug hole, into which they were placed along with the associated chalk weights.

Group 4 (7.123–7.127): The last group consists of six weights from P2570 and layers 1913 and 1914. These weights from separate contexts were recognized as a group, because of the similarity of their fabrics and a certain feature common to several of them. It was then found that pieces from different contexts joined. It is possible the weight from Ph 9975, which is contemporary, was also part of the group. Of these only two were almost complete and indicated weights in the region of 1,100–1,200 gm. Where complete sides survive they varied in length from 120–165 mm and most have a thickness of about 55–65 mm, though two are wider measuring 75–80 mm. Perforations measured between 10 mm and 15 mm, but they do not occur across every corner: 7.126 has only one perforation and 7.125 may have had only one or two perforations. The unusual characteristic, which groups these weights together is the occurrence of a shallow groove around the outside of the corners. Grooves occur on five weights and were deliberately formed when the weights were being made. They measure between 12 mm and 22 mm wide and are no more than 5 mm deep. In some cases the comer appears to have been deliberately flattened to accommodate the groove. The purpose of these features appears to have been to tie some sort of thread around the outside of the weights. (Thus this group has this characteristic in common with type 6 weights.) Those weights in P2570 had been placed on the base as a deliberate deposit. However those in 1913 and 1914 were apparently discarded as rubbish in contemporary occupation deposits, in the adjacent quarry hollow.

Link to Next Section

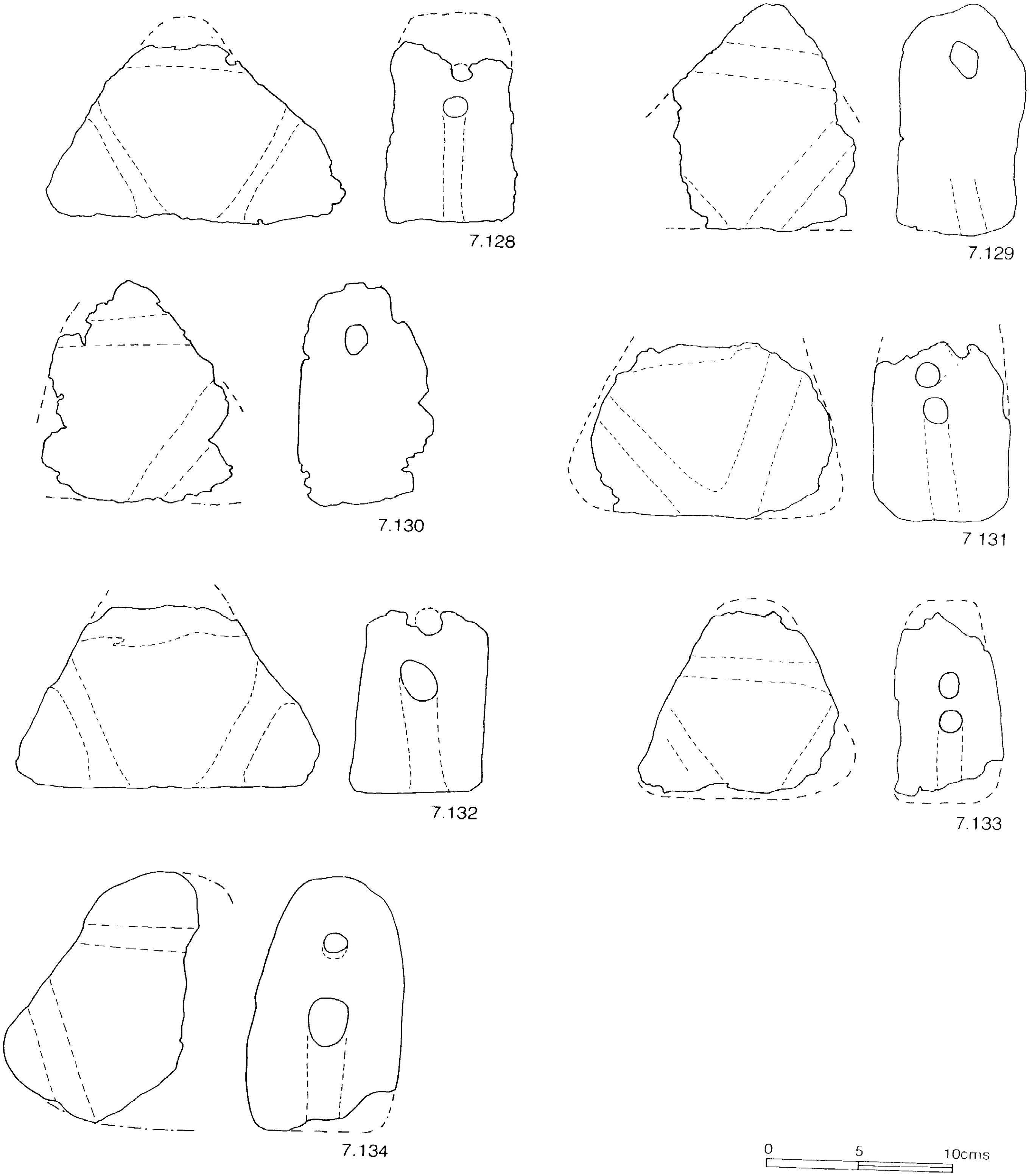


Figure 7.48 Loomweights of type 1: various contexts.

Link to Previous Section

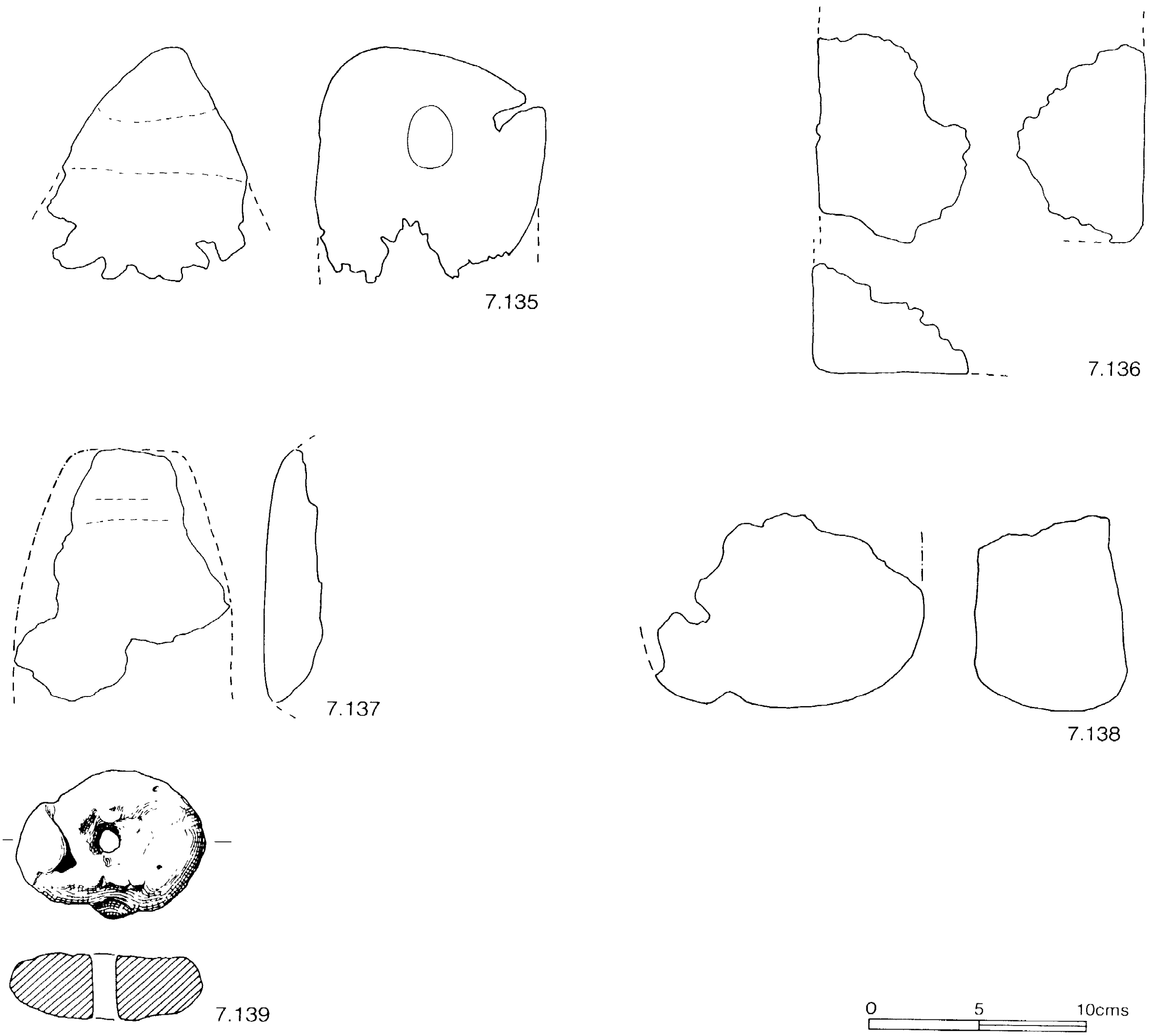


Figure 7.49 Loomweights of type 3 (7.135-136); type 4 (7.137); type 7 (7.138) and type 8 (7.139).

Type lb (7.126)
There are two weights with a single perforation: no 7.126 is the same shape as the majority of triangular weights, but has a single perforation slightly closer to the centre; no 7, 5f 1572 not illustrated. however is more like an isoceles triangle in shape with the single perforation placed half-way down its height.

Type 2
No further examples were found.

Type 3 (7.135, 7.136)
There are two corner fragments, which appear to come from these much larger types of weights. One, no 7.135, measures 105 mm in thickness and has a large perforation measuring 26 by 36 mm on one side and 30 by 35 mm on the other. Some sort of thread could easily have been passed through this perforation to suspend it and there do appear to be grooves worn around the upper part of the perforation. Both weights were made of fabric K and have been baked or fired to some extent.

The little evidence available for this type suggests it was suspended, but its greater weight could imply a function such as thatch weight. Similar, but more complete, weights of this type occurred at Maiden Castle.

Type 4 (7.137)
There are two examples of this cylindrical type. One is a

fragment from the upper half of the weight (no 7.137) and would have measured about 130 mm high, 100 mm wide at the base and about 50 mm thick. Remnants of a single perforation, 11 mm in diameter, occurred across the corner. It was made of fabric K. It came from a cp 7 layer. Though it is not exactly cylindrical, it is closer to this form than to the triangular type. The other, from a cp 6 layer, is just the top with remnants of a perforation.

Type 5
No further examples were found.

Type 6 (7.121, 7.123–5)
There are two examples of what were apparently intended originally to be type 1 weights, being used in the manner of type 6. One, no 7.121, from the group in ph 7474 had an incomplete perforation, but over the top of the comer was a groove suggesting cord had been tied round the outside. Similarly many of group 4 (7.123–5) have a groove over the top of the corners and one, 7.125, has the corner missing altogether and what would have been a perforation acts as a groove on the outside of the weight.

Type 7 (7.138)
There is one example of this type of which about half survives. It measures 125 mm wide and 60 mm thick and was made of fabric E. It came from a pit of cp 7.

Type 8 (7.139)
This type had not previously occurred amongst the clay weights, but is common among the chalk weights. One example, no 7.139, was made of fabric K, unbaked, in the form of a circular disc 75 by 84 mm and 30 mm thick. There was no evidence of wear. It came from a cp 7 pit.

There is clearly considerable variation among the triangular weights, but the evidence of the larger groups suggests weights were made in groups to similar specifications. Since these groups remained together to be buried, apparently as 'ritual' deposits, on pit bases in most cases, the implications must be that they had been kept together during use.

What the function of these weights was, must remain speculative. The evidence suggests they were used as groups but possibly varying in number, though it is clear not all the weights of a group would necessarily be deposited together, as is shown by group 4. There is no evidence to indicate whether they were used for an indoor or outdoor activity, except that 69% were fired, 22% baked and only 9% were of raw clay or daub. This suggests the possibility that a high proportion were designed for use outdoors, or firing was a feature resulting from their use.

The majority of weights have three perforations across the corners, but this is not invariably the case and must imply that they could function equally well, at least in some instances, with fewer perforations.

The generally applied designation of loomweights, seems inappropriate as the size of the perforations is not ideal for threading wool through and if the weights were to hang closely side by side it would be more logical to have the perforations at right angles to their usual orientation. The apparent lack of wear around the perforations of type 1 must cast doubt even on the likelihood that they were suspended. With the increased sample size from 1979–88 it has been noticed that a high proportion of triangular weights occurred in association with oven daub, and a superficial perusal of material from the first decade appears to show a similar pattern. From the 1979–88 sample 36 triangular 'weights' (including groups 1 and 2) were in contexts or features, where oven daub occurred, 29 (including group 4) occurred in features containing other unspecified daub or associated with oven daub within a structure and 32 (including group 3) were unassociated with oven daub. The pattern was noticed as often the daub or clay fabric was the same for both weight and oven daub. It is intended to examine the complete sample of triangular daub/clay weights in relation to oven daub, chalk weights and objects associated with weaving. Should the apparent association of triangular clay 'weights' with oven daub prove significant, a possible interpretation is that these objects were in some way associated with the construction or use of the ovens or were being fired prior to some other use.

Few examples of types 2–8 occurred and none were complete (except the single type 8 weight) so their exact forms and functions must remain speculative. The form of types 4 and 8 both occur among the chalk weights.

Metal-working accessories (7.140–7.150; Fig 7.50)

Crucibles (7.140–7.146; Fig 7.50)
A total of 12 crucibles or crucible fragments were found in the excavations of 1979–88 compared with four discovered in the previous decade. Of these nine were found in close proximity in the stratified sequence excavated behind the rampart in the south-west corner of the fort in 1988 (sequence H). The others were scattered: one came from a pit in the centre of the fort, one from a pit on the west side and one from a post-hole of PS321.

The following discussion will include all 16 examples, which are described in detail in Fiche 29:F5–F8.

In terms of ceramic phase, the assemblage divides as follows:

cp 3 – 4
cp 4 – 3
cp 4/5 – 1
cp 6 – 2
cp 6/7 – 2
cp 7 – 3
u/p –1

The group of six found close together in sequence H were all of a similar type: one was complete, two were about half complete and the rest were in recognizable fragments. The type may be characterized as a small rounded cup with a thick square handle (nos 7.140–7.142). The diameter of the rim measured 50–60 mm and the height 52–68 mm; the walls were mostly 10–12 mm thick but were occasionally up to 15 mm. The square handle measured 23–35 mm long, 30–43 mm high and 20–40 mm wide. The handle increased in size towards the cup wall. Where it was not totally obscured by slag incrustation, it can be seen that on the top, sides and bottom, but not the end, the surface has been depressed to form a rounded hollow a few millimetres deep. This would have made it easier to grip and thus less likely to slip. All were made in a grey sandy fabric similar to that described by Hilary Howard in Vol 2 (Fiche 13:D2–4).

In most cases the inner walls have remained least distorted and occasionally on the base there are remnants of copper alloy adhering to the surface. The outer surfaces are generally vesicular and are often coated with vitrified slag sometimes extending over the rim though part of the handle usually remains uncovered. This group of crucibles is considered in more detail below (pp 411–12).

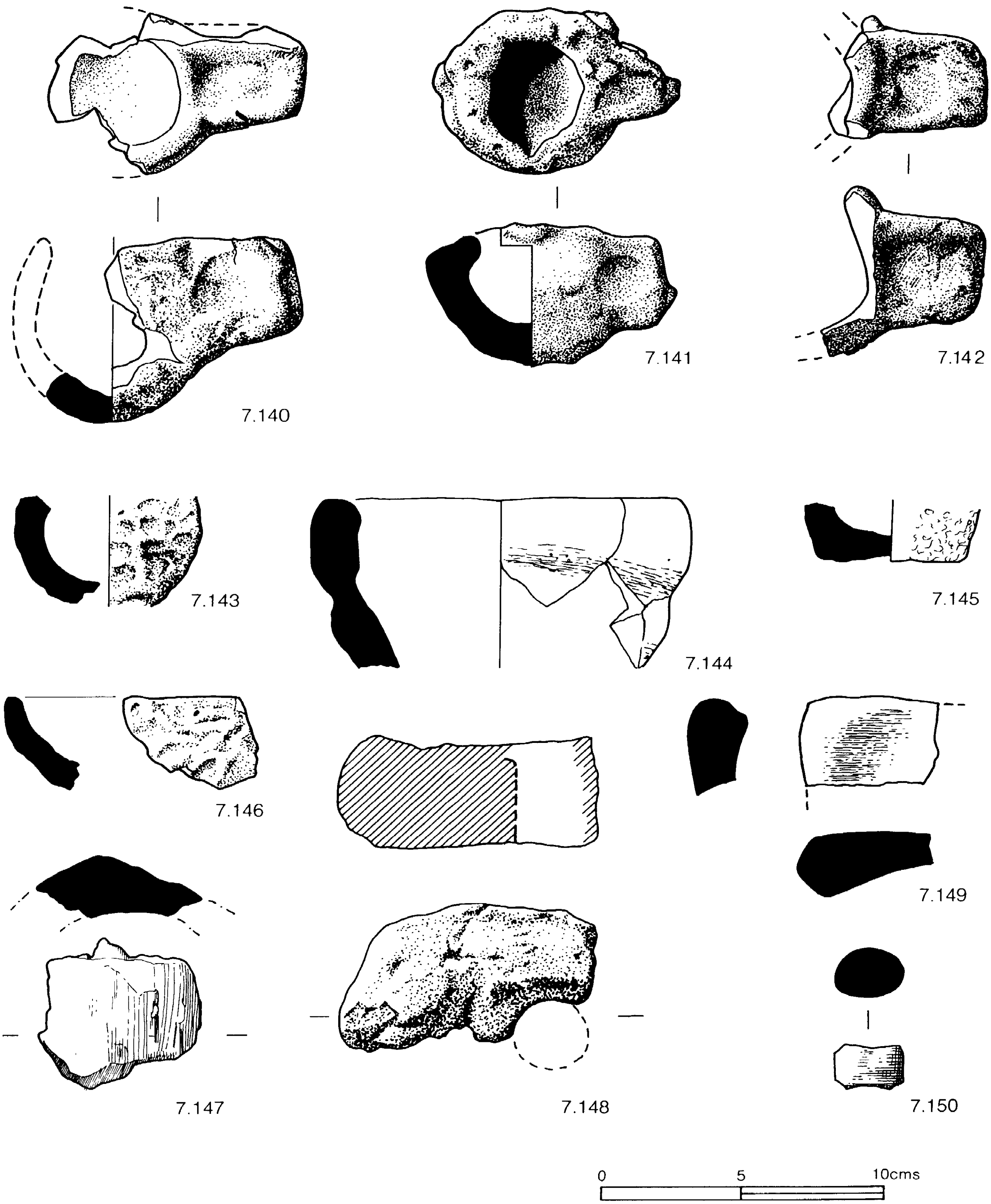


Figure 7.50 Crucibles (7.140–6, 7.149); bellows' guards (7.147–8); fire bar (7.150).

Apart from these handled crucibles none of the other fragments (eg 7.143–7.146) are complete enough to indicate overall form but most would appear to be of the triangular type common in the Iron Age. The most complete is 7.144–a large crucible with walls 12-17 mm thick and a height of in excess of 70 mm. The other fragments have walls of similar thickness though one exceeds 22 mm. All were made in a grey sandy fabric with a vesicular outer surface usually covered with vitrified slag.

One other fragment (no 7.145) may have been an unused crucible or a vessel unassociated with metal-working. It came from the base of a small flat-bottomed vessel but with the inside curving and rounded. The base has a diameter of 60 mm and the walls, which flare out slightly survive to a height of 23 mm and are 10 mm thick. It was made in fabric A.

Bellow's guards (7.147, 7.148)

Three fragments of bellow's guards were recovered: one unstratified from the topsoil and the other two from cp 7 and cp 8 pits. Two were made in fabric F and one in fabric E.

None are as well preserved as 7.71, described in Volume 2 (p 407), but they have the same general form. The unstratified example (7.148) appears to have been roughly rectangular with rounded corners. It originally measured *c* 100 by 160 mm with the central circular hole 23 mm in diameter at the base, widening to 25 mm upwards. There is possibly some slag attached to the base.

The other fragments appear to come from higher up the funnel the walls being only 10–20 mm thick. The outside surface is angled having some sort of polygonal shape (7.147), whilst the inside surface is curved with a diameter in one case of *c* 65–70 mm.

Oven supports (7.150)

Two small fragments, both very incomplete, could be interpreted as some sort of oven supports. One appears to be part of a flat topped (30 mm diameter) flaring pillar and one possibly a cylindrical fire bar (24 mm wide). Both were made in yellowish-red sandy clay (daub fabric F). The pillar comes from a cp 6 pit and the fire bar from a layer in sequence H, stratigraphically of cp 7. This type of object is usually best represented on kiln or briquetage sites, but at Danebury they are most likely to have been used in ovens or furnaces.

7.1.11 Objects of stone

by Kathy Laws, Lisa Brown and Fiona Roe

The stone objects recovered from the excavations of 1979–88 are described in the same order as that adopted in Volume 2 :

- the imported stone
- stone weights
- whetstones
- quernstones
- chalk marl discs
- chalk weights
- chalk spindle whorls and other perforated chalk discs
- miscellaneous chalk objects
- slingstones.

Full descriptions and other relevant details will be found in Fiche 26:B11–27:G5.

Imported stone

Over 5,000 fragments of stone were recovered from the excavations between 1969 and 1988. Of these about 1,700 showed signs of working but only 588 were of a recognizable morphological type. The total weight of stone just exceeds 1,200 kg. Over 800 contexts contained stone about half of which were pits. The figures include all worked and unworked stone, all worked chalk and marl but excludes slingstones.

All stone types listed in Volume 2 were present in the recent collection together with a few new types. More detailed study of the fine-grained materials was undertaken by Fiona Roe. The stone types represented in the 1979–88 collection are quantified in Table 7.3. Identifications were undertaken by A Mudd for 1978–83 and by

Table 7.3 Quantification of imported stone

Stone type	*Probable source*	*Distance from Danebury*	*No of frags*	*Weight/gm*	*% total weight*
Greensand	Lodsworth Shaftesbury, Westbury, and Vale of Wardour	60+ km 30–50 km	4209	896,219	71.93%
Tertiary sandstones	Hampshire basin	10–40 km	200	32,038	2.57%
Chalk	Local	–	166	116,735	9.37%
Marl	Local	–	93	46,060	3.70%
Gritstones ?Millstone Grit	Unknown	–	93	46,060	3.70%
Potterne Rock	Potterne	35 km	68	49,285	3.96%
Devonian Sandstone	S Devon	200+ km	54	4,574	0.37%
Sarsen	Wilts	*c* 30 km	46	45,634	3.66%
Pennant Sandstone	S Wales, Forest of Dean, Bristol Coalfield	70+ km	7	1,380	0.11%
Igneous Greenstone	SW England	160+ km	4	811	0.06%
Quartz Conglomerate	?Normandy	?200+ km	1	22,000	1.77%
Others and unidentified	various	–	69	13,944	1.12%

Link to Next Section

K. Laws for 1983–88 advised by Lisa Brown, Dr D Peacock and Fiona Roe.

Specific stone uses are discussed in the following sections.

Stone weights (8.74–8.80; Figs 7.51 and 7.52)

Thirty-two stone weights were recovered from the excavations of 1979–88 bringing the total from the site to 68. Seven stone types were identified. Fourteen weights were made from Lower Greensand (44%), six from sarsen (19%), three each from calcareous sandstone and marl (9%) and one each from grey sandstone, ironstone and chalk (3%). Three types were unidentified.

The four morphological types distinguished in the 1969–78 assemblage were found to be applicable to the recent group (Vol 2, 408). The occurrence of the types is as follows:

Type	*No*	*Cp*
W1 (nos 8.74–8.77)	16	cp3–1 cp7–9 cp7/8–5 u/p–1
W2	0	
W3 (nos 8.78–8.79)	4	cp3–1 cp5–1 cp7–2
W4 (no 8.80)	1	cp7–1
Unclassified fragments	11	

Occurrence by ceramic phase is as follows:

Cp	*no*	%
cp 3	2	6.3
cp 5	2	6.3
cp 6/7	3	9.4
cp 7	16	50.0
cp 7/8	6	18.7
unphased	3	9.4

No complete examples were found but four were sufficiently complete for the original weight to be reconstructed following the procedure set out in Volume 2 (p 421). The results were amalgamated with the statistical test (Fishers exact, chi square) used in testing the 1969–78 assemblage and this information is incorporated in Fiche. The new sample of four was too small to demonstrate with any certainty correlation with the Celtic weight standards of 309 and 638 gm.

Details of the weights are given in Fiche 26:C13–D10.

Whetstones and other utilized stones (8.81–8.106; Fig 7.53)

Leaving aside four Neolithic axe fragments and a pebble hammer (considered above, Vol 4, 8) of early prehistoric date, 99 fragments of stone comprising 88 individual items have been recovered from the twenty years of excavation. A selection of the main types are illustrated here (Fig 7.53). With such a heterogeneous collection rigid typological division is hardly warranted but three broad categories can be recognized: whetstones, rubbers or grinders and utilized pebbles. Whetstones are usually bar-shaped with rectangular or subsquare cross-section; rubbers/grinders are characteristically irregular but with one flattened surface, while utilized pebbles vary considerably in form.

Of the 36 distinctive whetstones recovered, 83% were made from Palaeozoic sandstones. Of these 77% were Lower Devonian sandstone, the remainder were Pennant sandstone. Only two whetstones were made from Tertiary rocks; the rest utilized miscellaneous pebbles. Clearly these Palaeozoic sandstones were thought to be preferable to more locally available materials. Some 20 definite and nine probable rubbers or small grinders were recovered, 70% of them made of locally available Tertiary gritstones and grey micaceous sandstones. The rest utilized a variety of stone types. Of the few hammer stones found, the majority were of sarsen. Most of the utilized pebbles were of south-western origin, mainly Devonian sandstone.

Of particular note is a whetstone (8.94) of Devonian sandstone which displays distinct grooves probably for the sharpening of a point as well as a generally worn appearance.

Utilized stones are found in all periods but with a preponderance in the later ceramic phases. A detailed listing of all items will be found in Fiche 26:E5–12.

The particular interest of this category of material is the information it provides about trade and exchange. For this reason a full consideration of the stone types is offered.

The origins of the (non-quern) utilized stone

by Fiona Roe

The hillfort of Danebury is set in the centre of an area of chalk downland, making it an undisputed fact that hard stone suitable for use as axes, querns, rubbers, whetstones and suchlike would by necessity have had to be imported. There was in fact some local stone available harder than the chalk, in the form of pebbles of sarsen and quartzite which could be collected from surface Pleistocene deposits. These seem to have been appreciated in earlier prehistoric times, but were used more sparingly during the Iron Age.

The imported stone at Danebury can be divided into materials brought in from relatively near at hand, and others that imply organized long distance trade. Into the first category come Cretaceous and Tertiary rocks obtainable from within a range of around 30 km (25 miles), such as greensand (which was principally used for querns), purple Tertiary gritstone (again also a quern material), Tertiary ironstone, and perhaps the grey micaceous sands tone.

Contacts further afield brought in good, hard Palaeozoic sandstone from more than one source. Such long distance contacts were already in operation in Neolithic times, when the need for durable stone brought stone axes or materials for making them into Hampshire from south-west England, including two of the axes in this report. It is then perhaps not so surprising to find that the greater part of the whetstone material appears to be Lower Devonian Staddon Grit with a source in south Devon. The many water-worn pebbles suggest derivation from a beach, rather than an inland source where the stone would have been less well exposed. The main coastal outcrops of this particular sandstone are limited to small areas on the east and west sides of Plymouth Sound. On the east coast the rock can be found just 1.5 km south of the port-of-trade at Mount Batten (Cunliffe 1988). The Staddon Grit here would have been the nearest outcrop of hard stone available to this trading post. Sea-borne trade from Plymouth Sound then appears to be a distinct

Link to Previous Section

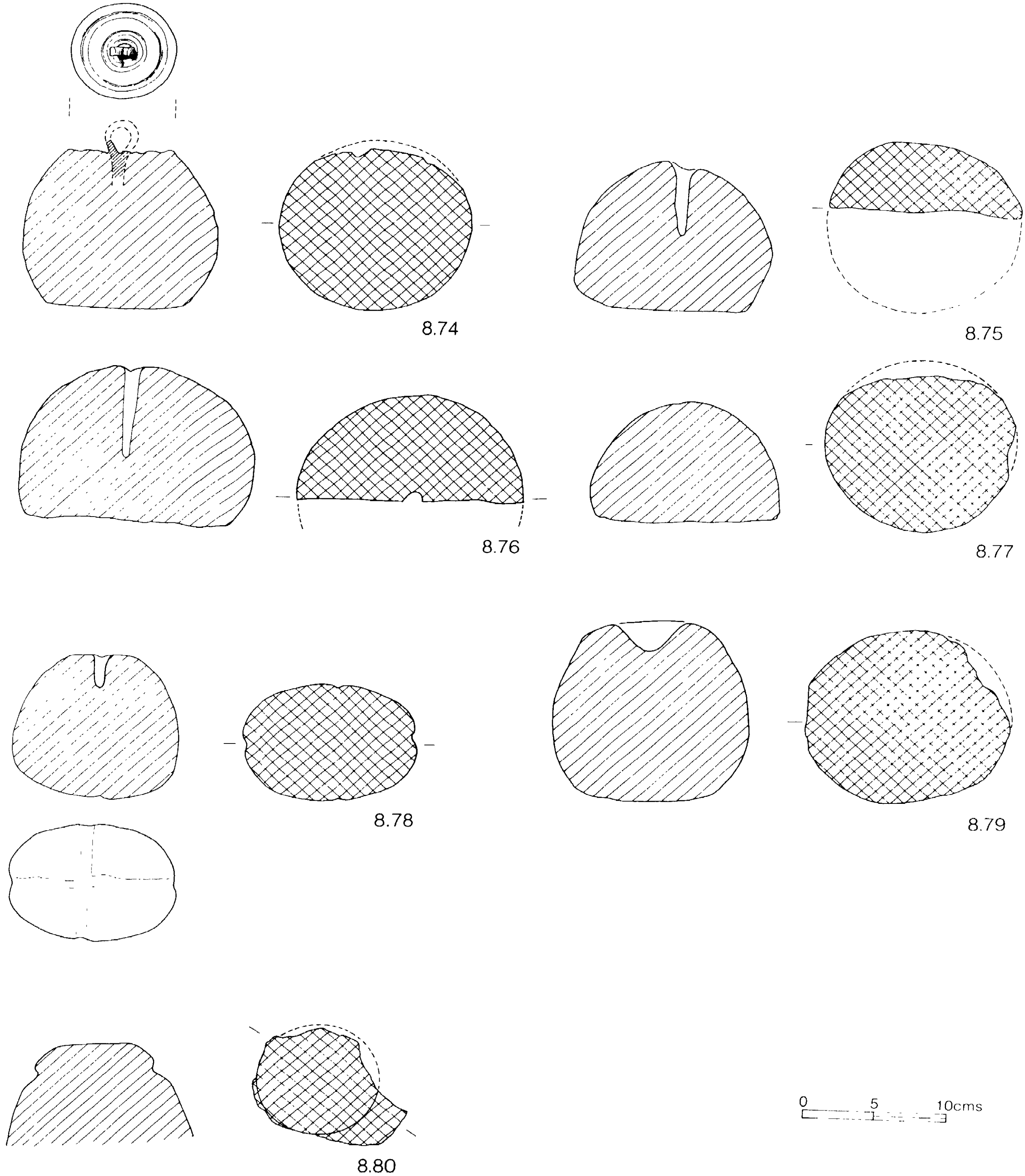


Figure 7.51 Stone weights

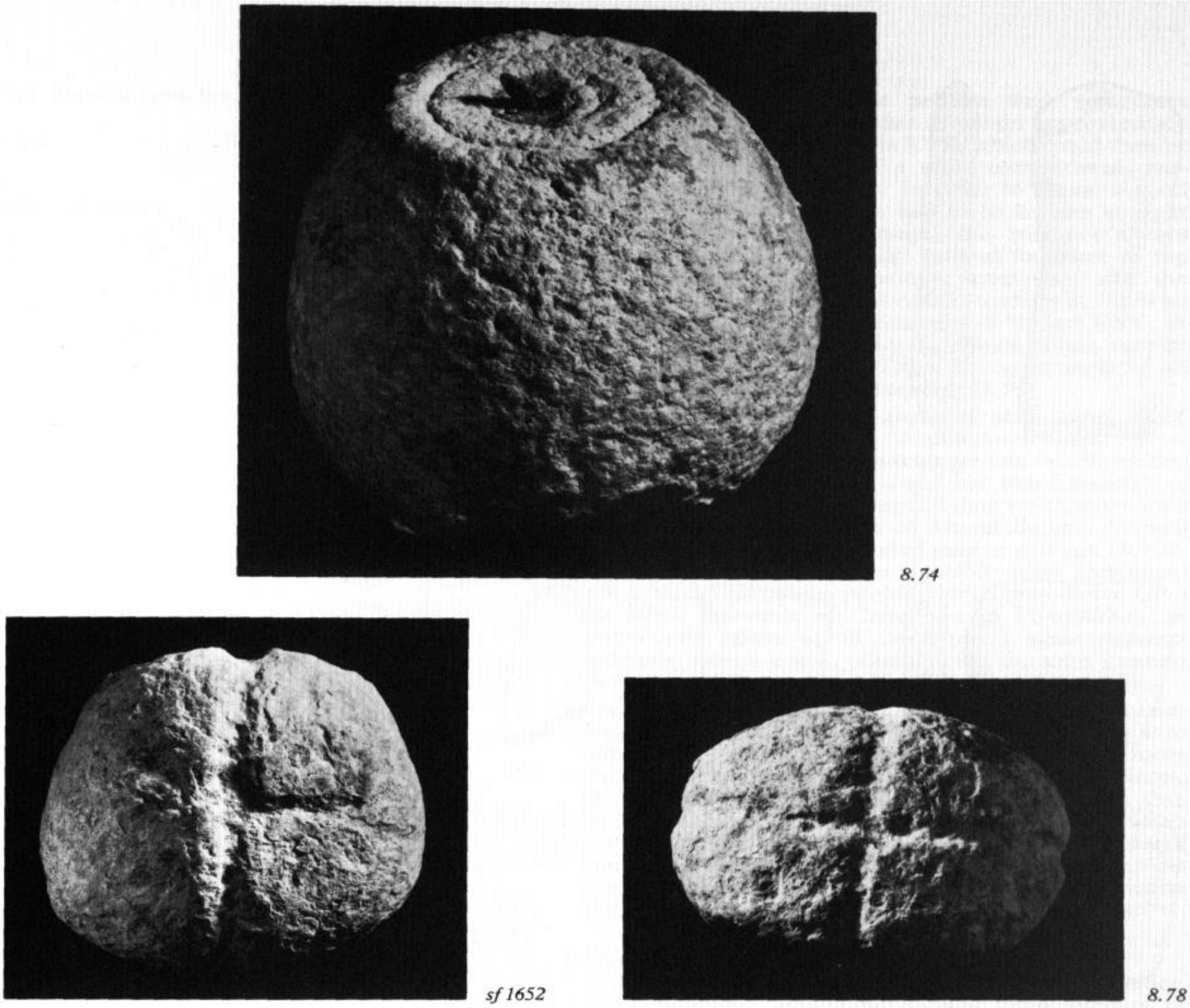


Figure 7.52 Stone weights: scale 1:2.

possibility, this being the most direct trading route, probably across to the Solent and Southampton Water, and it could perhaps have been carried out in conjunction with other items shipped from Mount Batten.

Carboniferous sandstone was used for whetstones at Danebury to a more limited extent. Seven of these can be related to the Upper Coal Measures Pennant sandstone, and again the finds suggest water-worn pebbles. The possible source area is a wide one, with outcrops in south Wales, the Forest of Dean and the Bristol Coalfield, the latter area being the nearest to Danebury. The beach at Portishead (Avon) would be a possible source for suitably water-worn pebbles, or material could have come from cliffs along the river Avon at Hanham, now on the outskirts of Bristol. All these Palaeozoic materials were evidently of some value, for, as can be seen in Table 7.4, they account for just over two-thirds of the Iron Age stone in this report.

While the earlier prehistoric finds fit into a well-established pattern, with plentiful published work for reference, Iron Age stone tools of the types described here are still in many ways an unknown quantity. New work is gradually progressing to remedy this deficiency, but as this proceeds changes in interpretation are still liable to occur, as little reference material is available. Therefore what is written here must be in the nature of an interim statement. The notes below are supplemented by more detailed information on stone types, tool types and thin sections in the fiche text.

Local types of stone

Pleistocene gravels. The locally available materials provided a limited choice, and the few items of sarsen and quartzite listed in the catalogue (Fiche 26:E5–12) amount to only 6.8% of the smaller piece, of worked stone. Uses were limited to hammer and grinding stones.

Stone imported over relatively short distances

Tertiary. The gritstone or heathstone was mainly used for small rubbers; there are five or six of these, with one crude whetstone. There is just one whetstone made from Tertiary ironstone (8.106).

Cretaceous. Greensand of the varieties found in this assemblage appears to have lacked the properties needed for whetstones, but evidently made serviceable small rubbers and grinders (8.100, 8.101). Some of these may have been the equivalent of the smoothers found in Iron Age contexts at Beckford, Worcestershire (Roe forth-

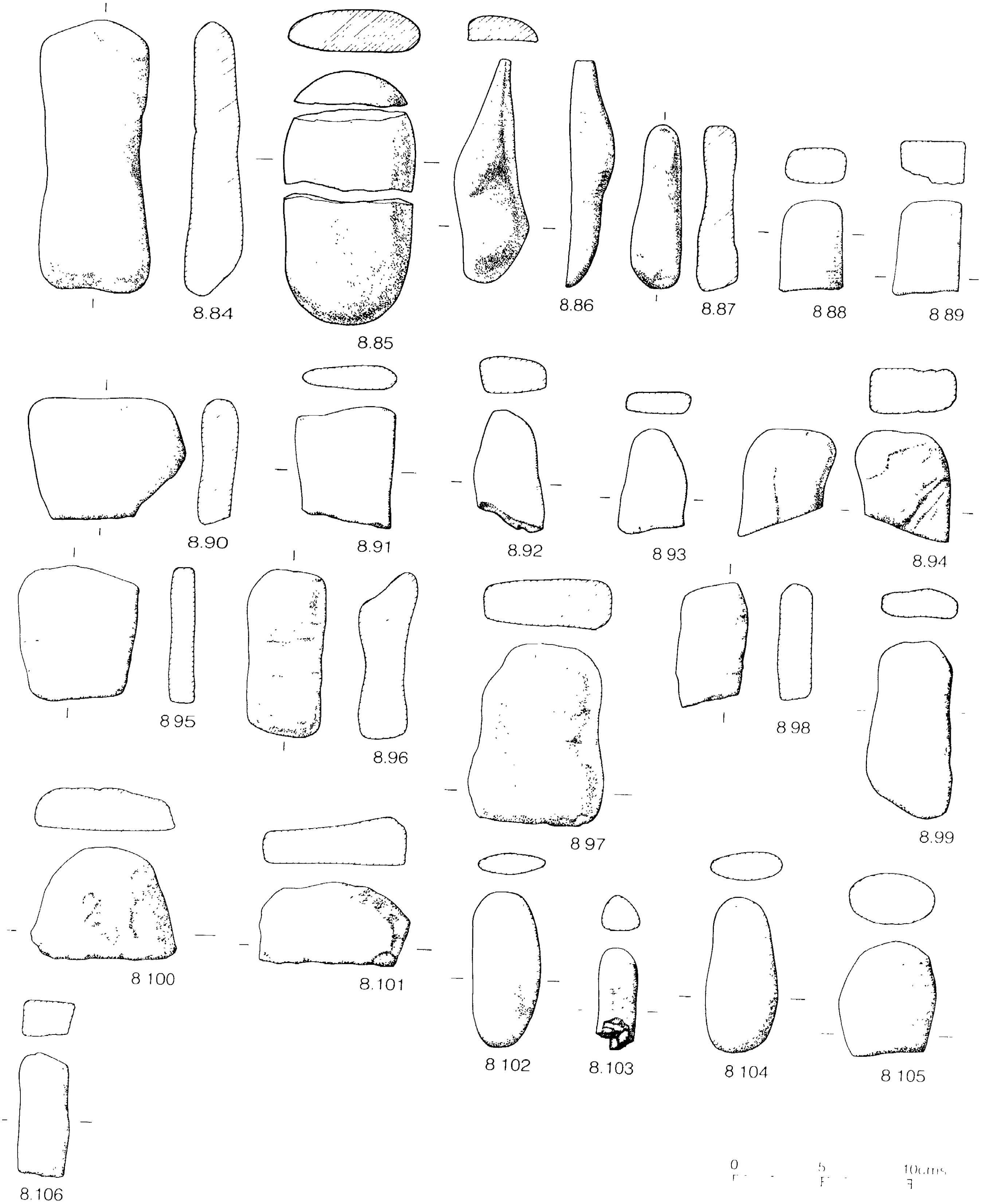


Figure 7.53 Whetstones.

Link to Next Section

Table 7.4 Percentages for Iron Age utilized stone

Type of stone	*No*	*Cp*	%	%
1. Local				
PLEISTOCENE gravels				
Sarsen	4	1–7	4.545	6.818
Quartzite	2	3–8	2.273	
2. Imported over relatively short distances				
TERTIARY				
Gritstone or heathstone	7	4–7	7.955	26.136
Ironstone	1	8	1.136	
CRETACEOUS				
Grey micaceous s.s	9	3–8	10.227	
Greensand	4	3–8	4.545	
MISCELLANEOUS				
Calcareous sandstone	1	7	1.136	
Blue clay	1	7	1.136	
3. Imported over longer distances				
DEVONIAN				
Staddon Grit	43	1–8	48.864	67.046
MISCELLANEOUS, probably from south-west England				
Black slate	2	4–7	2.273	
Sandstone	2		2.273	
Greenstone	2		2.273	
Slate or siltstone	2		2.273	
Black limestone	1		1.136	
CARBONIFEROUS				
Pennant sandstone	7	3–7	7.955	
Totals	88		100.000	100.000

coming a); at this site flat pieces of oolitic limestone were used. There are nine grinders made of grey micaceous sandstone (8.100 and 8.101) and a further three of varying materials, all greensand. A final fragment of fine-grained greensand contains part of a small hollow, highly polished but of uncertain purpose (sf 2852). A similar hollowed stone, worked in oolite, was found at Beckford (Roe, *ibid).*

Miscellaneous. These items comprise two small flat slabs of worked stone, one calcareous sandstone, the other a blue clay, which could come from the Oxford clay. or from Tertiary sediments.

Stone imported over longer distances

Devonian. Nearly half of the pieces of whetstone material, whether whetstones (usually incomplete) or broken pebbles, are made of the same grey/pink, relatively fine-grained micaceous sandstone, which is thought likely to be Lower Devonian Staddon Grit from south Devon: Two main varieties of stone are involved, depending on whether the clasts are coated with haematite or not. Three thin sections (of sf 716, 2121 and 2131), which are described in further detail in Fiche, show a lithic sandstone with iron-coated grains. These compare well with two thin sections taken from whetstones found at Maiden Castle (7795, 8638; Roe forthcoming b). Another thin section (sf 1730) shows a similar sandstone without the additional iron, and again this appears to relate to thin-sectioned whetstones from Maiden Castle (2543, 7989).

Much of this Danebury whetstone material is in the form of elongated, rather flat pebbles (8.91, 8.92, 8.93 and 8.94), not always showing much in the way of wear. There are also numerous fragments of shattered pebbles.

It seems likely that these pebbles were sometimes deliberately smashed, in order to obtain approximately rectangular centre sections (ie 8.95), which could then be worked into whetstones of a more conventional, rectangular shape (8.88, 8.89). In order to obtain a good transverse section the stone had to be broken at right angles to the natural cleavage; this was not always successful (8.85) which could account for some of the shattered pieces. The Devonian sandstone, like the Pennant, has flaggy characteristics, tending at times to produce similar shaped whetstones (8.90 and 8.95). A good whetstone of Devonian sandstone might receive very extensive use (8.86). There is one example of an additional use, as a point sharpener (8.94).

Miscellaneous. There is a group of nine items, all of which are likely to have a south-western origin. Most clearly of south-western character are two beach pebbles of greenstone (8.104, 8.105), and also two fragments of black slate, possibly the Jennycliff slate which outcrops a short distance to the south of Mount Batten. As well there are two pebbles of banded slate or siltstone (8.102, 8.103), two sandstone items (possibly again Devonian) and a black, calcareous pebble, which may derive from the black limestone of Cattedown in Plymouth. The water-worn nature of all these pieces again suggests collection from a beach, possibly even the same location as that supplying the Staddon Grit Devonian pebbles.

Carboniferous. The Pennant sandstone is fairly coarse-grained and flaggy, so that it breaks conveniently into slabs which may be thin in section (8.95) or more rectangular in shape (8.96, 8.97). There are seven pieces, all of which have been utilized as whetstones. A thin section was taken from one whetstone (sf 1251, discussed in more detail in the fiche) and found to match samples of Pennant sandstone collected during field work. At present no other whetstones made from this particular variety of stone are known from Iron Age contexts.

Discussion

The tool types listed in the catalogue are few in number, being restricted to hammer-stones, small rubbers or grinding stones, whetstones, pebbles with slight wear traces, one sharpening stone and one hollowed stone. These are discussed in more detail in the fiche. The morphology of these artefacts tends to be related more to the characteristics of the stone selected than to any ordered typology. Most of the whetstone material is of a flaggy nature, with a tendency to split naturally into thin slabs or thicker blocks, which produced whetstones of similar types. A sarsen pebble with a well rounded section produces a tool of an entirely different shape (8.83).

It can be seen from Table 7.4 that the various stone materials described here were used at Danebury throughout the life of the settlement with no chronological variations. The explanation probably lies in the fact that certain basic tool types were consistently needed, each requiring different kinds of stone; the Devonian sandstone, for example, appears to have been needed for whetstones from phases 1–8. One solitary whetstone made of Tertiary ironstone comes from phase 8 (8.106). Possibly by this stage in the development of the occupation new supplies of Palaeozoic rocks were either limited or not available, so that a less suitable stone obtained nearer at hand had to be tried as a substitute.

Knowledge of comparable stone from other sites remains limited, though the striking similarity of the whetstone materials at Maiden Castle provides some encouragement.

Whetstones of micaceous sandstone at Gussage All Saints

Link to Previous Section

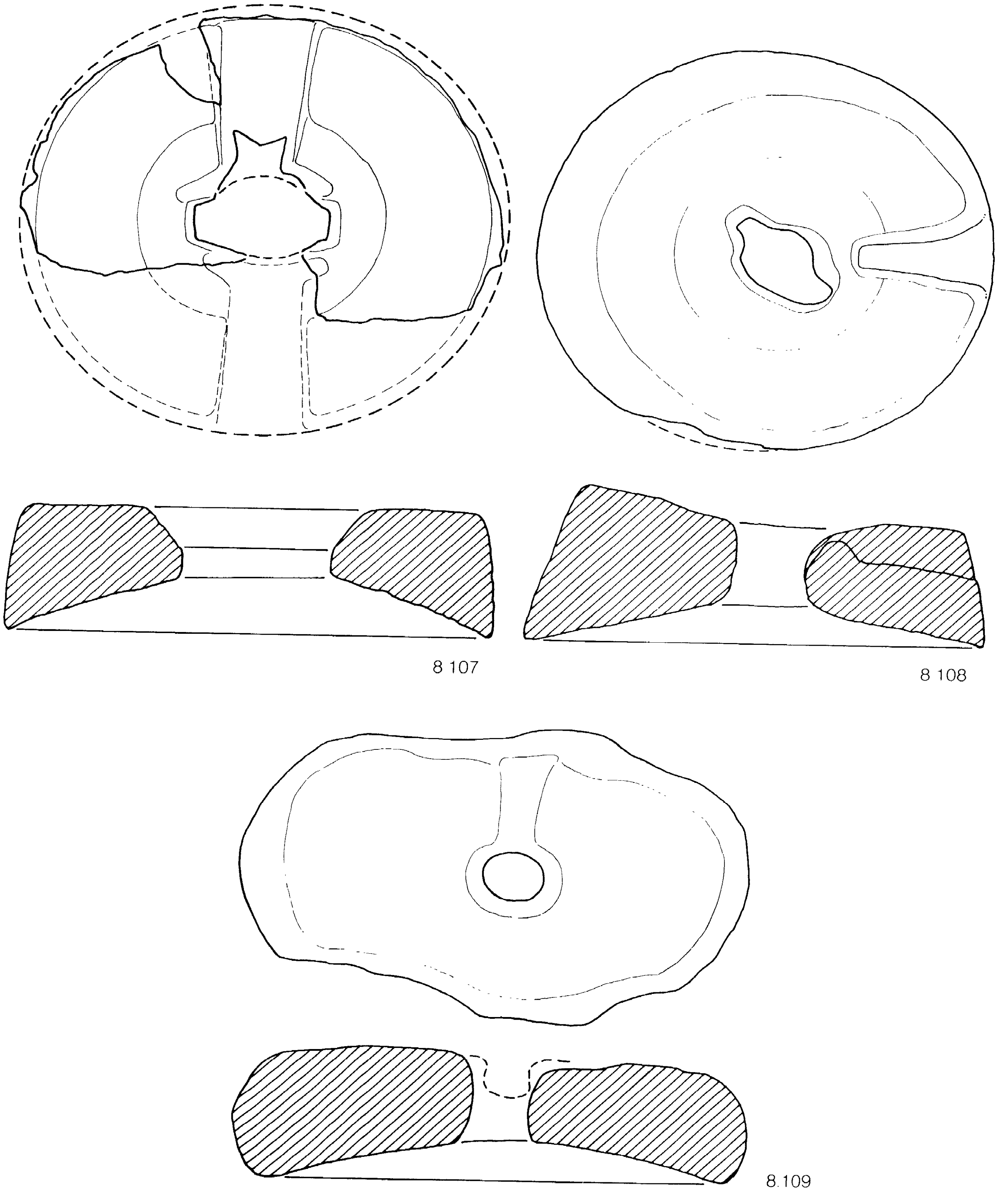


Figure 7.54 Rotary querns: upper stones.

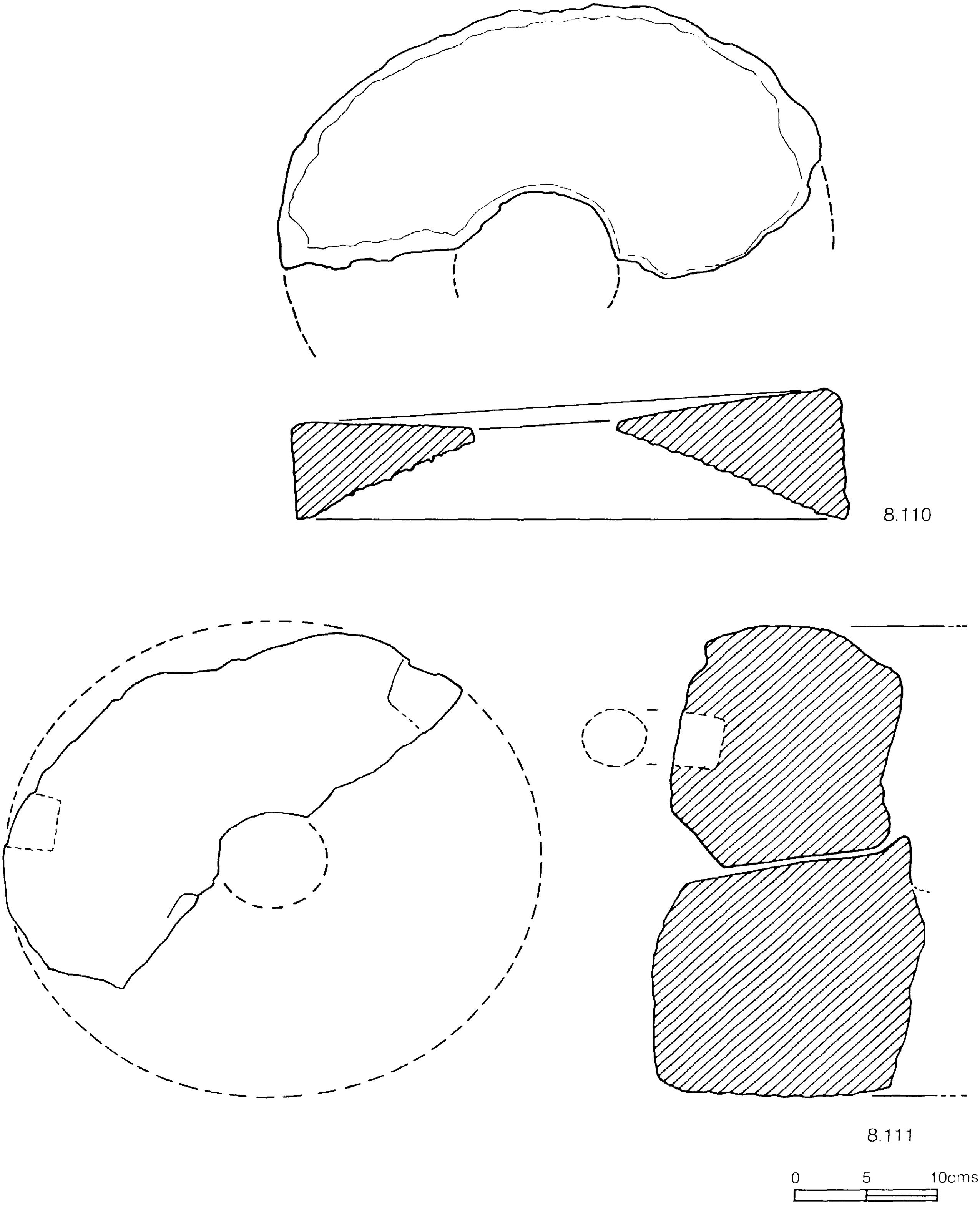


Figure 7.55 Rotary querns: upper stones.

(Buckley 1979) could prove to belong to the same trading pattern, as could others from Marshfield (Barford 1985). At Meare more possibly similar whetstones were recorded (Gray 1966, 376). The suggested source for these was the Old Red Sandstone of the Mendips, but this is poorly exposed and the whetstones were examined in 1932, so that the matter might now merit more attention. All in all there is generous scope for further investigation, to fill in the details of the general picture of whetstone use and the trading of stone in the Iron Age.

Acknowledgements. The work for this report would not have been possible without the generous provision of facilities at the Department of Earth Sciences, Oxford, while at the Institute of Archaeology, Oxford Miss Kathy Laws provided invaluable liaison work. The thin sections were made by Mr Philip Jackson and Mr. Jeremy Hyde, while Mr R J Howell gave very able assistance with the field work.

Quernstones (8.107–8.127; Figs 7.54–7.60)

The excavations of 1979–88 produced 598 fragments of stone utilized in the manufacture of rotary and saddle querns (this compares with 592 fragments found in 1969–78). Of this number 171 fragments represent 119 saddle querns, seven represent seven saddle quern rubbers and 420 fragments represent 152 rotary querns. In addition there are 17,521 faced fragments of stone possibly from querns but of unknown type. Detailed listings of all quern finds will be found in Fiche 26:E13–27:A8.

The most commonly used material for querns was greensand of which several different types can be recognized but not firmly identified as to source. It seems that the majority is Upper Greensand and more specifically about 40% of the greensand querns (ie *c* 30% of the total number of recognizable querns) originated from the Lodsworth quarries near Midhurst in Sussex (Peacock 1987). No further systematic attempt has been made by us to finely divide the varieties or to trace their origins pending further research into greensand quern sources.

Rotary querns

The quantification of the rotary querns by form and stone type is best summed up in Table 7.5.

Upper stones (8.109–8.114; Figs 7.54–7.57)

The typology presented in Volume 2 (pp 415–8) has been adopted here with the addition of one new type – R6. No certain examples of types R3 and R5 have been found among the present collection.

R6 (no. 8.114) Only one example has been found of this type, an upper stone, which is slightly oval and somewhat thin and flat in shape. Diam: 385–408 mm; thickness 39–87 mm. A central perforation is present. The most distinctive feature is the vertical handle hole in the upper surface indicating the use of an upright wooden handle. This hole has a diameter of 41–57 mm. Curwen (1937) refers to querns of similar type as belonging to the Roman period. The Danebury example however retains the concave lower grinding face distinctive of Iron Age querns rather than the flat grinding surfaces characteristic of the Roman types, and comes from a phase 7 context.

Querns of already recognized types (see Vol 2) are illustrated as follows: Type R1: 8.107, 8.109; Type R1/R2: 8.108, 8.110; Type R4: 8.111, 8.112, 8.113. While the same basic quern types remain, the increased number of examples has shown some variation within the main types. It has also become apparent that characteristics previously attributed to different forms can appear together on one quern. A number of examples have been chosen for illustration.

8.107 Essentially an Rl type quern but with an unusually complex central perforation, and notably pronounced handle groove.

8.108 A stone showing a handle groove terminating before reaching the central hole, typical of the R2 type, but with the neat finish and a slight hopper more typical of the R1 type.

8.109 A stone of basic Rl type but somewhat subrectangular in shape as opposed to circular. The quern is made of a sarsen boulder more commonly used in the production of saddle querns. Extensive wear indicates clear use of this stone in a rotary manner.

8.110 This could be of Rl or R2 type, but is uncharacteristically thin at its centre.

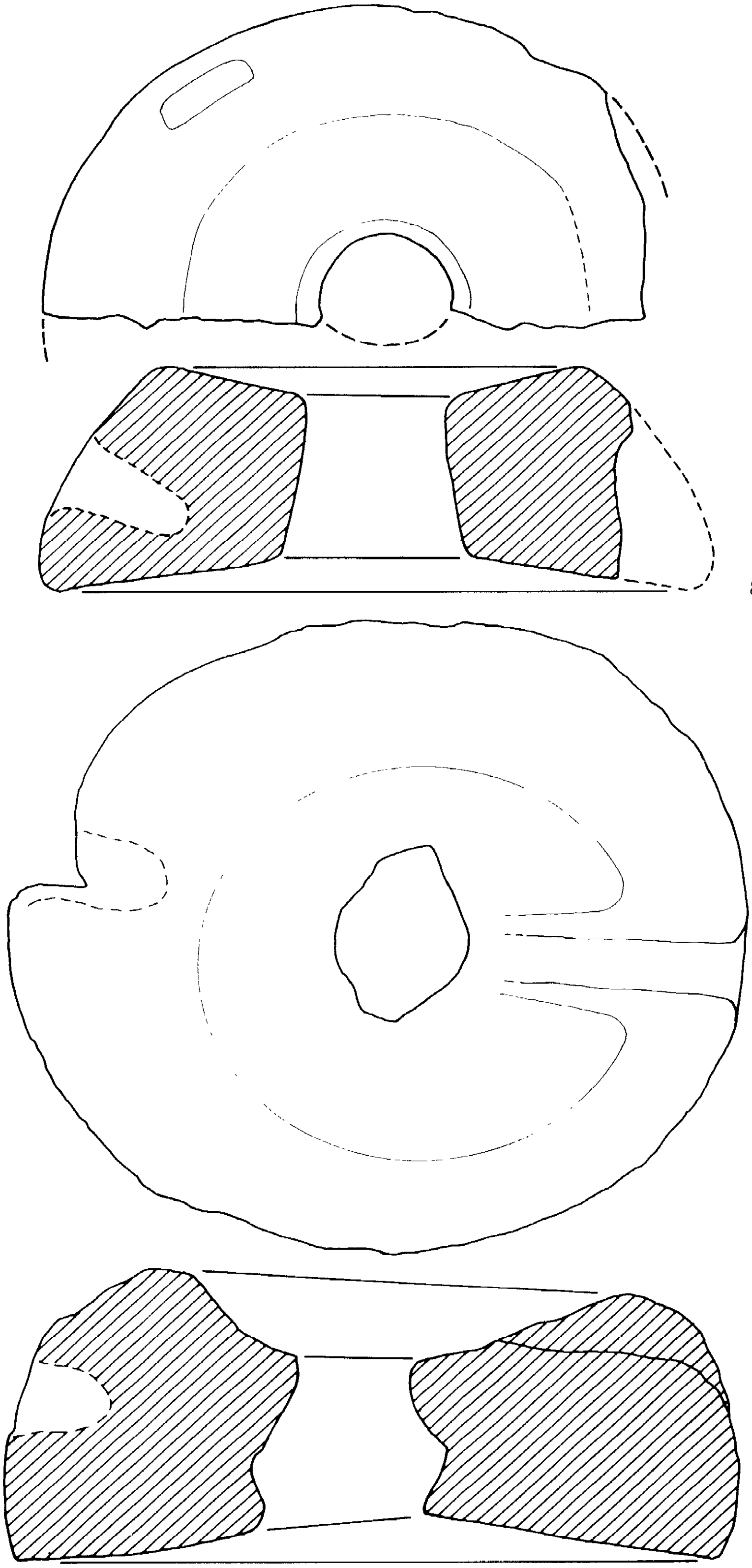
8.111 The Potterne upper stone is type 4 but has at least two handle holes halfway down the side of the stone.

8.112 An R4 example, but with a much shallower hopper than has previously been noted for this type.

8.113 A gritstone example of R4 type, with an Rl type handle groove in the top of the stone. This example also has a band of possible iron staining around the outer edge, suggesting an attempt at repair with an iron binding. The stone is in three large fragments. The staining partially traverses the handle hole in the side of the stone which

Table 7.5 Rotary querns

	Tertiary	*Sarsen*	*Conglomerate*	*Potterne*	*Greensand*	*Total*
Lower stones	3	1	1	7	42	54
Upper stones	2	2	0	17	61	82
Uncertain	0	0	0	2	14	16
Total	5	3	1	26	117	152
Type R1	0	1	0	0	8	9
R1/2	0	0	0	1	2	3
R2	0	0	0	0	2	2
R4	1	0	0	3	6	10
R6	0	0	0	0	1	1
Total	1	1	0	4	19	25



8.112

8.113

0 5 10cms

Figure 7.56 Rotary querns: upper stones.

Link to Next Section

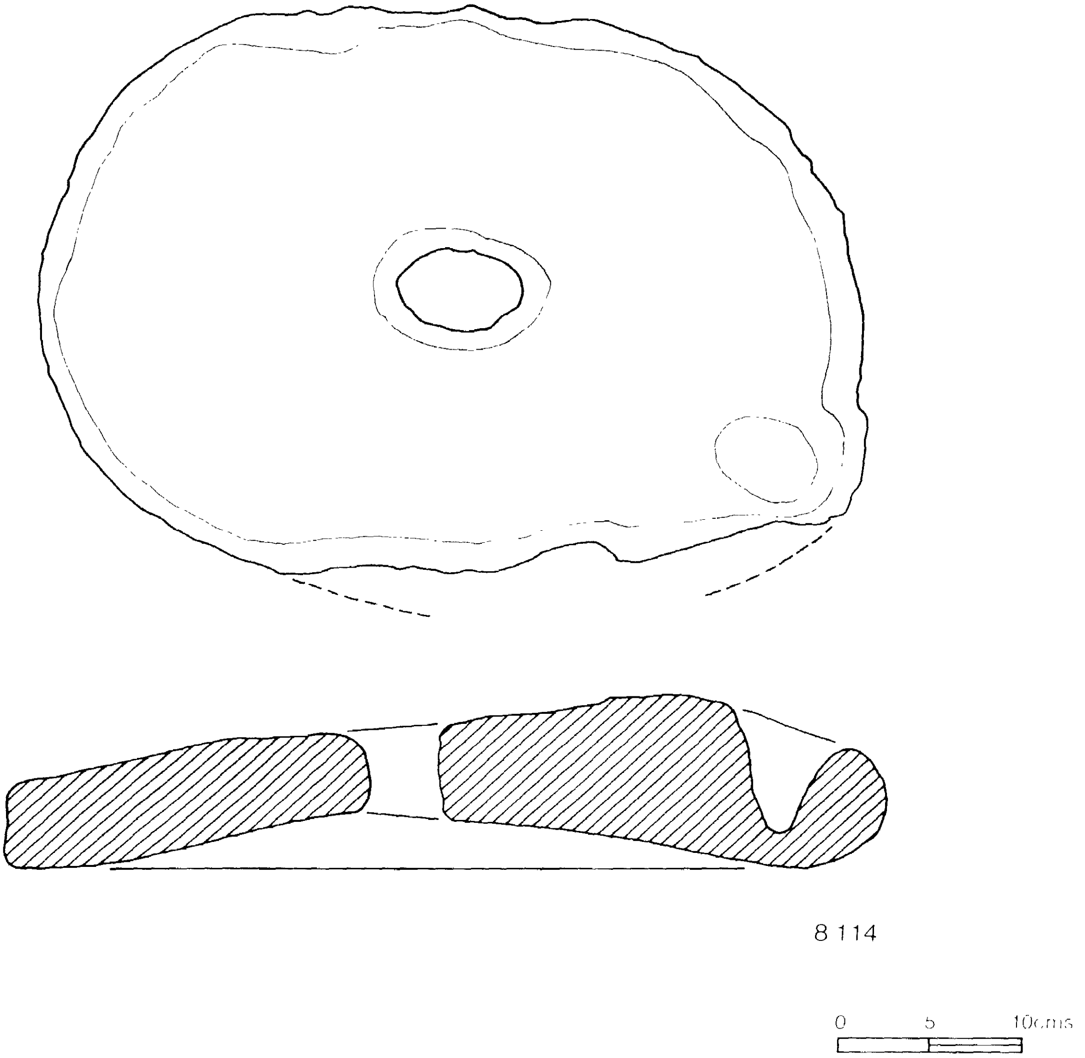


Figure 7.57 Rotary querns: upper stones.

would explain the presence of the handle groove in the top. All would point towards this stone being of particular value to its owner.

Further details of the upper rotary stones are given in Fiche 26:E13.

Lower stones (8.115–8.119; Fig 7.58)

Of the 54 lower stones recovered, 44(81%) were made of greensand, the remaining ten from four different types of stone (Table 7.5).

Most of the non-greensand examples are fragmentary but at least six belong to the more massive type of lower stone. Only one example is complete enough for its diameter to be measured (8.115): it is 350 mm across and 178–88 mm thick and is almost certainly the lower stone of R4 upper illustrated with it. The single quartz conglomerate example represents a stone type not previously recognized for quern production at Danebury. Possible sources include Hertfordshire, the Forest of Dean or Normandy. Potterne rock, a very hard limestone found only at Potterne in Wiltshire was not differentiated from greensand in the previous report.

