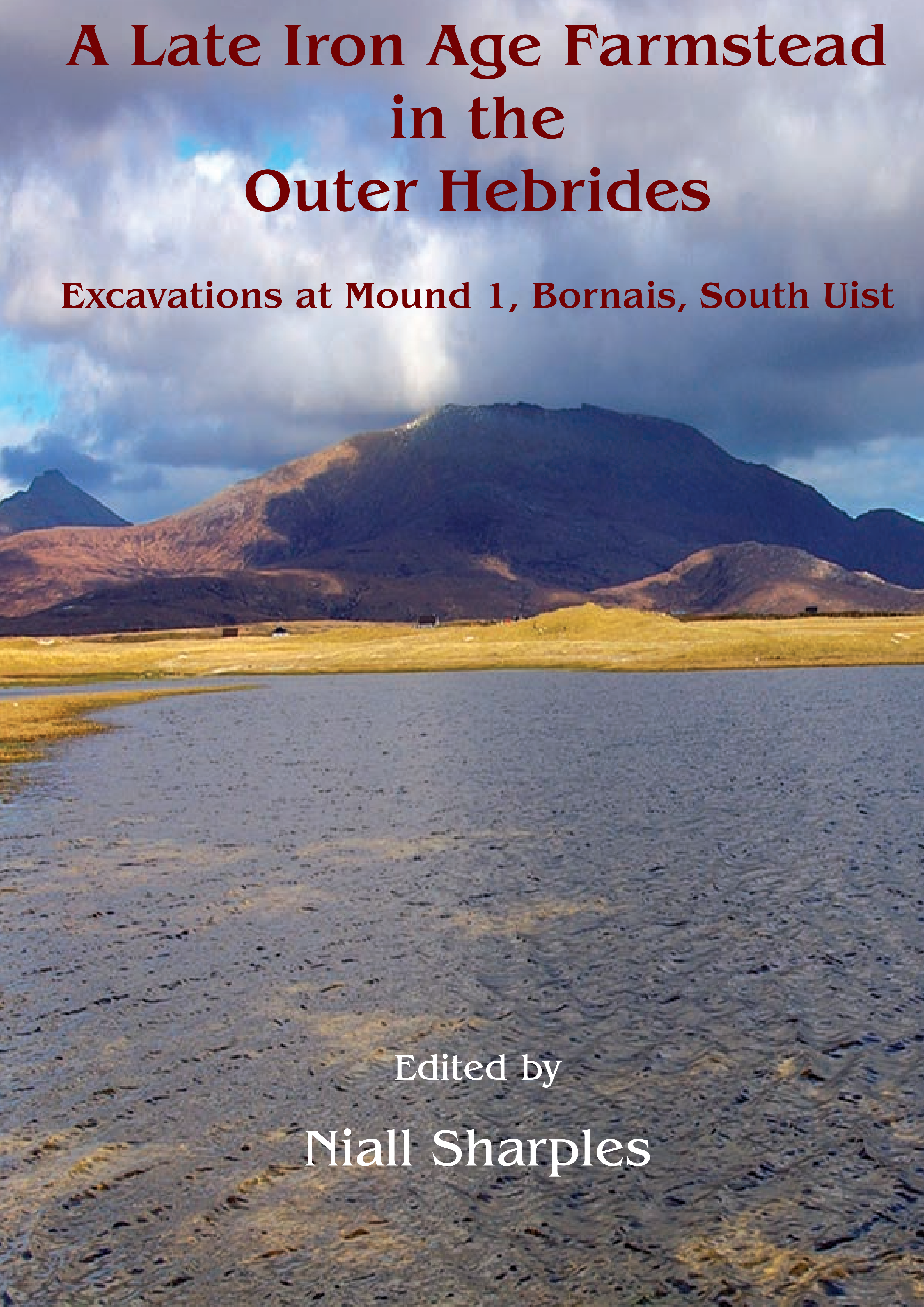
A Late Iron Age Farmstead in the Outer Hebrides

Excavations at Mound 1, Bornais, South Uist



Edited by

Niall Sharples

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Niall Sharples

With contributions by

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Cardiff Studies in Archaeology

Oxbow Books

Oxford and Oakville

Published by
Oxbow Books, Oxford, UK

ISBN 978-1-84217-469-2

*This book is published with the aid of a grant
from Historic Scotland.*

Historic Scotland is now Historic Environment Scotland.

Front cover image: A view of the Bornais mounds in the winter with the flooded machair in the foreground and Beinn Mhor in the background. Photo by Niall Sharples

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Appendix 5
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English–Gaelic glossary of place-names

The spelling of place-names differs on all editions of the Ordnance Survey maps of all scales. Furthermore, different versions of some names are used by the present-day community on South Uist. To add to these difficulties, there are occasional typographical errors on the 2007 edition of the 1:25,000 Explorer map (sheet no. 453); this map cannot therefore be considered definitive beyond all question. CANMORE records alternative place-names; it too contains a few errors.

Only place-names mentioned in this volume are listed here. We have attempted to record both the Gaelic name as shown on the O.S. map and all the variants used in the archaeological literature but even so this list is probably not exhaustive. Accented letters are marked in this glossary as they are shown on the 2007 1:25,000 O.S. map but the map's use of these accents does appear to be a little inconsistent. Accents are rarely reproduced in the archaeological literature (this volume included) or on CANMORE.

Some place-names are Old Norse in derivation (e.g. Bornish, Bornais, the fort on the headland) but all names today have a Gaelic form.

English or Anglicized name	**Gaelic name**
Allasdale (Barra)	Allathasdal
Alt Chrysal (Barra)	Allt Chrisal
Ardivachar, Ardnivachar	Àird a' Mhachair
Ardvule	Rubha Àird a' Mhuile
Askernish	Aisgernis, Aisgeirnis
Baleshare (North Uist)	Baile Sear
Barpa Langass (North Uist)	Barpa Langais
Barra	Barraigh
Ben Mor	Beinn Mhòr
Berie (Lewis)	Beirgh
Boisdale	Baghasdal, Baghasdail
Bornish	Bornais
Cladh Hallan roundhouses	Taighean Cruinn Cladh Halainn
Clettraval (North Uist)	Cleitreabhal
Drimore	Driomor, Druim Mor
Dun Vulan	Dùn Vùlan, Dùn Mhulan
Eochar	Iochdar
Flora Macdonald's birth-place	Airigh Mhuillin, Airigh-mhuillin
Gerinish	Geirinis
Glendale	Gleann Dail
Great Bernera	Beàrnaraigh Mòr
Grimsay	Griomasaigh
Hecla	Thacla
Heiskeir (or Monach islands)	Heisgeir
Hornish Point	Rubha Hornais, Thoirnis
Kildonan	Cill Donnain
Kilpheder	Cille Pheadair
Kneep (Lewis)	Cnip
Loch Aynort	Loch Aoineart, Loch Aineort, Loch Ainort
Loch Bee	Loch Bì

Lochboisdale, Loch Boisdale	Loch Baghasdail/Baghasdal
Loch Bornish	Loch Bhornais
Locheynort, Loch Eynort	Loch Aoineart, Loch Aineort, Loch Ainort
Loch na Berie (Lewis)	Beirgh, Loch na Beirgh
Lower Bornish	Bornais Iochdarach
Monach islands (or Heiskeir)	Heisgeir
Ormaclate, Ormaclete, Ormiclate	Ormacleit
Rosinish (Benbecula)	Ròisinis
South Glendale	Gleann Dail bho Dheas
South Uist	Uibhist a Deas
Stornoway (Lewis)	Steornabhaigh
Trossary	Trosaraidh, Trosairaidh
Unival (North Uist)	Uineabhal, Leacach an Tigh Cloiche
Upper Bornish	Bornais Uachdhrach
Upper Loch Bornish	Loch Bhornais Uarach
Ushenish, Usinish	Uisinis

1 Bornais and the Iron Age

Introduction – N Sharples

The settlement at Bornais consists of a complex of mounds (Figure 1) which protrude from the relatively flat machair plain in the township of Bornais on the island of South Uist. The machair plain forms the west coast of the island and comprises a sand deposit made up of shell and siliceous minerals, which provides a calcareous environment that is markedly different from the peat covered moorlands to the east of the coastal plain. Ritchie (1979; 1985; Ritchie *et al*. 2001) has argued that the sand has formed since the last Ice Age as a result of the submergence of the extensive shallow coastal plain that lies off the west coast of the Uists. The sand is comprised of relic glacial material and large quantities of comminuted shell from the ancient storm-washed shoreline. It is assumed that there was a fairly rapid rise in sea level up until about 5000–7000 years ago when sea level was probably only about a couple of metres below what it is today. There was then a massive influx of sand onto the land around 4050–3890 cal BC that created a coastal plain probably somewhat similar to that of today. This influx probably preceded a final rise in sea level which divided the islands of South Uist, Benbecula and North Uist.

These geomorphological developments created an extension to the solid geology of the island which has proved an attractive settlement location for the inhabitants of the island from the Beaker period onwards; the machair appears to have been intensively occupied from the Late Bronze Age to the end of the Norse period (Sharples *et al.* 2004). In recent years, although the machair has not been occupied, it has proved a valuable and extensively exploited agricultural landscape. The attraction of this landscape is that it provides a relatively well-drained and flat surface that is one of the few areas of the island that can be cultivated for cereal agriculture. The relatively large area of machair present on the Uists has meant these islands have been one of the most agriculturally productive areas of the west coast of Scotland (Dodghson 1998, table 3.1).

The reasons behind the excavations at Bornais have been described in detail in the first volume of the Bornais report (Sharples 2005b) and it is not intended to rehash the general history here. Some introduction is necessary, however, as the mound described here is different in significant ways to mound 3, which was described in volume 1, and mounds 2 and 2A which have been the focus for the recent excavations and which will be described in future volumes.

Excavation at Bornais commenced in 1994 and the main focus was the Viking/Norse settlement which dominates the deposits exposed on mounds 2, 2A and 3. Mound 1 was the original location for settlement in this part of the machair plain (Sharples *et al*. 2004); pre-Viking activity of some complexity is present and, although the early phases of activity were not explored, it is likely that the settlement activity started in the Middle Iron Age, if not earlier. This introduction will therefore provide some background on the Atlantic Iron Age and the distribution of settlement on the machair plain of South Uist.

The history of the excavations – N Sharples

Mound 1 was the last of the four principal mounds to be explored and the first trench was not opened until 1996 (Figure 2; Sharples 1996). It was already clear from surface collection of diagnostic pot sherds that this mound was likely to include deposits dating to the Iron Age. The knowledge that this mound was prehistoric had initially deterred excavation as the primary goal of the work at Bornais was to locate a Norse settlement. However, after the quality and depth of the Norse stratigraphy was demonstrated on mounds 2 and 3, it was regarded as an important research objective to establish the relationship between the Norse settlers and the preceding Iron Age occupants of the island. Identifying and locating the pre-existing settlement then became a significant goal of the excavations and mound 1, where Iron Age archaeology was known to be present, became the obvious place to start.

As a result of the delayed start to the excavation of this mound it was possible to carry out a geophysical survey immediately prior to excavation and this influenced the location of the initial exploratory trench. The results of the geophysical survey have already been described (Hamilton and Sharples 1996; Hamilton *et al*. in Sharples 2005b) but will be reassessed here, as they are directly relevant to understanding the way mound 1 was excavated and how it should be interpreted. The magnetic survey of mound 1 (Hamilton *et al*. in Sharples 2005b, fig. 13) is very distinctive. A massive negative anomaly completely covers the southern half of the mound, spreading off the

Figure 1. A plan of the Bornais mounds showing the trenches excavated up to 2004

mound to the east and west, and a separate, similar anomaly occurs in the flat area to the north of the mound.

These anomalies dominated our appreciation of the initial survey and a trial trench, 20 m long and 2 m wide, was laid out to explore the significance of the large negative anomaly (Figure 2, A). The trench was aligned roughly west to east to cut across the boundary of the principal negative anomaly and was located on the west side of the mound where this boundary was particularly clear. The trench was also deliberately located on the edge of an area of badly-eroding archaeological deposits (Figure 3). The erosion was being caused by a combination of rabbit burrowing, cattle trampling and recent cultivation.

It was clear after we deturfed the trench that the negative anomaly coincided with an area of relatively clean blown sand deposits that covered the centre and west side of the mound. The northern boundary of the negative anomaly coincided with the edge of rich Norse midden layers.

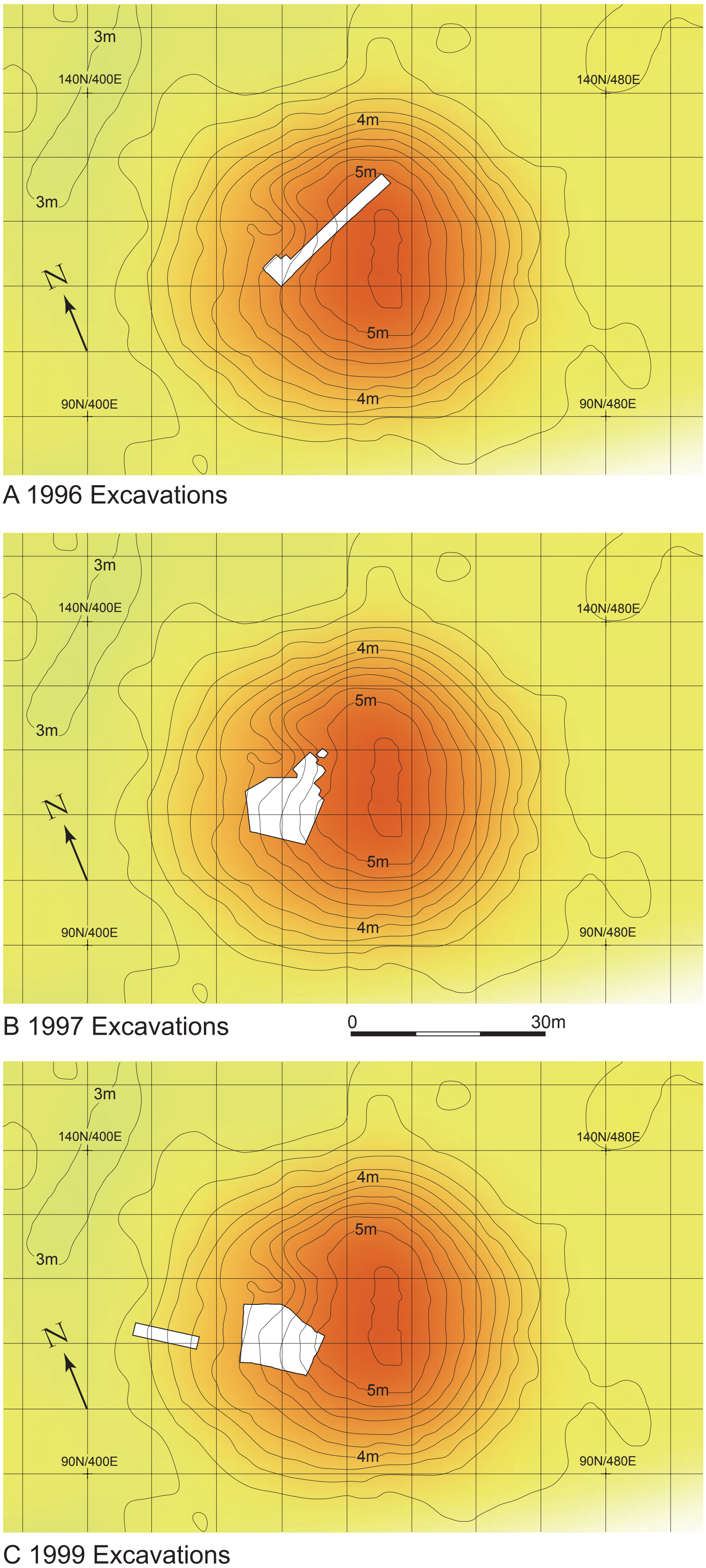


Figure 2. Plan of the areas examined in 1996, 1997 and 1999

The excavation team was relatively small in 1996 and it was possible to excavate only a limited area of the deposits exposed. By the end of the 1996 season it had been established that the wind-blown sand was associated with a stratified sequence of occupation deposits infilling the hollow above an abandoned and dismantled Late Iron Age building (Sharples 1996). The original trench was also expanded to the west by an area 3 m by 4 m, to explore these buildings. The Late Iron Age deposits were cut by the construction trench of a Norse building that was infilled with the thick organic middens that characterised the northern part of the trench.

In 1997 the excavations focused on the Late Iron Age deposits at the west end of the original trench. An area roughly 12 m by 15 m was opened up in order to define the extent of these deposits, to understand the underlying structure and to obtain dating evidence to establish the chronology of the occupation (Figure 2, B). There was also a slight expansion of the northern section of the original trench, which was designed to define the orientation and size of the Norse building. The excavations ended with the exposure of a Late Iron Age building whose structural walls had been almost completely removed but whose floor was largely intact (Figure 4). In the centre of the floor, exposed in the last days of the excavation, was a hearth decorated by an arc of upright metapodials.

The hollow created by the abandonment and robbing of the house was infilled with a series of alternating layers of wind-blown sand and burnt occupation debris. This was sealed by some discontinuous occupation layers and cut by a number of Norse features associated with these layers. These Norse layers and features were badly damaged by the erosion (mentioned above) and extensive rabbit burrows. They were excavated quickly and not as well recorded as they could have been. One of the Norse features was a rectangular stone-lined hearth and this shows up clearly as

Figure 3. A view of the trench excavated in 1996. The exposed surface deposits on the north side of the trench are clearly visible as are the modern cultivation marks cutting through the archaeological deposits. In the background people can be seen working on mound 2 and, further away, mound 3

a distinctive double-peaked anomaly (Figure 6) in the original geophysical survey. A very similar anomaly can be observed to the south just outside the trench and this presumably represents another hearth.

There was no excavation at Bornais in 1998 but we returned for an extended eight-week season in 1999. The primary objective was to complete the excavation of the Late Iron Age house floor exposed at the end of the 1997 excavations and a trench roughly 12.4 m by 9.6 m was opened up (Figure 2 C). It was also decided to open a trench 2 m by 17.6 m that would explore the deposits outside the house on the edge of the mound (Figure 5). What initially seemed to be a fairly achievable objective became much more difficult when it was realised that the floor deposits were extremely complicated. Two clear occupation horizons were identifiable, separated by a thick burnt layer that contained large carbonised timbers. The evidence was interpreted as indicating a wheelhouse that had burned down and then been substantially rebuilt without the removal of the collapsed and carbonised roof. A number of features were exposed below the original floor levels and there was also clear evidence for earlier buildings, which could not be excavated in the time available. The trench on the west side of the mound exposed a sequence of midden layers that defined the western edge of the settlement mound. The material culture present in these layers belonged to the same period as the wheelhouse and no evidence for middens contemporary with earlier or later structures was present.

At the end of 1999 the house had been completely excavated and it was now clear from a detailed examination of the pottery and small finds that the remains belonged to a fairly restricted period of the first part of the Late Iron Age (Late Iron Age I in the terminology of Barrett and Foster 1991). There was no evidence for the distinctive combs, pins and pots that characterise Late Iron Age settlement in the seventh and eighth centuries AD (Smith 2003; Sharples 2003b). Nor did any finds from the Norse deposits strongly suggest that the mound was reoccupied before the eleventh century (though radiocarbon dates later made us reconsider this issue). It seemed unlikely, therefore, that the area under examination was going to provide information on the immediately pre-Viking settlement, or for the earliest Viking settlement, and it was felt that these deposits were more likely to be found elsewhere. In 2000 attention was redirected to the excavation of mounds 2 and 2A and the excavation of these mounds continued in 2003 and 2004. These excavations revealed a sequence on mound 2 that

Figure 4. Excavation at the end of the 1997 season. In the centre is the floor of the Late Iron Age building, with a stone pier in the foreground. In the bottom right corner is the west end of the Norse house

includes pre-Viking occupation of the seventh to eighth centuries AD and an early Norse house dating to the tenth century AD. On mound 2A settlement activity begins with a substantial cultivation soil dating to the late ninth to tenth century AD.

In the course of publishing the first volume on the excavations at Bornais (Sharples 2005b) a detailed re-examination of the geophysical results was undertaken by Tim Young. The subsequent plot (Figure 6) was more detailed and resulted in a reinterpretation of some of the more ephemeral anomalies around the edge of mound 1. It was noted that the orientation of the Norse building excavated in 1996 and 1997 is comparable to the alignment of several anomalies that lie on the west, east and south sides of the mound. These anomalies have a linearity that suggests they represent rectangular buildings arranged either on a similar axis or perpendicular to the building excavated. In addition to the excavated structure, the presence of three, or four, further buildings was recognised:

S1 lies on the west side of the mound and has a well-defined south end indicated by a high magnetic anomaly. Running perpendicular to this are two lesser anomalies, which appear to represent the side walls of the house. The north end of the house is more difficult to identify, as the walls disappear into a general area of high magnetic readings, but it is possible to suggest a building up to 12 m long and 4 m wide.

S2 lies on the south side of the mound and is defined by two side walls and the eastern gable; the west gable is more problematic. A possible partition wall divides the house in two. The building is estimated to be about 12 m long and up to 6 m wide.

S3 runs parallel to this structure. It is not as well defined, but again two discrete anomalies mark the gable walls and a strong anomaly in the centre of the building appears to indicate a partition wall. This house appears to be smaller, approximately 10 m long by 4 m wide. Lying between the east ends of house S2 and S3 is an area of high magnetism that is more likely to indicate a midden than a structure.

S4, the eastern house, is well defined, with a southern gable from which faint perpendicular side walls extend. These run into a large area of high magnetism that cannot simply be the northern gable but may indicate a midden infilling the northern half of the building. If the house ends at this point then it would be 10 m long and 5 m wide. There is, however, some indication that the side walls continue to a less significant area of high magnetism, indicating the northern gable wall, which defines a house approximately 14 m long.

Unfortunately, it has not been possible to test these

Figure 5. Excavations in 1999 looking east at the trench on the west edge of the mound

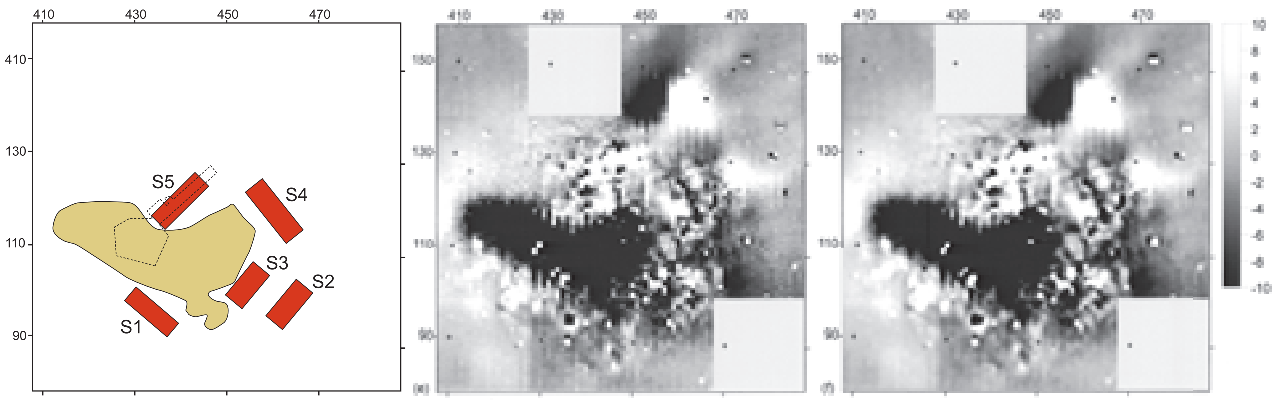


Figure 6. The gradiometer survey of mound 1

structures by excavation and so their existence is still open to debate. Nevertheless the results of the geophysical survey suggest the presence of a very well ordered settlement of quite substantial buildings.

Finally, radiocarbon dates obtained in the final stages of the post-excavation analysis of mound 1 suggest that the poorly preserved Norse deposits at the top of the Late Iron Age deposits in mound 1 date to the ninth to tenth century AD. These suggest that mound 1 may be one of the earliest areas occupied after the Viking invasion of the islands.

A history of archaeology in the southern Hebrides – N Sharples

The southern part of the Western Isles has featured

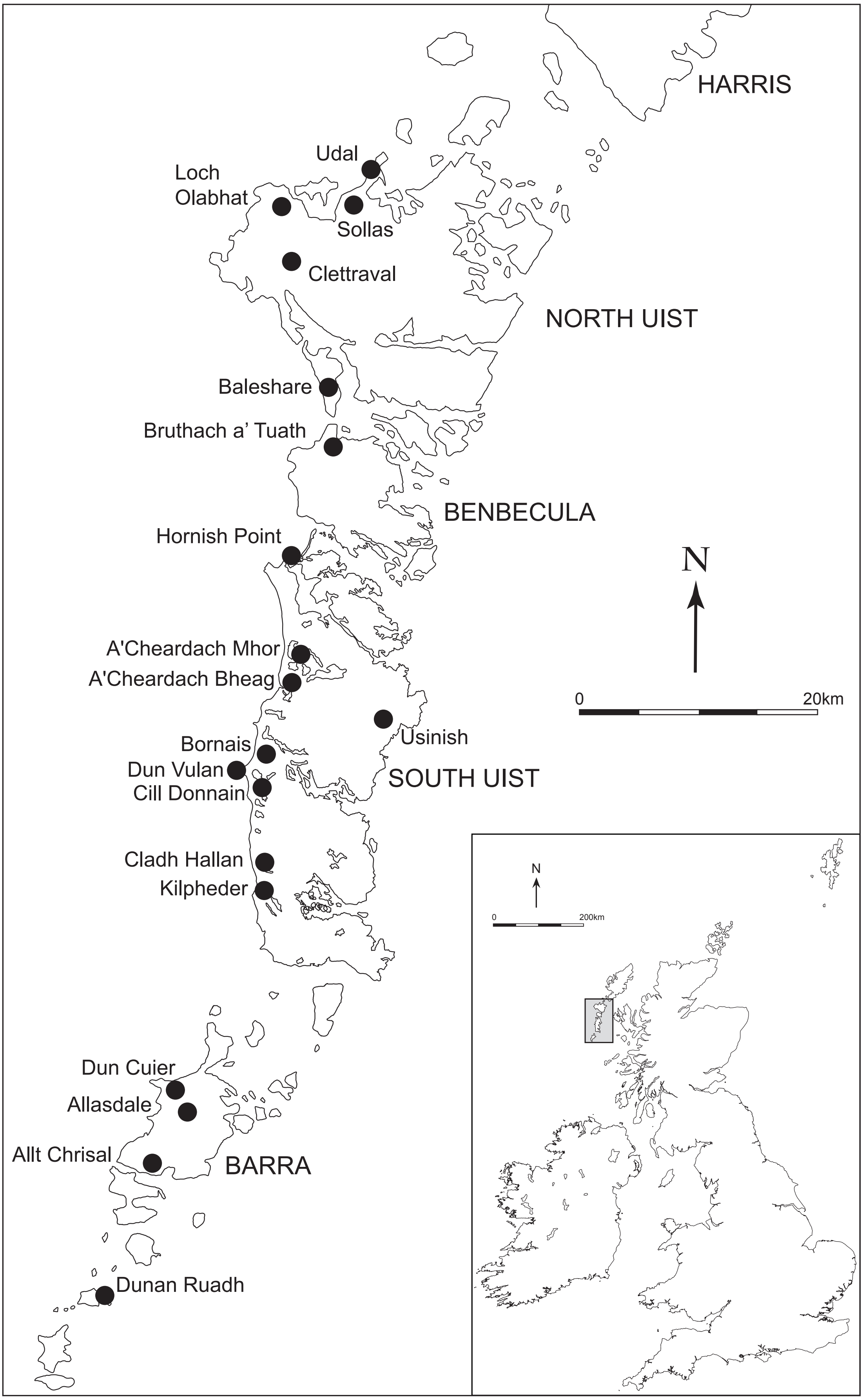
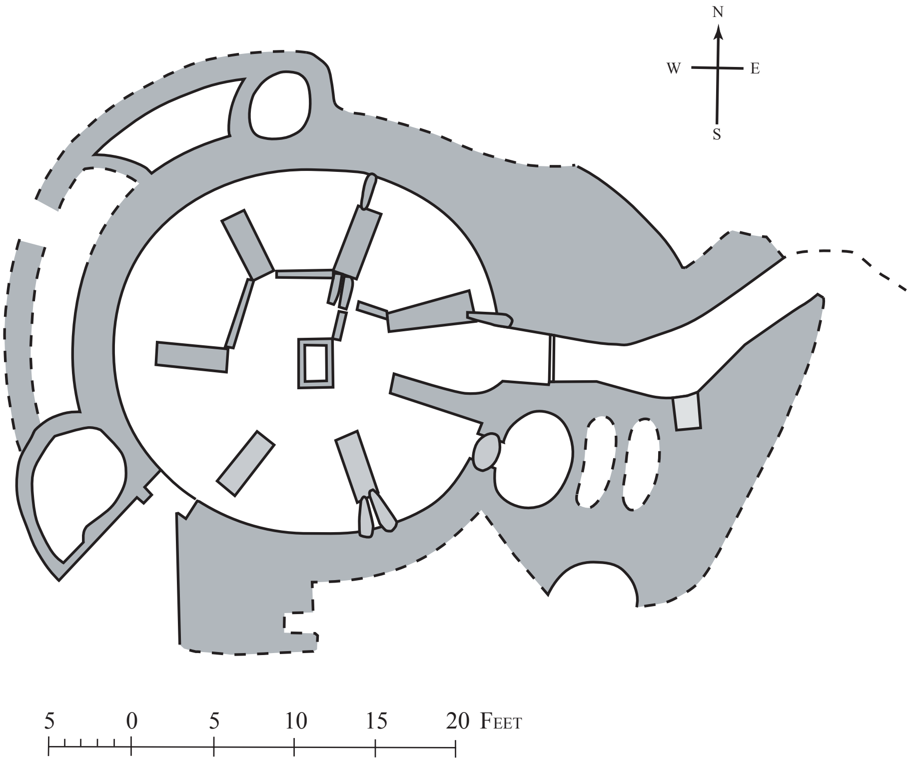


Figure 7. A map of South Uist showing the location of the Iron Age sites mentioned in the text



CNOC A'COMHDALACH, GROUND PLAN

Figure 8. A sketch of the wheelhouse at Cnoc a'Comhdalach (Beveridge 1911)

in archaeological discussions since the middle of the nineteenth century and the Iron Age archaeology has always been at the centre of these discussions. The islands have no monuments that can compare in preservation or fame with Dun Carloway,[1] or the standing stones in the Calanais region of Lewis, but they have probably seen more sustained archaeological research than the northern part of the Western Isles and until recently have been one of the best documented Iron Age landscapes in Scotland (Figure 7).