The greensand lower stones are more complete allowing a range of measurements to be taken. Seven have diameters ranging from 310–70 mm and 31 have thicknesses varying from 24–240 mm. Of these, 19 are over 100 mm, six of them being over 150 mm thick.

A selection have been chosen for illustration to demonstrate the range of thickness and differences in cross section.

The majority of the lower stones have a convex grinding surface sloping upwards towards the central socket. Wear may take the form of smoothing, concentric striations and raised lips around the central sockets. A few examples have flat grinding surfaces but no upper stones have been found to match them.

The lower rotaries have flat bases with the exception of 8.118 the base of which is concave and worn suggesting that it may have started life as an upper stone.

Link to Previous Section

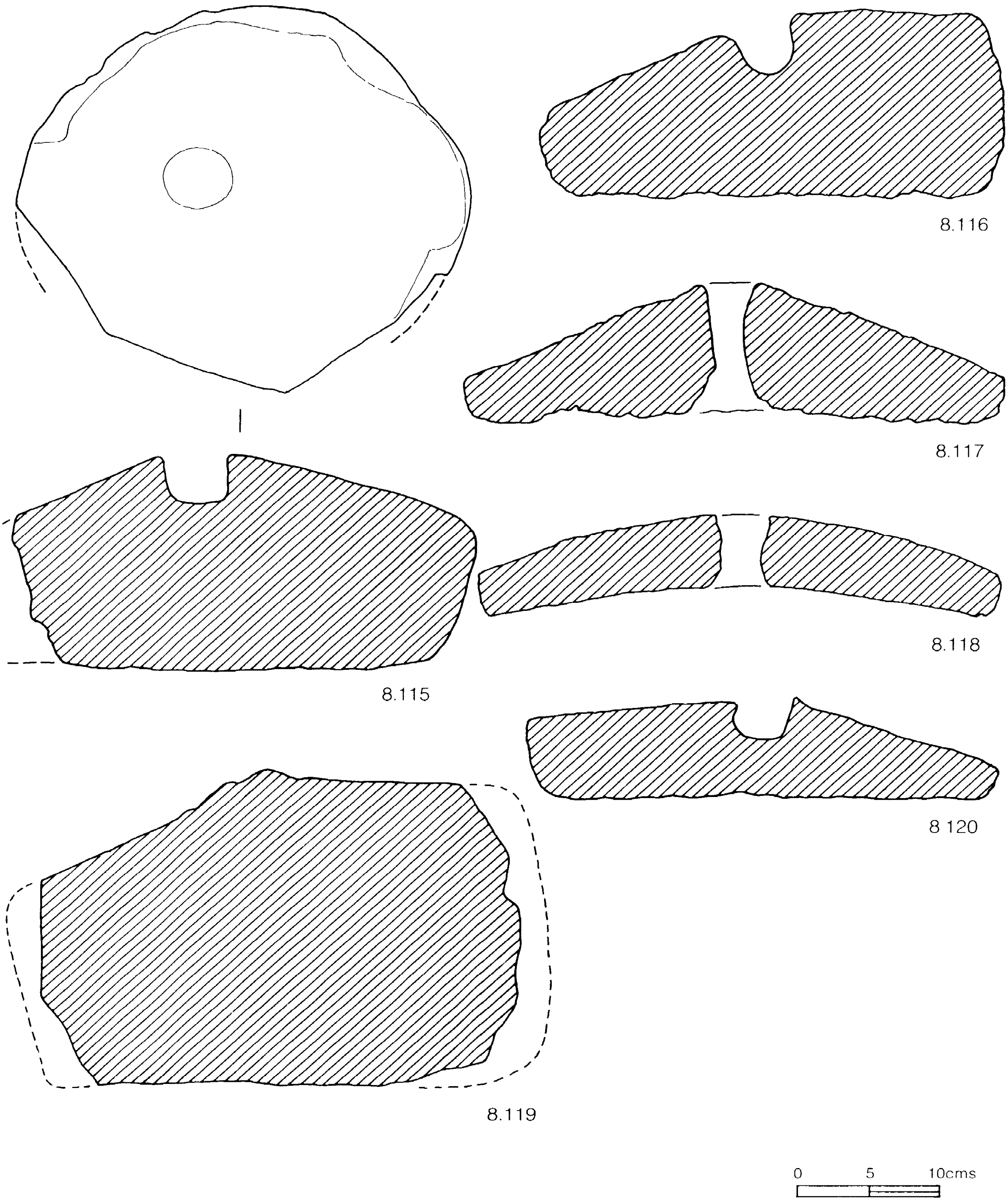


Figure 7.58 Rotary querns: lower stones.

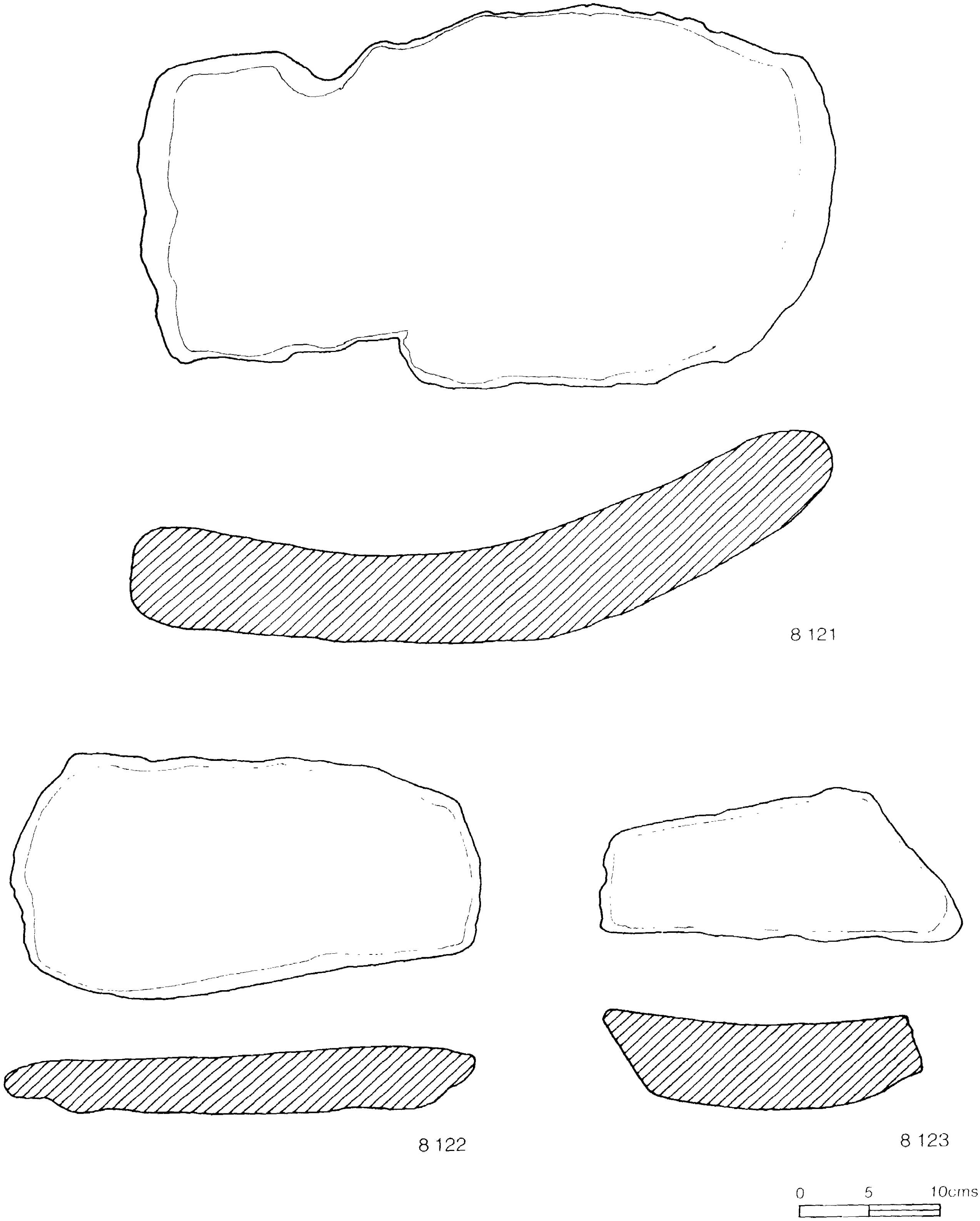


Figure 7.59 Saddle querns: lower stones.

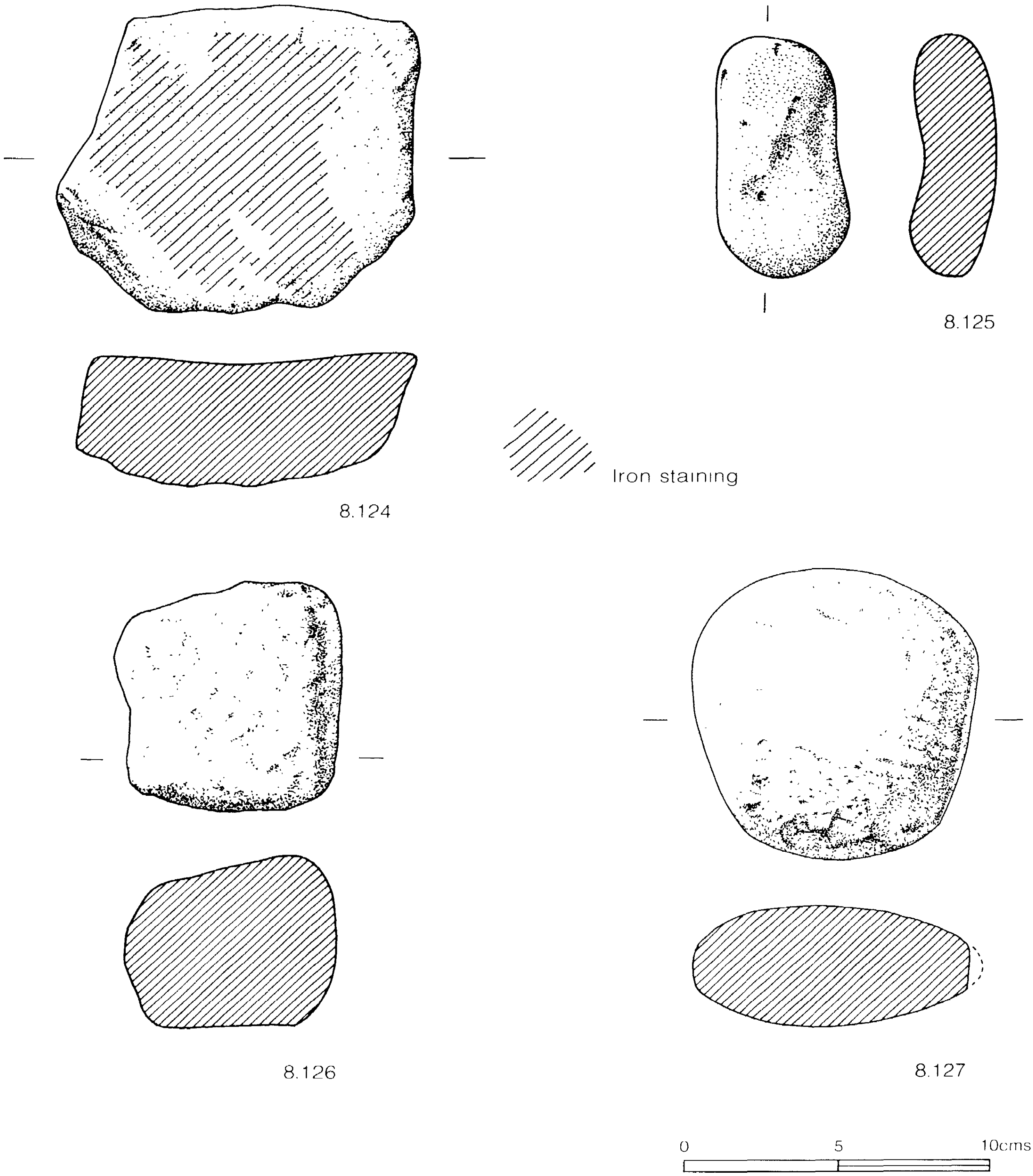


Figure 7.60 Stone rubbers.

The more massive types are not pierced whereas thinner examples often are. This may be because the lighter, thin, types required anchoring while the thicker types were sufficiently heavy to remain steady.

In most cases the tooling is much more precise on the grinding faces and edges. The direction of tooling sometimes remains visible on the outer edge and is either diagonal or vertical. The bases are only roughly worked.

The chronological range of those rotary querns to which a phase can be attached may be summed up as follows:

Cp:	3	3
	4	1
	5	6
	6	6
	6/7	4
	7	92
	7/8	20
	8	6

Clearly the majority of the rotaries occur in Middle-Late Iron Age contexts (Cp 6–8). The six examples from phase 5 contexts are sufficient, however, to show that rotaries were already in use at Danebury by the middle of the fifth century.

The four examples from Cp 3 or 4 are more difficult to assess. These pits contain very little datable material and what there is may be residual. On this evidence, therefore, it cannot be assumed that rotary querns began as early as the sixth century.

Saddle querns and rubbing stones (8.121–8.127; Figs 7.59–7.60)

The 119 saddle querns from the 1979–88 excavations represent 44% of the querns recovered during that time. This figure is slightly higher than that recorded for the previous ten years. Three main rock types were utilized. These are summed up in Table 7.6 which also provides evidence of phasing,

Table 7.6 Saddle querns

Cp	*Stone type* *Greensand*	*Sarsen*	*Tertiary*	*Other*	*Total*
1–3	4	0	0	0	4
3	12	5	2	1	20
4	6	0	2	0	8
5	3	0	0	0	3
6	4	3	0	0	7
6–7	8	3	1	1	13
7	30	10	4	0	44
7–8	3	0	0	0	3
8	0	0	1	0	1
u/p	13	1	2	0	16
Total	83	22	12	2	119

There seems to be no particular correlation between phase and stone type. When taken *en masse* the expected concentration of saddle querns in the early period is not demonstrated when a combination of ceramic and stratigraphic phasing is considered. Instead, continuous occurrence and slight increase in the later period is evident. This does not however discount theories that the saddle quern was used more intensively during the early period at Danebury. It merely points to redeposition factors noted also in the pottery assemblage, where pottery of early type occurs in pits assigned a late stratigraphic phase.

Twenty-two examples (18% of the total) are of sarsen stone. All were fairly small and were made from boulders which had undergone some shaping especially on the upper grinding surface. The profiles of these surfaces varied, some being flat, some slightly concave and some slightly convex. The size range is indicated by the two complete examples (8.123 and 8.124) both with slightly concave grinding surfaces. Four examples in this group, including the two illustrated, have evidence of iron staining on their grinding surfaces. This fact, and the relatively small size suggests a use other than that of corn grinding. The possibility that they were used as ore crushers is worth entertaining. Seven other querns, made of greensand, are also iron stained. One of them (sf 2557) came from the same pit as the sarsen quern (8.124) which was discovered in close association with a small pebble rubber (8.125). Rubbers of this kind could have been used with the small quern.

Twelve examples (10% of the total) were made from Tertiary sands and grits. These are all small and fairly precisely shaped with thickness varying from 23–67 mm. The grinding surfaces are almost all flat and most show a high degree of wear.

Tertiary and sarsen querns are nearly all of the saddle type. The stone was readily accessible and was less suitable for the manufacture of rotary querns.

Eighty-three examples (70% of the total) were made of greensand. This group falls easily into two typological groups (Vol 2, 418), the smaller more neatly finished examples (S2) and the larger, block-shaped, types (S1). The 1979–88 assemblage, however, demonstrates that the S1 type also includes examples which are both relatively large and heavy but are also neatly finished (eg 8.121). A third group (S3) has also been recognized. These are represented mostly by small fragments which might be classed as S2 but which may well have the narrowed edge of the S1 type: their exact classification is unclear. The types occur as follows:

S1 – 37
S2 – 14
S3 – 32

There is no apparent correlation between type and phasing. One of the illustrated examples (8.121) is of particular note since it would appear to have been shaped at one end possibly to allow the stone to be secured between two stakes hammered into the ground. A stone so curved and unstable might have needed anchoring.

The greensand saddle querns, being the largest group exhibit a relatively wide range of finish/shaping and wear, details of which are given in Fiche 27:A9–C3.

Finish/shaping or tooling mostly takes the form of either rough chopping or more precise pecking but in some examples it is not evident either due to excessive wear or to the fact that the stone chosen as a quern may have required only minimal modification. More attention has often been given to the upper grinding face while the base remains comparatively rough. Grinding faces tend to be either flat, slightly convex or slightly concave. It is difficult to say to what extent this would have been intentional or simply a result of wear.

Wear mostly takes the form of smoothness of the grinding surface. In a few examples, however, smoothness/wear is also noted on the base. This probably resulted from prolonged contact and friction with the ground while the quern was in use, but may also indicate that stones were sometimes used on both sides. Wear is occasionally noted on the edges of the querns. This is more difficult to explain, but may simply result from excessive handling.

Two examples (under 2% of the total) belong to different stone type. One is of Potterne rock, the other of fossiliferous limestone. The latter is large, thin (45 mm) with a flat and extremely smooth grinding face.

Only seven saddle quern rubbers have been found (8.124–8.127). Two are of greensand, two are of sarsen, the rest are pebbles of quartzite. A number of other, somewhat smaller, rubbers and grinders have been

Link to Next Section

considered above. These could have been used with the smaller saddle querns. In addition it is possible that some of the small fragments classified as saddles may in fact have been parts of rubbers.

Chalk marl discs (Fig 7.61)

Seventeen discs made from chalk marl were recovered from the recent excavations bringing the total from the site to 53. Most were very fragmentary. Only two have the central perforations surviving but most of the remainder exhibit the characteristic curving outer edge and traces of quite intense burning.

The number of discs per ceramic phase is as follows:

cp	*1969–78*	*1979–88*	*Total*	%
1–3	5	0	5	9.4
3	0	1	1	1.9
5	0	1	1	1.9
6	6	0	6	11.3
7	20	12	32	60.4
7/8	1	2	3	5.7
8	1	1	2	3.8
unphased	3	0	3	5.7
Total	36	17	53	100

Thirteen discs were recovered from a total of 12 pits the remaining four from layers.

The basic characteristics of the type remain much as described in Volume 2 (p 419) except that the recently discovered assemblage expanded the size range, the diameters now extending from 185 to 350 mm while the heights range from 15–144 mm. The expansion of the lower end of both scales is caused by a single artifact (sf 2169; Fig 7.61) which differs from the others in being much thinner, 15–30 mm, slightly smaller (185 mm in diameter) and having one face carefully finished. At the other end of the scale sf 1733 (Fig 7.61) was unusually thick, 95–144 mm but was otherwise fairly typical.

To the list of parallels may be added Maiden Castle, Dorset where a comparable example has been discovered.

There is little to add to the discussion of function except to point out that these discs, with their evidence of intense heat on one face, are strikingly similar to objects identified as bellows shields found set upright in situ in medieval sites in Bristol (information from M Ponsford). Some such use at Danebury is a possibility.

Chalk weights (8.128–8.149; Figs 7.6.2–7.64)

One hundred and twelve chalk weights were recovered during the 1979–88 excavations, bringing the total number from the site to 256. Eight examples derived from five post-holes, ten from seven layers, 92 from a total of 33 pits, and two from unstratified deposits.

The number of weights per ceramic phase is as follows:

cp 1/3 – 30 (27%) from two contexts
cp 4 – 4 (3.0%) from one context
cp 5 —
cp 6/7 – 51 (46%) from 30 contexts
cp 7/8 – 10 (9.0%) from six contexts
Undated – 17 (15.0%) from seven contexts

The distribution pattern is essentially uninformative. Although the number of weights recovered was considerable, the number of deposits containing weights was relatively low and there appears to be no significant clustering.

Fourteen pits produced more than one weight, the maximum recovered from a single pit being 23 (P2200). In only one case, however, was the evidence sufficient to indicate the deposition of a set of weights. Pit 1334 produced eight weights, of which five were complete. Of these, four had very similar relative weights (1326.1, 1327.6, 1337.2 and 1389.9 gm). These four were in a variety of shapes but all were carefully shaped and finished and all showed definite signs of use. This enhances the evidence from the 1969–78 assemblage which indicates that the objects were used as loom weights (Vol 2, 422). The other groups of weights from pits included too few complete examples to extend the argument further. Three weights recovered from a shallow oval feature designated Ph 4611, however, also had similar weights (954.2, 979.9, 1181.6 gm). In four cases weights were found in association with other possible weaving tools, two with bone combs and two with chalk spindle whorls. In nine deposits individual or groups of chalk weights were found in association with triangular clay ‘weights’. In the case of Ph 7474, two chalk weights were found with nine clay weights. Although traditionally regarded as loom weights, there is mounting evidence that the clay objects may have served a different purpose (p 380).

The morphological range of the weights as set out in Vol 2 holds true for the second assemblage. In just one case, however, it was found that the perforation had been cut from one side only. Quite clearly, therefore, the normal practice was to cut it from both sides of the stone. The dimensions of the perforations of the second assemblage were similar to the first. The narrowest central measurement was 7 mm, the widest 28 mm, the narrowest end measurement was 15 mm, the widest 42 mm.

The size and weight of the stones also showed similar variation. The height range was 102 to 225 mm, the weight range 615.1 to 3250 gm (on the basis of complete examples only, of which there were 17).

The recent assemblage produced no new information regarding tool marks and wear marks. In fact, a large number of the weights were heavily abraded, obscuring surface tool marks. Only three stones were found to be in a fresh rather than weathered or worn condition. Eighteen of the weights were burnt prior to deposition, resulting in a greyish discolouration. It is not possible, at this stage, to assess the significance of the fact that nine of the weights had suffered apparently deliberate damage at some point prior to deposition. In all cases the damage is similar, consisting of one or, in the case of four, two strike marks delivered by a pick, gouge or similar implement to one face of the stone. The width of the marks ranges from 12 to 25 mm.

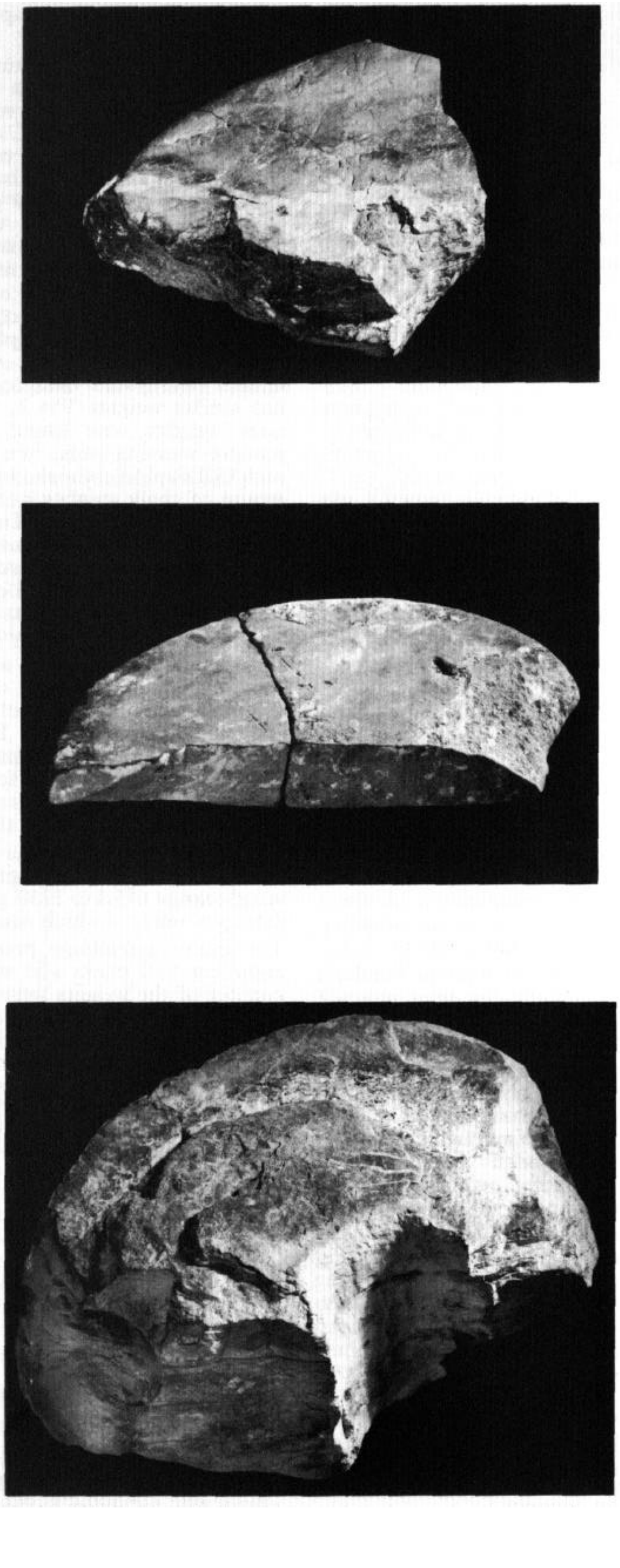
The weights are individually described in Fiche 27:C5–E10 and this report should be read in conjunction with that in Vol 2, 419–22.

Chalk spindle whorls and other perforated chalk discs (8.150–8.179; Figs 7.64–7.66)

The recent excavations have produced 41 examples of this group bringing the total to 94. The enlarged sample allows the collection to be divided into three general categories:

spindle whorls (8.150–8.165)
whorls/small discs (8.166–8.171)
discs, mostly perforated (8.172–8.179).

Link to Previous Section



sf 1741

sf 2169

sf 1733

Figure 7.61 Chalk marl discs: scale 1:2.

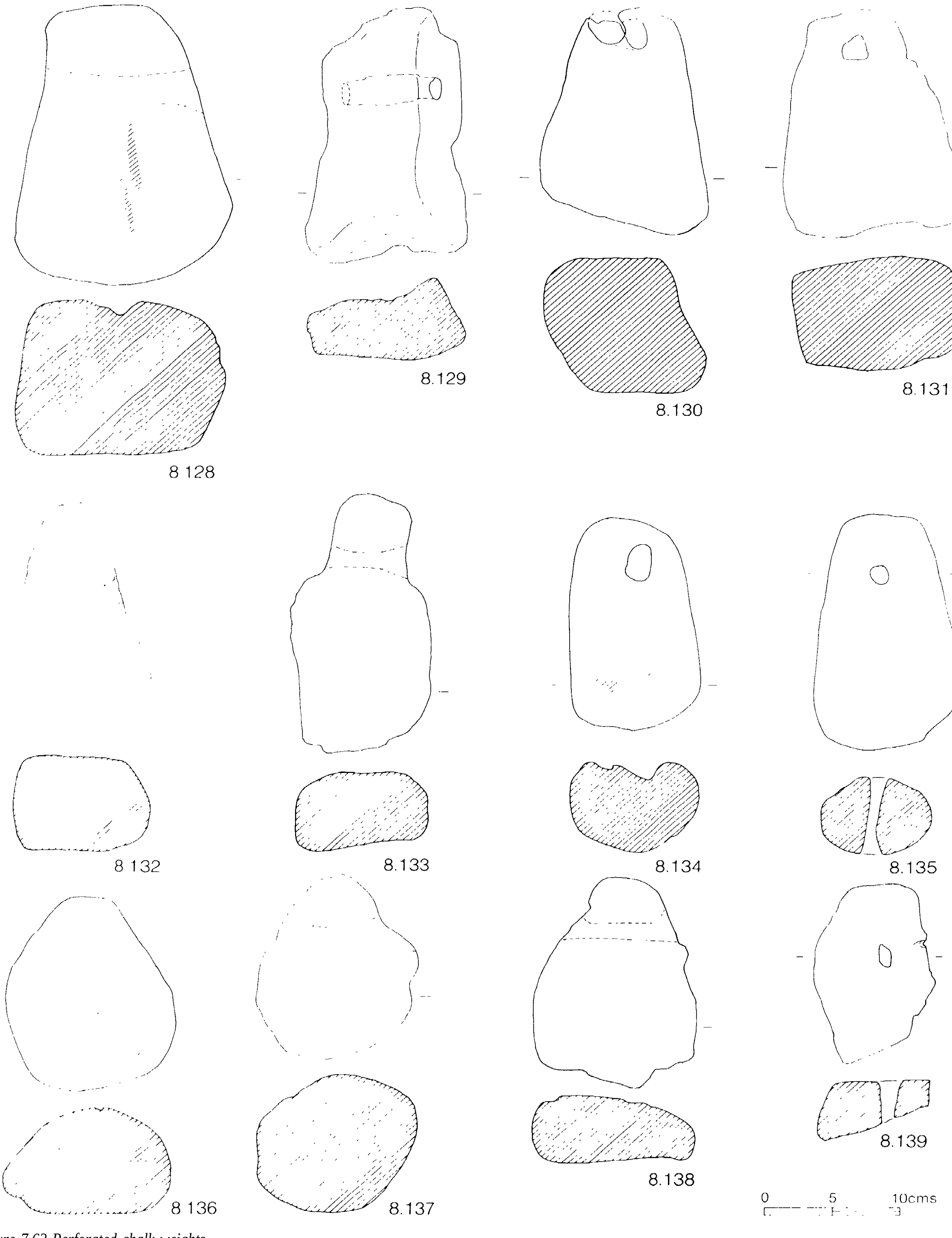


Figure 7.62 Perforated chalk weights.

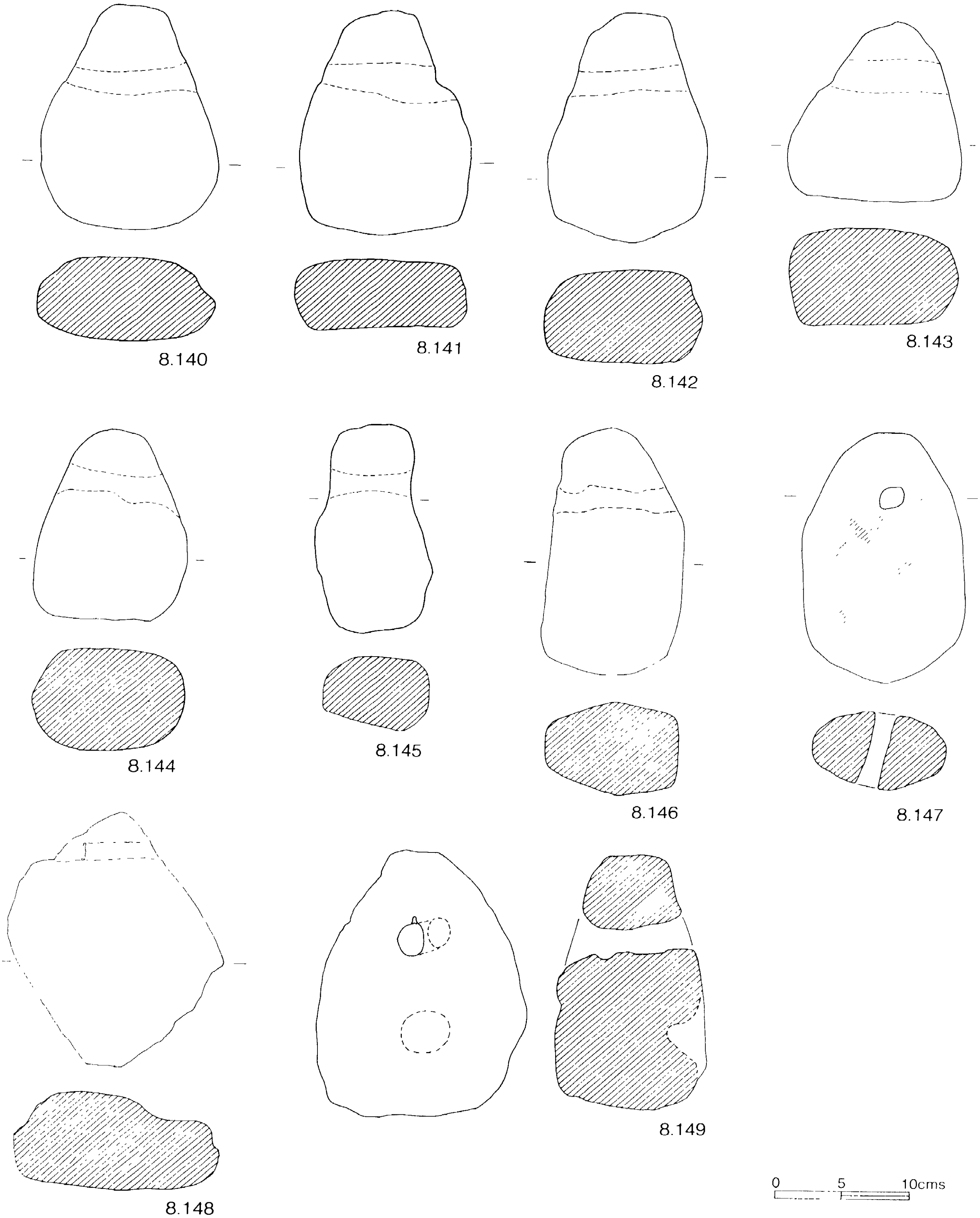


Figure 7.63 Perforated chalk weights.

Link to Next Section

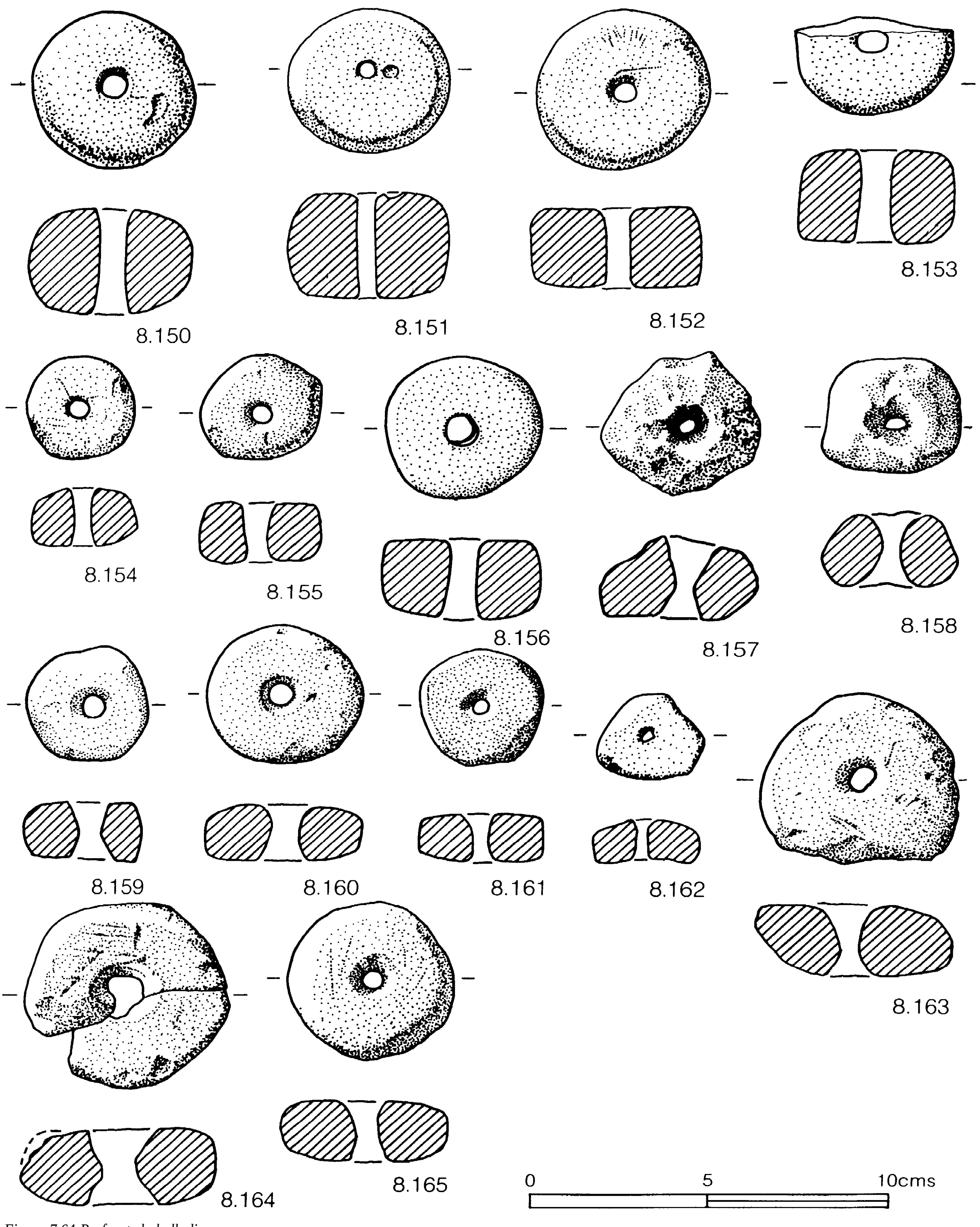


Figure 7.64 Perforated chalk discs.

Link to Previous Section

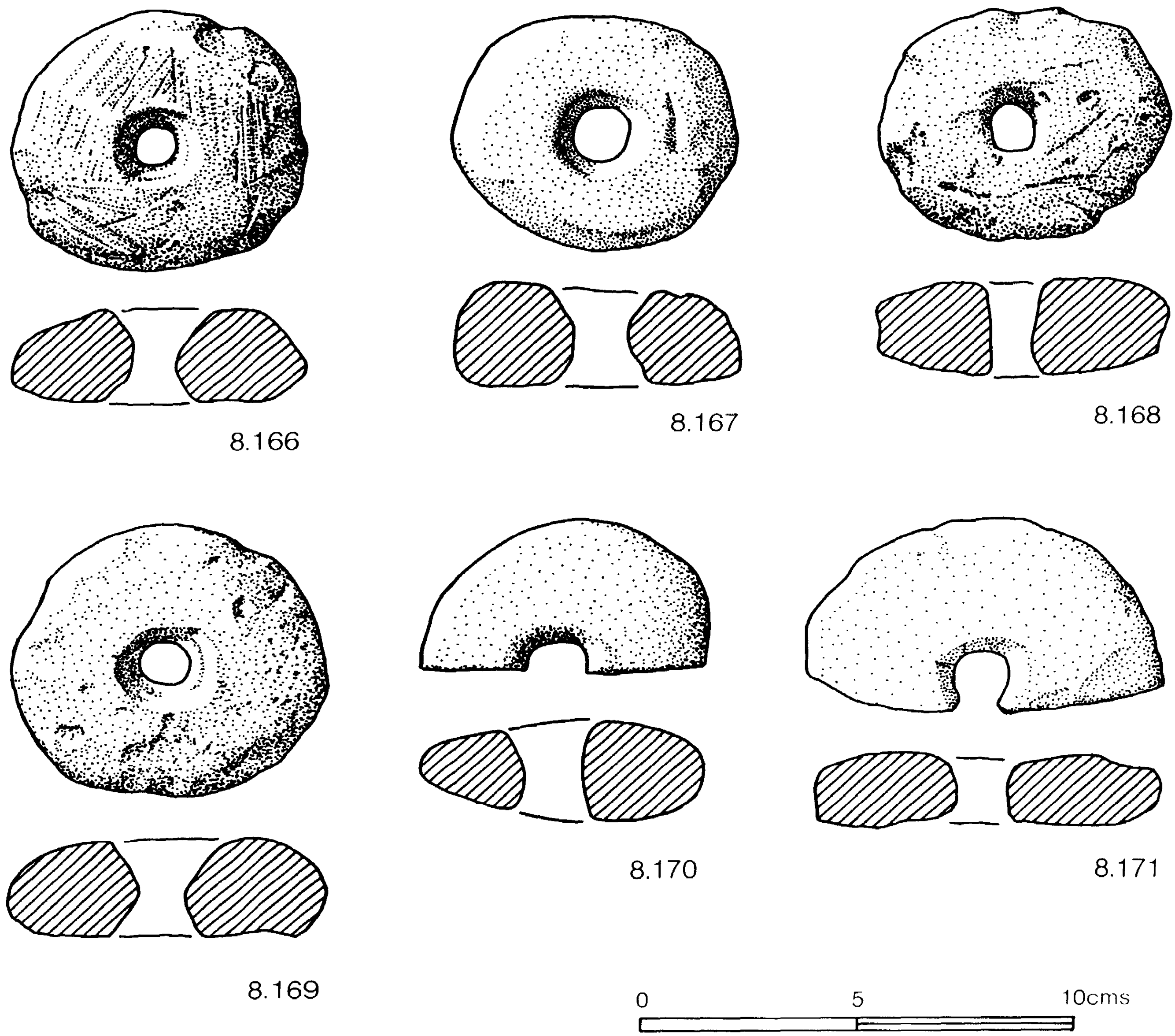


Figure 7.65 Perforated chalk discs.

The number of whorls and discs per ceramic phase is as follows:

cp	*1969–78*	*1979–88*	*Total*	%
1–3	5	8	13	13.4
3/4	1	0	1	1.03
4 1	3	4	4.7	7.2
5	3	0	3	3.1
6	4	2	6	6.2
7	25	24	49	50.5
7/8	1	1	2	2.1
8	5	0	5	5.15
undated	8	3	11	11.3
Total	55	41	92	100

Nineteen were recovered from a total of 18 pits, five from post-holes, one from a feature and 16 from layers.

None of the recent finds were decorated. All, including the unillustrated examples, are described in detail in the fiche section (27:E11–F12).

The groups into which the recent collections are divided may be briefly described:

Spindle whorls. These have a diameter range of 29–50 mm and vary in thickness from 14–33 mm. Weights range from 15–68 gm. Strictly this category can be divided into two groups:

a. Sub-spherical or sub-square in cross section and of a thickness which is greater than half the diameter. The four examples of this type are all illustrated (8.150–8.153). Two are made of hard Lower Chalk. Para-

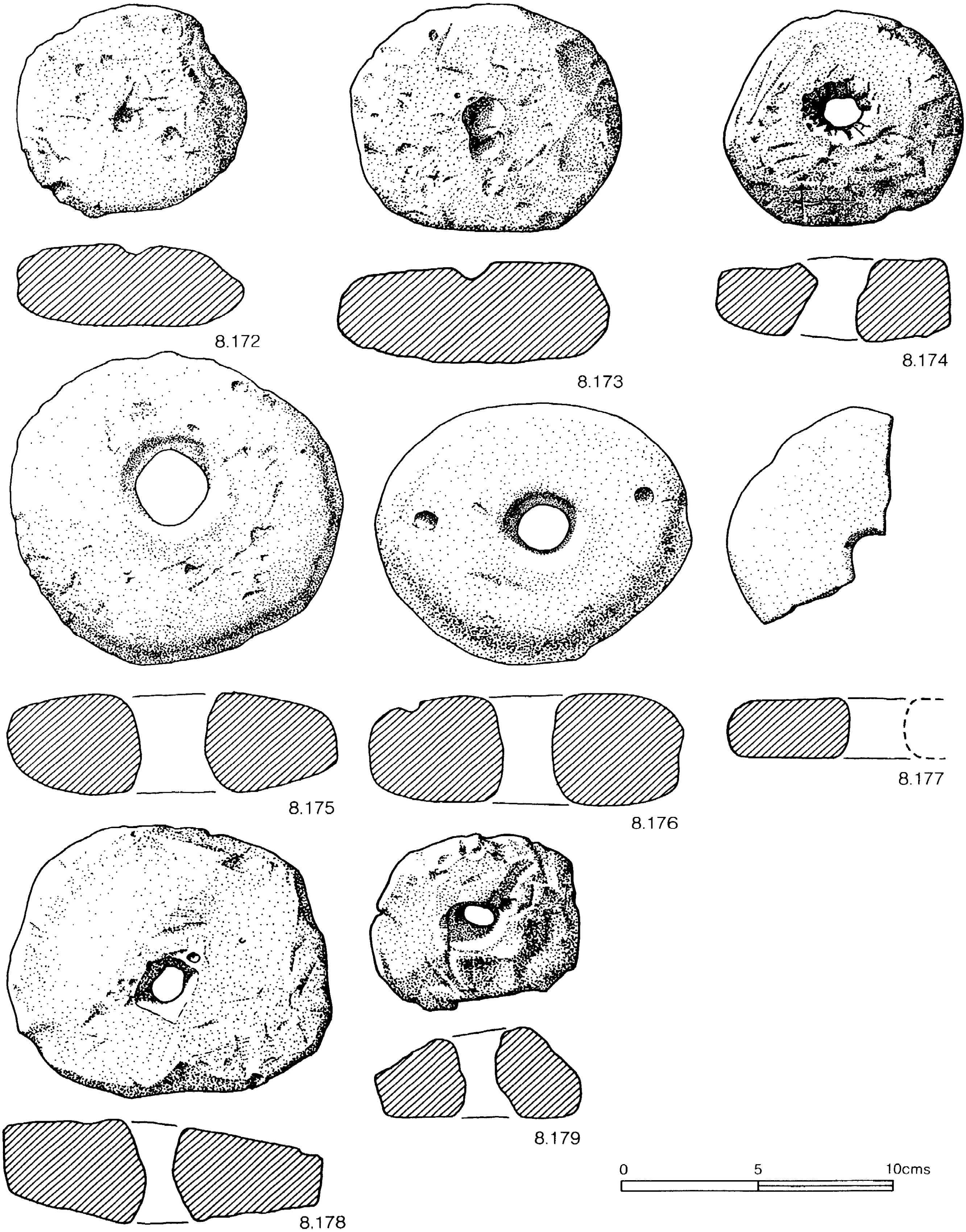


Figure 7.66 Perforated and partly perforated chalk discs.

meter measurements (ie maximum diameter x total weight) which give an indication of the yarn weight spinable are all over 3,000 indicating use for a specific kind of yarn. Whorls of this group have well finished surfaces and relatively straight-sided perforations.

b. Rectangular in cross section and of a thickness equal to or less than the diameter. Parameter measurements range between 400 and 3,000 indicating a fairly wide range of yarn weights spinable. Whorls of this group vary considerably in surface finish. Most have countersunk perforations although the smaller examples seem to favour straight-sided perforations though whether this is deliberate or through wear is uncertain.

Whorls/small discs. Six examples of this type were found (all illustrated). All have flattened rectangular cross sections, and vary in diameter from 59–80 mm. Weights range from 82–112 gm. All examples have countersunk perforations. Most are worn and have knife score marks visible on the surfaces.

Discs of this kind could have been used as spindle whorls.

Discs. These have rectangular or flattened rectangular cross sections with diameters of up to 124 mm. Weights range from 150–515 gm. Most have countersunk perforations or vestigial, unfinished, perforations as in nos 8.172 and 8.173. Surface finish varies considerably from unfinished, eg 8.174 which has no smoothing or rounding of the edges to heavily smoothed examples, eg 8.176 and 8.177. Roughly finished surfaces with some knife score marks remaining is the norm.

No 8.176 is noteworthy in that it has two small circular indentations on opposing sides of the perforation. No 8.179 displays wear marks running from the perforation to the edge on both sides suggesting suspension by a thread perhaps while it was used as a weight.

Miscellaneous chalk objects (8.180–8.189; Fig 7.47)

The following may be listed:

8.180–8.184 Hollowed objects. Six roughly oval or circular blocks of chalk, five of which are illustrated. These are all hollowed on one face. Many knife score marks are visible on all examples. Generally comparable to 8.67 (Vol 2, fig 7.62) but with the exception of 8.183 these examples are not carefully worked.

8.185 Oval-shaped object, sub-rectangular in section with two roughly oval perforations. Comparable to 8.68 (Vol 2, fig 7.62).

8.186–8.187 Two small, flat, unperforated discs with smoothed surfaces. One with a deeply incised cross on the surface. 8.188 Sub-spherical object with abundant tool-marks visible.

8.189 Elongated block, circular to pear shaped in cross section with smoothed surfaces.

All objects are described in detail in Fiche 27:G3–5 together with five other items not illustrated here.

Slingstones

Slingstones, of the type discussed in detail in the first report (Vol 2, 425–6 and fiche 12, frames E4–G8), continued to be found in considerable number. There is little to add to the earlier discussion except to record that a large collection was found immediately behind the rampart, excavated in 1988, in contexts dating to cp 3. This clearly shows that slings were used from the time when the first defences were constructed in the Early Iron Age.

7.1.12 Wooden objects

No wooden objects survived in the area excavated in 1979–88 except for fragments of planks on the bottom of several pits.

7.1.13 Briquetage containers (Fig 7.68)

by Cynthia Poole

Briquetage containers, associated with salt production and transport, were represented by 481 sherds weighing 2,622 gm. This smaller quantity compared to that from 1969–78, may be accounted for by the fact that only a sample of the pits were dug during the years 1979–1982. The briquetage occurred in contexts of all phases, though the highest proportion was found in the later contexts, especially cp 7, which accounts for 63% of sherds (55% by weight). A subsidiary peak in cp 4 is accounted for by a single group of one or two broken, but near complete, containers. Less than 2% was unphased.

Spatially the briquetage occurred throughout the fort with no obvious concentrations. Usually only a few sherds were found in any one context, apart from the one large cp 4 sample mentioned above. The majority (65%) occurred in 91 pits, about 1% in seven post-holes, 2% in six gullies and nearly 32% in 74 layers.

The fabrics and forms conformed closely to those described in Vol 2 (pp 426–30) but a new type, form 4, has also been identified. About 22% of the sherds were of uncertain form.

Numerical details are given on Fiche 30:A3–4.

The forms

Form 1 (nos 21, 22, 23)

The characteristics of this form have previously been described. Essentially the sherds indicate a straight-sided cylindrical vessel, which had been sliced in half or almost so prior to firing. This form accounted for almost 60% of the briquetage.

The length of these cylinders cannot be deduced from the Danebury fragments, but the thickness of the walls and diameter of the vessels indicate some variation in size. The walls vary in thickness from 3 to 15 mm, though 8–12 mm appears to be the most common.

Fewer measurements of the diameter of the vessels could be obtained, but the sizes range from one at 50 mm up to a maximum of about 200 mm. The most common were 100–140 mm. There appears to be no correlation between thickness of the walls and the diameter of the vessels. Where fragments occur with part of the base attached:, it is clear the walls at the base of the vessel were much thicker and thinned towards the rim. Size does not appear to have varied with time since all sizes occur in all phases.

Several sherds occurred bearing a straight cut edge running along the length of the vessel, and one cut edge had several scores or cuts along it.

Where the moulded rim at the top of the cylinder survived, it was usually simple and rounded or was drawn out to a narrow rim edge. The rims often appear to be very worn.

All fabric types were used for this form, with fabric 1 (53%) predominating, followed by fabric 4 (20%) and finally fabrics 2 and 3 in roughly equal proportions *(c* 13% each).

Form 2 (nos 24–8)

Further fragments of this type were identified, forming

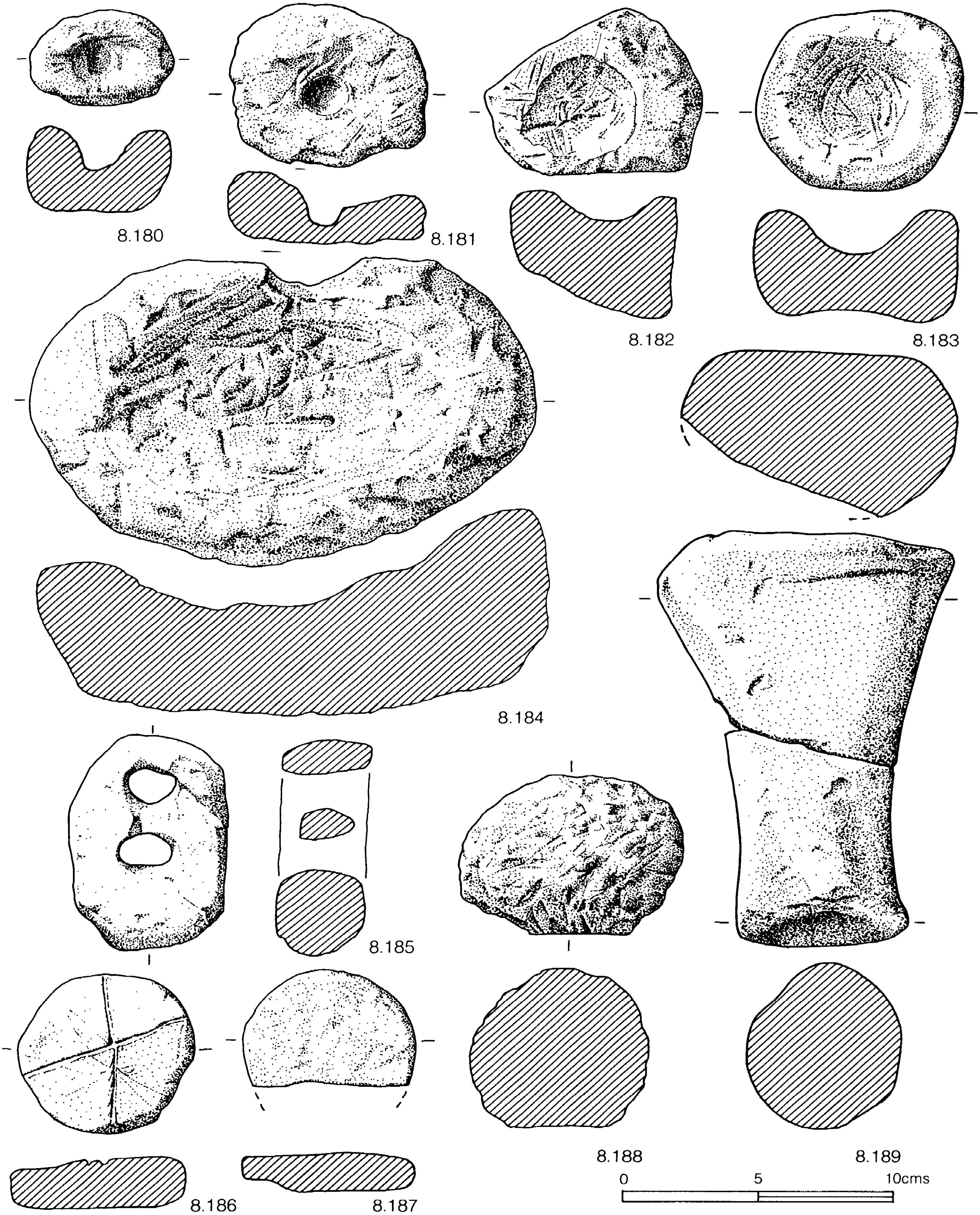


Figure 7.67 Chalk items.

Link to Next Section

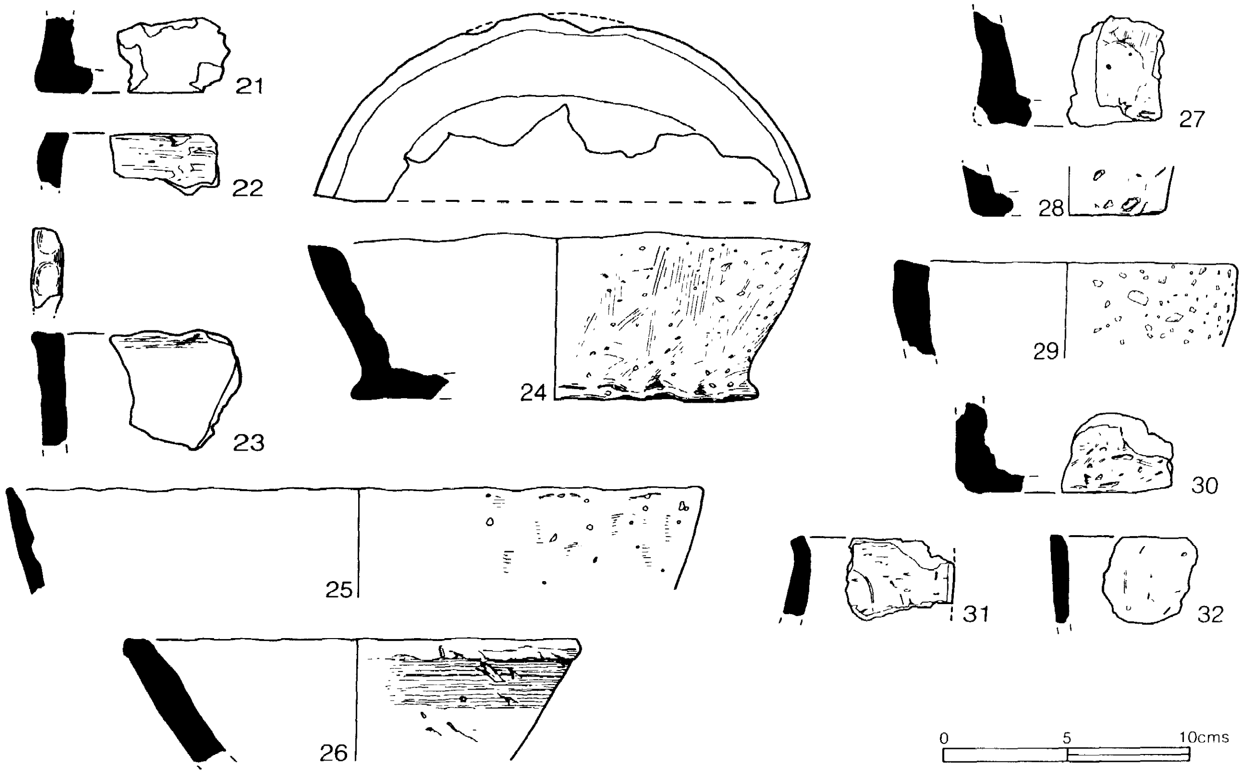


Figure 7.48 Briquetage.

14% of the sample. It is characterized as having flaring sides giving rise to a slightly conical form, in contrast to the cylindrical shape of form 1. It is likely that body sherds from this form will have been grouped with form 1, since it is often impossible to recognize these as coming from flaring vessels.

It was not clear with the examples from the first ten years, whether this form was cut in half or not. However a particularly good example (no 24) provided clear evidence of the flat cut edge bisecting the vessel. This sample produced a total of 65 sherds weighing 534 gm, probably from two half vessels, one of which was virtually complete. It had a base diameter of 170 mm, where the walls measured 14 mm thick, and a rim diameter of 190 mm at which point the walls were only 9 mm thick. It had a height of 74 mm and the thin rim was plain and rounded. One half, which has been reconstructed and is nearly complete, weighs 216 gm, so it is likely the other fragments belonged to another half.

Fabrics 1 and 4 were used in this form.

Form 3 (no 29)
Very few sherds (less than 1%) were identified, which could possibly be assigned to this form of rounded bowl. There is little additional information about them. However no 29 had a cut edge, with a diameter of 120 mm; the thickness of the walls was 14 mm.

Fabrics 3 and 4 were used for this form.

Form 4 (nos 30–32)
This newly identified form bears a number of similarities to form 1 and body sherds could easily have been assigned to form 1. Recognizable sherds amount to 5.6% of the briquetage sample. Superficially it is cylindrical in form, but evidence suggests it took the form of a trough. Some examples show the moulded rim ran parallel to the length of the vessel (eg fragments from layers 983 and 1567), whilst others were cut across the length (nos 31 and 32). No 30 has been slightly flattened on one side suggesting that this flattened area may have served as the base.

The sizes of these vessels appears to be similar to form 1. The thickness of the walls in most cases measures 4–9 mm, though the sherd from P2536 varies from 10–18 mm. In only one example from P1350(1) was there any indication of diameter, which appeared to be about 140 mm.

There are similar examples of trough-shaped forms in the briquetage from the recent excavations at Maiden Castle. Though trough forms have been identified on the salt-producing sites on the coast where they were probably used in the evaporating or drying process, they are generally much larger than the briquetage containers used for transporting the salt to the inland sites.

Fabrics 1 and 4 were used for this form.

The fabrics

The same four fabrics occurred as were described in Vol 2 and no further detailed description is necessary. However the proportions varied with fabrics 1 and 4 occurring in roughly equal proportions 41% and 36% respectively (both 37% by weight), whilst fabrics 2 and 3 were 13% and 9% respectively (both about 12%, by weight).

Link to Previous Section

Fabric 1 was used in forms 1, 2 and 4, fabric 2 for form 1, fabric 3 for forms 1 and 3, and fabric 4 for forms 1, 2, 3 and 4.

Surface treatment

Surface treatment is similar to the sample from the first ten years. The surfaces are generally plain and smooth, though fine striations may be visible. In addition coarser ridges may occur, generally running parallel along its length, which is similar to 'finger pasting' on troughs from Godlingston Heath, Dorset (Farrar 1963). On the inside surface of some fragments, there were a number of irregular rounded depressions, which appear to be the result of finger or thumb marks pressing and shaping the clay.

A few rims had a slightly different finish to the usual simple rounded or more pointed rims. In some cases the rim was slightly thickened or out-turned (eg no 25), and in others finger tip depressions occurred along the surface of the rim, resulting in irregular thickenings of the rim (no 23).

All the examples showing deliberate surface finish occur in the later phases, cp 7 and cp 8. Whether this is of any real significance is hard to tell since the sample is small and very little material has been recovered from earlier contexts.

Discussion

The briquetage found in 1979–88 is similar to that found in the first ten years of excavation except that a new form, form 4, has been identified. It is possible that a reconsideration of the earlier material may produce some more fragments of this trough form previously identified as cylinders. Form 4 troughs are similar to examples found at Maiden Castle but are different from the large evaporation troughs found at the salt-producing sites. All the forms have now produced evidence of cut edges made before firing the clay, suggesting that the characteristic was common to all containers used for transporting salt.

7.2 Metallurgical analyses

7.2.1 Introduction

In the following section we continue the policy, adopted in Volume 2, of providing a range of metallurgical information derived from the analysis of the non-ferrous and ferrous items and residues. Dr Northover and Mr Salter, whose work this is, would like to stress that their contributions are of an interim nature. Little systematic work has yet been undertaken on Iron Age metallurgy and we are therefore still in a pioneering stage. There is much to be done on the Danebury collection and a pressing need to explore the wider context. The results of further analytical work and a consideration of the broader implications will be presented in Volume 6.

7.2.2 Non-ferrous metalwork and metallurgy

by J P Northover

Introduction

Detailed discussion of the analysis of copper alloy metalwork and metallurgy is confined to material from the 1979–88 seasons. However general consideration of the distribution of copper alloy metalwork will include comparisons with 1969–78, as will the review of the evidence for metalworking at Danebury. Also, where necessary to increase sample size, results from the whole period 1969–88 will be combined to illustrate a particular point. The Bronze Age material is excluded in favour of a fuller discussion in Volume 6. The same is true of the brooch series which will also be considered as a whole in Volume 6.

Distribution

Excluding material of Bronze Age date, the excavations of 1969–88 have produced 190 copper alloy small finds, either individual objects or groups of sheet fragments. These 190 finds are divided almost exactly between the two ten-year periods of excavation: 94 in 1969–78 and 96 in 1979–88. Fifteen objects are unphased or unstratified; the division of the rest between the successive ceramic phases is shown in Table 7.7.

Table 7.7 Distribution of copper alloy finds by ceramic phase

cp	*1969–78*	*1979–88*	*Total*
3	12	5	17
4	1	1	2
5	3	1	4
6	6	12	18
7	53	70	123
8	0	0	0
up	8	7	15

NB Figures for cp 3 adjusted to include one unstratified La Tène I brooch. Elsewhere multiple finds of sheet are generally recorded as one whereas fragments of different artefacts at the same small find number are recorded separately.

Using the ceramic phases assigned to each pit or context, the occurrence of copper alloy metalwork in both ten-year periods is essentially the same with an apparent small concentration in cp 3 and an absolute minimum in cp 4, followed by a climb to a peak in cp 7. The variation in the early phases is more apparent than real and it is perhaps better to look at the rate of deposition in finds/year. If this is done the use and deposition of copper alloy metalwork appears roughly constant in the early phases, although there is still a minimum in cp 4. There is still an impressive increase in cp 7 but the level of deposition after cp 7, in cp 8, is uncertain. Material originally assigned to cp 8 from the 1979–88 has been re-attributed to cp 7 and it is possible that the same re-attribution should be applied to some of the cp 8 material from 1969–78. In any case, the fall off in metalwork deposition in cp 8 is dramatic, as shown in Table 7.8.

Table 7.8 Distribution of copper alloy finds by year

cp	*Finds/year*
3	0.23
4/5	0.12
6	0.18
7	0.62
8	0.15

This distribution through time parallels very closely the deposition of iron at Danebury (Salter & Ehrenreich 1984) and reflects wider trends in the developing Iron Age economy.

The finds from Danebury, as at some other Iron Age sites where excavation has achieved comparable levels of recovery, are dominated by fragments of sheet bronze (eg Maiden Castle, Dorset (Northover forthcoming b); Gravelly Guy, Oxfordshire (Northover forthcoming a), although at Maiden Castle the quantity of sheet is considerably augmented by the debris of sheet metal-working). The distribution of metalwork among basic categories of object is shown in Table 7.9.

Table 7.9 Type of copper alloy work by ceramic phase

cp	*Sheet/ Binding*	*Ornament*	*Harness*	*Weapon Accessory*	*Tools/ Waste*
3	64.7%	35.3%	–	–	–
4/5	80.0%	–	–	–	20.0%
6	66.6%	5.6%	5.6%	–	22.2%
7	61.8%	13.8%	8.9%	3.3%	12.2%
8	63.6%	27.3%	–	–	9.1%
up	46.7%	33.3%	20.0%	–	–

NB The assignment of some types, such as studs, to a particular category is necessarily arbitrary.

In number of finds, then, the presence of sheet is roughly constant between 60% and 70%. As a fraction of the weight of copper alloy the totals will be different with the larger harness pieces being much heavier than all except the largest packets of sheet recovered. Nevertheless Table 7.9 makes plain the ubiquity of sheet products in Iron Age metalworking: vessels, claddings, bindings and ornaments as well as the use of sheet as a basis for such products as wire. In comparison, at Maiden Castle sheet and related material, excluding that in metalworking contexts, comprises a rather smaller proportion of the number of finds, generally around 50%.

The change with time in the contexts in which copper alloy was found is also worth noting. This change is charted in Table 7.10. In this table a pit is regarded as a single context irrespective of the number of layers, implying some linkage in the deposition of metalwork in that pit. This simplifies the construction of the table and in some cases at least will be a realistic interpretation of events.

Table 7.10 Copper alloy finds per context

cp	*Finds/context*
3	1.00
4/5	1.00
6	1.13
7	1.78
8	1.57

The increase in the number of finds per context in cp 7–8 has a number of causes. For example, in cp 7 layer 1567, occupation silt above the chalk floor of house CS 56, contained many crushed fragments of sheet some certainly coming from a vessel, and others possibly from a scabbard as part of a chape was also found. Also in cp 7 another house floor deposit, layer 393, produced a group of related harness fittings (Volume 2, 345). In cp 8 the 1979–88 excavations yielded two pits containing a number of metal artefacts exceptional for the site. Although both P2261 and P2435 had a number of sheet fragments, P2261 contained several items of harness while the contents of P2435 were more miscellaneous with a wire fragment, a brooch spring and decorative sheet items.