The historical development of the archaeology of this region is characterised by the activities of four individual researchers, Erskine Beveridge, Sir Lindsay Scott, Tom Lethbridge and Iain Crawford, and two archaeological programmes, the Rocket Range excavations and the SEARCH programme, that encompassed many individuals. This early research provided an essential background to our understanding of the archaeological record that is worth exploring.

The earliest significant record of the archaeology of the islands was made by Capt. F W Thomas who provided a detailed description and illustration of some very well-preserved structures on the inhospitable and relatively uninhabited east coast of South Uist (Thomas 1870). The structures recorded by Thomas at Usinish (Uamh Iosal) appear to be a very well-preserved wheelhouse and souterrain. The first major programme of work was undertaken by Erskine Beveridge, a wealthy industrialist who had inherited a linen factory in Dunfermline. He came to North Uist in 1897, having worked for some years on Coll and Tiree, and was so taken with the island that in 1901 he purchased the estate at Vallay, on the north coast, and built a substantial mansion at considerable expense. In the years from 1897 to 1920 Beveridge carried out a detailed survey of the archaeology, history, topography and place-names of North Uist and undertook numerous important excavations. The survey and some of the early excavations were published in a monograph on the island (1911, reprinted 1999), but excavations continued in the years before the First World War and in the summer of 1918. Unfortunately, Beveridge died in 1919 but his later excavations were promptly written up by Grahame Callander, the Director of the National Museum of Antiquities of Scotland, which inherited his archaeological collections and his draft reports (Beveridge and Callander 1931; 1932).

In total Beveridge excavated 19 sites; these included extensive excavations at Bac Mhic Connain, Cnoc a'Comhdalach, Dun Thomaidh, Eilean Maleit, Foshigarry and Garry Iochdrach. Given the historical context and the complexity of the sites excavated, the quality of the work was not too bad. The sites are primarily documented by detailed textual descriptions and photographs. Artefact collection was fairly thorough and again descriptions and photographs exist for much of the material. The primary problem of the record is the lack of detailed plans, though

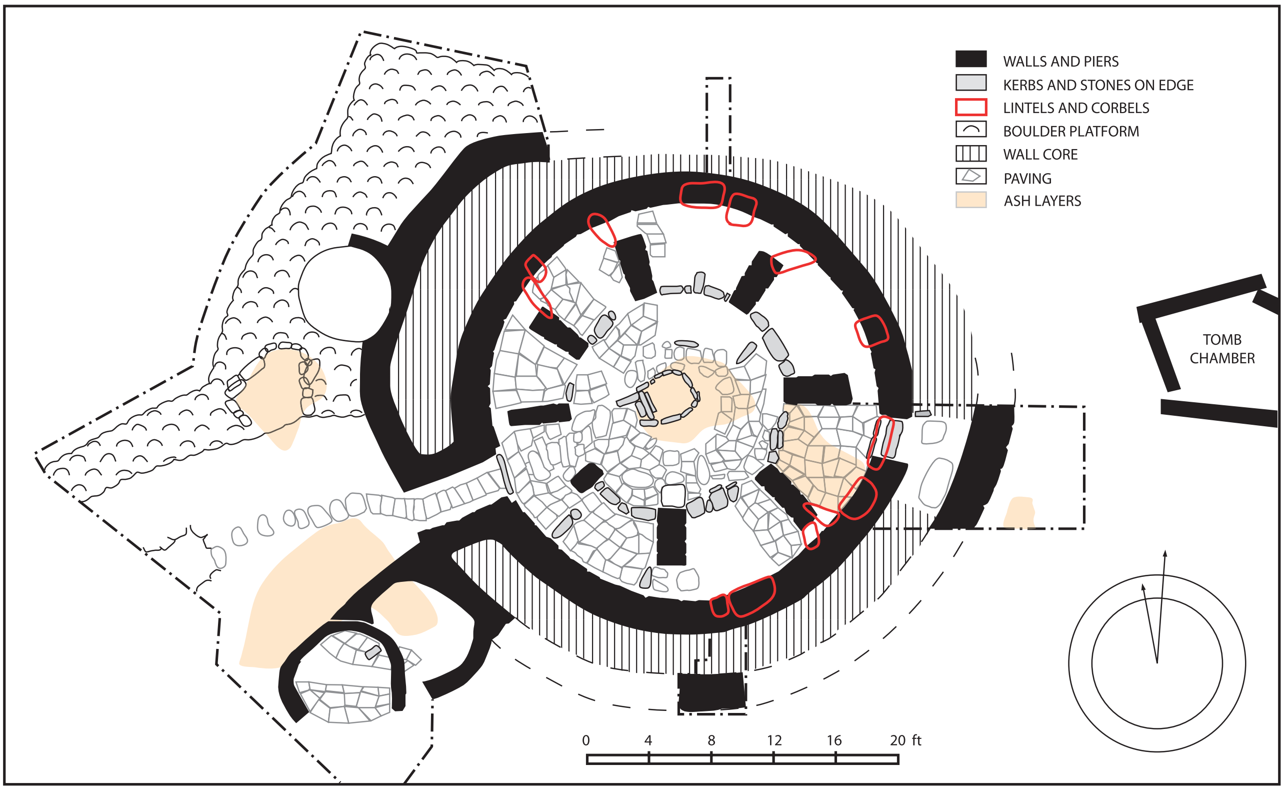


Figure 9. A plan of the wheelhouse at Clettraval (from Scott 1947a)

measured sketches exist for most sites (Figure 8), and the absence of detailed classification of either the architecture or the finds. The sketch plans suggest complex phasing at most of the sites and chronological depth is indicated by the artefacts, but Beveridge was unable to conceptualise this historical complexity and it is difficult to reconstruct without further excavation.[2] There was little attempt to place the sites in a national or international context, or to use the evidence to write a narrative history of the occupation of North Uist. Nevertheless, the publication of these sites brought the archaeology of North Uist to the attention of the archaeological community; the evidence produced by Beveridge was frequently drawn upon by archaeologists writing general histories of Britain and searching for comparanda. As a regional publication the volumes on North Uist (Beveridge 1911), and Coll and Tiree (Beveridge 1903), were not to be surpassed for some time and the assemblages deposited in the National Museum are an important resource that is widely known and has been referenced by scholars interested in material culture.[3]

Little work was done between the First and Second World War, though there was a rather hurried Royal Commission survey during the early months of the First World War that was eventually published in 1928. In the late 1930s another rich amateur archaeologist began to take an interest in the island. Sir Lindsay Scott was a senior civil servant who had an important role in the Air Ministry and was partly responsible for aircraft production during the Second World War. His initial interest was in the archaeology of the Isle of Skye but in 1935 he moved across the Minch to work at the chambered tomb of Unival on North Uist. His role in the Air Ministry absorbed all his energies during the war but, when it was over, he retired to pursue his archaeological interests. Scott became President of the Prehistoric Society, undertook a number of important excavations in the Hebrides and made a major contribution to our understanding of both the Neolithic[4] and Iron Age occupation of the islands. He appears to initially have been drawn to the islands because of his interest in sailing.[5]

Scott is perhaps best remembered in later prehistoric studies for an important paper on the nature of brochs (Scott 1947a) but his excavations on later prehistoric sites included the wheelhouse at Clettraval on North Uist (Figure 9) which stimulated a comprehensive paper on the nature of these monuments (Scott 1948). Scott's approach contrasts markedly with that of Beveridge as he was concerned with detail and the broader understanding of the archaeology of the region. His excavations were meticulous and MacKie claims he 'brought modern scientific excavations to the Iron Age sites of Atlantic Scotland' (MacKie 2007, 1146). The analysis of the substantial ceramic assemblages recovered by his excavations was comprehensive, with detailed classifications of decoration, vessel form, rim and base shapes all quantified in large tables and statistically analysed (Scott 1948, 117–20, table 1). Whilst this approach is now thought to be simplistic, it did provide

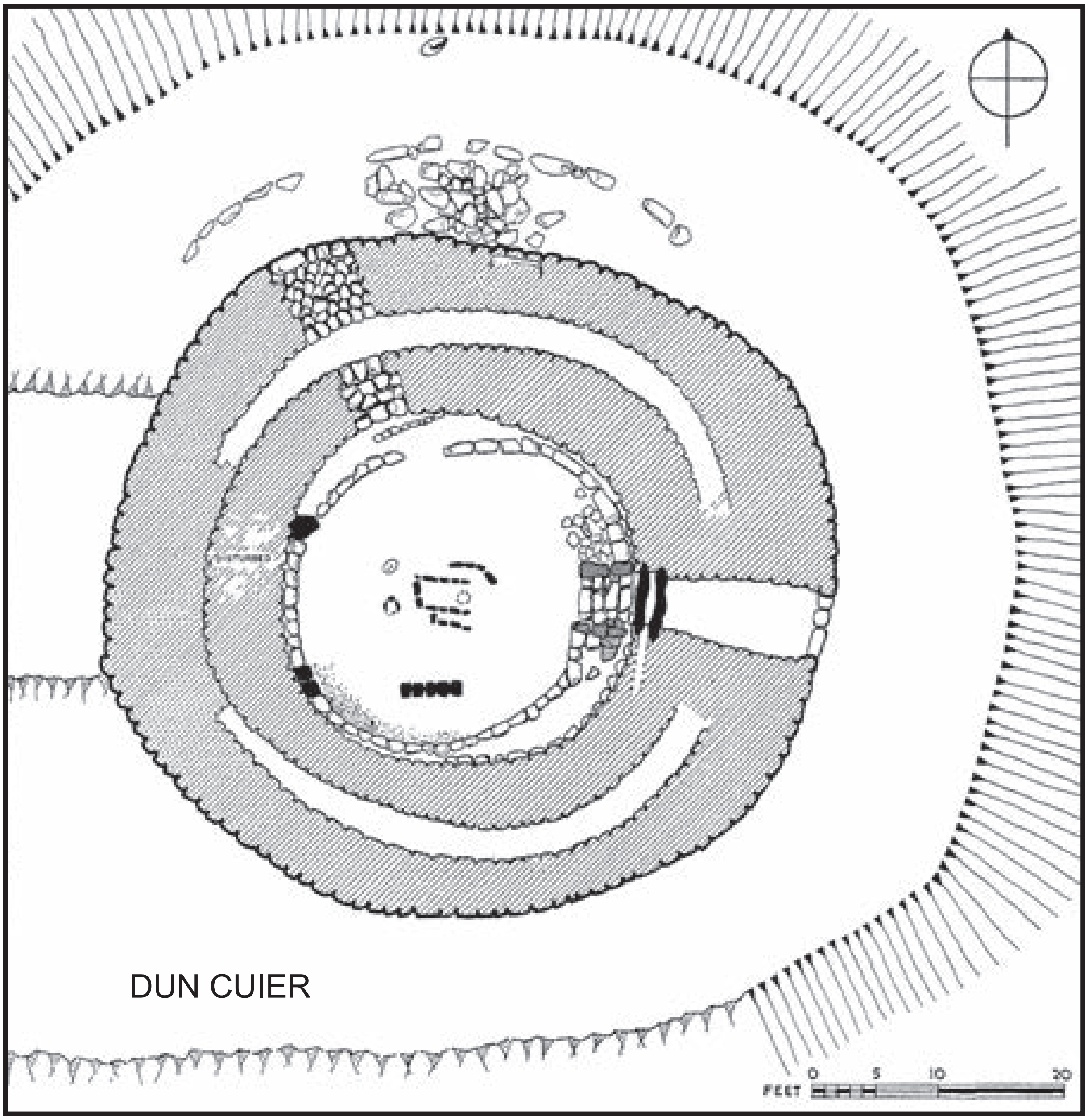


Figure 10. A plan of Dun Cuier (from Young 1956). I am grateful to the Society of Antiquaries of Scotland for permission to reproduce this figure

an essential building block that enabled the establishment of the Hebridean ceramic sequence by his assistant Alison Young (1966).

By publishing his principal papers on later prehistory (Scott 1947a; 1948) in the *Proceedings of the Prehistoric Society*, Scott was also placing the Hebridean Iron Age in a wider national and international context. He argued for the essentially domestic nature of the broch, suggesting that these structures should be considered simply as elaborate houses comparable to other circular British houses. This assumed a widespread distribution of relatively low-walled structures which challenged the elite 'castle complex' interpretation of Childe (1935, 197–206). Unfortunately, much of Scott's argument was placed within a diffusionist framework that was then becoming oppressively dominant and this undermines the wider validity of his analysis for most modern archaeologists.

Scott, like Beveridge, died whilst still active and it fell to his assistant Alison Young to complete his excavation of the wheelhouse at Tigh Talamhanta, Allasdale, on Barra (Young 1952). This was another upland wheelhouse, directly comparable to Clettraval, with free-standing stone walls that were penetrated by a souterrain similar to that at Usinish. Young continued to work on the islands in the 1950s and she excavated two key sites: the wheelhouse at A'Cheardach Mhor (Young and Richardson 1960), which will be discussed later, and Dun Cuier (Figure 10; Young 1956). The excavations at Dun Cuier are of considerable significance and have been the subject of some debate in recent years. The principal monument is a thick-walled, roughly circular structure which has been interpreted as a broch (Armit 1988), but which has some architectural peculiarities that challenge this identification (MacKie 2007, 1108). These include an unusual entrance, the absence of an intra-mural staircase and the absence of any access between the wall chamber/gallery and the interior. Dun Cuier does, however, have a scarcement which suggests the wall was high enough to support an upper floor. The most important feature of the excavations was the recovery of a large assemblage of ceramics which were associated with a distinctive assemblage of worked bone objects, including parallelopiped bone dice and composite bone combs, the latter clearly providing a date in the second half of the first millennium AD. The site therefore provided evidence for the nature of Late Iron Age ceramics and the material formed an important element in the Hebridean ceramic sequence outlined by Young (1966; see below 20). The early part of the Dun Cuier assemblage is very similar to the assemblage recovered from mound 1 at Bornais and the quantities of elaborately decorated Middle Iron Age ceramics were minimal.

T C Lethbridge was a Cambridge-trained archaeologist who was a keeper in the University Museum of Archaeology and of Ethnology, Cambridge. He was also attracted to the islands because of an interest in sailing and published several books on sailing in the North Atlantic that incorporated archaeology and tried to interpret it from a distinctive maritime perspective.[6] He was invited to undertake the excavation of a wheelhouse in South Uist by another idiosyncratic character, the German anthropologist, photographer and filmmaker Werner Kissling (Russell 1997). The purpose was to open up one of the mounds on the machair and reveal a wheelhouse that could be used to inform the locals about their archaeological past and provide an attraction that visitors to the island could view. After a brief survey of the south end of the island, the mound known as the Bruthach a'Sithean (Brae of the Fairy Hill) was chosen in the township of Cille Pheadair (Kilpheder). Excavations revealed a spectacularly well-preserved wheelhouse that had stone walls over 2.25 m high (Lethbridge 1952). There was clear evidence that these supported corbelled vaults around the central circular space which Lethbridge took to be an open space, but which most would accept as having had a timber roof. The excavation was promptly published and provided the first well-excavated example of a wheelhouse on the machair that could be compared with the moorland wheelhouses of Clettraval and Tigh Talamhanta.

Archaeology in the Uists became the subject of considerable attention in the later part of the fifties as a result of the decision to build a rocket range on the islands in 1955. This was one of the earliest and most important rescue archaeology projects undertaken in Scotland and was an ambitious attempt to undertake extensive excavations in advance of a major construction project. The Ministry of Works was quick to react and in the summer of 1955 sent Roy Ritchie, an Inspector of Ancient Monuments, to examine the areas that appeared to be threatened. Three principal areas were targeted: the area of the rangehead at the north-east corner of South Uist, the airport in Benbecula, which was to be expanded, and the township of Sollas on North Uist, where an existing airstrip was to be considerably enhanced. A team of experienced archaeologists was recruited for a summer season in 1956. The team included Alison Young and Kitty Richardson, Jack Scott from the Kelvingrove Museum, Horace Fairhurst from the Geography Department at Glasgow University, Richard Feachem and Alastair MacLaren from RCAHMS, James Wallace and Allard Johnson. The excavations were successful and a large number of sites were examined; some of these were visited by Her Majesty the Queen on her tour of the Western Isles.

The most important sites discovered by the Rocket Range project appear to be the three wheelhouse complexes at A'Cheardach Bheag and A'Cheardach Mhor on South Uist (Fairhurst 1971; Young and Richardson 1960), and Bruthach a'Tuath on Benbecula (Figure 11; still unpublished but see MacKie 2007), but a Viking house at Drimore (MacLaren 1974) was also a very important discovery, and several other settlements with less well-preserved structures were also explored. In 1957 the wheelhouse at Machair Leathann, Sollas, North Uist was excavated by Richard Atkinson of Cardiff University (Campbell 1991). As soon as this excavation was completed the decision was taken to reduce the scale of the rocket range and further excavations were no longer required. The modification of the original plans for the range also resulted in a shift in the location of the principal new buildings on South Uist. These now completely avoided the excavated sites, which consequently all survive in some form. The only site that appears to have been destroyed is Bruthach a'Tuath, which was bulldozed almost immediately to allow for the expansion of the airport at Benbecula.

The original intention had been to publish a single volume for the Ministry of Works Archaeological Reports Series which had recently started with the impressive volume on Jarlshof (Hamilton 1956). The volume was to be edited by Stuart Piggott, and would include reports on all the sites and an introductory chapter, by Ritchie, on the survey material. However, it almost immediately proved to be impossible to coordinate the production of this volume. Plans to disseminate information about the sites excavated in a lecture to the Society of Antiquaries of Scotland were cancelled as a result of the excavators' worry about how their work was to be presented. An approach to publish an interim account in *Antiquity* collapsed because O.G.S. Crawford tried to pressurize the Ministry of Works into publishing annual interim reports on their excavations. The proposed volume was critically undermined by Young and Richardson's decision to publish the excavations at A'Cheardach Mhor as an article in the *Proceedings of the Society of Antiquaries of Scotland*. This caused a heated

Figure 11. A view of the unpublished wheelhouse excavations at Bruthach a'Tuath (Historic Scotland)

debate in the publications committee and an attempt was made to block the publication of the paper as it was clear the consequence would be the end of the integrated volume. However, Piggott clearly favoured independent publication and as there was no sign of the imminent delivery of the other papers, the Ministry took the view that it would be unfair to delay publication. The remaining authors still desired to publish a monograph and Fairhurst took on the role of coordinating this but unfortunately his initial enthusiasm waned as his administrative burden at Glasgow University increased. Eventually reports on the wheelhouse A'Cheardach Bheag by Fairhurst (1971) and the Norse house at Drimore by MacLaren (1974) were published in the newly rebranded *Glasgow Archaeological Journal* as a result of pressure from Scott who had become its proactive editor. A planned third paper, the report on the excavations at Bruthach a'Tuath on Benbecula by Scott and Wallace, was never published though it appears to have been almost finished. Richard Atkinson's excavations at Machair Leathann were eventually published by Ewan Campbell in the *Proceedings of the Society of Antiquaries of Scotland* in 1991.

It is clear that the impact of this project was considerably undermined by the drawn-out process of publication.[7] The publication of a monograph on all the sites would have encouraged a detailed examination of the wheelhouse phenomenon and it would have made available a substantial body of information about the domestic architecture of the region to other archaeologists working in Britain. The exceptional nature of the archaeological record of the islands would have been immediately apparent and it seems likely that the region would have featured much more significantly in debates about settlement structure and domestic architecture. It is also quite possible that a successful project would have stimulated the Ministry of Works to actively support further rescue excavations, but instead Scotland lagged well behind England in the development of rescue archaeology (Crawford 1974). The publication of A'Cheardach Mhor (Young and Richardson 1960) was the only immediate result of the Rocket Range project. It provided another well-excavated example of a machair wheelhouse, comparable to Kilpheder, and was correctly interpreted as a semi-subterranean building that was created by digging a large pit in the sand. The ceramics from the site included evidence for chronological change which provided useful confirmation of the ceramic sequence that Young was soon to publish (Young 1966).

The following decades were dominated by the work of Iain Crawford at the Udal. Crawford was a freelance archaeologist who started out with ties to the University of Cambridge. He specifically set out to identify and explore an unfortified and indigenous settlement sequence that spanned a period from the Iron Age through to the post-medieval period in the west Highlands (Crawford and Switsur 1977, 124–5). His research led him to Coileagan an Udail, a settlement complex at the end of a peninsula extending from the north coast of North Uist. This area benefited from having been explored but not systematically excavated by Beveridge and the local estate papers were extensive and available for analysis. The site comprised two substantial tell-like settlement mounds as well as several smaller settlements in adjacent areas close to the coastline. The archaeological sequence turned out to be even more spectacular than was expected. The coastal sites produced important evidence for Neolithic and Early Bronze Age settlement and the two larger mounds provided what was argued to be a continuous sequence of settlement from the Middle Iron Age (though earlier deposits are suspected on the south mound) through to the end of the seventeenth century (Crawford and Switsur 1977).

The excavations at the Udal have undoubtedly revealed a sequence of incredible importance, with an enormous collection of well-stratified assemblages of material associated with well-preserved buildings which have simply not been explored on such a scale by any other archaeologists. However, the size and the complexity of the archaeological record created an impossible administrative problem. The excavation was a research project which was never well funded: the only state funding was tied to the rescue excavation of the Late Neolithic and Beaker settlement on the shoreline. As a result of the limited funding no substantive publication has been made and researchers are reliant on a small number of short interim publications (Crawford 1974a, 1981, 1986; Crawford and Switsur 1977; Selkirk 1996). These provide little more than tantalising glimpses of the archaeological record and do not really allow for any substantive use of the material. The situation was made worse by the belligerent character of the excavator who restricted access to the material recovered by his excavations[8] and who in his later years actively discouraged archaeologists from working on the islands.[9]

Very little other work took place in the Hebrides during the 1960s but things began to pick up in the 1970s when the Scottish Development Department Ancient Monuments Division began to take an active interest in the problem of coastal erosion, partly as a result of a campaign organised by Crawford (1974b). This erosion takes a variety of forms in the southern Hebrides but it is almost exclusively a problem of the machair plain and therefore largely restricted to the west coast. However, one of the first projects funded by this work occurred on the east coast of Benbecula at Rosinish, where a small area of machair exists at the end of the North Channel. The presence of the machair has encouraged settlement along a stretch of a otherwise relatively inhospitable coast and a long sequence appears to exist that includes Iron Age and Norse settlement. The area also includes a much rarer Beaker settlement which was excavated between 1974 and 1977 by Ian and Leckie Shepherd (Shepherd 1976; Shepherd and Tuckwell 1977).[10] The Beaker settlement consisted of a thin cultivation soil rich in artefactual material that was being severely eroded by wind.

At the end of the Rosinish excavations Historic Scotland sponsored a coastal erosion survey of the coast of the Western Isles in 1978. The Uists were surveyed by the Shepherds, and Lewis and Harris were surveyed by Trevor Cowie, then of the Central Excavation Unit.[11] The survey of the Uists identified over 100 sites that were suffering from erosion and, in a follow-up survey in 1983, the Central Excavation Unit identified 32 sites that were being actively eroded (Barber 2003). They selected five of these sites for exploratory analysis: Newtonferry, Balelone and Baleshare on North Uist, and Hornish Point and South Glendale on South Uist.

The excavation of Ceardach Ruadh, the Red Smiddy, at Baleshare is historically important as this is one of the most famous threatened sites in Britain. It had a prominent place in the classic propaganda publication *Rescue Archaeology* (Rahtz 1974), which spearheaded the campaign to increase state funding of rescue archaeology in Britain. Crawford (1974b) used the site to illustrate the inactivity of the Ministry of Works in Scotland. The site had been known about since the nineteenth century and was recorded when the Royal Commission surveyed the islands in 1914 (RCAHMS 1928). It was routinely referenced as an important site in the 1960s when Fairhurst and Ritchie (1963) undertook limited excavations because the sea had cut a vertical face several metres high, full of stratified archaeological layers and substantial structural walls. It was brutally attacked by some drunken students armed with a Drott excavator in 1971 when considerable damage was done. Throughout this period no action was taken by the Inspectorate. It was clear that by the time the CEU examined the site most of the settlement mound had been destroyed and it was not worth a serious investment of time and effort. The terrible storm of 2005 finally removed the last vestiges of the Iron Age settlement mound though an underlying Late Bronze Age soil horizon continues to survive.[12]

The most significant archaeological work of the CEU project was the excavation at Hornish Point at the north end of South Uist (James and McCullagh in Barber 2003). This is clearly a large, mostly Middle Iron Age, settlement and exposed in the coastal section were the remains of a wheelhouse and several other structures. A large part of the mound still survives inland and the site has the potential to make a very important contribution to our understanding of later prehistory. The most intriguing find from the site was the dismembered remains of a child carefully placed in a pit below the floor of the wheelhouse (Barber *et al*. 1989).