Analysis

From the material recovered in 1979–88 79 samples were taken from 74 objects/finds. Of these six samples proved to consist only of copper corrosion products, and a further 19 were so severely corroded as to provide only limited metallurgical information. In addition residues in three crucibles were analysed and a detailed investigation was made of the pouch contents (p 412). Analysis was by electron probe microanalysis (EPMA). The analyses are listed in full in Fiche 30:A5–8, Tables F1, F2. The general strategy for analysis is published elsewhere (Northover forthcoming b).

Alloys

Virtually all the copper alloy metalwork from Danebury from the whole period of excavation is tin bronze; among uncorroded samples only two items (both sheet products from cp 7) have more than 1% lead and only one, a La Tène III brooch (Vol 2, no 1.27) has more than 1% zinc. In a first century BC context the zinc could possibly come from some admixture of brass scrap but it seems certain that one, if not two, composition groups at this time have a significant zinc content deriving from zinc minerals associated with the copper ore. The final exception to the general occurrence of tin bronze is the presence of copper fragments in the pouch contents.

No site so far has given any clear trends for tin content during the Iron Age, and it would seem that Danebury is no exception. The identification of any such trends is difficult because of the scarcity of material in the earlier phases and the corroded state of many of the samples. The pattern for Danebury (Fig 7.69) is that most bronze has a reasonably high tin content, in the range 10–14% but in all phases there is a proportion of metal with tin contents in the range 5–10%. It is probable that in most phases, with the possible exception of cp 3, that the distribution of tin contents is multimodal, as in cp 7, with peaks at 9–10% and 11–12% tin. There is no correlation between tin contents and object type but the spread to lower tin contents in cp 6–7 has some correlation with the increased diversity of impurity patterns.

Impurity patterns

It is now well established that the impurity patterns of Iron Age copper alloys can be sorted into significant groups just as in the Bronze Age (Northover 1988). The distribution of these groups in time and space can provide important clues to chronology, trading patterns and metal resources. Danebury 1969–78 was the first Iron Age excavation where a large proportion of the bronze metalwork was analysed and no serious classification was attempted. The classification scheme that has now evolved has been applied to several recent excavation collections (eg Northover forthcoming b) and is listed in Table 7.11. The classification falls into nine major groupings with subdivisions. Other sites have shown how the occurrence of the different groups varies with time; there is also a regional variation as well but the number of sites studied is still too small for this to be defined. The variation of the major impurity groups with time is shown in Fig 7.69 (data from the whole period 1969–88 is used).

The overall picture is quickly summarized. In cp 3 the majority (88.9%) of the analyses are in Groups 1 and 5, ie those with As/Co/Ni and As/Ni impurity patterns, with only one analysis with Sb>0.10% but the sample is rather

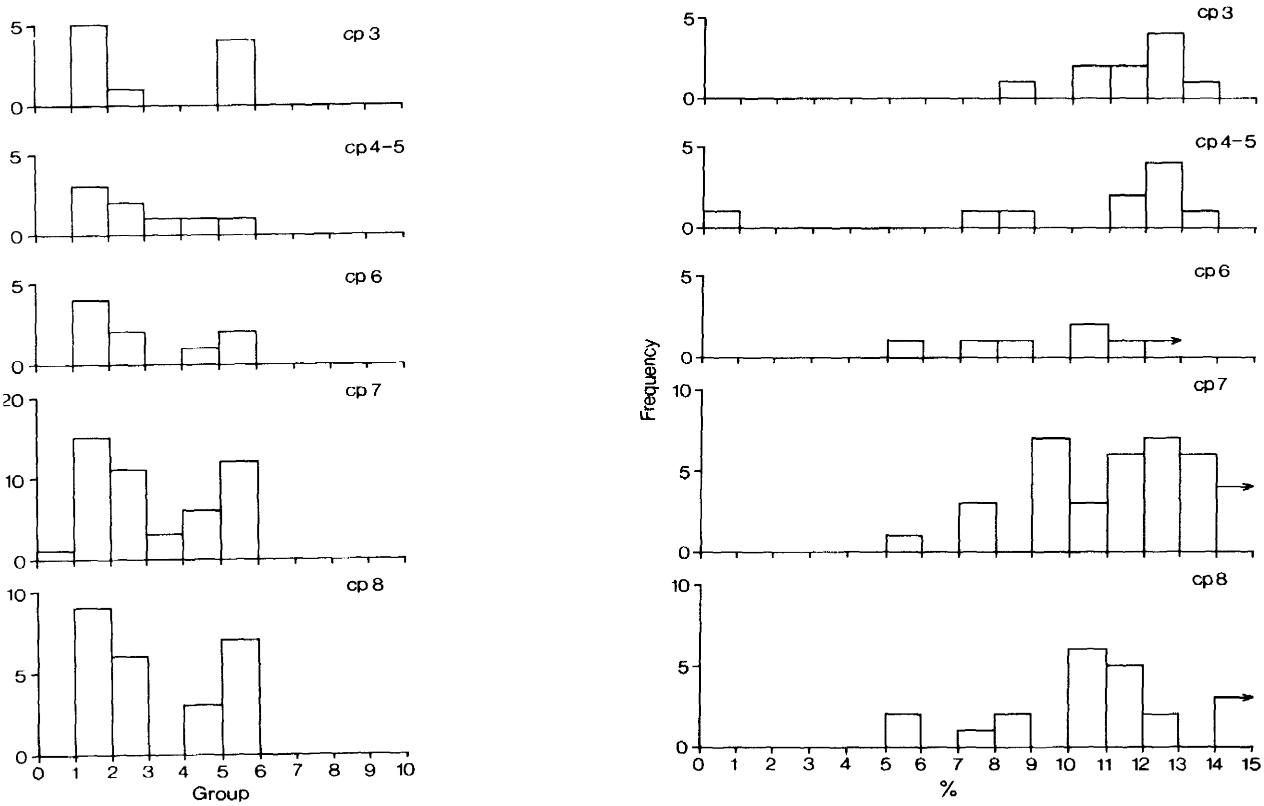


Figure 7.69 Histograms of metal groups by ceramic phase.

small. The proportion of analyses with >0.10% rises to about 40% through cp 6 and 7 falling to 30% in cp 8 although the number of analyses for cp 8 is small. This is in marked contrast to Maiden Castle where the proportion of the Sb-containing Groups 2–4 remained as low as 10% until phase 6H, approximately contemporary with late cp 7–cp 8 when the proportion there also rose to around 30–35%. Of course, at Maiden Castle the distribution of impurity patterns is dominated by the almost total use of metal of Group 1 for sheet bronze-working there. Considering just the material from non-metalworking contexts the occurrence of Groups 2–4 is more like that at Danebury. However, overall Group 2 (As/Sb/(Co)/Ni/Ag), is much more common at Danebury than at Maiden Castle with 20 against seven occurrences in a rather smaller total population of analyses.

The analysis of the 1979–88 material is now considered in more detail.

cp 3

From the five analyses of artefacts, four can be firmly placed in Group 1, with Co>Ni and no antimony. All are medium-high tin bronzes with 11.25–13.25% tin. Interestingly they have only trace levels of lead while Group 1 compositions in later phases have higher lead contents, up to 0.5%. If the consistent occurrence of Group 1 compositions through cp 3–7 can be related to continuing exploitation of the same source area there has clearly been some development in the exploitation of the source or in extractive techniques. As has been written elsewhere (Northover 1988), Group 1 metals are characteristic of much of La Tène metalworking in southern and south-west Britain and it is very probable that the source of the metal also lies in the south west. Cp 3 at Danebury, along with a small amount of La Tène I material from other sites provides the earliest dated occurrence for the metal. It has not been observed in Late Bronze Age/Early Iron Age contexts (ie Ha C–D).

It has also recently been demonstrated (Northover unpublished) that Group 1 metal is characteristic of sheet bronze vessels at La Tène itself. It is of course quite possible that the metal, or indeed the cauldrons themselves, was exported to Switzerland but a Continental source must also be considered. Unfortunately for this discussion there is a complete lack of comparative data: Iron Age analyses are still scarce in Europe and the French data that is available do not include cobalt. The argument must now turn to the remaining analysis from cp 3 which is similar to the analyses in Group 1 but has Co and Ni low but has Ni>Co. Technically this should be in Group 5 but as it is one of the two fragments of the cladding strip 1.107 with the other fragment having Co>Ni (Group la) the distinction is probably academic. The metal from cp 3 and Group 1 from 1979–88 consists of sheet claddings and bindings. The analysis of the crucible residues (p 411) is very close to that of the cladding fragment 1.107. That, and indeed any of the cp 3 fragments, could have been made at Danebury.

Table 7.11: Classification of impurity patterns

Significant impurities are As, Sb, Co, Ni, Ag

Group 0

All significant impurities at low levels (<0.03%): there may be some Fe, Pb

Group 1

Co>Ni>0.03%; Sb<0.10%; As 0–1.0%; Ag 0–0.10%; both Pb, Fe in range 0–1.0%; Bi variable.

Group sub-divided on basis of Maiden Castle and Beckford data; essentially Co is independent of Ni and:

- la : 0.03%<Co<0.10%
- lb : 0.10%<Co<0.20%
- lc : 0.20%<Co

A large majority of analyses in Group 1 have Sb<0.05%, hence examples with Sb in the range 0.05–0.10% are labelled as la*, lb*, lc*.

Group 2

Sb>0.10%; generally As>Sb; Ag 0–0.30%; sub-divided with:

- 2a : Co>Ni (i.e. group lbc + >0.10% Sb)
- 2b : Co≃Ni (i.e. near group la + >0.10% Sb)
- 2c : Co<Ni (i.e. As/Sb/Ni/Ag pattern; Ni ≥ 0.05%)

Group 3

Sb>0.10%; As 0–1.0%; Ag 0–0.30%; Co low; Ni low

In effect an As/Sb/Ag pattern; many of this group found with Zn impurity, perhaps from imported scrap.

Group 4

Sb>0.10%; Sb>As; Ni<0.50%; Ag variable; Sb contents generally exceed 0.20%

Group 5

Sb<0.10%; As 0–1.0%; Ag 0–0.10%; sub-divided by nickel content:

- 5a : Ni>0.05%
- 5b : Ni<0.05%

In both cases Co<0.03%<Ni; essentially those groups with As, As/Ni patterns

Group 6

Sb<0.10%; As 0.5–1.0%; Ni 0.05–0.15%; Ag variable; Zn 0.1–1.0%

In this case Zn appears to be a genuine impurity deriving from the original ore source

Group 7

Sb<0.10%; As 0.10–1.00%; Ni<0.075%; Ag>0.10%

Essentially an As/Ag pattern; generally Ag ≃ 0.20%

Group 8

Sb<0.10%; Ni 0.20–0.30%; Ag 0.5–0.75%

cp 4–5

These two phases yielded a minimal amount of metalwork in 1979–88 with only the pouch contents (1.129) being definitely attributed to them. The only item from these phases from 1969–78 that has been analysed, a fragment of sheet, was again of Group 1.

The contents of the pouch introduce further impurity patterns. The contents comprise a large quantity of chippings and swarf from probably a variety of metalworking jobs. There are two principal groups: the majority of the particles (about 80–85%) come from a bronze with 8-9% tin and a composition in Group 2c (As/Sb/Ni) with a rather high arsenic content of 0.8-1.0%. The second group (about 15%) also has a Group 2c composition but with arsenic in the range 0.2–0.5% but is effectively a copper. There is 0–0.8% tin but this probably comes from some contamination with bronze during melting. There are also isolated examples of other types with both low and high tin contents. The compositions in the pouch cannot be matched at Danebury in any phase.

cp 6

Nine analyses were made and the results were badly affected by corrosion (further material will be analysed for the fuller study in Volume 6). No clear pattern emerges from the 1979–88 material with the analyses scattered across Groups 1–5. Where the samples were intact the tin contents were lower than in the earlier phases with three examples with 5–9% tin. In contrast the three analyses available from 1969–78 have two much more typical Group 1 analyses and one in Group 2, all with 11–12% tin. These two Group 1 analyses continue the trend of small increases in Sb and Pb.

The material from cp 6 includes the decorative openwork disc or harness mount. This has a Group la/Group 5 analysis with Co-Ni, very similar to that already mentioned for the crucible residues. The comparison with the crucible residues is apt because, although the final deposition of the piece was in cp 6, it is the product of an earlier phase of metalworking. The probable date of its manufacture is before the end of the fifth century, more nearly contemporary with the crucibles. If this is taken to be an import then a Continental source for metal of this low impurity variety of Group 1 (ie Group la) is a reasonable inference. However, as hinted above for cp 3, the export of Group 1 metal from Britain is a very real probability, At present the analytical evidence as to the origin of the piece is ambiguous and further discs will be analysed to support a more extensive discussion in Volume 6.

cp 7

Fifty-two samples were taken for analysis. At the point of sampling it was already apparent that much of the material was badly corroded, especially the fragments from the house occupation silt 1567. This is a pity as it would have been useful to estimate how many objects might be represented by these fragments. In the end six of the 52 samples were found to consist only of corrosion products. As in earlier phases Group 1 is still the commonest impurity pattern, followed by Group 5. Of course, at low levels of Co, Ni any division between the two is arbitrary. As the majority of material recovered from cp 7 recovered in 1979–88 is sheet so almost all the material analysed from Group 1 is sheet. To look at correlations between object type and composition it is necessary to use the data from the whole twenty years. If this is done it is plain that the majority of non-sheet objects have compositions not in Group 1. The specific association between sheet and Group 1 was noted in the first series of Danebury reports (Northover 1984) although it is not as clear-cut as it was then thought to be. The same is true at Maiden Castle, although the record there is dominated by the evidence of on-site sheet metalworking. The evidence from Beckford, Hereford & Worcester (Northover forthcoming c) and from Merthyr Mawr, Glamorgan (Northover unpublished) shows how

Link to Next Section

Group 1 metal was used for cast products. One cast Group 1 product in cp 7 at Danebury is the small terret fragment 1.99.

Eighteen out of 70 cp 7 copper alloy finds in 1979–88 came from the occupation layer 1567. The majority of these were sheet fragments but there was also a section of a scabbard chape. Some of the sheet fragments are clearly from vessels. Where corrosion permits an estimate the fragments come from a wide variety of impurity patterns with, perhaps, Group 2 being the commonest, as in the scabbard fragment. Another possible scabbard fragment (1.126) from cp 7 has an analysis in Group 2b. As yet very few scabbards have been analysed but the majority of pieces that have have very similar analyses, for example at Hunsbury, Northamptonshire (Barnes 1985) and, indeed, in the fragment from cp 7 at Danebury (1.120). It is reasonable to suppose that the manufacture of scabbards was a specialized occupation implying a settled workshop and a stable metal supply. However, the number of analyses is still too small for the results to be considered better than coincidental.

As a whole the group from 1567 appears to represent fragments of a sword scabbard, perhaps including some of its sheet sections, and parts of two vessels crushed and trodden into the floor. The causes of such deposition are hard to imagine. Probably the commonest use of sheet in these times was for claddings and bindings for all sorts of metal, wood and leather products. It is easy to see how these may be damaged and fragments detached but the destruction, for example, of a scabbard would surely be a more deliberate act and the addition of the fragments to ordinary occupation debris difficult to foresee.

Two further large groups come from the contents of two pits, P2261 and P2435. Apart from a fibula spring all the objects from P2435 are sheet products, even the wire (1.124) being made from a narrow strip of sheet bronze, tightly twisted. The products are both heterogeneous in type as well as in origin with four metal groups represented in six samples. P2261 forms a considerable contrast with six out of eight pieces in Group 1. The deposit in P2261 also differs from P2435 in including three pieces of harness equipment, two terrets (1.96, 1.98), and the hollow ring 1.95.

Unstratified and unphased

The distribution of impurity patterns among the unphased or unstratified material is similar to that of the phased material. Group 1 is again the most important with a small number of analyses with Sb>0.10%. The only difference is that Group 5 is absent. One unphased piece of interest with a Group 1 composition is the pin fragment from a Type Aa penannular brooch (1.119), suggesting manufacture in southern England for this type.

Non-ferrous metalworking at Danebury

The total quantity of debris from non-ferrous metalworking at Danebury is very limited, even for the full twenty-year period of excavation. From the period 1969–78 fragments of four classic Iron Age sub-triangular crucibles were found, one in cp 4/5, two in cp 6/7 and one in a cp 7 context (Volume 2, 406–7). In addition there is what was catalogued as a tuyere fragment from a cp 5 context (7.70); it is more probably a mould or gate fragment.

The 1979–88 excavations have produced 12 crucibles (pp 380–2). Of these five were found close together in the excavation of 1988 (Table 7.12).

Table 7.12 Crucibles and crucible fragments

sf	*Object*	*Context*	*Phase*	*Analysis*
2682	Crucible handle	P2590/9	cp 3	136
2760	Crucible body sherd	layer 1997	cp 3/4	
2774	Complete handled crucible	layer 2050	cp 3	134
2778	Handled crucible fragment	layer 2047	cp 3/4	137
2792	Crucible sherd	layer 2080	cp 4	135

These crucibles form a coherent group in both form and use. Their bodies have a horseshoe-shaped profile, although in the complete crucible, sf 2774, is relatively shallower with a more in-turned rim, although it is possible that the rim has slumped during use at high temperatures. The body is attached to a thick, rectangular section handle which is dimpled on the top and side faces. The crucibles have been placed in the hearth in such a way that they are heavily vitrified on the exterior but are at most only lightly vitrified on the interior. The highest temperatures in the hearth will be in a region close to the tuyere blowing it and thus in the most oxidizing part of the furnace. It appears that these crucibles are therefore used in such a way that the surface of the metal inside is protected from this atmosphere. This is in contrast to the way in which the later Iron Age sub-triangular crucibles were used, in which the rim and upper part of the interior are most heavily vitrified, with extensive oxidation of the metal charge.

The relative absence of an oxidizing atmosphere inside the crucible suggested that the green coloured residues in them might well contain sound metal. This proved to be the case although in two cases it was largely corroded. Samples were therefore taken as indicated in Table 7.12. Sample 137 was completely corroded while the only uncorroded metal in Sample 136 was in copper prills in an oxidized part of the residue. Bronze was found in Samples 134–5, corresponding to Group l/Group 5 compositions with very low antimony and with Co, Ni low and roughly equal. The other impurities are arsenic and silver. The crucibles come from cp 3 and cp 4 contexts, and match analyses in cp 3, most importantly the openwork disc.

The handled form of crucible has been recorded in other Iron Age contexts. One was found in a potentially early context at Old Oswestry, Shropshire (Savory 1976); this aroused a certain amount of argument over dating because of the evidence for zinc found in it. However, we now know that certain Iron Age impurity patterns can contain zinc, and the distribution of one relates to the Marches (Northover 1988). A second find of handled crucibles is at the small hillfort of Llwyn-bryn-dinas, Powys, now in the process of publication by the Clwyd-Powys Archaeological Trust; the residues from this site have yet to be analysed. Another possibly contemporary crucible of this date has been found at Methwold, Norfolk with pottery that dates early in the La Tène Iron Age. This crucible has a similar profile to those from Llwyn-bryn-dinas but has no handle. The metal residues in this have been analysed and are virtually identical to those at Danebury. It should be pointed out that in this crucible cobalt was heavily segregated to the slaggy part of the residues, showing that metal with a small cobalt trace in the range 0–0.05% could be associated with a high cobalt source.

The handled crucibles at Danebury date to cp 3–4, while the triangular crucibles from the 1969–78 excavations date to cp 4/5–cp 7. There is therefore a strong suggestion of a change in metalworking technology at some time in the period cp 4–5. The triangular crucible then lasted

Link to Previous Section

into the first century BC, but by the first century AD was replaced by other types. Little attention has been paid to these changes because the triangular crucible was dominant for so much of the Iron Age. The occurrence of these handled crucibles at Danebury greatly increases our understanding of the development of metallurgy in the centuries occupied by the La Tène Iron Age.

The second important item of metallurgical evidence is the 'pouch' (1.129) from a cp 5 context. This was quickly recognized on site as comprising a mass of metal particles consolidated by corrosion and originally contained in a ?leather pouch with a drawstring. The pouch contents were examined intact by Mr N D Meeks in the JEOL 840 scanning electron microscope (SEM) at the British Museum Research Laboratory. We are indebted to Mr Meeks for this assistance. The images obtained are displayed in Fig 7.70.

The particles photographed consist largely of small, thin, curled fragments with circumferential striations. They are typical debris of a number of metalworking operations. The most appropriate to an Iron Age context would be engraving and filing (or possibly sawing) although the nearest experimental approach today was achieved with the steel twist drill used for sampling. During post-excavation handling particles became detached and these were collected and mounted for analysis. As discussed in the review of impurity patterns there is debris from two principal metal types, an 8–9% tin bronze (85%) and an impure copper (15%), with examples of one or two others. As neither composition could be parallelled at Danebury it is not possible to indicate the products from which the debris might have come: the manufacture of something like a sword scabbard may be a possible example. Another would be the making of the harness mount from cp 3. The only merit of this attention to detail in conserving metal is if metal was scarce, as would still be possible in cp 5, or it was the habit of the workshop. A jeweller's shop would be more likely to conserve metal in this way than a large foundry. The mixing of metals in the pouch shows that it was not thought important to preserve them separately. If the metal was for recycling a mixed composition would result with tin and impurity contents reduced.

Despite the exceptional interest of the metallurgical debris from the 1979–88 excavations the quantity is small. Non-ferrous metalworking was almost certainly not an important part of the economy of Danebury and what activity there was is likely to have been of a very specialized nature. It is of course possible that metallurgy was concentrated in an unexcavated part of the site. If it was, however, it would be reasonable to expect more traces in the form of casting waste or refractory debris to have been scattered across the rest of the site, even if very thinly. No such waste has been recovered.

7.2.3 Metallurgical aspects of the ironworking debris

by Chris Salter

This report is restricted to a consideration of the metalworking slags and deals only with material recovered during the excavations of 1979–88. Further analyses on the ironworking systems of the Danebury community will be considered in Volume 6.

Classification

The classification of metalworking slags from Iron Age sites is particularly difficult, as each of the various processes involved during the production of a metal artefact can create a range of slag morphologies depending on the temperature, duration and chemistry of the fuel, hearth linings and alloys used. Thus, there are no sharp morphological boundaries between the various slag forms. This in turn makes it difficult to determine the process that generated an individual piece of slag. However, the various metalworking processes do create differing proportions of the various types of slag. So by examining the complete suite of slags recovered it is possible to determine the sort of processes that were being carried out on the site. The classification scheme used is similar to that used in the first Danebury report (Vol 2, 433–6), where there were two basic classes based on density. This system has been extended and refined as was outlined in the report on the material discovered at Hengistbury Head (Salter 1987). For the purpose of this report the classes of material recovered were as follows:

1 LM Hearth or furnace lining material (FLM), this material can range from poorly fired soil or clay through to fully vitrified clay. Some of the larger pieces from Pit 1456 (cp 7) retained impressions of the air-blast holes or tuyères. These were 32–35 mm in diameter and clearly were not of the clay insert type which projected beyond the hearth lining into the bowl of the furnace. These hearths clearly could not be used in conjunction with the clay funnel (Vol 2, fig 7.49 no 7.71) purported to be a tuyère. The diameter of the air passage at 7 mm was too small for the object to be an effective tuyère for normal copper- or ironworking processes. The usual passage diameter is 25–35 mm for blacksmithing and melting copper alloys; however, these narrow tuyères could have been used for more detailed jewellery type work.

2 FAS This low density, often highly vesicular slag can vary in colour from white and grey through olive green to black. The size of individual fragment ranges from less than 10 mm across up to 200 mm. Some pieces clearly show that this type of slag formed by the partial fusion of the silica-rich hearth lining or crucible exteriors. The darker coloured versions tend to be associated with ironworking whereas the lighter versions with copper casting. However, this is partially a function of the chemistry of the soil and hearth lining materials, and with the high calcium contents of the soil at Danebury it is not surprising that the lighter colours predominate.

3 LRP This type of slag is the result of the reaction of the bulk slag material and the more refractory hearth lining or even any stray debris that might be accidentally swept into the hearth. A number of examples contained flint pebbles 20–30 mm in diameter which had reacted with the slag. There was no indication, at Danebury, of the deliberate use of crushed flint or chert as a flux as there was at Hengistbury.

4 HD The high density slags include the full range of dense slags associated with blacksmithing. These range from small individual drops, dribbles and flows through to large plano-convex hearth bottoms. In the more detailed classification, given in the full catalogue (Fiche 30:A9–Bl l), the high density slags are subdivided into seven sub-classes based largely on size and morphology. The larger of these sub-classes (5 and 6, and PCs) can be associated with the iron-smelting process; the number and distribution of material in this case does not suggest that iron smelting played a major role in the metalworking tradition at Danebury.

5 SS Slag spheres, small, less than 5 mm diameter, may be magnetic, and may be produced at all stages of ironworking but small magnetic versions are most

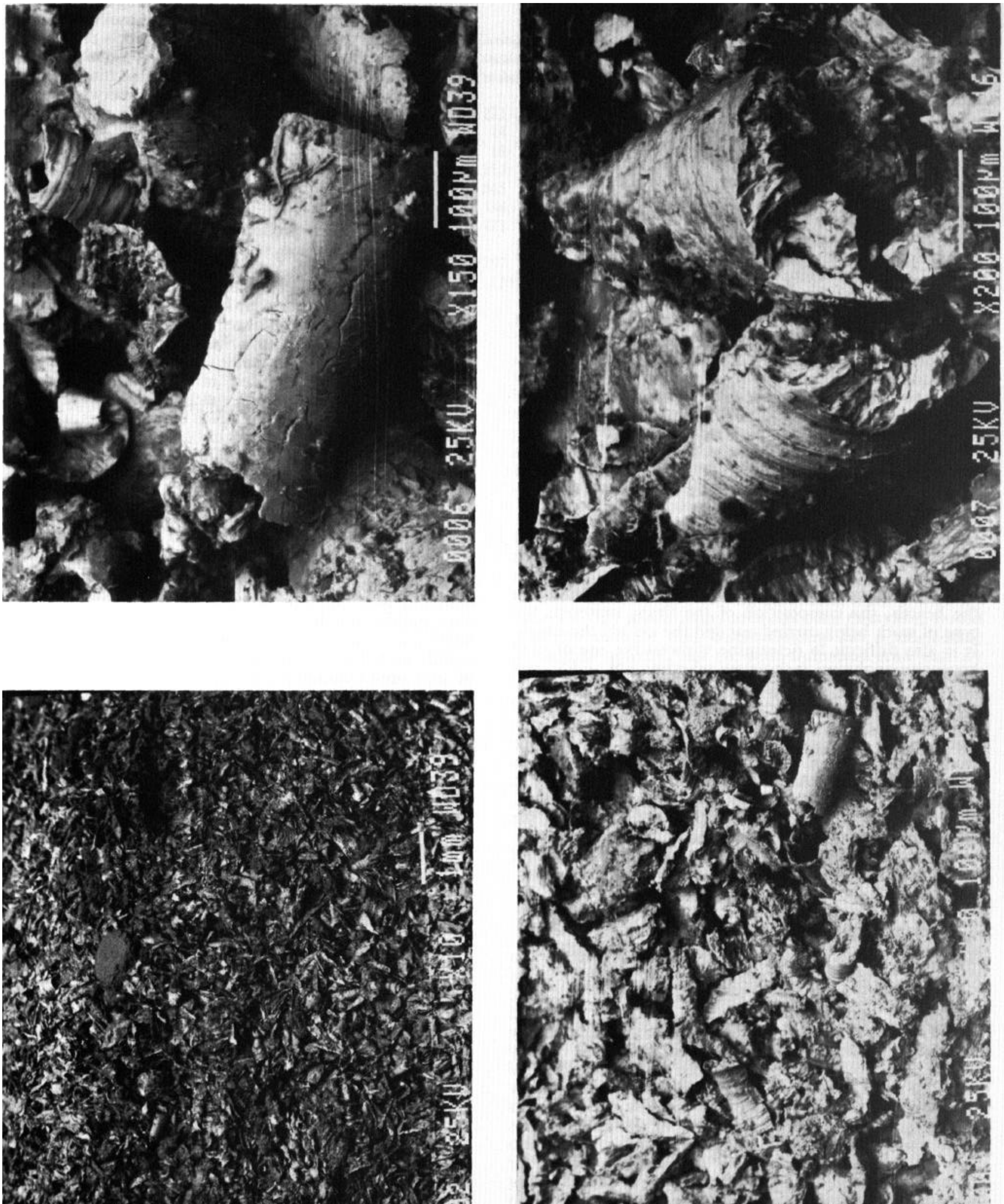


Figure 7.70 The surface of the mass of bronze turnings from the leather bag: various magnifications.

commonly produced during blacksmith hammer welding. The slag spheres found at Danebury were all of the non-magnetic type and seem closer in character to fuel ash slag spheres than those produced during forge welding. Hence, they have been grouped with the fuel ash slags (as sub-type S).

6 HS Hammer scale. Thin sheets and fragments of black iron oxide scale and slag, produced in large quantities during artefact forging. A very clear indication of the site of a forge, for example at Maiden Castle the accumulated deposit of scale on the floor of the forge in the eastern Gateway was up to 150 mm thick. It is often first spotted in the residues of charcoal flotation, however, virtually none of this material was recovered from Danebury. Only approximately 10 gm of the thicker forging slags were recovered.

7 BVM Black low density vitreous or waxy material of unknown origin, often with a high low atomic number component, that is they are often composed of elements with atomic numbers below that of sodium, principally of carbon. This type of material may be generated by the charring of organic material. Material looking rather similar but with a higher silica content, and thus probably related to the darker FAS material, has in general been classified as FAS. Therefore, this type of material might be slightly under-represented in this report.

It must be emphasized that in ironworking the slags of types 1 to 4 (LM-HD) form a continuous series, the composition, size and shape of the slags being a function of the hearth or furnace temperature, the position within the hearth, the composition of the lining material, the type of work being carried out and the skill of the smith. It is also difficult to determine without the use of very expensive analytical techniques whether LM, FAS, and to some extent LRP were produced by copper- or ironworking processes. In some cases even high density slag which might be thought to be associated with ironworking may, on closer examination, prove to be from copper-working. However, preliminary examination of material by EMPA (electron microprobe analyser) in the Department of Metallurgy and Science of Materials, University of Oxford, has not shown that any of the Danebury high density slags are associated with copper-working. (Although it has indicated that one sample (sf 1389) is probably a fragment of stony meteorite.)

The slags by type and phase

Table 7.13 shows that the majority of the slag came from cp 6 and 7 features. This is similar to the distribution of the iron artefacts (Salter & Ehrenreich 1984). The table also shows that the low density slags (LM, FAS and LRP) reach a maximum in cp 6 whereas the high density slags concentrate in cp 7. The dominance of low density material in cp 6 is caused by the large collection of material from Pit 2541. This consisted entirely of low density slags, in fact 64% of all the low density slags found came from this context. Most of this material was clearly formed by the intense heating of a calcium-rich soil rather than a clay lining normal of a hearth or furnace. However, some of these low density slag samples had the characteristic curved shape of a hearth bottom; therefore, it would seem likely that they were formed in a rough hearth dug into the ground which had not been lined, rather than by an accidental process operating at ground level. There was very little sign of contamination, in this set of material, by iron. Thus, it would seem reasonable to assume that this debris was produced as a result of copper alloy melting, although it is possible but unlikely that other processes may have produced this type of material. If this debris represents the result of the working of copper alloys, as would seem likely, the quantity of material found would indicate that the bronze smith was active for a period of between a few days and a week.

The other large collection of debris was from Pit 1456, which contained a distribution of slag types (Table 7.14) typical of ironworking activity. Again, the majority of the hearth lining material and lining reaction product assigned to cp 7 came from this single pit. The high density slags which predominate in cp 7 were more evenly distributed amongst the various features and pits of the phase. As with Pit 2541, the material from pit P1456 would only seem to represent a few days' blacksmithing activity as only nine large slag pieces were recovered. Each of these larger pieces would have been formed by the forging and welding activity between hearth clearances. A blacksmith usually clears the slag from the hearth at the end of each day and more frequently if a lot of complex welding was being carried out. Thus, the nine larger samples from this pit indicate that up to nine separate phases of blacksmithing activity, each lasting between two hours and a day, occurred while the pit was open.

Ironstone

Just under 17 kg of various types of ironstone were recovered, the majority of which were in the form of oxidized iron sulphide nodules (mainly marcasite but with some pyrite) from the chalk. Most of these appear to have been oxidized naturally in the soil. Such nodules could, with further roasting, have been used as a source of iron ore (Tylecote & Clough 1983). There were also brown limonitic iron ores which would have had virtually no sulphur, and, therefore, would have been even more suitable for use as an iron ore. However, only a very few samples show any evidence of having been deliberately roasted in preparation to smelting (Table 7.15). This, when taken with the evidence that iron was being imported onto the site from a number of distant sources (Salter 1983), and the fact that only a very small quantity of slag could be associated with smelting, all indicates that little or no iron smelting was carried our at Danebury.

Summary and comparisons

The slag collection would suggest that there was a minimum of 22 episodes of blacksmithing activity (Table 7.16 gives the number by phase). Obviously, this will be a gross under-estimate. The lack of hammer-scale suggests that all evidence from light forging activity is missing. Moreover, it indicates that only a small proportion of the quantity of slag originally generated will have found its way into excavated contexts.

Although recovery rate is likely to vary between sites it is unlikely that the variation is so great as to invalidate inter- site comparisons. The major Iron Age iron smelting sites such as Trevelgue, Cornwall, Bryn y Castell, Gwynedd and possibly Gussage All Saints (where the dating of the slag was not good) all produced large quantities of slag (over 250 kg, 1,000 kg and 750 kg respectively). Even at Maiden Castle, where very little smelting activity was carried out, over 70 kg of slag were recovered of which over 20 kg came from the blacksmithy in the eastern gateway. The amount of slag

Link to Next Section

Table 7.13 Slag by type and phase

Ceramic phase	*Lining Material*	*Fuel Ash Slag*	*Lining Reaction Product*	*High Density*	*Black Material*	*Sum of all types*
Unphased	22	105	221	571	14	934 (7%)
1–3	35	172	14	625	–	845 (6%)
4	8	310	18	294	21	650 (5%)
5	32	59	152	14	–	257 (2%)
6	4868	369	845	324	0	6406 (46%)
7	592	66	336	2676	92	3761 (27%)
8	–	133	171	776	21	1102 (8%)
Total	5557	1214	1757	5279	149	13955
	40%	9%	13%	38%	1%	100%

Weight in grammes
Total weight of all slag 13995 gm

Table 7.14 Slag debris from Pit 1456 ceramic phase 7

Type	*Weight in gms*	*No*	*Percentage of total type in phase*
Iron sulphide	214.0	1	
Fuel ash slag	0.5	1	0.8
High density	384.0	4	14.3
Lining material	566.8	15	95.7
Lining reaction	304.2	11	90.5
Black material	3.0	50	3.3
Total	1472.5		

Table 7.15 Ironstone by phase

Phase	*Total weight in gms*	*Total no*	*Number heated*	*Weight heated*
unphased	7585	121	1	50
1–3	2473	42	–	–
4	1289	24	2	91
5	1311	9	1	17
6	1418	30	1	67
7	2391	65	2	96
8	450	6	–	–
Total	16,916	297	7	321

Table 7.16 Number of slag samples indicating blacksmithing hearth clearance

Phase	*Number*
Unphased	5
1–3	7
4	6
5	–
6	4
7	22
8	5
Total	49

actually present in the archaeological contexts in and around the smithy at Maiden Castle must have been greater than the 20 kg recorded, as this was only the weight of material recovered from the environmental samples from one half of the hut. Unfortunately, Wheeler did not record the quantity of slag he found in the half of the hut he excavated and that scattered to its east. Thus, the archaeological contexts around the Maiden Castle smithy probably produced between three and ten times the amount of material recovered. Thus the total of about 14 kg of slag recovered from Danebury where a very much larger area has been excavated would seem to indicate that blacksmithing was a small-scale occasional activity, not the semi-industrial scale activity that marked the late phase of Maiden Castle. Although it is clear from the metal artefacts themselves, such as the fragments of currency bars and the reworked saw/spearhead, as well as the slag, that blacksmithing was carried out, it would seem to have been just to supply the internal needs of the hillfort.

7.3 Manufacturing activities

In the second volume of this series we gave a brief review of the manufacturing activities reflected in the archaeological evidence recovered in the first ten years of excavation (Vol 2, 436–9). The review considered in particular metalworking activity and textile manufacture with a briefer comment on bone and antler work, Kimmeridge shale and other luxury products. The second ten years of excavation has enhanced the archaeological record considerably but has done little to require us to alter the generalizations made there.

The metalworking debris still supports the idea of bronzeworking being undertaken on a limited scale. The concentration of crucibles and a bag of bronze filings found quite close together in an early context just behind the rampart in 1988 adds support to the idea that bronzeworking was going on in the earlier as well as the later period while at the same time showing that there may well have been some concentration of activity in specific locations.

The evidence for ironworking gives strong support to the view that smelting was not normally carried on in the fort implying that the iron was brought in in ingot form – a suggestion strengthened by the discovery of a number of partially used currency bar fragments. The presence of forging was, however, widespread, though not apparently intensively practised. The only notable con-

Link to Previous Section

centration of forging slag came from P1456 suggesting that a smith may have been at work in the area at least for a few days. Mr Salter's conclusion is that ironworking met the needs of the community but was not carried out on a sufficient scale to imply the large-scale export of finished products.

Besides producing tools and small ornaments, the bronze and blacksmiths, together no doubt with carpenters, seem to have engaged in making vehicles, possibly chariots. An impressive array of gear has now been recovered including bronze and iron harness fittings, knave hoops, a fragment of iron tire and lynch pins.

Much work remains to be done on the analysis of copper and iron, both finished items and residues, before the full picture will emerge and the Danebury craftsmen can be seen in their regional context. Several programmes of analysis are now in hand and the results can be expected to appear in Volume 6.

There is little to add to what was said in the second volume about textile manufacture except to emphasize that it does appear to have been a major activity throughout the life of the fort. As to the other handicrafts – shale working, bone working, basketry, leather working, etc – evidence is sparse.

No attempt is made here to show the spatial distribution of material reflecting the different manufacturing activities. Simple plans such as those produced in Volume 2 can be misleading since the presence (or absence) of an indicator of activity can only begin to be relevant when seen against a range of other structural and chronological data. We are now working towards a more appropriate form of presentation of the spatial data and will return to these matters again in Volume 6 where the level of productivity of the Danebury community will be fully considered.

Bibliography

BARFORD, P.M. 1985: Objects of Stone. In Blockley, K., *Marshfield: Ironmongers Piece Excavations 1982–3* (Oxford: BAR Brit Ser 141), 217–51.

BARNES, I. 1985: *The non-ferrous metalwork from Hunsbury hillfort, Northants.* Dissertation for Postgraduate Diploma in Post-Excavation Studies (unpublished), University of Leicester.

BOYD DAWKINS, W. 1902: On Bigbury Camp and the Pilgrims Way. *Archaeol Journ* 59, 211–8.

BRAILSFORD, J. W. 1953: *Later Prehistoric Antiquities of the British Isles* (London).

BRITNELL, W. J. 1976: Antler cheek-pieces of the British late Bronze Age. *Antiq Journ* 56, 24–34.

BUCKLEY, D.G. 1979: The Stone. In Wainwright 1989, 10.

BULLEID, A. & GRAY, H.ST.G. 1911: *The Glastonbury Lake Village Vol 1* (Glastonbury Antiquarian Society).

BULLEID, A. & GRAY, H.ST.G. 1917: *The Glastonbury Lake Village, Vol* 2 (Glastonbury Antiquarian Society).

BULLEID, A. & GRAY, H.ST.G. 1953: *The Meare Lake Village, Vol* 2 (Taunton).

COLES, J.M. 1987: *Meare Village East. The excavations of A. Bulleid and H. St. George Gray 1932–1956* (Som Level Papers 13).

CUNLIFFE, B. 1987: *Hengistbury Head, Dorset.* Volume 1: *The prehistoric and Roman Settlement, 3500 BC–AD 500* (Oxford: OUCA Monog 13).

CUNLIFFE, B. 1988: *Mount Batten, Plymouth. A Prehistoric and Roman Port* (Oxford: OUCA Monog 26).

CURWEN, E.C. 1937: Querns. *Antiquity* 11, 133–51.

DENT, J. 1985: Three cart burials from Wetwang, Yorkshire. *Antiquity* 59, 85–92.

DUNNING, G.C. 1932: Map and pp. 69–71. In Wheeler & Wheeler 1932.

FARRAR, R.A.H. 1963: Note on prehistoric and Roman salt industry. *Proc Dorset Nat Hist & Arch Soc* 84, 137–44.

FELL, C.I. 1937: The Hunsbury hill-fort, Northants: a new survey of the material. *Archaeol Journ* 93, 57–100.

FOWLER, M. J. 1954: The Typology of Brooches of the Iron Age in Wessex. *Archaeol Journ* 110, 88–105.

FOX, C.F. 1946: *A find of the Early Iron Age from Llyn Cerrig Bach, Anglesey* (Cardiff).

GRAY, H.ST.G. 1966: *The Meare Lake Village. Vol 3* (Taunton).

GUIDO, M. 1978: *The Glass Beads of the prehistoric and Roman periods in Britain and Ireland* (London).

HENCKEN, T.C. 1939: The Excavation of the Iron Age Camp on Bredon Hill, Gloucestershire, 1935–1937. *Archaeol Journ* 95, 1–111.

HENDERSON, J. 1985: The Raw Materials of Early Glass Production. *Oxford Journ Archaeol* 4, 267–91.

HENDERSON, J. 1987: Glassworking (at Hengistbury). In Cunliffe 1987, 180–6.

HODSON, F.R. 1971: Three Iron Age Brooches from Hammersmith. In Sieveking, G. de G. (ed), *Prehistoric and Roman Studies (= Brit Mus Quart* 35), 50–61.

HULL, M.R. & HAWKES, C.F.C. 1987: *Corpus of Ancient Brooches in Britain* (Oxford: BAR Brit Ser 168).

JACOBI, G. 1974: *Werkzeug und Gerät aus dem Oppidum von Manching* (= Manching 5) (Wiesbaden).

JACOBSTHAL, P.F. 1944: *Early Celtic Art* (Oxford).

JACOBSTHAL, P. & LANGSDORFF. A. 1929: *Die Bronzeschnabelkannen.*

JOPE, E.M. 1961: Daggers of the Early Iron Age in Britain. *Proc Prehist Soc* 27, 307–43.

JOPE, E.M. 1974: Iron Age dagger- and sword-chape construction: technology, taxonomy and prehistory. *Irish Archaeol Res Forum* 1. 1–8.

JOPE, E.M. 1970: Iron Age Dagger and Sword Chape Construction: Technology, Taxonomy and Pre-history. *Irish Archaeol Research Forum* 1, 127.

JOPE, E.M. 1982: Hallstatt-D Daggers: Britain and Europe. *Bull Inst Archaeol Lond* 19, 83–9.

JOPE, E.M. & HOLIDAY, E.R. nd: The ultraviolet spectral absorption of chrysene and its methoxy-derivatives. *Spectrochimica Acta 4, 157–64.*

JOPE, E.M. & JACOBSTHAL. P.F. in press: *Early Celtic Art in the British Isles* (Oxford).

LAMBRICK, G. forthcoming: *Excavations at Gravelly Guy, Stanton Harcourt, Oxfordshire* (London: CBA Res Rep).

LONGLEY, D. *1980: Runnymede Bridge 1976: Excavations on the Site of a Late Bronze Age Settlement* (Guildford: Surrey Arch Soc Res vol 6).

MACGREGOR, M. & SIMPSON. D.A.A. 1963: A group of iron objects from Barbury Castle, Wilts. *Wilts Arch Mag* 58, 394–402.

MANNING, W.H. 1983: The Cauldron Chains of Iron Age and Roman Britain. In Hartley, B. and Wacher, J. (eds), *Rome and Her Northern Provinces* (Gloucester), 132–54.

MANNING, W.H. 1985: *Catalogue of the Romano-British Iron Tools, Fittings and Weapons in the British Museum* (London).

MEGAW, J.V.S. 1971: *Art of the European Iron Age* (Bath).

MEGAW, J.V.S. & MEGAW, R. 1988: *Early Celtic Art* (London).

NORTHOVER, J.P. 1984: Analysis of the bronze metalwork. In Cunliffe 1984, 430–6.

NORTHOVER, J.P. 1987: Non-ferrous metallurgy. In Cunliffe 1987, 186–94.

NORTHOVER, J.P. 1988: Copper. tin, silver and gold in the Iron Age. In Slater, E.A. and Tate, J.O. (eds.), *Science and archaeology, Glasgow, 1987; Proceedings of a conference on the application of scientific techniques to archaeology, Glasgow, September, 1987* (Oxford: BAR Brit Ser 196), 223–33.

NORTHOVER, J.P. forthcoming a: Non-ferrous metalwork and metalworking debris from Gravelly Guy. Oxfordshire. In Lambrick forthcoming.

NORTHOVER, J.P. forthcoming b: Non-ferrous metalwork and metallurgy. In Sharples forthcoming.

NORTHOVER, J.P. forthcoming c: Non-ferrous metalwork and metalworking debris from Beckford. In Wills & Dinn forthcoming.

PALK, N. 1984: *Iron Age Bridle-bits from Britain* (Univ of Edinburgh Dept of Archaeol Occas Pap No 10).

PALK, N. forthcoming: *Metal Horse Harness of the British and Irish Iron Ages* (Unpublished D.Phil. thesis, Univ of Oxford).

PEACOCK, D.P.S. 1987: Iron Age and Roman Quern Production at Lodsworth, West Sussex. *Antiq Journ* 67, 61–85.

REES, S.E. 1979: *Agricultural implements in prehistoric and Roman Britain* (Oxford: BAR Brit Ser 69).

RICHMOND, I.A. 1968: *Hod Hill, vol 2: Excavations carried out between 1951 and 1958* (London).

RIETH, A., EICHHORN, P. & HUNDT, H-J. 1969: Zur Herstellungstechnik der Eisendolche der späten Hallstattzeit. *Jahrb. R.G.Z. Mainz* 16, 17–88.
ROE, F.E.S. 1979: Typology of stone implements with shaftholes. In Clough, T.H.McK. and Cummins, W.A. (eds), *Stone Axe Studies* (London: CBA Res Rep 23), 23–48.
ROE, F.E.S. 1987: Identification of the utilised stone. In Cunliffe 1987, 174–6.
ROE, F.E.S. forthcoming a: Worked Stone. In Wills, J., *Excavations at Beckford 1975–79*
ROE, F. E. S. forthcoming b: Report on smaller pieces of utilised stone. In Sharples, *N., Excavations at Maiden Castle.*
SALTER, C. J. 1983: The relevance of chemical provenance studies to Celtic Ironwork in Britain. *Bull Inst Archaeol London* 19, 73–81.
SALTER, C.J. 1987: Ferrous Metallurgy and other Slags (from Hengistbury). In Cunliffe 1987, 197–204.
SALTER, C.J. & EHRENREICH, R.M. 1984: Iron Age iron metallurgy in Central Southern Britain. In Cunliffe, B.W. and Miles, D. (eds.), *Aspects of the Iron Age in Central Southern Britain* (Oxford: OUCA Monog 2), 146–61.
SAVORY, H.N. 1976: *A Guide Catalogue to the Iron Age collections* (Cardiff: National Museum of Wales).
SMITH, R.A. 1925: *British Museum Guide to the Early Iron Age* (London).
STEAD, I.M. 1979: *The Arras Culture* (York).
STEAD, I.M. 1984: Some notes on Imported Metalwork in Iron Age Britain. In Macready, S. and Thompson, F.H. (eds), *Cross-Channel Trade between Gaul and Britain* (London, Soc Antiq Occas Pap, n ser 4), 43–66.
TYLECOTE, R.F. & CLOUGH, R.E. 1983: Recent bog-iron ore analysis and the smelting of pyrite nodules. *Offa* 40, 115–8.
ULRICH, R. 1914: *Die Graberfelder in der Umgebung von Bellinzona, Kt Tessin.*
VAN ARSDELL, R.D. 1989: *Celtic Coinage of Britain* (London).
VOUGA, P. 1923: *La Tène* (Leipzig).
WAINWRIGHT, *G.* J. 1979: *Gussage All Saints. An Iron Age Settlement* in *Dorset* (London).
WHEELER, R.E.M. 1942: *The .Stanwick Fortifications* (Oxford).
WHEELER, R.E.M. 1943: *Maiden* Castle, *Dorset* (Oxford).
WHEELER, R.E.M. & WHEELER, T.V. 1932: *Excavation of the Prehistoric, Roman. and Post-Roman Site in Lydney Park, Gloucestershire* (Oxford).
WOODCOCK, A.G., KELLY, D.B. & WOOLLEY, A.R. 1988: The petrological identification of stone implements from south-east England. In Clough, T.H.McK. and Cummins, W.A. (eds.), *Stone §xe Studies: volume 2* (CBA Res Rep 67), 21–33.

Link to Next Section

8.1 The deposition of the human remains

8.1.1 Types of burial practice (Fig 8.1)

The report on the human remains, found in the first 10 years of excavation, examined exhaustively the variations of practice evident in the archaeological record (Vol 2, 442–63). Each human bone or collection of human bones found together in a single context was called a deposition and each deposition was given a number. In all 182 depositions were identified. To these the excavations of 1979–88 have added a further 118 bringing the total to 300.

Although there was considerable variety in the mode of deposition six main categories can be identified:

A Whole bodies (in single or group burials).
B Incomplete skeletons (individual depositions).
C Multiple, partial semi-articulated skeletons.
D Skulls or parts of skulls (excluding mandibles).
E Pelvic girdles.
F Individual bones or bone fragments isolated or in small groups.

Each category represents an archaeologically recognizable process of deposition. It is probable, but by no means proven, that these groupings may be specifically identified with discrete patterns of social behaviour. Standing back from the considerable variety of practice three such patterns may be distinguished:

1. Inhumation of the body of a child or adult while still articulated, probably before decay had begun.
2. Inhumation of the body of a neonatal infant, sometimes in a specially dug small pit.
3. The depositing of parts of a body or bodies after the flesh and connecting tissue had begun to decay.

The occurrence of isolated bones in pits or occupation layers need not result from a deliberate act of deposition. It is more likely that they represent either the loss or discard of curated fragments or the accidental disturbance of one of the deposition categories.

8.1.2 Treatment of the data in the burial assemblage

The dataset derived from the excavations of 1979–88 represents a minimum number of 31 substantially complete skeletons and 37 occurrences of skull fragments derived from 83 storage pits, 12 post-holes and 32 stratified contexts behind the rampart. Added to the evidence from the first 10 years of excavation the total assemblage now represents at least 91 individuals plus an uncertain number represented by 45 occurrences of skull fragments the remains coming from 181 storage pits, 14 'post-holes' and 44 stratified layers.

The treatment of the data follows the procedure laid down in Volume 2. Each deposition has been assigned a unique number and a letter indicating its 'deposition category' as defined in 8.1.1 above. Full descriptions of each deposition have been prepared, together with illustrations, and are presented in context number order in the fiche section (Fiche 31:B5–F9). To facilitate cross referencing four separate indexes have been prepared: these will also be found in the fiche section:

Index 1 lists in order of deposition number (Fiche 31:A3–5)
Index 2 lists in order of feature number (Fiche 31:A6–8)
Index 3 lists in order of ceramic phase (Fiche 31:A9–11)
Index 4 lists in order of deposition category and also gives gender and age where known (Fiche 31:B1–4).

A full discussion of the human population, reviewing the material from the entire excavation programme, is given below in Section 8.2.

In the last ten years it has become increasingly apparent that the deposition of human remains is part of a complex and fascinating pattern of behaviour which also involves the burial of several other categories of material. Such practices must represent the archaeologically-recognizable fraction of rituals reflecting the belief systems of the community. The database from the Danebury excavation is now of sufficient size to enable at least some aspects of this system to be considered in a detail hitherto impossible. Work is in progress and the results of these analyses will be presented in Volume 6. For this reason the report to follow will be restricted to remarks based entirely upon the human remains themselves and will be little more than a brief commentary on the salient points. Spatial considerations and the broader ritual implications will be considered in the final volume.

8.1.3 Burial tradition

There is little to add at this stage to the comments offered in Volume 2 (pp 442–3).

8.1.4 Deposition categories

Deposition category A: inhumation

Between 1969 and 1978 25 complete inhumations were excavated in 19 pits and one gully. To these may now be added a further 13 from the excavations of 1979–88 found in 11 pits and two small holes (designated as post-holes).

Within this category it is possible to distinguish a distinct sub-group of neonatal infants buried either in small pits 300–500 mm in diameter, possibly specially dug for the purpose, or within the fillings of storage pits (Fig 8.2). In all 12 can be recognized of which three were incomplete and have therefore been listed as belonging to category B.

Table 8.1 List of complete or near complete inhumations of neonatal infants

deposition number	*context*		*cp*
15	P381	in upper part of storage pit	3
17	P430	in middle filling of storage pit	6
18	P430	in middle filling of storage pit	6
19	P437	in upper part of storage pit	5
31	P857	in upper part of storage pit	3
201	Ph 5802	in small hole	?
204	Ph 6768	in small hole	3
205	Ph 6383	in small hole	?
219	P2155	in middle filling of storage pit	7
Incomplete burials classed as deposition category B			
189	P1285	in basal layer of storage pit	7
252	P2566	in middle filling of storage pit	7
261	Ph 10010	in small hole	3
Isolated bones of neonatal infants have also been found in			
202	Ph 5803	in small hole	?
203	Ph 6756	in small hole	?

Link to Previous Section

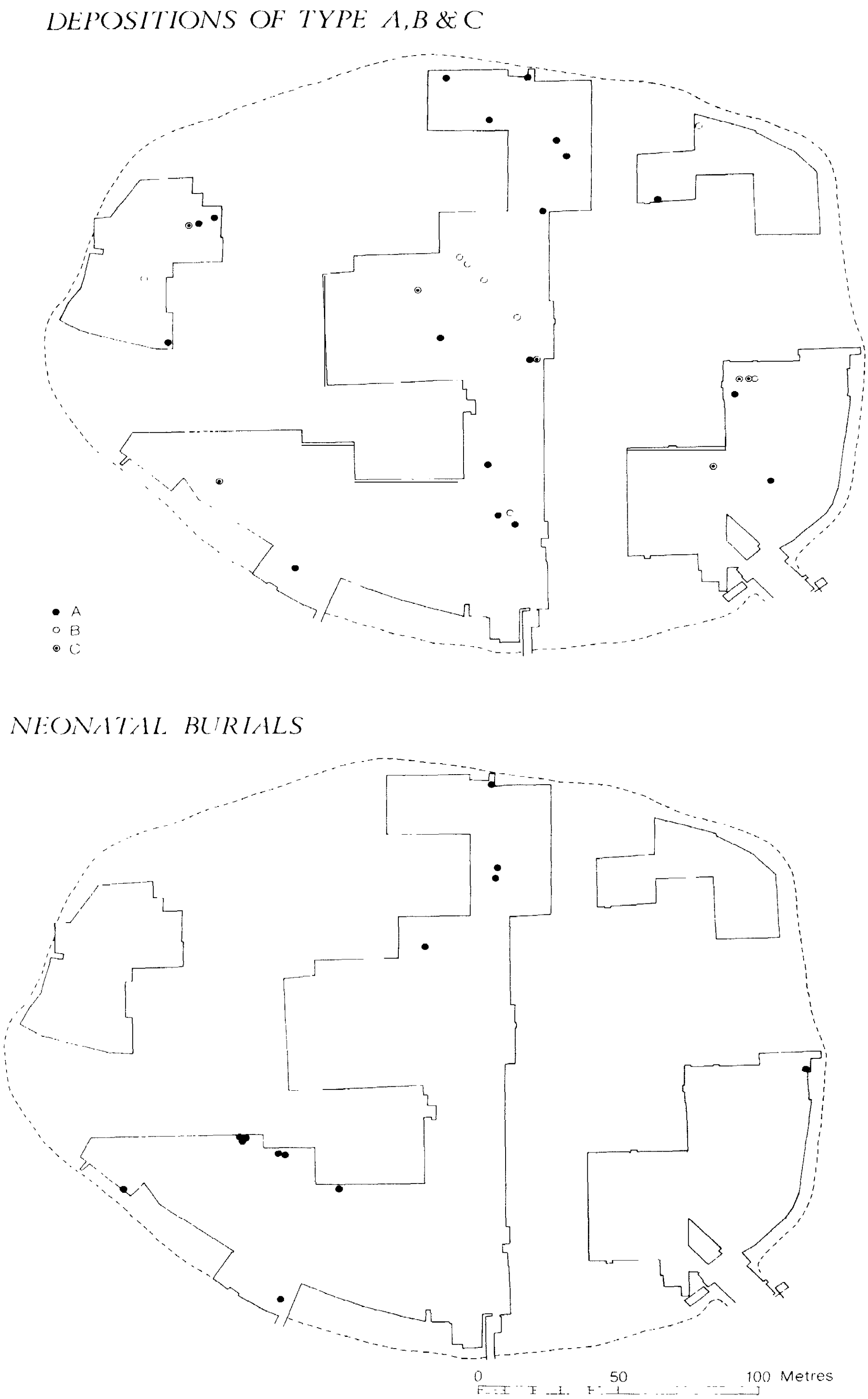


Figure 8.1 Distribution of burials within the fort.

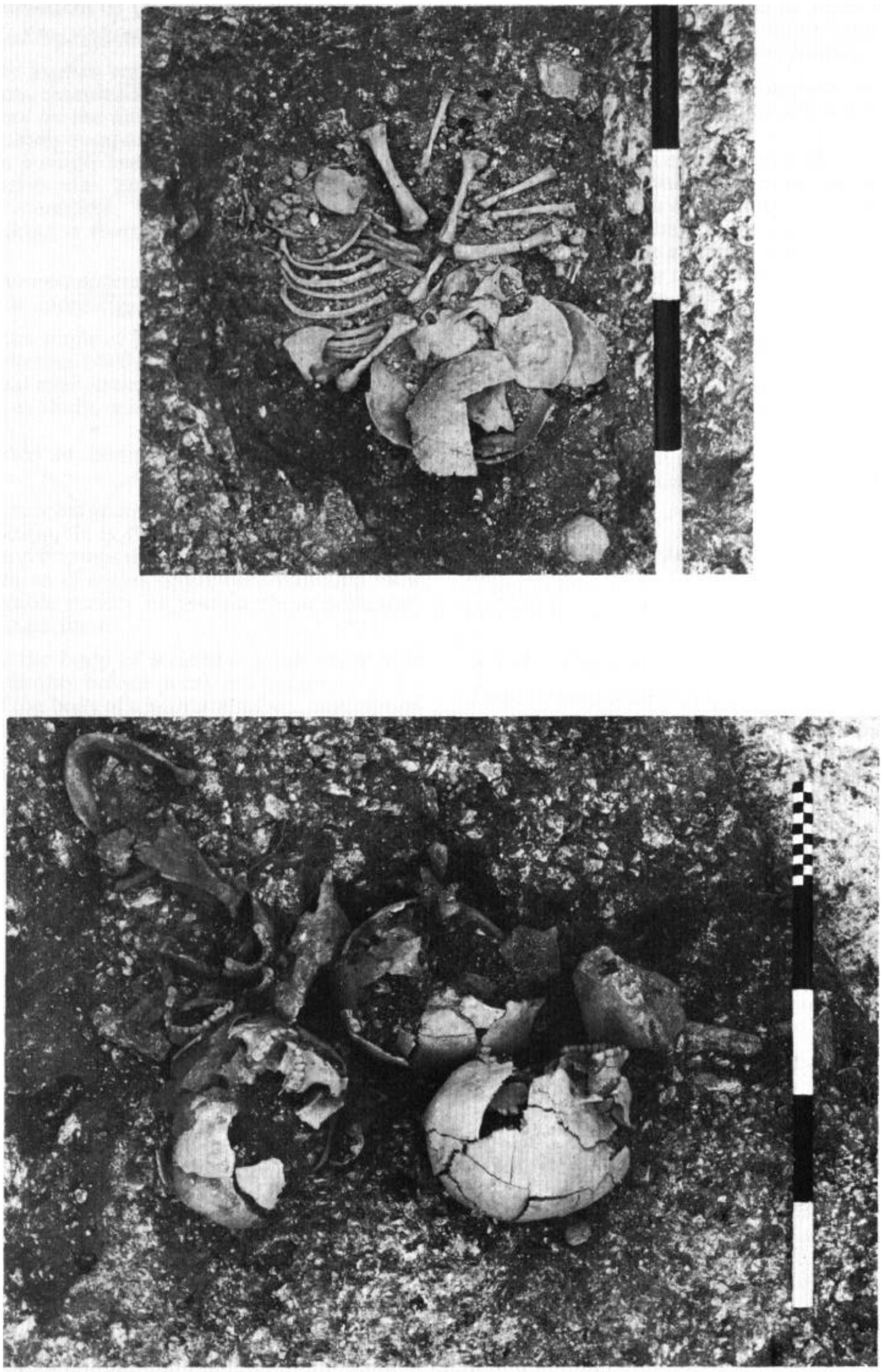


Figure 8.2 Neonatal burial in (top). Nest of skulls in P2509 (bottom).

The burial contexts of neonatal infants differ from those typical of the category A in that they were buried either in specially dug pits of appropriate size or within the middle or upper filling of an already partly filled storage pit. Only one example has been found on the bottom of a pit in the position occupied by the typical category A adult burial. For this reason they are best regarded as a separate category of deposition.

Returning to the typical category A deposition, in only one case was a multiple burial found in a single pit (P2100). Both bodies were deposited as part of a single process. The adult (deposition 248) was laid first and covered by a thin dump of soil before a 5 year old child (deposition 217) was buried close to the head of the adult. Thereafter the pit was deliberately filled to the top with chalk rubble. The procedure cannot be paralleled elsewhere in Danebury. Two other aspects of this particular pair of depositions stand out: first the sex of the adult, over 35 years of age, was difficult to determine and secondly beneath his/her neck was found a glass bead – the only 'grave good' from the entire site.

Of the eight child, teenage or adult inhumations all were lying on the bottoms of the pits usually close against the side in flexed positions, five on their left sides, two on their backs and one on the right side. There was no significance in the orientations. Only one (deposition 222) had been deliberately covered by large flints, the rest were buried by normal silting processes or by layers of soil thrown over the bodies.

Leaving aside the neonatal burials, which are difficult to assign to a particular ceramic phase, there was no discernible concentration of burials in any particular period. The pair of burials in P2100 and one other belonged to cp 3, two were of cp 5, two of cp 6 and two of cp 7. The sample is small but would support the view that the practice of inhumation in pits occurred throughout the life of the fort.

Deposition category B: individual incomplete skeletons

Only five incomplete individual skeletons were found in 1979–88. Of these three (depositions 189, 201 and 205) were neonatal infants and two of these are from small specially dug pits, This group is best considered with the complete neonatal burials of deposition category A since a number of post-depositional factors could account for the absence of some of the more fragile bones.

Of the remaining two depositions, 214 was a female of 25–30 largely complete apart from the arms and parts of the legs, while deposition 239 was a male of 18–22 missing most of his arms and legs. Both were lying on the bottoms of pits. It is possible that the missing bones were removed, perhaps by scavengers, at or soon after the time of deposition.

Deposition category C: charnel pits

Five depositions were identified in which groups of bones belonging to more than one individual were found.

Of these the most complex was deposition 242 – a collection of human bones which was deposited within a lens of black carbonized material on the irregular base of an unfinished pit (P2496) (Fig 8.3). The bones comprised:

a) child *c* 12: femur and scapula
b) male *c* 20: partial skeleton
c) male *c* 25: fragmentary skull
d) female? 25–35: fragmentary skull
e) female adult: pelvic girdle, thoracic vertebrae and ribs

This particular assemblage is not dissimilar to the masses of disarticulated bones found in the 'charnel pits', P923 and P1078, excavated in 1969–78. All three belong to cp 7.

The other four assemblages of human bones were smaller. Deposition 245 (P2509) comprised a nest of three juvenile skulls together with a small group of long bones. Deposition 199 (P1545) was the partial skeleton of a child of 10–12 less skull found together with the mandible of an adult. Deposition 224 (layer 1743) consisted of a collection of isolated bones from one or more adults and one or more juveniles. Deposition 221 (P2183) included the skull of a female together with part of the torso of a male.

It is interesting to note the category C depositions contain a far greater than average percentage of young juveniles.

Deposition category D: skulls and fragments of skulls

In all, from the excavations of 1979–88, nine complete or largely complete skulls have been recovered together with isolated fragments, mainly frontals, parietals and occipitals from a further 28 contexts. The complete and near-complete skulls may be listed as follows in Table 8.2.

Table 8.2 List of complete or near complete skulls

deposition number	*pit number*	*cp*	*sex*	*age*	*position in pit*
196a	P1530	7	M	20–35	middle
b			M	20–30	middle
208	P1698	7	M	20–25	lower/bottom
215	P2030	6	F	20–30	bottom
227	P2269	7	F	30+	top
245a	P2509	3	–	10–12	middle
b			–	8–10	
c			–	15	
251	P2383	7	–	adult	upper

Taken together with the six complete or near complete skulls found in 1969–78 (excluding the two depositions of frontal bones only), seven belong to young males between the ages of 17 and 35, four belong to juveniles and three to females. The sample is therefore clearly biased to males of fighting age. While skulls have been found in all periods there is a concentration in cp 7.

Two of the depositions found in the last ten years contained more than one skull. Deposition 245 comprised three juveniles together with a number of other long bones (Fig 8.2) while deposition 196 contained the skulls of two young males both bearing marks of sword wounds (p 423) (Fig 8.4).

Deposition category E: pelvic girdles

The deposition of pelvises was selected for special mention in Volume 2 because of the distinctive nature of deposition 47. Two further examples have been recovered (depositions 193 and 230), both were female and both fragmentary. One was found in a post-hole the other in a stratified layer behind the rampart. The circumstances of discovery were in no significant way different to those of the isolated bones of category F and therefore add little support to the suggestion that the pelvis was selected for special treatment.