The excavated extent of each site was limited and the most substantial sites were examined by what was called a 'tapestry excavation', where the coastal section was cut back, cleaned and recorded. This was accompanied by systematic coring of the dunes behind the erosion face to define the extent of the settlement mound. The approach taken was rigorously scientific with the hypothetico-deductive method applied to the post-excavation process (Barber 2003, 114). This led to an ill-conceived 'objective' analysis of the ceramic assemblage that was argued to demonstrate that 'we have yet to achieve a meaningful taxonomy of the ceramics of the Hebrides' (Barber 2003, 126), a view that is contradicted by the ceramic specialists' sensible interpretation of the established ceramic sequence (MacSween in Barber 2003, 131–2). Economic and environmental evidence was very thoroughly examined and new techniques were explored; these included phytolith and diatom analyses and the mollusc analysis was used to interpret site taphonomy rather than environmental history.[13] Unfortunately, the impact of the work was diminished by the limited nature of the archaeological interventions.[14] The tapestry excavation did not provide enough material to fully understand what were clearly complex settlements and the fragmentary elements of most of the structures defied easy interpretation. The assemblages of animal bones and carbonised plant remains confirmed some of the patterns that, by the time of publication, were better documented on other sites but, again, the excavations produced relatively small assemblages which restricted interpretation. The chronology of the sites was also confused by the use of marine shell for most of the radiocarbon dates.

These exploratory excavations by the Central Excavation Unit were intended to be followed up with the full-scale excavation of one of the selected sites but financial pressures meant that this never took place. The excavations did, however, lead directly to the setting-up of the next big research project to explore the southern Hebrides, the SEARCH project (Branigan and Foster 2002, 9). The post-excavation analysis that followed the CEU projects of 1984 involved specialists based in the University of Sheffield (notably Paul Halstead, Glynis Jones and Nigel Thew) and this stimulated the development of a 'major long-term programme of integrated environmental and archaeological research in a marginal landscape' (Branigan and Foster 2000, 1). This was primarily developed by Richard Hodges and Dave Gilbertson and it was intended to take most of the staff and students of the department to the Hebrides to undertake a summer fieldwork season.[15] Richard Hodges left the project before any meaningful fieldwork was underway, to become Director of the British School in Rome, and leadership was passed to the Head of Department, Keith Branigan.

The first field season was 1988 when Keith Branigan and Pat Foster began a survey of Barra. Work soon became focused on Ben Tangaval in the south-east corner of the island as here the archaeology was threatened by the construction of a road and causeway to the island of Vatersay (Branigan and Foster 1995). This subsequently led to the excavation of threatened sites and the discovery of an important Neolithic and Beaker settlement complex at Allt Chrisal. The excavations produced a substantial assemblage of ceramics, comparable to those from Northton in Harris, but the structural evidence from the main site was characteristically difficult to interpret. A second field team including Andrew Fleming, John Moreland and Marek Zvelebil was dispatched to South Uist. Moreland and Fleming undertook survey of the blacklands and the Loch Aoineart area (Fleming 2011; Moreland 2011) and Zvelebil began the excavation of a small wheelhouse at Cill Donnain that was suffering badly from wind erosion (Zvelebil 1991; Parker Pearson and Zvelebil in prep.).

Running parallel with the archaeological work on Barra and South Uist was a series of environmental projects. These were coordinated by Dave Gilbertson but included a number of specialists with only limited association with Sheffield University. The character and history of the machair environment (Gilbertson *et al.* 1996; Kent *et al.* 1996) and the environmental history of the peatlands (Brayshay and Edwards 1996; Weaver *et al.* 1996) were some of the more important themes explored. A project directly relevant to the Bornais excavations was the analysis of the site formation processes of a recently abandoned Hebridean croft (Smith 1996) which was intended as a model for the analysis of archaeological deposits on settlement sites.

The project was initially set up to run for five years but Branigan and Foster continued their exploration of Barra and islands to the south until 2000. The islands were completely surveyed and large numbers of archaeological monuments were identified. New examples were recorded of monuments already known on the islands, including wheelhouses, chambered tombs and an unfinished broch, but perhaps of greater import were the identification and mapping of a wide range of previously unknown types of monuments. This has created a much broader understanding of the landscape and demonstrated the extensive nature of settlement evidence. It became clear that the picture of an Iron Age where settlement was restricted to a small number of isolated monumental structures (Armit 1992a) was totally misleading. Instead we have to envisage a much more densely occupied landscape, filled with many varied and different forms of settlement.

Small excavations were undertaken on a number of settlements on Barra and the Southern Isles (Branigan and Foster 1995; 2000). Foster concentrated on badly damaged and eroding prehistoric settlements, including a wheelhouse adjacent to the early prehistoric settlements at Allt Chrisal on Barra, a badly eroded broch (Dunan

Ruadh) and an unusual cellular structure at Bagh Ban on the island of Pabbay, and middens at Sheader on Sandray and Chapel House on Mingulay. Branigan, working with Colin Merrony, initially concentrated on upland sites which included a couple of kerbed cairns on Vatersay, and the trial trenching of an enclosure and a hut circle in the Borve valley and Scurrival Cave on Barra. The results were variable but some sites produced important assemblages of animal bone that are categorically different from the assemblages from the main islands. Dating is unfortunately problematic for several sites as very few radiocarbon dates were acquired and the pottery assemblages can only provide rough dates. Nevertheless, the assemblages recovered do suggest Early Iron Age sites exist, notably the small hut circle in the Borve valley. In the last years of the project Branigan focused his attentions on the pre-clearance settlements and has made a major contribution to the understanding of the post-medieval archaeology of the Western Isles (Branigan 2005).

On South Uist developments took a different course. Mike Parker Pearson joined Sheffield University in 1990. He was enthusiastic about becoming involved in the work on South Uist and encouraged the participation of the author. We were interested in excavating sites on the machair as this seemed to us to be the only way to understand the archaeology and to chart the chronological developments of the material culture, architecture and economy. The organisation of the Udal project was very influential in our approach but although the specific objective – to provide a long-term archaeological narrative for the settlement of the islands that spanned prehistory up to the Clearances – was very similar, the approach taken was quite different. We identified a variety of problems in the approach taken by Crawford that had ultimately led to the non-publication of the results and these encouraged us to develop a number of principles:

- To excavate at least a couple of sites from each period and not to become focused on a single exceptional site;
- To make no attempt to completely excavate these sites but to restrict our exploration to an area sufficient to provide an accurate and well-understood picture of the settlement and to recover enough material to enable detailed environmental and economic analysis;
- To involve other archaeologists who took responsibility for their sites and their materials and were not under our control;
- To try to publish as much as possible as quickly as possible; individual sites are being published serially and, for Bornais, the rationale behind the publication of this volume and the previous volume (Sharples 2005b) is to make the information available as quickly as possible.

Most importantly we made every effort to acquire support from Historic Scotland for the major excavations. This has tied them into providing financial support for post-excavation and publication that would have otherwise been impossible to acquire.

Since 1990 we have excavated a large number of sites and these are detailed in the first Bornais volume (Sharples 2005b, 5–6, fig. 4; see also Parker Pearson 2011). These have provided an exceptionally broad coverage of the island's archaeology, spanning the period from the Neolithic to the nineteenth century. The most significant excavations are the broch at Dun Vulan (Parker Pearson and Sharples 1999), the Iron Age to Norse sequence at Bornais (Sharples 2005b; Sharples and Smith 2009; Sharples forthcoming), the Norse settlement at Cille Pheadair (Brennand *et al.* 1998; Parker Pearson *et al*. forthcoming), the post-medieval settlement at Airigh Mhuillin (Symonds 1997) and the Late Bronze Age settlement at Cladh Hallan (Parker Pearson *et al.* 2000; in prep.) and we intend to complete the project with substantive excavations on Neolithic and Early Bronze Age settlements.

We have not, however, been completely successful in all our objectives. The amount of material recovered has proved logistically difficult and our publications have been less frequent than we would have liked. In my case I probably spent too long working at Bornais. The site proved to be too interesting and, in particular, the incredible quantities of top-quality artefactual material recovered from the eleventh-century house on mound 2 encouraged a prolongation of the excavation until the house was completely excavated (Sharples and Smith 2009). This was undoubtedly an important research objective, and can be justified on a number of levels, but it resulted in the recovery of a very large quantity of material which has slowed down the post-excavation process.

Finally, in parallel with the SEARCH project in the southern Hebrides, Edinburgh University was heavily involved in a long-term project into the archaeology of the islands of Lewis and Harris that began slightly earlier, in the mid 1980s (Armit 1990). Most of this project was concerned with the examination of the archaeology of west Lewis, particularly the Calanais and Uig regions and is not directly relevant to this historical summary. However, one of the adjuncts to this project was the work of Ian Armit. He not only completed a PhD on the monumental architecture of the Atlantic Iron Age (Armit 1992a) but also undertook a considerable amount of fieldwork in the southern Hebrides. This included a detailed geographical analysis of the location of 'Complex Atlantic Roundhouses' in North Uist and Barra (Armit 1992a) and the excavation of both Neolithic and Iron Age settlements on North Uist. The Neolithic sites excavated included the chambered tomb at Geiriscleit (Dunwell *et al.* 2003) and the settlement at Eilean Olabhat (Armit 1992b); the latter is a particularly important island settlement with waterlogged deposits that have provided an immense amount of environmental evidence.[16] Directly relevant to this volume are his excavation of a Bronze Age burnt mound at Ceann nan Clachan (Armit and Braby 2002), the discovery of an Early Iron Age house that was reoccupied in the Late Iron Age at Loch Olabhat (Armit *et al.* 2008) and the re-excavation of one of Beveridge's wheelhouses at Eilean Maleit (Armit 1998). These sites will be discussed in detail in chapter 8.

Both the SEARCH and the Edinburgh University projects came to an end in the early years of the twenty-first century and to a certain extent their ending marks the beginning of a new period of archaeological exploration on the islands. This period was presaged by the appointment of the Regional Archaeologist for the Western Isles in 1998 and the beginning of the communities of the Western Isles taking responsibility for their own archaeological heritage. The twentieth century was a period when the archaeology was controlled by outsiders, initially a group of rich idiosyncratic amateurs and more recently groups of university-trained academics. These have imposed their own views on what was required and what was an interesting topic to discuss and have influenced the nature of the debate and the medium of that debate (the English language). It is clear that circumstances are changing and that archaeology is becoming a more devolved process. Archaeological contractors have become settled on the islands and the archaeological work is being driven, as it is elsewhere in Scotland, by development. Local archaeological groups, such as that working at Baleshare on North Uist, are becoming much more involved and want to see the material recovered displayed on the islands. Cultural tourism will become increasingly important and has already seen a transformation of the presentation of many sites and the creation of a series of locally published guidebooks to the archaeology of the islands (*e.g.* Branigan 2007; Parker Pearson *et al.* 2004a; 2008). The twenty-first century will provide a whole new set of problems and opportunities and the archaeology of the Western Isles should continue to provide an important resource for a range of interest groups that includes the local communities as well as the wider community of academics, throughout Europe and North America, who find this region immensely interesting.

The Iron Age background – N Sharples

The sites on the Uists are directly comparable to many other contemporary settlements, which are found throughout the Atlantic seaboard of Scotland. The structures of this period are frequently monumental stone-built houses with important architectural features (Sharples 2003b) and this has meant they have been easy to identify and attractive to excavate. These structures are associated with deep stratigraphy, often including thick midden layers producing substantial assemblages of animal bones, crop remains and pottery. The pottery can be of the best quality and is often elaborately decorated. There is consequently a lot of material to analyse and in recent years this has been utilised to create some complex archaeological narratives that address important contemporary concerns of identity, memory and inhabitation (Dockrill 2003; Giles and Parker Pearson 1999; Sharples 2003b; 2005a). The discourse is frequently controversial: there are many public disagreements about the nature of the archaeological record and the role and interpretation of many of the distinctive structures that characterise the period and the region (see Armit 1992a and Sharples and Parker Pearson 1997; Parker Pearson *et al*. 1996 and Gilmour and Cook 1998). This is a healthy sign.

It is necessary to provide a fairly detailed background to the Iron Age as the author's position is sufficiently idiosyncratic to confuse readers who come to this text having read only a limited amount of the now extensive literature on the subject. The Atlantic Iron Age is customarily divided into three phases, radically labelled Early, Middle and Late. Harding (2004, 3–4) has recently suggested a twofold division of the period but, whilst this might be useful in mainland Scotland, it oversimplifies the well-documented changes that occur in the Atlantic province. The chronology and characteristics of these phases have been fairly well established, though not unchallenged, since the 1980s when radiocarbon dating became relatively commonplace (Barrett and Foster 1991).

The Early Iron Age

This period lasts from *c.*600/500 cal BC to 200 cal BC and has until recently been relatively difficult to identify in the Western Isles, although it is well represented in the Northern Isles. In the Northern Isles the Early Iron Age is characterised by the use of circular houses. Circular houses are almost certainly an innovation in Shetland where the houses of the Late Bronze Age appear to be cellular. The change from cellular to circular houses is clearly documented in the prehistoric sequence at Jarlshof (Hamilton 1956) and has been confirmed by the excavations at Sumburgh (Downes and Lamb 2000). The situation in Orkney is less clear but the evidence from Tofts Ness suggests circular buildings were present in the Late Bronze Age though the dating is minimal (Dockrill 2007). There is evidence for a hierarchy of house structures in both Orkney and Shetland. Isolated thick-walled round houses such as Pierowall Quarry (Sharples 1984) and Bu (Hedges 1987) can be contrasted with clusters of thin-walled houses at Jarlshof (Hamilton 1956) and Quanterness (Renfrew 1979). The larger roundhouses do not have the architectural sophistication of the later brochs (see below for a definition) but, towards the end of the period, it is clear that structures such as those found at the Howe (Ballin Smith 1994) and Crosskirk in Caithness (Fairhurst 1984) are developing very thick, presumably high, walls and more complex entrances. Recent radiocarbon determinations from the excavations at Old Scatness (Dockrill *et al*. 2006) have provided dates that suggest construction between the fourth and second century BC, which is earlier than the likely construction of either the Howe or Crosskirk. There are still some question marks over these dates and, as the nature of the primary structure and the character of its occupation are relatively unknown as a result of the presence of later occupation, they do not significantly alter my interpretation of the Early Iron Age.[17]

There are also significant changes in the material culture at the Bronze Age/Iron Age transition. The evidence from Jarlshof indicates that these peripheral islands were integrated into the complex exchange networks of the Atlantic Bronze Age. Clay moulds (Hamilton 1956, fig. 14) indicate the production of Ewart Park swords but these internationally recognised prestige goods disappear with the introduction of iron technology. The ceramic record also indicates significant change – a distinctive shouldered jar is present at Early Iron Age sites such as Jarlshof (Hamilton 1956, figs 18 and 19), Pierowall Quarry (Sharples 1984, fig. 19) and Quanterness (Renfrew 1979, fig. 53.62) which is quite different to the straight-sided buckets of the Late Bronze Age. These shouldered vessels are comparable to shouldered jars found at a number of transitional LBA/EIA sites throughout the British Isles, including Staple Howe in Yorkshire (Brewster 1963, fig. 36), Castell Odo in Caernarvonshire (Alcock 1960, fig. 11) and Brean Down in Somerset (Bell 1990).

The changes visible in the Northern Isles are not so obvious in the Western Isles where well-dated Late Bronze Age or Early Iron Age settlements have proved difficult to find. Recently arguments have raged about when the structures at Dun Mor Vaul (MacKie 1974) and Dun Bharabhat (Harding and Dixon 2000) originated and whether they began life in the Early Iron Age (Gilmour 2005). It seems best to assume that the radiocarbon dates from Dun Mor Vaul are unreliable (Lane 1987, 58) and there is no good evidence for an Early Iron Age beginning to the site. At Dun Bharabhat the early date seems reliable but only provides a *terminus post quem* for the principal structure; furthermore, the large assemblage of material culture came from later contexts. This small, but elaborate, stone roundhouse could be an early structure but it would be better to have more radiocarbon dates to prove this chronology.

The situation has recently been transformed by the SEARCH project on South Uist which has located and dated an Early Iron Age settlement at Sligeanach (Sharples 1998a; Sharples 2011) and carried out substantial excavations on the Late Bronze Age settlement at Cladh Hallan (Parker Pearson *et al*. 2000). The material from the latter site is still under analysis but should provide a sequence extending up to and possibly across the LBA/EIA transition. The site consists of a row of at least three roundhouses and two separate figure-of-eight structures (Parker Pearson *et al.* 2000). Artefacts include isolated pieces of Late Bronze Age metalwork, amongst them a gold-plated hair ring and fragments of moulds, including those for the production of Ewart Park swords. The pottery assemblage is almost completely undecorated, consisting of simple straight-sided jars with no evidence for the distinctive carinated vessels that are found in the north, nor for the elaborately decorated vessels that characterise the Middle Iron Age. The settlement clearly indicates the presence of round houses in the Bronze Age and, indeed, suggests that this region has settlements which are closely comparable in layout (linear rows) to those in southern England (*i.e.* Blackpatch, Drewett 1982) and Perthshire (RCAHMS 1990) though the presence of a large surrounding midden is a much more distinctively Hebridean characteristic.

Contrary to much of the debate (Gilmour 2005), there is no evidence that any of the substantial complex roundhouses, commonly known as brochs, date to before the second century BC in either the Western or Northern Isles. The candidate with the best potential would be the roundhouse currently under excavation at Scatness on Shetland (Dockrill *et al*. 2006, 57). Moreover, the argument about when brochs appear has obscured a basic agreement over the nature of the Iron Age development. There appears to be continuity in structural form between the Early and Middle Iron Age. Large roundhouses exist in the early period and these probably function in much the same way as the later brochs. These large houses can be contrasted with a number of much smaller houses; the relationship suggests a hierarchical distinction that will be discussed in greater depth when we outline the Middle Iron Age material. The most profound changes appear to occur at the beginning of the period with the transition to the Iron Age, though this has yet to be fully documented in the Western Isles.

The Middle Iron Age

This period can be placed between 200 cal BC and 400 cal AD and is characterised by the appearance of complex architectural forms and elaborately decorated ceramics. A considerable amount of debate has centred on the appearance, function and relationship of brochs and wheelhouses. The author is firmly of the opinion that the term ‘broch’ is a heuristically useful term that can be used to describe a particularly elaborate roundhouse which has a limited chronological life around the turn of the first millennia BC/AD. These structures represent an evolutionary development of the roundhouses of the Early Iron Age and, though indicating essentially similar social relationships, the size and complexity of these structures suggest a society that is becoming increasingly insular and introverted. MacKie (1965, 100) defines a broch as a ‘free-standing stone tower with a hollow-built wall consisting of two concentric shells of masonry separated by a gap … which narrows as the wall ascends’. Other structural features listed as characteristic of brochs include the scarcement, entrance passage and doorway, internal staircase and vertical voided gaps in the inner wall. The presence of any of these features, along with the general proportions of the wall thickness and outer diameter, can be used to identify a broch.

The principal aim of this definition is to identify structures that were constructed as tall towers similar to those surviving at Dun Carloway, Dun Troddan, Dun Telve and Dun Dornadilla, though perhaps not as substantial as the best preserved broch at Mousa, which Fojut (1982) has argued is exceptionally large. I have suggested that these structures represent the domestic dwellings of the elite members of relatively small-scale societies (Sharples 2005a) and I have discussed the way location and architecture have been used to create boundaries that isolate the occupants and associate them with the threatening forces of the wild (Sharples and Parker Pearson 1997).

Structures contemporary with the brochs are present in large numbers in both the Western Isles and Orkney but are rather difficult to find in Shetland, outside of the south mainland. In the Hebrides wheelhouses are found in large numbers on the machair and in slightly lesser numbers on the moorland. These are very distinctive roundhouses. On the machair they were constructed within a large pit excavated into the sand (Armit 1996). The principal architectural feature of the wheelhouse is a revetment wall, built on the inside edge of the construction pit; projecting from this wall are partition walls which in plan look like the spokes of a wheel. These partition walls can be rectangular pillars separated from the main wall by an 'aisle' or they can be V-shaped walls bonded into the main wall. On the basis of the sequences at Jarlshof and Scatness in Shetland (Hamilton 1956; Dockrill *et al.* 2005) it is thought that the structures using free-standing pillars precede those with bonded walls. In the well-preserved examples at Jarlshof (Hamilton 1956) and Cnip (Armit 2006), the projecting walls create an outer ring of small cells or rooms which were covered with corbelled roofs.[18] The inner central space of these wheelhouses is too large to have had a corbelled roof and one assumes that this space had a thatched roof similar to those found on roundhouses on the British mainland.

Armit (2005) has argued that there is a chronological succession from brochs to wheelhouses and that they both represent the normal domestic dwellings of these successive periods. However, this suggestion ignores the available radiocarbon dates which cannot be used to separate the two types of structure (Sharples 2005a). Both types of structure also produce large quantities of elaborately decorated ceramics that suggest they are contemporary. The pottery sequence has been studied by many individuals and the basic changes have been known for some time (*cf.* Young 1966; Lane 1990; Campbell 2002) though the precise chronology is open to refinement. Armit's argument is based on an inflated assumption of the numbers of brochs (or Complex Atlantic Roundhouses as he refers to them) present in the landscapes of Barra and North Uist (Armit 1996), which has been critiqued in detail by Sharples and Parker Pearson (1997).

Wheelhouses are found in Shetland but, rather surprisingly, they have not been found in Orkney or Caithness. The best examples in Shetland are found surrounding the brochs of Jarlshof and Scatness, where there is a sequence of wheelhouses beginning in the Middle Iron Age and continuing through the Late Iron Age (Dockrill *et al.* 2005). These two brochs appear to be unusual in a Shetland context in having a settlement that surrounds the broch in the Middle Iron Age. Most Shetland brochs appear to be isolated structures, though they are surrounded by additional boundaries (Sharples 1998b, 40). It seems likely that the presence of villages around the brochs at Scatness and Jarlshof is linked to their location on an intensively occupied landscape of shell sand, which is largely restricted to the south end of the island.

The situation on Orkney is quite different and these islands have a very distinctive and idiosyncratic Middle Iron Age. Brochs are almost invariably surrounded by houses that are in turn surrounded by a substantial boundary. The houses completely occupy the space between the external boundary and the broch and there appears to be no large area of open space. The form of the houses is irregular but each house appears to contain two distinctive spaces that presumably served different functions. The settlement plan, whilst not symmetrical, is laid out systematically around a central passageway that provides direct access to the broch entrance from the enclosure entrance. The number of houses varies from broch to broch. At the well-preserved settlement of the Howe six houses were identified, whereas at the settlement of Gurness an estimated 14 houses could be identified. Some brochs such as Midhowe are unlikely to have had more than a couple of structures in the immediate vicinity of the tower.

Our understanding of brochs is limited by the small number of extensive modern excavations. These are rare events as the structural complexity and quantity of large rubble that needs to be removed makes excavation time-consuming and costly. Since the excavation of Dun Mor Vaul (MacKie 1974), only nine structures have been extensively explored: Dun Vulan in South Uist; Dun Bharabhat and Beirgh, Lewis; Dun Flodigarry, Skye; Crosskirk and Everley, Caithness; the Howe, Orkney; and Old Scatness and Scalloway in Shetland. This apparently impressive list obscures the fact that only three of these brochs – Dun Flodigarry, Dun Bharabhat and Scalloway – have had the central floor area completely stripped and even these structures have problems that make interpretation difficult.

This problem is less acute with the non-monumental houses as these are smaller, discrete structures that have proved easier to excavate. Several well-recorded excavations were undertaken in the 1950s and 1960s and in the last 20 years there have been extensive excavations at Allt Chrisal, Barra; Cill Donnain, South Uist; Hornish Point, South Uist; the Udal, North Uist (four structures); Cnip, Lewis; Scatness, Shetland (seven structures) and Bayenne, Shetland. These investigations, together with the older excavations, provide an extensive database

(Crawford 2002) that can be used to undertake a detailed analysis. Current interpretations of wheelhouses are discussed in detail in chapter 8. Our understanding of the subsidiary structures around Orcadian and Caithness brochs is more limited as the only recent fully-published excavations were at the Howe (Ballin Smith 1994) and Crosskirk (Fairhurst 1984).

The Late Iron Age

Dating the transition from the Middle to Late Iron Age is as problematic as placing a date on the transition from Early to Middle. The basic changes that characterise the Late Iron Age evolve from the Middle Iron Age and it would be simplistic to expect an abrupt transition. The key changes are the, probably abrupt, decline in the construction of monumental roundhouses, the increasingly restricted use of decoration on pottery and the appearance of a range of artefacts, such as pins and brooches, which were used to differentiate individuals (Sharples 2003b). The presence of an identifiable human burial tradition is also clearly visible in the first millennium AD (Mulville *et al.* 2003).

The evidence for the abandonment of broch construction is as problematic as the date for the commencement of construction and for the same reasons – very few brochs have primary phases excavated and there are very few reliable radiocarbon sequences. The latest possible construction dates from well-dated brochs come from Scalloway (Sharples 1998b) and the Howe (Ballin Smith 1994). The construction of the former broch was argued to be *c.*100 cal BC (Sharples and Dalland in Sharples 1998b, 86–7), but this was the earliest possible date for construction and it could have been constructed as late as the second century AD if one assumes the isolated early date (ut-1655) is an outlier. The phase 7 broch at the Howe has similarly been dated earlier than it needs to be. In the published report Carter placed its construction in the first or second centuries AD (Carter in Ballin Smith 1994, 265) but in the published discussion it was argued (Shepherd in Ballin Smith 1994, 273) to have been constructed between 200 cal BC and cal AD100. Both of these brochs are notably thick-walled examples of the type; indeed, the dimensions of the Scalloway broch make it the only broch comparable to Mousa. This particularly high-walled and stable structure has been regarded as the evolutionary apex of the broch form and therefore possibly one of the latest examples to be built. This is perhaps a rather simplistic view of broch development but it is difficult to find many people who do not believe that brochs stopped being constructed between the second and third century AD.

The situation with wheelhouses is complex, with significant differences between the situation in the Western Isles and in Shetland. In the Western Isles only two wheelhouses have substantial sequences of radiocarbon dates: Cnip, Lewis (Armit 2006) and Sollas, North Uist (Campbell 1991; Campbell *et al*. 2004). The former might have been constructed as early as the first century BC whereas the latter is more likely to have been constructed in the first or second centuries AD. There are indications, however, that wheelhouses continued to be built into the third and fourth centuries AD in the Western Isles. The as yet unpublished South Uist wheelhouse Cill Donnain III has a radiocarbon date in the fourth century AD and undecorated double cordoned pottery which would be consistent with this date. The evidence from Bornais, discussed below, also suggests wheelhouse construction continued into the fourth century AD.

The evidence from Shetland is dependent on the well-dated sequence from Old Scatness. At this site the construction of aisled wheelhouses dates to the first century BC and these are modified to create 'long pier' wheelhouses in the early centuries AD; both of these structures had large internal diameters. Small wheelhouses with V-shaped piers appear 'in the late fifth to early sixth centuries AD' (Outram and Batt 2010, 124) and they could have been constructed as late as the seventh century AD. In Orkney the evidence suggests the replacement of the broch village at the Howe by a much more restricted settlement of quite different character in the fourth century AD (Ballin Smith 2005).

The abandonment of these traditional architectural forms in the third and fourth centuries AD coincides with the appearance of a variety of structures that are characteristically smaller in scale and lacking in monumentality. These structures are initially quite variable in ground plan and they are often constrained by the reoccupation of existing architectural forms. At Cnip (Armit 2006) a rectangular structure was built into the wheelhouse and rectangular buildings are also present outside the broch of Dun Vulan (Parker Pearson and Sharples 1999). Inside the broch at Dun Vulan and the broch at Beirgh (Harding and Gilmour 2000) are circular structures surrounded by ancillary rooms; at Beirgh these follow on from much more irregular cellular structures. By the later part of the first millennium AD these irregular structures appear to consolidate into a characteristic cellular building which is best represented by the structures found at Buckquoy (Ritchie 1977), Bostadh (Neighbour and Burgess 1997) and the Udal (Crawford 1986). These are more formalised versions of the structures found inside the brochs at Dun Vulan and Beirgh.

The changes in material culture again testify to important changes in the period from the third to fourth century AD. The relative paucity of items of personal significance in the Middle Iron Age is challenged by the appearance of a selection of Roman artefacts, characteristically brooches, in the Atlantic province (Hunter 2001). Contemporary with this we see the development of metalworking that initially involves the creation of objects clearly derived from southern British prototypes; hand pins and door-knob spear-butt moulds (Heald 2001) are the most distinctive. During this period there was also the widespread use of parallelopiped bone dice and weaving combs. These objects have earlier prototypes in pre-Roman Iron Age contexts in southern Britain but they appear to be rarely used at this time in the Atlantic province. There is also an increasingly diverse quantity of local material culture that includes a particularly impressive range of worked bone and stone tools (Sharples 2003b).

By the sixth century AD both the quality and the variety of material culture available in the Atlantic province have grown considerably. Metal pins and brooches become increasingly common and evidence for production is present at several sites during the seventh and eighth centuries, notably Birsay in Orkney (Curle 1982). There is also a wide range of other artefacts, including elaborate composite combs and hipped pins. Many of these items indicate influences from outside the region. Anglo-Saxon objects have been recognised (Campbell in Sharples 1998b) and many have suggested Irish influences are important (Laing 1975). Recently Smith (2003) has suggested influence from as far afield as Frisia. The Atlantic province is therefore well integrated into the early historic societies of western Europe and the inhabitants of the Western Isles were clearly aware of and responding to social changes that were occurring throughout Britain.

The Hebridean ceramic sequence – A Lane

Although the excavated deposits on Bornais mound 1 do not contain significant stratified material earlier than the mid first millennium AD and, therefore, postdate the main sequence of decorated Middle Iron Age ceramics, it is important to understand the background to our ceramic interpretation and where we stand in debates about the longer pottery sequence.

There has been considerable work done on Hebridean pottery assemblages since the 1950s. It has been clear for some time that this area is probably unique within the British Isles in having continuous local handmade ceramic production from the Neolithic to the nineteenth century AD (Lane 1990). Neolithic and Bronze Age ceramics can be recognised through comparison with forms and decoration found in other parts of Britain and Ireland. The local Iron Age ceramics were relatively well known as the result of the excavation of broch and wheelhouse structures though their precise chronology was unclear and largely dependent on associations with Roman imports. The Udal excavations demonstrated that the pottery sequence continued through the first and second millennium AD up to the 'craggan' vessels reported by travellers to the Hebrides as late as the nineteenth century (Crawford and Switsur 1977). A possible gap was apparent from the Middle Bronze Age until the beginning of the decorated Iron Age sequence though the existence of potentially early thick-walled bucket-shaped vessels has been apparent for some time. Parker Pearson's work at Cladh Hallan has now firmly recognised and dated a distinctive, albeit long-lived, Late Bronze Age/Early Iron Age assemblage of such vessels. He suggests that this class, which he names 'Plain Style', may be in use from as early as 1700/1500 BC and survives as late as the Early Iron Age, with dates at Sligeanach between the eighth and sixth centuries BC (Parker Pearson *et al*. 2004a, 53, 61; Sharples 1998a; 2011) and similarly dated at Dun Vulan (Parker Pearson and Sharples 1999, 50–1). The date at which the decorated Iron Age assemblages begin is still uncertain and has been complicated by the rather personalised debates about brochs, wheelhouses and 'Atlantic roundhouses' (*e.g.* Armit 2005; MacKie 2005), as well as scepticism among some field workers as to whether the Hebridean pottery assemblages could be seriated at all (Topping 1987; *cf.* Barber 2003, 126).

Alison Young outlined her understanding of the Hebridean pottery sequence at the 1961 *Edinburgh Conference on Problems of the Iron Age in Northern Britain* which was published in 1966 (Rivet 1966). At that time she could not trace any Bronze Age sequence and was inclined to look for parallels between Neolithic incised decoration and that found on wheelhouse pottery, which she thought to be Iron Age or Roman period in date (Young 1966). While her attempt to seek Neolithic origins for the Iron Age ceramics was mistaken since we can see that more than 1000 years separates them from Grooved Ware (though see Hingley 1999), her basic subsequent sequence has stood the test of time and seems essentially to be correct (*cf.* Campbell 2002, 140–2). This Iron Age sequence involves incised wares with inturned rims or slight out-turns and simple cordons; the later addition of sharply everted rims with some finger-channelled decoration; the decline in elaborate decoration in favour of simple cordons; and the eventual abandonment of decoration in favour of crude plain pots which she thought might last till the Viking period (Young 1966).

Euan MacKie's excavation of a number of sites in the 1960s and the dating of deposits by radiocarbon led to the recognition of new ceramic types including 'barrel-shaped vessels' and a style he named Vaul ware after the key broch excavation of Dun Mor Vaul, Tiree (MacKie 1974, 157–86). The dates for Dun Mor Vaul were interpreted as pushing the decorated sequence back to at least 500 BC (MacKie 1974, 157) though the bulk of decorated pottery was still seen as dating to the early centuries BC and AD. In 1987 I published a critique of the diffusionist evidence central to MacKie's interpretation and suggested that this was distorting the evidence for the pottery sequence (Lane 1987; *cf.* Harding 2005). Subsequently I published another discussion of the definitions used in analysis of the Hebridean Iron Age pottery and of the dates attributed to it and argued that the Dun Mor Vaul dates could not be relied upon and were seriously distorting interpretation of the Hebridean artefact and monument sequence (Lane 1990).

The 1980s saw a number of new excavations of Iron Age sites in the Hebrides and more general discussion of both the ceramic sequence and the dating and development of monument types. In 1991 Armit suggested that the pottery typology was not chronologically sensitive as certain decorative traits seemed to be in use over a 'long Iron Age' from 600 BC to AD 300 (Armit 1991, 199–200; *cf.* MacKie 2007, 1009). Topping reached similarly negative views about the dating potential of the local ceramics (Topping 1986, 127–8; 1987). These pessimistic views of the potential to recognise a chronologically sensitive pottery sequence were driven, at least partly, by what might be termed 'the Edinburgh school' of thought which was critical of MacKie's diffusionist views on broch origins and Hebridean material culture but wished to maintain the long chronology offered by the early dates at Dun Mor Vaul (Armit 1990; Harding 1990; *cf.* Harding 2005).

In Lane (1990), I disputed the pessimism of the Edinburgh school and argued that, with modern excavation of stratified sites and independent dating free of diffusionist presumptions, chronological change would be recognisable (*contra* Armit 1991; MacKie 1997; 2000a). Campbell's publication of the Sollas assemblages suggested that the phase of highly decorated incised and cordoned vessels did belong in the early centuries AD as Young had thought (Campbell 1991). Since then the refinement of the pottery sequence with evidence from new sites and multiple radiocarbon dates is beginning to confirm that there is chronological change within the sequence though the comparative analysis of the Bornais pre-Viking ceramic assemblage has been hampered by the delays in publication of other sites.

Several important pottery assemblages have been excavated in the Hebrides in the last 20 years. Beirgh and Dun Bharabhat are partly published with some details of the ceramic sequence (Harding and Gilmour 2000; Harding and Dixon 2000). Armit has now published both the Cnip wheelhouse sequence contradicting earlier dates (Armit 1990; 1996, *passim*; 2006) and Eilean Olabhat (Armit *et al.* 2008). Also published is the report on the partial excavation of the broch and post-broch structures of Dun Vulan; these excavations produced a significant quantity of pottery and a radiocarbon dated sequence (Parker Pearson and Sharples 1999). Unfortunately the lack of funding to excavate the broch interior at Dun Vulan, coupled with problems of residuality in the exterior areas, limits the usefulness of the assemblage. The CEU assemblages are likewise of limited use in view of the misleading shell dates affected by the marine reservoir effect and the inadequate artefact publication strategy (Barber 2003).

In 2002 Campbell briefly outlined the evidence for the Hebridean pottery sequence, with coarsely decorated Early Iron Age material at Eilean Olabhat dated as early as the fourth century BC and the main decorative sequence still seeming to belong in the early centuries AD. The date at which the decorated sequence begins is still a matter of debate. At Eilean Olabhat Campbell has dated the pottery from charred residues on the vessels, indicating activity focused on the fourth century BC (Armit *et al*. 2008, 70–3). Related early material has been identified An Dunan, Sollas site A and Dun Vulan (Gilmour 2002). MacKie, however, has recently reasserted his view that the highly decorated material he styles 'Vaul ware' dates as early as 600 BC. Indeed he argues it continues apparently unchanged for 1000 years till AD 500 (2007, 1005–9). What is clear is that secure stratified sites are essential to the identification of the ceramic sequence and that, in particular, the recognition of the presence of residual material is critical. The problem of residuality is not unique to the Hebrides; in more securely stratified and dated sites it has been shown that residual pottery can comprise the majority of finds in some contexts (Crummy and Terry 1979). However, the failure to recognise this fully on Hebridean sites has almost certainly contributed to confusion about the local ceramic sequence.

In summary then, the evidence suggests coarse undecorated buckets from the Late Bronze Age/Early Iron Age; the adoption of simple incised, crude cordon and fingermark decoration by the fourth century (Figure 12, 1–3); the emergence of more elaborate decoration perhaps in the first century BC/AD (Figure 12, 4–6), and its combination with everted rims and channelled decoration in the first or second century AD (Figure 12, 7–9); the decline of incised decoration perhaps by the third century (Figure 12, 10–13); and the eventual abandonment of any decoration sometime in the mid first millennium (Figure 12, 14–15).

Machair settlement in the townships of Bornais and Cill Donnain – N Sharples

Extensive survey of the machair plain of South Uist was undertaken by Mike Parker Pearson between 1993 and 1996 and there have been further *ad hoc* discoveries in the following years (Parker Pearson 1995; 1996b; 2012). The survey has revealed a large number of settlement mounds (over 237; Figure 13) which indicate that the machair was the primary location for settlement during the Middle Iron Age. It appears that this landscape was initially occupied in the Beaker period (Sharples 2009), but that the first large permanent settlements belong to the Late Bronze Age (*e.g.* Cladh Hallan; Parker Pearson *et al.* 2004a). There are large numbers of Middle Iron Age settlements and the excavations at Bornais suggest that the settlement there was established in this period and then continued to be occupied through the Viking conquest of the island to be abandoned in the fourteenth century (Sharples *et al.* 2004; Sharples 2005b). After this period the machair tends to have been avoided for settlement but continued to be used for agricultural purposes.[19] The contemporary pattern is for the settlements to be located on the rocky landscapes or blacklands, immediately adjacent to the machair to the east, and for the machair to be used for a rotation of pasture and cereal cultivation.[20]

The survey identified approximately 20 sites on the machair of the township of Bornais, a further 18 sites in

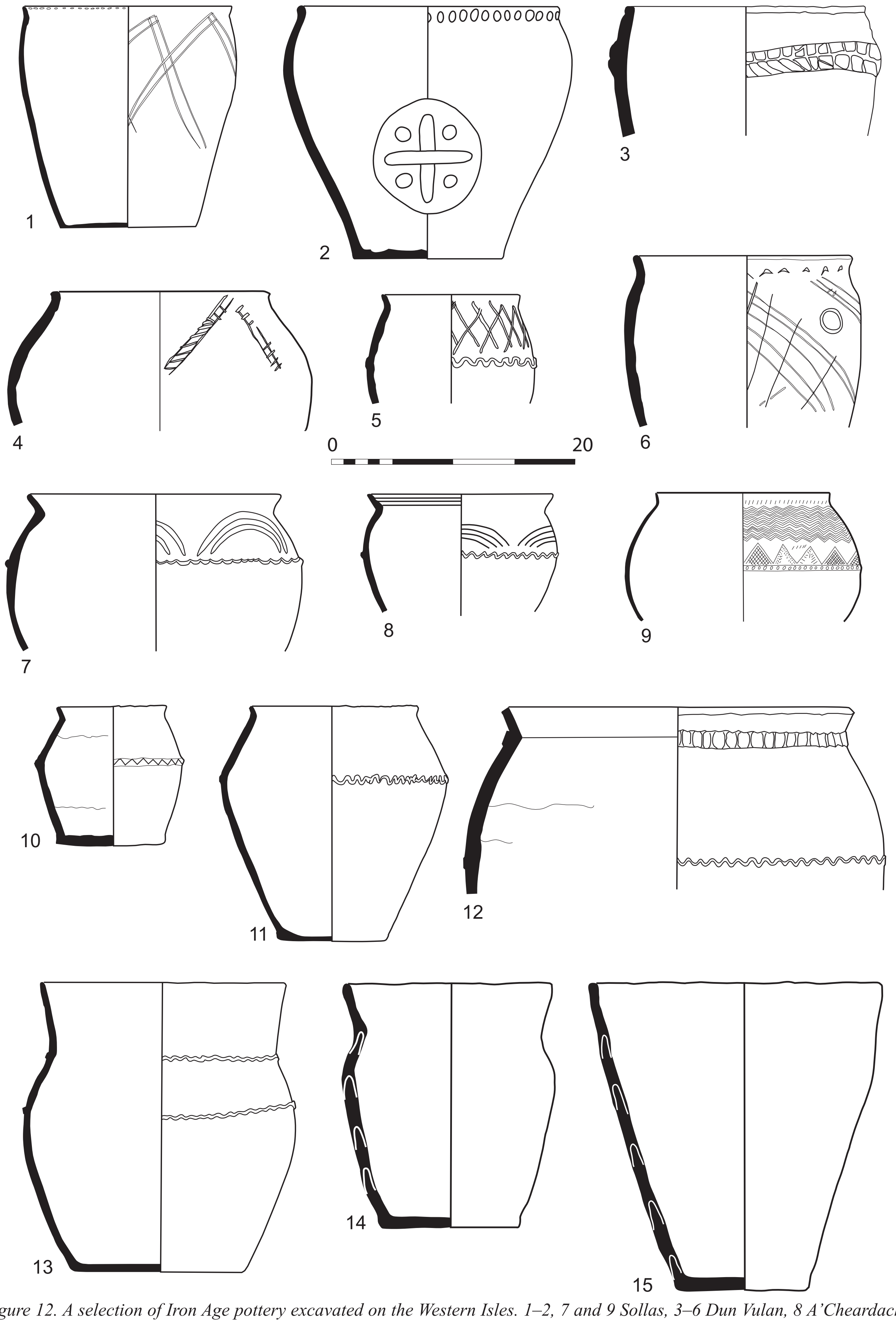


Figure 12. A selection of Iron Age pottery excavated on the Western Isles. 1–2, 7 and 9 Sollas, 3–6 Dun Vulan, 8 A'Cheardach Mhor, 10, 12 Cnip, 11 Baleshare, 13 Olabhat, 14–15 Udal

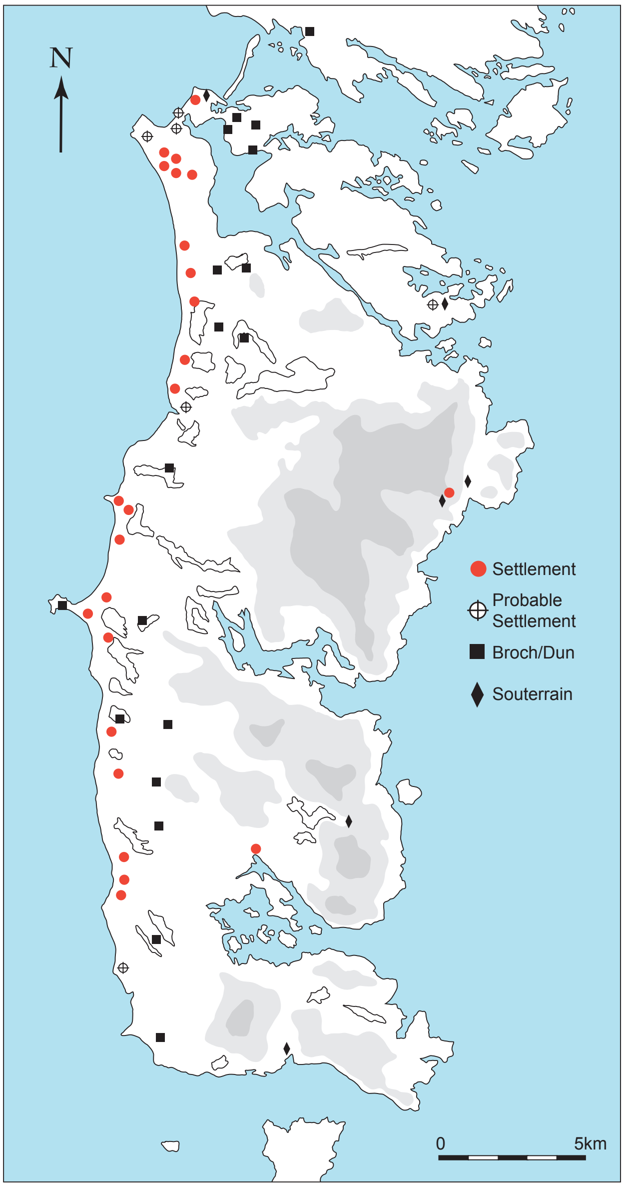


Figure 13. The settlement mounds on the machair plain of South Uist

the township of Cill Donnain immediately to the south and seven sites in the township of Ormacleit immediately to the north.[21] The distribution of these settlement mounds (Figure 14) provides an excellent indication of the nature of settlement in the Iron Age as the machair in most of this area is a low, level plain in which sites are relatively easy to locate. The presence of plentiful robust and distinctive Iron Age and Norse ceramics also enables at least a rough chronological characterisation of many of the mounds as sherds survive exposure to be recovered during fieldwalking. Furthermore, many of the sites in this area have been excavated (Zvelebil 1991) or at least test pitted (Sharples 1998a; Gilbertson *et al*. 1996), which allows us to speak with confidence about their character and date.

The settlement mounds are concentrated in five clusters with only a limited number of outliers and there are at least two, and possibly three, broch sites in the land on either side of the machair. The southernmost complex of sites occurs in the sand dunes of south Cill Donnain and is difficult to fully characterise as the landscape is masked by the thick accumulations of sterile wind-blown sand. The principal components appear to be two sites, numbered 83 and 85 in the machair survey (Parker Pearson 2011), at either end of a large dune. Cill Donnain 85 is a Middle Iron Age wheelhouse, excavated by Zvelebil between 1989 and 1991, whereas the settlement at the south end of the dune has produced grass-impressed platter that dates to the Norse period and the remains of what appears to be a rectangular building is eroding from the west side of the mound. The wheelhouse excavated by Zvelebil was a small structure with an internal diameter of only 6.2 m and rectangular piers separated from the wall by a narrow aisle. The excavations produced double cordoned flaring rim pottery comparable with the ceramics from Bornais mound 1 but the stratigraphic relationship with the structure is unclear.[22] The size of the structure suggests that this was not the principal domestic building and it is likely that the settlement extends further to the south. It is possible that mounds 83 and 85 are linked under the dune but it seems more likely that these are two separate mounds. This situation is similar to that at Bornais where a wheelhouse settlement mound was abandoned sometime in the Late Iron Age for a new mound only a short distance away.

Immediately to the west of the two large settlement mounds at Cill Donnain are two small mounds, sites 84 and 90 of the machair survey. The former has produced some Norse platter but neither mound seems to be a major settlement focus. Further to the west and south-west are mounds 86 and 87; site 86 is a very insubstantial feature but site 87 is an important Early Bronze Age settlement (Hamilton and Sharples 2011). The location of this Early Bronze Age settlement to the west of the later prehistoric settlement complex is paralleled by the location of the settlement mounds in the Sligeanach area to the north and in the Machair Mheadhanach area at the north end of South Uist (Parker Pearson 2012; Hamilton and Sharples 2012).

The Sligeanach settlement mounds were systematically test pitted in 1998 (Sharples 1998a; 2011; Figure 15) and two separate areas of settlement were identified.[23] Immediately behind the coastal dune is a cluster of four low mounds (sites 17, 18, 19 and 176) that represent the remnants of a Beaker and Early Bronze Age landscape. A sequence of at least three cultivation soils, with associated ditched boundaries, was identified and one of the mounds produced evidence for structural remains and sub-surface features (Sharples 1998a; 2009; 2011).

The inland group lies approximately 150 m to the east and comprises seven sites identified by the machair survey (Parker Pearson 2012). Test pitting showed the three southern mounds (sites 22, 23, 24) to be relatively uninteresting, comprising shell scatters in sterile wind-blown sand; finds were very rare but an isolated animal

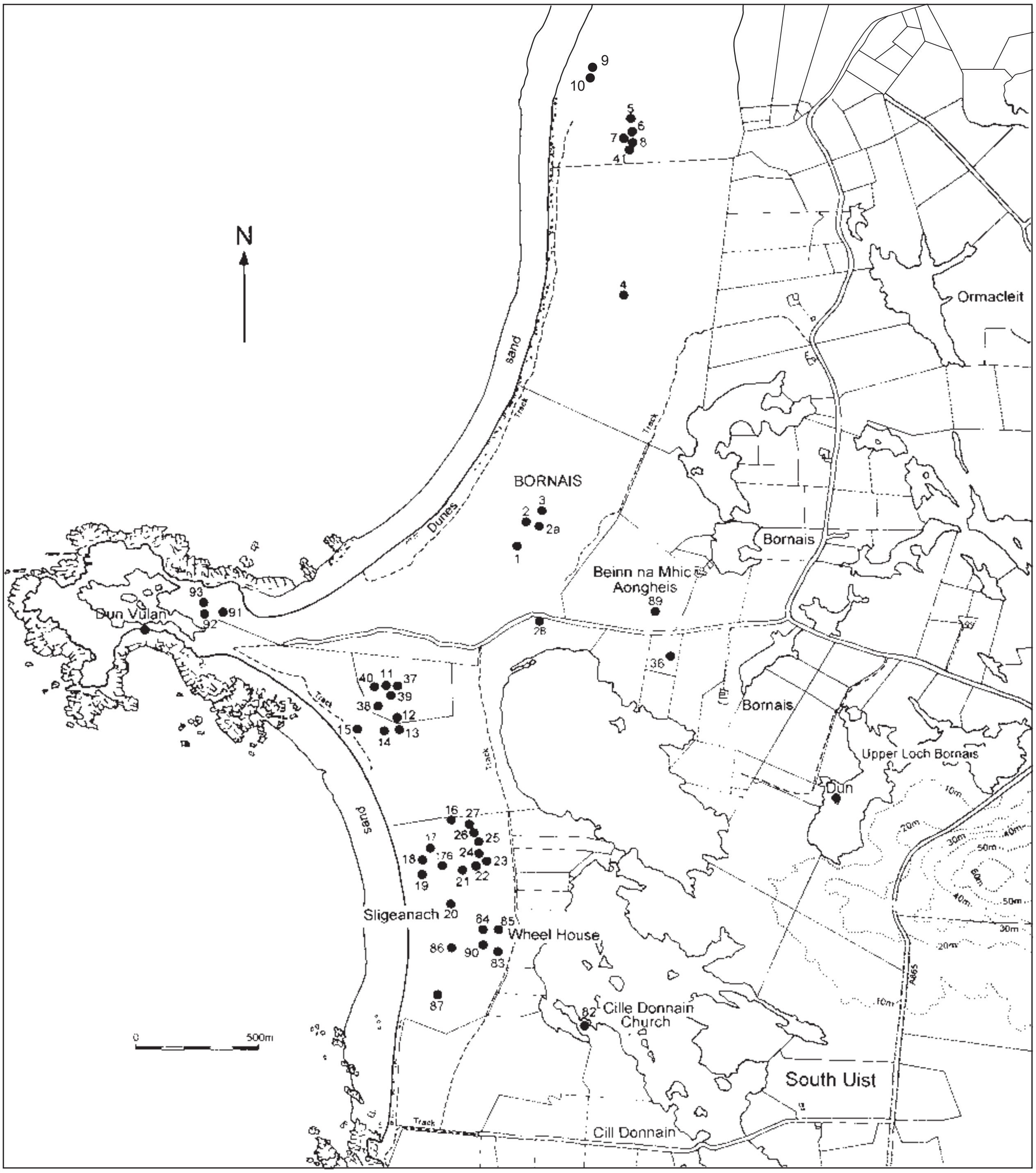


Figure 14. The distribution of settlement on the machair plain in the townships of Bornais, Cill Donnain and Ormacleit

bone produced a radiocarbon date that indicates Early Iron Age activity. The most conspicuous mound in the northern group of inland mounds is site 16 which lies on the boundary between Bornais and Cill Donnain townships. This mound is over 5 m high but largely comprises wind-blown sand layers capped by a thin occupation soil that has been radiocarbon dated to the Middle Iron Age. The surface indications of the three remaining inland mounds are slightly misleading. The mounds are actually natural wind-blown sand deposits but these cover archaeological deposits, which were explored by three test pits in the area immediately to the east of the mounds. The northern test pit behind mound 27 revealed an arc of walling with one projecting stone (Sharples 1998a, fig. 5; 2011), and a diagnostic rim sherd from a Middle Iron Age vessel. The evidence suggests the presence of a large wheelhouse (roughly 10 m in diameter) slightly earlier in date than the example at Bornais mound 1. The two trenches to

Figure 15. A view of the test pitting at Sligeanach in 1998

the south (in mounds 26 and 25) revealed sequences of mid to pale brown sand containing simple flat-rimmed pottery, bone and carbonised plant remains that produced radiocarbon dates from the middle of the first millennium BC (Sharples 1998a, 13; 2012).

These excavations clearly indicate the presence of another important settlement. In contrast to Cill Donnain and Bornais, this settlement has clear evidence for an Early Iron Age component and no evidence for any succeeding Late Iron Age and Norse continuation. The excavation was minimal, however, and the later prehistoric settlements in this area are not prominent mounds. It is quite possible that further settlement evidence exists to the east where the overlying deposits of wind-blown sand may obscure the picture. It should also be noted that a sherd of Norse ceramic was recovered from mound 27 during the machair survey (Parker Pearson 2012).

The settlement cluster to the north lies in a separate enclave of Lower Bornish (Bornais Iochdarach)[24] and is about 600 m to the north-west of the Sligeanach settlement, essentially lying between it and the promontory of Ardvule, where the broch of Dun Vulan is located. Nine separate settlement mounds were identified in this cluster but only two appear to be substantial settlement mounds: site 15 is a mound 60 m in diameter that has produced a Middle Iron Age sherd and site 38 is a mound estimated to be 20 m in diameter but partially covered by a large sand dune. Adjacent to the latter location is a stone-walled enclosure, a cairn and several other small midden scatters (sites 37, 39, 40), some of which have produced Norse pottery and from somewhere nearby a bronze pin (Parker Pearson 2012). This part of the Bornais machair was subject to wind erosion in the late 1950s and 1960s which caused severe problems for the agricultural exploitation of the township but which was eventually brought under control (Angus 1997, 167–9). Locals recall the presence of a very visible wheelhouse in the blow-out area but it is unclear which of the recently identified sites relate to this observation. It seems likely that a full sequence of settlement activity would be revealed by a limited programme of test pitting in this area.

The next group of mounds to the north are the Bornais mounds that are the focus for this volume and their description will not be repeated here. It is worth noting, however, the small isolated mound (site 28) which lies on the east side of the machair immediately adjacent to the road to Ardvule. This mound has produced Norse pottery but it is suspiciously circular and is the right size to be a wheelhouse (Parker Pearson 2012). The mounds located on the edge of the Ardvule peninsula (sites 91, 92 and 93) include a complex of early twentieth-century kelpers' huts and all the mounds may be of this date. On the promontory itself there is the broch at Dun Vulan (Parker Pearson and Sharples 1999) and several stony mounds but none has produced cultural material and they show no definite evidence for human construction.