Link to Next Section

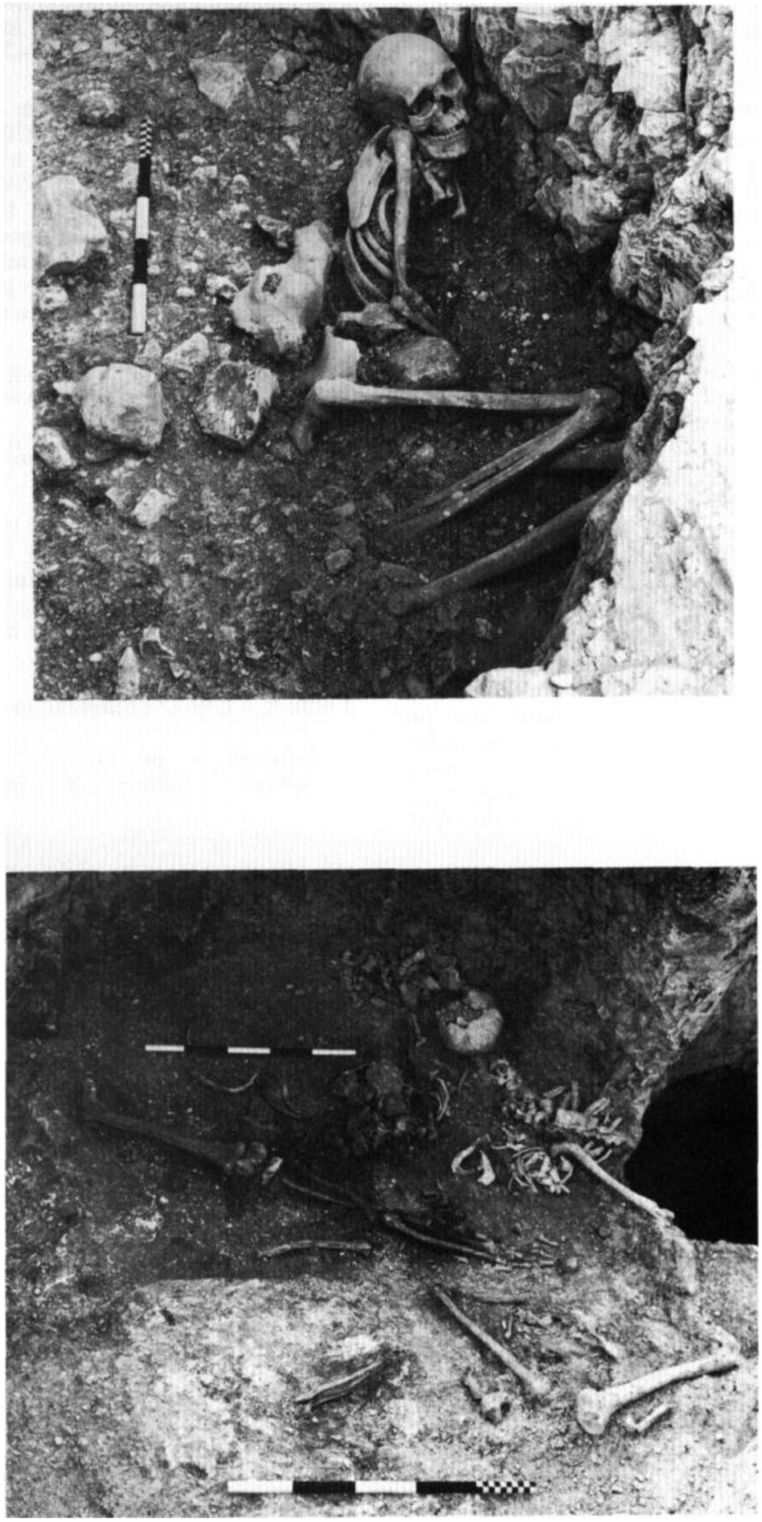


Figure 8.3 Burial in P2218 (top) and burials in P2496 (bottom).

Link to Previous Section

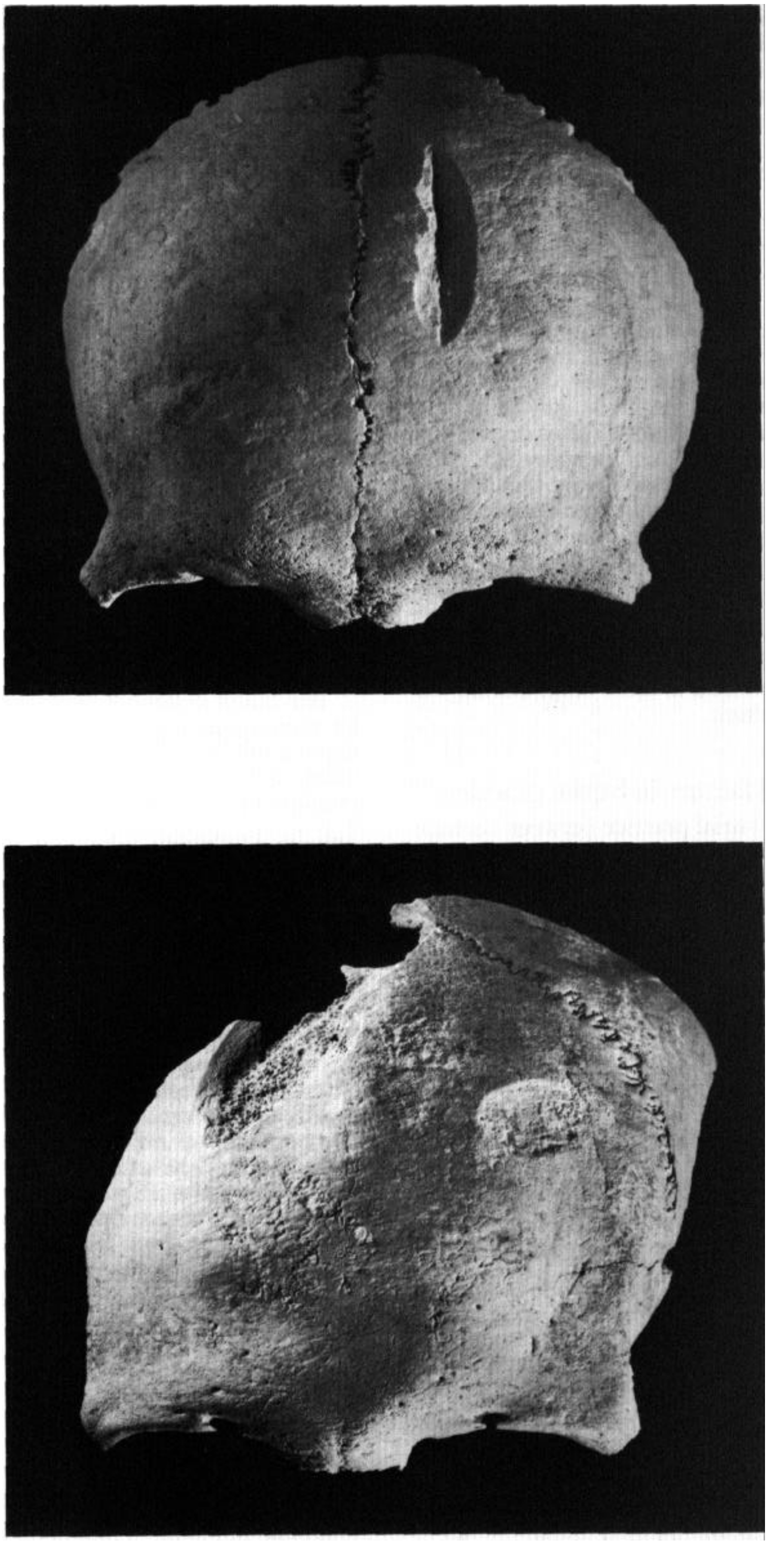


Figure 8.4 Weapon marks on skulls (scale 2:3). Above: deposition 196(b) showing single sword wound to frontal bone. Below: deposition 196(a) showing multiple sword wounds to frontal and parietal bones.

Link to Next Section

Deposition category F: individual and fragmentary bones

If we include within this category isolated fragments of skull and of pelvis (from categories D and E above) together with all other isolated bones then 95 contexts have produced isolated bones or bone fragments (only occasionally were there two fragments in one context). Of these 54 were pits, eight were post-holes and 33 stratified layers. The commonest occurrences were bones of the skull (38) and mandibles (11). The axial skeleton was under represented with only 6 vertebrae, 3 scapulae, 3 rib fragments and 3 pelvis fragments. Limb bones occurred more frequently: humerus, 9; radius 1; ulna, 3; femur, 11; tibia, 10; fibula, 3. In addition 9 phalanges were recovered.

Although the sample is too small to permit detailed analysis it is clear that skull fragments and mandibles occurred in a disproportionately large number. One possible explanation for this is that skulls may have been carefully curated, perhaps as trophies. This is implied by the numbers found in deposition category D. The isolated fragments could have derived from this set, the mandibles falling off as the connecting tissue rotted while accidental breakages could explain the fragments of cranium. Of the other bones it is interesting to note the disproportion between the axial skeleton (less skull) and the long bones. This, however, is complementary to the burials of deposition category B, which tend to be missing limbs, and could therefore be the result of the extremities becoming detached at some stage during the process that led to deposition.

8.1.5 Chronological factors in burial practice

To make comparisons of burial practice between ceramic phases using the recorded figures is potentially misleading for three reasons: the different ceramic phases last for different periods; the density of pits varies in each phase irrespective of phase duration; and a far greater volume of cp 6 and 7 layers has been excavated in comparison with layers of cps 3–5. Clearly to be able to make meaningful comparisons it is necessary to apply various correction factors. Since the data to enable these to be calculated has not yet been assembled detailed consideration of chronological variation within the burial data will be reserved for Volume 6.

Taking the data in its uncorrected form there appears to be little significant change in burial practice throughout the 500 years or so when the fort was in active use. Table 8.3 sums up the evidence.

Table 8.3 Deposition categories by phase

deposition categories	*cp 3*	*cp 4*	*cp 5*	*cp 6*	*cp 7*	*cp 7/8*	*cp 8*	*unphased*
A	3	0	2	2	5	0	0	1
B	1	0	0	0	3	0	0	2
C	2	1	0	1	1	0	0	0
D&D/F	8	4	4	5	15	1	1	0
E	1	0	0	1	0	0	0	0
F	10	1	1	7	29	2	0	4
Total	30	6	5	16	50	3	1	7

The only slight difference appears to be in categories B and C. In the former (single dismembered bodies) there is a concentration in cp 7 while in the latter (multiple dismembered bodies) there is a slight concentration in cp 3. The numbers, however, are so small that this may well be fortuitous. On present evidence it is simpler to conclude that the full range of burial ritual was in operation throughout the life of the fort without significant variation or intensification.

8.1.6 The spatial distribution of human remains

The spatial distribution of human remains will be considered in detail in Volume 6 in relation to other forms of spatial burial and to the overall density of activity at different stages in the fort's development. Simple distribution maps of the kind published in Volume 2 (Figs 8.6–8.9) while giving a very general spatial impression can now be much improved upon.

8.1.7 The population structure of the skeletal remains

It was established in Volume 2 that the human remains deposited within the hillfort do not represent the totality of the population which inhabited the site nor, necessarily, are they a random sample of that population. In all probability they were selected by processes now totally unrecoverable and subjected to complex rituals before what remained was finally deposited in the ground. Thus the burial assemblage cannot be used to reconstruct the population. A few simple statistics, however, may throw some light on the methods of selection through which the human remains passed before ending up in the soil.

In the tables below we have selected the 91 depositions for which an assessment of age or sex is possible from the depositions in categories A–D. The data is presented in Table 8.4a. Tables 8.4b, c and d give a more detailed breakdown by deposition type.

Taking the aggregate figures in Table 8.4a it is clear that, allowing for the different length of each period, after a neonatal peak, burial rate was fairly consistent for the first 30 or 50 years of life. Thereafter rate declined rapidly, very few of the bodies being older than 50. This pattern is not unlike that which might be expected if the burials reflected the natural death rate of the population. We cannot, however, assume this and that some other factor is involved is suggested by the considerable disparity in numbers between male and female burials. One possible explanation, of course, is that in a warlike society male mortality is likely to be greater than female in the early years. This may be so but there is no compensatory increase in female deaths in later years. It is simplest therefore to regard the disproportion as being the result of some socially controlled selection process.

Turning now to the different types of deposition, the neonatal group clearly represents a cohesive subset. If the three partial burials (B) can be regarded simply as disturbed complete burials then the group of 12 can be taken together as a single rite for disposing of new born fatalities.

The inhumation of complete bodies, usually on pit bottoms (deposition type A less neonatals) accounts for about one third of the total sample. Compared with the aggregate figures there is little discernible difference except for the higher percentage of older bodies afforded this type of burial. There is the same disparity between male and female numbers in total but whereas the female numbers might represent normal death rate, the sample contains an exceptionally high percentage of young men between the ages of 14 and 35 (39% of the total burials in category A less neonatals). This must reflect a deliberate selection but whether by mortality in battle or some other factor is uncertain. It is tempting to explain a similar

Link to Previous Section

peak in the number of male skulls (deposition category D) as reflecting an interest in head hunting among young warriors.

The dismembered bodies in categories B and C were selected in a different manner. Leaving aside the neonatal burials, 40% of the sample were children and juveniles below the age of 14. This compares with only 18% in category A. While it might be argued that 25 of the 38 burials come from three pits (P923, P1078 and P2509), which could have been filled following massacres in which young children suffered disproportionately, there was an equally high proportion of children and juveniles in the remaining 12 pits. It is simpler therefore to accept the figures on their face value and to suppose that the ritual leading to the deposition of partially dismembered bodies favoured children.

Sufficient will have been said to show that many different factors were involved in the selection of the human remains and in their mode of deposition. We cannot assume, therefore, that the sample in any way reflects a 'normal' Iron Age population nor is it representative of the full range of rites involved in the disposal of the dead.

8.1.8 Discussion

While the data presented above is complex and varied it is possible to distinguish certain broad patterns which may lead to useful generalizations. Four groups can be identified representing discrete concepts:

a) The burial of complete bodies on pit bottoms.
b) The burial of neonatal infants.
c) The deposition of partial bodies.
d) The deposition of skulls.

The isolated human bones which occurred widely about the site were most likely the result of a variety of processes none of which need have involved deliberate deposition.

The burial of neonatal infants in partially filled pits or small holes dug in the chalk may be interpreted as a 'normal' burial rite involving little more than the efficient removal of dead infants in a manner which continued throughout the Iron Age and Roman period. The other three modes of deposition, however, seem to involve more complex concepts. It is tempting to regard the complete burials on pit bottoms as some kind of propitiatory rite. If so then human burial of this kind is best regarded as a subset of a pattern involving the deposition of other categories of material in similar positions. The deposition of skulls, singly or in groups, is most likely to reflect some aspect of trophy-gathering, but the act of deposition was probably also regarded as a means of propitiation.

The deposition of partial bodies is more difficult to understand and may have involved a range of beliefs and rituals since there is no reason to regard a single archaeological category as having conceptual validity in the Iron Age. Various possibilities suggest themselves. The deposition could reflect the clearing up after massacres, the final burial of bodies exposed after a period of excarnation, the remnants of ritual dismemberments or simply the effects of scavengers on bodies originally deposited complete. It is unlikely that we will ever be able to get beyond rehearsing possibilities to the actual ritual and belief involved. These comments are offered as an interim statement pending the more detailed analysis of data relating to belief systems in general.

Table 8.4 Depositions by age and sex

A Depositions of types A–D

	M	*F*	?	*Total*
Neonatal	–	–	12	12
1–14	–	–	21	21
14–25	12	7	4	23
25–35	16	6	0	22
35–50	7	2	1	10
50+	1	2	0	3
	36	17	38	91

B Depositions of type A

	M	*F*	?	*Total*
Neonatal	–	–	9	9
1–14	–	–	5	5
14–25	4	2	1	7
25–35	7	1	0	8
35–50	2	2	1	5
50+	1	2	0	3
	14	7	16	37

C Depositions of types B and C

	M	*F*	?	*Total*
Neonatal	–	–	3	3
1–14	–	–	15	15
14–25	6	3	3	12
25–35	3	4	0	7
35–50	4	0	0	4
50+	0	0	0	0
	13	7	21	41

D Depositions of type D

	M	*F*	?	*Total*
Neonatal	–	–	–	–
1–14	1	–	–	1
14–25	2	2	–	4
25–35	6	1	–	7
35–50	1	–	–	1
50+	–	–	–	–
	10	3	0	13

8.2 Anatomical considerations

by Bari Hooper

8.2.1 Introduction

The bones are a similar assemblage to those previously described in Volume 2, and the criteria by which their sex, age, stature, etc, were determined will be found in that volume (pp 463–5).

All tables in this present report are derived from the previously published data in Volume 2 combined with that of the present group.

8.2.2 Estimation of age at death

The mean age at death in early populations is generally lower for females, and the information gained from the first group of bones examined from Danebury confirmed this. The mean age at death for males and females was found to be 29.4 and 26.5 years respectively. But the new figure based upon the information from both groups slightly reverses this pattern, see Table 8.5 overleaf.

Table 8.5 Mean age at death of adults

Cabined male and females	*males*	*females*
30.0 years (76)	29.1 years (37)	31.7 years (19)

Of the children and infants, it will be seen from Table 8.6 below, that just over a quarter of them succumbed in the first two years of life. This figure is in all probability too low, reflecting the delicate nature of infant remains. Several of the adult bones bear the marks of carnivore teeth upon them.

Exposed or lightly buried infants if subject to the attentions of animal predators would in many cases have been completely destroyed.

It is interesting to note that having survived the first five critical years of life, nearly 40% of the children died between the ages of 8 and 12 years. The reason for this relatively high mortality at this period of life is not clear.

Table 8.6 Percentage distribution of ages at death of children and infants

Age in years	*no*	%
0–2	14	28.57
2–4	2	4.0
4–6	4	8.1
6–8	3	6.1
8–10	10	20.4
10–12	9	18.3
12–14	2	4.0
14–16	5	10.2
16–18	1	2.0

8.2.3 Determination of sex

The process of deciding the sex of an adult human skeleton is dependent upon the survival of those bones which most clearly emphasize sexual dimorphism. A complete skeleton in a good state of preservation is usually fairly easy to assign to a particular sex, and even an incomplete specimen may have sufficiently well-defined sex characteristics among the surviving bones for a diagnosis to be made with confidence.

The bones which provide the most information for this purpose are the skull, pelvis, sacrum, scapula, clavicle and sternum, and to a lesser extent the long bones. Where all of these bones are present about 80% of skeletons may be sexed without difficulty. Of the remaining 20%, 10% are difficult to sex due to their dimorphic characteristics being too ill-defined, the remainder are too morphologically ambiguous to be safely assigned to either group.

Using the above criteria a total of 37 males and 19 females were clearly identified. The remains of a minimum of 24 other adults was also noted, but their bones were either too few or too fragmentary to sex.

8.2.4 Estimation of stature

Table 8.7 Estimated stature of adults

Sex	*no*	*Mean*	*Range*
Male	15	166.5 cm	156.9–178.7 cm
Female	11	153.3 cm	140.5–160.2 cm

Standard error = ± 35 mm

8.2.5 Skeletal adaptation

A total of 12 adults (7 females, 4 males and an unclassified odd tibia) have 'squatting facets' upon the tibiae. Of the complete pairs, with one exception, all are bilateral facets.

8.2.6 Epigenetic variants

Minor morphological variants of the skull were noted as follows.

Table 8.8 Epigenetic variants

	no	%
Lambdoid wormian bones	32	52.4
Parietal notch bones	2	3.4
Bregmatic bones	1	1.7
Metopism	7	10.6
Parietal foraminae	18	26.4

In addition to these skull variants, other anomalies of epigenetic origin were found as follows: Deposition 241, a male child of about 12–13 years of age, has an open posterior arch in the first cervical vertebra; the anterior arch has a patent suture. Deposition 240, a male of 25–30 years of age, has a small crack running at right angles to the median plane in the calcaneal surface (posterior) of the right talus, indicative of an imperfectly formed *os trigonum.*

Congenital anomaly

Deposition 214, a female of 25–30 years of age, has an anomalous sacrum. The first sacral vertebra is completely fused to the alae at each side as normal, but the join between this segment and the second sacral vertebra is patent on both the pelvic and dorsal aspects. On the pelvic side there is an open suture between the segments, and on the dorsal aspect the inferior articulations of the first sacral vertebra are in contact but not fused to the corresponding superior facets of the second sacral vertebra. As a consequence of this anomaly there is an hiatus in the wall of the sacral canal in the second sacral vertebra. In life this would have been closed with fibrous tissue.

Muscular development

Deposition 240, a man of 25–35 years of age, has a strongly developed insertion for the pronator teres muscle in the left radius. The pronator teres rotates the radius upon the ulna (pronation-supination) and assists in the flexion of the elbow joint. This strong development is probably a consequence of the repetitive use of this arm in a manual task involving a tool requiring a rotary movement under pressure. An activity such as rope-making might be the cause of this.

Deposition 248, a man of more than 35 years of age, has evidence on both knees which suggests that the ligamentum patellae were subjected to heavy usage during life. Strong pressure must have been applied by the quadriceps femoris muscles, with the knees being regularly flexed as in rising from a squatting position.

8.2.7 Pathology

Osteoarthrotic lesions were noted in the spines of three individuals in the present group (1♂ 2 ♀). In one of these, the male designated as deposition 223, there is much evidence of senile decay, including mild arthrotic degeneration of the cervical and thoracic vertebrae and in the distal phalanges of both feet. A re-examination of the skeletons of the first group also revealed slight traces of osteoarthrosis in the spine of one female (in addition to the two already mentioned in Volume 2).

The total number of people affected with osteoarthrosis of the spine at Danebury is 12 (7♂ 5♀ 0). The percentage of spinal osteoarthrosis present is 37.5% for the whole group (33.3% ♂ and 45.0% ♀). It must however be emphasized that though the disease is widespread, most of the victims are only mildly affected. This suggests that these people were not generally involved in heavy agricultural labour.

Osteoarthrosis was also noted in a hip joint; an acromio-clavicular joint; two metatarso-phalangeal joints; and in two temporo-mandibular joints (see Volume 2).

Periostitis

Three adult males (depositions 222, 240 and 262) have slight periostitic 'graining' upon some of their long bones. This 'graining' is known to be the first stage of a periostitic reaction to an infective agent. In its later stages the reaction takes the form of periosteal bone being laid down along the diaphysis. In the present instances depositions 222 and 262 both have very thin layers of superficial bone present.

In deposition 240, the disorder is in its early stages., but is widespread, involving the right femur (left missing), tibiae, and right radius. In deposition 222, only the left tibia is affected. In the third example, deposition 262, consisting only of a pair of femora, both are affected.

Periostitic lesions such as these are frequently reported in early bones, and a non-specific pyogenic infection is suspected as the causative agent. To date no positive identification has been made of this infection.

Coxa vara

An odd right femur head of an adult (from Pit 2509 layer 2) has its neck bent downward, a condition known as *coxa vara*. The normal neck shaft angle of the femur is in the region of 125 degrees. The deformity is a consequence of mechanical stress brought about by the weight of the body upon a defective bone.

Its principal cause is the upper femoral epiphysis slipping during late childhood, either as the result of trauma or by a gradual displacement by an unknown cause. It can also result from a fracture in the region of the trochanter or femoral neck, with subsequent malunion. In rare instances it may be a congenital condition in which part of the femoral neck fails to ossify. In the present case it is probably the result of a trauma during adolescence.

Radial pitting of the skull

Two skulls in the present group, a neonatal infant and a child of 8–10 years (depositions 219 and 245), have slight radial pitting of the parietal bones. If these are added to those previously noted with this condition (Volume 2), the total affected is ten (five children, one adolescent, one neonatal infant and three adults).

The precise cause of this hyerostotic condition is uncertain. The perforations radiate from the primary centres of ossification, but in none of these cases do they conform with the classic 'crew-cut' trabeculae associated with hereditary anaemic disorders such as thalassemia and sicklemia. They may be a consequence of a vitamin deficiency or of iron-deficiency anaemia (see remarks under *cribra orbitalia* below).

Cribra orbitalia (Usura orbitae)

In the present group of skeletons three have the osteoporotic condition of the orbits known as *cribra orbitalia* (called Usura orbitae in Volume 2). These three have been added to the 23 individuals previously noted with the condition (Volume 2, Table 53, p 468). The new total of 26 represents 30.9% of the 84 complete or partial skulls having one or both orbits available for inspection. The 26 individuals have a total of 44 lesions between them, of which 18 (69.2%) are bilateral and three (11.5%) unilateral. In the remaining three cases only one orbit is present. Thirty-five cases (79.5%) are mild infections having 1° lesions; four (9.0%) are slightly worse, having II° lesions, and five (11.3%) have advanced or III° lesions. A breakdown of the condition as it affects adults and children is shown below.

Table 8.9 Numbers and percentages of adults and children affected by *cribra orbitalia*

	no	*affected*	%
Males*	34	8	23.5
Females*	16	4	25.0
Children (2–16 years)	26	14	53.8
Infants (0–2 years)	8	0	0.0
Totals	84	26	30.9

* including probable identifications of each sex

A very brief account of *cribra orbitalia* was given in Volume 2., without any firm conclusion as to its cause or causes being advanced. The aetiology of the condition is still the subject of debate, but a consensus of current opinion deems it to be a manifestation of iron-deficiency anaemia. It is sometimes found in association with *cribra cranii* (porotic hyperostosis of the vault), which is also widely believed to be an indication of iron-deficiency disease. At Danebury porotic changes emanating radially from the ossification centres of the parietal bones of the skull were noted (see above), but in only three of these is *cribra orbitalia* also present.

Iron-deficiency anaemia is still a very common disease, especially among women. In modern populations it is seldom caused solely by an insufficiency in the diet, but in earlier populations living in more precarious circumstances, its presence may well indicate dietary irregularity.

Anaemia of a dietary origin is brought about when the food contains an insufficiency of iron to provide and maintain the production of haemoglobin, the oxygen-carrying protein and iron substance making up the red pigment of the blood. The average daily requirement of

Link to Next Section

9 Environment and economy

9.1 The Danebury environment

A general description of the Danebury environment has been given in Volume 2 (475–6) and there is little that can usefully be added at this stage. The whole question of the exploitation and evolution of the environment is, however, currently being studied as part of the Danebury Environment Programme which began in 1989 and is due to run until 1993. The results of that programme will be published in the seventh volume of this series.

9.2 Land snail analysis

by J G Evans and Tim Hewitt

The broad aims of the molluscan analysis from Danebury are both archaeological and zoological; they are as follows:

1. To detail the environment of the various archaeological phases and the environmental history of the hillfort and its surroundings.
2. To look at spatial variation in environment during the various phases.
3. To investigate problems associated with the function and nature of individual contexts.
4. To detail the molluscan assemblages through time and spatially at various scales.

Specific problems are:

1. The nature of the pit environments, especially after primary use.
2. The nature of the environments during the infilling of the quarry hollows.
3. The pre-rampart sequence.
4. The pre-linear earthwork environment, its spatial variation, and its comparison with the pre-rampart environment.

A particular problem is the identification of general environments from assemblages which are in extreme contexts such as pits. The main point is that the molluscs in a pit come from close by, so however extreme the pit environment in terms of moisture and shade, it will not have a diverse molluscan fauna unless the environment around the pit provides refuges for those species. The pit draws from the general environment and develops certain aspects of it, but these will not be developed if they are not there in the first place.

There are also taphonomic problems such as the redeposition of shells in rampart material and in pits where these have been deliberately backfilled, and the longevity of shells of certain species in buried soils due to differential preservation. The presence of distinctive assemblages, distinctive that is in their species composition, is a guide to autochthony, as is the occurrence of large shells of fragile species like *Vitrina pellucida.* High proportions of large and adult shells of species that survive differentially as tough apical fragments are also an indication of an autochthonous assemblage, *Pomatias elegans, Cochlicopa,* the Limacidae, the Clausiliidae and *Cepaea* being the main groups in question. The operculum of *Pomatias elegans,* especially if *in situ,* is another guide that a deposit-has-been little disturbed.

Analytical procedures follow Evans (1972), and the nomenclature is that of Kerney (1976). All samples weighed 1.0 kg, air-dry. The results of analysis are presented as tables (Tables 9.1, 9.2 and 9.3) and histograms (Figs 9.1, 9.2 and 9.3). The results are described in approximately chronological order, beginning with the linear earthwork outside the hillfort, then the buried soil under the hillfort bank, and finally the pits and quarry hollow sequence within the hillfort.

The Results of the Molluscan Analysis

The linear earthwork

Trench 133: tree hole. Tree hole sealed by turf line under linear earthwork. Three samples were analysed but shells were extremely sparse, only 12 in 3.66 kg being recovered; this was unexplained and annoying. The shells were all of woodland species, namely *Discus rotundatus, Carychium* and Zonitidae.

Trench 122: buried soil. Buried soil under linear earthwork, layer 1797, (Fig 9.1). Five samples as a vertical series were analysed (0 cm = surface of buried soil): 0–3, 3–6, 6–9, 9–12, 12–15.

The molluscan sequence (Table 9.1; Fig 9.1) shows detailed zonation, justifying the close sampling interval, At the base (9–15 cm), there is woodland; the small open-country component is likely to be from downward movement because these are not deposits but soil horizons where there is always some blurring. Then there is a transition zone which could indicate scrub (3–9 cm). Characteristic here is *Pomatias elegans;* many of the shells are adults, so this is not a question of differential preservation as sometimes happens in buried soils. There is also *Vallonia costata* which peaks here, so the ecological reality of the assemblage is assured. The change at 3 cm is abrupt; *Pomatias elegans* is virtually absent from the top sample, and *Vallonia costata* does not respond. Instead, *Pupilla muscorum* increases, as do the typical grass-sward species, *Vallonia excentrica* and *Vertigo pygmaea,* so an environment of stable grassland with some bare ground is likely. Cultivation of this soil at any time is unlikely in view of the fine stratification of shells.

Trench 133: *buried soil.* Turf-line (F1888) under bank of linear earthwork, layer 2067 (Table 9.1; Fig 9.1). This was very thin, much less well-developed than turf-line 1797 in trench 122, and only two samples were possible. These were (0 cm = buried soil surface): 0–2 and 2–4 cm.

Both assemblages are similar, with *Pupilla muscorum* as the predominant species. There are similarities with the upper part of the profile of layer 1797, but note the paucity of the grass-sward species, especially *Vertigo pygmaea* and *Vallonia excentrica.* So this area had a thinner vegetation cover of grassland, with far more bare ground or poaching – a bit of local variation, possibly due to overgrazing.

The main defence sequence

Buried soil beneath prima y rampart sectioned in 1988 (layer 2042). This was well preserved with a thick turf-line (0–9 cm), a flint horizon (9–12 cm) at its base, and a brashy chalky zone below that (12–15 cm+). A vertical series of samples was taken as follows (0 cm = surface of buried soil): 0–3, 3–6, 6–9, 9–12, 12–15.

There is a sequence (Table 9.1; Fig 9.1), but not as striking as that in the pre-linear earthwork soil, layer

Link to Previous Section

Table 9.1 Danebury, land Mollusca. Old ground surfaces (= buried soils): 1797, below linear (1987); F1888, below same linear (1988); 2042, below hillfort rampart (1988); 2027, interface of primary and secondary ramparts (1988).

Context	*1797*					*F 1888*		*2042*					*2027*
Depth below soil surface	12–15	9–12	6–9	3–6	0–3	2–4	0–2	12–15	9–12	6–9	3–6	0–3	
Pomatias elegans >2.0 mm	7	16	24	33	7	4	3	31	42	31	18	12	–
Pomatias elegans <2.0 mm	26	40	60	64	31	29	28	64	75	71	46	37	19
Pomatias elegans, operculae	4	2	3	4	–	–	–	2	1	–	1	1	–
Carychium tridentatum	40	56	38	37	7	1	1	2	3	1	–	1	–
Cochlicopa	7	3	5	19	19	36	37	44	76	79	61	44	16
Vertigo pygmaea	4	2	4	8	30	2	3	6	3	11	4	4	1
Pupilla muscorum	4	10	29	61	175	266	195	216	628	754	712	461	40
Vallonia costata	5	5	24	50	58	38	25	45	71	69	36	27	248
Vallonia excentrica	3	23	47	89	253	46	27	104	152	133	112	95	79
Acanthinula aculeata	4	2	1	–	–	1	–	2	4	1	1	2	2
Ena montana	–	–	1	3	2	1	–	–	1	–	–	–	–
Ena obscura	–	–	–	–	–	–	2	1	1	1	–	–	–
Punctum pygmaeum	–	–	3	1	5		–	1	1	6	3	1	–
Discus rotundatus	26	27	29	27	4	1	1	7	4	1	3	1	4
Vitrina pellucida	–	1	–	–	–	–	–	1	2	1	–	1	51
Vitrea crystallina	1	–	–	–	–	–	–	–	–	–	–	–	–
Vitrea contracta	15	10	6	2	1	–	–	1	–	–	–	1	1
Nesovitrea hammonis	–	–	1	1	4	–	–	–	1	–	–	–	–
Aegopinella pura	12	8	8	2	3	–	1	1	–	2	–	–	–
Aegopinella nitidula	1	4	1	6	2	–	–	1	2	–	3	1	–
Oxychilus cellarius	7	6	11	11	2	1	–	2	2	2	1	–	2
Limax	1	–	–	1	1	2	1	6	7	3	1	1	–
Limacidae	25	55	44	51	32	35	52	68	119	132	115	91	49
Cochlodina laminata	1	2	6	15	6	1	1	5	4	2	1	–	1
Clausilia bidentata	5	11	15	19	18	9	10	14	19	24	13	7	3
Helicella itala	2	4	14	34	46	27	13	22	67	89	74	45	19
Trichia striolata	–	–	1	–	–	–	–	–	–	–	–	–	–
Trichia hispida	2	7	5	4	8	4	–	2	3	4	6	5	419
Helicodonta obvoluta	–	–	–	1	1	–	–	–	–	–	–	–	–
Helicigona lapicida	–	2	2	1	3	–	–	3	1	1	1	1	–
Cepaea nemoralis	–	–	–	–	–	–	–	–	1	2	–	–	–
Cepaea hortensis	1	–	–	1	–	–	–	–	–	–	–	1	1
Cepaea	2	4	9	19	8	9	9	27	18	19	21	9	9
Ova	–	–	–	–	–	–	–	–	2	3	4	3	1

1797 in trench 122, and the whole facies is more open. Indeed, the assemblages as a whole are almost identical to that from beneath the linear sectioned in trench 133 (layer 2067), with predominant *Pupilla muscorum.* But the sequence is more subtle. *Pomatias elegans* and *Vallonia* are common in the lower samples (9–12 cm) but they then decrease upwards as *Pupilla* increases. Then *Vallonia* shows a slight come back in the top sample, but only *Vallonia excentrica,* while *Pupilla* falls off.

The absence of a woodland assemblage in the lower part of the profile by comparison with the profile of layer 1797 is a real feature, not a reflection of the quality of the soil sections available for sampling, for both were complete. It means that this area was cleared of woodland for at least a century prior to the construction of the rampart. In the middle part of the profile there was much bare ground. At the top, there was stable, short-turved grassland, probably grazed quite heavily; the antipathetic behaviour of the two species of *Vallonia* in the sequence indicates a change in grassland type from species rich, lightly grazed to species poor, heavily grazed. Absence of cultivation, at least for a very long time prior to the construction of the rampart, is indicated by the soil stratification and the very large numbers of shells.

The interface between the primary and secondary rampart sectioned in 1988 (layer 2027) (Vol 4, fig 3.4, section 44). A single sample was analysed (Table 9.1). The assemblage was strikingly different from that under the primary rampart, being made up largely of *Trichia hispida* and *Vallonia costata.* The significance of this is uncertain, but I would say it implies (a) that there was a standstill phase here, ie this is not just a dump of soil, and (b) that the environment was open but damper than that of the pre-rampart soil. Its north-facing aspect may also make a difference. There are large numbers of large, well-preserved, specimens of the fragile shell of *Vitrina pellucida* and this clinches the autochthonous nature of the assemblage.

The pits

Pit 1114. Samples were taken from about two-thirds down the fill, downwards, from five layers of fine material (silts) which alternated with coarse layers (not sampled) (Fig 3.4, section 44). This is the primary fill. The samples came from a point immediately above a large chalk block, marked ‘6’ on the section. (The upper two-thirds of the fill had been excavated before sampling took place.) The samples are all from layer 3 and are subdivided as silts 1 (top), 2, 3, 4 and 5.

The assemblages from all five layers are virtually identical so they can be considered as one (Table 9.2; Fig 9.1). There is a mixture of woodland and open-country species, and they are in equal abundance in terms of shell

Table 9.2 Danebury, land Mollusca. Pits 1114 and 2557; () = intrusive.

Feature	*P1114*					*P2557*						
Layer/depth (cm)	5	4	3	2	1	115–125	95–105	75–85	55–65	35–45	15–25	0–5
Pomatias elegans >2.0 mm	16	13	29	5	16	–	–	–	–	–	–	–
Pomatias elegans <2.0 mm	22	24	16	4	14	3	1	1	1	1	1	3
Pomatias elegans, operculae	1	–	2	1	–	–	–	–	–	–	–	–
Carychium tridentatum	24	32	39	11	27	–	–	–	–	–	2	36
Anisus leucostoma	–	–	–	–	–	–	–	–	–	–	1	–
Succineidae	–	–	–	–	–	–	–	–	–	–	2	–
Cochlicopa	13	23	20	12	17	4	2	3	6	4	99	42
Vertigo pusilla	–	–	–	–	1	–	–	–	–	–	–	–
Vertigo pygmaea	–	–	–	1	2	–	–	–	–	–	1	2
Pupilla muscorum	31	35	30	32	14	52	13	43	29	57	103	128
Lauria cylindracea	1	–	–	–	–	–	–	–	–	1	6	1
Vallonia costata	22	22	21	21	9	195	47	172	67	237	951	399
Vallonia excentrica	17	30	20	16	6	12	–	6	9	3	48	59
Acanthinula aculeata	4	5	5	3	5	2	–	–	–	–	–	–
Ena montana	–	1	–	–	3	–	–	–	–	–	–	–
Ena obscura	2	1	4	–	1	1	–	–	–	–	2	2
Punctum pygmaeum	3	–	4	–	–	–	1	–	–	1	2	4
Discus rotundatus	35	33	25	26	19	–	–	1	–	2	1	53
Vitrina pellucida	1	2	3	3	–	1	2	3	1	–	35	12
Vitrea contracta	3	4	2	2	1	–	–	–	–	–	1	12
Nesovitrea hammonis	1	–	–	–	–	–	–	–	–	–	–	3
Aegopinella pura	6	6	10	2	11	1	–	–	–	–	–	–
Aegopinella nitidula	6	3	3	5	2	–	–	–	–	–	–	6
Oxychilus cellarius	5	6	10	5	6	4	4	2	7	16	96	39
Oxychilus alliarius	–	–	–	–	–	–	–	–	–	–	–	1
Limax	–	–	–	1	–	2	–	–	–	–	9	2
Limacidae	66	64	35	46	38	9	–	7	6	14	33	44
Cecilioides acicula	–	–	–	–	–	–	–	–	–	(1)	(3)	(1)
Cochlodina laminata	–	4	1	3	3	1	–	–	–	–	1	–
Clausilia bidentata	10	7	11	10	7	–	–	3	–	–	1	11
Candidula	(3)	–	–	–	–	–	–	–	–	–	–	–
Helicella itala	5	7	–	3	4	20	4	13	15	15	25	17
Trichia striolata	1	1	4	–	1	–	1	–	–	–	–	–
Trichia hispida	7	15	30	27	11	58	20	52	57	64	437	306
Helicodonta obvoluta	–	1	–	–	–	–	–	–	–	–	–	–
Arianta arbustorum	?l	–	–	–	–	–	–	–	–	–	–	–
Helicigona lapicida	1	1	1	–	–	–	–	–	–	–	–	–
Cepaea	2	8	3	3	3	2	–	–	1	2	19	12
Ova	1	–	–	–	–	–	–	1	–	4	2	2

numbers. This is unlikely to be taphonomic mixing in view of the abundance of shells in all the samples, the large specimens of fragile species like *Vitrina pellucida*, and the high proportion of large to small *Pomatias elegans*, including several operculae. The woodland assemblage is a diverse one, so this is not a specialized rock-rubble fauna like that from Pit 2557, but a true woodland one. As well as the usual species from chalk woodlands, there are three rarities, *Vertigo pusilla*, *Ena montana*, and *Helicodonta obvoluta*, and these ally the assemblage with undisturbed woodland. Also present is *Pomatias elegans*, the only place on the site later than the pre-rampart surface where this species is found *in situ*.

The environment at the time of early infilling was largely woodland or scrub with open-country influence. We can say this with certainty in view of the fact that the assemblages are autochthonous and close to the bottom of the pit. In other words, there was no time for woodland snails to migrate from anywhere other than the immediate locality. So the pit may have been dug in a shaded environment or at least close to the woodland or scrub edge, and in this respect it differs from the other nine pits whose molluscan assemblages have been investigated, all of which were dug in open country although the upper fills of some have woodland assemblages. But that is not the same thing.

Pit 1114 also stands out in the presence of *Pomatias elegans* which elsewhere on the site is absent from post-rampart contexts apart from a small residual (allochthonous) component. The pit is a very large one typical of the latest phase of cp 7. Little pottery was found and none of it need be later than cp 6. The pit is sited in the interior part of the fort well clear of the quarry hollow. Its assemblage represents the environment, perhaps localized, of an area which shows little sign of intensive occupation towards the end of the fort's life.

Pit 2557. Thirteen samples were taken (measurements in cm below excavation surface) (Fig 3.4, section 44) but only alternate samples have been analysed; these are: 0–5, 15–25, 35–45, 55–65, 75–85, 95–105 and 115–125 (Table 9.2; Fig 9.1).

The assemblages from 15 cm downwards are fully open-country ones, with *Trichia hispida*, *Helicella itala*, *Pupilla muscorum* and *Vallonia costata* as the main species; the last is particularly characteristic, comprising 50% in five of the assemblages. Another distinctive feature is the consistent presence of a single woodland species, *Oxychilus cellarius*, in low abundance, while all

Table 9.3 Danebury, land Mollusca. Quarry hollow section, 1986 and 1987. This is a continuous sequence (Fig. 4.113, for location of samples); () = intrusive.

Sample series	*DA 87 I*					*DA 86 IV*							
Depth in cm	41–45	30–33	20–23	6–13	0–3	135–145	115–125	95–105	75–85	55–65	35–45	15–25	0–5
Pomatias elegans	1	1	3	–	–	1	–	–	1	4	5	3	3
Carychium tridentatum	–	–	–	–	–	–	1	8	89	8	164	209	511
Cochlicopa	1	2	23	–	3	7	4	8	106	29	10	14	10
Columella edentula	–	–	–	–	–	–	–	–	–	–	14	8	1
Vertigo pygmaea	1	–	1	–	–	–	–	1	1	8	14	4	6
Pupilla muscorum	2	3	13	5	6	24	21	28	75	264	196	147	110
Lauria cylindracea	–	–	–	–	–	–	2	–	1	–	35	33	37
Vallonia costata	23	58	163	85	32	47	26	35	356	85	29	16	7
Vallonia excentrica	–	1	8	3	–	1	6	2	50	155	122	91	57
Acanthinula aculeata	–	–	–	–	–	–	–	–	–	–	–	1	13
Ena obscura	–	–	–	–	–	–	–	–	–	–	–	–	7
Punctum pygmaeum	–	–	–	–	–	–	2	1	5	2	42	23	125
Discus rotundatus	–	–	–	–	10	3	2	25	73	14	4	5	78
Vitrina pellucida	–	3	5	–	1	3	–	6	19	–	7	2	18
Vitrea contracta	–	–	1	–	–	–	3	16	15	1	36	32	47
Nesovitrea hammonis	–	–	–	–	–	–	1	–	4	1	4	3	3
Aegopinella pura	–	–	–	–	–	–	–	–	–	–	3	2	1
Aegopinella nitidula	–	–	–	–	–	–	1	2	46	4	3	2	29
Oxychilus cellarius	8	1	4	5	3	1	2	4	24	1	3	5	19
Oxychilus alliarius	–	–	–	–	–	–	–	–	–	–	–	3	–
Oxychilus helveticus	–	–	–	–	–	–	–	–	–	–	–	–	5
Limacidae	25	7	13	–	4	15	7	7	16	14	24	28	40
Euconulus fulvus seg.	–	–	–	–	–	–	–	–	–	–	7	2	5
Cecilioides acicula	–	–	–	–	–	–	–	(1)	(1)	(10)	(14)	(19)	(4)
Clausilia bidentata	1	2	1	–	1	–	–	2	23	1	–	4	22
Candidula intersecta	–	–	–	–	–	–	–	–	–	–	–	1	–
Cernuella virgata	–	–	–	–	–	–	–	–	–	3	17	36	17
Helicella itala	–	–	–	–	3	6	4	9	7	29	16	7	2
Trichta hispida	47	49	182	35	34	77	27	27	221	143	73	75	60
Helicigona lapicida	–	–	–	–	–	–	–	–	–	–	–	–	1
Cepaea hortensis and spp.	–	1	2	–	–	2	–	2	14	4	14	6	11

other woodland species are virtually absent. So the assemblage, while being basically indicative of open-country, is a specialized one. What does it mean? *Vallonia costata* is a versatile species, inhabiting, in addition to grassland, woods, screes and human environments; it is often a pioneer species, or so its abundance in the lower levels of ditches and pits indicates. *Oxychilus cellarius* is a species of rock rubble, underground places like caves and cellars (hence its name), and it can survive on animal food. May be these comments are a clue to the environment of infilling of Pit 2557 – much bare ground, sparse vegetation and crevices and hollows in loose chalk rubble. Note that *Vallonia costata* is abundant in many of the pits from the 1975 excavation (Evans in Cunliffe 1984), but never in the same extreme abundances and always with a more diverse assemblage; likewise, although *Oxychilus cellarius* is present in these assemblages, it is accompanied by other woodland species such as *Aegopinella nitidula* and *Vitrea contracta.*

The assemblage lacks *Pomatias elegans* and in this respect and in its uncompromisingly open-country nature is entirely different from that in Pit 1114. These differences are too extreme to reflect only the pit environments; the surroundings were almost certainly different as well. In view of the fact that *Pomatias elegans* can occur in quite open places as well as hedgerows and woodland, I would suggest the two pits are of different dates.

The assemblage from 0–5 cm has a significant woodland component, especially *Discus* and *Carychium,* as well as *Aegopinella* and *Vitrea; Vallonia costata* has fallen to a mere 33%. All this indicates surface stabilization and shading. A similar feature is seen in many of the pits from 1975, notably Pits 807, 813, 814, 818 and 819. The pit was dug close to the back face of the rampart in cp 3 in the midst of an area of dense occupation. The uppermost fill suggests that vegetation had taken a hold by the time the pit had filled.

Pit 2349 (Fig 9.2) (A table has not been presented because the histogram shows numbers, not percentages) 120–180 cm. The main species are *Pupilla, Vallonia* (both species), *Trichia* and *Helicella itala,* unequivocally an open-country assemblage. The low numbers of shells, the lack of biostratfication and the context – low in a shaded pit – indicate an allochthonous origin, so this is the fauna of the surrounds at the time of infilling. Between 78 and 120 cm no samples were taken because the fill was coarse chalk rubble.

38–78 cm. There is an increase in woodland species notably *Oxychilus cellarius* and *Discus* by comparison with the lower assemblage, but the open-country species maintain their abundance. The lower part of the zone, in which shells are abundant, corresponds to a pea-grit horizon, the upper part, in which they are sparse, to a relatively stone-free horizon. These two horizons are probably an *in situ* soil profile so the shells are autochthonous.

35–39 cm was another rubble layer which was not sampled.

0–35 cm. Apart from *Vitrina,* there are no major changes in species from the assemblage immediately below, but there is a large increase in absolute numbers so the

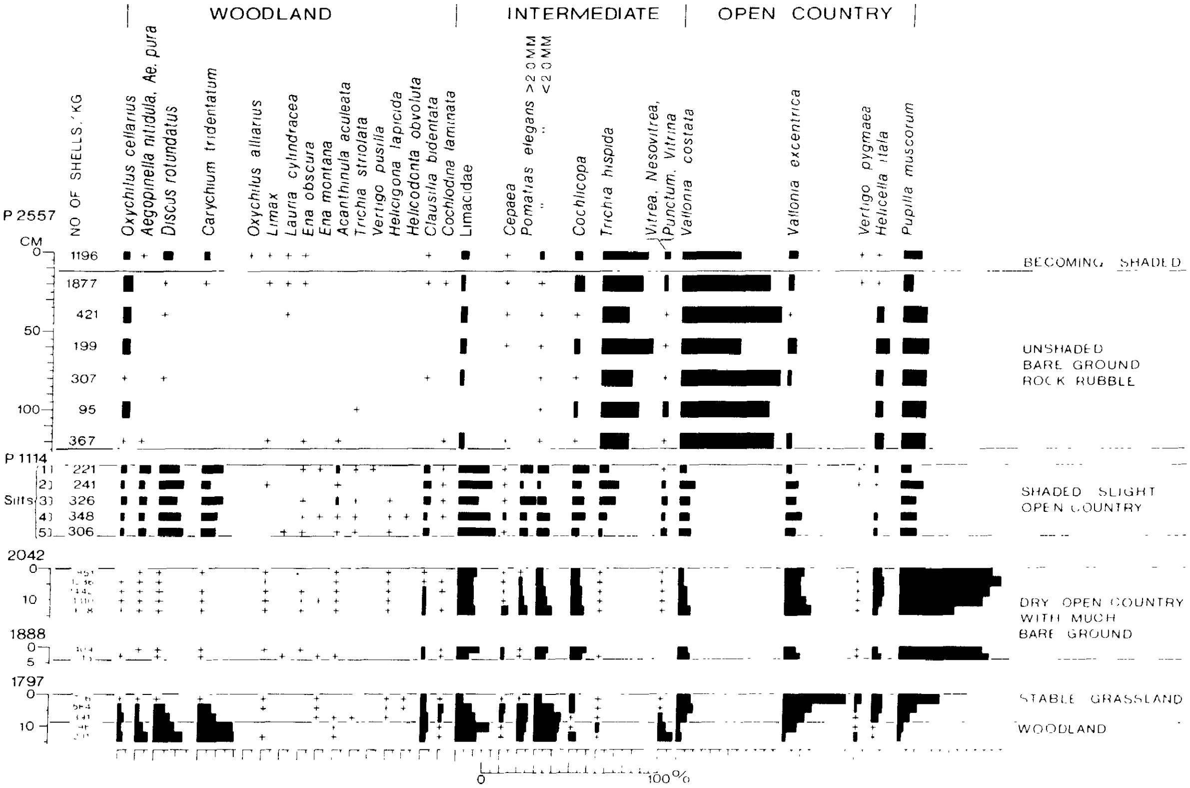


Figure 9.1 Molluscs from P2557 and P1114 and buried soils beneath rampart (layer 2042) and linear earthwork (layers 1797 and 1888).

Figure 9.2 Molluscs from P2349.

assemblage can again be considered more or less autochthonous.

In conclusion, the pit was dug in an open-country environment which is reflected in the lower part of the infilling. After deliberate backfilling (78–120 cm), a soil formed in an environment of grassland perhaps with some scrub. There was renewed infilling (0–35 cm) in a similar environment.

The assemblage is different from all other pits analysed in the general abundance of *Vallonia excentrica.* On this basis we would suggest that the pit is either very early in the sequence or very late.

Quarry hollow

Two series of samples were taken through the quarry hollow in the 1986 and 1987 excavations (Fig 4.113), series DA 86 IV through the upper part (1986) and series DA 87 I through the lower (1987), the two series being iron for an adult is 12 mg, but adolescents, pregnant and lactating women require 15 mg. The principal sources of dietary iron are meat, especially liver, eggs, cereals and legurninous vegetables. For the iron to be assimilated, Vitamin C found in fresh fruit and vegetables is necessary. Vitamin C, however, is easily destroyed in cooking. Iron-deficiency anaemia intervenes when these essential foodstuffs are absent through famine, ignorance, deliberate exclusion by social custom, or a combination of these factors. At such times, all things being equal, men tend to fare better than women as they are able to maintain a normal haemoglobin level on a diet containing as little as 8 mg daily, but a woman of reproductive age rapidly becomes anaemic on such a low intake.

Table 8.9 shows no significant difference in the incidence of *cribra orbitalia* between the men and the women, but the children it would seem, were twice as likely to be affected. The numbers studied are however fairly small, and the evidence may not be a true indication of iron-deficiency anaemia among these people. Children and adolescents require a greater daily intake of iron than an adult male, and at times of an iron-deficient diet they would be more susceptible to deficiency disease. But the inbalance between the percentages of affected adults and children must be regarded with caution, for the symptoms of iron-deficiency anaemia rapidly subside on commencement of treatment with replacement iron. In earlier times, the re-establishment of a balanced diet after a famine-induced iron deficiency, would have been the 'treatment' which limited the effects of the disease in many cases. Adult survivors of infantile deficiency disease may in some instances have lost all traces of porotic lesions as a consequence of subsequent bone regeneration following the termination of the disorder and a return to a healthier diet.

The surprising fact that none of the 0–2 years old infants are affected also needs to be viewed cautiously. This group would have been particularly vulnerable to deficiency disease. The iron requirements of the unborn child have to be provided for from the mother's own store of the element. Should she be anaemic during pregnancy, the infant is born with an iron-deficiency which obviously lessens its chances of survival. Even its maternal nourishment is of little help, for the milk of even a healthy woman contains only just enough iron for the infant's needs. A lactating woman is unable to provide iron for her infant until her own stores have been replenished and her needs met. This process could take several weeks even if she is on a balanced diet from the time of her infant's birth. The presence of orbital lesions in the adults and children and their absence among the infants, suggests that the latter may have succumbed swiftly before the lesions had time to develop.

The presence of *cribra orbitalia* among 30.9% of the skulls is indicative of iron-deficiency anaemia being present among these people. Its true prevalence is impossible to estimate given the time span of these interments, but it does suggest periodic deficiencies in the quality of the food supply.

Trauma: fractures

Three adults have healed bone fractures. Deposition 223, an elderly male above 50 years of age, suffered several violent indignities to his bones during his life. A long time before his death he sustained fractures to several ribs and to the right clavicle, perhaps in the same incident. At a later date, perhaps only a short time before his death, he received a severe injury to the spine.

The rib cage is incomplete and very fragmentary, but there is evidence of at least five ribs having been fractured. Multiple rib fractures usually result from direct injury, either from a fall against a hard unyielding object, or by being struck by a blunt instrument. Because of the cohesive effect of the surrounding musculature, the ribs are seldom badly displaced in minor trauma, and healing is usually spontaneous without the need for surgical treatment. All of the fractures in this instance are well-healed with no signs of complications.

The clavicle because of its position is the bone most frequently fractured in minor trauma, usually by indirect violence, as in a fall upon the outstretched arm. The force of the fall is conducted through the rigid arm, causing the clavicle to snap at its weakest point — the junction between the middle and lateral third of the bone. When this occurs, the lateral fragment is usually displaced downward and medially, The medial fragment is seldom displaced. To effect healing with the minimum of deformity the displacement has to be reduced as far as is possible, by elevating the arm and pulling back the shoulder, a painful process if the patient is not anaesthetized. In the present instance if reduction was attempted it was not successful, for the broken fragments failed to unite. In this unsatisfactory condition a false joint was created out of the healed fragments, leaving the victim with a legacy of an arm whose movements were severely restricted.

The lumbar and thoracic vertebrae are both fragmentary and incomplete, but from what remains it can be seen that wedge compression fractures are present in the vertebral bodies of the second and fourth lumbar segments. The condition of the affected vertebrae suggests that the damage was sustained only a short time before death. Fractures of this kind arc caused by a severe flexion force acting through the skull from a heavy object falling upon the back of the head, or by a fall from a height upon the buttocks or heels. The force is transmitted through the spine to the anterior margins of the vertebral bodies, causing wedge-shaped fractures. In this particular instance the damage may well have been accelerated as a consequence of generalized bone weakness due to advanced age.

Deposition 248, an adult male? (the skull appears to be that of a male above 35 years of age, but the skeleton has a number of female characteristics), also has some compression damage to the anterior margins of two lumbar vertebrae. These fractures are presumably a consequence of one of the above-mentioned causes.

Deposition 210, a female above 50 years of age, has a very well-healed fracture of the left tibia. The bone is markedly bowed anteriorly, and is 8 mm shorter than the right tibia, but no obvious signs of damage can be seen on the associated fibula. This is most unusual in a fracture which has caused such shortening of the tibia. Fractures of the tibia1 shaft without damage to the fibula do sometimes occur, though displacement is rarely as marked as this. The degree of healing suggests that the fracture occurred many years before death.

Trauma: sword and other weapon wounds (Fig 8.4)

At least ten individuals suffered injuries made with the sword or other weapons. Of these. five have already been noted and described in Volume 2. In only two instances has healing taken place, indicating that the majority of the victims died as a result of these or other injuries.

Depositions 196(a) and 196(b) have both sustained

Link to Previous Section

serious head wounds inflicted with a heavy sharp-bladed weapon, almost certainly a sword. In the following descriptions the terms first, second, etc, have been adopted for convenience, they are not meant to imply the actual sequence in which the injuries were inflicted.

Deposition 196(a), a male of 20–35 years of age, represented solely by an incomplete frontal bone and part of the left parietal (Fig 8.4), was struck at least five blows. One was sustained on the right frontal at an oblique angle, making an incision approximately 60 mm in length to a maximum depth of 6 mm, but without the tabula interna being breached. Although this stroke did not open the brain cavity, the force of the impact combined with the leverage upon the sword blade as it was removed, was sufficient to detach a large sliver of bone approximately 38 by 26 mm from the tabula externa. The second stroke, almost at a right angle to the first, struck the crown of the skull roughly along the line of the coronal suture. Because of post-mortem damage and subsequent bone loss, only 13 mm of this incision remains, but in its original state it is likely to have been in excess of 40 mm in length. The impact of this blow caused a large flake of bone to become detached from the tabula interna, and in all probability the blade of the weapon penetrated the right cerebral hemisphere of the brain. A third, shallow incision, above 25 mm in length at a right angle to the second cut and just touching it at its lateral end, is the consequence of a comparatively light sword-stroke upon the posterior part of the frontal bone in the region of the bregma. The fourth stroke may have been intended to strike the centre of the frontal bone, if so, it missed its target and glanced obliquely off the left side of the bone, shaving a 25 by 15 mm paper-thin oval-shaped piece off the tabula externa in the process. A fifth, very heavy blow was sustained upon the left parietal at its junction with the temporal squama, making an incision above 70 mm in length and fracturing the skull at this point. Most of the bone is missing in this region, but the fracture may be inferred from two secondary hair-line cracks running up from what remains of the squamous border of the parietal. The first of these cracks extends approximately 40 mm, crossing the superior temporal line; the second, now only 13 mm in length, runs into the coronal suture. The presence of these hair-line cracks is indicative of a severe fracturing of the temporal bone. There is no trace of any healing having taken place, and there can be no doubt that these lesions are part of a pattern of violence in which this man met his death.

Deposition 196(b), an adult of 20–30 years of age and probably male, also represented by a frontal bone, has a single obliquely aimed sword-cut 44 mm in length upon the left side of the bone, running parallel to and about 15 mm from the metopic suture (Fig 8.4). The maximum depth of penetration into the bone is about 8 mm, but because of the thickness of the skull in this region, the tabula interna was not breached. A sliver of bone the same size as the lesion was removed from the tabula externa and some small flakes were also detached from the forward edge of the cut by the weapon rebounding away from the bone under its forward impetus. As in the previous instance, no healing took place, and it may therefore be reasonably inferred that the victim succumbed at the time of, or shortly after the assault, though not necessarily of the sole effects of this particular wound. The man was in the prime of life and had a thick frontal bone, and assuming he was in good health, he could have survived a wound of this nature. But since there is absolutely no trace of any healing or post-traumatic infection, it may be presumed that he sustained other injuries, one or more of which was mortal.

Deposition 256, consisting only of the shaft of a right humerus of an un-sexed adult, has a cut 17 mm long on the medial side of the bone at the mid-shaft. The unusual position of this wound on the inside of the arm, might indicate that the victim had the right arm raised high when it was struck.

Deposition 260, the left parietal bone of an adult, perhaps below the age of 35 years and male, has a small puncture 5 by 2 mm at the top close to the bregma. The lesion on the tabula interna is small, but the impact of the blow was sufficient to partially detach a plate of bone 15 by 2 mm on this side. No healing has taken place. The wound appears to have been inflicted with a pointed instrument, perhaps a spear-point or a pick-like weapon.

Deposition 238, consisting only of a portion of the left side of an adult male? mandible, has a sword-cut 18 mm in length beginning at the posterior edge of the ramus. If the victim was in a standing position when this wound was sustained, the blow must have been delivered with the sword-blade held in a horizontal plane, either from the front or behind. Alternatively, if the victim was bent over at the waist with head thrust forward, or lying prone upon the ground, the fatal blow must have been struck from above with the sword-blade descending in a perpendicular arc. This type of injury is often sustained in executions by decapitation with the sword, particularly in those instances where more than one sword-stroke proves necessary to remove the head.

Other damage caused by metal implements

Three depositions have superficial marks upon their bones made by metal implements. Deposition 239, a partial skeleton of a male 18–22 years of age, has a cut 14 mm in length on the superior surface of the right femur just below the greater trochanter; there is also a mark 9 by 5 mm on the left side of the frontal bone of this skeleton. Deposition 208, a fragmentary skull of an adult male, has a scrape mark at the base of the skull. Another fragmentary skull, deposition 227, an adult female, has a small cut 8 mm in length on the right parietal. In each of these three cases the damage appears to have been sustained during subsequent excavation, not necessarily in recent years.

Of the lesions which were manifestly sustained during conflict or its immediate aftermath (including those previously reported in Volume 2), most, if not all, occur upon the bones of adult males (see Table 8.10 overleaf).

Cranial scars

Of the whole group of human remains (including those described in Volume 2), 23 skulls (13 ♂, 6 ♀, 1?♀ and 3 children) have one or more small scars upon them. A few of these scars are round or crater-like, called here Type 1, but most are more elongated in form, called here Type 2; these last include some of a geometric form (see below).

Type 1, seen upon the skulls of eight adults (4 ♂, 4♀), appear to be the sequel of some kind of pathological process. Six individuals have a single scar, one has two, and one has four scars. One of the individuals with a single scar also has two Type 2 scars. 66.6% of the scars are located upon the parietal bones, and 16.6% are upon the occipital and frontal bone respectively. The disease or diseases responsible for these lesions have not been identified. Two major diseases whose infective processes may produce lesions upon the skull are tuberculosis and syphilis, but none of the scars resemble the typical lesions of these disorders, nor is there any other evidence

Table 8.10 Locations of lesions and type of weapon used to inflict them

Deposition	*Sex*	*Age*		*Location*	*Weapon*
11	M	–40	Skull:	3 punctures	spear
28	M		Skull:	ossified haematoma below left orbit	blunt weapon
30	M		Skull:	superior edge of right orbit	sword
48	M	30+	Skull:	4 punctures	pick-like weapon
50	M	25–302	Skull:	1 cut (healed)	sword
			Rib:	fracture (healed)	?
196a	M	20–35	Skull:	5 cuts	sword
196b	M ?	20–30	Skull:	1 cut	sword
256	?	adult	Humerus:	1 cut	sword
260	M ?	–35	Skull:	1 puncture	spear or pick-like weapon

to suggest their presence. Many less serious disorders can result in skull lesions, including dermoid tumours and other commensal diseases of uncertain aetiology.

Type 2 scars are more numerous than Type 1 (see Table 8.11), and their frequent occurrence upon the frontal bone might suggest that they are a consequence of minor wounds sustained in frontal assaults. This would be quite consistent with other evidence of violence among these people (see Trauma: sword wounds). But the size and form of the great majority of these scars is quite unlike the normal healed legacies of physical combat frequently seen in early cemeteries, The unusual shape of many of the scars also rules out their being a consequence of dermoid pathological disease processes. This conclusion is corroborated by the fact that 88% of the lesions are situated upon the frontal bone, with only 8% occurring on the occipital bone, and 4% on the parietal bones. General scalp infections are unlikely to be so selective in the sites of their appearance. Further analysis of the locations of the scars show that 40.9% are close to, or just above the superior temporal line; 36.3% are supra-orbital lesions, and 22.7% occur above the glabella.

The largest Type 2 scar on a frontal bone is an oval-shaped lesion 23 by 14 mm on the left side of deposition 8. But the most intriguing scars are those occurring on the left and right sides of the frontal bones of depositions 26 and 14 respectively (Fig 8.5, A and B). Each consists of an almost identical lesion in the form of a shallow equilateral triangle, indicating that the wounds were made by an instrument of that shape. Other regular-sided scars are to be seen on the skulls of deposition 24, which has among three scars, one shaped like a shallow scalene triangle (Fig 8.5, C), and deposition 21, which has a single bar-like scar.

The form of these and other Type 2 scars raises the possibility that most, if not all, are a consequence of some form of deliberate mutilation of the forehead close to or on the hair-line, perhaps as tribal markings or as part of some kind of initiation ritual. To mark the skull in this fashion would require a penetration of the superficial fascia of the scalp. This could easily be achieved with a sharp instrument under strong pressure, for the fibro-fatty layer beneath the skin is neither very thick nor proof against such an assault. Little or no inflammatory reaction exists about the margins of the scars, indicating that the mutilations were achieved without secondary infection developing. This fact together with the very regular form of some of the scars would seem to indicate

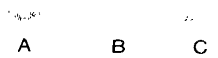


Figure 8.5 Cranial scars (scale 2:3).