The area to the north of the Bornais mounds is noticeable for the sparsity of settlement. One kilometre to the north there is a small mound (site 4; 10 m in diameter) in the centre of the plain yet, even though there are no large dunes in this area and systematic coring was undertaken, no further settlements were located. Pottery suggests this settlement dates to the Late Iron Age.

The next settlement complex to the north lies close to the coastline immediately to the west of Ormacleit Castle. The group comprises one large mound (site 9) which has produced a sherd of Middle Iron Age pottery and, immediately adjacent to it, a small mound (site 10) which has produced simple crude sherds that suggest a Late Bronze Age/Early Iron Age date; immediately to the south-east is a cluster of five low mounds which have produced Late Iron Age and Norse ceramics and metalworking debris. This is a pattern reminiscent of the settlement distribution at Bornais and Cille Pheadair but it is noticeable that the mounds are closer to the coastline here, suggesting that this area may be particularly susceptible to coastal erosion.

The Iron Age settlement of South Uist – N Sharples

The area around the centre of South Uist clearly indicates some consistencies of settlement that are worth noting. The most obvious pattern is the spacing of the settlement clusters. It is one kilometre between the settlements at Ormacleit, the isolated mound 4, the main Bornais cluster and the Lower Bornish mounds. Between Lower Bornish and Sligeanach and Cill Donnain mounds the distance is reduced to approximately 500–600 metres. The regularity of spacing is continuous to the north as it is one kilometre to the next group of mounds at Staoinebrig but south of Cill Donnain there is a considerable gap before the next mounds at Frobost, though this may be partly explained by the substantial dunes that exist in this area and the use of the area for sand quarries.

Parker Pearson felt that the even spacing of the Iron Age settlement clusters indicated the existence of a proto-township pattern of settlement (Parker Pearson 1996b). The basis for the argument is the even spacing of the settlement clusters on the machair plain and the relationship of these clusters with the existing township boundaries. Every township contains a cluster of machair mounds that appears to indicate continuity of settlement from at least the Middle Iron Age through to the fourteenth century, when people moved to the blacklands and the settlement locations depicted on the Bald map of 1805. The coincidence of the regular spacing of the settlements with individual townships should not be overemphasised; the machair plain is a relatively prescribed narrow strip of land along the west coast which, because of the mountainous nature of the east coast and the increasingly extensive peat bogs of the central area, has been the only area of the island where extensive cereal cultivation was or is possible. It is not surprising that this strip should be relatively evenly divided between the different communities occupying the island.

The relatively dense distribution of the settlements in the area around Rubha Ardvule is the more unusual pattern of the distribution. Perhaps the machair plain was originally wider at this point or perhaps the coastal resources and sheltered anchorage available on the Ardvule peninsula encouraged the use of such coastal resources. An even more dramatic concentration of settlement mounds exists at the north end of South Uist in the township of Machair Mheadhanach. A line of roughly 33 settlement mounds extends south-east from the rocky point of Ardivachar towards Loch Bee and several of these mounds have produced Middle Iron Age pottery. Again the density of settlement may be explained by either the extent of the machair plain in this area or access to the resource-rich rocky coastline that lies immediately to the north. It is, however, difficult to be certain of the nature of the coastline given the possible changes that might have occurred over the last millennium.

One of the most important aspects of the township system is that each township controls a strip of land that extends from the machair plain across the peat moorlands and the exposed mountains to the east coast. Again this is a natural division of the resource zones of the island, which enables all the separate communities to have access to the available resources. The resources include freshwater lochs for fish and birds, peat bogs for moss and fuel, heather for bedding and roofing, upland grazing, hunting, wild fruits and much more. There is currently no way of knowing whether this is true of the Iron Age settlement pattern, as field boundaries were not a feature of the Middle Iron Age landscape and we have a very limited understanding of the nature of Iron Age settlement on the moorlands. It is clear from work on North Uist and Barra that Middle Iron Age settlements do exist in the uplands: at Clettraval, for example, a substantial wheelhouse was built at an altitude of 100 m OD. Similar settlements exist on the east coast of South Uist, most notably at Usinish where a very well-preserved wheelhouse with an attached souterrain was observed in the late nineteenth century (Thomas 1870), and several other sites are known (Parker Pearson and Sharples 1999, 12–14). These might have been satellite settlements tied to the settlements on the west coast and possibly only occupied on a seasonal basis related to the summer grazing of cattle and sheep (Lethbridge 1950, 62–3; Raven 2012b) but it is also possible that they were relatively independent settlements that had an economic basis less dependent on cereal cultivation, although it is possible to grow crops in the flatter, more sheltered valleys of the east coast.

The distribution of the brochs also suggests a settlement structure that is different from the township structure of the post-medieval period. It is likely that in the Norse period the different communities of South Uist owed allegiance to a single overlord and by the fourteenth century chiefs of the clan Ruairi and then clan Ranald can be identified in the historical record (Parker Pearson *et al.* 2004a, 146–8). The situation in the Late Iron Age is unclear and it may well be that an individual had an essentially similar role in the seventh to eighth centuries AD. For the Middle Iron Age, however, there is very little evidence to suggest the island had an overall leader. Instead a rather flattened hierarchy is indicated by the distribution of brochs (Sharples and Parker Pearson 1997).

Around sixteen probable brochs, or monumental roundhouses, have been identified on the island, most being located on islands immediately adjacent to the machair (Parker Pearson and Sharples 1999, 12; Raven 2012a).[25] They are fairly evenly spaced in the southern half of the island, but in the northern half of the island possible broch sites appear to come in pairs: Dun Buidhe and Dun Aligarry are very close to each other and immediately to the north Dun Mor and Dun Cille Bhanain are again very close. In both cases the pair is arranged on an east–west axis, with one closer to the machair than the other. This is somewhat similar to the relationship between Dun Vulan and the island site at Upper Loch Bornish (Marshall and Parker Pearson 1997; 2012). The excavations at Dun Vulan indicate the construction of the broch sometime in the first centuries BC/AD (Parker Pearson and Sharples 1999, 210) and the early occupation is associated with Middle Iron Age ceramics. The excavations at Upper Loch Bornish, although they did not clarify the nature of the structure on the island, revealed middens with ceramics of Early Iron Age type associated with two radiocarbon dates that suggest occupation in the third to fourth centuries BC (Marshall and Parker Pearson 1997; 2012). A later Middle Iron Age occupation was also present. It seems likely therefore that the pairing of these island sites indicates a movement from an earlier monumental roundhouse to a broch which was located closer to the machair.

This shift is also visible on Lewis on the Cnip peninsula where two island sites have been excavated, Dun Bharabhat and Beirgh (Harding and Dixon 2000; Harding and Gilmour 2000). Dun Bharabhat is a small thick-walled roundhouse which has produced a couple of radiocarbon dates and ceramics that suggest an early date for construction. It is located in an upland loch some distance from the machair plain. In contrast Beirgh is a substantial broch located in a low-lying loch on the edge of the machair plain. The primary deposits at Beirgh have not been excavated but it does have evidence for significant Late Iron Age occupation similar to Dun Vulan that is not present at Dun Bharabhat. This movement might indicate that the moorlands were becoming increasingly inhospitable in the first millennium BC and consequently that the machair became more and more important. At the north end of South Uist there is a cluster of four brochs in the township of Iochdar. This is difficult to explain but does correlate with the larger number of settlement mounds in the adjacent machair area.

If one accepts that there is some abandonment of the earlier substantial roundhouses, then it may be possible to break the island of South Uist into approximately 11 or possibly 12 broch territories depending on how one interprets the Iochdar concentration. Parker Pearson and Sharples (1999, 15) have argued that the estimate of 40 Iron Age settlement mounds on the machair made by Lethbridge (1952, 193) is reasonably accurate. This would mean that each broch territory contained fewer than four subsidiary machair settlements. This seems a rather low number compared to Fojut's estimate for Shetland and also for the size of the subsidiary villages around the Orkney brochs (see Sharples and Parker Pearson 1997). The wheelhouse settlements might have contained more than one household (see below) and, as I have mentioned, there are an unknown number of associated moorland settlements. Nevertheless, it seems likely that not all the wheelhouse settlements have been located or survive to be located.

Two smaller observations arise from this analysis of the settlement mounds on the machair. The first concerns the relationship between Beaker settlement activity and later prehistoric mounds. On several occasions it was noted that Beaker settlements are located closer to the coastline than are the later prehistoric and Norse mounds. This is the case at Sligeanach and Machair Mheadhanach and is noted in other areas of the Western Isles at Rosinish and the Udal (Sharples 2009). This is not the place for a detailed examination of this phenomenon but it may suggest that there has been considerable coastal erosion in areas where later prehistoric mounds are close to the coastline and those areas where coastal erosion has been less severe are where Beaker settlements survive.

The second observation is that within the clusters of settlement mounds there seems to be a separation between Middle Iron Age mounds and Late Iron Age/Norse mounds. This is clear from the excavated settlements at Bornais and the Udal (Crawford 1986; Selkirk 1996), but it is possible to suggest a shift in the unexcavated settlement complexes at Cill Donnain and Ormacleit. Further work is required to test these suggestions. This settlement shift coincides with the abandonment of wheelhouse architecture and the emergence of the less monumental cellular structures and may coincide with the increasing influence of the larger political structures of mainland Scotland, such as the Picts. This was not a major disruption of settlement as the general locations remains occupied. Nevertheless, this does appear to be a period when there were significant changes occurring and, though the pottery shows some continuity across the period of disruption, other artefacts were introduced that were of considerable social significance.

The research potential – N Sharples

The richness of the Middle Iron Age dataset from the Hebrides meant that, after the excavation of Dun Vulan, it was decided that the research of the SEARCH project should be directed towards other, less well understood periods, notably the Viking period and the Late Bronze Age/Early Iron Age transition. The excavated material and structures on mound 1 at Bornais are important, however, because they lie on the boundary between the Middle Iron Age and the Late Iron Age. As described in chapter 2, the original building on mound 1 was a wheelhouse, normally thought to be a characteristic structure of the Middle Iron Age, but it was associated with the Dun Cuier ware (Young 1966) that has been ascribed to the early part of the

Late Iron Age (Lane 1990). Mound 1 therefore provides important evidence for the nature of the transition between these two periods. The site is also important because there is very little evidence for chronological contamination. There is some evidence for early structures underlying the excavated building but the ceramic assemblage is remarkably homogeneous, with only a few small Middle Iron Age sherds present. This contrasts with the situation at Dun Vulan where the pottery and radiocarbon dates indicate considerable mixing of material throughout the first half of the first millennium AD (Parker Pearson and Sharples 1999). The mixed deposits of many of the long-lived Hebridean sites often make it difficult to interpret the subtle changes that characterise chronological development in Atlantic Scotland.

The examination of the mound 1 deposits, whilst not the prime goal for the excavation at Bornais, provides an important contribution to our understanding of the Iron Age sequence in the Atlantic province. The principal contribution comprises the large quantities of mammal, fish and bird bones, carbonised plant remains and pottery, which can be accurately dated to a fairly precise and narrow period in the first millennium AD. These are augmented by a substantial collection of small finds which, whilst deficient in exotics and metalwork, includes a number of distinctive bone artefacts. The contextual significance of the site is based on the survival of floor deposits and a burnt-down roof. These deposits were carefully excavated on a half-metre grid which enables the detailed exploration of the spatial distribution of artefacts and ecofacts inside the house. The floor deposits can also be compared with abandonment deposits and with adjacent midden deposits and thus provide contrasting contextual environments that help to clarify depositional processes.

The exceptional importance of the Hebridean Iron Age to wider archaeological debates is based on the existence of well-preserved domestic structures that provide a great deal of information on how buildings are used. Modern anthropological and archaeological analyses have shown that buildings are not simply used in a practical fashion but also provide a template or structure for thinking through relationships between different members of the household (Parker Pearson and Richards 1994; Waterston 1997). These relationships and the associated mental structures act as metaphors for, and are influenced by, the wider cosmological structures that order the world outside the house. Whilst the substantial and systematic destruction of the walls of the house on mound 1 restricts discussion of the architectural significance of this structure, the burning down of the initial house and the excellent preservation of the deposits within it, including an extremely unusual hearth, provide an unparalleled opportunity to examine the timber superstructure of the building and the layout of the material used by the inhabitants.

The excavation of the mound 1 Norse deposits was only cursory but it was still possible to recover significant quantities of animal bone and there were a few finds that are of considerable importance. This material generally expands our knowledge of the occupation at Bornais and, together with the mound 3 data, allows for a more detailed analysis of the agricultural economy of Norse settlement. It also enables an analysis of spatial patterns across the different mounds that make up the settlement of Bornais.

Methodologies – N Sharples

A range of analyses have been undertaken by a variety of specialists on the material recovered by the excavations at Bornais. There is much continuity with the material from mound 3 reported on in volume 1 (Sharples 2005b); though I have tried to restrict discussion of the approaches taken to a minimum, the nature of the analysis does vary because of the different nature of the material recovered. It has also been felt necessary to produce a complete volume that does not require constant cross-referencing with volume 1. This volume also carries on the experiment in integration that was attempted in volume 1. All the specialist reports have been systematically fragmented and reassembled in the different thematic chapters. This was done by the principal author and represents his overall vision of how an excavation report should look. All the specialists were instructed to write their reports to fit into the volume format but it was still not an easy task and some would rather their reports had remained intact and their authorial voice clear and inviolate.

Sampling – N Sharples and H Smith

A detailed account of the sampling procedures is outlined in the introduction to the mound 3 excavations (Sharples 2005b, 34). Routine sampling involved the removal of a two-bucket (or less when this was not possible) sample and a small (champagne glass) sample from every layer excavated. The floor layers of the mound 1 Iron Age house were completely sampled on a 0.5 m by 0.5 m grid. The large sample was transported to a water separation/flotation tank (Kenward *et al*. 1980) where light material was collected as coarse and fine fractions (1 mm and 300 µm mesh sieves) and the heavy material as residue (above 1 mm).

The residues were taken to Cardiff University for further analysis. All heavy residues were passed through a 10 mm mesh sieve and the artefactual and ecofactual material was removed, the numbers counted and the material bagged by finds category. Heavy residues selected for further analysis were first sieved through a 0.5 mm mesh to remove fine dust particles and then sub-sampled for detailed analysis. The sub-sampling was done using a riffle splitter which creates samples by systematically halving the residues, creating fractions of 0.5, 0.25, 0.125, 0.0625 *etc*. The splitting was designed to reduce the residue to a size that could be sorted and recorded in about two hours. All the various sample fractions were bagged separately to enable further sampling. The sub-sample for sorting was first assessed for the percentage of shellfish. The residue was then examined systematically and all the material that was not stone or seashell was removed. The various categories of finds were counted and then bagged for subsequent analysis by specialists. The unexamined samples have been retained in order that they should be available for future analysis.

As a result of the amount of material collected and the time involved in searching the charcoal-rich layers, only a selection of samples was examined. The burnt floor deposits were particularly time-consuming so only every other sample of these layers was examined. Every attempt was made to maximise the examination of the samples from the Late Iron Age middens and infill layers; less effort was expended on the Norse deposits as better samples are available from the mound 2 and 2A excavations.

The detailed quantification of the materials recovered by the sorting of the heavy residues is presented by stratigraphic block in chapters 2 and 3. This is accompanied by a discussion of the data which characterises the patterns present and isolates unusual contexts. The overall variations in the deposition rates of the different stratigraphic blocks is analysed in chapter 4.

Sediment analysis of floor layers – H Smith and P Marshall

In order to maximise the potential for comparison between sites, the same sampling procedures were employed as for the geo-chemical investigation of adjacent buildings on Bornais mound 3 (Smith and Marshall 2005) and mound 2 (Smith and Marshall in Sharples forthcoming) and as for nearby sites such as Dun Vulan (Marshall and Smith 1999), Cille Pheadair (Smith forthcoming b) and Cladh Hallan (Smith forthcoming a). The only extensive occupation deposit was that associated with the use of the Late Iron Age House 2 (stratigraphic block CB; see chapter 2 for description of blocks), a compact orange-red sand layer (397/306). This was sampled comprehensively at 0.5 m intervals using the site grid. Small 'spot' samples were collected at 0.5 m intervals on the site grid, at the intersections of the bulk sample squares.

Mass specific magnetic susceptibility (χ) was measured at low frequency using a Bartington MS2 meter and MS2B dual frequency sensor (following the method of Gale and Hoare 1991), with results expressed as ($10^{-8}m^3kg^{-1}$). Elemental analysis was undertaken by ICP-OES at Bournemouth University, School of Conservation Sciences, for total phosphorus (P), chromium (Cr), copper (Cu), lead (Pb), magnesium (Mg), manganese (Mn), nickel (Ni), potassium (K), sodium (Na), sulphur (S) and zinc (Zn). The Aquae Regis digest method was used to prepare the soil for analysis. Three replicates were measured, each was weighed into acid-washed test tubes and the weights recorded. Methods broadly follow McGrath and Cunliffe (1985) with modifications. To 0.25 g of soil 9 ml of 36% hydrochloric acid and 3 ml of 70% nitric acid were added. The samples were then left to cold digest in a fume cupboard for three hours. Afterward they were placed in heating blocks at 60°C for six to eight hours, then at 105°C until the time the acid had evaporated and we were left with dry soil. At this stage the tubes with the dry soil in were re-weighed and the dry weight recorded.

Samples were re-suspended by the addition of 3 ml of 25% nitric acid and by placing them back in the heating blocks for 20 minutes at 60°C, subsequently adding 12 ml of analytical grade water and heating again at 60°C for another 30 minutes. The samples were then left to cool before being re-weighed for the final time. All the samples were then filtered through Q210 filtration papers prior to being dispensed into clearly labelled auto-sampler centrifuge tubes. A standard solution for calibration of the ICP was prepared prior to the samples being analysed; quality control blanks were inserted every 20 samples. The samples were then analysed using the Varian Vistra-Pro Axial ICP-OES. Trace element results are quoted in ppm. Precision values (calculated against certified soil standards) range up to ± 10%.

Micromorphology – K B Milek

Thin sections were prepared at the McBurney Geoarchaeology Laboratory at the University of Cambridge. The samples were air dried and impregnated under vacuum with a crystic polyester resin that was thinned with acetone, to which was added the catalyst methyl ethyl ketone peroxide (MEKP) and Accelerator 'G'. Once cured, blocks were thin-sectioned following the procedure in Murphy (1986). Thin sections were first examined on a light box; colour differences were used to identify layers and to measure their thickness. In some cases, the context identified in the field was seen in thin section to be composed of several distinct lenses; in these cases the micro-scale units were designated with a number following a decimal point (*e.g.* 397.1, 397.2, 397.3, *etc.*) and were analysed separately. The thin sections were analysed with petrographic microscopes using plane polarised (PPL), crossed polarised (XPL), oblique incident light (OIL) and ultra-violet light (UVL) at magnifications ranging from ×1 – ×250. Micromorphological descriptions conform to the internationally accepted terminology in Bullock *et al*. (1985) and Stoops (2003), and also benefit from reference material in FitzPatrick (1993).

Pottery – A Lane

Some of the mound 1 pottery was initially catalogued by Jerry Bond in 1998. It was subsequently re-catalogued by Kirsty Harding and Ian Dennis under the supervision of Alan Lane. The analysis and discussion of the pottery was then carried out by Alan Lane.

The pottery was studied in the way outlined in the mound 3 report (Lane and Bond 2005, 36–8). Bond's initial fabric subdivisions were simplified as the minor differences noted could not be shown to produce meaningful categories.

Individual sherd variation in density of inclusions and colour can be shown to vary within single vessels. As a consequence no attempt has been made to identify individual vessels unless large parts of single pots were found, as in stratigraphic block CB, and no attempt has been made to estimate minimum vessel numbers. The subdivision of the Hebridean wares is complicated by the way surface treatment may mislead the analyst. Smoothing or burnishing of surfaces can give the impression of higher density of micas and give the impression of different fabrics. These problems were recognised by Campbell in his analysis of the Sollas wheelhouse pottery where he accepted two basic fabrics for effective analysis (Campbell 1991, 148, illus. 13, fiche 2c 6–8). La Trobe-Bateman makes a similar point in discussion of the Dun Vulan broch assemblage (Parker Pearson and Sharples 1999, 213). Blinkhorn (1997) discusses the very similar problem of dealing with large domestic assemblages of handmade Anglo-Saxon ceramics and makes similar observations. He is very critical of attempts to analyse coarse pottery by thin sectioning and argues that current attempts to analyse such fabrics are often largely a waste of time (Blinkhorn 1997, 117). His observation of the large Mucking, Essex, assemblage dismisses the multiple fabric divisions produced in analysis. Blinkhorn quotes Hamerow's report that 'a number of sherds which were assigned to different fabric groups [by thin sectioning *(ed.)*] were subsequently found to cross-join' (Hamerow 1993, 27) and he argues that a broad distinction between mineral-tempered and chaff-tempered wares is the only meaningful distinction in the assemblage (Blinkhorn 1997, 118). MacSween (2002, 151–2) also argued for general fabric groups in her reconsideration of the Dun Beag, Skye assemblage.

Four 'fabrics' have been retained for descriptive purposes but without any implication that the sherds are mineralogically significantly different. A sample of sherds including any which appeared unusual was examined by Dr Tim Young who confirmed that the suite of minerals present is consistent with Lewisian gneiss.

A: the standard fabric referred to as fabric A in the mound 3 report is the most common fabric**;** a rough, gritty and hard fabric with quantities of Lewisian gneiss and other minerals. Surface finish is variable, with smooth, rough, wiped and grass-marked examples all being recorded. It ranges in sherd thickness from approximately 7–8 mm up to approximately 12–14 mm, though most fabric A sherds are between 8 mm and 12 mm in thickness, and is also found in all the possible colour variations, though most sherds are of grey or buff colouring. Some colour variation was thought to be significant in individual vessels (as in the reddish pottery found in the CA contexts) but without significant mineralogical variation. A small number of other sherds were noted as having occasional red inclusions which are thought to be haematite. This may be a significant variable but occurs only in a few sherds and without any co-varying distinctive feature that would allow this to be defined as a separate fabric. It was thought that this might be a Middle Iron Age feature and future work in the area on earlier ceramics may establish whether this is significant.

In addition a number of sherds have been classed as fabric C, D or E.

C: a fine ware; a smooth hard shiny fabric, though considerable quantities of Lewisian gneiss can be used as an inclusion. Smoothed or burnished surfaces are common, though examples with only one treated surface are also common. Sherd thickness ranges from 3.5–7 mm, though most sherds are 4–5 mm, and are usually of a black or dark grey colour, though some sherds with buff-coloured patches have been recorded.

D: smooth, softer, less gritty fabric, though still with considerable quantities of Lewisian gneiss; sherd thickness varies from 5–10 mm in a colour range similar to fabric A.

E: a fine ware; a smooth, hard and less commonly occurring fabric, distinguished by its thin walls (*c*.4–8 mm) and laminated fabric; predominantly of grey/buff/reddish colouring.

The assemblage from mound 1 covers a longer time span than the mound 3 material. One potential difficulty in analysing this longer sequence is that the differentiation of undecorated Iron Age sherds with smoothed or burnished surfaces from visually similar Late Norse sherds can be difficult unless sherds are big enough to indicate clear vessel forms. The decoration of Iron Age pottery with incised and cordoned motifs is fairly distinctive but some simple decoration reappears on Late Norse, medieval and post-medieval pottery, and the use of some similar rim forms in the Middle Iron Age and medieval periods is also a trap for the unwary. My experience of handling large quantities of Hebridean pottery of all periods has also led me to doubt the value of the rim classifications used by some specialists (*e.g.* LaTrobe-Bateman 1999, fig. 9.1; *cf.* Topping 1987, illus. 2). This is partly an issue of definition. The vessel shape running up to the rim is an important feature in shape definition but most rims (*i.e.* the top of the vessel) are quite simple with only slight modification of the rim top. Where rims are distinctively finished, as in Campbell's turntable-finished group at Sollas (1991, 150, 157), this is an important feature, but most of the so-called rim definitions used (*e.g.* LaTrobe-Bateman 1999, fig. 9.1) are actually descriptions of vessel form. Where unusual rim forms appear they are described in the catalogue (appendix 4).

Artefact methodology – A Clarke, P Macdonald and A Smith

The artefact assemblage from mound 1 is more substantial and diverse than the assemblage from mound 2 and was examined by a variety of specialists. A complete catalogue of the objects recovered is presented in appendix 2. The four principal categories of material recovered are:

- coarse stone tools examined by A Clarke;

- the metalwork (copper alloy, iron and lead) examined by P Macdonald;
- the worked bone examined by A Smith;
- a small assemblage of flint examined by A Pannett (appendix 3).

A number of unusual objects were examined by individual specialists: Gareth Williams looked at the coin, K Forsyth reported on the ogham inscription and S Youngs commented on some of the decorated bone.

The ironwork assemblage was X-rayed and a small number of finds were selected for investigative cleaning prior to examination. The preservation of this assemblage is poor and consequently the number of positive or detailed identifications that could be made is limited.

Charcoal – R Gale

The residues from a hundred and sixty-five soil samples were examined from a range of contexts from mound 1 but focusing particularly on the two floor areas (457) and (397) of the Late Iron Age house (CB). The sampling strategy for the latter followed that employed for the Norse farmstead on mound 3 (Sharples 2005b), based on a grid system, with the aim of evaluating the spatial distribution and density of organic deposits. Sieved residues were often comparatively large whereas flots were generally extremely small. In addition a large number of hand-picked samples of charcoal were collected. Seventy-eight samples were selected for full analysis, determined by sample size, the relevance of the context and the potential of the sample to produce viable data. For example, within the two principal layers (457, 397) of the Late Iron Age House (CB), the selection of charred plant remains was based on alternate squares of the grid system (see above 28) and, thus, where possible, charcoal was selected from the same contexts, with emphasis on the central floor areas. For some grid squares, however, where charcoal was either not available or the samples were insufficient for identification, appropriate samples were selected from adjacent squares. Very little charcoal was available from the areas adjacent to the house walls.

Horizons composed of black sand were often described on excavation as charcoal-rich but, in most instances, the charcoal had degraded to such an extent that suitable fragments for identification were either sparse or absent and these contexts rarely provided enough material for identification.

The condition of the charcoal varied from context to context. For example, most of the roof timbers (context 457) were very friable and often degraded, and some included evidence of beetle bore-holes. The roof timbers were sampled individually and thus assumed to contain the remains of a single entity but, when received for identification, the charcoal was fragmented; it was therefore considered prudent to examine a good proportion of each sample to test this theory.

The samples were prepared using standard methods (Gale and Cutler 2000). Anatomical structures were examined using incident light on a Nikon Labophot-2 compound microscope at magnifications up to ×400 and matched to prepared reference slides of modern wood. When possible, the maturity of the wood was assessed (*i.e.* heartwood/sapwood) and stem diameters recorded. It should be noted that during the charring process wood may be reduced in volume by up to 40%.

Classification follows that of *Flora Europaea* (Tutin *et al.* 1964–80). Group names are given when anatomical differences between related genera are too slight to allow secure identification to genus level. These include members of the Ericaceae (heathers) and *Salix* and *Populus* (Salicaceae) and *Picea* and *Larix* (Pinaceae). When a genus is represented by a single species in the British flora, this is named as the most likely origin of the wood but it should be noted that it is rarely possible to name individual species from wood features.