Table 8.11 Location and dimensions of cranial scars

Deposition	*Sex*	*Age*	*Type*	*Scar Size*	*Location*
8	F?	*c* 17	2	23x14 mm	Left frontal
12	M	25–35	2	6x2 mm	Right frontal
			2	6x2 mm	Right frontal
14	M	17–25	2	8x3 mm	Right frontal
16	M	25–35	1	4x3 mm	Left frontal
20	M	17–25	2	14x4 mm	Right occipital
21	F	35+	2	9x2 mm	Left frontal
24	M	20–25	1	17x11 mm	Left occipital
			2	13x2 mm	Left frontal
			2		Left frontal
26	M	25–35	2	10x4 mm	Left frontal
27	M	17–22	2	20x2 mm	Left parietal
28	M	25–35	2	25x20 mm	Right frontal
			2	15x7 mm	Right frontal
29	M	25–35	1	7x7 mm	Left parietal
30	M	30–45	1	10x10 mm	Right parietal
			1	7x7 mm	Right parietal
			1	7x7 mm	Left parietal
			1	5x5 mm	Left parietal
32	M	25+	2	9x5 mm	Centre frontal
			2	7x3 mm	Left frontal
36	C	14–18	2	5x2 mm	Right frontal
40	F	25–30	1	15x5 mm	Left occipital
			1	5x5 mm	Right parietal
45	C	10–12	2	17x11 mm	Left frontal
			2	14x4 mm	Right frontal
			2	5x3 mm	Right frontal
48	F	30+	1	15x11 mm	Centre frontal
58	C	*c* 15	2	7x4 mm	Centre frontal
191	F	35–45	1	10x10 mm	Right parietal
215	F	20–30	2	7x3 mm	Left occipital
239	M	18–22	2	12x5 mm	Left frontal
242	M	*c* 25	2	10x3 mm	Left frontal
			2	10x3 mm	Left frontal
259	F	45+	1	10x10 mm	Sagittal suture

that most, if not all, of these mutilations were executed by a process of cauterization, perhaps with a red-hot knife or sword point.

8.2.8 Dental pathology

General comments on the condition of the teeth and the types of diseases to which they were susceptible are to be found in Volume 2. The figures given there for caries and other diseases have now been amended to take in the present group. Of the 1442 surviving teeth 82 (5.6%) are carious; 56 abscesses are present, being 2.9% of the surviving sites available for this condition; 118 teeth (6.2%) were lost through abscesses or other paradontal disorders.

Link to Next Section

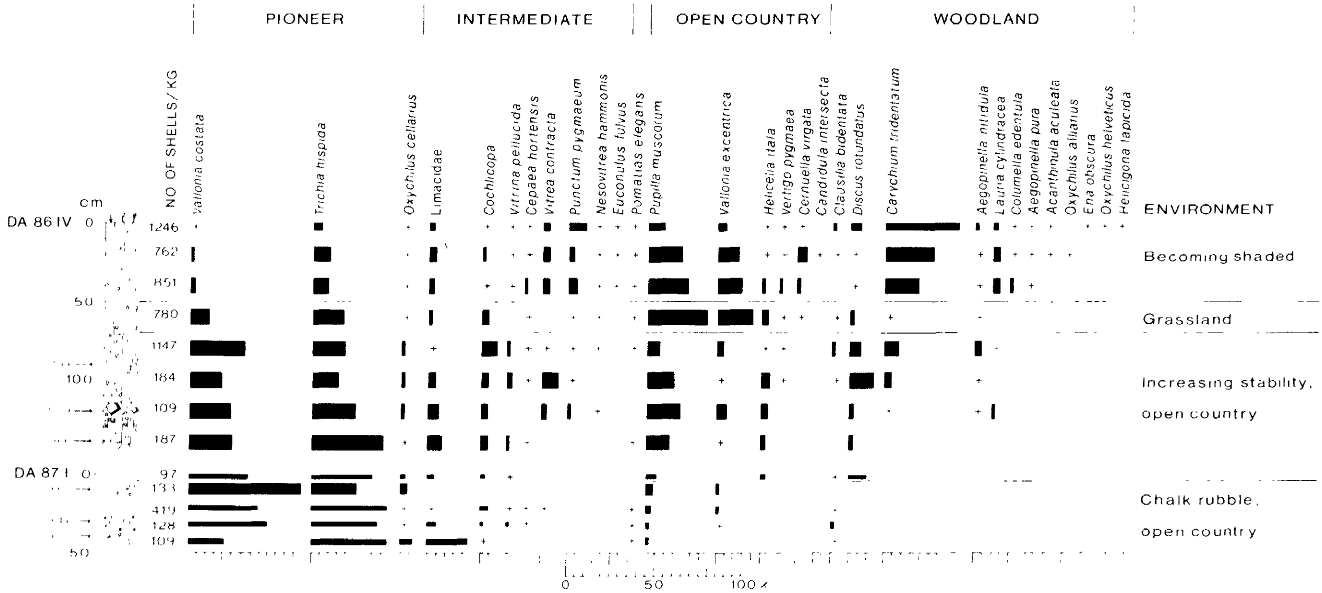


Figure 9.3 Molluscs from quarry hollow sequence.

staggered laterally to obtain the longest sequence. Alternate samples were analysed. DA 86 IV (0 = the modern surface): 0–5, 15–25, 35–45, 55–65, 75–85, 95–105, 115–125, 135–145; DA 87 I (0 = the excavation surface): 0–3, 6–13 (10 cm = context 1663), 20–23, 26–30, 33–38 (35 cm = context 1684), 41–45 (40 cm = context 1685; 50 cm = 1857) (Table 9.3; Fig 9.3).

The sequence can be divided into three main zones on the basis of the molluscan assemblages.

DA 87 I, 6–45 cm. The assemblages are of low diversity and made up of two main species, *Trichia hispida* and *Vallonia costata; Oxychilus cellarius* is the only consistent woodland species. So the assemblages are similar to those from Pit 2557, but more extreme in their low diversity.

The environment was sparsely vegetated surfaces, with much chalk rubble, probably quite damp; the paucity of *Pupilla muscorum* and the absence of *Helicellu itala* suggest shade and/or dampness. *Vallonia costata* and *Trichia hispida* are probably good at colonizing freshly created habitats. In addition to youthfulness, the low diversity suggests absence of refugia in the immediate surrounds.

DA 87 I, 0–3 cm and DA 86 IV, 95–145 cm. Here the assemblages are more diverse, with *Discus rotundatus* and *Helicella itala* being present, and *Pupilla* is more important than before. These changes indicate a vegetated surface, probably herb-rich open country.

DA 86 IV, 0–85 cm. *Carychium* and *Vallonia excentrica* become important, the latter eventually more so than *Vallonia costata*, indicating the establishment of stable grassland. Another grassland species, *Cernuella virgata,* which probably came into Britain during the Iron Age, is present in the top three samples. Ultimately a substantial woodland component is established (0–45 cm, and especially 0–5 cm), including species such as *Columella edentula, Euconulus fulvus* and *Lauria cylindracea* which as a group indicate stability and lack of disturbance. But note that some of the species of the earlier woodland do not return, namely *Helicodonta, Helicigona* and *Vertigo pusilla;* nor does *Pomatias elegans.* Note too that the open-country species remain important, which is why I have not split off the upper part of the sequence as a separate zone. So the woodland had open spaces in it.

The sequence represents a phase of continuous use from the time when the quarry hollow was first dug and there was much exposed chalk around, through subsequent phases of occupation by which time grass cover had become established until final abandonment when scrub and woodland took over.

The Molluscan Assemblages and their Interpretation

So far, the molluscan assemblages have been described and utilized in an *ad hoc* way. Here we detail them more formally, bringing together the assemblages from the different contexts.

The main reasons for the different assemblages are two. One is secular change in the southern English land molluscan fauna during later prehistory for reasons which are connected with climatic change and other more nebulous factors like changes in the quality of soils and vegetation due to agriculture. In this category we can put the decline of *Pomatias elegans* on account of cooling winters, as described by Kerney (1968), the decline of *Vallonia costata* and the upsurge of *Vallonia excentrica,* and the upsurge of *Trichia hispida,* although the last was very abundant in the Late-glacial period. The changing fortunes of the two species of *Vallonia* may be related in that the one took over the niche vacated by the other, but in terms of the external environment, it may be seen as a result of progressive grazing pressure, for *Vallonia costata* cannot withstand heavy grazing whereas *Vallonia excentrica* can. The observed changes in *Trichia hispida* may not be quite so universal in southern England, but they have certainly been observed on other sites. *Trichia hispida* is a species which requires a degree of moisture greater than that required by, say, some of the open-country species, and which thrives in species-poor grassland, often where grazing is relaxed; so again we are possibly seeing the effect of changing grassland quality.

Link to Previous Section

The second reason for the different assemblages are differences in the more immediate and obvious properties of the environment, primarily the nature of the ground surface, and the amount of shade and moisture.

The assemblages are characterized using the following features:

The main species.
The general species spectrum.
The presence or absence of an excessively abundant species.
The numbers of species.
The presence or absence of particular species.
The proportions of woodland and open-country species.

There are two main groups, woodland and open country, and within each there are subdivisions. The assemblages, their environmental interpretation, and their distributions at Danebury (including the 1975 analyses) are listed below.

Woodland assemblages

1. Woodland species over 40%; no excessively abundant species except *Carychium; Pomatias elegans* distinctive but not unique; *Ena montana*, *Vertigo pusilla* and *Helicodonta obvoluta* probably distinctive but not always present. Environment: Undisturbed or little disturbed woodland. Beneath linear earthwork: layer 1797, 9–15 cm.
2. Woodland and open-country groups present in equal abundance; woodland component similar to assemblage 1. Environment : Small disturbance in scrub or woodland, or scrub or woodland edge, or dense hedgerow. Pit 1114.
3. Woodland and open-country groups abundant; woodland component lacks *Ena montana*, *Vertigo pusilla* and *Helicodonta obvoluta; Columella*, *Lauria* and *Euconulus* distinctive; no *Pomatias elegans;* of the open-country species, *Vallonia excentrica* is the most characteristic. The differences with assemblage 2 probably relate to secular rather than local environmental change. Environment: As for assemblage 2, but with a longer history of environmental disruption. Quarry hollows: DA 86 IV, 0–45 cm.
4. Woodland, with *Vallonia costata* excessively abundant; other open-country species sparse; the distinctive species of assemblages 1 and 2 are lacking. This is probably an immature, colonizing assemblage. Environment: Young woodland with bare rubbly ground. Upper fills of the 1975 pits (807, 813, 814, 818 and 819); Pit 2557, 0–5 cm.

Grassland assemblages

5. *Pupilla* and both species of *Vallonia* abundant; some woodland species; no single species excessively abundant. Environment: Lightly-grazed or ungrazed grassland that has not become rank; some bare ground; some scrub. Beneath linear earthwork: layer 1797, 0–9 cm; 1975 pre-rampart contexts; pit 2349; quarry hollow (1986) 55–65 cm.
6. *Pupilla* excessively abundant; *Pomatias elegans* present; *Trichia hispida* virtually absent. Environment: Short grassland, much bare ground. Buried soil beneath main earthwork (layer 2042); buried soil beneath linear earthwork (context F1888).
7. *Vallonia costata* excessively abundant, with *Pupilla muscorum* and *Trichia hispida; Oxychilus cellarius* in low numbers but characteristic. Environment: Open and unstable, with rubbly ground. Interface between rampart 1 and rampart 2 (layer 2027); Pit 2557, 15–125 cm; Quarry hollow: DA 87 I, 6–45 cm.

These are the main groups. In addition to the criteria listed above, they are defined by their distinctiveness from each other and their frequency of occurrence. Subtleties involving contrasting abundances of lesser species in one or two assemblages are not taken into account, even though they might be important – eg the changing abundance of *Vertigo pygmaea* and *Vallonia excentrica* at the top of the buried soil beneath the linear (layer 1797).

Discussion

It is really too early in our work at Danebury to discuss the results in detail and make definitive statements about the Iron Age environment, but the following points can be proffered, bearing in mind the main general and specific aims outlined at the beginning of this report.

Environmental change

The varied and distinctive character of the molluscan assemblages demonstrates their potential as environmental indicators. In general terms, there was a change from woodland to various types of grassland before the fort and its linears were built, but there is no evidence for cultivation. More detailed assessment of the sequence really needs an appraisal of the archaeology.

Spatial variation

This has been demonstrated for the old ground surface, although it is not known whether all the surfaces looked at were precisely contemporary. It has also been shown for the pits, with at least one, P1114, well clear of the rampart having been filled in a much more shaded environment.

Functions and processes

It has been shown that some of the pits filled up naturally because there are distinctive assemblages in their primary fills. It has also been shown that there are qualitative differences between various of the quarry hollow fills, eg the assemblages of layer 200 (of the 1975 excavation) and the lower part of the 1987 quarry hollow sequence (DA 87 I), with their high *Vallonia costata* and *Trichia hispida* values, indicate a different and probably damper environment from those of the 1975 soils and occupation horizons with their high *Pupilla* values. The interface between the primary and secondary ramparts (layer 2027) clearly represents a standstill period when a putative soil formed, for again there is a distinctive assemblage, not forgetting the large specimens of the fragile *Vitrina pellucida* in it.

Comparisons with Maiden Castle

Brief comparison with Maiden Castle is relevant because both are currently being studied by molluscan analysis. There are two striking differences between the two sites with regard to their soils and molluscan assemblages.

1. The pre-rampart soil is fully calcareous at Danebury, with a relatively rich, if open-country, molluscan assemblage. At Maiden Castle, it was decalcified, and molluscs were absent.
2. From the fauna of the pits, especially P1114 (and some of those analysed previously) it can be said that the general environment was a lot more wooded at

Danebury than at Maiden Castle. At the latter site, final woodland clearance took place in the Beaker Period, and there is no evidence of subsequent regeneration at any time. At Danebury, in spite of the generally open-country nature of the pre-linear and pre-rampart assemblages/environment, woodland or at least patches of scrub and hedgerows grew in the vicinity, from which Mollusca could invade and colonize the infilling pits.

Acknowledgements

We would like to thank Barry Cunliffe and his assistants for their help during this work and the Danebury Trust for a grant to enable some of the sorting to be done.

9.3 The woodlands and their use

No new work has been undertaken on this theme.

9.4 The plant remains: a quantitative analysis of crop debris

by Martin Jones and Sandra Nye

9.4.1 Introduction

The archaeological deposits preserved within Danebury retain a record of sustained and intense crop handling throughout the period of the hillfort's use. Almost every time a disused pit or other feature was backfilled, charred fragments of the cereal harvest formed part of the debris entering the feature, sometimes in concentrations unparalleled on contemporary sites in the region. This factor, together with the extensive nature of the excavations, has led to a singularly important archaeo-botanical database for the British Iron Age.

This analysis marks the third stage in the examination of this database. The first relates to the 1969 to 1977 seasons of excavation, when plant remains were collected on a judgemental basis, producing a dataset which emphasized the occasional very rich and very pure deposit of cereal grains from the site. The second relates to the 1978 season, when a detailed programme of probabilistic sampling was undertaken on layers excavated within pits and within a quarry hollow in the lee of the rampart. This provided a more representative and detailed picture of the deposition of plant remains across the site, and one from which extensive inferences on Iron Age crop economy were drawn (Jones 1984). The third stage we have aimed to give those inferences a broader context in space and time, and to understand how the handling of crops was organized within the interior during each phase of occupation.

In developing a strategy for that third stage, we faced a choice of continuing the 1978 analysis at the same depth of qualitative detail, which would involve rigorous spatial sampling, or on extending the spatial scale of the database, at the expense of qualitative detail. We chose the latter course for the following reasons.

In terms of taxonomic diversity, there is little doubt that the greater the qualitative analysis, the longer the species list for any single site. The rate at which the database diversifies is however bound to diminish with increasing sample size, and carbonized plant remains typically have a narrower compositional range than some other forms of plant remains. In the light of contemporary carbonized assemblages from southern England (Jones 1985b), we anticipated a slow rate of new species additions with any further work on Danebury samples.

In contrast to this, the spatial information that had been achieved with the 1978 data was greatly restricted, to two small areas, in the core of the interior and in the lee of the rampart. There was little that could be said about the spatial organization of crop-related activities across the site as a whole. Several studies have indicated that quantitative relationships between different morphological categories of plant remains could prove a valuable indicator of these activities (cf Dennell 1974; Hillman 1984; Jones 1985a). It was therefore considered that a spatially extensive exploration of these quantitative relationships would constitute the best use of research resource to complement the qualitative results of the 1978 analysis.

Such a strategy would be most effective were the components of the broad categories outlined below to remain in broad terms qualitatively similar to the 1978 data. As the assemblages were examined with an experienced eye, any dramatic qualitative departure could be observed and followed up if necessary with a more intensive analysis.

Methods

A probabilistic sampling strategy had been built in to the selection of contexts for full excavation. This strategy was fully consistent with that developed for plant data in the 1978 season, and formed the basis for sample extraction in the field. Samples of default size 25 litres were taken from each excavated context and floated over tap water into a mesh of 500 microns aperture. Any departure from default volume was recorded (see Table 9.4) and incorporated into the correction factor used in subsequent analyses. The flots were air died and wrapped in tissue paper for storage.

A pilot scheme conducted on the 1978 material had indicated that the fullest assemblages of plant material might be expected in the basal layers of the pits (Jones 1984, section 9.4.3), and the general analysis of pits indicated that the plant debris from different layers within a single pit tended to reflect a particular range of crop-related activities *(ibid,* section 9.4.4). For these reasons a purposive subsampling strategy was implemented, selecting a single flot for analysis from a basal context in each pit. Pits and layers were worked through on a random basis, in order that the overall sample would remain probabilistic at whatever stage examination needed to cease. In fact, we were able to examine 100% of the contexts submitted for analysis.

Analyses

The decision to confine the qualitative analyses to broad categories of 'grains', 'chaff fragments', and 'weed seeds' greatly accelerated the process of analysis. The separated fragments have been stored and labelled separately, such that any detailed analysis considered desirable is possible in the future. The three categories above were also used in the 1978 analysis to recognize processing activities, and have additionally proved successful in comparing the activity ranges of separate sites within a region. They are categorized in the following way:

'Grains': All seeds that are recognizably from cereal taxa. These range from well preserved seeds of *Triticum spelta* (spelt wheat) and *Hordeum vulgare* (hulled six-row barley), the two species that dominate Danebury cereals, to rather badly preserved fragments of starch that retain some feature, such as a large basal germ area, that allow identification as cereal grains, but little else.

Table 9.4

phase	context	easting	northing	number cereal grains	number chaff frags	number weed seeds	weight flot sorted	weight flot unsorted
0	2413	3017	1987	5	2	3	13	0
0	1396	1345	462	46	15	17	8	19
0	1345	1337	360	25	16	5	18	24
0	1334	1469	496	2	0	3	7	0
0	1326	1447	405	19	76	14	3	42
0	1183	1695	514	17	9	2	5	60
0	1871	1479	1256	3	0	0	6	24
0	2386	2885	1880	3	4	1	2	0
0	1638	1543	1508	7	4	10	12	41
0	1196	1628	677	122	18	2	2	10
0	1292	1414	311	14	16	7	4	16
0	1289	1488	678	13	59	16	12	70
0	1265	1564	399	12	44	14	3	8
0	1932	1744	1129	0	0	0	7	62
0	1714	1499	1438	0	0	0	2	60
0	1946	1577	1230	5	5	2	9	8
0	2474	2426	1803	2	0	0	6	28
0	1359	1427	593	15	27	16	8	34
0	1869	1451	1258	0	0	0	3	78
0	1379	1196	373	0	0	1	6	31
0	1917	1519	1167	2	0	0	4	0
0	1785	1431	1336	37	9	2	45	112
0	1294	1415	336	17	101	14	2	5
1	1602	1154	610	9	6	3	3	0
1	2064	552	1323	41	6	18	32	0
1	1204	1763	164	50	50	12	2	3
3	1258	1500	420	51	23	26	10	90
3	2205	732	1816	28	21	61	7	39
3	1926	1695	1114	11	3	7	12	82
3	2063	557	1335	16	10	9	4	0
3	2460	2464	1965	0	0	0	1	0
3	2130	722	731	53	20	17	17	0
3	1892	1519	1283	2	1	1	7	0
3	1832	1661	1224	6	14	1	7	3
3	1166	1707	467	7	12	10	7	53
3	1816	1738	1312	1	0	0	4	15
3	1163	1738	546	1	0	0	5	153
3	1216	1752	631	64	35	1	4	34
3	1219	1692	473	14	15	7	21	7
3	2011	714	1593	7	2	3	29	0
3	2297	578	1842	85	5	0	2	117
3	1346	1347	365	6	4	13	11	23
3	1809	1722	1354	24	10	9	13	11
3	554	3070	880	7	3	3	1	0
3	1454	1150	800	0	1	0	3	70
3	450	3070	880	67	23	37	300	2200
3	1012	2750	1000	59	261	186	1	0
3	1461	1153	769	12	10	34	5	5
3	1250	1532	430	95	13	44	2	13
3	1707	1437	1407	8	18	6	10	25
3	1131	3141	830	50	71	174	1	0
3	1509	1158	518	6	25	117	12	22
3	1109	2000	1200	7	4	2	1	0
3	1667	1384	1430	40	8	15	9	6
3	1522	877	618	19	18	12	9	6
3	2451	2558	1893	0	0	0	1	0
3	1098	2000	1200	56	16	10	1	0
3	1092	2000	1200	10	13	12	1	0
3	1619	1155	517	3	4	12	2	0
3	2190	744	1787	8	11	6	15	48
3	1549	960	721	20	15	72	5	0
3	1060	2000	1200	13	26	37	1	0
3	1048	2000	1200	5	2	3	70	180
3	1157	1772	690	38	22	40	11	18
3	1045	2000	1200	11	7	8	100	150
3	1590	1083	497	7	2	12	5	0
3	1593	954	730	14	2	10	9	29
3	1548	935	706	0	0	0	1	0
3	2065	547	1308	14	6	4	9	0
3	1206	1738	183	80	22	3	2	97
3	1620	1117	542	41	11	7	15	17
3	1631	1574	1571	0	0	0	1	5
3	1245	1592	435	28	16	22	6	10
3	1655	1687	1551	11	27	29	8	0
3	1927	1731	1180	30	39	31	12	8
3	1031	2000	1200	20	21	21	1	0
3	1697	1433	1480	19	14	27	27	10
3	1022	2850	970	18	20	18	1	0
3	514	3070	880	27	17	17	1	0
3	1471	1115	538	21	8	6	20	10
3	1715	1509	1420	I	0	0	3	21
3	1315	1456	545	27	90	10	1	48
3	2211	770	1819	0	0	0	3	5
3	1941	1655	1285	3	0	0	5	0
3	2452	2552	1874	9	2	5	8	0
3	2440	2612	1877	2	2	1	11	11
3	1786	1415	1355	63	30	7	11	83
3	2142	735	806	32	4	10	15	0
3	2056	577	1309	50	242	103	16	0
3	1293	1417	316	45	30	16	18	33
3	1305	1485	348	35	77	5	1	28
4	1185	1637	580	26	30	13	12	17
4	1189	1694	548	97	7	1	6	37
4	1717	1552	1440	9	4	2	14	0
4	1545	909	707	15	3	7	7	8
4	1317	1531	646	11	18	6	14	32
4	1242	1625	614	25	14	24	16	4
4	1298	1415	387	129	28	3	8	21
4	1011	2800	950	49	80	68	120	130
4	1282	1448	691	29	62	9	5	43
4	1780	1450	1380	12	10	4	13	55
4	1529	887	690	63	11	20	12	19
5	1823	1696	1244	1	1	2	7	0
5	1230	1590	611	31	60	9	5	73
5	2174	573	1522	19	80	20	2	0
5	1576	1226	797	68	26	18	4	20
5	1615	1353	816	18	14	6	10	0
5	1058	1964	1289	15	10	19	1	0
6	1252	1548	451	120	10	16	2	31
6	1521	882	605	15	17	17	4	0
6	547	3070	880	37	92	40	200	2300
6	1074	2000	1200	152	64	19	60	190
6	1860	1375	1282	15	10	14	7	0
6	1041	2000	1200	36	19	34	1	0
6	478	3070	880	51	51	18	200	2300
6	472	3070	880	100	78	42	50	200
6	1184	1616	578	3	2	1	4	9
6	458	3070	880	8	10	16	50	200
6	457	3070	880	8	19	22	1	0
6	1758	1612	1362	0	0	0	1	0
6	2183	800	1740	10	7	24	3	0
6	2184	805	1760	50	31	35	9	164
6	1162	1703	517	1	0	0	4	34
6	2030	600	1372	83	311	134	25	27
7	1981	610	1528	23	7	83	1	297
7	1202	1724	287	71	25	6	10	32
7	2434	2616	1933	25	3	21	15	21
7	2094	510	1419	95	113	115	26	0
7	2234	811	1595	50	43	19	8	6
7	2242	910	1680	2	6	9	6	18
7	2256	568	1610	42	45	11	6	52
7	2269	680	1735	11	73	16	4	8
7	1161	1731	572	62	56	6	5	35
7	2314	2972	1749	7	3	1	10	0
7	2316	3046	1712	16	12	1	5	0
7	2318	3024	1774	1	5	1	10	0

7	2320	3043	1774	137	29	9	2	20
7	2349	2892	1828	63	40	3	5	189
7	2355	2855	1707	1	0	2	2	0
7	2362	2850	1740	11	35	18	12	0
7	2371	2946	1898	91	14	17	2	51
7	2377	3023	1754	75	25	29	1	5
7	2221	824	1757	34	57	9	8	73
7	2197	775	1630	31	24	5	30	0
7	1452	1165	828	34	25	17	20	0
7	1455	1156	643	76	13	15	3	13
7	2145	738	786	207	318	69	21	0
7	2449	2709	2100	19	65	21	18	307
7	2066	533	1305	11	4	86	1	246
7	2052	640	1290	3	2	2	3	0
7	2035	630	1365	25	112	100	11	0
7	1986	590	1611	34	47	39	5	143
7	2477	2763	2017	10	28	84	12	14
7	1057	1965	1286	9	5	9	1	0
7	1410	1379	690	9	43	7	9	0
7	1793	1313	1358	21	19	30	6	47
7	1333	1452	489	19	35	24	6	0
7	460	3070	880	51	41	42	120	130
7	1207	1717	193	11	62	10	6	6
7	1577	1270	784	31	36	40	6	164
7	1574	947	687	2	0	1	5	24
7	1562	1024	658	99	29	5	2	40
7	1224	1548	698	52	56	14	4	195
7	1299	1416	400	22	40	9	31	322
7	1511	1075	515	57	68	11	2	48
7	1456	1151	856	95	8	0	7	32
7	1479	1125	645	19	0	0	11	15
7/8	1727	1558	1476	23	74	7	5	8
7/8	1815	1730	1329	15	31	17	5	8
7/8	2196	745	1630	47	40	16	3	2
7/8	2435	2576	1911	100	8	3	1	14
7/8	1481	1146	642	96	10	29	3	20
7/8	1530	873	727	46	47	21	6	84
7/8	1543	1142	628	73	19	21	5	60
7/8	1687	1313	1489	40	48	31	7	18
7/8	1698	1463	1483	12	6	6	10	36
7/8	1900	1340	1120	55	33	12	4	90
7/8	1078	2050	1175	497	44	109	100	150

'Chaff fragments': All quantifiable and recognizable fragments of the cereal plant, other than its seeds. These are dominated by the glume bases of spelt wheat (95% by number of the 1978 chaff fragments), which are separated from the grains at the 'dehusking' stage (subsumed under the term 'threshing' in the 1978 report). The remaining 5% are made up of the rachis nodes of *Triticum* and *Hordeum* spp in more or less equal numbers, which, like *Triticum* glumes, remain with the grain until a late stage in the processing sequence, and a smaller number of cereal culm nodes, that generally separate off at an earlier processing stage. Cereal awns, also separating off at an earlier stage, are present as a trace, but are excluded from 'chaff fragments' as they are too fragmentable to be quantified in any meaningful way.

'Weed seeds': Seeds not recognized as being from either the major crop components, or from woody plants likely to have entered with the charcoal component of the carbonized assemblage. The boundaries of this category are in practice less fuzzy than they sound. The nature of the Danebury assemblages is such that all non-crop seeds tend to be of wild herbaceous species tolerant of a great deal of human disturbance. It may well be that several of these, such as *Chenopodium* and *Bromus* spp had some, at least secondary, economic role, but they nevertheless form a coherent group of plants growing in the arable landscape, and their principal entry into archaeological

Table 9.5. Conversion of log to linear values

log.v/25ltr	*lin.v/ltr*
2.25	7.11
2.00	4.00
1.75	2.25
1.50	1.26
1.25	0.71
1.00	0.40
0.75	0.22
0.50	0.13
0.25	0.07

contexts is as crop processing waste, particularly as a by-product of fine sieving.

The primary data set thus assembled is of 178 contexts together with their phases, grid references, numbers of 'grains', 'chaff fragments', 'weed seeds' and weights of sorted and unsorted fractions. The grid references were converted from the alphanumeric codes used in the primary site recording to purely numeric 'eastings' and 'northings', to facilitate computer mapping. In this translation, the south-west corner of sector H was used as the origin. The contexts comprised: three from phase 1, 65 from phase 3, 11 from phase 4, 6 from phase 5, 16 from phase 6, 43 from phase 7, 11 from phase 7/8, leaving 23 for which no phase was allocated. These data are presented in Table 9.4.

The data have, in various forms, been mapped using the UNIRAS program on a SUN 3/160 workstation in conjunction with MINITAB on an AMDAHL mainframe at the Durham University Computer Centre, communicating through a JANET link with the main Danebury database at Oxford. The data were divided according to phase, and a range of maps prepared as outlined below.

9.4.2–7 The floristic composition of the assemblage, etc

For reasons stated above it was decided to do no more work on these topics but to concentrate instead on spatial patterning.

9.4.8 The new data set

Form and pattern in the database

Histograms for the three categories of debris are presented in Fig 9.4. As can be seen from this figure, the data is in each case heavily skewed towards the origin. The maximal values are 100s or even 1000s of times greater than the median value, and the median values are 5–12 times the mean. In order to spread the data more usefully for analysis of both low range and high range variations, logarithmic transformations rather than raw data were mapped, bringing the medians and means within 10% of one another. Table 9.5 allows a direct conversion from log-values per 25 ltr sample to linear fragments densities per litre of sediment.

It is interesting to note, from the histograms of log data shown in Fig 9.5, that each one is bimodal around a value of 0.7–0.8, with the main mode at 1.2–1.4. In other words, there is a clustering at either a lower density of below five fragments per 25 litre sample, or a higher density 10 or more times this value for each of grains, chaff fragments, and weed seeds.

To see whether these patterns were correlated the MINITAB program was used. A rank correlation test

Link to Next Section

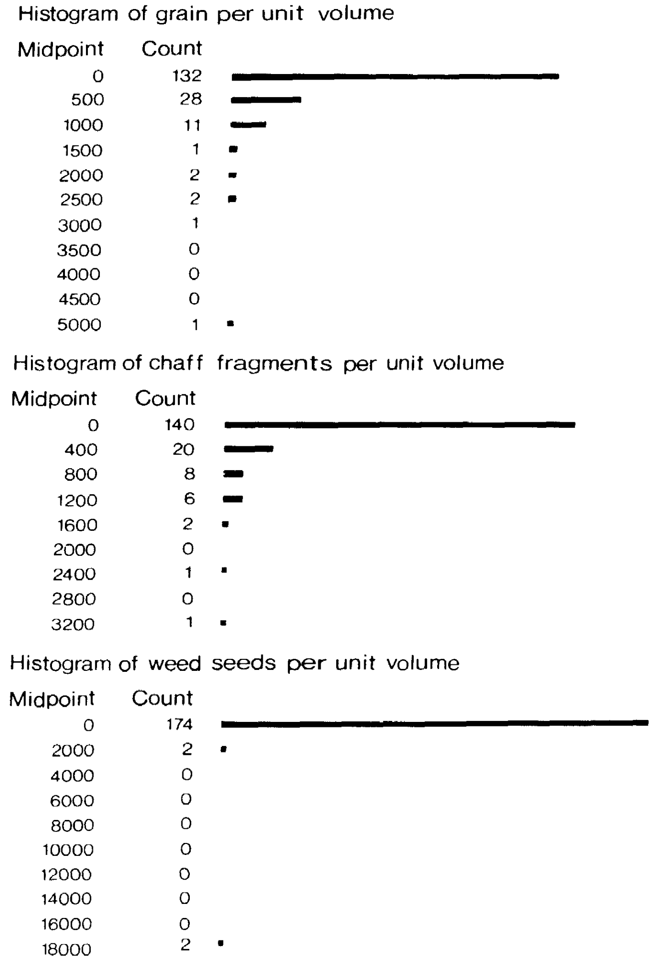


Figure 9.4 Histograms of numbers of grain, chafffragments and weed seeds per 25 ltr sample. A correction factor has been applied where the sorted subsample corresponded to a different volume.

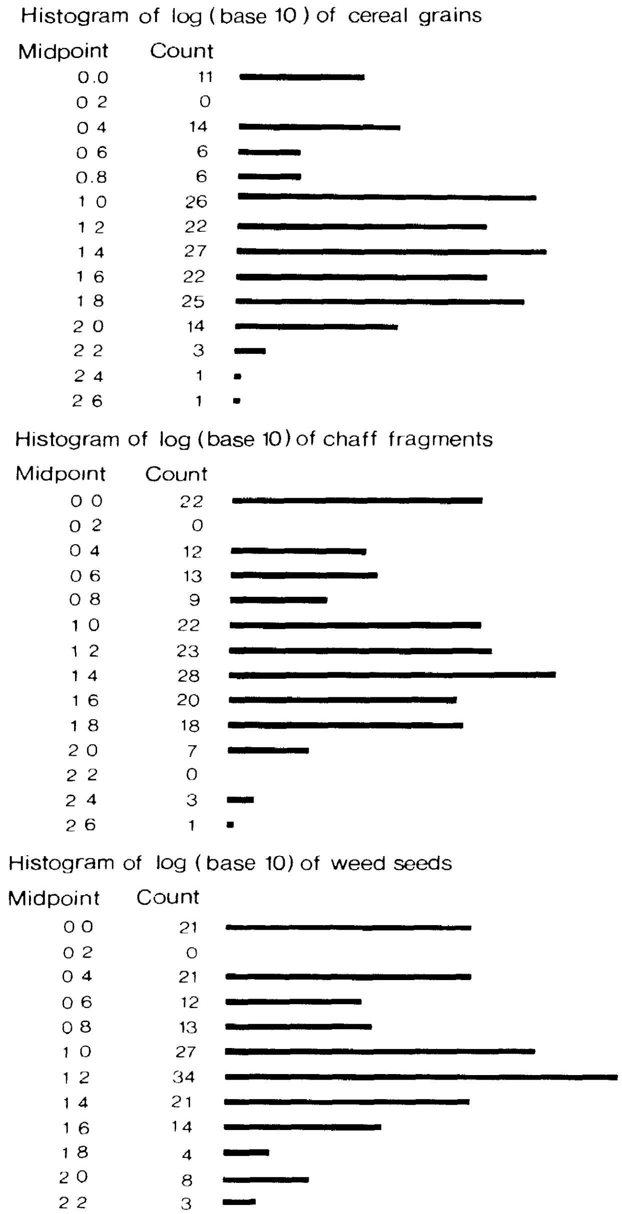


Figure 9.5 Histograms of the logarithms to base 10 of numbers of gram, chaff fragments and weed seeds per 25 ltr sample. Stipulations are as in log representations of zero values. Fig 9.4, and in addition, 1 is added to each sample to cope with

was used (Spearman's rho) because of the irregular pattern of the data. The coefficients for grain, chaff and weed seeds, both as densities per unit volume of sediment, and per unit number of plant fragments, are recorded in Table 9.6. Two observations may be made. First, there is a negative correlation between the proportions of grains and chaff, and grains and weed seeds respectively, and second, the densities per unit volume of all three categories are positively correlated.

The first correlation can be presumed to reflect the separation of the products and by-products of crop-processing activities, the former being dominated by grain, the latter by chaff fragments and/or weed seeds. This separation was also observable in the 1978 analysis, assemblage types 2 and 3 corresponding to either end of the spectrum (cf Jones 1984, section 9.4.6).

The second correlation demonstrates that beyond this internal variation, the various charred products of crop-processing tend to occur in large or small amounts together. Three possible component causes may be cited: crop handling may have been concentrated in different parts of the site; fires may have occurred only in the vicinity of crop processing in certain parts of the interior; the depositional processes of only certain of the archaeological contexts examined were conducive to the incorporation of crop-processing debris.

The first two possibilities may well in fact be associated, reflecting two facets of the same concentration of human settlement activity. Further exploration of the third would involve exploring the correlation between charred fragment density and categories of depositional process.

Variations through time

As can be seen from Fig 9.6, the density of crop debris steadily rises through time. Like the correlations discus-

Link to Previous Section

Table 9.6. Spearman's rho for grain:chaff (gc), grain:weeds (gw), and chaff:weeds (cw), both in densities per unit volume, and percentages of total fragment numbers. *indicates 95% and **99% significance respectively.

vol	*gc*	*gw*	*cw*
all	+.665**	+.522**	+.655**
phase 1		insufficient data	
phase 3	+.751**	+.572**	+.715**
phase 4	+.373	–.100	+.545
phase 5	+.771	+.371	+.600
phase 6	+.801**	+.641**	+.854**
phase 7	+.438**	+.223	+.446**
phase 7/8	–.145	+.314	+.387
	%gc	*%gw*	*%cw*
all	–.252*	–.443**	+.149
phase 1		insufficient data	
phase 3	–.283	–.310	+.161
phase 4	–.891**	–.418	+.055
phase 5	–.600	–.371	–.429
phase 6	–.252	–.443	+.149
phase 7	–.501**	–.617**	–.244
phase 7/8	–.973**	–.309	+.182

sed in the previous section, we must consider the possibilities of both cultural and depositional explanations. A cultural explanation would relate to the gradually increased handling of crops through the course of the hillfort's life, in conjunction with settlements and their fires. A depositional explanation could be found in residuality. Indeed, with such intensity of activity, we would surely expect some residuality, pushing the median value upwards, and blurring the 'edges' of perceived change in the archaeological record. However, the range also becomes more extreme through time, and it is hard to see how residuality in itself could create these extremes. In addition, substantial residuality would be confined to the recutting of old fills, as the 1978 analysis suggested that charred remains had a limited survival rate in the topsoil (Jones 1984, section 9.4.3).

To assemble the data in a form that can easily be compared between sites and phases within sites, they are plotted on triangular scattergrams in Fig 9.7. Such scattergrams were employed in the 1978 analysis *(ibid,* section 4), as well as in various other Iron Age sites in Britain (Jones 1985b; Nye & Jones 1987; Palmer & Jones in press; van der Veen 1983; 1985). Each circle on the scattergram represents a single sample, whose composition is indicated by the position of the circle, and concentration of charred debris by its radius.

As in the 1978 analysis, the spread of values is striking for its range of fragment densities, and extremes in terms of samples high in each of the three components. This is particularly evident in cp 3 and cp 7, a consequence at least in part of the higher sample numbers. The best parallels for this are LIA2 Hengistbury Head, and LIA Maiden Castle. In each case we would suggest that this reflects the intense and diverse crop processing activity characterizing the economic foci of an agrarian landscape, in contrast to the more specific range of agricultural activities taking place at individual farming sites within the rural hinterland. Of especial note are the chaff-rich assemblages, which are only paralleled to this degree at Maiden Castle, suggesting a spatial separation of the dehusking process within hillforts yet to be encountered on contemporary famstead sites.

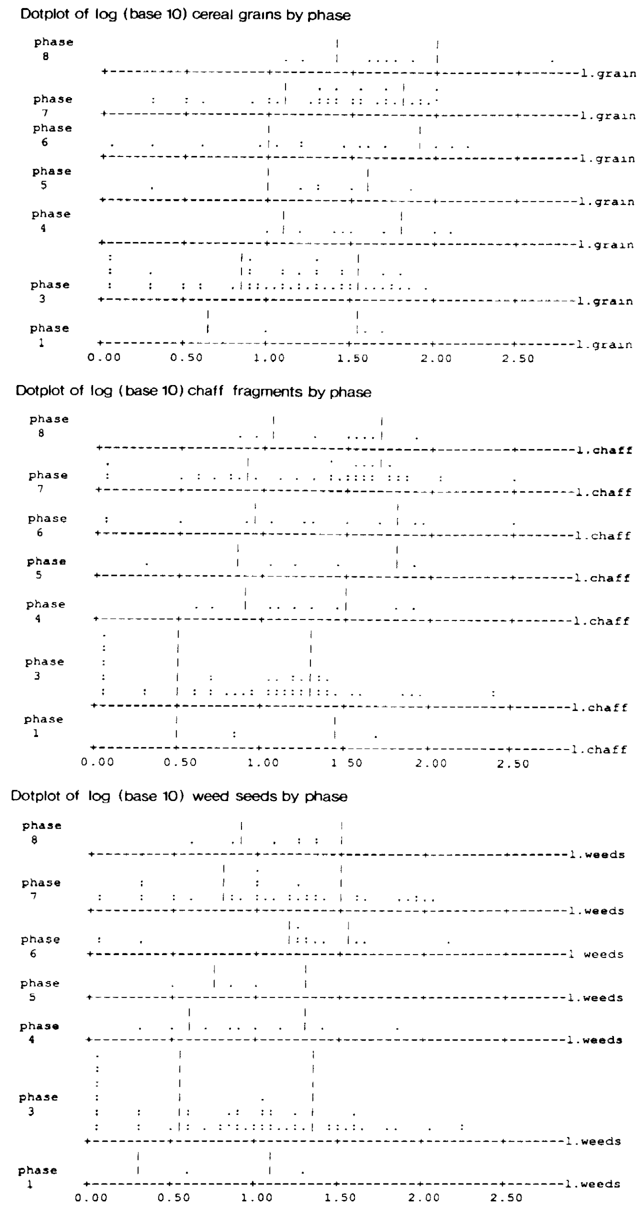


Figure 9.6 'Dotplots' of the logarithms to base 10 of the numbers of grain, chaff fragments, and weed seeds per 25 ltr sample (stipulations us in Fig 9.5). Horizontal axes show the logarithmic value, each dot represents an individual sample, and vertical lines enclose the interquartile range.

Variations in space

The spatial distribution of grains, weeds and chaff are illustrated in Figs 9.8–9.11 for each cp 3 to cp 7 inclusive. Phases 1, 2 and 8 produced insufficient data for spatial analysis, and cp 4 and cp 5 were combined to improve the sample size for the corresponding maps.

The maps were interpolated by means of a UNIMAP program (UNIRAS version 6.1e) operated in the following way. The three columns of data provided, eastings, northings, and values specific to each map, are trans-

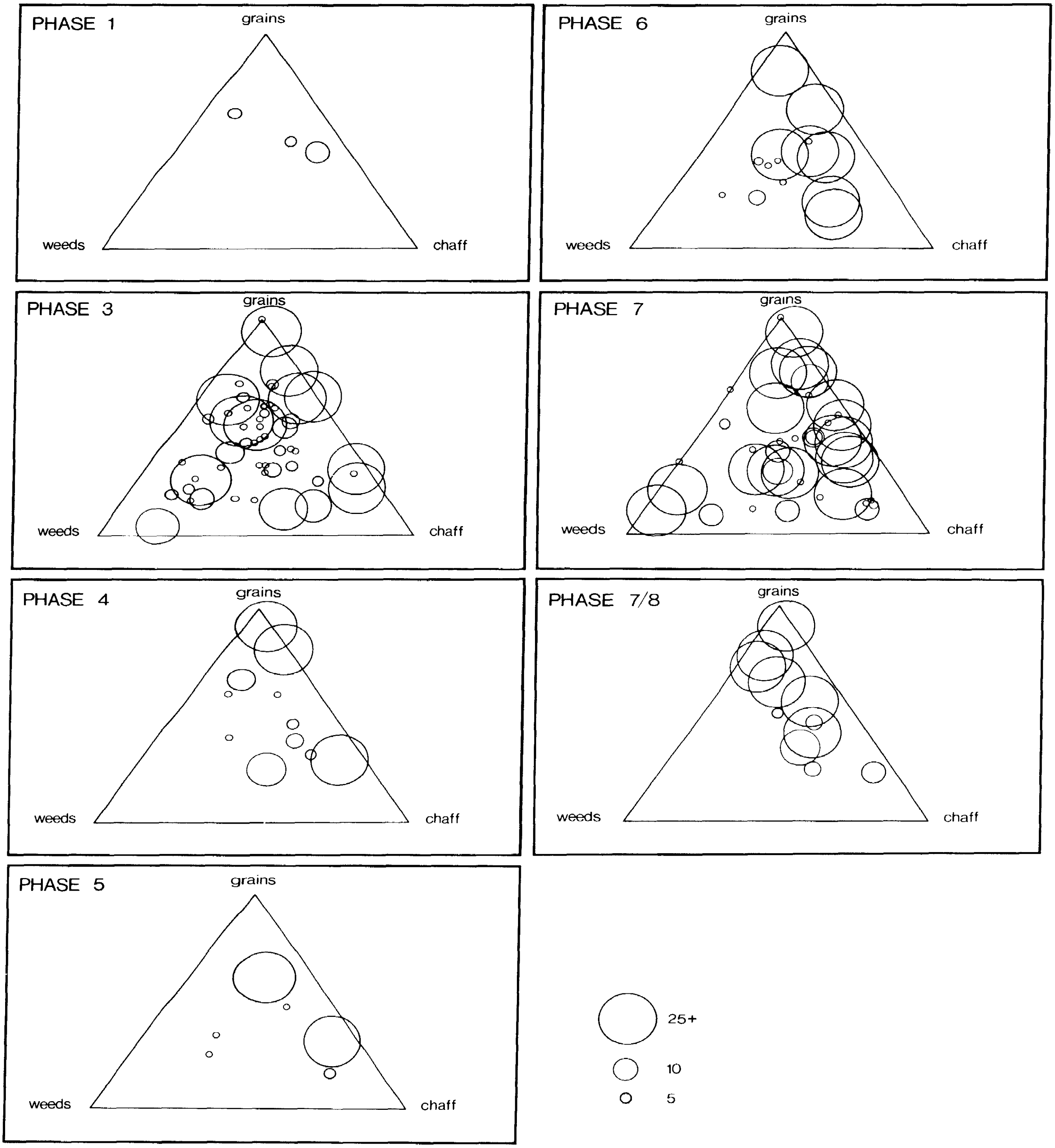


Figure 9.7 'Scattergrams' of proportions of grain, chaff fragments, and weed seeds for each phase. Each circle represents an individual sample, its radius the density of grain, chaff fragments and weed seeds collectively in the source deposit, and its position the relative proportion of the three components.

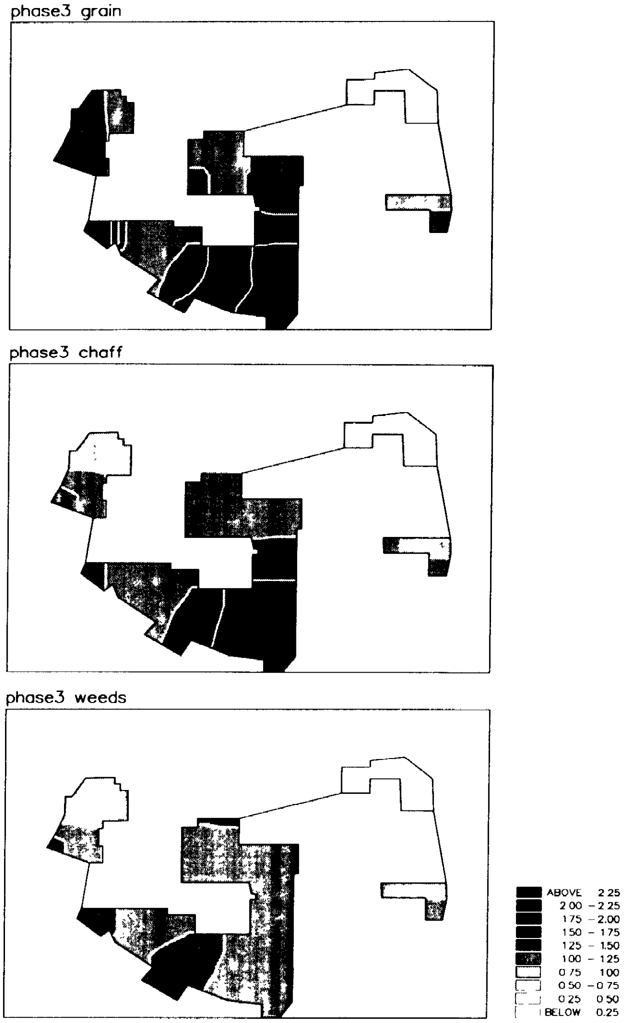


Figure 9.8 The spatial distributions of the logarithms of the numbers of grain, chaff fragments, and weed seeds per 25 ltr sample (stipulations as in Fig 9.5) for phase 3.

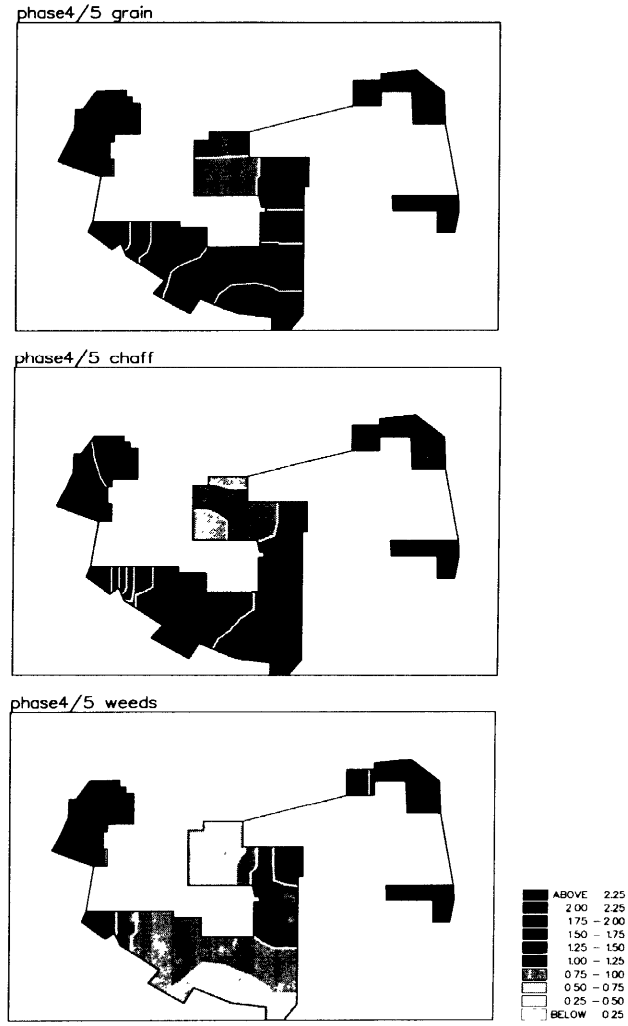


Figure 9.9 The spatial distributions of the logarithms of the numbers of grain, chaff fragments, and weed seeds per 25 ltr sample (stipulations as in Fig 9.5) for phase 4/5.

formed from an irregular scatter of points, to a rectilinear grid. This ‘interpolation’ is achieved by either averaging the values within a grid square, or in vacant squares extrapolating from the nearest data to vacant grid squares. The number of grid squares is selected by the program to make best use of each individual dataset, varying as they do between 16 and 65 data-points. The data is then smoothed by quadratic interpolation, and contoured according to defined thresholds, in this case intervals of 0.25 between 0.25 and 2.25 (see Table 9.5 for linear fragment density equivalents).

9.4.9 Conclusions

cp 3

The main concentrations of grain and chaff lie around the western entrance and the southern sector, while the north-east has the lowest densities. This pattern is mirrored in the weed seeds, but to a lesser degree. There may be some broad correlation with the density of rectangular post structures, which are also sparse towards the north-west, and at their densest around the west entrance and near the southern sector. The similarity of spatial patterns for grains, chaff, and weeds suggests that a range of processing activities are concentrated in these zones.

The breadth of that range of activities is clearly illustrated by Fig 9.7, which shows both the diversity of assemblage compositions and fragment densities that, as discussed above, distinguishes Danebury from smaller contemporary rural sites.

cp 4 and cp 5

The net deposition in these phases is rather different for the three categories of material. One consistent feature however, and one that sustains throughout the fort’s subsequent history is that samples from the centre of the fort are at a consistently lower density than samples around at least points along the perimeter. The densest deposition of material generally occurs, and continues to occur, towards the perimeter of the interior.

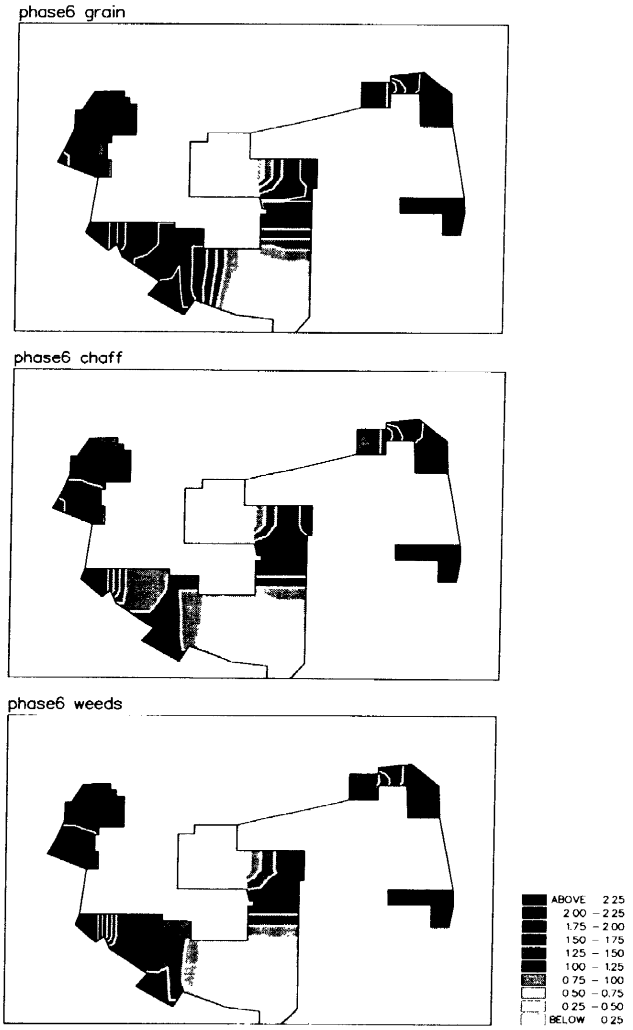


Figure 9.10 The spatial distributions of the logarithms of the numbers of grain, chaff fragments, and weed seeds per 25 ltr sample (stipulations as in Fig 9.5) for phase 6.

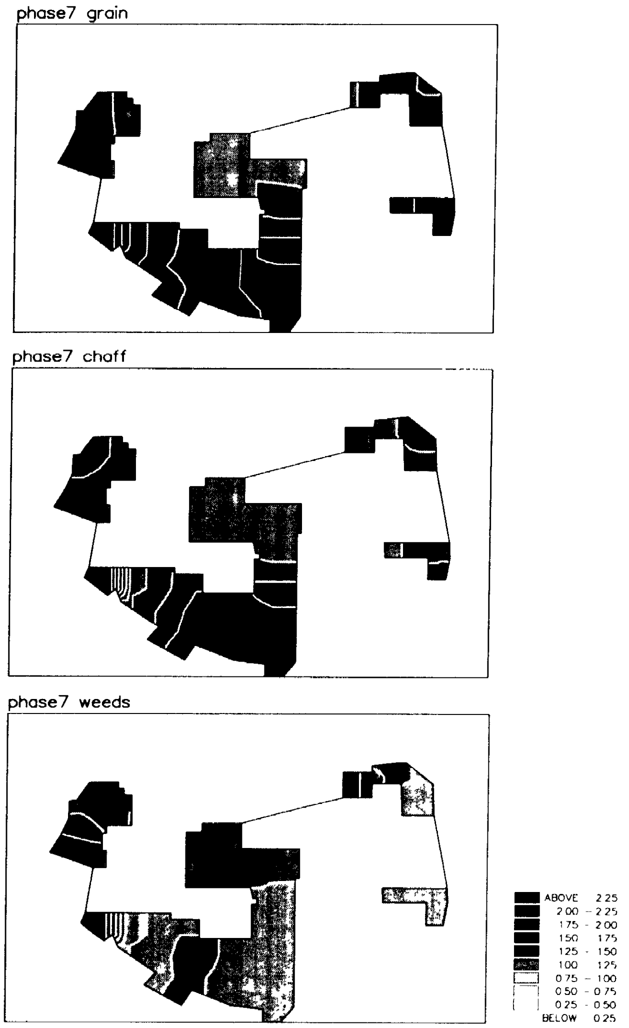


Figure 9.11 The spatial distributions of the Logarithms of the numbers of grain, chaff fragments, and weed seeds per 25 ltr sample (stipulations as in Fig 9.5) for phase 7.

In cp 4 and cp 5, grain is most richly deposited in the southern area, more or less coincident with the area of six-post structures and roads. The chaff however is denser around the western entrance, and the weeds around the eastern area. We may speculate that this reflects a spatial organization of crop-processing mirroring the spatial organization of features in the interior.

In the light of this it is interesting to note that pit 1078, which received detailed analysis in the earlier report, revealed a storage deposit fully cleaned from weed seeds, but incompletely dehusked, suggesting the separation of the processes with storage in between. The distributions may therefore reflect sieving for weeds prior to storage, while dehusking went on at a later stage in different parts of the site.

cp 6

During this phase, distribution of the three categories of material becomes similar once again. The density trough in the centre remains, accompanied now by a trough in the southern sector, which had been rich in grain in the previous three phases. The highest concentrations are along the east and west flanks of the site, perhaps reflecting a concentration of crop-processing activity around the entrances of the fort.

cp 7

The marked emphasis on crop handling throughout the southern sector of the interior returns, this time producing higher densities of charred debris, though not for weeds, suggesting once again as in cp 4/5 the spatial organization of these activities. Cp 7 also provides the most diverse range of assemblages since cp 3.

General comments

We can construct a hypothetical dynamic from the plant evidence alone, that sustains between cp 3 and cp 7. At

Link to Next Section

one extreme, crop-related activities which lead to the deposition of charred debris are concentrated at certain points along the perimeter, including one or both of the entrances (cf cp 3 and cp 6). At the other extreme, such activities spread all across the southern sector of the interior, as in cp 4/5 and cp 7. Whether this dynamic reflects contraction and expansion in a broader sense can only be assessed when the plant data is viewed in the context of other data categories, as is planned for the subsequent report of the Danebury Project.

Of particular note is the continued enhancement of the data set in cp 7 and cp 7/8, after the major structural episodes of the fort's life. The question of residuality aside, we would suggest that the charred plant evidence for the latest Iron Age indicates a continued increase in the intensity of crop handling in this period, rather than a decline, and the spatial patterning of crop handling shows no radical departure from what was in place in the 'late period' (cp 4–6).

Acknowledgement

We would like to thank all the project team for their help with this project, in particular Cynthia Poole for coordinating the field collection of samples, and Gary Lock and Lisa Brown for their help in supplying data. Thanks also to Phil Howard, Ken Middleton, and Bob Williams at Durham University for their guidance on UNIRAS.

9.5 Animal husbandry

by Annie Grant with Christina Rushe and Dale Serjeantson

9.5.1 Introduction

During the first ten seasons of excavation at Danebury, carried out between 1969 and 1978, approximately 138,000 animal bone fragments were recovered. The first analysis of these bones was published in 1984 and described and discussed 'the overall nature of the bone material . . . the animals kept and utilized by the hillfort's inhabitants and the nature of the animal husbandry practices'. It also examined the 'changes in the husbandry practices and in other man-animal relationships over the period of occupation of the site' (Grant 1984a, 496). In the introduction to this analysis, a further, more detailed, more integrated and more wide-ranging discussion was promised for a subsequent volume. In the event, excavations at Danebury continued for longer than originally had been envisaged, producing a further, very large, assemblage of bone material which also had to be identified and analysed, thus delaying the final phase of analysis and discussion.

The faunal assemblage recovered during 1979–1988 comprised roughly 103,000 bone fragments (making a grand total of 241,530). The aims of this discussion of the bone material are essentially those of the first analysis, in keeping with the publication strategy of the site as a whole. However, full discussion of some aspects that were dealt with in the first analysis was not possible due to the limited time that was available in order to meet the tight publication schedule. These will now be dealt with in volume 6.

9.5.2 The condition of the bone material

The bone material was generally in very good condition and soil conditions at the site seem to have been favourable to bone survival. Bone from pits was usually slightly better preserved than bone recovered from occupation layers against the ramparts, where there was a higher incidence of bone with some degree of surface erosion. This suggests that much bone food refuse may have been thrown directly into the pits, rather than left around on the ground surface before being cleared away. Such eroded bone as was recovered from pits was usually from the upper layers of these features. Some post-depositional damage from tree root disturbance had occurred to a small percentage of the bone.

9.5.3 The recovery of the bone material

The vast majority of the assemblage was hand-collected during excavation by pick and trowel. Although many of the diggers were volunteers, recovery standards, at least for the bones of the larger mammals, seem to have been fairly good. However, the results of the sieving experiments carried out at Danebury in 1972 and 1973 demonstrated that with hand-collection alone, many of the smaller bones of the larger mammals and the bones of small mammals, fish and birds were being lost. We must assume that this has led to an under-estimation of the numbers of remains of small species at Danebury (Grant 1984a, 496). Sieving was a routine part of the excavation procedure for two seasons, 1987 and 1988. Comparison of the bones recovered during this season and those recovered from seasons when there was no sieving for bone remains will be published in Volume 6.

9.5.4 The provenance of the bone remains

The majority of the bone remains were recovered from two main types of features, chalk-cut pits, and occupation layers that accumulated against the ramparts. A much smaller number of bones was recovered from features such as slots, gullies and post-holes. The main summary analyses of the Danebury animal bones shown in Tables 9.7 and 9.8, gives the results separately for the pits and the layers (the figures for layers also include the bone from the other smaller features). In Fig 9.12, the relative proportion of bone material from the two main types of context is compared for each phase (see section 9.5.7), and for the total samples from the 1979–88 and 1969–78 seasons. There are only slight differences between the three earliest phases of occupation when between 62–67% of the bone was recovered from pits. In the latest phase, however, 86% of the bone was from pits. There is also a significant difference between the 1969–1978 and 1979–88 samples. Much of the focus of the final ten years of excavation was concentrated on the complex stratigraphy of the occupation layers against the rampart, and this is reflected in the greater proportion of bone recovered from this type of context.

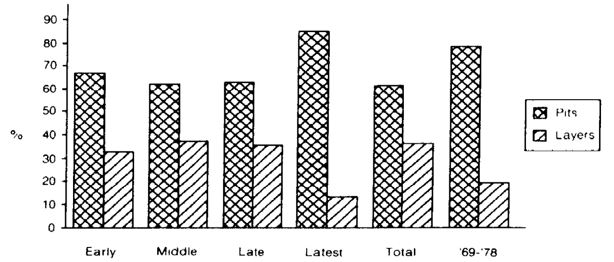


Figure 9.12 Relative proportions of bones recovered from pits and layers.

Link to Previous Section

Table 9.7 The species represented ('total fragments' method)

	Early		*Middle*		*Late*		*Latest*		*Undated*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
pits												
Sheep*	1755	60	1180	56	12564	59	591	43	182	58	16272	58
Cattle	558	19	405	19	4461	21	353	26	31	10	5808	21
Pig	325	11	297	14	2278	11	69	5	66	21	3035	11
Dog	139	5	39	2	597	3	284	21	2	1	1061	4
Horse	95	3	45	2	812	4	71	5	14	4	1037	4
Red deer	0	0	0	0	182	1	8	1	0	0	190	1
Roe deer	0	0	0	0	6	0	0	0	19	6	25	0
Bird	9	0	160	8	261	1	5	0	0	0	435	2
Cat	0	0	0	0	2	0	0	0	0	0	2	0
Fox	56	2	0	0	98	0	0	0	0	0	154	1
Badger	0	0	0	0	0	0	0	0	0	0	0	0
Fish		0	0	0	3	0	0	0	0	0	3	0
											0	0
Total(a)	2937		2126		21261		1381		314		28019	
Skull bone	424	10	325	10	4130	13	250	13	58	12	5187	12
Ribs	990	23	646	21	7255	22	288	15	123	25	9302	22
Misc*	24	1	35	1	103	0	8	0	4	1	174	0
Total(b)	4375		3132		32749		1927		499		42682	
Unident	2893		1753		14438		1195		197		20476	
Layers, trenches, features, slots, gullies and postholes												
Sheep*	865	59	595	48	8719	63	125	52	969	62	11273	61
Cattle	397	27	376	30	2607	19	64	27	356	23	3800	21
Pig	154	10	140	11	1952	14	19	8	145	9	2410	13
Dog	13	1	17	1	148	1	7	3	39	2	224	1
Horse	42	3	95	8	337	2	25	10	40	3	539	3
Red deer	0	0	1	0	8	0	0	0	4	0	13	0
Roe deer	2	0	0	0	1	0	0	0	0	0	3	0
Bird	5	0	8	1	28	0	0	0	14	1	55	0
Cat	0	0	1	0	1	0	0	0	0	0	2	0
Fox	0	0	0	0	16	0	0	0	0	0	16	0
Badger	0	0	0	0	0	0	0	0	0	0	0	0
Fish	0	0	0	0	0	0	0	0	1	0	1	0
											0	
Total(a)	1478		1233		13817		240		1568		18336	
Skull bone	270	13	280	15	1565	8	18	6	251	11	2384	9
Ribs	403	19	363	19	3396	18	47	15	394	18	4603	18
Misc*	8	0	7	0	59	0	1	0	3	0	78	0
Total(b)	2159		1883		18837		306		2216		25401	
Unident	1148		805		10544		343		1600		14440	
All features												
Sheep*	2620	59	1775	53	21283	61	716	44	1151	61	27545	59
Cattle	955	22	781	23	7068	20	417	26	387	21	9608	21
Pig	479	11	437	13	4230	12	88	5	211	11	5445	12
Dog	152	3	56	2	745	2	291	18	41	2	1285	3
Horse	137	3	140	4	1149	3	96	6	54	3	1576	3
Red deer	0	0	1	0	190	1	8	0	4	0	203	0
Roe deer	2	0	0	0	7	0	0	0	19	1	28	0
Bird	14	0	168	5	289	1	5	0	14	1	490	1
Cat	0	0	1	0	3	0	0	0	0	0	4	0
Fox	56	1	0	0	114	0	0	0	0	0	170	0
Badger	0	0	0	0	0	0	0	0	0	0	0	0
Fish	0	0	0	0	3	0	0	0	1	0	4	0
Total(a)	4415		3359		35081		1621		1882		46358	
Skull bone	694	11	605	12	5695	11	268	12	309	11	7571	11
Ribs	1393	21	1009	20	10651	21	335	15	517	19	13905	20
Misc*	32	0	42	1	162	0	9	0	7	0	252	0
Total(b)	6534		5015		51589		2233		2715		68086	
Unident	4041		2558		24982		1538		1797		34916	
Total no. fragments recovered											103002	

KEY
Sheep* - Sheep and goat
Misc* - Abaxial metapodials and phalanges etc

Numbers of bones of individual species expressed as a percentage of Total(a)
Numbers of skull bones, ribs and miscellaneous bones expressed as a percentage of Total(b)

Table 9.8 The species represented ('epiphyses only' method)

	Early		*Middle*		*Late*		*Latest*		*Undated*		*Total*	
	N	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
Pits												
Sheep*	816	62	588	57	5840	61	262	40	72	48	7578	59
Cattle	227	17	178	17	1860	19	169	26	12	8	2446	19
Pig	118	9	134	13	986	10	31	5	39	26	1308	10
Dog	76	6	11	1	251	3	133	21	2	1	473	4
Horse	41	3	33	3	389	4	43	7	14	9	520	4
Red deer	0	0	0	0	53	1	3	0	0	0	56	0
Roe deer	0	0	0	0	2	0	0	0	10	7	12	0
Bird	4	0	86	8	212	2	6	1	0	0	308	2
Cat	0	0	0	0	0	0	0	0	0	0	0	0
Fox	27	2	0	0	56	1	0	0	0	0	83	1
Badger	0	0	0	0	0	0	0	0	0	0	0	0
Total	1309		1030		9649		647		149		12784	
Layers, trenches, features, slots, gullies and postholes												
Sheep*	329	54	234	50	3470	62	36	43	380	59	4449	60
Cattle	181	30	128	27	1020	18	22	27	146	22	1497	20
Pig	59	10	59	13	783	14	13	16	57	9	971	13
Dog	5	1	4	1	68	1	2	2	11	2	90	I
Horse	26	4	46	10	182	3	9	11	26	4	289	4
Red deer	0	0	0	0	3	0	0	0	0	0	3	0
Roe deer	1	0	0	0	1	0	0	0	0	0	2	0
Bird	5	1	0	0	33	1	1	1	29	4	68	1
Cat	0	0	0	0	1	0	0	0	0	0	1	0
Fox	0	0	0	0	6	0	0	0	0	0	6	0
Badger	0	0	0	0	0	0	0	0	0	0	0	0
Total	606		471		5567		83		649		7376	
All features												
Sheep*	1145	60	822	55	9310	61	298	41	452	57	12027	60
Cattle	408	21	306	20	2880	19	191	26	158	20	3943	20
Pig	177	9	193	13	1769	12	44	6	96	12	2279	11
Dog	81	4	15	1	319	2	135	18	13	2	563	3
Horse	67	3	79	5	571	4	52	7	40	5	809	4
Red deer	0	0	0	0	56	0	3	0	0	0	59	0
Roe deer	1	0	0	0	3	0	0	0	10	1	14	0
Bird	9	0	86	6	245	2	7	1	29	4	376	2
Cat	0	0	0	0	1	0	0	0	0	0	1	0
Fox	27	1	0	0	62	0	0	0	0	0	89	0
Badger	0	0	0	0	0	0	0	0	0	0	0	0
Total	1915		1501		15216		730		798		20160	

KEY
Sheep* - Sheep and goat

Overall, there is little significant difference in the relative proportions of species found in the two types of context although bird, horse and dog bones are rarer in layers than in pits (Fig 9.13). The slightly worse preservation of bone in the layers would be expected to have favoured the survival of cattle bones relative to those of sheep and pigs, but in fact sheep and pig bones are slightly more common in layers than in pits. However, Table 9.7 shows that the four phases of occupation differ in this respect. In the early and middle phases, significantly higher percentages of cattle bones were indeed found in layers. It is particularly in the late period, from which the majority of bone material was recovered, that higher proportions of sheep and pigs were found in the layers.