The taxa identified include:

- Betulaceae. *Alnus glutinosa* (L.) Gaertner, European alder; *Betula* sp., birch.
- Corylaceae. *Corylus avellana* L., hazel
- Ericaceae. *Erica* sp. and *Calluna vulgaris*, heathers and ling. Many members of the heather family are anatomically similar.
- Fagaceae. *Quercus* sp., oak
- Oleaceae. *Fraxinus excelsior* L., ash
- Rosaceae. Subfamily: Pomoideae, which includes *Crataegus* sp., hawthorn; *Malus* sp., apple; *Pyrus* sp., pear; *Sorbus* spp, rowan, service tree and whitebeam. These taxa are anatomically similar.
- Salicaceae. *Salix* sp., willow, and *Populus* sp., poplar. In most respects these taxa are anatomically similar.
- Ulmaceae. *Ulmus* sp., elm
- Cupressaceae. *Juniperus* sp., juniper
- Pinaceae. *Pinus sylvestris* L., Scots pine. Also *Picea* sp., spruce and/or *Larix* sp., larch, neither of which are native to Britain.

Mammalian bone – J Mulville and A Powell

Identifications were checked against reference skeletons held by the Department of Archaeology, University of Sheffield, the Department of Archaeology, University of York, the Department of Archaeology, University of Southampton and the Department of Archaeology, Cardiff University.

Sheep/goat bones have been identified to species where possible using the criteria of Boessneck (1969) and Payne (1985). The criteria described by Lister (1996) have been used to confirm that all large cervid bones belong to red deer (*Cervus elaphus*) rather than fallow deer (*Dama dama*). Fragments of mammal bone that could not be identified more precisely were classified as ‘cattle-sized’ (horse, cattle or red deer size) or ‘sheep-sized’ (sheep or pig size).

The recording method used is a modified version of the diagnostic zone system described by Serjeantson (1996), in which for each identifiable fragment a zone is recorded only where over 50% is present. Lateral metapodials, fibulae, and carpals or tarsals other than magnum, astragalus, calcaneum and naviculo-cuboid were not recorded; of these only the calcaneum was zoned. The remainder were treated as one zone and thus only recorded when more than half was complete, as were all the phalanges. Ribs were only recorded when the head was present and vertebrae when over 50% of the centrum was present (except axis, atlas and the first sacral segment, which for practical purposes were treated as a single zone). Only certain cranial fragments were counted: occipital, horn core (base or tip), antler (burr/pedicle or tine), zygomatic, premaxilla, mandible, isolated mandibular teeth and hyoid. Other fragments might have been recorded, for example fragments from rarer taxa or antler beam fragments, but have not been used for quantification purposes. Pig and deer maxillary canines have been recorded for sexing purposes. Similarly, most of the large cetacean bone present could not be identified to element, let alone species, and has therefore been recorded but not used for species quantification.

The zone method used to quantify elements obviates many of the problems inherent in counting bones. Long bones, unless fragmented to less than 50% of one of the eight zones, will always be recorded and the other more compact elements tend to be less fragmented by butchery, breakage or gnawing. Thus absences of material indicate either a genuine lack of that particular element or evidence of extreme fragmentation. For adult animals the former is more likely than the latter. In the case of sites such as Bornais, however, where much of the material is from extremely young animals, the effect of age on identification rates and robusticity must be taken into account.

A basic fragment count, or number of identifiable specimens (NISP), is given for all the taxa present. In order to facilitate comparison between the most frequent taxa, the minimum number of elements (MNE) has also been calculated. This is based on the sum of the most frequent zone for each element, taking symmetry into account. Minimum numbers of individuals (MNI) have then been derived from the most common element in the MNE counts for these species.

The relative body part representation of the main mammals (over 300 NISP) is explored by expressing the MNE for each element as a percentage of the expected MNE for that element calculated from the MNI for that species.

In the discussion of body part data the following elements were considered to be high meat-yielding elements: scapula, humerus, radius/ulna, pelvis, femur and tibia with mandible, carpals, astragalus, calcaneum, metapodials and phalanges considered to be lower meat-yielding elements. Ascribing meat values to different elements is only a crude measure of the potential for each part of the body to provide food; for example, mandibles provide both cheek and tongue meat, whilst essential fats can be extracted from bones in the form of marrow fats and bone grease (Outram 2004).

Tooth eruption and wear data were recorded for mandibles, loose deciduous fourth premolars, fourth premolars and third molars of cattle, sheep/goat and pig using Grant (1982); in addition, the Grant diagrams for cattle were adapted to record this information for red deer. The data were then grouped into age classes following Payne (1973) for sheep/goat, Halstead (1985) for cattle and O'Connor (1988) for the remaining species. The fusion state of post-cranial bones was recorded as 'neonate', 'unfused' or 'fused' and age groups were derived from the time of epiphyseal closure given by Sisson and Grossman (Getty 1975) for domestic mammals. The unfused total for each element was derived from either the unfused epiphysis or shaft, whichever figure was greater. For red deer, elements have been grouped into early-, mid- and late-fusing, assuming a similar sequence of fusion as in the other artiodactyl species present (Cegielka 1995; Bosold 1968)

Sexes were separated using morphological characteristics of the pelvis in sheep and cattle (Grigson 1982), the horn core in sheep, and of the canines in pigs (Schmid 1972). Bones of all species were measured, where possible, following von den Driesch (1976) and Davis (1992).

For all identified bones (including those in the general size categories) gnawing and butchery marks were noted where present. Both carnivore and rodent gnaw marks were observed; butchery marks were described by type and location. The incidence of burning was recorded for all fragments, identifiable or otherwise.

The shell sand burial environment of South Uist's machair ensures that bone survives in excellent condition, with many of the surface features well preserved. The excellent survival of the bones of perinatal animals on machair sites is an indication of the benign physical and chemical environment provided by the calcareous machair sand from which the majority of deposited material is derived. This excellent preservation has been noted at a number of other sites located on the machair (Mulville *et al.* 2005).

Isotopic analysis – R Madgwick, J Mulville, R E Stevens and T C O'Connell

The ratio of the stable isotopes of carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) in bone collagen provides an established method for reconstructing the protein part of the diet of past populations (Ambrose 1993; 2000; Katzenberg 2000; Sealy 2001). The $\delta^{13}C$ values give an indication of the proportional contribution of terrestrial and marine sources of dietary protein whilst $\delta^{15}N$ values reflect trophic level. In environments such as temperate Europe which lack C_4 plants, high $\delta^{13}C$ collagen values demonstrate a contribution of marine-derived protein to the diet whilst high $\delta^{15}N$ values are indicative of the consumption of products from higher in the food chain (*e.g.* meat, fish or dairy protein). Climate and environment can also impact upon isotopic signatures in bone collagen. Climatic changes can affect fractionation within the carbon and nitrogen cycles and result in small-scale variation in isotope signatures (Drucker *et al*. 2003; Murphy and Bowman 2006; Richards and Hedges 2003; Stevens and Hedges 2004; Stevens *et al.* 2008; van Klinken *et al.* 1994) whilst more local environmental effects may also occur, for example elevated nitrogen isotope values from sea spray (Britton *et al*. 2008; Virginia and Delwiche 1982).

Analysis of $\delta^{13}C$ and $\delta^{15}N$ isotopes in bone collagen is most frequently employed for dietary reconstruction in humans, with faunal values used primarily as a baseline from which to interpret human isotopic datasets. The technique does, however, also have the potential to inform on human-mediated changes in animal diet, such as changes in the exploited pasturage, manuring practices (Bogaard *et al.* 2007; Jay and Richards 2006) and fodder provision at a population and individual level (*e.g.* the use of seaweed as fodder: Balasse *et al*. 2005; 2006). The identification of alternative fodder resources is of particular relevance to insular environments such as South Uist, where high levels of neonatal mortality in cattle have been attributed to the low availability of hay fodder (Mulville *et al.* 2005). The exploitation of a diverse range of terrestrial and marine resources, both directly and indirectly, has been demonstrated through zooarchaeological and palaeobotanical analysis (Smith and Mulville 2004) and isotopic analysis has the potential to provide further detail as to the novel foddering strategies that might have been necessary to sustain herds in a restricted island ecosystem.

For all of the samples, material was analysed using an automated elemental analyzer coupled in continuous-flow mode to an isotope-ratio-monitoring mass-spectrometer (in Cambridge, a Costech elemental analyzer coupled to a Finnigan MAT253 mass spectrometer; in Oxford/Newcastle, a Carlo Erba elemental analyzer coupled to a PDZ Europa Geo 20/20 mass spectrometer). Stable isotope concentrations are measured as the ratio of the heavier isotope to the lighter isotope relative to an internationally defined scale, VPDB for carbon, and AIR for nitrogen (Hoefs 1997). Isotopic results are reported as δ values ($\delta^{13}C$ and $\delta^{15}N$) in parts per 1000 or 'permil' (‰) values, where $\delta^{15}N_{AIR} = [(^{15/14}N_{sample} / {}^{15/14}N_{AIR}) - 1] \times 1000$. Based on replicate analyses of international and laboratory standards, measurement errors are less than ±0.2‰ for $\delta^{13}C$ and $\delta^{15}N$. The analytical errors on samples analysed at ORAU are larger, potentially as large as ±0.4‰ (Peter Ditchfield pers. comm.). No inter-laboratory repeat testing was undertaken but all samples were measured relative to International Atomic Energy Agency international standards, with the McDonald Institute and ORAU also measuring the samples relative to the same in-house standard. Thus the results from different laboratories are thought to be comparable.

Bird bone – J Cartledge†

The bird bones were identified with the aid of comparative collections at the University of Sheffield and the author's personal collection. Ribs and vertebrae are included in the unidentified count. An attempt was made at identification of all other bird bones or bone fragments. This was considered important since the presence or absence of certain bones may be an indicator of whether the carcasses were prepared on or away from the site, perhaps in the area where they were killed. Skull fragments were considered important since the beak often identifies the bird. Only those bones that could be assigned to a family or species were recorded in detail. The other bones, usually shaft fragments of long bones missing proximal and distal ends, were counted as unidentified. The identified long bones were recorded in six categories – complete, proximal end, proximal end and shaft, fragment, distal end, distal end and shaft. There was a visual assessment of age with three categories – juvenile, sub-adult and adult. Butchery marks, indications of pathology, condition of bone, burning and presence of gnawing were all recorded. Minimum number of individuals was calculated using the humerus, the most frequently occurring bone.

Fish bone – C Ingrem

All site deposits were riddled through a 10 mm mesh and some fish bone was retrieved from these hand-sieved deposits. Occupation floors were divided into 0.5 m grid squares for the purposes of excavation and sampling. More important for the recovery of fish, all of the floor deposits and environmental samples were processed by flotation using 1 mm mesh. The residues were then sieved through a 10 mm mesh to remove the larger artefacts and ecofacts. The remaining residue was then subdivided and a proportion sorted. The fish assemblage is therefore comprised of three categories of material: that over 10 mm recovered by riddling on site, that over 10 mm recovered from flotation residues and a fraction of the material between 10 mm and 1 mm recovered from flotation residues. The known fraction of each <10 mm sample sorted has been used to calculate projected figures for the total amount of fish bone present in the <10 mm component. The density of fish remains can only be calculated for material recovered by flotation, since the number of litres of soil excavated is known for these samples. For the purposes of this report both the over 10 mm categories have been amalgamated.

The fish bones were identified and recorded at the Centre for Archaeological Analyses (CAA), University of Southampton with the aid of the LAZOR (Laboratory for Zooarchaeological Research) comparative collection and using a low power (×10) binocular microscope. All fragments were recorded to species and anatomical element where possible (with the exception of ribs and fin spines) to produce a basic fragment count of the number of identified specimens (NISP). Unidentifiable fragments in the >10 mm sample were also counted and those in the <10 mm material estimated. For the purpose of this report the terms large gadid and cod-family fish have been used to include merluccid (hake) although strictly speaking they belong to a separate family. In order to overcome the problems of differentiating between closely related species and identification bias, and to facilitate comparative studies, a selected suite of elements has been used to calculate the 'percentage presence' of saithe as follows: vomer, premaxilla, maxilla, dentary, articular, hyomandibular, opercular, cleithrum, supracleithrum, posttemporal, otolith, anterior abdominal vertebrae, post abdominal vertebrae and caudal vertebrae. Clupeids were identified to species using the morphology of the opercular and size characteristics, members of the wrasse family using the dentary, premaxilla and pharyngeal bones. No opercular bones of pilchard were present, so all clupeid remains have been classified as herring for the purposes of this report. Where not given in the main body of the report, anatomical elements recorded to species are listed in the archive (available online).

The proportion of an element represented by each fragment was recorded as <25%, 25–50%, 50–75% and 75% according to completeness. Where possible elements were sided. The minimum number of individuals (MNI) was determined according to the frequency of the most numerous element and divided by the number of times that it occurs in the skeleton. The 'percentage presence' of the various anatomical elements was calculated by dividing the number of fragments of each element by the number of times that it occurs in the skeleton and displaying it as a percentage. To calculate the MNE of gadid vertebrae, the number present was divided by the number present in an individual skeleton based on the figures of Barrett (1997) and for herring on this author's personal observation.

The state of preservation was recorded as good, medium and poor. The incidence and location of butchery marks were noted according to the categories of Barrett (1997). Similarly, evidence of damage caused by burning, gnawing and digestion was all recorded and, although it is not possible to determine the agent responsible for the latter two, it is quite likely that the modifications result from human digestion.

Measurements taken during recording follow the guidelines of Morales and Rosenlund (1979) and are given in the archive (available on line). In addition, size was visually categorised with the aid of the reference specimens. In the interests of comparative studies the visual size categories follow those used by Cerón-Carrasco (1999) as follows: very small (<150 mm), small (150–300 mm), medium (300–600 mm), large (600–1200 mm) and very large (1200–2000 mm approximately).

Due to the comprehensive recovery strategy employed at Bornais, it is unlikely that either species or anatomical representation has suffered from size-related bias associated with recovery. In addition, almost all the fish bone is in good condition and the high proportion of identifiable material in the >10 mm assemblage (average 47%) and in the <10 mm sample (average 17%) is an indication of the extremely good preservation afforded by the calcareous shell sand from which the assemblage was recovered. Otoliths, however, are few. They are composed of aragonite which is less stable than bone (which is composed of hydroxyapatite) and are most likely to survive in alkaline conditions, particularly waterlogged cesspits or deep refuse pits where (acid) rain cannot percolate (Van Neer *et al.* 2002). Their survival in large numbers only in stratigraphic block CG may therefore reflect the variable nature of the depositional environment.

Although species or anatomical representation is unlikely to be seriously biased by the factors mentioned above, variation in the diagnostic properties of individual bones may affect their identifiability, resulting in certain bones appearing less visible than others. In addition, density-related survival is likely to have played a role especially with regard to cartilaginous species such as the elasmobranchs and other taxa possessing poorly calcified bones, as suggested for members of the Salmonidae: as a result these may be under-represented.

Marine shell – N Sharples

Large quantities of marine shell are present in the occupation layers of the Bornais settlement, far too many shells to make total recovery possible or in any sense desirable. The strategy used to assess the quantity and species variation was threefold (Evans 1973):

- All species were recovered from the flotation samples and counted.
- Species other than limpets or winkles were recovered whenever they were observed during excavation.
- When particularly large and dense shell layers were excavated, a large sample was taken.

The basic analysis of the shells involved counting to assess species variation. For the common species (limpets and winkles) and for other gastropods only the apices were counted but for other species rarely found such as clam, razorshells and oysters, numbers were so few and the shells so fragmented that the presence of any part of the shell was sufficient to be counted.

Acknowledgements – N Sharples

The fieldwork undertaken at Bornais would not have been possible without the support of many people. University of Cardiff and Historic Scotland supplied financial support. P Ashmore, S Foster, N Fojut and R McCullagh of Historic Scotland have all provided considerable help and P Ashmore supported the extensive programme of radiocarbon dating.

Permission to excavate was given by the Bornais Grazing

Figure 16. The Cardiff University South Uist excavation team in 1997

Figure 17. The Cardiff University South Uist excavation team in 1999

Committee through Ewan Steele, South Uist Estates (now Storas Uibhist) through Tim Atkinson, and Scottish Natural Heritage through Mary Harman. Throughout the project we have received much invaluable support from the members of Comann Eachdraidh Uibhist a Deas, Kathy Bruce, James and the late Calum MacDonald, the late Alasdair MacIntyre, the late Gill MacLean, the late Neil Macmillan, the late Effie MacMillan and Robert Tye. Mrs K Frazer, Mrs M MacIsaac, Mr and Mrs A J MacKinnon, Mrs M K Morrison and Col H Massey kindly provided accommodation. J J MacDonald Builders, Norman MacAskill, Laing Motors and Uist Builders Construction provided technical help.

The excavations operated within the overarching structure of the SEARCH project and have benefited from the critical comment of Jacqui Mulville, Mike Parker Pearson and Helen Smith. Helen Smith organised and carried out the flotation programme and was responsible for the overall coordination of the analysis of the plant and soil samples. She enlisted Sue Colledge, Karen Milek and Pete Marshall who have provided important contributions to this volume. Soil thin sections were manufactured by Julie Boreham at the Thin Section Facility at the University of Cambridge. Karen Milek would like to thank Dawn Elise Mooney for identifying the wood remains in thin section, and is very grateful to Charles French and the Department of Archaeology at the University of Cambridge for permitting her to use the microscope and digital imaging facilities at the McBurney Geoarchaeology Laboratory.

Jacqui Mulville has coordinated the analysis of the animal remains and, as well as undertaking the analysis of the large mammal bones, she enlisted Claire Ingrem, Judy Cartledge, Dale Serjeantson and Jan Light to undertake the specialist analysis of the fish and bird bone and the crab remains.

The finds specialists were organised by myself as project director and principal author and I am indebted to my colleague Alan Lane for organising the report on the pottery, with Jerry Bond and Kirsty Harding; to Ann Clarke for the stone report; Phil Macdonald for the report on the metals; Amelia Pannett on the flint; Andrea Smith for the report on the worked bone, Katherine Forsyth, Susan Youngs and Gareth Williams for additional comments on special objects and Tim Young for the analysis of the slag and the geology of the pottery fabrics. The iron was X–rayed and cleaned by undergraduate students in the Conservation Department of the School of History and Archaeology, Cardiff University and Phil Parkes of Cardiff Conservation Services, School of History and Archaeology, Cardiff University. Phil Macdonald is grateful to Katharina Becker (University College Dublin), John Ó Néill (formerly of Queen's University Belfast) and Malachy Conway (National Trust) for their assistance in the discussion on the copper alloy stick pin. Helen Smith would like to thank Harry Manley and Debra Costen (Bournemouth University) for the soil analysis.

The excavation of mound 1 was undertaken by Chris Swanson in 1996 and 1997 and by Dave Brewer and Katinka Stentoft in 1999. We would like to thank all the students, from Cardiff and Sheffield universities, who worked on these trenches for the skill and effort they put into the job (Figures 16, 17). The post-excavation process again involved many people but Sarah Housley, Fiona Morris, Rhiannon Thomas and Kate Waddington provided invaluable help

Many thanks to Ian Dennis for producing the publication drawings and the cover design, to Kate Waddington for producing various plans and sections and to John Morgan for the photographs. We are grateful to the Society of Antiquaries of Scotland for permission to reproduce Figure 10, to Historical Scotland for permission to reproduce Figure 11, to Professor Dennis Harding for permission to reproduce Figure 204 and to Alan Braby for permission to reproduce Figure 202.

Notes

1 Nevertheless Dun Torquil and Dun an't Sticar on North Uist are both very well-preserved brochs that provide considerable architectural information as well as impressing the visitor, whilst Barpa Langass is the only Neolithic tomb in the Western Isles with an original roof.

2 Armit (1998) has done further work at Eilean Maleit and demonstrated that information can still be recovered from these sites which will contribute to our understanding of the Iron Age.

3 Hallén (1994) has recently re-analysed the worked bone assemblages from Foshigarry and Bac Mhic Connain.

4 He excavated chambered tombs at Rudh' an Dunain on Skye (Scott 1932) and Clettraval and Unival on North Uist (Scott 1932; 1947b), and the very important settlement of Eilean an Tighe on North Uist (Scott 1950).

5 Scott appears to have used his yacht as a base for the summer excavations and there is a story, perhaps apocryphal, that the excavation of the relatively isolated cave and chambered tomb at Rudh' an Dunain was undertaken without anyone on the island of Skye being aware of his presence.

6 Lethbridge's career as an archaeologist was characterised by a rather personal approach to archaeological interpretation and these ideas became more and more idiosyncratic in the late fifties and sixties. He resigned his position at the Museum and became increasingly obsessed with hidden forces which he felt were identified by dowsing. He developed a complicated system of dowsing that he believed enabled him to read the past and to predict sites by dowsing maps. This late flowering of creativity has made Lethbridge a heroic figure in the alternative community but has tended to undermine his reputation as an archaeologist.

7 It is difficult to criticise Young and Richardson for pushing ahead with their publication as it seems very unlikely that an integrated monograph publication would have emerged in the 1960s. Many of the archaeologists involved became notorious for their poor publication records. Piggott was well aware of this and was very influential in the decision to publish the article.

8 Numerous scholars tried to gain access to the Udal material but few achieved it. One of the contributors to this volume, Alan Lane, became involved in the project in its early years

and was allowed to undertake a PhD on Late Iron Age and Norse ceramics from the Udal under the supervision of James Graham Campbell at University College London. This proved to be a very important piece of work which has been the basis for the identification of Norse settlement throughout the Western Isles (Sharples and Parker Pearson 1999). However, the decision to publish a short article on this work (Lane 1990) was met with considerable hostility and a threat to take legal action.

9 Professor Keith Branigan received a hostile letter from Crawford when Sheffield University announced they were starting work on South Uist and Barra which suggested that they were not qualified to undertake such a project.

10 The importance of Rosinish was realised when Iain Crawford excavated an Early Bronze Age cist with an elaborately corbelled vault (Crawford 1977).

11 The author of this volume was employed to work on the Lewis and Harris coastal erosion survey and has to say it was one of the most enjoyable pieces of fieldwork he undertook as a student.

12 Two new coastal erosion problems were created on Baleshare by this storm. To the south, a site at Sloc Sabhaidh identified by the CEU (James and Duffy in Barber 2003, 43) was exposed and badly damaged. It is currently being excavated as a Shorewatch project. Perhaps of even greater significance is a substantial and apparently relatively undamaged site to the north of the Red Smiddy.

13 The Western Isles played an important role in the development of the discipline of snail analysis as John Evans took samples from Northton on Harris and several other sites as part of his PhD work. The evidence from Northton was crucial to his influential interpretation of the environment in the Neolithic (Evans 1971).

14 The report on the excavations appeared in 2003, twenty years after the sites were excavated and it was initially published as one of the first Scottish Archaeological Internet Reports (No. 3).

15 One of the attractions of the islands was their status as deprived areas, which it was hoped would attract EEC grants.

16 The discovery of this settlement was also important in establishing that some of the artificial islands in the Hebrides could be Neolithic and that these could well be furnished with causeways and stone structures which superficially may suggest an Iron Age date (*cf.* Henley 2012; Raven 2012a)

17 For Scatness, the chronological argument depends on two assumptions that I find questionable: that the articulated foot sealed underneath the broch wall is associated with the construction of the broch and that the carbonised plant remains found in deposits deposited around the constructed broch are in a primary position and are not residual material from an earlier settlement.

I don't think you can necessarily make the assumption that the paving under the broch wall is associated with the construction of the broch, particularly as there is a layer of soil and stones between the paving and the broch wall in which the articulated sheep bones were found. This paving may be structural activity that precedes the broch.

The use of carbonised grains to construct chronologies is problematic as they are very small and move around very easily. There is no discussion on how the grains at Scatness got into the layers from which they were recovered; we don't know how many carbonised grains were recovered in these samples and whether other samples from below the broch wall contained similar quantities of grain.

There is clearly evidence for structural modifications of the broch wall near where these samples were recovered and it may be that a complicated sequence of early roundhouse construction, similar to that at the Howe, is present but not fully understood.

18 It is clear that some of the aisled wheelhouses would have had a more complex superstructure as there is evidence at both Jarlshof and Old Scatness for scarcement ledges that could have supported some form of timber floor (Dockrill *et al*. 2010)

19 Two historic settlements can be located on the machair by early cartography: the mound complex at Baghasdail is on the Bald map of 1805 (Parker Pearson 1996b; 2012) and the site of 'Machribeanach' at Machair Mheadhanach is on the Blaue map of 1654. Neither site is accurately located by the recent survey as no late or post-medieval pottery was recovered in the areas indicated. However, pottery of this date was recovered from a mound at Aisgernis (site 97) which may be marked on the Bald map (Parker Pearson 2012; Parker Pearson and Raven 2012b).

20 The township of Bornais is currently managed on a two-year rotation with one half of the machair under crops and one half grazed by cattle.

21 In this case a site is an area of occupation, sometimes but not always a mound, producing dark brown sand and/or artefactual material such as marine shell, animal bone and pottery. In most areas the material comes from the upcast of rabbit burrows, but larger areas can be exposed by cattle trampling, wind erosion, quarrying and erosion by water, either the sea or rivers (Parker Pearson 1996b; 2012).

22 The wheelhouse was built above a soil horizon that produced sherds of cordoned urn of Early–Middle Bronze Age date (Parker Pearson and Seddon 2004).

23 A further two sites, 20 and 21, lie between the Cill Donnain and Sligeanach concentrations but neither represents a substantial settlement.

24 See Parker Pearson (2012) for a discussion of the possible significance of this unusual pattern of township boundaries.

25 Dun Vulan is the exception as it lies on a sea promontory to the west of the machair but, in being surrounded by water and accessible only by a narrow strip of land between the sea and a small loch, it is very similar to the island setting of most of the other brochs.