These phase and context differences will be further investigated at a later stage, but should be borne in mind when comparisons are being made between the 1969–78 and the 1979–88 samples.

Average numbers of bone fragments recovered per pit for each phase of occupation (see 9.5.7) showed a continuous increase over the period of occupation (Fig 9.14). This is consistent with the results from the 1969–78 seasons, although the 1979–88 pits had consistently lower averages than those of the pits excavated in the first ten years. These averages have an important bearing on the understanding of such issues as the density of occupation and the nature of rubbish disposal practices, and will be further investigated in volume 6.

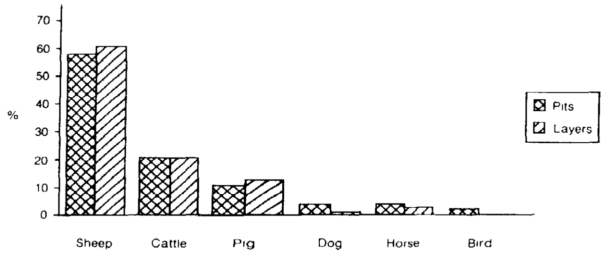


Figure 9.13 Relative proportions of the main species in pits and layers (total sample).

9.5.5 Identifying and recording the bones

The bones from the 1979–1985 seasons were identified by Annie Grant, and those from the 1986–1988 seasons by Christina Rushe. The system used for computer coding and analysis was identical to that used for the 1969–78 sample (see Lock 1984). The bird bones were identified and analysed by Dale Serjeantson (pp. 478–81). A report on the small mammal bones, by Sue Browne, will be included in volume 6.

Excluding the small mammal bones (rabbit size and smaller), a total of 103,000 bones and bone fragments were recovered during the 1979–88 seasons of excavation. Almost 35,000 (34%) of these, mainly small fragments and chips of bone, were unidentifiable. This is a slightly lower percentage than from the earlier seasons when 40% were unidentified, but it is not clear whether this reflects differences in recovery methods and standards, contextual differences or even improved identification skills.

Bones of the following mammal species were identified: sheep, goat, cattle, pig, horse, dog, red deer, roe deer, fox and badger. Bones from two fish species were identified. Details of the numbers and the relative proportions of bones found for each of the species are given in Table 9.7, which serves as a basic reference point for much of the following discussion. Because of the well-known difficulties encountered in differentiating between the bones of sheep and goats the figures given for sheep include those for goats. Separate analyses have been given for the different phases of occupation and for the pits, and the layers and other contexts.

Bones were found from a number of bird species, both wild and domestic and these are detailed separately in Tables 9.31–9.34, with summary figures included in Table 9.7.

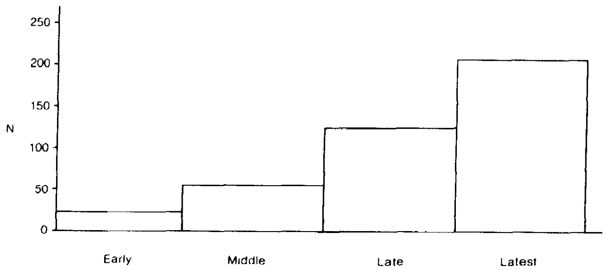


Figure 9.14 Average numbers of bones per pit.

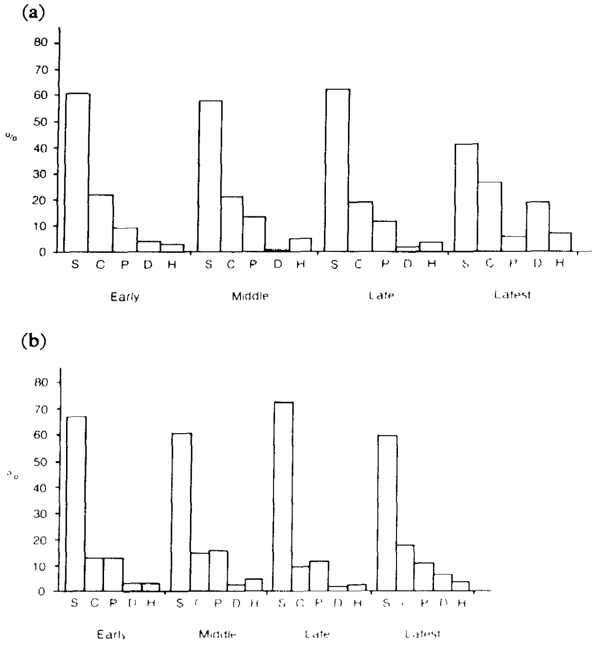


Figure 9.15 Percentages of species represented. a) Epiphyses only; b) Minimum number of individuals

KEY S Sheep
C Cattle
P Pig
D Dog
H Horse

9.5.6 Methods of analysis

In order to ensure consistency and comparability, the main methods of analysis used for the 1979–88 sample are the same as those used for the 1969–1978 bones (see Grant 1984a, 498–501). Thus three methods were used for analysis of the relative importance of the various species: 'total fragments', 'epiphyses only' and 'minimum number of individuals'. The results are given in Tables 9.7–9.9 respectively, with the percentages for the most important species shown graphically in fig 9.15

A full discussion of the nature and incidence of disease in all the domestic animals is being prepared by Don Brothwell and will be published in volume 6. A high incidence of periodontal disease in sheep was noted in the previous discussion (Grant 1984a, 506 & Fig 9.20). The mandibles and maxillae from the 1979–88 bones were similarly affected, particularly, as was the case for the earlier sample, in the late phase.

Cut marks on the bones testified to a distinct butchery tradition, which was characterized, particularly for sheep, by the careful separation of the limbs by severing the ligaments that bind the joints together (Grant 1987). The same cut marks were found over and over again in identical positions on the bones. This will allow a full analysis and reconstruction of the butchery methods that will aid our understanding of the cooking methods used and of the utilization of animal carcasses, both for meat and for other animal products. A full discussion of the butchery practises will be included in Volume 6.

Some additional analyses were undertaken for the 1979–88 sample and some new methodological approaches that were applied to the complete sample

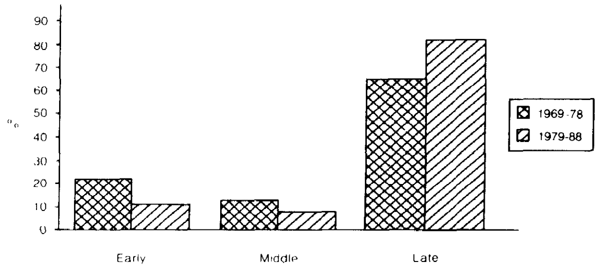


Figure 9.16 Proportion of bone fragments assigned to each of the occupation phases. NB Late includes 'late(a)' and 'late(b)' for the 1968–78 sample and 'late' and 'latest' for the 1978–88 sample

(1969–88) of sheep, cattle and pig remains will be discussed in this volume. The first of these uses Vigne's (in press) 'meat and offal weight' (MOW) method to determine the relative contributions made to the animal protein diet by the three most important domestic species. This method, based on detailed studies of the relationship between animal size and carcass weight for animals of different ages and adult sizes, estimates the gross meat and offal yield for each species, taking into account the age profile (see Table 9.15 and Fig 9.23).

A new approach, currently being developed by the writer (AG), was used to attempt to assess the productivity potential of the sheep, cattle and pigs whose bones were recovered at Danebury. This method, which is still being developed and full details of which will be published in volume 6, attempts to assess both the productivity, in terms of meat, milk, wool, traction and young, and the cost of keeping the domestic herds and flocks. Costs and yields are assessed in terms of units, which represent the cost or productivity of an adult animal each year. Thus, for example, an animal that died when adult will have yielded one unit of meat while a juvenile will have yielded a particular fraction of a unit, calculated according to its age at death. An eighteen month old sheep will have yielded one clip of wool (say 0.75 of the size of the clip of an adult animal) worth 0.75 of a unit; a two and a half year old animal two clips, one small clip in its second year, and a larger clip in its third year (say 0.9 of a clip) making a total of 1.65 units of wool. Other products are calculated in the same way, with milk and young yields taking into account not only the age of each animal at death, but also the male: female ratios, and the likely female fertility and neo-natal mortality rates. 'Cost' units represent the cost of feeding, or the total input expended on one adult animal for one year, with those for immature animals calculated pro-rata.

Once the productivity and cost have been calculated for individual animals, the totals for each phase can be obtained and then the average productivities and costs, allowing comparisons to be made between the separate phases of occupation.

The calculations have been made on the basis of the age profiles determined from the mandibles, using the method proposed by Grant (1983). There are obvious limitations to the use of this method. Firstly when comparisons of productivity *totals* are made between species, the figures calculated must be corrected to take account of differences in the proportion of ageable mandibles that were found. If in one phase the aged mandibles of sheep represent, for example, 60% of the calculated minimum number of individuals, while those of cattle represent only 55%, the productivity units, and indeed the meat and offal weights, must be multiplied by factors of 100/60 (1.67) and 100/55 (1.81) respectively. This assumes that the lost or damaged mandibles were uniformly distributed over all ages, and while this is unlikely to be the case, it is the only practically applicable assumption that can be made. When *average* figures are used for comparative purposes these corrections do not need to be made.

Secondly, when we compare the productivity and feeding costs of the three species, we must make allowance for the different costs of feeding a sheep, a cow and a pig, and for the differences in meat yield, and, for cattle and sheep, in milk yield. These can only be estimated, but, using medieval figures (Oschinsky 1971), we have estimated the annual milk production of a cow to have been 10 times that of a ewe, and using a number of books on animal feeding requirements (for example, McConnell 1897) we have estimated the ratio of the feeding costs of sheep: cattle: pig as 0.8: 7.4: 4.0 (see Table 9.36). Meat yield ratios are based on Vigne's figures (Table 9.15).

Thirdly, we can only calculate productivity and cost for those animals whose mandibles were recovered. We cannot assess the contribution or cost of animals who died or were traded elsewhere, and nor can we compensate, in terms of cost or of contribution, for animals that were bought or brought into the site rather than reared by the site's inhabitants. Other limitations are also inevitable, for example those of assessing the relationship between mandible wear stages and absolute ages, and of the figures used for such parameters as fertility rates and neo-natal mortality. However, since the calculations are made according to standardized units, there is at least an internal consistency in the method, allowing comparisons to be made between the different periods of occupation at the site. Despite the inevitable limitations and problems, it is only by the development of such approaches that we shall be able to increase the depth and sophistication of our understanding of animal exploitation in the past (see also Cribb 1985).

9.5.7 The dating of the animal bones

The dating of the bones was dependent on the dating of the individual features from which the bones were recovered, pottery types being the main source of evidence for this. Further information, mainly relevant to the dating of the occupation layers, but also relevant to the dating of some pits, is provided by the stratigraphic relationships of features. Such information has shown that many contexts that on the basis of the initial analysis of the pottery were dated to early phases of occupation at the site, must in fact be later. This to some extent may affect the validity of comparisons between the 1969–78 and 1979–88 samples, since stratigraphic information was available for far fewer of the contexts excavated in the first ten years. There is certainly a difference between the proportion of material that was assigned to each of the main phases in the two samples. A larger proportion of the bone material was dated to the early and middle phases in the 1969–78 sample than in the 1979–88 sample, when the majority was dated to the late phases (Fig 9.16). This must be accepted as a possible biasing factor when the results of the two campaigns are compared.

There is a further complication in that in the analysis of the 1969–78 material, the late phase was divided into 'late(a)', material dated to ceramic phase 6, and 'late(b)', material dated to cp 7 and 8. It is now clear that a distinct cultural gap cannot be drawn between these two ceramic phases, and the more meaningful division lies between cp 7 and 8. For this analysis, the late phase has thus been divided into 'late', cp 6 and 7, and 'latest', cp 8 (Table 9.10).

Link to Next Section

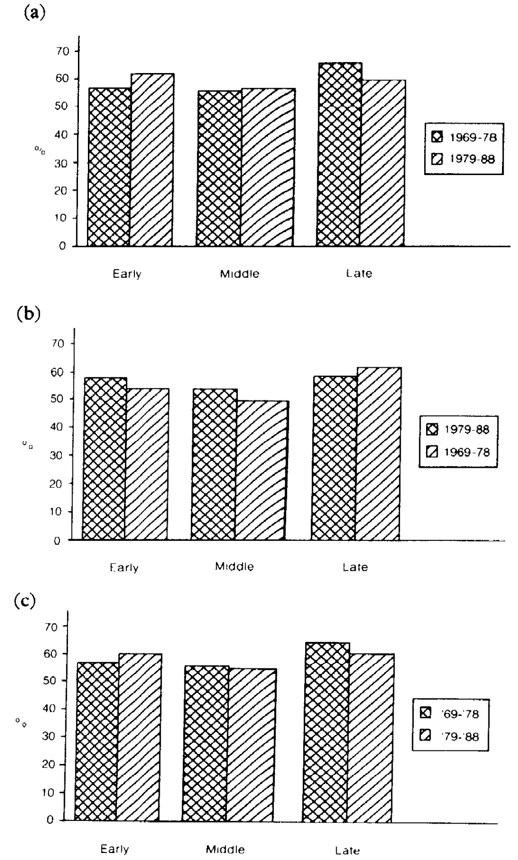


Figure 9.17 Relative proportions of sheep bones in the 1969–78 and 1979–88 samples ('epiphyses only')
a) Pits
b) Layers
c) all features
NB late includes 'late(a)' and 'late(b)' for the 1968–78 sample and 'late' and 'latest' for the 1978–88 sample

Since the publication of the first analyses of the finds from Danebury in 1984, it has also become clear that there are problems both of residuality and of misassignment of contexts to ceramic phase (see Lock this volume). Further work to eliminate or minimize these problems may affect some of the conclusions that have been drawn in this discussion about the changes that took place over the period of occupation of the site. Such conclusions will of course be reassessed in the light of any future work.

9.5.8 The domestic animals

Sheep

The distinction between sheep and goat is not possible for all skeletal elements, particularly when there is fragmented material. However, the examination of clearly diagnostic bone suggested that only a very small proportion of the ovicaprid remains was from goats. With the knowledge that some goat bones have inevitably been included in the bone remains identified as sheep, we feel justified in assuming that this will not invalidate the following discussion of the sheep husbandry.

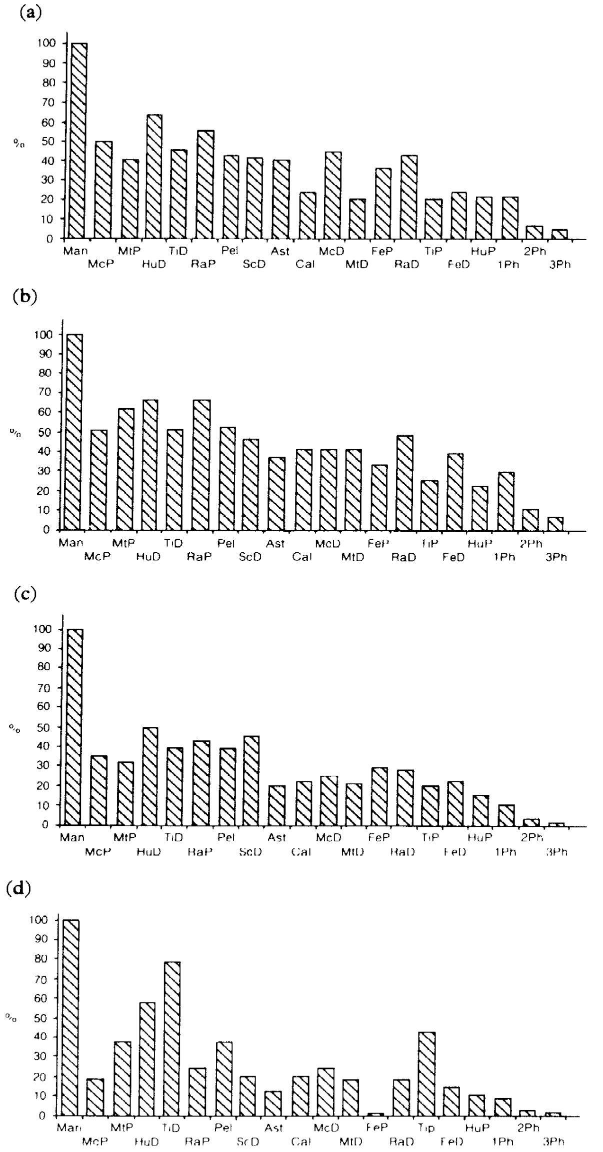


Figure 9.18 Sheep: skeletal element percentages
a) Early phase
b) Middle phase
c) Late phase
d) Latest phase

KEY % = percentage of the most common element
P = proximal; D = Distal; Ast = astragalus; Cal = calcaneum; Fe = Femur; Hu = humerus; Man = mandible; MC = metacarpal; Mt = metatarsal; Pel = pelvis; Ra = radius; SC = scapula; Ti = tibia; 1Ph = first phalange; 2Ph = second phalange; 3Ph = third phalange

The evidence

Approximately 60% of the identified bones were those of sheep. The 'fragments', 'epiphyses' and 'minimum numbers of individuals' counts all suggest that there was a slightly smaller proportion of sheep in the middle phase than in the early and late phases (Tables 9.7, 9.8 and 9.9; Fig 9.15). The 'fragments' and 'epiphyses' figures for the proportion of sheep bones found amongst the rather small sample dated to the latest phase suggest a sharp

Link to Previous Section

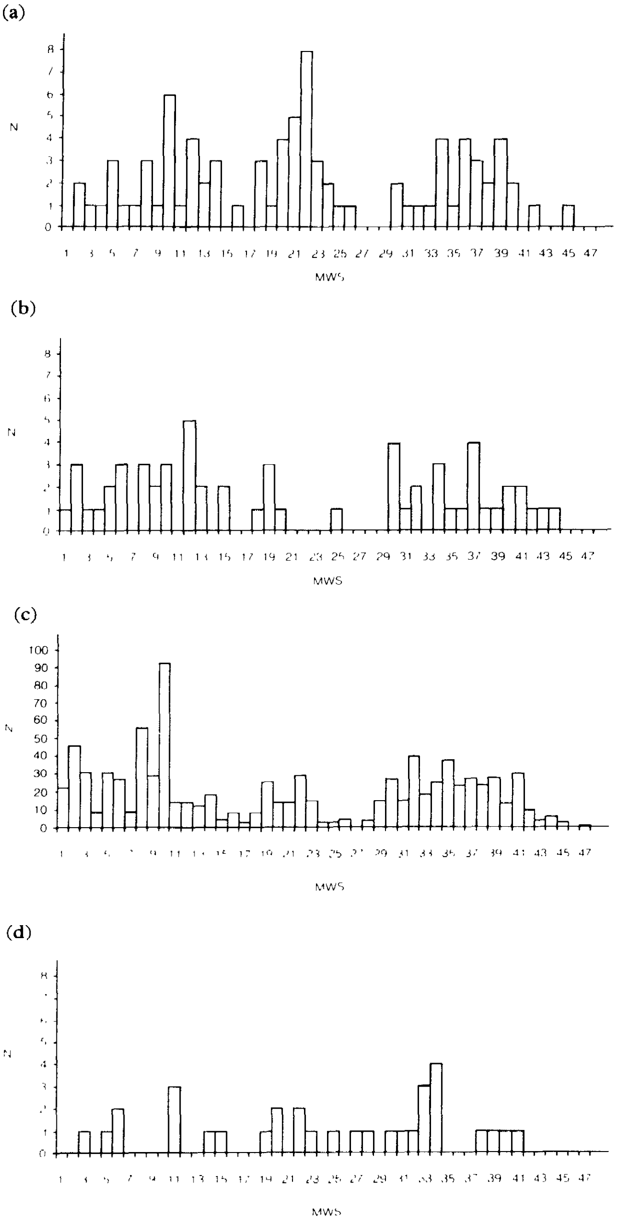


Figure 9.19 Sheep: mandible wear stages (MWS)
a) early phase (N = 85)
b) Middle phase (N= 59)
c) Late phase (N = 897)
d) latest phase (N = 32)

decline in sheep, but they are distorted by the high proportion of dog bones found in this phase. This distortion is less apparent in the MNI figures (Table 9.9), which suggest a rather higher proportion of sheep.

This picture is broadly similar to the one that emerged from the analysis of the 1969–78 bone assemblage, although there are some slight differences. There are also differences in sheep bone proportions from the two main types of context, pits and layers. These are shown graphically in Fig 9.17 where the ‘epiphyses only’ figures for the 1969–78 and 1979–88 samples are compared by context. Sheep bones were, in the late phase for example,

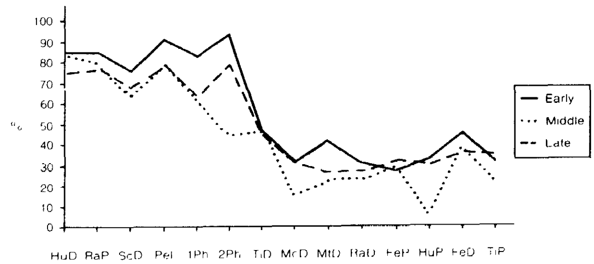


Figure 9.20 Sheep: Percentages of fused banes
NB Bones in fusion order (see Table 9.13); for key see Fig 9.18

slightly more common in nits than in layers in the 1969–78 sample, but the reverse was the case for the 1979–88 sample. The significance of these differences will be further investigated in volume 6.

The analysis of the representation of skeletal elements is given for the main bones in Table 9.11. Fig 9.18 gives the percentage survival figures in the order in which the bones are expected to occur, with those elements that were expected to have the best survival potential on the left, and the worst on the right. This ordering is made with the assumption that all parts of the skeleton were once deposited in equal numbers and discrepancies between the numbers of the different elements recovered are primarily a result of taphonomic factors (see Grant 1984a, 498). In general those bones that are best represented at Danebury are the larger and denser elements and those that fuse early in the animals’ lives; those that are least well represented are the smaller and more fragile elements. For all phases the mandible is the most frequently recovered bone, but very small bones such as carpals and tarsals were found, and the fragile skull bones are also common. There is no reason to doubt that, by and large, sheep were slaughtered within, or very close to, the fort and their entire carcasses disposed of within the habitation area. This supports the conclusions reached previously for the 1969–78 assemblage (Grant 1984a, 501). There is certainly no clear sign of, for example, a general over-abundance of butchery waste or of food debris over the excavated area as a whole, but the more detailed analyses planned for the next volume may well show differences between location and context.

There already are some indications of changes over time in the element representation (Table 9.11 and Fig 9.18), which can be summarized by the calculation of the

Table 9.9 The species represented (minimum numbers of individuals)

All features

	Early		*Middle*		*Late*		*Latest*		*Total+*	
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
Sheep*	62	67	37	61	644	73	27	60	770	71
Cattle	12	13	9	15	92	10	8	18	121	11
Pigs	12	13	10	16	108	12	5	11	135	13
Dogs	3	3	2	3	15	2	3	7	23	2
Horse	3	3	3	5	23	3	2	4	31	3
Total	92		61		882		45		1080	

KEY
*sheep and goat
+ excluding undated features

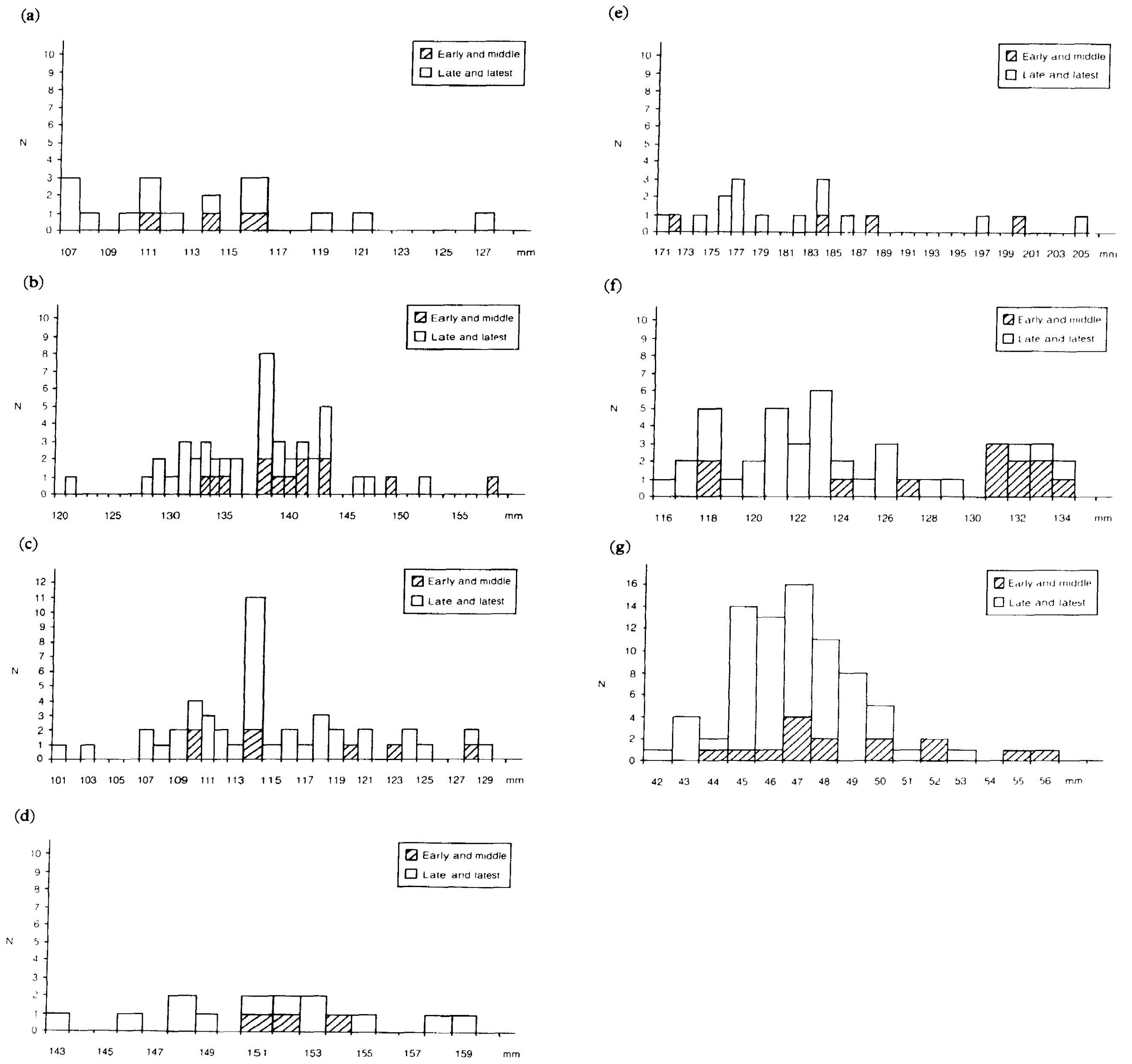


Figure 9.21 Sheep: bone lengths
a) Humerus *e) Tibia*
b) Radius *f) Metatarsal*
c) Metacarpal *g) Calcaneum*
d) Femur

'minimum percentage loss' figures (Table 9.12), which give the magnitude of the overall discrepancy between the best represented element and the other skeletal parts (Grant 1984a, 498). This discrepancy is greatest in the late and latest periods, with 69% and 73% loss respectively. In the early and, more especially, the middle periods the sheep were better represented (64% and 57% loss respectively). Since the overall pattern of bone representation suggests that the factors that have had the most significant influence on bone recovery are taphonomic ones, changes in rubbish disposal practices between these periods, particularly seen in the increasing amount of refuse found in the generally larger pits of the late period, may be major contributory factors. This may be particularly relevant for the understanding of the latest phase, although the relatively small size of the bone sample from this phase urges a cautious interpretation of the very much more irregular pattern of bone element representation. Many of the bones assigned to the latest phase did not come from discrete pits, but from the top

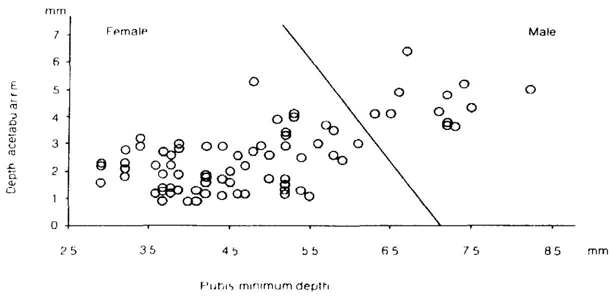


Figure 9.22 Sheep: pubis dimensions

layers of pits whose primary fill dated from earlier phases of occupation. In this position they will have been less protected from weathering and scavenging by dogs than bone from deeper down in the pits (see 9.5.2).

Particularly in the late period, one discrete part of the skeleton, the lower part of the limbs, comprised of the calcaneum, astragalus, metapodials and phalanges, is slightly under-represented, (although the extent of this under-representation in respect of the phalanges is very difficult to assess given the small size of these bones). This may suggest that in this phase of occupation, some of the preliminary carcass butchery may have taken place in a part of the site other than that excavated, although other 'waste' bones, in particular the mandibles, occur very frequently. An alternative, and perhaps better supported, explanation is that this part of the carcass was removed to supply the raw materials for tool manufacture – many of the bone objects recovered from Danebury had been made from sheep metapodials (p 481).

The age of the sheep at death was assessed by analysis of tooth eruption, tooth wear and epiphyseal fusion, and the evidence is presented in Figs 9.19 and 9.20 and Table 9.13. Mandibles were the bones recovered in the greatest numbers and they thus have the double advantage over long bones of giving not only the most precise but also the most representative information about mortality and culling strategies. Overall, approximately 70% of the recovered sheep mandibles could be given mandible wear stages (Grant 1983), with a rather higher percentage than this for the middle phase and a lower percentage for the latest phase. Incidentally, this confirms all the other indications of the comparatively good preservation of sheep bone remains for the middle phase, and poorer preservation for the latest phase.

The mortality profiles (Fig 9.19) are broadly similar for the four phases of occupation, (although the sample size for the latest phase is too small for detailed comparisons). In general, the analyses suggest high mortality in the first year of life (MWS 1–10), particularly in the second half of that period, with a smaller peak representing older, but still juvenile, animals (MWS 16–26). A significant

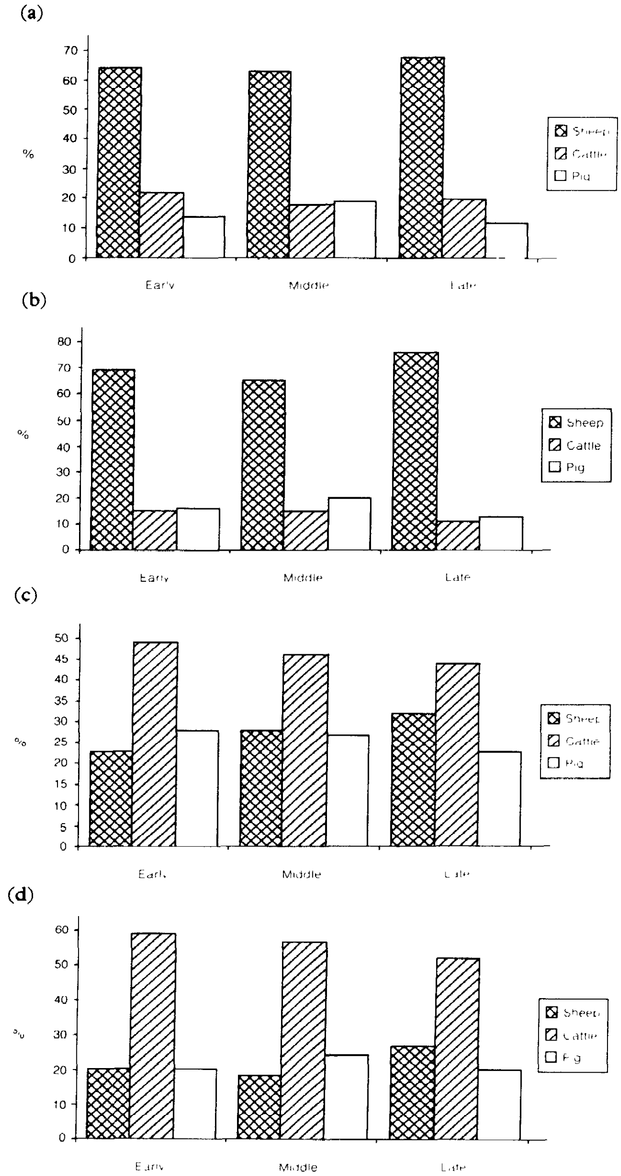


Figure 9.23 Relative proportions of the three main domestic species: 1969–88 sample
a) 'Epiphyses only'
b) Minimum number of individuals
c) Meat and offal weights (Vigne in press)
d) Meat weights
NB late includes 'late(a)' and 'late(b)' for the 1968–78 sample and 'late' and 'latest' for the 1978–88 sample

proportion was kept until maturity (MWS 28+), but there were only a few very elderly animals. This is consistent with the results obtained from the analysis of the sheep mandibles from the 1969–78 sample. In the early phase there appeared to be a much larger group of animals killed while juvenile (MWS 18–26) than in the other phases of occupation, but this apparent difference was not confirmed by statistical tests.

The bone fusion data (Table 9.13 and Fig 9.20) confirm the general picture of the sheep mortality given by the

Table 9.10 The dating of the occupation phases

Phase	*Ceramic phase*	*Approx. date BC*
Early	1–3	550–450
Middle	4–5	450–350
Late	6–7	350–50
Latest	8	50 +

Table 9.11 Sheep: occurrence of skeletal elements

	Early		*Middle*		*Late*		*Latest*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Horn core	55	45	44	60	673	52	18	34
Upper orbit	44	36	29	40	594	46	16	30
Lower orbit	23	19	21	29	324	25	10	19
Occipital cond.	25	20	15	21	260	20	3	6
Maxilla*	36	29	29	40	562	44	11	21
Mandible*	123	100	73	100	1288	100	53	100
Scapula D	52	42	34	47	595	46	11	21
Humerus P	27	22	17	23	211	16	6	11
Humerus D	79	64	49	67	649	50	31	58
Radius P	69	56	49	67	555	43	13	25
Radius D	53	43	36	49	373	29	10	19
Ulna P	40	33	24	33	339	26	10	19
Metacarpal P	62	50	37	51	447	35	10	19
Metacarpal D	55	45	31	42	337	26	13	25
1st Phalange	110	22	89	30	551	11	19	9
2nd Phalange	32	7	32	11	205	4	6	3
3rd Phalange	24	5	19	7	124	2	1	2
Pelvis*	53	43	39	53	512	40	20	38
Femur P	45	37	25	34	384	30	1	2
Femur D	29	24	29	40	297	23	8	15
Tibia P	26	21	19	26	266	21	23	43
Tibia D	57	46	38	52	520	40	42	79
Calcaneum	29	24	31	42	293	23	11	21
Astragalus	51	41	28	38	274	21	7	13
Metatarsal P	50	41	45	62	411	32	20	38
Metatarsal D	26	21	31	42	279	22	10	19
Atlas	18	29	14	38	210	33	5	19
Axis	14	23	11	30	194	30	5	19

KEY
P proximal; D distal; % = % of best represented element.
* maxilla and mandible with teeth, pelvis with acetabulum and ilium.
(corrections made when there are more or fewer than two elements per skeleton)

mandibles and emphasize the similarities in the three main phases of occupation. Unfortunately, the small sample size for the latest phase precludes any detailed analysis or discussion. For the first three phases the figures suggests that something in the order of 30% of animals were under the age of fusion of the earliest fusing bone elements, which according to Silver (1969) may be around ten months of age. A further 30%, or thereabouts, were fully skeletally mature at death. There is no evidence to suggest that sheep mortality in the latest phase was significantly different, although there may have been a slightly increased proportion of mature animals.

A summary of the most commonly taken sheep bone measurements is given in Table 9.14. The metrical data suggest that the sheep were small, slender limbed animals. Calculation of withers heights using Teichert's (1969) factors for the metacarpal and metatarsal give an

Table 9.12 'Minimum percentage loss' figures

	Early	Middle	Late	Latest
Sheep	64	57	69	73
Cattle	34	40	39	47
Pig	66	59	64	81
Horse	60	46	58	59
Dog	35	70	57	35

average size of 56 cm, The majority of the measurements taken on the 1979–88 bones fall within the range for the same measurements on the 1969–78 sample, with the range extended only for the metacarpal distal width and the tibia length *(cf* Grant 1984a, table 67). However, a majority of the bone size means calculated for the 1979–88 bones was slightly smaller than for the 1969–1978 sample. In the 1984 report, it was suggested that there may have been some reduction in the average size of sheep during the life of the hillfort, and this may be reflected in the smaller mean sizes for the 1979–88 bones, since a much smaller proportion of the bone from this campaign was dated to the early and middle phases. Many mean bone sizes were indeed larger for the early and middle periods than for the late periods, but the sample size was often too small for any statistical validity to be given. In Fig 9.21 the bone lengths for the main limb bones are plotted, with the early and middle phase bones distinguished from those of the late and latest phases. The tendency for those of the earlier periods to be, on average, slightly larger is demonstrated.

Apparent size changes between the phases could be a reflection of sexual differences in the sheep remains – the apparently larger size of the sheep in the early and middle phases could be a reflection of a larger proportion of males. A series of measurements was taken on the pelves to try to determine the sexual composition of the sheep population. Work carried out by the writer on skeletal material of known sex has shown that one of the more sexually diagnostic bone elements is the pubic bone. In

Link to Next Section

Table 9.13 Sheep: bone fusion

*Aprox. age at fusion **	*Bone*	*Early* F	*Early* UF	*Early* % F	*Middle* F	*Middle* UF	*Middle* % F	*Late* F	*Late* UF	*Late* % F	*Latest* F	*Latest* UF	*Latest* %F
10 mo.	Humerus D	33	15	69	41	11	79	482	194	71	24	7	77
	Radius P	58	16	78	39	16	71	424	195	68	12	2	86
	Scapula D	31	12	72	16	11	59	299	172	63	2	1	67
	Pelvis acetabulum	58	8	88	32	8	80	459	132	78	20	0	100
13–16 mo.	1st phalange	91	19	83	54	35	61	344	208	62	16	3	84
	2nd phalange	30	2	94	14	18	44	160	43	79	6	0	100
1.5–2.25 yrs	Tibia D	27	37	42	18	24	43	227	322	41	13	9	59
	Metacarpal D	17	43	28	5	27	16	105	243	30	5	8	38
	Metatarsal D	11	16	41	7	25	22	74	233	24	3	7	30
2.5–3yrs	Calcaneum	15	11	58	12	18	40	107	143	43	6	3	67
	Radius D	16	39	29	8	32	20	98	295	25	0	11	0
	Femur P	12	42	22		26	21	120	330	27	1	0	100
3–3.5 yrs	Humerus P	9	24	27		20	5	63	189	25	2	4	33
	Femur D	13	20	39	1	23	32	106	230	32	5	3	63
	Tibia P	8	25	24	4	20	17	89	230	28	2	6	25

KEY
* see Silver 1969
P proximal; D distal; F fused; U unfused; %F percentage fused

males this part of the pelvis tends to be rounded, while in the female it is rather more oval in section with a groove on the upper surface extending towards the pubic symphysis. In many examples this difference is clear to visual inspection, but it can also be quantified metrically. Other workers (for example Armitage 1977) have used the depth of the rim of the acetabulum. In neither case do males and females fall into discrete groups – there is always an area of overlap, and the sexual distinctions may be further complicated by the possible presence of castrates. Using both criteria together can sometimes clarify the distinctions, and in Fig 9.22 the depth of the acetabular rim is plotted against the minimum diameter of the pubis in a dorso-ventral direction. While there is a group that is clearly female and a group that is clearly male, a few measurements fall between the two extremes. An indication of where the male:female division might lie has been made, taking into account morphological criteria, but it is recognized that both the male and the female groups could include castrates. On the basis of this analysis, the male:female ratio for all phases together is 14:65, that is approximately 82% female. Unfortunately there were relatively few pelves that were well enough preserved to allow both measurements to be taken, and the sample size for the early and middle phases was only nine. Of these three were male and six female (67% female). This does suggest a slightly higher proportion of males in these periods, but analysis of the

Table 9.14 Sheep: bone measurements

Bone	*Measurement*	*Range (mm)*	*Mean (mm)*	*SD*	*CV*	*N*
Scapula	dw	21.9–33.4	27	1.8	6.5	189
Humerus	l	107–127	113	5.6	5	17
	dw	21.1–30.0	25	1.7	6.5	340
Radius	l	121–158	138	6.6	4.8	48
	pw	20–31	26	1.8	7.2	226
Metacarpal	l	101–129	115.4	6.3	5.5	49
	dw	18.0–27.0	21.5	1.3	5.9	98
Femur	l	143–159	152	4.3	2.8	15
	dw	29.5–38.5	32	1.5	4.9	40
Tibia	l	171–205	183	9.3	5.1	18
	dw	19.8–25.5	22	1.2	5.3	172
Metatarsal	l	116–134	124	5.6	4.5	44
	dw	17.8–22.9	20.5	1.0	4.8	74
Calcaneum	l	42–56	47	2.6	5.5	80

KEY
SD standard deviation; CV coefficient of variation; N number
1 length; pw proximal width; dw distal width

Link to Previous Section

Table 9.15 The relative proportions of the main domestic animals (meat and offal weights (in press)): 1969–88 sample

			Middle		*Late*	
Adult carcass weight	*Kgs*	*%*	*Kgs*	*%*	*Kgs*	*%*
Sheep 30kgs	2344	23	1509	28	14163	32
Cattle 400kgs	4994	49	2481	46	19443	44
Pig 130kgs	2801	28	1457	27	10319	23

The weights are corrected by the factors shown in Table 9.16 (see p.451)

Table 9.16 Productivity correction factors (see p. 451)

Correction factors	*Early*	*Middle*	*Late*
Sheep	1.7	1.5	1.5
Cattle	1.6	1.9	1.9
Pigs	2.3	2.4	1.7

acetabular rim measurements alone suggests that in fact there may have been a rather higher proportion of females in the early phase, but a slightly lower one in the middle phase. However, the sexual differences between the phases do not seem to have been sufficiently large to account for the apparent size differences between the phases. These are important issues, affecting both the interpretation of the nature of the sheep husbandry (see below) and of the changes that took place over time. Analysis of the measurements from the complete sample (1969–88) may help resolve them.

The majority of the sheep were horned in both sexes, but a small proportion was hornless. All examples of hornless sheep were dated to the late phase.

Sheep husbandry

The 1984 discussion of the Danebury sheep emphasized the importance and suitability of this animal for the downland environment immediately surrounding the hillfort. Much of what was said earlier could be repeated here, but in order to avoid repetition, this discussion will concentrate on those aspects that add to, support or even contradict the conclusions previously reached.

One essential aim of the analysis of faunal remains must be to understand the role that animals played as suppliers of essential products, both foodstuffs and raw materials. To this end, methodologies to analyze productivity (outlined in section 9.5.6) are being developed. The first of these, developed by Jean-Denis Vigne (in press), attempts to estimate the amount of edible foodstuffs (both meat and offal) that were being supplied by the domestic animals. This method is different from those more commonly employed to estimate meat yields (eg Carter *et al.* 1965), where the minimum numbers of individuals figures are multiplied by the assumed adult carcass weight for each species. Vigne's method takes account of both the mortality profile of the animal population, and the size of the animals. The mortality profiles used here have been calculated on the basis of the mandible wear stages, and the size from the estimation of withers heights discussed above; the adult weight of a sheep has been estimated at 30 kg, and the carcass yield at 50% of this, that is 15 kg. In Table 9.15 the meat and offal yields have been calculated for the three main domestic species. In Fig 9.23 the relative proportions based on epiphyses and minimum numbers of individuals counts and Vigne's meat and offal weights (MOW) and crude meat weight counts are compared for these three species. The MOWs given in Table 9.15 have been corrected by the appropriate survival factors (see 9.5.6; Table 9.16), in order to improve the validity of the comparisons. The analyses are made on the total sample of the relevant animal bones from the 1969-88 seasons, in three chronological groups, early, middle and late (ie late (a) and late (b) for the 1969–78 bones and late and latest for the 1979–88 bones).

It is quite clear that although their bones are considerably more numerous than the bones of the other species, sheep do not make the major contribution to the meat diet – in all periods this is made by cattle. This is perhaps not very surprising, given the very considerable difference in body size between the species. However, the meat and offal weight calculations have revealed another dimension to the changes over time that were not apparent from the figures based on bone counts. In the middle phase, the proportion of sheep appears to have fallen (Fig 9.23 (a) and (b)), but the proportion of sheep meat eaten seems to have increased in this period (Fig 9.23 (c)). In the late phase there was a significant increase in the proportion of sheep bones found, but the increase in the proportion of sheep meat eaten was less pronounced. The differences between the phases must therefore reflect not only changes in the relative proportions of the domestic animals but also changes in their husbandry. The inadequacy of the standard meat yield figures (Fig 9.23 (d)) is shown in their failure to demonstrate this.

The nature of these changes is partly revealed by calculations of the average MOW for each period (Fig 9.24 (a)). This reveals a rise in meat productivity in the middle phase, and a drop in the late phase, resulting from slightly higher proportions of young animals in the early and late phases, killed before they had achieved their full body weight. The figures also suggest that meat productivity was highest in the latest phase, although the small sample size, and in particular, the possibility of slightly poorer bone survival for this period, suggest a cautious interpretation of these figures. Another factor that must be taken into consideration when productivity is being assessed is that of 'cost', or the amount of input expended. While more or less equal amounts of food may have been produced by a three year old and a five year old sheep, the cost of feeding the older animal will have been almost twice that of the younger animal. Fig 9.24 (a) also gives the 'cost' of a kilogram of meat and offal in feed units, one unit being equal to the cost of feeding one adult for one year (see section 9.5.6). Lower average food yields are matched by lower costs per kilogram, with yield and cost highest in middle and latest phases, and lowest in early and late phases. However, while average yields are similar in the early and late phases, the cost is higher in the late phase, and in the latest phase the cost rises only slightly for a relatively steep rise in the average amount of food produced per animal.

Meat production may certainly have been an important aim of the sheep husbandry, and all the evidence suggests that the vast majority of the bone remains were food refuse. However, husbandry aims may also have been focussed on the production of wool and milk. Table 9.17 gives figures for the average yields of all major products (meat, milk and wool) in units (see 9.5.6), together with the average cost per product unit, calculated in feeding units.

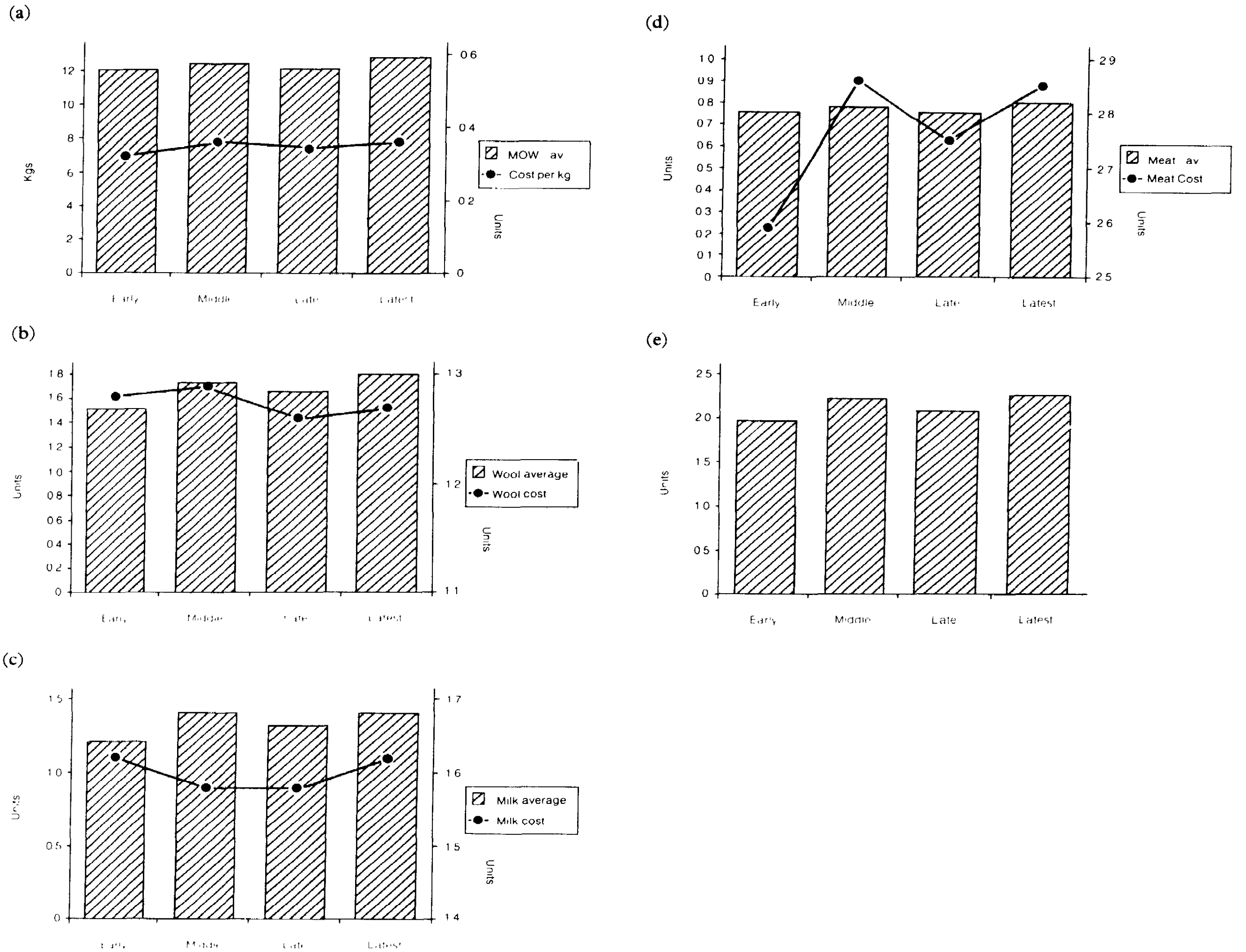


Figure 9.24 Sheep: average productivity and cost
a) Average meat yield per animal (in kgs) and cost per kg
b) Average wool yield per animal (in units) and cost per unit
c) Average milk yield per animal (in units) and cost per unit
d) Average meat yield per animal (in units) and cost per unit
e) Average feeding cost per animal (in units)
NB All costs calculated in units (see 9.5.6). For Figures a), b), c) & d) the right hand axis relates to the costs, the left hand axis to the productivty

Wool productivity and cost are shown in Fig 9.24 (b). Average wool productivity per individual is at its lowest in the early phase. In the middle phase there is an increase in productivity, with a very slight rise in cost. In the late phase, there is a slight fall in productivity, but a sharper fall in cost, suggesting a less intensive, but possibly more cost efficient husbandry. In the latest phase the potential for wool productivity is at its highest, with costs per unit still lower than in the early phase when productivity was at its lowest. From the early to the latest period there is an 18% increase in wool productivity per individual, with a 1% drop in the average cost per unit of wool (Fig 9.25).

Milk productivity and cost are shown in Fig 9.24 (c). The proportion of females has been estimated at 0.95. This is rather higher than determined from the analysis of the pelvis measurements (p 458), but it is assumed that a much higher proportion of males than of females will have been killed off in their first two years (see below), increasing the ratio of females to males in the adult population. For all phases female fertility has been taken as 90%: this is a rather high figure, but it was decided for the purpose of this analysis to take the most optimistic figures. Similarly it has been assumed that the sheep produced their first lamb when two years old. The milk productivity analysis suggests that average milk yields may have fluctuated quite markedly over time, with a 16.5% difference between the most productive periods, the middle and latest phases, and the least productive period, the early phase (Fig 9.25). Milk unit costs also vary, with the costs highest in the early and latest phases, and lowest in the middle and late phases.

Milk is, of course, a resource that cannot be used totally for the benefit of the human population – a proportion, possibly a significant proportion, will be needed to feed the lambs. Some of the sheep remains from Danebury were those of neo-natal or very young lambs (MWS 1–2) (Fig 9.19) and all the milk produced by the mothers of these animals could have been used for human consumption. Rather less milk will have been available from the

Table 9.17 Sheep: productivity and feeding costs

	Early	*Middle*	*Late*	*Latest*
Average product units per individual	*N*	*N*	*N*	*N*
Wool	1.52	1.73	1.66	1.80
Milk	1.21	1.41	1.32	1.41
Meat	0.76	0.78	0.76	0.80
Average feeding costs per individual	1.96	2.23	2.08	2.28
Cost (in units) per product unit				
Wool	1.28	1.29	1.26	1.27
Milk	1.62	1.58	1.58	1.62
Meat	2.59	2.86	2.75	2.85

NB A unit of milk and of wool is taken to be the yield of one adult in a year; meat units are the yield of one adult individual; feed units are the cost of feeding one adult for a year

ewes whose lambs survived. This productivity analysis is not yet sophisticated enough to take account of this.

Meat productivity and unit cost have already been discussed above (see Fig 9.24 (a)), but they have been calculated again (Fig 9.24 (d)) using meat units rather than actual weights. The cost differences between the phases are emphasized here, since the cost is calculated per unit, that is per adult animal, rather than per kilogram of food. Particularly important is the demonstration of the relative cost of the three products. Meat, which is a non-renewable resource, is a much more expensive product than the two renewable resources, milk and wool. Of these, wool is the cheapest, as its production is dependent neither on sex nor on fertility.

The costs for each product have been calculated individually, but of course in reality some animals will produce both wool and milk each year, and almost all will ultimately have supplied meat. Thus the average feeding costs per individual are the best indication of overall energy consumption (Table 9.17, Fig 9.24 (e)). They show the greatest average expenditure of food resources in the latest and middle phases, and the lowest in the early and late phases, with a 16 percent difference between the two extremes, the early and latest phases (Fig 9.25 (b)).

Summarizing this attempt to understand the sheep husbandry (see Table 9.17, Fig 9.24 and 9.25), we may characterize the early phase as one where relatively limited resources were invested in the sheep, and consequently there were relatively low returns. There was a modest production of wool, milk and meat, with no indication of any particular specialization in one product. The sheep husbandry in this early phase seems to have been most efficient in terms of its meat production, where costs were the lowest of all phases. Milk costs were higher than in either the middle or the late period, and wool costs higher than in the late or latest phases.

In the middle phase, there was a significant increase (14%) in the average consumption of food resources by sheep, with an associated rise in productivity. The rise in productivity was relatively modest in the case of meat (2.6%) but there was a much greater increase in wool and milk productivity (14% and 16% respectively). The increase in milk productivity was achieved with a drop in unit cost, and the increase in the unit cost of wool rose only very slightly (1%). Meat costs, however, rose quite considerably (10%).

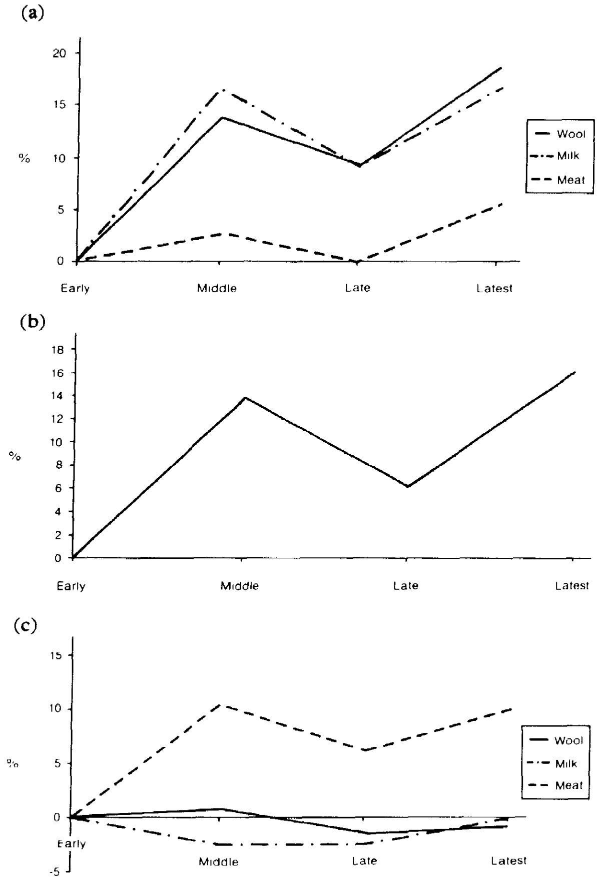


Figure 9.25 Sheep: percentage change in productivity over time
a) average yields of wool, milk and meat (calculated in units)
b) Average feeding costs (calculated in units)
c) Average unit costs of wool, milk and meat (calculated in units)

In the late phase, average feeding costs dropped again, although they still showed a 6% rise over the early phase levels. The output of all products fell, in the case of meat to the early phase levels, but wool and milk productivity still showed a significant rises in relation to the early phase (9%).

Finally in the latest phase there was a considerable rise in average expenditure per animal (16%) and a considerable rise in all products. Meat production rose only to middle phase levels, but milk and particularly wool both exceeded these, with rises over the early phase levels of 16% and 18% respectively. The unit costs for all products except meat were still very low although they were both higher than in the late phase.

These changes in average productivity are not sufficiently large to suggest a move to a specialized husbandry in any of the later periods; in fact, the husbandry system seems to have been relatively stable, considering the long period of occupation of the site. However, there is perhaps an indication of a shift to a greater emphasis on wool production, particularly in relation to meat production. The exploitation of wool at the site is also evidenced by the many finds of artefacts related to wool processing, with a marked concentration in the deposits of the late period. Further investigation of the incidence of these artefacts in the different phases of occupation might provide supporting evidence for the speculations on the nature of sheep husbandry.

Some of the limitations of these productivity analyses have already been discussed above (p 451*ff*). Perhaps one of the most serious of these is our lack of information about the trade or exchange of animals. We can only examine the potential productivity of those animals whose remains we have recovered, but these are not necessarily representative of the animals who were tended by the fort's inhabitants. We do, however, have ways of investigating whether or not the bone remains could represent the mortality of viable, self-reproducing herds. Whatever the products required, the over-riding concern of any husbandry system must have been to produce enough fertile offspring to maintain the size of the flock, therefore it is important to investigate whether the proportion of adult females found is theoretically sufficient to have maintained flock size. Lamb productivity is calculated with the proportion of females and the fertility rate as for milk production above, with the assumption that single lambs were produced rather than twins. Milk productivity was averaged for the total sheep population represented, but in this analysis the average number of lambs is calculated per adult female. In order to ensure herd maintenance, the number of female lambs that survive to adulthood must equal the number of adult females. If we assume the chance of giving birth to a female lamb is 1 in 2, then an average of two lambs per female must be produced. We also need to allow for neo-natal and infant mortality; therefore, the average figures must in fact be slightly higher than two to compensate for those animals that die before they are able to reproduce. The average number of births per adult (that is reproductively adult) female has been calculated for each phase of occupation at Danebury, and also the number per female that would survive, assuming a 10% neonatal mortality. In the early and latest periods only two lambs per adult female might survive birth, and assuming no further deaths of female lambs before maturity, herd size could, theoretically at least, have been maintained. However, no herd growth would have been possible, and if mortality was any higher, or fertility any lower than estimated here, then herd size would fall. It is certainly possible, if not likely, that in these two periods a proportion of the adult sheep population may have been traded or exchanged, or at least have died elsewhere.

In the middle and late periods the reproductive potential of the sheep was higher, with averages of 2.2 and 2.3 respectively. This is more compatible with the possibility that we have, for these periods, a representation of the mortality of a self-reproducing herd. While it by no means negates the possibility of trade or movement of animals, it does not make it *necessary* as an explanation for the *adult* mortality structure.

So far this analysis has only taken into account those sheep that reached sexual maturity before death. The MWS calculations also give information about the number of animals that died while still immature. We can use these figures to estimate the proportion of the potential number of lambs born that died before they reached sexual maturity. Assuming that 50% the births were male, and that the proportion of adult males necessary for reproductive purposes was only 0.05 (that is one male to 20 females), approximately 47% of the lambs could be killed while still immature without affecting the viability of the herd, as long as they were all male.

In all phases, sub-adult mortality accounted for under 50% of the reproductive potential of the adult population but in the late, and in particular in the early periods, the mortality figures are high enough to suggest that unless only males and no females were killed before they reached adulthood, the herd could not have been maintained. The figures for sub-adult mortality are rather lower in the middle and latest phases, but still relatively high compared to all other sites for which this analysis has been carried out. The potential for the production of animals for trade was low in the early period, but slightly higher in the other periods, particularly in the middle phase, but any trade would have had to be almost entirely in male animals.

This analysis of the reproductive potential of the sheep has assumed that we have recovered a 'cross-section' of the mortality of what was once a viable herd. Fertility and the proportion of females have been set at relatively high levels, infant mortality at relatively low levels, in order to present the most optimistic picture. This analysis merely demonstrates a potential. To use statistical terminology, it takes as the null hypothesis that the animal mortality is that of a viable, self-reproducing herd, then tests this hypothesis. The hypothesis cannot be proved, it can merely be given a basis for acceptance or rejection. On this basis we may summarize the evidence.

In the early and latest periods, there is some reason to suppose that a proportion of the adult female flock may not be represented in the animal bone sample since the reproductive potential of the females whose bones were recovered seems rather too low to have ensured their own replacement. This is coupled with high infant mortality. The remains of the adult females that produced some of these lambs may have been disposed of elsewhere. This could imply some trade or exchange of adult animals. Alternatively it could imply that some of the infant animals were those of other flocks (see Grant 1984b).

In the middle phase, the reproductive potential *could* have been high enough to ensure flock viability. Infant mortality was apparently rather lower than in the early phase, and thus a small surplus of animals could have been produced for trade. Most of them would have been male, but there may have also been a very small surplus of females.

In the late phase the reproductive potential was very slightly higher than in the middle phase, but a higher proportion of immature sheep were killed. There was a potential for the production of surplus males, but this was lower than in the middle phase.

In the latest phase, the reproductive potential was low, and a relatively small number of lambs were killed in infanthood. The number of female lambs produced may have been barely enough to ensure flock survival, but in theory, a surplus of males could have been produced. There is reason to consider the possibility that taphonomic factors (p 455) may have led to a slight underestimation of the real proportion of young deaths. The possibility that the mortality profile for this period may not be that of a self-reproducing flock must be considered. Whether trade in animals from, or supply of animals to the fort is indicated is unclear, although the lower proportion of young animals in this phase may support the latter view.

Overall, this analysis has suggested a largely self-sufficient, rather unspecialized, low input, low output sheep husbandry. Some slight increase in wool production is suggested, in the later phases, but the potential for production of animals or their products for trade or exchange would seem, on the evidence that we have, to be relatively limited. At two other Iron Age sites, Odell and Ashville (Grant in press; Wilson 1978), whose occupation was partly contemporary with that of the

Link to Next Section

latest phase at Danebury, input and output were significantly higher. Wool productivity was higher in relation to meat productivity than at Danebury, the increased output being achieved with a slight drop in the unit cost of the wool. The reproductive potential at Odell was similar to that at Danebury, but considerably higher at Ashville. Both these sites seem to have had slightly more potential as producers than Danebury.

Goats

Goat bones were distinguished from those of sheep on the basis of clearly visible morphological criteria which were validated by metrical analysis. The most diagnostic bones were the horn cores, the metapodials and the calcanea.