2 The Late Iron Age settlement

Introduction – N Sharples

The excavation of mound 1 comprised two trenches located on the west side of the mound (Figures 1, 18). The contexts excavated on mound 1 can be grouped into seven stratigraphic blocks which provide a basis for the descriptive analysis of the excavations. These are:

CA EARLY STRUCTURES
CB LATE IRON AGE HOUSE
CC DESTRUCTION AND INFILLING
CD NORSE STRUCTURE
CE NORSE ACTIVITY AREA
CF NORSE MIDDENS
CG LATE IRON AGE MIDDEN

The Late Iron Age units were restricted to the south-west end of the trench excavated in 1996 and formed the focus for the excavations in 1997 and 1999. The sequence began with the early structures (CA) exposed but as yet unexcavated. These structures were overlain by a structure (CB), which has been very badly robbed. This building has two phases of use but the deposits were so intermingled that it is more accurate to describe this as one block rather than divide the contexts into separate blocks. The hollow created by the abandonment and robbing of this structure was infilled with a series of sand and charcoal-rich layers (CC). An important but limited series of Norse features cut the surface of these deposits (CE) but the bulk of the Norse material lay to the east. This area was only partially examined in the first year of excavation but this was sufficient to expose the walls of at least one substantial rectangular building (CD). The western half of this building was infilled with sand layers, whereas the eastern half was covered with a thicker, more compact midden deposit (CF). Excavation of a trench on the west side of the mound in 1999 exposed a sequence of compact midden layers (CG) that appear to have been deposited

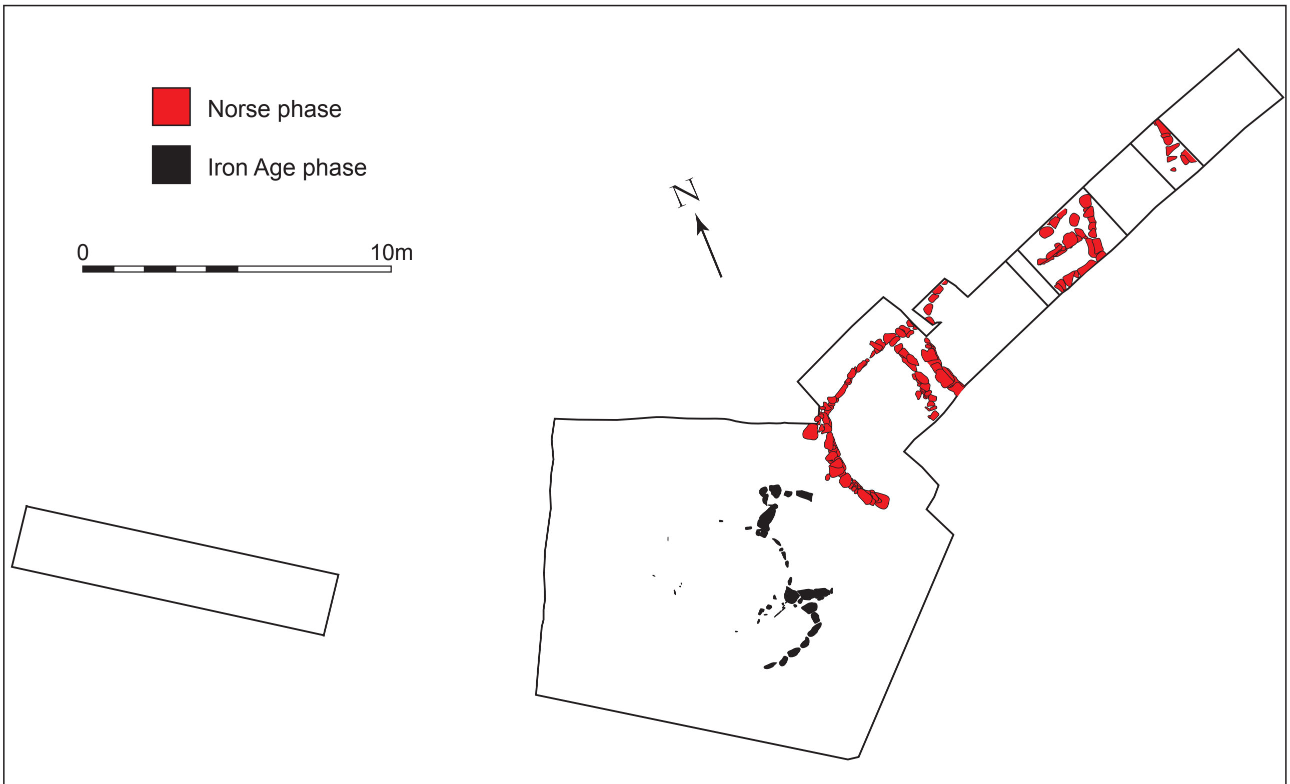


Figure 18. A plan of the excavated area on mound 1 showing the principal structural features and the cumulative outline of the areas excavated in 1996, 1997 and 1999

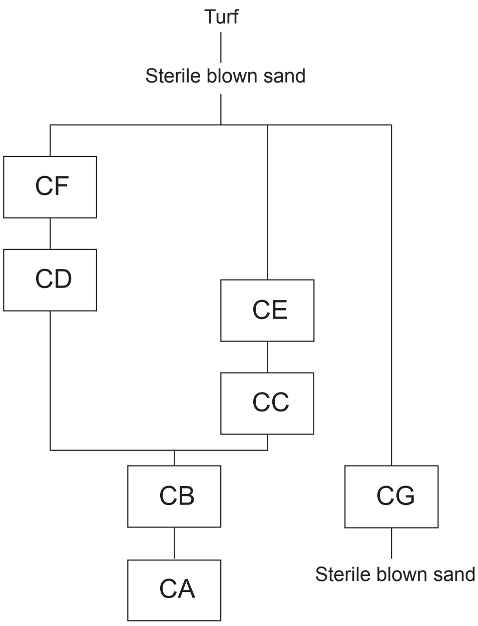


Figure 19. A diagram illustrating the stratigraphic relationships of the different blocks

within the period of the Late Iron Age occupation of the adjacent house (CB). The stratigraphic relationships are summarised in Figure 19.

This chapter will describe the contexts and stratigraphic relationships of the Late Iron Age occupation within the excavated area. It will also provide a summary of the artefactual and ecological material recovered from these contexts and other specialist analyses which help in the interpretation of the activities on the site. The later Norse material will be described in chapter 3.

Early structures (CA) – N Sharples

In the last week of the 1999 excavation season the floor of the Late Iron Age structure (CB) was removed and a number of features believed to be associated with the construction, or occupation, of that house were excavated. These excavations revealed a loose pale yellow sand (499) that completely covered the trench. Observation of the sides of the later features indicated that beneath 499 there was a thin dark occupation layer. This layer varied in texture,

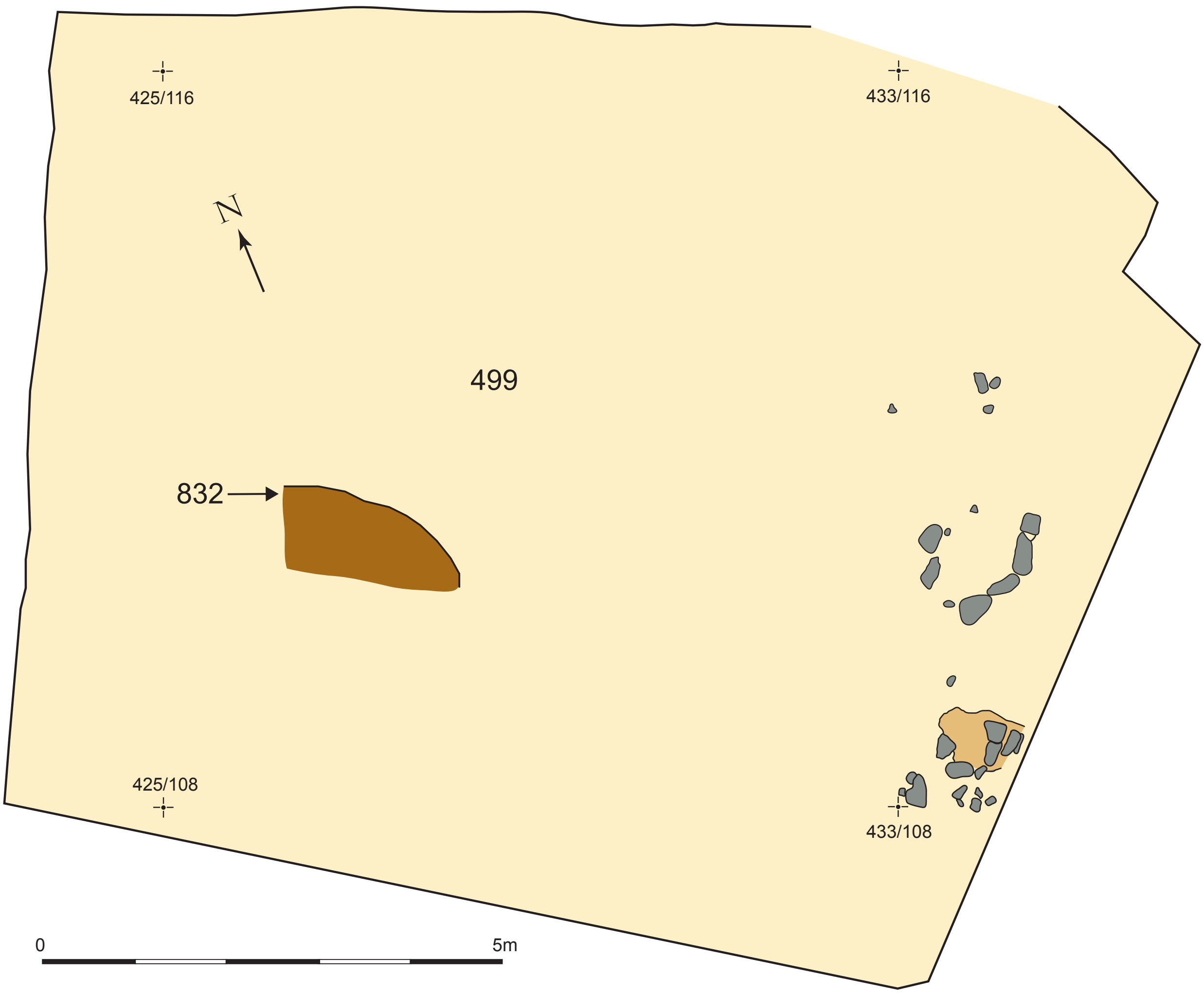


Figure 20. Plan of features visible below the wheelhouse

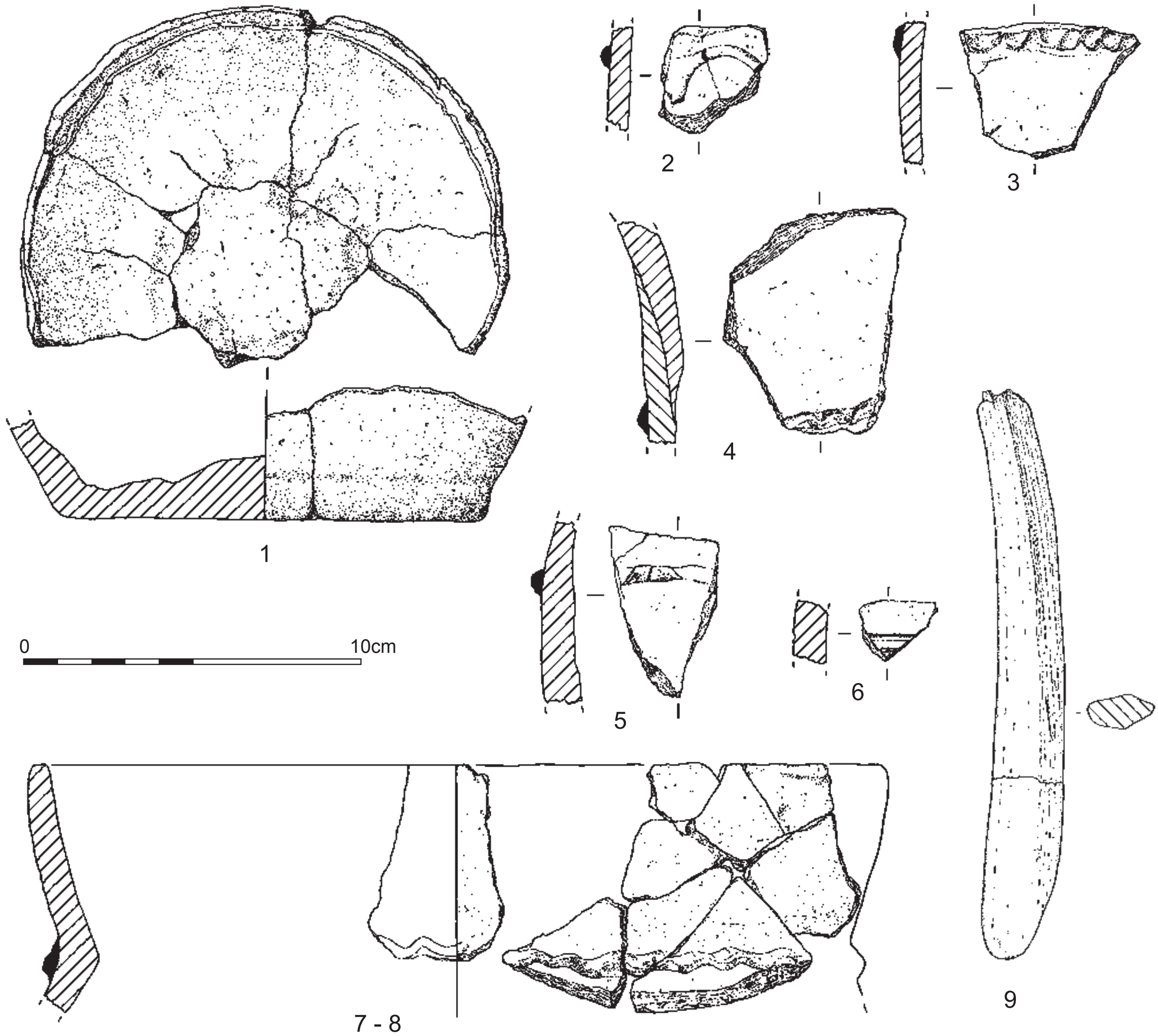


Figure 21. The pottery and a bone spatula (4758) found in the CA deposits

colour and depth below the surface and it is not clear if one single continuous layer is present. A particularly compact dark brown layer (832) with a high shell content was observed on the final day and hasty cleaning of this layer immediately prior to backfilling revealed an edge that appeared to define a circle, roughly 4 m in diameter, in the west corner of the trench (Figure 20). It seems likely that this is a floor layer inside a structure whose walls have been robbed out.

A number of structural stones were visible on the south-east side of the trench and these suggest the presence of another building distinct from that discussed above. The structure comprised an arc of four small orthostats (Figure 20). About one metre in front of this arc is a line of much smaller stones lying fairly loosely within 499. This structure has not been examined in any detail and no associated floor was identified. A brief clean of the area around the stones revealed some slight colour variations in layer 499 but owing to the dry weather these features could not be recorded in any detail.

Artefacts – A Smith, A Lane and K Harding

The number of finds recovered from CA was limited, as the deposits were not excavated. However, a few finds were exposed by the removal of the overlying layers and these were recovered to avoid damage during backfilling. These finds were all from 499 and comprise two bone artefacts, a spatulate rib point (4758; Figure 21, 9) and a bone point (2312), and 39 potsherds.

The pottery from CA consists of a small well-preserved assemblage (39 sherds) with an average sherd weight of 16g. Several groups of sherds conjoin and some are from a single vessel. A nearly complete base has a circle of deep

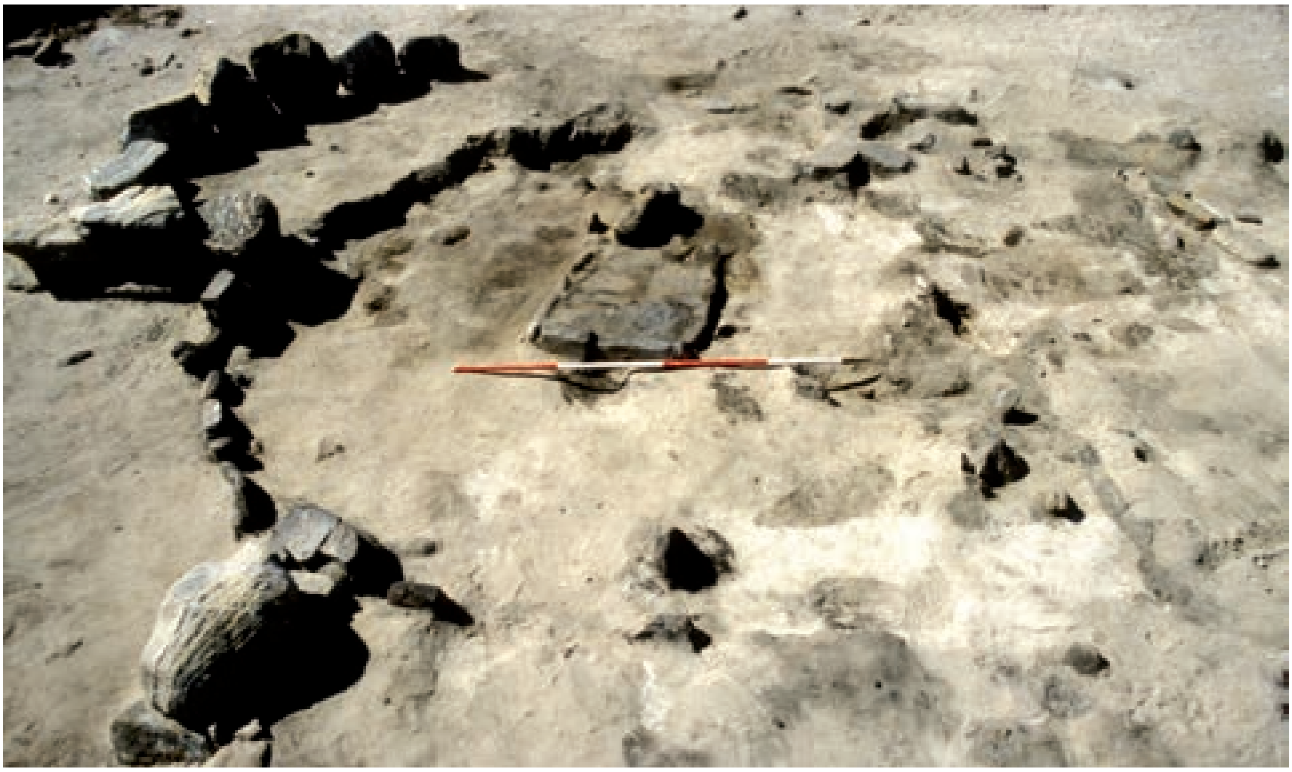


Figure 22. A view of the Late Iron Age house showing the primary hearth, the vestigial remains of the walling and the features cut into the underlying wind-blown sand.

fingermarks on its interior surface (Figure 21, 1). A group of rims and body sherds is from a flaring rim vessel with a cordon at the neck. The position of the cordon at the angle of the neck is reminiscent of earlier material such as that from Cnip phase 2 and phase 3 (Armit 2006, illus. 3.6, a, c and 3.14, c respectively), though the rim length in this instance is significantly longer (nearly double). These base sherds and rims might be from one vessel though this is not certain (Figure 21, 1, 7 and 8). The fabrics are slightly different from the later CB material and include some sherds with finer surface finish, including a few classed as fabric D fineware. The combination of construction technique, decoration and vessel form indicates that these sherds date early in the Late Iron Age, or Late Iron Age I according to Barrett and Foster (1991, 49). Flaring rims with cordons are typical of the Dun Cuier material in the area. Several sherds are from necks. Some applied cordons are from slight shoulders while one applied strip may be from a circle or semicircular swag (Figure 21, 2). One small sherd (2393) has a double incised line which is probably indicative of residual Middle Iron Age material (Figure 21, 6). The size of the other sherds and their unabraded condition suggest that they have not been trampled or scattered by post-depositional activity.

Animal bone – J Mulville and A Powell

A small quantity (24 fragments) of mammal bone and one bird bone were recovered from the surface cleaning of the pale yellow sand 499 (Table 1). Cattle and sheep were present in similar quantities. In terms of the relative abundance of body parts, cattle phalanges predominated and for sheep humerus fragments were most abundant. There was a single pig scapula and red deer was represented by a femoral fragment and an astragalus. The bird bone was an unidentified passeriform. A third of the mammal bone was gnawed and 4% had butchery marks, less than was found in the other stratigraphic blocks (although this may be a product of gnawing). No bone was burnt.

Context	499
Sheep	7
Sheep/Goat	4
Cattle	10
Pig	1
Red deer	2
Total	24
Passeriforme	1

Table 1. Animal and bird bone from CA

Conclusion – N Sharples

Despite the relatively restricted nature of the explorations

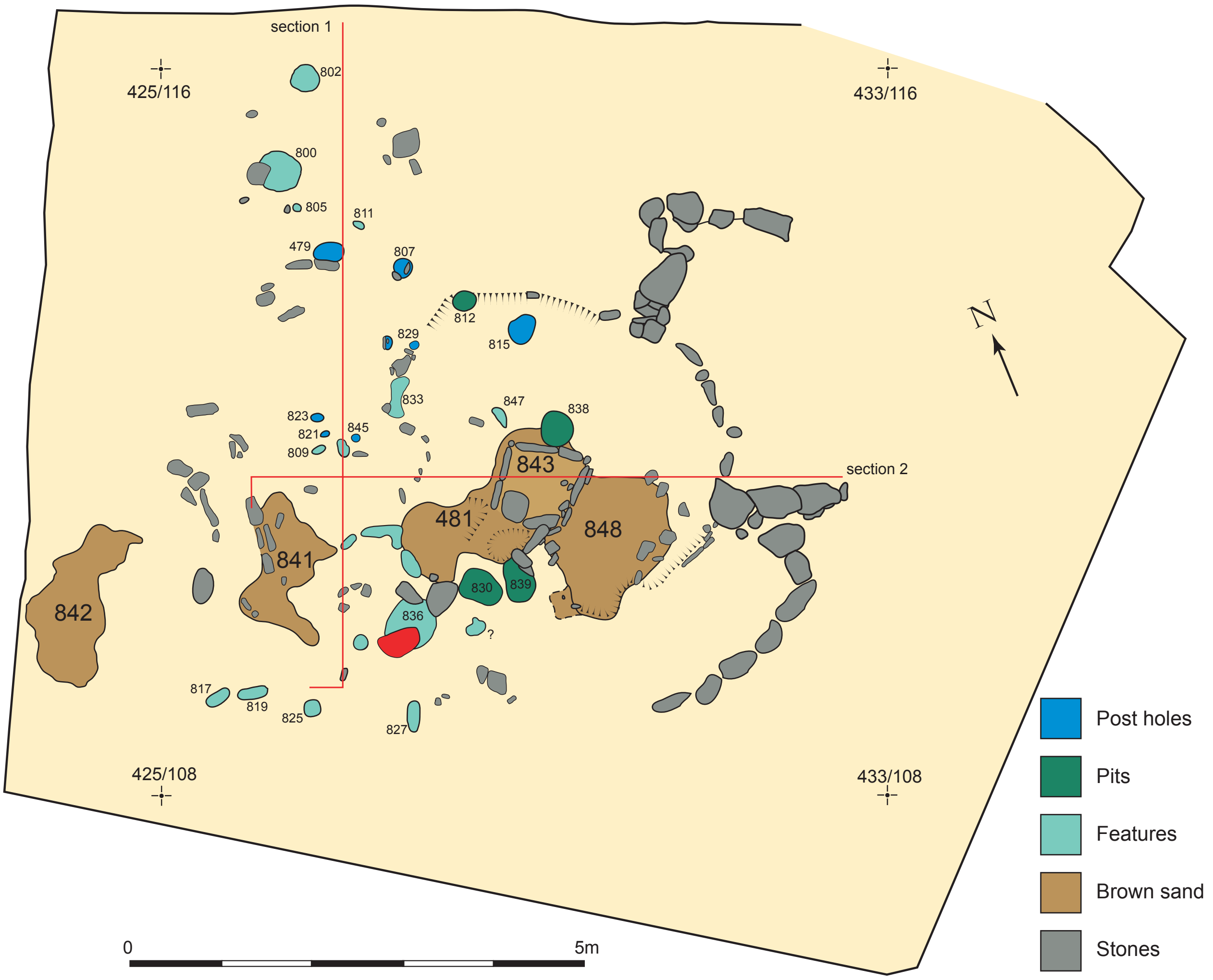


Figure 23. The structural remains and the sub-floor features of the Late Iron Age house (CB)

discussed above, it is clear that the Late Iron Age settlement described below was constructed on top of an earlier Iron Age settlement mound. The ephemeral remains of structures suggest extensive robbing has taken place but the presence of what appears to be a stratified floor indicates that potentially important deposits survive. It is not clear how deep these deposits extend or how early the settlement sequence at Bornais began but the deposits survive for further work.

Late Iron Age house (CB) – N Sharples

The Late Iron Age structure exposed by the excavations appeared to be a building burnt down and rebuilt at least once and then subsequently almost completely robbed of all its structural elements after it had been abandoned (Figure 22). Only short sections of the basal course of the walling survive and the overall plan can only be a cautious interpretation based on the vestigial remains of structures, occupation deposits and possible stone holes. As a result of this problem it was felt best to deal with the structural remains and occupation deposits as one stratigraphic unit.

The surviving structural features were restricted to the following: two groups of stones defining the inner wall face, two piers projecting from the inner wall face, an arc of small stones joining the ends of the piers, two rows of low stones which may be entrance thresholds and two hearths (Figure 23). The presence of two hearths and two entrance thresholds indicates that the house was reconstructed at least once. It seems clear that the east wall remained the same in both phases. However, the change in location of the hearth and the presence of two possible thresholds suggest that the west end of the structure was radically altered between the two phases.

House 1

The east side of the house was represented by three horizontal stones which form an arc behind a stone pier which projects into the interior. The pier is approximately 1.4 m long and 0.5 m wide (Figure 23). Only one course survived and this consisted of a single large slab with

Figure 24. A view of the primary hearth

several small slabs packed behind and in front of it. There is a slight gap between the pier and the wall but this is probably insignificant.

The south side of the house is defined by the best stretch of walling discovered – a continuous line of five substantial upright stones forms a well-defined arc of wall (Figure 22). These uprights comprised stones c. 0.6 m wide. At the east end of this wall is a pier projecting into the interior of the house. This pier was better preserved than the pier noted above and comprised two layers of substantial stone slabs. It extended 1.4 m into the interior and was noticeably trapezoidal in plan, 1.1 m wide at the wall and 0.5 m wide in the interior. The circle defined by these two arcs of walling is roughly 6.4 m in diameter.

The inner ends of the two piers were joined by a line of five small upright stones. The line was continued, 2.0 m to the west of the northern pier, by two stones and a noticeable scarp in the underlying pale yellow sand (499). Following this line round, two shallow features (829 and 834) and some associated small slabs may be a continuation. Similarly on the west side of the southern pier the line was continued initially by two to three upright stones and then by an irregular scarp for *c.*1.8 m. Overall this line follows an oval roughly 3.4 m by 3.8 m and creates a distinction between an interior core area and an external periphery divided by stone piers. The interior of the house is some 0.2 m lower than the periphery.

At the centre of this circle were the remains of a hearth (Figure 24). This was not excavated as there was not enough time to do so properly. It was roughly trapezoidal, 0.9m to 0.75 wide and roughly 1.1 m long. The north, east and south sides were defined by edge-set slabs, three to the north-west, two to the north-east and three to the south-east, whereas the south-west was left undefined. The north and east corners were marked by the presence of small rounded cobbles. The slabs projected 0.12 m above the floor of the house. Unlike the later hearth, this hearth had flat slabs laid across the interior. A thin ash layer (843) covered these slabs and formed a thick deposit immediately to the south of the hearth. The south corner of the hearth was marked by the presence of two prominent upright slabs which projected well above the surface of the hearth. These may have been the remains of a stone box with the east side removed during the occupation of the house.

The only structural evidence for the west wall of this house was a line of four stones, 0.9 m long, which lay directly west of the hearth (Figure 25). These comprised two flat slabs and between them two parallel upright slabs. All were placed with their tops level and were roughly

Figure 25. A view of the threshold stones

flush with the surface of the sand. These stones appear to represent the threshold of an entrance. Lying 1.4 m between the south end of this line and the hearth were a group of three shallow features (planned but not numbered) which appear to provide a link with the inner scarp and the access from the entrance.

Isolated features

Cutting the underlying sterile sand (499) were several features (Figure 26) that were only identifiable after the excavation of the overlying occupation layers (see below). These features appeared either as dark brown to black charcoal-rich contexts or as light brown sand. Clearly the first were the more obvious and climatic conditions– hot and sunny – made the recognition of the pale brown sand features difficult. The precise stratigraphic position of these features is also difficult to interpret. The charcoal-rich fill of many features suggests that these were either open during the destruction of the house or were dug through the destruction layer and backfilled with charcoal-rich sand from this layer. The latter scenario appears to be applicable to at least one pit. This pit (837) was located at the north-east end of the original hearth, close to the very centre of the house. The fill (838) contained large quantities of unabraded pottery sherds; during the excavation of the overlying charcoal layer, these had already been noted as a special context (478; Figure 27). Pit or post hole 480 also contained a mixture of burnt and unburnt mammal bone which suggests the feature, or its fill (479), originated after the house was burnt down and that material burnt during the destruction and fresh material were deliberately deposited in its fill.

There is very little pattern to the location of the features but to present the data they have been divided into four groups whose characteristics are summarised in Table 2.

The first group (480, 801, 803, 804, 806, 810, 813, 814) occurred in the north part of the trench and cut across the proposed wall line of House 1. Three features (480, 806 and 814) contained packing stones and appear to be post holes and together with 813 they form a rough line. Two others (801, 803) are arranged perpendicular to this line but appear to be pits rather than post holes. The remaining two features (804, 810) are insignificant and cannot be interpreted with confidence.