The analysis confirmed the presence of a small number of goat remains in the deposits of all phases of occupation. No precise figures for their relative proportions can be given, since these figures varied for the different bone elements. The proportions calculated on the basis of the horn cores can be given as a very rough guide and suggest that approximately 8% of the ovicaprids were goats in the early and middle periods, while they fell to only 1% in the late and latest periods.

This is a higher proportion for the early and middle phases than in the 1969–78 sample, but very similar to that calculated for the late periods. All analyses suggest that goats were more commonly kept in the early and middle phases of occupation, but declined in economic importance in the later phases.

Cattle

The evidence

Overall, approximately one-fifth of the bones recovered were those of cattle, but there appears to have been some fluctuations in their relative importance over the period of occupation of the site. All three bone counts suggest the lowest proportion of cattle in the late period and the highest in the latest period (Tables 9.7, 9.8 and 9.9; Fig 9.15). The 'total fragments' count and MNI figures suggest that there was a very slightly higher proportion of cattle in the middle than in the early phase, but the 'epiphyses only' figures suggest a very slight, but steady decline in cattle from the early to the late period. Direct comparisons with the results of the 1969–78 analyses are hampered by the change in the phase groupings (pp 45l–2), but the earlier analysis suggested a significant drop in the proportion of cattle in the middle phase. Fig 9.26 summarizes the percentages of cattle bones in the 1969–78 and 1979–88 samples by context, using the 'epiphyses only' counts. It is apparent that rather different results are obtained from the analysis of the bones from the pits and from the occupation layers. Particularly striking are the differences in the proportions of cattle bones found in the occupation layers excavated in the two campaigns (Fig 9.26 (b)). We should thus be cautious in the significance that we assign to apparent changes over time in the proportion of cattle, until we have further investigated the significance of contextual differences.

The analysis of the occurrence of the different cattle skeletal elements is summarized in Table 9.18, and Fig 9.27 gives the relative proportions of the main elements in the order in which they might be expected to survive, assuming that it was predominantly natural processes that had influenced their chance of survival. In general, the pattern is as for sheep, in that the best represented elements are mainly the larger, dense and early fusing ones. There are some exceptions; in all phases there is a tendency for metapodials to be slightly under-represented and this may be connected with their use as raw materials for tool manufacture (see pp 359, 481; Grant 1984a, 510). However, in all phases, all bone elements are found. including the fragile skull bones and. apart from the relative scarcity of metapodials. there was no readily discernable pattern in the bone survival figures that could be easily accounted for by human activities. Even in the latest phase, where the sample size was rather small, all parts of the skeleton were represented.

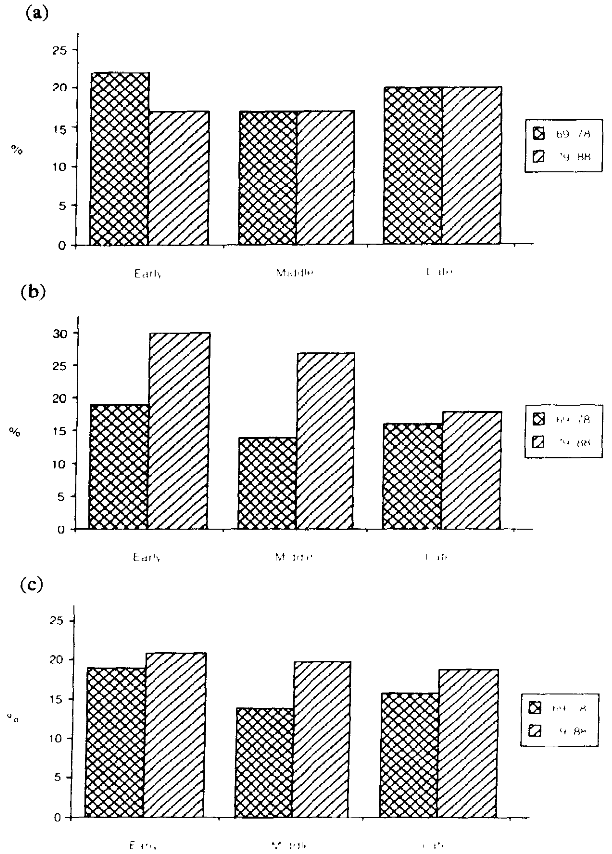


Figure 9.26 Relative proportions of cattle bone in the 1969–78 and 1979–88 samples
a) Pits
b) Layers
c) All features
NB late includes 'late(a)' and 'late(b)' for the 1969–78 sample and 'late' and 'latest' for the 1979–88 sample

The minimum percentage loss figures (Table 9. 12) are much lower for cattle bones than for those of sheen. which may well reflect their larger size and confirm the biases that result from the more rapid decay of the smaller, fragile bones, and the lower chance of recovery of small bones. As in the case of the sheep, losses were greatest in the latest period. This adds some support to the suggestion that bone dating from this phase may have been slightly less well preserved overall than that from earlier phases. This impression is also supported by the rather low proportion of small bones, such as phalanges from this phase (Fig 9.27 (d)).

It is clear that to understand fully these analyses we must look more carefully at the nature of the bone material in the different types of context at the site.

A summary of the evidence for the age at death of the

Link to Previous Section

Table 9.18 Cattle: occurrence of skeletal elements

	Early		*Middle*		*Late*		*Latest*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Horn core	19	79	16	89	160	87	15	100
Upper orbit	21	88	8	44	96	52	11	73
Lower orbit	18	75	14	78	88	48	5	33
Occipital cond.	12	50	7	39	70	38	4	27
Maxilla*	11	46	9	50	75	41	5	33
Mandible*	24	100	17	94	127	69	12	80
Scapula D	24	100	10	56	182	99	12	80
Humerus P	15	63	4	22	68	37	6	40
Humerus D	24	100	13	72	168	92	10	67
Radius P	24	100	16	89	183	100	15	100
Radius D	11	46	8	44	108	59	9	60
Ulna P	20	83	8	44	149	81	11	73
Metacarpal P	12	50	10	56	146	80	11	73
Metacarpal D	10	42	9	50	92	50	8	53
1st Phalange	43	45	35	49	220	30	10	17
2nd Phalange	22	23	26	36	155	21	5	8
3rd Phalange	18	19	18	25	108	15	4	7
Pelvis*	21	88	11	61	146	80	10	67
Femur P	16	67	6	33	110	60	4	27
Femur D	11	46	5	28	99	54	8	53
Tibia P	16	67	11	61	84	46	5	33
Tibia D	19	79	16	89	132	72	11	73
Calcaneum	13	54	18	100	116	63	10	67
Astragalus	11	46	18	100	132	72	7	47
Metatarsal P	19	79	15	83	116	63	9	60
Metatarsal D	14	58	14	78	74	40	7	47
Atlas	12	100	7	78	74	81	5	67
Axis	7	58	2	22	64	70	2	27

KEY
Maxilla* including teeth; mandible* including teeth: pelvis* acetabulum and ilium: P proximal; D distal; % = % of best represented element.
(corrections made when there are more or fewer than two elements per skeleton)

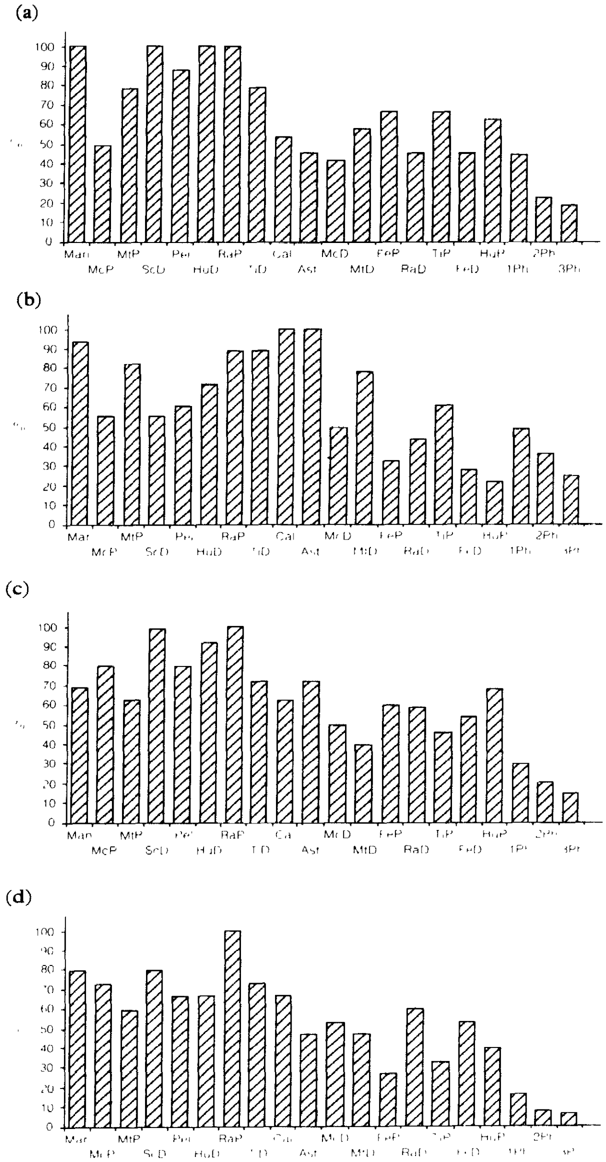


Figure 9.27 Cattle: skeletal element percentages
a) Early phase
b) Middle phase
c) Late phase
d) Latest phase
KEY see Figure 9.18

cattle is presented in Figs 9.28, 9.29 and 9.30 and in Table 9.19. Although mandibles give the most detailed information on age at death, they were the most common bone element only in the early phase (Table 9.18). Furthermore, since many of the mandibles were broken or had lost teeth post-mortem, only a proportion of them could be assigned a precise MWS. In the four chronological phases at Danebury the number of aged mandibles were respectively 67%, 39%, 43% and 67% of the MNIs. As was noted in the analysis of the 1969-78 sample, the majority of the damaged mandibles were not those of young animals as might have been expected, but those of adult animals. In Fig 9.29 the mandibles are shown grouped by MWS in such a way as to allow the inclusion of most of the damaged mandibles. This not only helps to counteract the bias against the older animals, but also increases the representativeness of the mandibles. The numbers included in this figure in the four phases are respectively 83%, 61%, 52% and 67% of the MNI's calculated. These figures show that there is a danger, particularly for the late phase, that the mandibles may not be a true reflection of the mortality profile of the cattle.

On the evidence that we have, there appear to be quite distinct differences in the cattle mortality profiles in the four phases of occupation. In the early phase, a very high proportion of the cattle were young and juvenile animals, with a rather small proportion of adults. A number of young animals were still found in middle phase contexts, but the proportion of adult animals seems to have increased. However, the sample size was very small for this period: only seven precisely aged and 11 less precisely aged mandibles were found. In the late phase the majority of the mandibles were from very young or fully mature animals, with relatively few mandibles from young or juvenile beasts. There was a similar pattern to the cattle mortality in the latest phase, but again the sample size was very small (nine aged mandibles).

Bone fusion data are summarized in Table 9.19 and Fig 9.30. The sample size for the middle and latest periods precludes any detailed discussion. Although rather more difficult to interpret, the bone fusion data do in general

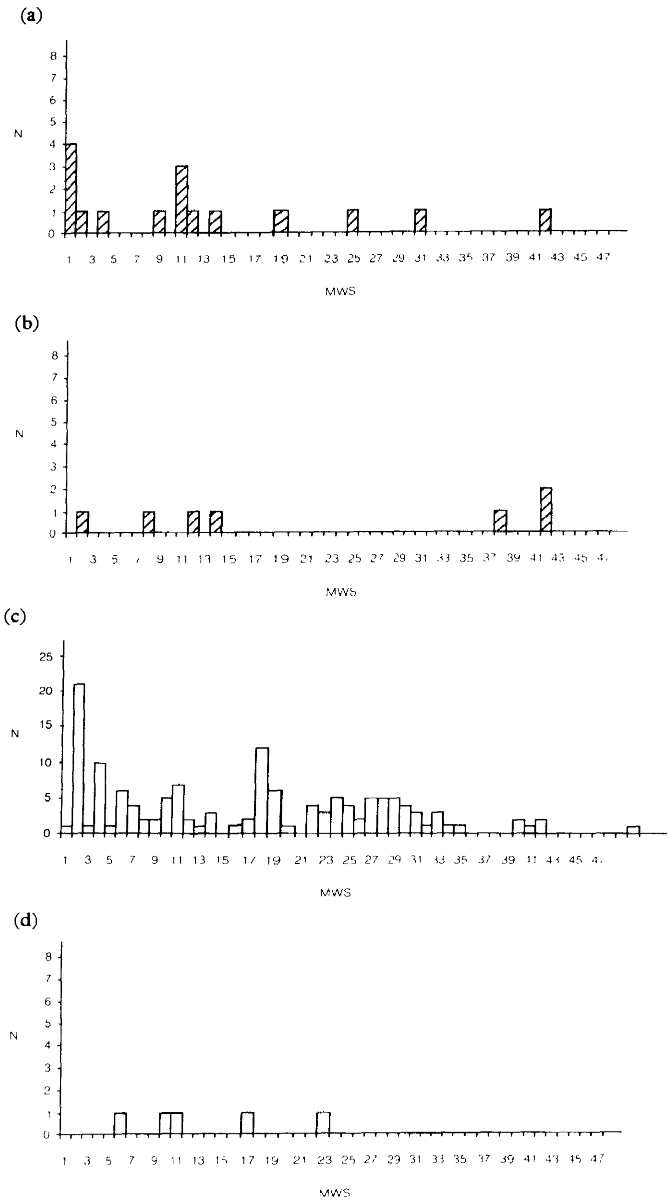


Figure 9.28 Cattle: mandible wear stages (MWS)
a) Early phase (N = 16)
b) Middle phase (N = 7)
c) Late phase (N = 79)
d) Latest phase (N = 9)

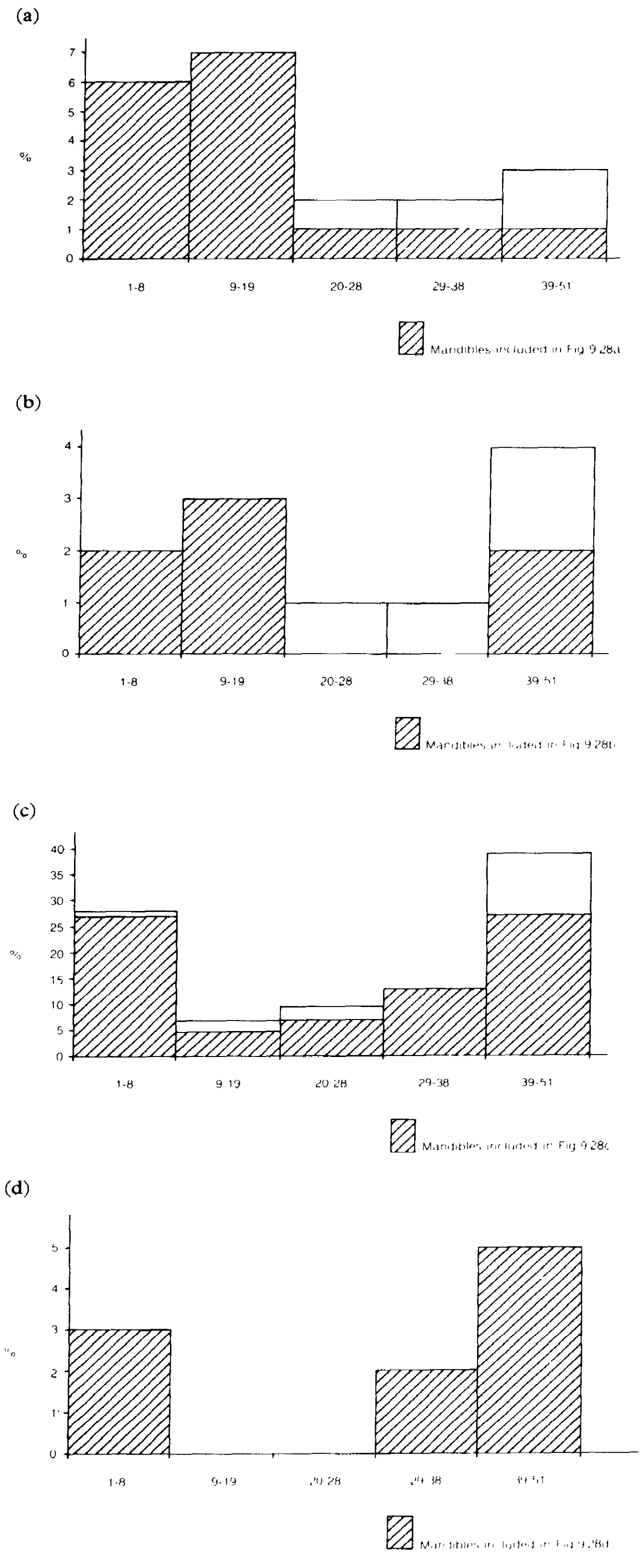


Figure 9.29 Cattle mandible wear stages including fragmentary mandibles
a) Early phase (N = 20)
b) Middle phase (N = 11)
c) Late phase (N = 96)
d) Latest phase (N = 9)

confirm the mortality profiles suggested by the tooth wear analyses. Smaller percentages of the early fusing bone elements were fused in the early phase than in any other, which confirms the impression that many young animals were killed in this phase. There were also rather lower percentages of late fusing bones, particularly in comparison with the late period figures.

The main measurements are summarized in Table 9.20, and in Fig 9.31 the lengths of the major limb bones are plotted. The majority of the individual measurements fall within the size range established by the analysis of the 1969–78 sample, but in several cases the range, particularly of the long bone measurements has now been been

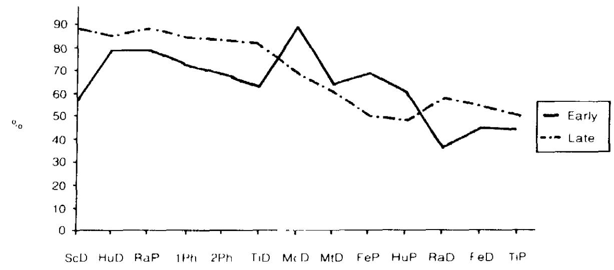


Figure 9.30 Cattle: Percentages of fused bones (early and late phases) NB Bones in fusion order (see Table 9.19). For key see Figure 9.18

extended. This is not surprising, or necessarily significant, since the the number of complete, measurable bones from both campaigns was relatively small.

By modern standards, the Danebury cattle were very small, with average withers height of only just over a metre (Foch 1966). However, some of the animals were fairly large by Iron Age standards. There was no evidence for size changes over time, but this issue will be readdressed in Volume 6 when the complete sample of bone measurements can be analysed.

Some measurements were taken in order to attempt to establish the sexual composition of the Danebury cattle population. Most workers use metrical data from the metapodials to establish sexual divisions: Howard (1963) suggests the use of distal and shaft indices and Higham (1968) the dimensions of the distal articulation. Following the work on sheep pelvises described above, measurements were also taken on the cattle pubises, although it should be noted that the value of these measurements for determining sexual differences has yet to be verified on modern specimens of known sex. Fig 9.32 gives plots of distal metacarpal and distal metatarsal measurements, metacarpal distal and shaft indices, and pubis dimensions for the early and middle, and late and latest phases. For the early and middle phases, each set of measurements appears to fall into two distinct groups suggesting male/female divisions. The ratio of females to males would appear to be 5:6 from the distal metacarpals, 6:3 from the distal metatarsals, and 8:1 or 6:3 from the metacarpal indices. The metapodials will only indicate the sexual structure of the cattle that were approximately two to two and a half years of age or older at death, as the distal epiphysis is unfused in younger animals. The pelvis measurements suggest a male: female ratio of 3:3. Since the pubis can be measured even for young animals, any sexual groupings revealed by this bone may be of a slightly different portion of the cattle population than those revealed by the metapodials. Preferential culling of either males or females in the 1 to 2 year age group should be revealed in differences in the proportions of males and females determined from the pelvises and the metapodials. However, we neither have a large enough sample, nor a precise enough idea of the sexual groupings to draw any very firm conclusions from this analysis. We may however suggest that approximately 70% of the adult and sub-adult cattle were females.

For the late phases the sexual groupings are much less clearly defined than for the early and middle phases. The clearest divisions can perhaps be seen in the pubis measurements (Fig 9.32 (h)): there is a distinct and fairly coherent group in the bottom left of the chart, which might well be females, and a slightly more diverse group towards the upper right, which might be the males. These suggest a female:male ratio of 18:14, that is approximately 65% females.

For the metapodials the interpretation is much more difficult. In all cases there is a group of measurements that fall between what appeared to be the male and female groups for the early and middle phase measurements. While the two extreme ends of the distributions may still be assigned to males and females with some confidence, the sexual status of the intermediate group is not clear. Are they males, females or even castrates, or a mixture of all of these? Taking the groupings suggested by the distal metacarpal measurements for the early and middle phases (Fig 9.32 (a) and (b)), nine of the late

Table 9.19 Cattle: bone fusion

*Aprox. age at fusion**	*Bone*	*Early*			*Middle*			*Late*			*Latest*		
		F	*UF*	*%F*	*F*	*UF*	*%F*	*F*	*UF*	*%F*	*F*	*UF*	*%F*
10 mo.	Scapula D	10	8	56	7	0	100	111	15	88	4	2	67
18 mo.	Humerus D	19	5	79	12	1	92	143	25	85	9	1	90
	Radius P	19	5	79	13	3	81	159	22	88	12	3	80
	1st Phalange	31	12	72	29	6	83	185	35	84	9	1	90
	2nd Phalange	15	7	68	22	4	85	128	27	83	5	0	100
2–2.5 yrs	Metacarpal D	8	1	89	5	4	56	63	28	69	6	2	75
	Tibia D	12	7	63	14	2	88	105	25	81	8	2	80
	Metatarsal D	9	5	64	10	4	71	45	29	61	4	3	57
3.5 yrs	Calcaneum P	4	4	50	4	1	80	32	29	52	3	2	60
	Femur P	11		69	3	3	50	55	55	50	4	0	100
3.5–4 yrs	Humerus P	9	6	60	1	3	25	31	34	48	4	2	67
	Radius D	4	7	36	3	5	38	62	44	58	5	4	56
	Ulna P	0	10	0	0	4	0	14	30	32	1	2	33
	Femur D	5	6	45	2	3	40	53	45	54	7	1	88
	Tibia P	7	9	44	5	6	45	42	42	50	5	0	100

KEY
* see Silver 1969
P proximal; D distal; F fused; UF unfused; %F percentage fused

Table 9.20 Cattle: bone measurements

Bone	*Measurement*	*Range (mm)*	*Mean (mm)*	*SD*	*CV*	*N*
Horn core	length	90–175	121	30.4	25.0	9
Scapula	Maximum dw	48–70	58.3	5.0	8.7	55
Humerus	l	217–256	234	13.9	6.0	9
	dw	65–82	72.3	4.2	5.8	47
Radius		227–282	255	15.6	6.1	18
	pw	64–78	72.5	3.9	5.4	53
Metacarpal		150–192	170	9.7	5.7	30
	dw	44–62	53	4.0	7.5	41
Femur		275–324	295	14.8	5.0	10
	dw	77–90	84	4.3	5.2	11
Tibia		280–343	306	18.7	6.1	15
	dw	49–64	55	3.4	6.2	73
Metatarsal		178–240	197.5	10.5	5.3	32
	dw	41–59	50	3.9	7.9	40
Calcaneum		106–132	118	7.0	5.9	25
Astragalus		48–64.5	57.6	3.3	5.8	66

KEY
SD standard deviation; CV coefficient of variation; N number
1 length; pw proximal width; dw distal width

phase measurements fall within the ‘female’ group, eight within the ‘male’ group and seven fall between the two. If all the intermediate group were in fact female, the proportion of females would be just under 70%. If however the intermediate group were males, or castrates, the proportion of females would be just under 40 percent.

The clear and consistent change in the distribution of the metapodial measurements between the early and middle phases and the late phases suggests the possibility that there may have been an important shift in emphasis in the cattle husbandry in the later phases of occupation. The possible implications of this will be discussed in the next section. Further research into the sexual determination of archaeological bone material should be a major priority for archaeozoology. An imprecise knowledge of the sexual structure of domestic animal populations is a severe limitation to our understanding of animal exploitation in the past.

Cattle husbandry

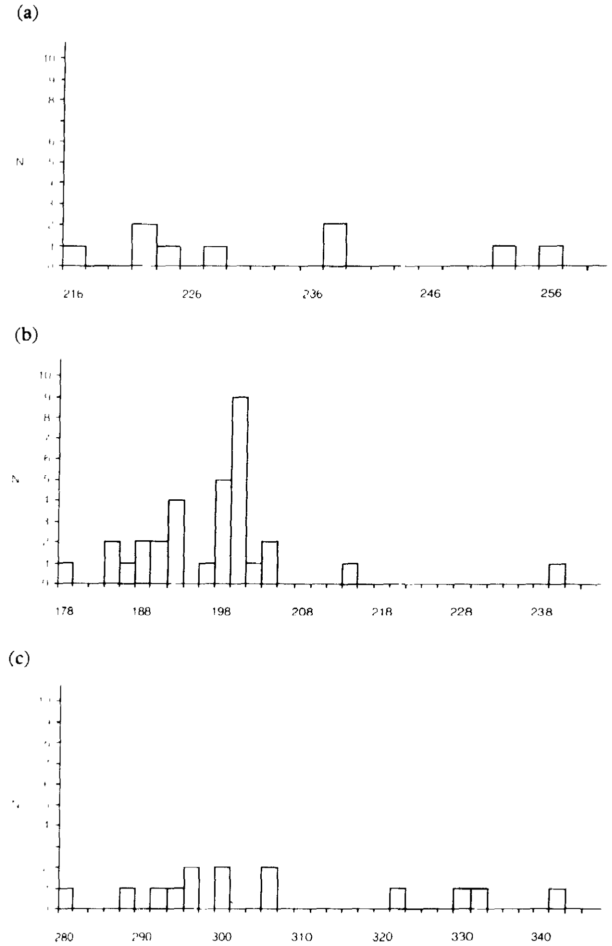
The general conclusions that were reached in 1984 about the nature of cattle exploitation in relation to the Danebury environment still seem appropriate and will not be repeated here. This section will take a more detailed and critical look at the cattle husbandry using the same approaches as were adopted for the discussion of the sheep husbandry. The following analyses have been based on the mortality profiles of the complete (1969–88) sample of Danebury bones. Cattle productivity calculations have been made for meat, milk and work. Those for work, or traction, have not, in this instance, taken account of the sexual ratios, although it is accepted that males, particularly castrated one, may be more productive in terms of work than females. However both medieval records and modem observations in countries that still use cattle for traction show that even pregnant cows may be yolked to the plough.

Although only about a fifth of the Danebury bones were those of cattle, the meat and offal weight analysis, taking adult body weight as 400 kgs, and the dressing out percentage as 50%, suggests that these animals supplied nearly a half of all the meat consumed within the hillfort (Table 9.15, Fig 9.23). It was in the early period that their contribution was the greatest (49%), but in the middle phase it had fallen (to 46%). There was a further slight decline in beef consumption (44%) in the late phase. These changes in beef consumption must reflect fluctuations in the proportion of cattle amongst the domestic livestock, but changes in cattle husbandry are also suggested. The average MOW per individual fluctuates quite markedly over the four phases of occupation, with the highest productivity in the late and latest phases, and the lowest in the middle phase (Fig 9.33 (a)).

The relationship between meat productivity and cost are shown in Fig 9.33 (b), calculated in units (9.5.6). (*NB.* These productivity calculations have been made from mandibles recovered during all twenty seasons of excavation (1969 – 1988). Many of the damaged mandibles that could not be given a precise MWS were able to be included in this analysis, but there is still a possibility of a slight distortion of the results.) Meat productivity, and cost, were quite markedly lower in the middle phase than in any other period, with a very low average of less than half a unit per animal being achieved. Average meat productivity, however, rose in the late and latest periods, although the cost of a unit of meat also rose (Figs 9.33 (a) & (b); Table 9.21). This is because a higher proportion of animals was being kept beyond maturity, and suggests that the secondary products of cattle may have been increasingly exploited. This is confirmed by the milk and work productivity calculations (Fig 9.33 (c) and (d); Fig 9.34; Table 9.21), which show a significant average increase in these products, with a slight drop in unit cost. In the middle phase productivity is particularly low again. Overall average feeding costs (Fig 9.33 (e), Fig 9.34 & Table 9.21) also reflect these changes.

To summarize, we may suggest that in the early phase there was a very unintensive husbandry with only a

Link to Next Section



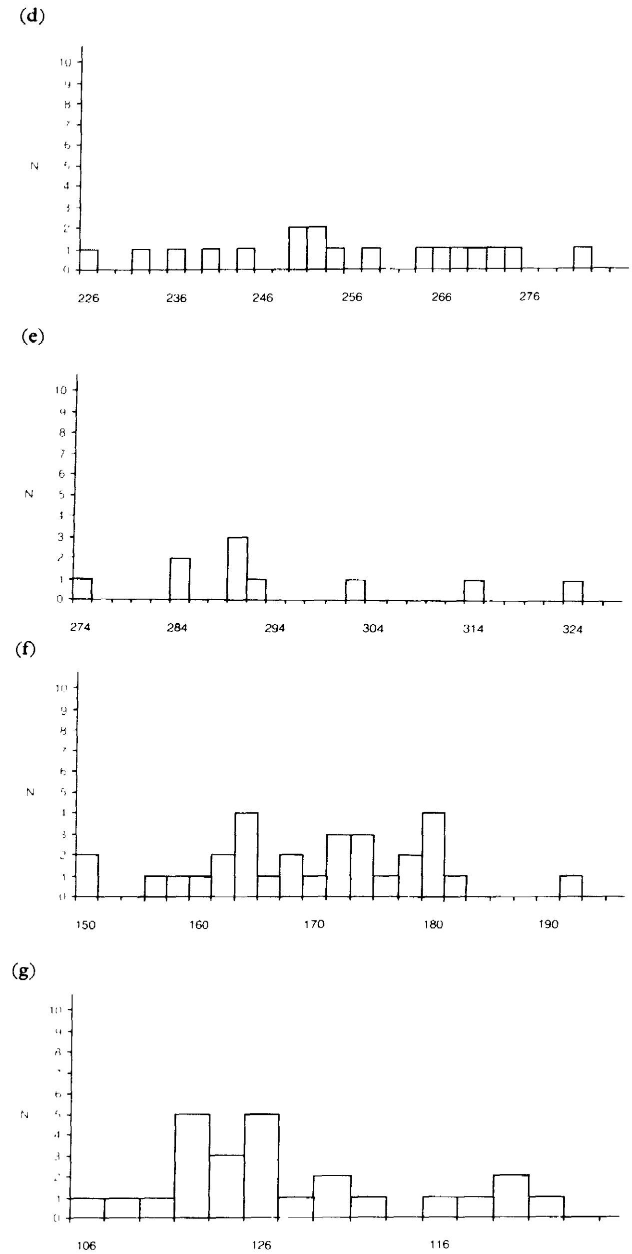


Figure 9.31 Cattle: bone lengths
a) Humerus
b) Radius
c) Metacarpal
d) Femur
e) Tibia
f) Metatarsal
g) Calcaneum

modest production of all animal products possible. In the middle phase the proportion of cattle bones was relatively high (Tables 9.7, 9.8 & 9.9 this volume; Grant 1984a, Tables 61, 62 & 63), but the investment in feeding the cattle whose remains have been recovered, and consequently their productivity, appear to be quite markedly lower than in any other period.

While the scale of the husbandry was still relatively unintensive, there seems to have been an increase in the average production of the renewable secondary products, milk and especially traction, in the late and latest phases. This seems to have been achieved by more efficient husbandry in terms of these products, since the unit cost of both milk and traction fall in these periods (Fig 9.34). These conclusions are particularly significant in the light of the metrical analyses discussed above, which suggests the possibility that in these phases there may have been an increased proportion of castrates, or even the first extensive use of castration as an animal management strategy.

The reproductive potential of the cattle whose remains were recovered was also calculated, in the same way as for sheep. The proportion of females has been assumed to be 0.7, a figure suggested by the metrical analysis of metapodial and pubis dimensions (see above). For this analysis we have assumed that the bones whose measurements fell in the 'intermediate' group in the late and latest phases were those of females (Fig 9.32 (b), (d), (f) and (h). If they were in fact castrates the milk and young yields would have been considerably below those calcu-

Link to Previous Section

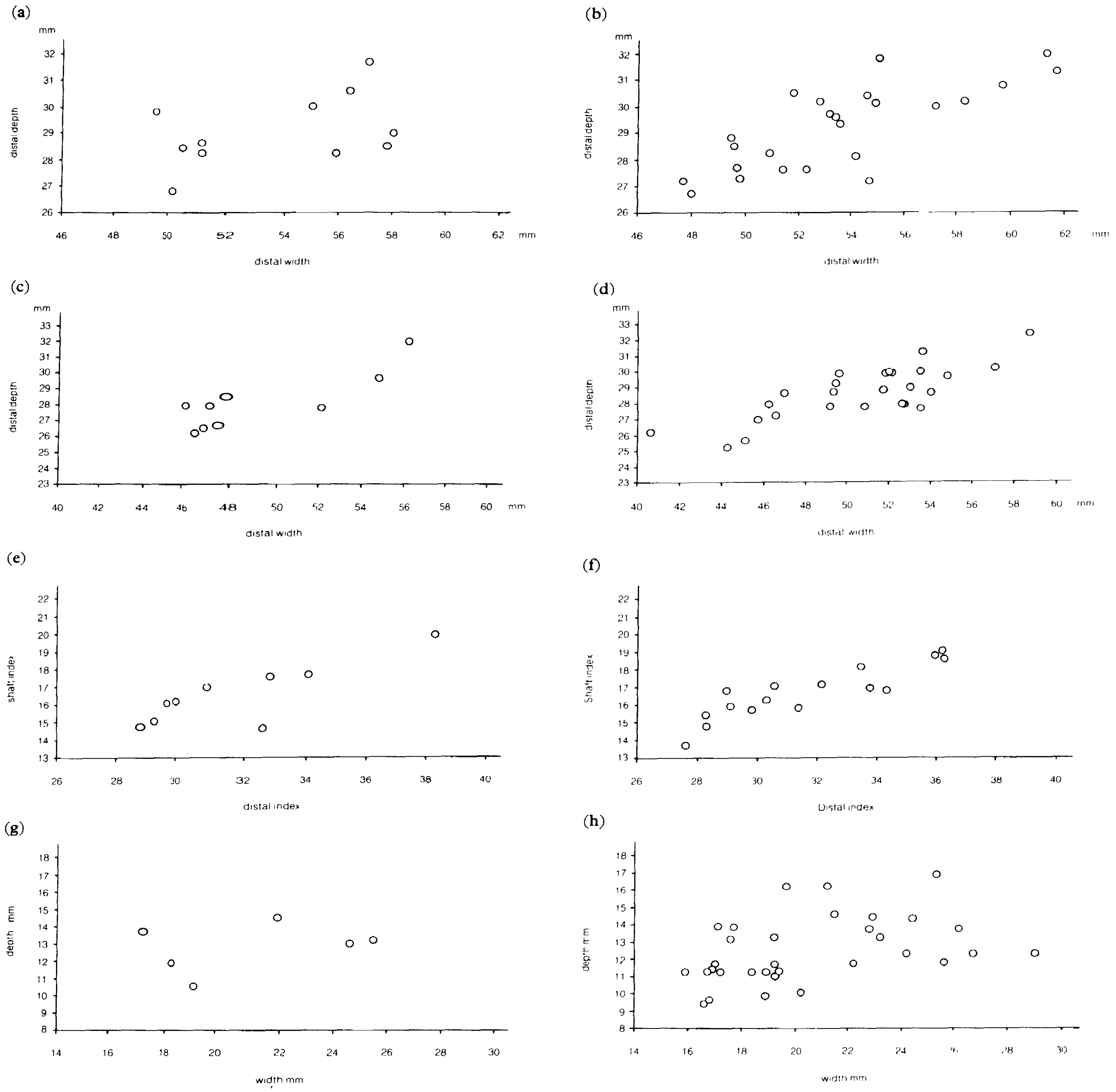
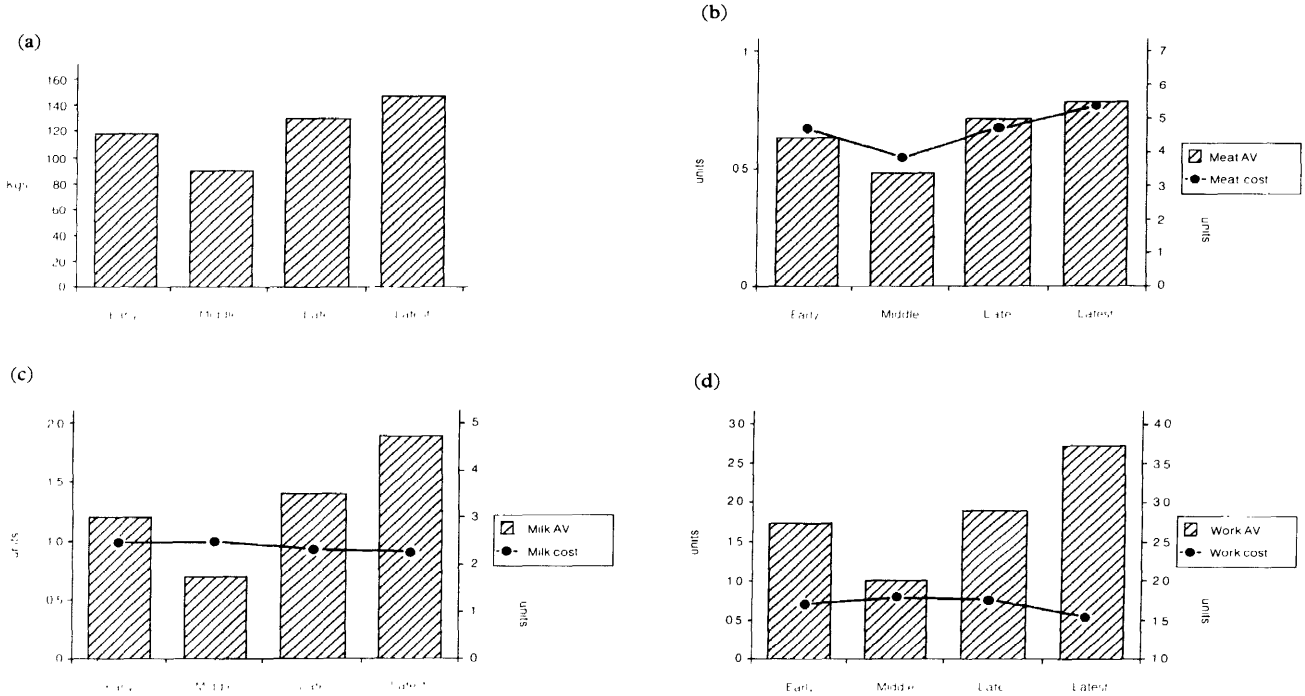


Figure 9.32 Cattle: metapodial and pubis dimensions
a) Distal metacarpals, early and middle phases
b) Distal metacarpals, Late phases
c) Distal metatarsals, early and middle phases
d) Distal metatarsals, late phases
e) Metacarpal shaft and distal indices, early and middle phases
f) Metacarpal shaft and distal indices, late phases
g) Pubis dimensions, early and middle phases
h) Pubis dimensions, late phases
NB Shaft index = 100 x shaft width/length
Distal index = 100 x distal breadth/length



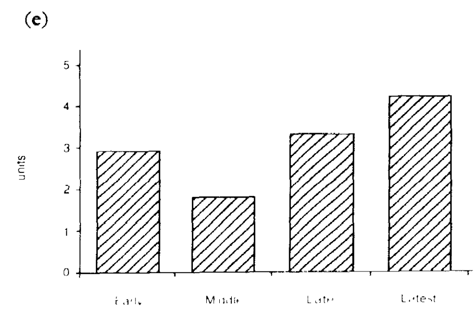


Figure 9.33 Cattle: average productivity and cost
a) Average meat yield per animal (in kg)
b) Average meat yield per animal (in units) and cost per unit
c) Average milk yield per animal (in units) and cost per unit
d) Average work yield per animal (in units) and cost per unit
e) Average feeding cost per animal (in units)
NB All costs calculated in units (see 9.5.6). For Figures b), c), and d) the right hand axis relates to the costs, the left hand axis to the productivity.

lated here. We will examine further this possibility, and its implications, in Volume 6. First calving is assumed to have taken place at two years, and fertility and neo-natal mortality were set at 0.8 and 0.9 respectively. In all phases the potential number of surviving births per adult female was around three, with the highest average reproductive potential in the latest period, and the lowest in the middle period. Theoretically this should have ensured herd replacement and even offer the potential for growth as long as mortality was low. The proportion of cattle that died under reproductive age varied quite considerably in the four phases of occupation, being lowest in the late and latest periods. In the middle period the proportion of young animals was especially high and if the mortality profile of the recovered animal remains was that of a single herd, the herd would have died out rapidly. However, we must interpret this with caution, because of the rather small sample for this period, and the possible biases that may have resulted from differential damage to mandibles from animals of different ages

Table 9.21 Cattle: productivity and feeding costs

Average product units per individual	*Early*	*Middle*	*Late*	*Latest*
Work	1.73	1.02	1.88	2.73
Milk	1.20	0.70	1.40	1.90
Meat	0.63	0.48	0.71	0.78
Total	3.56	2.20	3.99	5.41
Average feeding costs per individual	2.93	1.83	3.32	4.21
Cost per product unit				
Work	1.70	1.80	1.76	1.54
Milk	2.45	2.47	2.30	2.23
Meat	4.66	3.81	4.70	5.37

NB A unit of milk and of work is taken to be the yield of one adult in a year; meat units are the yield of one adult individual; feed units are the cost of feeding one adult for a year

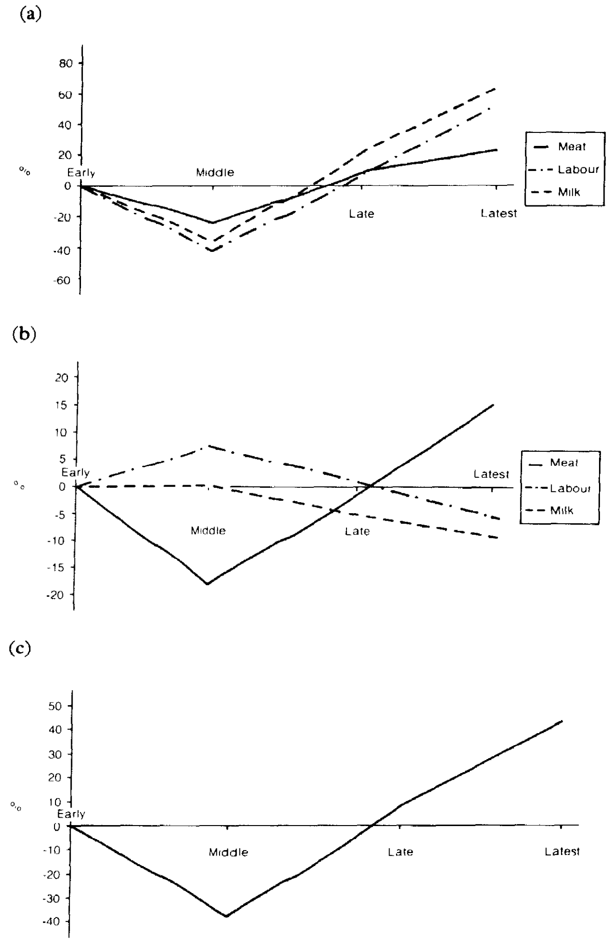


Figure 9.34 Cattle: percentage change in productivity over time
a) Average yields of wool, milk and meat (calculated in units)
b) Average unit costs of wool, milk and meat (calculated in units)
c) Average feeding costs (calculated in units)

(see above). In all other phases, the mortality pattern is not inconsistent with that of a single herd, and as long as fertility was not significantly different from that assumed in the calculations made above, there would have been the potential for the production of surplus animals or for herd growth – modest in the early period, but rather more substantial in the late and latest phases.

These calculations have been made taking fairly optimistic values for mortality and fertility. We can have no way of knowing the true value of these parameters and the calculations have been made to give a general indication of what might have been possible. What has emerged though is that for the middle phase it is extremely unlikely that the cattle mortality represents that of a self-reproducing herd. While those adult animals whose remains were recovered *could* have produced enough offspring to replace themselves, the large proportion of deaths of young animals suggests that they were not all the offspring of those adult cattle. The possibility of trade, exchange or movement of adult cattle away from the site, or of young animals to the site during this period is strongly suggested. This is a factor that must be taken into account when interpreting the low estimates for cattle productivity and investment in the middle phase.

At the present time, Danebury could only be compared to one other Iron Age site. This was Odell, a small settlement with occupation from the 1st century BC. This site also seemed to have had a rather unintensive cattle husbandry, but with slightly more emphasis on meat production than at Danebury. Figures for work productivity at Odell were lower than in any phase except the middle phase at Danebury.

Pigs

The evidence

Approximately 12% of the bones recovered were those of pigs, with slightly higher proportions being recovered in the layers than in the pits (Tables 9.7 & 9.8; Fig 9.12). There are fluctuations in their proportions in the four phases of occupation, and they are most common in the middle phase and least common in the latest phase. In the 1969–78 sample a significant drop in the proportion of pig bones was noted between the late (a) and late (b) phases (Grant 1984a, 514). However, in the 1979–88 sample they are only slightly less common in the late phase than in the middle phase (although the MNI figures show a greater difference than the 'total fragments' and 'epiphyses only' figures). The proportion of pig remains in the total sample (1969–88) is shown in Fig 9.23 (a) and (b), and suggests a rise in the proportion of pigs in the middle phase, with a decline in their numbers in the late phase.

The differences between the two assemblages can be partly accounted for by the different phase groupings used for the two campaigns (9.5.7), but there do seem to be more significant differences. Fig 9.35 compares the 1969–78 and 1979–88 proportions of pig bones in each type of context. Higher proportions of pigs were found in all 1969–78 contexts except the late phase layers. These differences are clearly worthy of further investigation and will be considered again in Volume 6.

The skeletal element analysis is given in Table 9.22 and Fig 9.36 gives the percentage survival figures in the expected order of survival. This order is slightly different than that used for the 1969–78 sample, the main difference being the position of the proximal metapodials. In the earlier analysis (Grant 1984a, 514) it was suggested that these bones were under-represented. It is now felt that this was probably not the case, as these relatively small bones should not be expected to have survived particularly well, and certainly not as well as the same elements in cattle and sheep. In general, the pattern of survival is rather close to the expected one, although, rather surprisingly, mandibles were not the best represented elements in the early and middle phases – in the 1969–78 sample mandibles were the best represented element in all phases. The most likely explanation is that it is a sampling effect – the sample size was small for both early and middle phases. There is certainly no other evidence to support a view that any preliminary butchery of pigs was being carried out elsewhere, since maxillae were particularly common in all phases, and the other 'waste' bones did not seem to be significantly under-represented.

The 'minimum percentage loss' figures (Table 9.12) are relatively high, particularly in the latest phase, although it should be noted that the sample size was very small for this phase. The figures confirm the general conclusions drawn above in the discussion of the sheep and cattle bones (p 456, p 463).

The evidence for the age at which the pigs were killed, or died, is summarized in Figs 9.37 and 9.38 and Table 9.23. Mandibles were only the most common bone

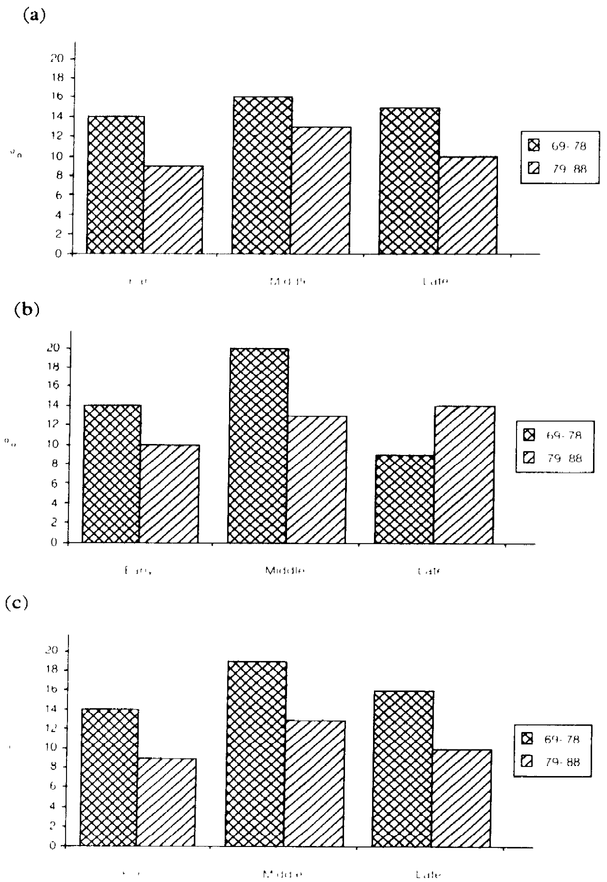


Figure 9.35 Relative proportions of pig bones in the 1969–78 and 1979–88 samples
a) Pits
b) Layers
c) All features
NB late includes 'late(u)' and 'late(b)' for the 1968–78 sample and 'late' and 'latest' for the 1978–88 sample

Table 9.22 Pig: occurrence of skeletal elements

	Early		*Middle*		*Late*		*Latest*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Upper orbit	13	54	13	68	131	61	2	20
Lower orbit	5	21	5	26	77	36	1	10
Occipital cond.	4	17	7	37	47	22	0	0
Maxilla*	24	100	19	100	200	93	6	60
Mandible*	14	58	14	74	215	100	10	100
Scapula D	17	71	12	63	136	63	0	0
Humerus P	3	13	5	26	49	23	2	20
Humerus D	8	33	12	63	120	56	4	40
Radius P	11	46	7	37	89	41	3	30
Radius D	1	4	3	16	43	20	1	10
Ulna P	15	63	15	79	133	62	1	10
Metacarpal P	16	33	12	32	113	26	5	25
Metacarpal D	12	25	8	21	81	19	4	20
1st Phalange	15	16	20	26	130	15	0	0
2nd Phalange	13	14	12	16	70	8	3	8
3rd Phalange	3	3	1	1	41	5	1	3
Pelvis*	10	42	13	68	95	44	3	30
Femur P	8	33	6	32	59	27	2	20
Femur D	6	25	8	42	58	27	2	20
Tibia P	9	38	2	11	43	20	0	0
Tibia D	8	33	6	32	88	41	1	10
Calcaneum	8	33	9	47	76	35	1	10
Astragalus	7	29	8	42	67	31	1	10
Metatarsal P	7	15	12	32	80	19	2	10
Metatarsal D	3	6	7	18	51	12	3	15
Metapodial P	2	4	1	3	14	3	0	0
Metapodial D	2	4	1	3	19	4	0	0
Atlas	8	67	5	53	59	55	2	40
Axis	3	25	3	32	18	17	0	0

KEY
P proximal; D distal; % = % of best represented element,
Maxilla* including teeth; mandible* including teeth: pelvis* acetabulum and ilium
(corrections made when there are more or fewer than two elements per skeleton)

element in the late and latest phases, and only a proportion of them could be assigned a precise MWS. Thus in the four phases of occupation, the aged mandibles are representative of only 21, 26, 70, and 50% of the pig population represented by the pig bone assemblage as a whole. Thus only for the late phase can we have any confidence that the mandibles give us very reliable information about pig mortality in the 1979–88 sample. The MWS calculations for this phase suggest that there was a fairly high mortality in the very young age group (MWS 1–5), and after that a fairly steady kill-off of young and juvenile animals, with only a very few animals kept beyond maturity. The majority of the mandibles that were clearly those of males were from juvenile animals, with the oldest male pig having a MWS of 29, and we may thus suggest that the majority of mature animals were female.

Little can be concluded from the scant evidence for the other phases, apart from noting the spread of ages in the early phase, and the lack of mature animals in the middle and latest phases.

Bone fusion data is summarized in Fig 9.38 and Table 9.23. Again the sample size is very small for all but the late phase. The fusion evidence for this phase is consistent with that given by the tooth wear analysis, and also suggests a fairly steady kill-off of young and juvenile animals, with only a very small proportion being kept beyond maturity (Fig 9.38). The fusion data for the other phases demonstrate that a small number of adult animals were represented in all phases, but that the majority were killed while young or juvenile. There is insufficient evidence here to use to suggest any differences between the four phases of occupation (but see below).

Metrical analysis of the pig bones to determine size and size changes was hampered by the very small number of complete and fully fused long bones recovered. The only complete long bones recovered were metacarpals and metatarsals. Those measurements that could be taken are summarized in Table 9.24. Almost all fall within the ranges established from the 1969–78 sample, with a few slightly extending these ranges. These measurements are consistent with animals of shoulder heights of around 0.7m, a figure calculated from the complete tibia found in the 1969–78 campaign, and all appear to be from domestic animals.

Pig husbandry

The primary economic value of a pig is as a producer of meat, with the only significant by-product of the live animal being manure. Calculations of the food yield of the 1969–88 sample of Danebury pigs suggest that they provided a significant proportion of the meat and offal

Link to Next Section

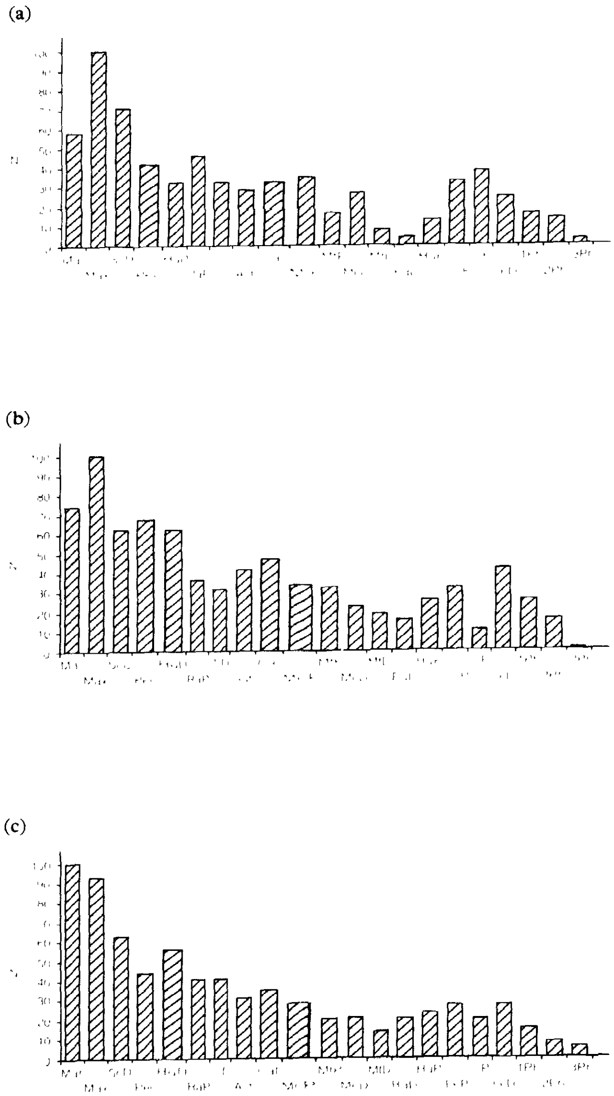


Figure 9.36 Pig: skeletal element percentages
a) Early phase
b) Middle phase
c) Late phase
NB Latest phase excluded because of the small sample size for this phase.
KEY see Figure 9.18

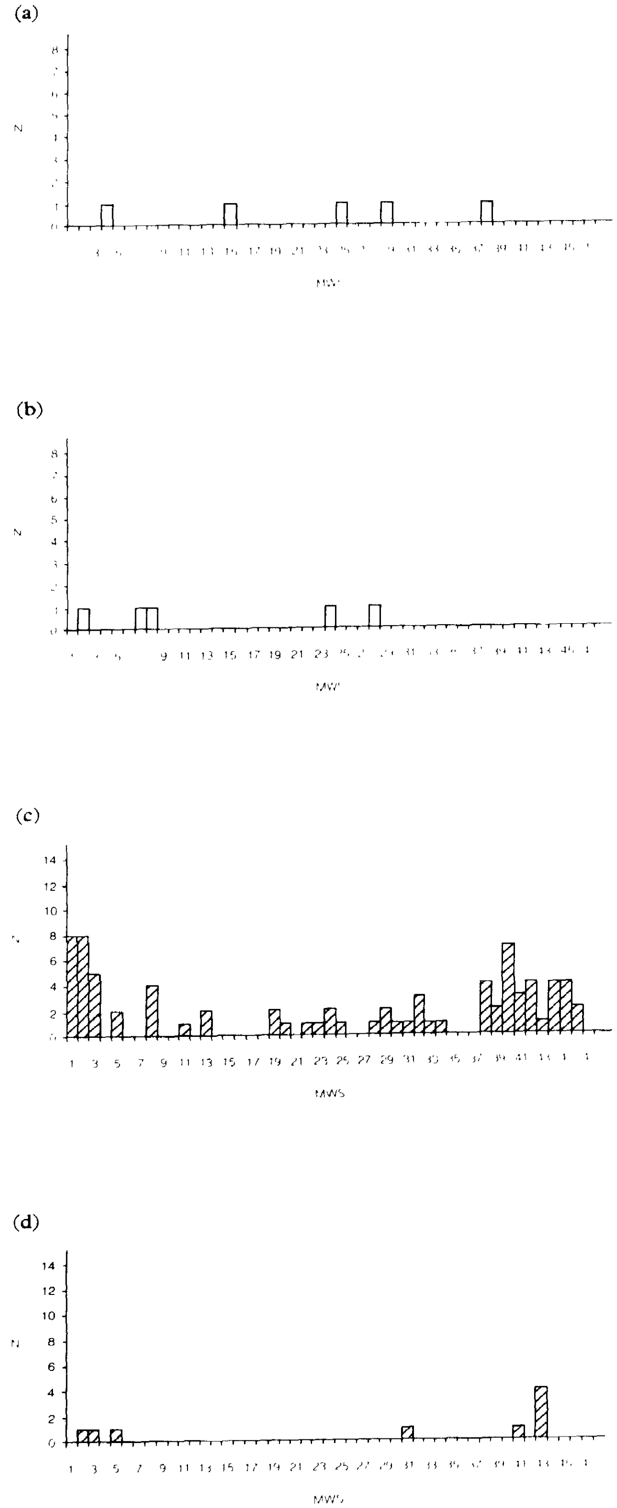


Figure 9.37 Pig: mandible wear stages (MWS)
a) Early phase (N = 5)
b) Middle phase (N = 5)
c) Late phase (N = 140)
d) Latest phase (N = 5)

Link to Previous Section

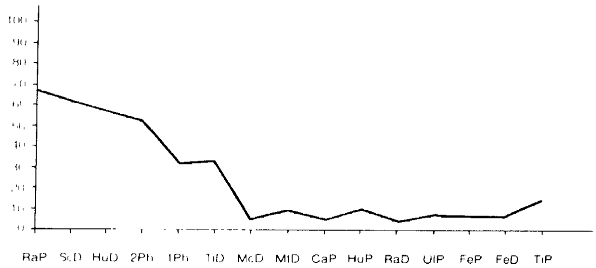


Figure 9.38 Pig: Percentages of fused bones (late phase)
NB Bones in fusion order (see Table 9.23). For key see Figure 9.18

consumed within the hillfort (Table 9.15 and Fig 9.23). The corrected figures shown in Fig 9.23 (c) (see p 455) suggest that more pork than lamb or mutton was eaten in the early phase, but that pork consumption declined in the late phases. The average MOW produced per individual (Fig 9.39 (a)) fluctuated quite considerably over time, with the highest average yields being obtained in the early phase, and the lowest in the late phase. The latest phase has been excluded from these productivity calculations because of the very small size of the sample. The same calculations in terms of meat units are shown in Fig 9.39 (b) and emphasize the rather low productivity of the Danebury pig husbandry. A husbandry that aimed to maximize meat production would be expected to have average meat yields fairly close to 1 unit, but at Danebury they were 0.5 and 0.6 units respectively in the early and late periods, and only 0.38 in the middle phase. The meat unit costs (Fig 9.39 (b)) and the average individual feeding costs (Fig 9.39 (c)) suggest that the investment in pork production was very low, particularly in the middle phase.

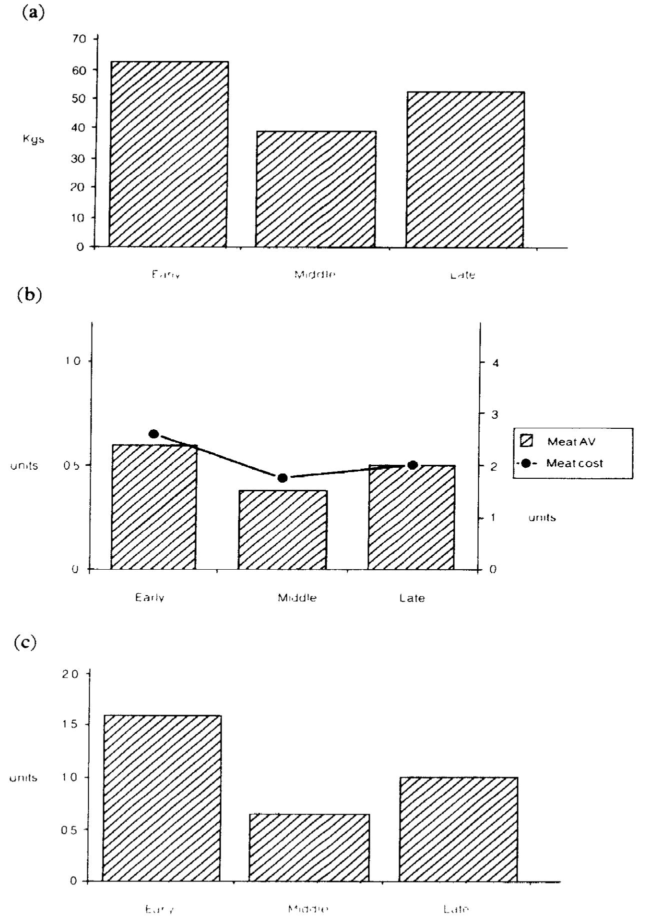


Figure 9.39 Pig: average productivity and cost
a) Average meat yield per animal (in kgs)
b) Average meat yield per animal (in units) and cost per unit
c) Average feeding cost per animal (in units)
NB All costs calculated in units (see 9.5.6). For figure b) the right hand axis relates to the cost, the left hand axis to the productivity.

Table 9.23 Pig: bone fusion

Aprox. age at fusion	*Bone*	*Early*			*Middle*			*Late*			*La test*		
		F	*UF*	*% F*	*F*	*UF*	*%F*	*F*	*UF*	*%F*	*F*	*UF*	*%F*
1 year	Scapula D	8	2	80	8	1	89	65	41	61	0	0	
	Humerus D	4	4	50	7	5	58	68	52	57	3	1	75
	Radius P	10	1	91	7	0	100	59	30	66	3	0	100
	2nd Phalange	9	3	75	6	6	50	36	34	51	2	1	67
2–2.25 yrs	Metacarpal D	3	8	27	1	7	13	4	77	5	1	3	25
	Metatarsal D	2	3	40	2	5	29	5	46	10	2	1	67
	1st Phalange	6	9	40	8	12	40	41	89	32	0	0	
	Tibia D	2	6	25	3	3	50	29	59	33	0	1	0
	Calcaneum P	2	4	33	3	4	43	3	56	5	1	0	100
3.5 yrs	Humerus P	0	3	0	0	5	0	5	44	10	0	2	0
	Radius D	0	1	0	2	1	67	2	41	5	0	1	0
	Ulna P	0	6	0	0	5	0	4	47	8	0	0	
	Femur P	2	7	22	0	6	0	4	55	7	1	1	50
	Femur D	3	3	50	2	6	25	4	53	7	0	2	0
	Tibia P	0	8	0	0	2	0	6	36	14	0	0	

KEY
* see Silver 1969
P proximal; D distal; F fused; UF unfused; %F percentage fused

Table 9.24 Pig: bone measurements

Bone	*Measurement*	*Range (mm)*	*Mean (mm)*	*SD*	*CV*	*N*
Scapula	dw	28.7–37.3	33.3	2.1	6.3	25
Humerus	dw	32–40	36.1	2.2	6.1	35
Radius	pw	23.9–30.2	26.3	1.7	6.5	26
Metacarpal	1	63.5–76.5	70.1	4.2	6	7
	dw	13.6–17.3	14.9	1.3	8.4	7
Tibia	dw	25.6–30.2	27.7	1.2	4.3	21
Metatarsal	1	76.0–84.7	81.2	3.0	3.7	10
	dw	14.2–16.6	15.2	0.8	5.5	7
Calcaneum		70–78	73.8	3.5	4.7	4

KEY
SD standard deviation; CV coefficient of variation; N number
1 length; pw proximal width; dw distal width

Table 9.25 Horse: occurrence of skeletal elements

	Early	*Middle*	*Late*		*Latest*
	N	*N*	*N*	*%*	*N*
Upper orbit	4	3	20	44	0
Lower orbit	1	3	12	27	0
Occipital cond.	2	5	1	2	3
Maxilla*	2	5	14	31	0
Mandible*	2	0	28	62	0
Scapula D	5	3	45	100	3
Humerus P	0	1	8	18	0
Humerus D	3	2	18	40	1
Radius P	4	3	30	67	4
Radius D	6	4	17	38	3
Ulna P	2	4	33	73	4
Metacarpal P	1	3	25	56	5
Metacarpal D	1	4	23	51	3
1st Phalange	4	4	34	38	2
2nd Phalange	3	6	21	23	3
3rd Phalange	2	3	17	19	1
Pelvis*	5	2	26	58	4
Femur P	1	1	21	47	4
Femur D	0	1	16	36	1
Tibia P	4	1	9	20	0
Tibia D	3	5	21	47	3
Calcaneum	1	2	21	47	0
Astragalus	1	2	17	38	3
Metatarsal P	3	2	19	42	1
Metatarsal D	3	1	16	36	0
Metapodial P	0	0	3	7	0
Metapodial D	2	1	11	24	1
Atlas	0	1	4	18	4
Axis	0	1	7	31	3

KEY
P proximal; D distal; % = % of best represented element.
Maxilla* including teeth; mandible* including teeth: pelvis* acetabulum and ilium
(corrections made when there are more or fewer than two elements per skeleton)

These figures are brought into sharper focus by comparison with other sites. The only other Iron Age site for which this type of analysis has been carried out so far is Mount Batten (Grant 1989a). Here the average meat yield was 0.88 units and the average feeding cost 2.36, suggesting a greater investment, but a more productive husbandry here – average meat yields were nearly 50% greater than in the most productive phase at Danebury, the early phase, with an increase in unit cost of only 3%.

The natural fecundity of the pig makes it possible to kill a high proportion of the offspring with no damage to the reproductive potential of the herd. Female pigs may begin to breed when only around one year of age, and even in unimproved breeds may produce at least six offspring per year. The potential average number of births per adult was more than sufficient to ensure herd replacement – the figures calculated were, for the early, middle and late phases respectively, 26, 14 and 18. These calculations assume that 90% of the adult pigs were female and that 80% of these were fertile in any one year. Even with a relatively high neo-natal mortality herd replacement should have been possible. Sub-adult mortality was highest in the middle phase, when almost 60% of the pigs seem to have been killed before they were sexually mature – figures for the early and late phases are 44% and 47% respectively. In all phases the production of a surplus would have been possible, but by far the greatest potential lay in the early phase, when sub-adult mortality was lowest and potential fertility highest.

In summary, the pig husbandry, like the sheep and cattle husbandry seems to have been a rather unintensive one. Although these animals may have provided a significant proportion of the meat consumed within the site, had more resources been invested in their feeding, the same number of animals could have produced significantly more food for the fort's inhabitants. There appears to have been a significant decline in the intensity of pork production in the middle phase, despite an increase in the proportion of pigs kept. In the late phase productivity rose again, but not to the levels achieved in the early phase, and at the same time there was a drop in the

Table 9.26 Horse: bone fusion

*Aprox. age at fusion**	*Bone*	*Early* F	*Early* UF	*Early* %F	*Middle* F	*Middle* UF	*Middle* % F	*Late* F	*Late* UF	*Late* % F	*Latest* F	*Latest* UF	*Latest* %F
1 year	Scapula D	8	2	80	8	1	89	65	41	61	0	0	
9–12 mths	2nd Phalange	3	0	100	5	0	100	21	0	100	3	0	100
13–15 mths	1st Phalange	4	0	100	4	0	100	33	1	97	2	0	100
15–18 mths	Humerus D	3	0	100	2	0	100	7	1	88	1	0	100
	Radius P	4	0	100	3	0	100	30	0	100	4	0	100
	Metacarpal D	1	0	100	4	0	100	23	0	100	2	0	100
	Metatarsal D	3	0	100	1	0	100	15	1	94	0	0	
18–24 mths	Scapula D	5	0	100	3	0	100	34	0	100	3	0	100
	Pelvis	4	0	100	2	0	100	37	0	100	4	0	100
	Tibia D	3	0	100	4	1	80	20	1	95	3	0	100
3–3.5 yrs	Humerus P	0	0		1	0	100	7	1	88	0	0	
	Radius D	4	0	100	3	1	75	14	3	82	3	0	100
	Femur P	1	0	100	1	0	100	20	1	95	4	0	100
	Femur D	0	0		1	0	100	14	2	88	1	0	100
	Tibia P	4	0	100	1	0	100	9	0	100	0	0	

KEY
* see Silver 1969
P proximal; D distal; F fused; UF unfused; %F percentage fused

overall proportion of pig remains at the settlement (Fig 9.23 (a) & (b)).

Horses

Three percent of the bones recovered from the 1979–88 excavations were those of horses (Table 9.7), the same proportion as was recovered during the 1969–78 excavations. Proportions fluctuated slightly from phase to phase, and horse bones were most common in the middle and latest phases, but the differences between phases are rather small.

As was noted for the 1969–78 sample, they tend to be fairly well distributed between the different contexts, rather than occurring in a very limited number of features. However in some features there were concentrations of horse remains. In some of the pits were articulated legs, articulated vertebrae and complete skulls: such deposits have previously been discussed in relation to ritual activity at the site (Grant 1984a, 533f; see below). In one layer dated to the middle phase there was a large collection of horse bones.

Table 9.25 summarizes the evidence for the representation of the different skeletal elements. The sample size for the early, middle and latest periods was rather small for analysis, but there is no obvious pattern to the representation of the bone elements for these phases, other than what appears to be a fairly even representation of all parts of the skeleton. More detailed analysis was possible for the late phase bones (Fig 9.40), and this confirms the impression that all parts of the horse carcasses had been disposed of within the fort. The particularly large number of horse scapulae is worthy of note, although not easily explicable. This bone was one of the most common bones in the 1969–78 samples, but it was the proximal radius that was the best represented element here. These differences emphasize the difficulty of interpreting skeletal element figures, as they can be influenced by a wide range of natural and human factors. When the sample size is relatively small, as in this instance? cautious interpretations are perhaps the only appropriate ones.

Minimum percentage loss figures are, for the four phases, respectively 60, 46, 58 and 59 (Table 9.12). With the exception of the middle phase, these figures are rather higher than those calculated for cattle. However, for all but the late phase, we are dealing with a very small sample and we feel that the complete (1969–88) bone assemblage should be looked at together before any very firm conclusions are drawn.

Table 9.26 presents the bone fusion data, with that for the late period presented graphically in Fig 9.41. They show a mortality pattern that is very different to that of cattle, for example, (Table 9.19, Fig 9.30), and confirm

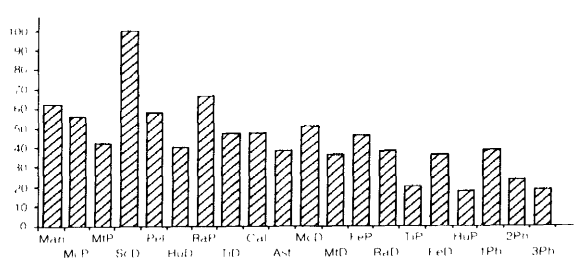


Figure 9.40 Horse: skeletal element percentages, late phase
KEY see Figure 9.18

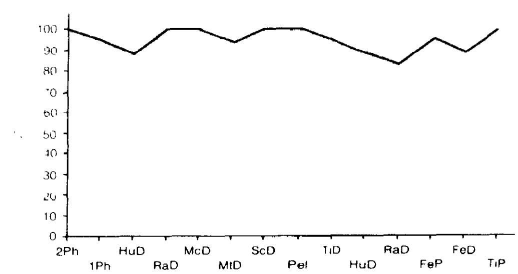


Figure 9.41 Horse: Percentages of fused bones (late phase)
NB Bones in fusion order (see Table 9.26)

Table 9.27 Horse: bone measurements

Bone	*Measurement*	*Range (mm)*	*Mean (mm)*	*SD*	*CV*	*N*
Humerus	l	223–252	238	12.0	5.1	4
	dw	60–76.5	69.4	7.8	6.9	16
Radius	l	275–325	303	14.7	4.8	13
	pw	64.2–76.2	71.9	2.8	3.8	18
Metacarpal	l	170–237	201.8	15.3	7.6	18
	pw	39.5–50.7	44.3	3.1	6.9	20
	dw	36.2–51.1	43.4	3.3	7.6	19
Femur	l	302.5–317				2
	dw	79.0–83.4	81	2.2	2.7	3
Tibia	l	299–343	321	22.0	6.9	3
	dw	57.9–71.5	63.3	3.9	6.2	16
Metatarsal	l	227–253	240.6	7.1	2.9	14
	pw	40.8–47.7	44.9	2.4	5.3	8
	dw	40.8–46.7	44.1	2.1	4.7	14
1 st phalange	l	64–82	74.7	4.9	6.5	27

KEY
SD standard deviation; CV coefficient of variation; N number
1 length; pw proximal width; dw distal width

the earlier findings (Grant 1984a, 520) that the vast majority of all horses found at Danebury were adult animals. In fact it is only from late phase contexts that any unfused bones were recovered. The youngest animal found in this phase was no more than fifteen months old at death, and is represented by an unfused first phalange. The total number of unfused bones was 11, but they all could have been from only two individuals, one less than fifteen months, the other less than three and a half years. No remains from very young or neo-natal horses were found. The mandibles were all from mature animals.

The sexual ratios for horses were determined from the mandibles. Of the 19 mandibles that could be sexed, nine (47%) were female, and 10 (53%) were male. There was one female mandible from the early phase, and one male from the middle phase. The remaining 17, eight female and nine male, were recovered from late contexts. In the 1969–78 assemblage there was a higher proportion (76%) of male horses, and although a much smaller proportion of the 1979–88 sample were male, the overall bias towards males is confirmed by the figures for the total assemblage – 16 (33%) female and 32 (67%) male.

A summary of the most common bone measurements taken on the horse bones is given in Table 9.27. In most instances the ranges and means are similar to those for the 1969–78 sample, although in a few instances, for example the humerus length there is an apparently significant difference. However it is thought that this reflects the small sample size for some of the measurements and does not indicate any real differences between the horses from the two excavated areas. Further investigation of the apparent size changes over time that were discussed in the previous analysis (Grant 1984a, 522) will be addressed in volume 6.

In relation to the relatively small number of horse bones recovered, there are a rather large number of measurable horse bones listed in Table 9–27, and this has significant implications. There are 114 cattle and 54 horse long bone length measurements listed in Tables 9.20 and 9.27, that is a ration of 2.1 to 1. However, there were 9,608 cattle bones and only 1576 horse bones found, a ratio of 6.1:1. A far higher proportion of the horse than of the cattle bones were unbroken, and therefore measurable, when recovered. This must, in part, reflect differences in the mortality patterns of the two animals: the majority of the horses were mature at death, while many of the cattle died before their bones were fully fused. However, it may also reflect differences in the uses of these two species. A proportion of the horse remains were ‘special’ deposits (*cf* Grant 1984a, 533) and apparently deposited with their flesh still attached, but some of those that occurred as isolated bones were also in good condition and lacking any evidence for butchery. Other bones, however, did have butchery marks suggesting that horse flesh was eaten at least occasionally. However, as was suggested in the earlier analysis (Grant 1984a, 522), attitudes to the horse seem to have been very different to those to the other domestic animals that we have already discussed. The lack of neo-natal animals in all phases and of juvenile animals in all but the late phase, together with the predominance of males, suggests the possibility that these animals were not being bred at Danebury. The frequency with which their bones occur in apparently ritual contexts also suggests that horses may have held a position of higher status than cattle, sheep or pigs, and were only exceptionally a source of food, perhaps in times of particular need or even to celebrate particular occasions.

Dogs

Three percent of the bones from the 1979–88 excavations were identified as those of dog, the majority of these from pits rather than from layers or other features (Table 9.7; Fig 9.13). As was the case for the 1969–78 assemblage, they were slightly more common in the early than in the middle and late phases. However, in the latest phase (which was included with the late (b) phase in the 1969–78 sample) 18% of the bones were identified as dog bones. The percentages for the rather small bone sample for this phase have been distorted by the inclusion of a dog skeleton – all but 32 of the 291 dog bones recovered from features of this phase were from a single dog which had been deposited in a pit. If these are excluded, the percentage of dog bones for the latest phase is only 2%. In the other phases, dog bones also occurred as isolated

Link to Next Section

Table 9.28 Dog: occurrence of skeletal elements

	Early N	Middle N	Late N	Late %	Latest N
Upper orbit	4	3	11	38	5
Lower orbit	4	3	13	45	4
Occipital cond.	4	2	13	45	4
Maxilla*	5	3	29	100	5
Mandible*	5	4	15	52	4
Scapula D	5	1	26	90	3
Humerus P	3	1	11	38	3
Humerus D	4	1	18	62	3
Radius P	4	1	16	55	4
Radius D	3	0	14	48	3
Ulna P	4	3	19	66	4
1st Phalange	14	1	42	29	22
2nd Phalange	8	0	18	12	24
3rd Phalange	0	0	7	5	17
Pelvis*	3	1	18	62	7
Femur P	3	1	15	52	6
Femur D	1	0	14	48	5
Tibia P	2	0	10	34	4
Tibia D	2	0	9	31	4
Calcaneum	2	0	6	21	5
Astragalus	3	0	3	10	4
Metapodial P	22	1	69	48	29
Metapodial D	20	0	54	37	22
Atlas	1	0	7	24	4
Axis	1	0	4	14	3

KEY
P proximal; D distal; % = % of best represented element.
Maxilla* including teeth; mandible* including teeth: pelvis* acetabulum and ilium
(corrections made when there are more or fewer than two elements per skeleton)

bones and as complete or partial skeletons. The majority of the early phase dog bones were from a single skeleton and two skulls, and there were also dog skeletons found in late phase features. These will be fully discussed in Volume 6 (and see 9.5.11).

Table 9.28 summarizes the skeletal element representation for dog. For the early and latest phases in particular, most elements were fairly equally represented, since the majority of the bones from these phases were from articulated skeletons. The minimum percentage loss figures (Table 9.12) are consequently low for these phases. There was a much more uneven representation of the bones in the middle phases, with a rather high minimum percentage loss figure. The sample size is very small, but skull bones are very much more common than those of the rest of the skeleton. This was not however the case for the 1969–78 sample, and we should perhaps be wary of drawing any firm conclusions until the whole bone assemblage has been looked at together.

The minimum percentage loss figure for the late phase was higher than that for the early and latest phases, but of a similar order to those calculated for sheep, the animal closest in size to the dog at this site. The most common element was the maxilla, and although the other skull bones listed in Table 9.28 were rather less well represented, there were in fact a comparatively large number of other skull fragments recovered from late phase contexts. The second most commonly occurring bone element was the scapula, which is perhaps most interesting because the same element was the most

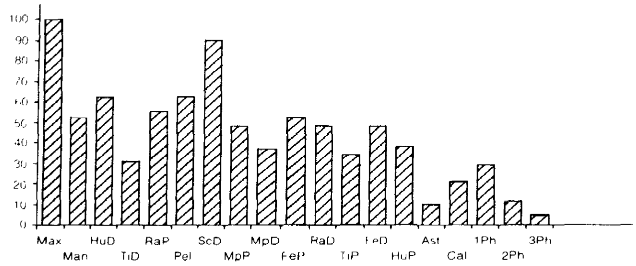


Figure 9.42 Dog: skeletal element percentages, late phase
KEY see Figure 9.18

Table 9.29 Dog: bone fusion

*Approx. age at fusion **	*Bone*	*Early F*	*Early UF*	*Middle F*	*Middle UF*	*Late F*	*Late UF*	*Latest F*	*Latest UF*
6–7 months	Scapula D	3	2	1	0	23	3	3	0
8–10 mths	Humerus D	2	2	1	0	19	1	3	0
	Ulna P	1	2	1	0	13	3	3	0
	Metapodial D	4	15	0	0	49	6	22	0
11–12 mths	Radius P	2	2	1	0	13	2	4	0
	Radius D	1	2	0	0	10	3	3	0
13–16 mths	Tibia D	0	2	0	0	8	1	4	0
	Calcaneum	0	2	0	0	5	0	5	0
15–18 mths	Humerus P	1	2	1	0	4	5	3	0
18 mths	Femur P	1	2	1	0	11	4	6	0
	Femur D	0	1	0	0	10	4	5	0
	Tibia P	1	1	0	0	7	3	4	0

KEY
* see Silver 1969
P proximal; D distal; F fused; UF unfused

commonly occurring part of‘ the horse skeleton (see above). Although cattle scapulae were also quite common (Table 9.18), this was not the case for sheep (Table 9.11). In other respects the bone element representation does not depart far enough from the expected order to necessitate explanations other than those of differential survival and recovery (Fig 9.42).

The bone fusion data are summarized in Table 9.29. The dogs from the middle and latest phases were all mature, but the skeleton found in the early phase pit was that of a young animal, under seven months of age. The other bones from this phases were those of mature animals. In the late phase contexts the majority of the bones were from skeletally mature animals, but there were two (incomplete) skeletons from young animals, one of under seven months, and the other between six and ten months. Two other isolated unfused bones were found, a scapula and a proximal humerus. None of the bones were from neo-natal animals.

Bone measurements are summarized in Table 9.30 Many of the measurement fall within the ranges established by analysis of the 1969–78 sample, but the 1979–88 dogs also include some rather larger animals, one represented by a complete skeleton found in a pit of the late phase.

Link to Previous Section

Table 9.30 Dog: bone measurements

Bone	*Measurement*	*Range (mm)*	*Mean (mm)*	*SD*	*CV*	*N*
Scapula	dw	25.2–33.2	29.5	2.2	7.3	19
Humerus	l	124–170	151	21.4	14.2	4
	dw	24–37	30.3	4.1	13.5	15
Radius	l	146–172	163	12.4	7.6	6
	pw	15.8–20.6	18.3	1.5	8.2	9
Femur	l	152–191	168.4	13.9	8.3	9
	dw	29–34	31.6	1.5	4.7	9
Tibia	l	167–192	177	12.3	6.9	5
	dw	20.3–25.7	22.5	1.9	8.3	7

KEY
SD standard deviation; CV coefficient of variation; N number
l length; pw proximal width; dw distal width

The co-efficients of variation were fairly high, especially for the humerus measurements, and suggest a varied population, rather than one that was genetically isolated and interbreeding. The presence of some young animals suggests that we should not exclude the possibility that some of these animals had been bred at the site. However, no neo-natal bones were found, and the wide range of variation in size suggests the possibility that the animals were from several different breeding populations. Animals of different sizes may have been used for different purposes, such as for herding animals, as guard dogs or even as pets.

Cats

There was little evidence for the presence of cats at Danebury – only four bones were found, one in a layer dated to the middle phase, and three in late phase contexts, two in the same pit and one in a layer. Rather more cat bones were found in the 1969–78 sample (75 in total) but many of these were the bones of a single individual, a kitten from the middle phase. There is no evidence that these animals were eaten or that their fur was used.

9.59 Wild animals

The only wild mammals whose bones whose bones have been found at Danebury were red deer, roe deer, fox, badger and a range of small mammals. The small mammal bones from the 1979–88 seasons have yet to be identified, and will be discussed in Volume 6. Bones from two fish species, salmon and pike, were identified. These are both fresh water species.

The bones of all wild species together, including bird and fish, amounted to less than 2% of the total number of identified bones; the majority of these, just over 1%, were birds.

Red deer were the most frequently represented single wild mammal species. No red deer remains were found in early phase contexts, and the only fragment identified as red deer in the middle phase was a piece of antler. In the late phase, 1% of the bones identified were red deer remains (Table 9.8), but almost all of these were from a single animal, a neo-natal red deer deposited in a pit. This is a very unusual find and the possibility that this was one of the ‘special’ deposits must be considered (9.5.11). Part of a skull, with the base of the antlers still attached was found in another pit dated to this phase.

All the other red deer remains in the late pits, apart from a skull fragment and a broken metatarsal, were antler fragments, 46 in all. In the layers of the late phase there were only two antler fragments, but there were six bone fragments from the post-cranial skeleton.

In the latest phase the eight red deer fragments were all found in pits, and included three bones and five antler fragments.

Roe deer remains were even rarer. A piece of antler and a broken metacarpal were found in early contexts, but there were no roe deer remains dated to the middle phase. In the late phase, the seven fragments identified as roe deer included two mandibles and five antler fragments, all but one mandible from pits. No roe deer remains were dated to the latest phase.

Any economic importance that deer had for the inhabitants of Danebury seems to have been almost entirely as suppliers of antler, which was commonly used for tool making (see 354, 481; Grant 1984a, 525). There is very little evidence indeed for the hunting of deer, but the find of the neo-natal red deer calf in a late phase pit suggests the possibility that these animals may also have had some special or ritual significance.

The only other wild species whose remains were found in any quantity was the fox. Badger bones had been found during the earlier excavations, but there were none in the 1979–88 sample.

Fox bones were found only in early and late contexts. Those dated to the early phase were all from a sub-adult animal, deposited in a pit. An immature fox was also found in an early phase pit during the 1969–78 excavations. The skeleton of another fox, this time a mature animal, was found in a pit of the late phase. Other fox bones occurred singly or together with two, or three other bones – a total of 19 in 11 different contexts, eight of them layers.

It was suggested in the 1984 report (p 526) that the fox remains may have been of animals killed as pests, and this interpretation is still felt to have validity. However, the discovery during the 1969–78 campaign of a fox and a badger skeleton, both very rare finds, within the same pit, suggested the possibility that they may have been an unusual form of ritual deposit. The further finds of fox skeletons will also be considered in this light when the possible ritual activity at the site is fully investigated (see 9.5.11).

Table 9.31. Bird bones from the early period

	COR	*HUM*	*RAD*	*UL*	*CMC*	*SY*	*FEM*	*TIB*	*TMT*	*ST*	*total*
Duck ?wigeon	1										1
Mallard		1			1						2
Teal				1							I
Greylag goose		1	1	1							3
Plover ?golden										1	1
Thrush family		1									1
Raven				1		1		2		4	
Unidentified bird										1	
	1	3	1	3	1	1		3		1	14

Key

SC	Scapula	TIB	Tibiotarsus
COR	Coracoid	TMT	Tarsometatarsus
HUM	Humerus	FU	Furcula
RAD	Radius	ST	Sternum
UL	Ulna	PH	Phalange
CMC	Carpometacarpus	VT	Vertebra
SY	Synsacrum	SK	Skull
FEM	Femur		

Table 9.32. Bird bones from the middle period

	SC	*COR*	*HUM*	*RAD*	*UL*	*CMC*	*SY*	*FEM*	*TIB*	*TMT*	*ST*	*total*
Mallard										1		1
Duck n.f.i.					1							1
Unidentified bird			1									1
Subtotal			1		1					1		3
Raven	.... four burials											128
Crow/rook	.... one burial											37
Total												168

For key see Table 9.31

The bird bones

by Dale Serjeantson

The total number of bird bones recovered is small compared to the number of other animal bones. Of these, the majority are from ten raven burials and three burials of crows or rooks. Most of the rest are probably from birds which were eaten, but there are also birds of prey and small birds which may have died accidentally or been the prey of species other than man.

The bones were identified using reference specimens at the Centre for Extra-mural Studies, Birkbeck College, London University, the Faunal Remains Unit, Southampton University, the Ancient Monuments Laboratory and the British Museum (Natural History), Tring. The metrical studies of Woefle (1967) were used to suggest identifications of the middle sized ducks. Measurements are listed in microfiche, by phase.

Altogether 490 bird bones were examined, of which 476 can be assigned to the main periods of occupation, and of these 462 were identified to species or family. There are 13 identified bones from the early phase (Table 9.31) from seven different species. Of the 168 bird bones from the middle period (Table 9.32) ail but three are from corvid burials. The birds from the late period (Table 9.33) are more varied; 289 bones have been identified from 19 species. Of these 169 (64%) are from corvid burials. In the latest phase four bones of rook or crow and one of goose, probably domestic, were recovered (Table 9.34).

Species identified for the first time from Danebury are the barnacle goose *(Branta leucopsis)*, Bewick's swan *(Cygnus bewickii)*, cormorant *(Phalacrocorax carbo)*, partridge *(Perdix perdix)*, red grouse *(Lagopus scoticus)*, long-eared owl *(Asio otus)*, and possibly woodcock *(Scolopax rusticola)* and lapwing *(Vanellus vanellus)*. Fewer species have been identified than from the earlier seasons (Coy 1984), but this may be because the sample size is smaller. The proportion of corvids in the two assemblages is similar.

Raven and other corvid burials

There were four part skeletons of ravens *(Corvus corax)* from the middle period, and six from the late period. One partial skeleton of a crow or rook was recovered from the middle period deposits and two more from the late period. The crow *(Corvus corone)* and the rook *(Corvus frugilegus)* overlap in size and their bones cannot be reliably distinguished (Harrison 1988). One surviving skull, from P2218, is from a crow. Some clue to the identification of the birds may be obtained from a consideration of their behaviour, which differs between

Table 9.33.Bird bones from the late period

	SK	SC	COR	HUM	RAD	UL	CMC	SY	FEM	TIB	TMT	FU	ST	PH	VT	total
Domestic fowl						1		1		3						5
Mallard	1			2	1	2	3			1						11
Duck n f i					1	1	1									5
Wigeon																
?Gadwall																
Tufted duck							1									
Greylag										1	1		1			3
Barnacle goose		1	1	1								1				5
[Bewick's] swan													1			
Heron						1					1					2
Cormorant				1	1	2										4
Partridge						1				1						2
Red grouse													1			
?Woodcock										2						3
?Lapwing											1					
Plover cf golden													1			2
Buzzard			1	3	1	2		1	2							11
Owl									2	1					1	5
Sparrow ?house	2			2												4
Unid passerine						2				1						3
?Blackbird				1												1
Raven			1	2	2	6	5	2	3	4	3		1	3	1	33
Crow/rook				2		1					1	1				6
Unidentified bird				2		2	3		2	2	1					12
Subtotal	4	1	5	16	7	23	13	4	9	18	8	2	5	3	2	120
Raven	………… six burials …………															143
Crow/rook	………… two burials …………															26
Total																289

For key see Table 9.31

Table 9.34. Danebury: bird bones from the latest period

	HUM	UL	CMC	DIGIT	total
Crow/rook		2	1	1	4
Domestic goose	1				1
Total	1	2	1	1	5

For key see Table 9.31

the two species. The crow is predominantly a scavenger of carrion though it also eats grubs and some plant food, while the rook is predominantly a grain eater. If these are birds which were scavenging food scraps within the hillfort they are most likely to be crows. However, grain was being used and stored on the site and being grown nearby, so it is possible that some of the smaller corvid bones are from rooks. The taphonomy of the corvids will be discussed further in the final volume.

Food species

By the late period domestic fowls *(Gallus gallus)* are found, confirming the introduction of this important species to Britain by the later Iron Age. Even in the quite large sample from this period there are only five bones, but they include bones comparable in size with those of a bantam and at least one bone from a larger type of fowl. As Coy suggested previously (1984), some of the goose bones may be from domesticated birds. Apart from the bones of barnacle goose, all the other goose bones are compatible with the greylag *(Anser anser),* though some are within the size range of the bean goose *(Anser fabalis)* (Bacher 1977). A broken humerus from P1930 (early period) has a shaft as stout as that of a modern domestic goose.

Ducks are the most numerous species after the corvids, and must have been eaten. The only bone from this assemblage on which clear cut marks were seen was a mallard tibia from P2567. Most of the ducks identified are mallard *(Anas platyrhynchos),* but there are also a number of the smaller wild ducks, including wigeon *(Anas Penelope),* tufted duck *(Aythya fuligula),* and teal *(Anas crecca).* There is also a coracoid 49.2 mm long which best fits the size range of the pintail *(Anas acuta)* or gadwall *(Anas strepera).* The small swan bone is closest to Bewick's swan, which is a winter visitor, as is the barnacle goose. The traditional season for wild fowling is autumn and winter, but many of the species identified are residents today or were in the past. We have no knowledge of how wild fowl were captured in later prehistoric times, but the most likely method is netting the birds on pools or rivers where they were known to congregate.

Other species were not found in numbers that suggest systematic exploitation. The plover bones are compatible with those of golden plover *(Pluvialis apricaria),* a species more likely to be found on an inland site today than the grey plover *(P squatarola).* The identifications of woodcock and lapwing in the late period are very tentative as the bones are immature.

Birds of prey

The most common bird of prey is the buzzard *(Buteo buteo).*

Eleven bones of this species were identified, including two femurs and the synsacrum of a single bird in P2598, and an articulating radius and ulna from layer 1768. The buzzard was also the most common bird of prey among the bones recovered from the 1969–78 excavations. These birds may have been deliberately captured for their feathers. Today they are slaughtered because they kill, or are believed to kill, new-born lambs, and this is a possible reason for their presence. The possibility also needs to be considered that the buzzard, like the raven, had a part in the ritual activity on site, particularly in view of the find of a complete skeleton in the earlier excavations.

The skull and four post cranial bones of an owl *(Asio* sp) were found in P1350. The long-eared *(Asio otus)* and the short- eared owl *(A flammeus)* are morphologically similar, but the shape of the temporal region and the breadth of the skull across the postfrontalis of the specimen from Danebury are closer to the long-eared owl. The relevant measurements of three specimens from the skeleton collection of the Natural History Museum Sub-Department of Ornithology and the Danebury specimen are:

	GB of postfrontalis
A flammeus 95.3.2.1	37.0 mm
A otus S/1982 32.1	39.3 mm
A otus S/1976.60.8	41.8 mm
Danebury skull	41.0 mm

Other species

The smaller species of which bones were recovered may or may not have been eaten, The two bones of the thrush family match those of blackbird *(Turdus merula),* but single bones cannot be separated from the ring ousel *(Turdus torguatus)* (Harrison 1988), which used to be more widespread than it is today. There were seven passerine bones, all recovered from sieved pits and layers, of which at least four are probably from the house sparrow *(Passer domesticus).* There is no evidence on the bones themselves as to whether the thrush- and sparrow-size birds were eaten. Small birds have often been eaten in the past and the bones from Danebury were all found with other food remains. However, unlike the larger food species, they may have lived on or around the site, where they died or were killed by cats.

A few were apparently killed by species other than man. A vole *(Microtus* sp) skull and a sparrow skull from P2396, were both damaged in a distinctive way: the area at the back around the foramen magnum has been enlarged, apparently deliberately in order to expose the brain, but there were no carnivore tooth marks. This behaviour is characteristic of hawks which feed on small mammals and birds (Bang & Dahlstrom 1972). These two at least appear to be the prey of a species other than man.

Discussion

After analysis of the bird bones from the earlier excavations Coy concluded that there was 'no deliberate and large scale exploitation of the edible birds of the neighbourhood', and this conclusion still stands. The only wild bird species present in any numbers at Danebury are the ducks, but their numbers are minuscule compared with the mammals, even taking into account any bias in recovery because of the smaller size of bird bones. The only type of Iron Age settlement in England in which exploitation of wild fowl has any importance seems to be those in the fens such as Glastonbury (Andrews 1917) and the recently excavated site of Haddenham V (Evans & Serjeantson 1988), where swans, mallard and other ducks and waterfowl are common. The presence of a few domestic chickens in the late period of occupation also confirms the findings from the earlier campaign that the domestic fowl was introduced to Britain during the Iron Age. Without doubt the most important findings are the raven and other corvid burials. They confirm that the raven, common on Roman sites, may well have already taken up a commensal role by the later Iron Age, and was tolerated or encouraged around the hillfort. The bird was sacred to the Celtic god Lugus (Ross 1967) and tales of the magical power of ravens have survived in Celtic folklore (Jacobs 1892), and the birds from Danebury may have had ritual importance. Ravens have also been kept as pets: it is documented by, for instance, Pliny and Macrobius that both ravens and crows were kept as pets in Rome (Toynbee 1973). As scavengers, they would also have performed a useful function, and a combination of reasons for their presence cannot be ruled out. The relatively high numbers of buzzard bones, and the burial from the first campaign, suggest that the buzzard, like the raven, may also have had special status for the community. This can only be understood in the context of their associated finds and will be discussed in the final volume, when the full extent and nature of ritual activity on the site is assessed.

Acknowledgements

I am grateful to Jennie Coy and T O'Connor for helpful comments. I also thank the Natural History Museum (Sub-Department of Ornithology) and the Faunal Remains Unit, Southampton University for access to their reference collections.

9.5.10 Bone and antler as raw materials

The catalogue of small finds includes many objects made from bone or antler. The full analysis of these finds that was undertaken for the 1969–78 material has not been possible for this volume, but preliminary analysis has shown that the most commonly utilized bones were sheep metapodials and tibias, and cattle and horse metapodials, as was the case for the earlier sample (Grant 1984a, 531). Only two objects were made from pig bones, one from a tibia, the other from a scapula. Many objects were made from red deer antler, particularly tools, such as weaving combs that need to be strong. A pierced fish vertebra may have been used as a bead.

The use of bone as a raw material is a factor that must be taken into account when assessing the skeletal element representation, particularly if objects were manufactured for trade as well as for home use. For the Iron Age there does not seem to be any evidence for this – bone would have been available at any farming settlement, and Sellwood (1984, 493) has suggested that bone and antler work was carried out on a domestic basis. The level of skill involved in manufacturing most of the bone objects found at Danebury does not seem to have been very high – many of the bones had been turned into tools with very little modification to their natural shape. Nonetheless, some of the apparent under-representation of sheep and cattle metapodials may be due to their use for the manufacture of bone objects and tools.

Link to Next Section

9.5.11 *Ritual behaviour: the special bone deposits.*

In the analysis of the 1969–78 bones, a number of animal bone deposits, were singled out from the bulk of the bone sample because of their associations with other bones or the manner of their deposition (Grant 1984a, 533). They were, in the main, articulated skeletons (mainly of the common domestic animals, but also possibly including birds, fox and badger), articulated limbs (particularly of horses), and skulls and mandibles, and it was argued that they might have been deposited in the pits as part of some kind of ritual activity. The 1979–88 excavations produced more examples of such deposits, and provided additionally an example of a neo-natal red deer skeleton that might also be considered in this category. During the late 1980s there has been an increase in interest in the possibility of identifying ritual in archaeological deposits, particularly in the prehistoric period, and similar deposits have been identified at many other sites, both in Britain and abroad (for example, Wait 1985; Meniel 1989). There is also, it must be added, an undercurrent of scepticism about these animal deposits, and some have argued, privately and publicly, though not necessarily in press, that they represent nothing more than natural deaths of animals that died in circumstances that rendered them unfit for human consumption.

However, increasing awareness of the possibility that there was ritual activity at Danebury has shown that deposits of other finds, such as stones, pottery and other domestic objects, may also have been a part of these ritual practices, which may have been far more complex than had initially been recognised. Indeed, some of the animal deposits demonstrate the complexity of these depositional practices. For example, in one pit there was the articulated head, neck and chest of a horse. The pelves and sacrum were positioned over the vertebrae, but the rest of the animal was missing. Within the chest cavity were two large flint nodules, which, from their position, must have been deliberately placed there, suggesting the cutting and evisceration of the horse prior to its burial. A complete young pig was placed against the horse, one forelimb over and the other under the atlas and axis and its head resting against the back of the horse's skull. A second young pig lay on the other side of the pit, and within the same layer were many burnt flints, chalk blocks, sling stones and large pieces of pot. A broken whetstone had been placed against the horse's jaw. The ritual, if ritual it was, clearly involved not only animals but also many objects whose functions were usually domestic (see also Grant 1989b).

For this reason it has been decided to delay further description or analysis of these special, if not ritual, deposits until Volume 6, when the discussion can integrate all the separate classes of evidence that were involved.

9.5.12 *Discussion and conclusions*

While it may be somewhat unsatisfactory for the reader to be so frequently referred to a previous volume, (and indeed to a forthcoming one), neither does it seem relevant to repeat opinions that have already been voiced. A full discussion of the conclusions reached from the first analysis of the 1969–78 material was published in Volume 2 of the Danebury report (Grant 1984a, 542–7). In most respects, the analyses made of the 1979–88 bone sample were the same as those carried out on the 1969–78 material. Indeed the main aim of this volume as a whole was to provide basic analyses and discussion to the same level as that carried out for the earlier samples. New, more sophisticated and integrated analyses are planned for the final volume, volume 6.

However, the passing of time between the writing of the two bone analyses, the increased sample size, and the application of a different approach to the study of animal mortality patterns have changed, modified or added to, some of the conclusions previously reached. This final section will try to avoid repetition, but will concentrate on the discussion of what seem to be the most important new insights that have emerged from this final phase of what is seen as the preliminary analysis of the Danebury bone material.

Something must first be said about what has been learned from a methodological point of view. While the results of many of the analyses are very similar to those of the 1969–78 material, slight, and sometimes not so slight differences, warn us of the dangers of assuming that any archaeological bone assemblage is typical for the individual site, let alone for the particular category of site. For example, the species proportions calculated from the two campaigns and from the two different types of context (Figs 9.13, 9.17, 9.26 & 9.35) were, in several instances, significantly different. This was particularly important when it altered our perceptions of changes over time. For this site we have the possibility, in the next stage of analysis, of investigating the possible causes, and significance of, these differences, and it is hoped that this will not only aid our understanding of Danebury, but also of taphonomic processes and biases that affect all bone assemblages. For many sites, conclusions must be based on bone samples that are only a fraction of the size of this Danebury assemblage, and from a very much smaller proportion of the occupied area. Even for Danebury, the minimum number of animals that are represented for each ten years of occupation is very low (Table 9.35). This is an issue which of course affects every aspect of archaeology and we are all aware that our evidence is partial, and almost certainly biased. Very large assemblages, such as this, have the potential to help understand the nature of some of the biases.

Analysis of the bones recovered within the hillfort can be assumed to most accurately reflect the meat eaten at the site. Assessments of the productivity of the Danebury animals in terms of any of the so called secondary products are more liable to be distorted, particularly if there was any trade or movement of animals to or from the site. Nonetheless, the productivity analyses described and discussed above have helped to deepen and clarify our understanding of animal husbandry practices at Danebury. The possible management strategies adopted for the three most common domestic species have already been discussed, but it is also important to attempt to understand how the overall husbandry aims of the Danebury farmers were integrated, and to address such issues as whether Danebury should be seen primarily as a self-sufficient, a producing or a consuming site.

Table 9.35 Minimum numbers of individuals per 10 years of occupation (1969–88 sample)

Phase	Approx date BC	Sheep	Cattle	Pig	All species
Early	550–450	19.2	4.2	4.5	27.9
Middle	450–350	12.1	2.7	3.7	18.5
Late	350–50	40.4	6.3	6.9	54.9
All phases	550–50	31.3	5.2	5.8	42.3

Link to Previous Section

Evidence for Danebury as primarily a consuming site is the most difficult to find. The bone refuse of a modern English town would consist almost exclusively of the remains of young, male animals. Such a bias in the age and sexual composition would immediately mark it out as a receiver rather than a producer of food. However, the inhabitants of towns in the Roman and medieval periods consumed animals from a much wider range of ages, including the young, juvenile, and even elderly. Many animals were only sold for meat after they had been used for wool, milk or traction for several years. When this is the case the distinction between producer and consumer is not so clearly visible in the bone remains, but there are frequently biases in the sexual ratios and in the age groups represented that suggest consumption rather than production. The most convincing evidence that the Danebury inhabitants were themselves involved in animal raising is the very large proportion of neo-natal and very young animals in all phases of occupation. This age group tends to be under-represented when there is only consumption and no production. It has been suggested elsewhere (Grant 1984b) that the high proportion of young animal remains could be explained if the hillfort had served as a protected place where lambing and calving for the flocks and herds of several farming groups took place. However, one argument that can be put forward to contradict the view that the fort was used for communal calving is that the nearest permanent water supply is 3 km away, and cattle need daily access to water. The more detailed analyses of the mortality profiles undertaken in this volume have also now shown that such explanations are not necessary to explain the mortality profiles, except in the case of the cattle mortality in the middle phase. In the deposits of this phase a particularly high proportion of the cattle bones was from young animals. An alternative explanation is that mature animals had been exchanged or traded, or killed elsewhere for other reasons (see above). This view is also supported by the apparently low productivity figures for cattle in this phase (p 467).

We would argue that Danebury was not primarily a consuming settlement, but that its inhabitants were involved, in some way, in animal raising, at least in the main phases of occupation at the site.

Were the aims of the animal husbandry geared merely to provide for the needs of the inhabitants, or was the production of a surplus possible?

When interpreting the estimates of the potential productivity of the Danebury animals we have had to make the assumption, unless there is clear evidence to the contrary, that the mortality patterns in the bone assemblage bear some relationship to the mortality of the herds or flocks kept by the Danebury inhabitants, and that we thus may have some measure of what was possible in the way of production.

For all phases and all species, a relatively unspecialized low-input, low-output husbandry is suggested, with the animals managed for a range of products. Table 9.36 presents a summary, by phase, of the productivity of each animal, the relative production of meat and milk taking into account the differences in body size and milk yield, and the relative cost of feeding each animal (see 9.5.6). Clearly the actual cost of feeding an animal depends on the availability of resources, both wild and cultivated, and one might argue that if a pig, for example, was fed mainly on scrubland in the spring, on cereal waste in the late summer, and on woodland resources in the autumn, the cost would be very low compared to feeding, for example, cattle which require good quality grass and probably cereal supplements in the winter. However, even the apparently free resources are not in fact without cost. Cereal waste such as straw can also be used for bedding or as a roofing material, grassland can be ploughed and used more productively to grow cereals, and woodland, whose regeneration can often be severely damaged by pigs, is an extremely valuable resource, especially when wood is the main building material. The feeding of all animals represents a real cost to the community. What is almost impossible to do is to evaluate the relative cost of the natural resources that are consumed by, and the products that are produced by, the domestic animals. Our only clue to the value of any community of animals and their products is in an assessment of how animals were managed.

The early phase was, in most respects the least productive in terms of secondary products, with low yields of wool and milk for sheep, and, at least in relation to the late period, of milk and traction for cattle.

The greatest investment, in terms of feeding costs, were put into the feeding of cattle, and percentages of these animals were higher than for any other phase (Fig 9.43 (a), (b) & (d); 9.5.6). However, average yields, for milk, traction and meat, were still low.

There was an apparently similar investment in sheep and pigs, although far more sheep were being kept. For sheep, the early phase was the one with the lowest investment per animal, and the lowest yields. However, it was the period with the most intensive exploitation of pigs. Proportions of pig bones were higher in the middle phase, but in the early phase, the proportion of animal food resources invested in feeding pigs was the highest of any period, as was the average feeding cost and the average meat yield per animal. The early phase was one when the potential for production of live animals for trade would seem to have been very modest as infant mortality was high, particularly for sheep and cattle. However, fertility calculations for the sheep for this phase are low, and so there is some possibility that some mature ewes may have been traded or at least moved to other sites. Overall, the potential for production seems to have been low, and we suggest that this is more compatible with a self-sufficient site than of a major producer.

Interpretation of the animal husbandry for the middle phase is particularly problematic, and more research is needed to enable us to understand what was happening in this phase. There seems to have been a considerably increased investment, in relative terms, in the feeding of sheep (Fig 9.43 (d)), although a slightly smaller proportion of the bones recovered from this phase was those of sheep. Calculations of the minimum number of animals found per ten years of occupation (Table 9.35) give markedly low figures for the middle phase for all species, but especially for sheep and cattle. Sheep contributed a greater proportion of food, both meat and apparently of milk, than in the early phase (Fig 9.43 (f) & (h)), with average meat and milk productivity at their highest. Wool productivity was also high. There was, however, rather less investment in pig raising. A larger proportion of the bones recovered were from pigs, but they still only provided the same proportion of meat as they had in the early phase, as the average amount of meat produced per animal was very low.

It is particularly difficult to assess the role of cattle in this phase. In comparison with the early period they contributed less meat, and, on the basis of the animals that died and were disposed of at Danebury, less milk. However, as has already been discussed, it is likely that some of the adult animals that produced the young cattle that were eaten at Danebury were not themselves eaten there. If

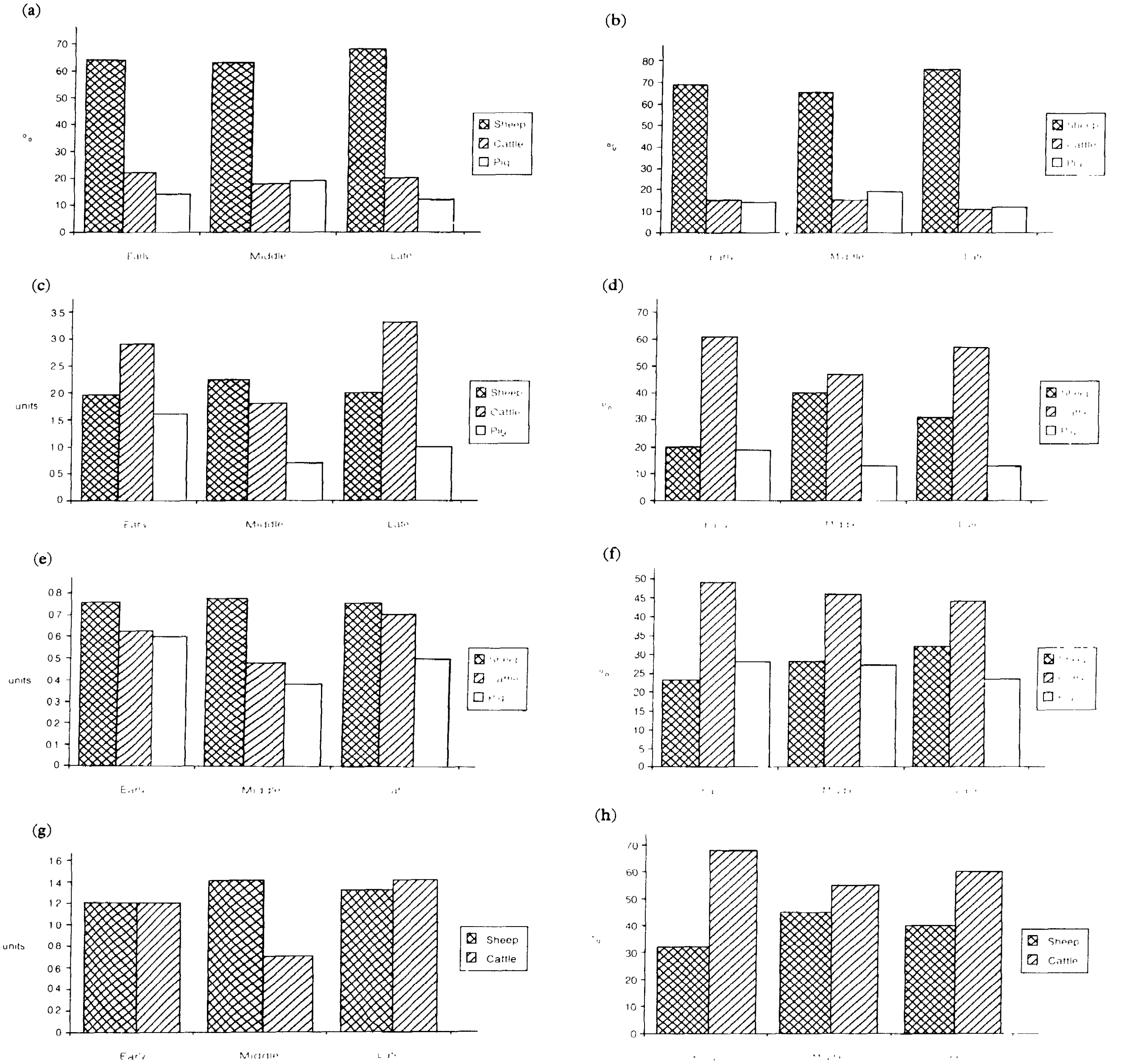


Figure 9.43 The relative contributions of the main domestic species to the economy
a) Relative proportions (epiphyses only)
b) Relative proportions (minimum numbers of individuals)
c) Average feeding costs (in units)
d) Relative feeding costs (see Table 9.36)
e) Average meat yield (in units)
f) Relative meat contribution
g) Average milk yields (in units)
h) Relative milk production (see Table 9.36)

this was the case, then their contribution to milk production cannot be assessed. There are similar problems in assessing the productivity in this phase in terms of traction. Low figures have been calculated, but again, a proportion of the animals used for traction may have died elsewhere. While this may suggest trade in animals, other interpretations are also possible. Successful cattle husbandry on dry downland is not without its problems. From Danebury itself, the nearest permanent sources of water were the Wallop Brook, 3km to the west, and the River Test, 3.5km to the east. It is very likely that in all phases of occupation, cattle were pastured for some, perhaps considerable, part of the year, in the river valleys and on the watered downland. Analysis of the plant remains has shown that the hillfort may have had access to the resources of a wide area (Jones 1984, 493). Inhabitants of settlements sited nearer to the rivers, may have been involved in tending cattle for certain times of the year, with obligations to supply animals to the fort for milk, meat and traction, but with rights to keep some of the animal or their products themselves (see Grant 1984b). Changing social and/or political relationships

Table 9.36 Domestic productivity

	Early N	%	Middle N	%	Late N	%
Feeding investment (units)						
Total cost (corrected figures*)						
Sheep	756	66	777	84	4845	78
Cattle	246	21	98	11	965	16
Pigs	144	13	50	5	403	6
Weighted cost						
Sheep (x 0.8)	605	20	622	40	3876	31
Cattle (x 7.4)	1821	61	726	47	7144	57
Pigs (x 4.0)	577	19	200	13	1614	13
Meat yields (Kgs)						
Total yield (corrected figures*)						
Sheep	2344	23	1509	28	14163	32
Cattle	4994	49	2481	46	19443	44
Pigs	2801	28	1457	27	10319	23
Milk yield (units)						
Total yield (corrected figures*)						
Sheep	468	82	341	89	3087	87
Cattle	101	18	41	11	454	13
Weighted yield						
Sheep (x 1)	468	32	341	45	3087	40
Cattle (x 10)	1013	68	410	55	4541	60

* see p. 451 and Table 9.16
see p. 451 for explanation of weightings used

within the territory around Danebury over time may have altered the way that the resources of the territory were managed, with consequent effect on which animals were eaten within the fort. This is is the kind of problem that can best be addressed by the multidisciplinary approaches that will be adopted for Volume 6.

For the late phase, we have evidence for some increase in intensity in animal husbandry. We have the remains of far more animals (Table 9.35), and thus a considerable increase in the total amount of food and other products available, but also in the quantity of resources utilized for feeding animals. The greatest investment was made in the feeding of cattle (Fig 9.43, (d)), although there is evidence for a drop in the proportion of cattle kept. Those animals that were kept were more intensively exploited, with average meat, milk and work productivity higher than for any earlier phase.

Sheep were slightly less intensively exploited than in the middle phase, but more intensively than in the early phase, and there seems to have been an increased proportion of sheep amongst the domestic animals. They may have contributed more of the the milk drunk than in the early phase, and a greater proportion of the meat than in any other phase. Wool production may have been at its most cost effective.

Pigs are rather less common than in the earlier phases and there seems to have been a relatively small proportion of foodstuffs invested in feeding these animals (Fig 9.43 (d)). The intensity of pig production was greater than in the middle phase, but distinctly lower than in the early phase.

This is perhaps tied to an overall shift in emphasis to the production of secondary products, which started in the middle phase with an increase in sheep productivity, and continued in this phase with an increase in cattle productivity. Although meat productivity increased over time for both cattle and sheep, the cost calculations discussed previously (p 459 and p 467), and the decline of pig production, suggest this may have been incidental, with the main aim being to increase the production of wool, traction and milk. What is not clear is whether this increase in production was in order to produce a surplus for trade, or whether its purpose was to clothe and to feed a larger population, one that was perhaps having to be increasingly reliant on vegetable rather than animal food.

The potential for the production of surplus, whether as live animals, or wool was perhaps there, at least in the later phases of occupation, but it was not very great. In a sense this begs a question since we do not have sufficient information from other sites to be able to see how Danebury stands within its period. Detailed comparisons have so far mainly been made with much later sites, and these emphasize the very low level of productivity that seems to have been achieved by the Danebury herds and flocks, but it is far more crucial to be able to set the site within its contemporary setting. Odell in Bedfordshire (Dix forthcoming) and Ashville in Oxfordshire (Parrington 1978) are the only Iron Age sites for which a similar analysis has so far been possible for sheep and cattle. Both these sites seem to have had slightly more potential as producers than Danebury. Pig productivity could only be compared with that at Mount Batten (Grant 1989a), where a much more intensive pig production was matched with a far higher proportion of pig bones. Such comparisons are, of course, not necessarily to be taken at face value. The good survival of bone at Danebury has perhaps had the effect of making average productivity seem low in comparison to other sites, where the bones of young animals may have survived less well. Further refinement of the method are planned to try to compensate for such problems, but until then we must, on the basis of the evidence we have so far, conclude that Danebury was not itself a major production site, at least not for animals or their products. Given its rather difficult geographical situation, on relatively poor soil, and at some distance from permanent water, this is perhaps not surprising.

The latest phase has not been analysed separately in Table 9.36 and Fig 9.43, mainly because the rather small bone sample for this period precluded a detailed analysis of the pig husbandry and partly because the nature of the occupation for this phase is as yet somewhat uncertain. In general the productivity figures for sheep and cattle are slightly higher than in earlier phases, and suggest a continuation of the trend towards increased production of secondary products that is apparent from the middle phase.

The relationship between animals and agriculture was discussed in the Volume 2 (p. 544), when the vital importance of animals as a source of manure was emphasized. Cattle are also vital for traction, and we have suggested a slight change in emphasis in their management by the late period, to produce more traction, perhaps because of a need to intensify cereal production. The possible increase in the proportion of castrates in the late periods is also relevant (p 466).

While it is almost impossible to make accurate comparisons between the amount of vegetable and animal food in the diet, there is some reason to suggest that the majority of the food eaten was in fact vegetable. The very large number of pits had the potential to store a very considerable quantity of cereal food, particularly if they were used for several years before being filled up with refuse. The animal food refuse that was contained in them was, in the early and middle periods equivalent to less than half an animal, and in the late and latest periods, when the pits were generally considerably larger, equivalent to approximately 1.5 and 2.5 animals respectively. Some bone refuse was also found in layers, but against this must be set the amount of grain that may have been stored in granaries above ground. (We cannot of course quantify the amount of food refuse that was disposed of outside the site, and this is inevitably a limitation on any estimations of this sort.) The calculations of the number of animals represented for every ten years of occupation (Table 9.35) also emphasizes the very small number of animals for which we have evidence, even when they are multiplied by two, to take account of the unexcavated area of the site. Such a calculation suggests that only 8.4 animals were killed each year; this represents a very small amount of meat. Was meat a food that was eaten only on special occasions? There are certainly many ethnographic parallels for this (for example, Parkes, 1990). Or were very small amounts of meat eaten more frequently? If this was the case, there would need to be the means to preserve meat, so that the relatively large quantity of food produced by the killing of a cow or even a pig would not have to be eaten very rapidly. Frequent finds of briquetage at Danebury suggest that salt was an important commodity. The planned more detailed analyses of the bone deposits within individual pits, and of the evidence for seasonality in the deposits may help to answer these questions.

The previous analysis discussed the possibility that in the late phase, there were signs of stress in the husbandry system, evidenced by such parameters as the incidence of periodontal disease in sheep, and the decline in the proportion of cattle and pigs kept. The results of the 1979–88 analyses can be seen to provide some further support for this view, although the evidence is not entirely unambiguous. The decline in the relative numbers of the primary meat producing animals, pigs, is confirmed, and it has also been shown that there was a decrease, in relation to the early period, in the average amount of food invested in rearing each animal.

There may have been an absolute increase in the number of animals kept, particularly of sheep. The chalk downland is a rather delicate environment and an increase in the intensity of animal husbandry may well have been damaging; it is certainly not suitable land for heavy stocking. It is of course also possible that there were political changes in the late period that made a greater area of the territory surrounding Danebury available, both for growing crops and for pasturing animals, but the incidence of sheep periodontal disease, which may well be the result of overgrazing, would argue against there having been sufficient land available.

There is one final point to be made, concerning the possible status of the inhabitants of Danebury. There is an apparent correlation between high status and high percentages of pig bones (see Grant 1988a; Grant in prep.). The correlation transcends environmental groupings – it has been observed on chalk downland sites as well as on sites in valley bottoms – and it transcends temporal groupings – it has been observed for the medieval period (Grant 1988b) and also seems to be valid for much earlier periods such as the Iron Age. In terms of the proportion of pig remains, Danebury falls within the group that includes apparently high status settlements such as Gussage All Saints in Wiltshire and Groundwell Farm in Wiltshire (Harcourt 1979; Coy 1982), the late Iron Age oppida such as Silchester and Sheepen (Grant forthcoming a; Luff 1982) and the, middle Iron Age trading site at Mount Batten, in Devon (Grant 1989a). If the relatively high proportion of pig bones at Danebury is a reflection of its status, or at least of the status of its inhabitants, is the decline in the proportion of pigs and the intensity of pig production a reflection of a change in status over time? It is perhaps particularly significant that the proportion of pig bones drops very considerably in the latest phase.

We confidently hope that this, and many of the other questions raised in this analysis will at least begin to be able to be answered in Volume 6.

Acknowledgments

I should particularly like to acknowledge, with gratitude, all the help and support given by Gary Lock in the computer analysis of the bone data. Andrew Jones kindly identified the fish bones.

Bibliography

Andrews, C W, 1917 Report on the remains of birds found at the Glastonbury Lake Village II, in *The Glastonbury Lake Village* (A Bulleid & H St G Gray) (London).

Armitage, P, 1977 *The Mammalian Remains from the Tudor Site of Baynard's Castle, London. A Biometrical and Historical Analysis,* Unpublished PhD thesis, Royal Holloway College/British Museum of Natural History.

Bacher, A, 1977 *Vergleichend morphologische Untersuchungen an Einzelknochen des postcranialen Skeletts in Mitteleuropa vorkommender Schwane und Ganse,* Inaugural dissertation, Univ Munich.

Bang, P, & Dahlstrom, P, 1972 *Animal Tracks and Signs.*

Carter, P L, Phillipson, D, & Higgs, E S, 1965 The animal bones, in The excavation of an Iron Age farmstead at Hawks Hill, Leatherhead (C Hastings & B W Cunliffe), Surrey *Archaeol Coll* **62,** 40–42.

Coy, J, 1982 The animal bones, in The excavation of an Iron Age Enclosure at Groundwell Farm (G Gingell), *Wilts Archaeol Mag* 76, 68–73.

Coy, J, 1984 Bird bones, in Cunliffe, B W 1984, 527–31.

Cribb, R, 1985 The analysis of ancient herding systems: computer simulation in faunal studies, in *Beyond Domestication* (eds G Barker & C Gamble) (London), 75–106.

Cunliffe, B W, 1984 *Danebury: An Iron Age Hillfort in Hampshire* Vols 1 and 2 (London).

Dennell, R W, 1974 Botanical evidence for prehistoric crop-processing activities, *Journal of Archaeological Science* **1,** 275–84.

Dix, B, forthcoming Excavations at Harold's Pit, Odell, Bedforshire, *Bedfordshire Archaeol J*

Evans, C, & Serjeantson, D, 1988 The backwater economy of a fen-edge community in the Iron Age, *Antiquity* **62,** 360–70.

Evans, J G, 1972 *Land* Snails *in Archaeology* (London).

Foch, J, 1966 *Metrische Untersuchungen an Metapodien einiger europäeschen Rinderrassen,* Dissertation, Munich.

Grant, A, 1983 The use of tooth wear as a guide to the age of domestic ungulates, in *Ageing and Sexing Animal Bones from Archaeological Sites* (eds B Wilson, C Grigson & S Payne) (Oxford: BAR Brit ser 109), 91–108.

Grant, A, 1984a The animal husbandry, in Cunliffe, B W 1984, 496–548.

Grant, A, 1984b Animal husbandry in Wessex and the Upper Thames Valley in Aspects of the Iron age in Central Southern Britain (eds B W Cunliffe & D Miles) (Oxford OUCA monog 2), 102–19.

Grant, A, 1987 Some observations on butchery in England from the Iron Age to the medieval period, in *La Découpe et le Partage du Corps à Travers le Temps et l'Espace* (ed J-D Vigne), 53–8.

Grant, A, 1988a Food, status and religion in England in the middle ages: an archaeozoological perspective, in *L'Animal dans l'Alimen-*tation *Humaine: les Critères de Choix* (ed L Bodson), 139–46.

Grant, A, 1988b The animal resources, in *The Countyside of Medieval England* (eds G Astill & A Grant), 149–87.

Grant, A, 1989a Bone deposition and animal husbandry: the animal bone remains from Mount Batten, Devon, in *Mount Batten, Plymouth: a prehistoric and Roman Port* (B W Cunliffe), 28–35.

Grant, A, 1989b Animals and ritual in early Britain, in *Animal et Practiques Religieuses: les Mamfestations matérielles* (ed P Meniel), 79–86.

Grant, A, in press The animal bones, in Excavations at Harrolds Pit, Odell, Bedfordshire, 1974-1978 (B Dix), *Bedfordshire Archaeol J.*

Grant, A, forthcoming Animal husbandry, in *Iron Age and Roman Silchester: Excavations on the Basilica 1977 and 1980–86* (M.G. Fulford).

Grant, A, in prep. The domestic pig: peasant food or status symbol.
Harcourt, R, 1979 The animal bones, in *Gussage All Saints. An Iron Age Settlement in Dorset* (G J Wainwright) (London), 150–60.
Harrison, *C* J D, 1988 *The History of British Birds.*
Higham, C F W, 1968 Patterns of prehistoric economic exploitation of the Alpine Foreland, *Veirteljahrsshrift der Naturforschenden Gesellschaft in Zürich* **113,** 41–92.
Hillman, G, 1984 Interpretation of archaeological plant remains, in *Plants and Ancient Man* (eds W van Zeist & W A Casparie) (Rotterdam/Boston), 1–41.
Howard, M, 1963 The metrical determination of the metapodials and skulls of cattle, *Royal Anthropological Institute Occasional Paper.*
Jacobs, J, 1892 *Celtic Fairy Tales* (reprinted 1968).
Jones, M K, 1984 The plant remains, in Cunliffe, B W 1984, 483–95.
Jones, M K, 1985a Archaeobotany beyond subsistence reconstruction, *in Beyond domestication in prehistoric Europe* (eds G Barker & C Gamble) (London), 107–28.
Jones, M K, 1985 *The ecological and cultural implications of selected carbonised seeds assemblages from southern Britain,* DPhil thesis, Univ Oxford.
Kerney, M P, 1968 Britain's fauna of land Mollusca and its relation to the Post-glacial thermal optimum, *Symposia of the Zoological* Society *of London* no **22,** 273–91.
Kerney, M P, 1976 *Atlas of the Non-marine Mollusca of the British Isles* (Cambridge: Institute of Terrestrial Ecology).
Lock, G, 1984 The computing of the animal bones, in Cunliffe, B W 1984, Fiche 16:A2.
Luff, R-M, 1982 *A Zooarchaeological Study of the Roman North-western Provinces* (Oxford BAR Int Ser 137)
McConnell, P, 1897, *The Agricultural Notebook* (6th edition).
Meniel, P, 1989, L'animal dans les pratique religieuses des Gaulois, in *L'Animal dans les Pratique Religieuses: Les Manifestations Materielles* (ed P Meniel), 87–97.
Nye, S, & Jones, M K, 1987 The carbonized plant remains, in *Hengistbury Head, Dorset. Volume 1* (B W Cunliffe) (Oxford: OUCA monog 13), 323–8.
Oschinsky, D, 1971 *Walter of Henley and Other Treatises on Estate Management and Accounting.*
Palmer, C, & Jones, M K, in press The plant remains, in *Excavations at Maiden Castle Dorset 1985-1986* (ed N Sharples).
Parkes, P, 1990 *Kalasha* Society.
Parrington, M, 1978 *The excavation of an Iron Age settlement, Bronze Age ring-ditches and Roman features at Ashville Trading Estate, Abingdon, Oxfordshire, 1974–6* (London CBA Res Rep).
Ross, A, 1967 *Pagan Celtic Britain* (London).
Sellwood, L, 1984 Objects of bone and antler, in Cunliffe, B W 1984, 371–95.
Silver, I A, 1969 The ageing of domestic animals, in Science and *Archaeology* (eds D Brothwell & E S Higgs) (London), 283–302.
Teichert, M, 1969 Osteometrische Untersuchungen zur Berechnung der Widerristhöhe bei vor- und frugeschichtlichen Schweinen, *Kühn-Archiv* **83,** 237–92.
Toynbee, J M C, 1973 *Animals in Roman Life and Art* (London).
Veen, van der, M, 1983 Sampling for seeds, in *Plants and Ancient Man: studies in palaeoethnobotany* (eds W van Zeist & W.A. Casparie), (Rotterdam/Boston) 193–9.
Veen, van der, M, 1985 Carbonised seeds, sample size and on-site sampling, in *Palaeoenvironmental investigations: research design, methods and data analysis* (eds N R J Fieller, D D Gilbertson & N G A Ralph) (Oxford: BAR int Ser 258), 165–74.
Vigne, J-D, in press The meat and offal weight (MOW) method and the relative proportions of ovicaprines in the meat diet of the north-west Mediterranean, in *Archeologia della pastorizia nell'Europa Meridionale* (eds R Maggi & R Nisbet).
Wait, G, 1985 *Ritual and Religion in Iron Age Britain* (Oxford: BAR Brit Ser 149).
Wilson, B, 1978 The animal bones, in Parrington, M 1978, 110–37.
Woelfle, E, 1967 *Vergleichend morphologische Untersuchungen an Einzelknochen des postcranielen Skeletts in Mitteleuropa vorkommender Enten, Halbganse und Sager,* Inaugural disseration, Univ Munich,

10 Community, continuity and change

In Volume 2 some remarks were offered under this general heading, summarizing the development sequence exposed by the first ten years of excavation, and exploring ways in which the hillfort and the society which created and maintained it might be modelled in economic and social terms. We ended the discussion by stressing the speculative nature of much of what was said reminding the reader that 'rather than serve as a conclusion let it be the opening salvo of a continuing debate.' Since then in several reviews and short papers some of the issues which we raised have been considered and criticism offered. Without addressing them in detail the overriding impression which the research team has gathered is that we have failed to impress on the readership the immensely complex nature of the database. This may in part have been the fault of our desire to lay out the material evidence in a simple and straightforward manner, but it may also be due to the fact that little constructive thought has yet been given, in the published literature, to the nature of the surviving evidence and of the depositional processes involved.

During the first ten years of the Danebury Programme we learnt the value of dealing with well stratified deposits. In the central area the archaeological record consisted of little more than holes dug into bedrock containing a range of artefacts and ecofacts. Spatial games could be played but chronological control was poor. Given these chronological uncertainties and a lack of understanding of formation processes, sophisticated analysis is clearly worthless and if indulged in could lead the unaware into a false sense of achievement. In the deeply stratified deposits behind the rampart, however, chronological relationships are explicit and the facility exists for a range of detailed testing. Moreover there is considerable potential here for the study of formation processes. With such advantages in mind the second ten-year programme concentrated upon the examination of these peripheral stratified deposits.

The greatly enlarged database and our growing awareness of the sheer complexity of analysing it in anything other than a superficial manner has been a humbling experience but now that the full dataset is available and has been ordered in a preliminary way in the two sets of published reports more detailed work can begin. Some notion of what is involved can be gleaned from the aspirations hinted at in the specialist reports.

In essence the process of analysis is progressing along the following lines:

- testing of the validity of associations
- refining the chronology of the dataset
- examination of the processes of deposition
- multivariate spatial analysis within chronological constraints.

Once these preliminaries have been completed it will be possible to consider questions of:

- spatial organization
- productivity and consumption
- ritual behaviour
- social systems
- trajectories of development.

It remains to be seen whether the enhanced dataset will enable us to make major advances in our understanding of Iron Age society or whether it will impose on us, even more forcefully, the limitations of the archaeological record.

Index

by Barbara Hird

NOTE: references in italics denote figures; there may also be textual references on these pages.

Link to Previous Section