Arranged around the hearth were three very well defined pits with dark brown, sometimes charcoal-flecked sand fills; 837, in the middle of the north-east end, had large quantities of pottery in the fill, as mentioned above, whereas 831 and 840 at the south-western open end had few finds in their fills. Another feature (846) close to the north-west corner was well defined but slightly smaller than the previous features. There were no pits or post holes on either side of the hearth.

A group of features was located on the west edge of the house; two of these (828, 834) appeared to lie on the line of the inner scarp circle of House 1 and this was also marked by a few stones at this point. 834 was a shallow irregular gully and might have been a hollow created by the removal of upright stones similar to those adjacent to it. In contrast 828 resembles a post hole. The other four features formed a cluster to the west of these features. Three of these (808, 820, 822) were rather unconvincing features but 844 was a deep and well-defined post hole.

Along the south side of the house was a rough line of four features (816, 818, 824, 826) that all had similar

Cut	Fill	Fill colour	Depth (m)	Width/ Length (m)	Packing stones	Interpretation
Group 1 features						
803	802	Dark brown, charcoal flecks	0.2	0.3/0.35	No	Shallow pit
801	800	Dark brown, charcoal flecks	0.13	0.4/0.63	No	Shallow pit
804	805	Light brown	0.02?	0.17/0.21	No	Dubious feature
810	811	Light brown	0.04		No	Dubious feature
480	479	Dark brown, charcoal flecks	0.2	0.2	Yes	Post hole
806	807	Dark brown, charcoal flecks	0.25	0.3	Yes	Post hole
813	812	Dark brown, ceramics	0.3	0.36	No	Pit
814	815	Dark brown	0.35	0.35	Yes	Post hole
Group 2 features						
837	838, 478	Grey, charcoal flecks, ceramics	0.36	0.32	No	Pit
846	847	Dark brown			No	?
831	830	Dark brown	0.15	0.56/0.39	No	Pit
840	839	Dark brown	0.23	0.45/0.31	No	Pit
Group 3 features						
828	829	Dark brown	0.24	0.15	No	Post hole
834	833			0.44/0.23	No	Shallow irregular gully
844	845	Dark brown	0.13	0.11	No	Post hole
820	821	Dark brown	0.08	0.11	No	Post hole?
808	809	Dark brown	0.12	0.19	No	?
822	823	Brown	0.14	0.23	No	Post hole?
Group 4 features						
816	817	Light brown	0.04	0.36/0.27	No	Stone hole
818	819	Light brown	0.02	0.41/0.20	No	Stone hole
824	825	Dark brown	0.04	0.23/0.20	No	Stone hole
826	827	Dark brown			No	Stone hole
835	836	Light grey	0.06	0.54	No	Stone hole

Table 2. A summary of the characteristics of the features associated with the Late Iron Age house

characteristics. They were shallow elongated scoops that may indicate the former location of stones. The remaining feature 835 was a shallow feature which is best interpreted as the location of a horizontal slab. This lay inside the proposed wall line and was amongst a concentration of stones that may indicate the position of a pier. Immediately to the north of these features were three other shallow scoops which were not numbered. These might indicate the position of stones following the inner line of the original house.

Occupation deposits

The occupation of House 1 is represented by a complex deposit comprising the vestigial remains of an original floor layer and a thick deposit of charcoal-rich sand (457), containing a large number of carbonised timbers (Figure 28), which was covered by a secondary floor.

Occupation layers associated with the primary hearth were surprisingly patchy and difficult to define. Two layers were identified on either side of the hearth. To the south between the hearth and the scarp, defining the inner core area, was a brown sand (848) which was not excavated. To the west a compact red-brown sand (481) extended as far as some features defining the inner core. Both these layers were restricted to the south side of House 1 but it is possible that they were originally more extensive and that north of the main baulk they were removed, as part of layer 457. However, there was certainly no sign of this layer in the raised area between the piers. The only primary deposits in the peripheral area were a layer of coprolite (465) covering an area *c.*0.5 m in diameter, to the north of the southern pier and a brown sand (841) around the possible threshold stones defining the west entrance. An isolated patch of orange sand (474) and an unexcavated layer of dark brown sand (842) may be

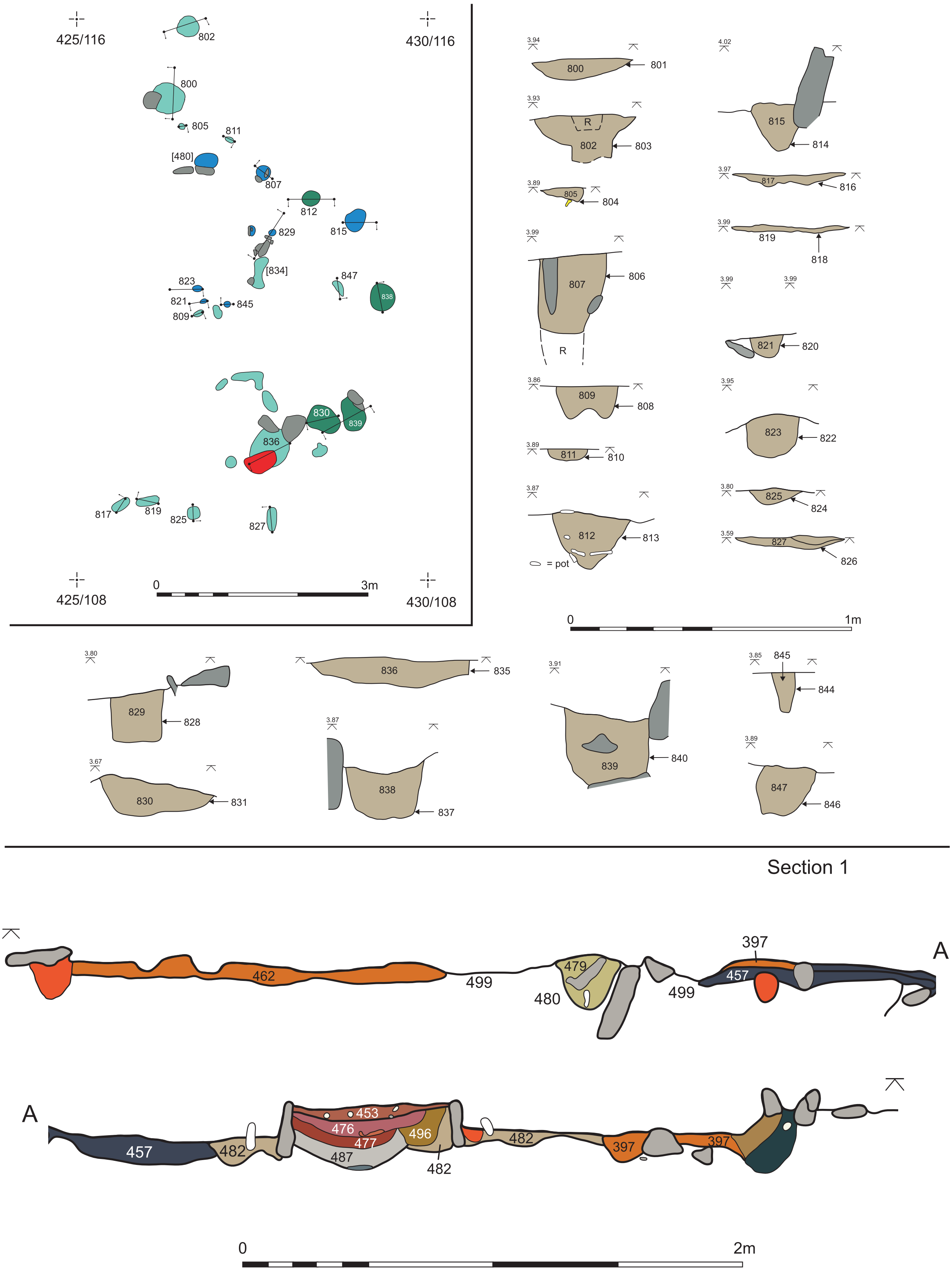


Figure 26. Sections through the sub-floor features and the house floor; the section also shows the hearth in House 2

related to the earliest occupation of the house but they are not stratigraphically linked to the main sequence in this trench. The coprolite layer (465) produced a cattle phalanx that was radiocarbon dated: SUERC-7636 has a radiocarbon age of 1565±35 BP which when calibrated indicates that this layer was deposited between cal AD 410–570 (95% probability).

Figure 27. Large slabs of pottery in pit 837

Charcoal layer

Sealing the occupation features noted above was a thick

Figure 28. A view of the charcoal layer 457 during excavation

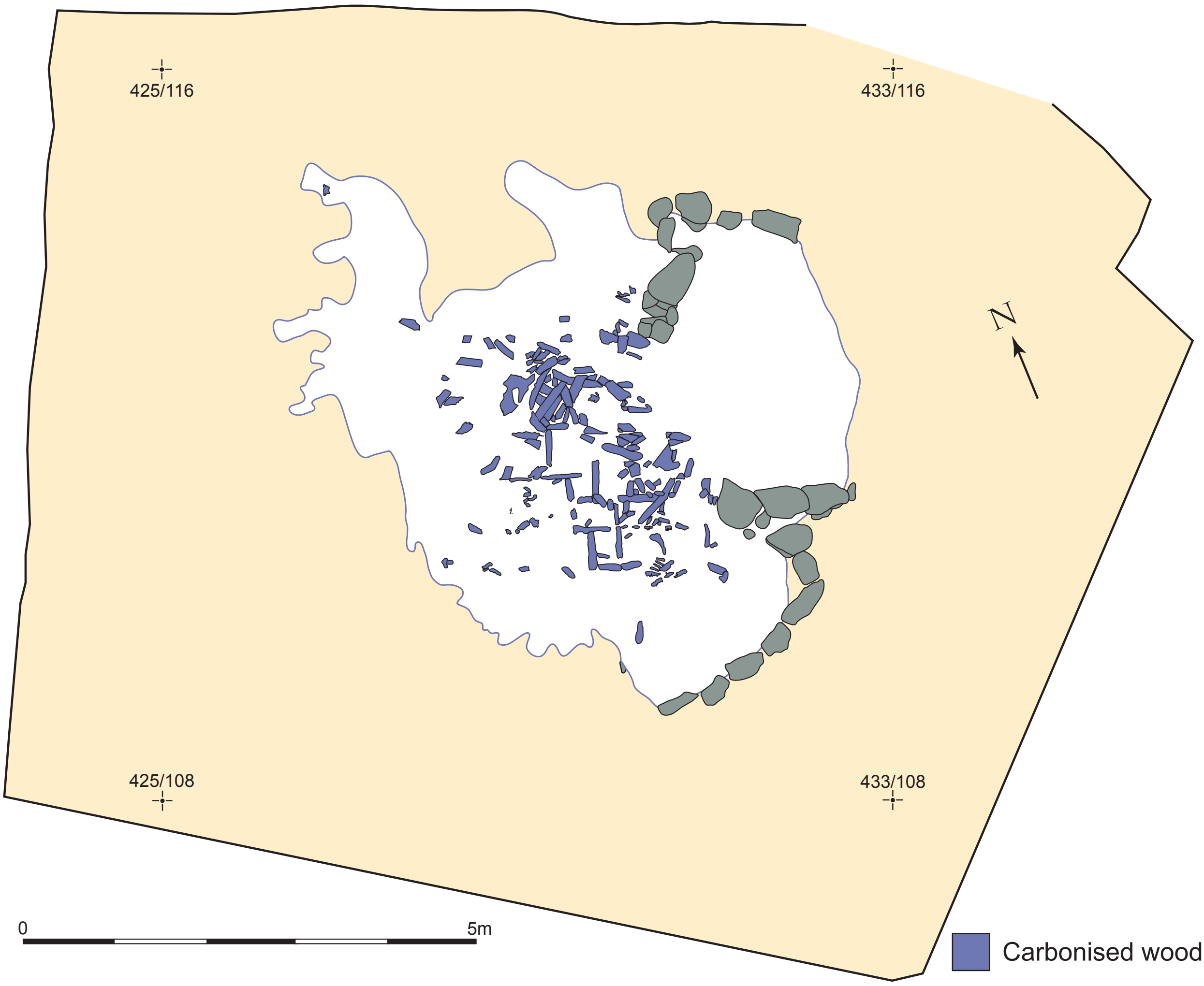


Figure 29. The charcoal layer 457 showing the carbonised roof timbers

layer of charcoal-rich sand (Figure 29, 457). It was difficult to separate this layer from the overlying layer of orange-black sand (397) which represented the floor of House 2. Often this ashy layer dipped down and appeared to be covered by the black charcoal sand. This mixing is not surprising if one considers that the charcoal layer was a layer of relatively soft sand which one would expect to be churned up by any movement of people after it had been formed. Within the charcoal layer were large quantities of carbonised timbers and other fragments of burnt wood (Figure 29). These timbers were scattered across the centre of the house with only a few outliers in the peripheral area between the piers. To the north of the central baulk little pattern to these timbers was visible.

Figure 30. A detailed view of the rectangular arrangement of timbers

To the south of the baulk a more distinctive pattern was visible – the timbers appeared to be arranged in a rectangular grid. There were three discontinuous timbers oriented roughly north–northeast to south–southwest and two perpendicular to these (Figures 29, 30). These timbers though not continuous did seem to interweave.

The edge of this charcoal layer defines the position of the wall of the house between the two surviving piers. The line to the west of the northern pier is difficult to follow. Initially the line appears to continue the arc of a circular building but there is then an extension of the charcoal layer that projects to the north. However, the character of the deposit in this extension was quite different to that in the central area; it was thinner and more patchy. To the west of the southern pier the charcoal layer was found abutting the wall stones. However, the end of this line was marked by a sharp inturn in the edge of the charcoal which suggests the presence of a pier that has been completely robbed. The edge of the charcoal layer then continues along a line which continues the arc of stones separating the interior from the periphery.

The charcoal layer was removed using a grid of 0.5 m squares (Figure 31) which facilitated the examination of the distribution of artefactual and environmental material within this deposit. Four radiocarbon dates were obtained from within this charcoal layer. SUERC-7644 came from a concentration of flax seeds in sample square 9014 and has a radiocarbon age of 1550±35 BP which calibrates to a date cal AD 420–590 (95% probability). SUERC-7646 came from a concentration of *Rumex* sp. seeds in sample square 9007 and has a radiocarbon age of 1585±35

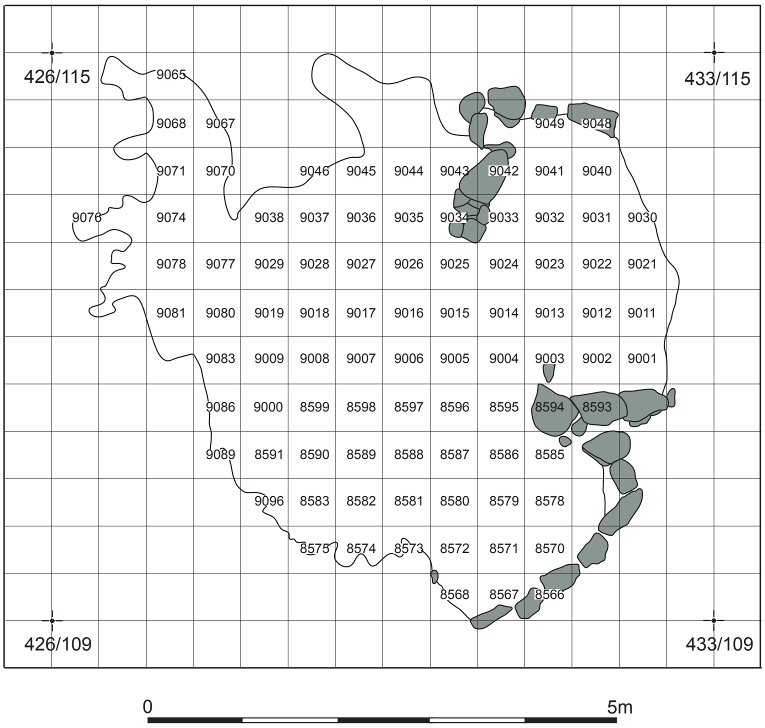


Figure 31. A sample number plan of floor 457

Figure 32. Feature 470, an arc of yellow sand within the charcoal layer (457)

BP which calibrates to a date of cal AD 400–560 (95% probability). SUERC-7647 came from a concentration of barley grains in sample square 9018 and has a radiocarbon age of 1505±35 BP which calibrates to a date of cal AD 430–490 and cal AD 500–640 (95% probability). SUERC-7648 came from a concentration of barley grains in sample square 9029 and has a radiocarbon age of 1570±35 BP which calibrates to a date of cal AD 410–570 (95% probability).

Within the charcoal layer were patches of light brown and yellow sand (467, 486) and pale yellow sand (484). A more unusual feature was an arc of orange sand (470) immediately in front of the north pier (Figure 32). Features 467 and 470 were low in the charcoal layer and perhaps represent activity associated with the use of the house rather than its destruction. However, 484 and 486 definitely lay over the carbonised planks.

Interpretation

The structural remains of House 1 are poorly preserved but nevertheless it is likely that they represent the remains of a wheelhouse with a maximum internal diameter of approximately 6.4 m. The central space is defined by a kerb of small upright stones and the peripheral space is sub-divided by V-shaped piers which define rooms up to 2.6 m wide and 1.3 m deep. The curve of the east wall and the presence of stone piers are clear and there are very few alternatives to this interpretation.

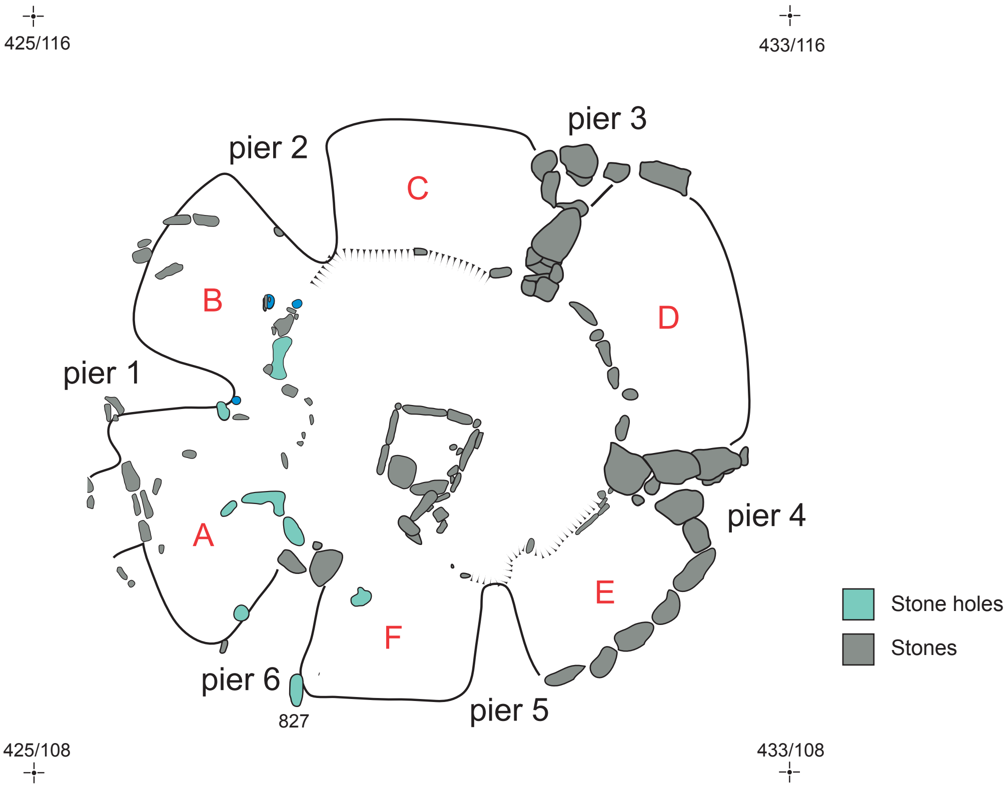


Figure 33. An interpretive plan of the wheelhouse

An interpretive plan of the building as a wheelhouse is presented in Figure 33 and it is important to outline the evidence and guesswork that this is founded upon. Only two of the piers survive (3 and 4) but the presence of a third (pier 5) can be fairly accurately defined by the south-western edge of the charcoal layer. Pier 6 is a more nebulous creation but a large flat stone and a shallow feature which might be a stone hole (835) suggest the location of this pier. Piers 1 and 2 are almost completely conjectural. Pier 1 sits on top of three small features 808, 820, 822 which might be relevant; pier 2 meets the inner scarp at a point where it makes a marked change in direction. Both these pier locations avoid the charcoal layer. The edge of the central area is fairly well defined in places by *in situ* upright stones, in other areas by a distinctive scarp, the edge of the charcoal layer and, on the west side, by several features which might be stone holes. The edge of the outer wall is less clear: on the south and east side it is defined by upright slabs and the edge of the charcoal layer but the rest of the wall line is more or less an arbitrary curve joining these points to the stones interpreted as an entrance threshold. This line is only crossed by the charcoal layer at one point between piers 1 and 2. This might be a result of later disturbance but it is also possible that it might indicate a passageway, possibly leading into buildings to the north.

The charcoal layer can be interpreted as the result of a massive fire which destroyed the house. The carbonised timbers could be:

1. The main timbers that covered the central roof space and supported a turf roof.
2. The remains of a timber floor or the supports for a more flimsy organic floor.
3. The remains of collapsed upstanding timber partition(s).

The evidence of structured patterning to the south of the baulk is important but it could be a result of all three scenarios. The sheer volume of timber and the absence of clearly associated post holes suggest the third scenario is unlikely. To become carbonised these planks would have to have been set alight and then sealed in an oxygen-free environment. This would most likely have been caused by the collapse of a turf roof but, again, it does not help to distinguish between the remaining two alternatives as a roof could collapse on itself or onto a floor.

Two features suggest the planks represent a collapsed roof structure. Firstly, the planks cover the primary hearth and cannot therefore represent a primary floor. Secondly, no planks were found in the peripheral zone between the piers. If this house was a wheelhouse then one would expect these areas to have had a corbelled stone roof with only the central area covered by a timber and turf roof. However, the peripheral area was covered by a thick layer of charcoal-rich sand. It was also noticed that two patches of yellow sand were found overlying timbers and it is difficult to see how these would be present within the roof. The greatest problem with the interpretation of this

Figure 34. A cluster of hammerstones, animal bones and antler at the base of charcoal layer 457 close to the edge of the floor

Figure 35. A view from the south when the House 2 was exposed at the beginning of the 1999 season of excavation

structure as a roof deposit is the presence of large numbers of artefacts within the layer. These include animal bones, including relatively intact long bones, many bone tools and clusters of hammerstones (Figure 34). A possible interpretation of the artefacts' presence is that they were stored in the rafters of the roof or hung in bags from the roof.

House 2

This house involved the retention of the south and east arc of wall and at least piers 3 and 4 (Figures 35, 36). The new structural features included a hearth (Figure 37), built to the west of the original hearth, just inside the entrance

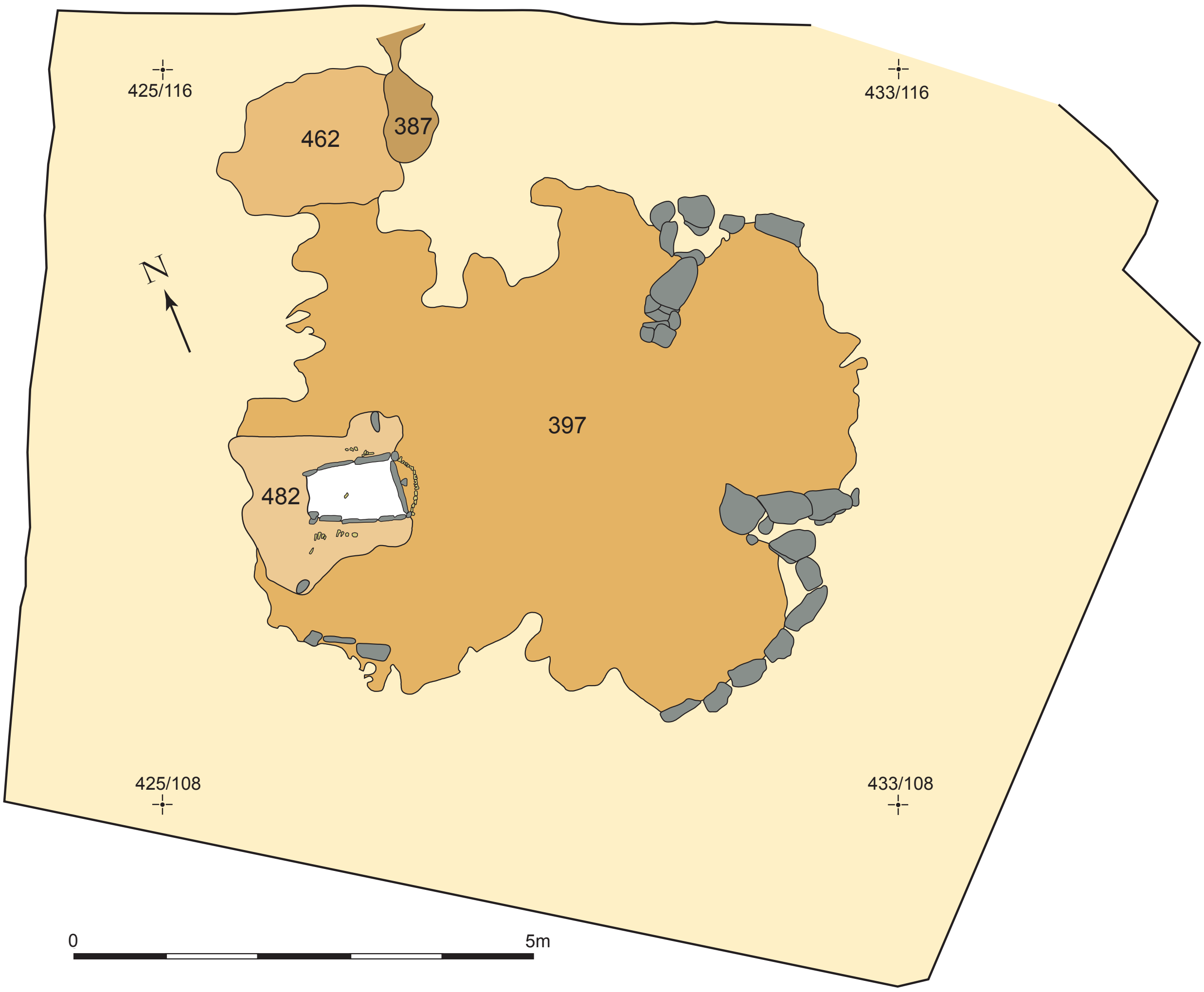


Figure 36. A plan of the extent of floor 397 and associated layers 462 and 482

of the original building, and a new entrance directly south of this hearth. Both these features cut through the charcoal layer.

The entrance threshold lay on the west side of the structure and was a line, 0.9 m long, of three small edge-set slabs. The upper edge of these slabs was level, about 0.2 m above the floor surface, and apparently rounded and smoothed. The height, the desire to make the slabs level and the evidence for wear all indicate that this was an entrance threshold. These stones were set in a trench or slot cut through the charcoal layer (457).

The hearth is trapezoidal, 0.75 to 0.55 m wide and 1 to 1.1 m long (Figures 37, 38). Three sides are defined by edge-set slabs (489) but the west end is open. The north side comprised three slabs, the south side four slabs and the east end a single slab. At the north-east and south-east corners were two rounded pebbles. Springing from these corner stones was an arc of 14 cattle metapodials (metacarpals and metatarsals), set so that their distal ends protruded above the surface of the floor (Figures 37; 203). Lines of metapodials also lay parallel to the north and

Figure 37. A view of the secondary hearth from the east showing the arrangement of cattle metapodials

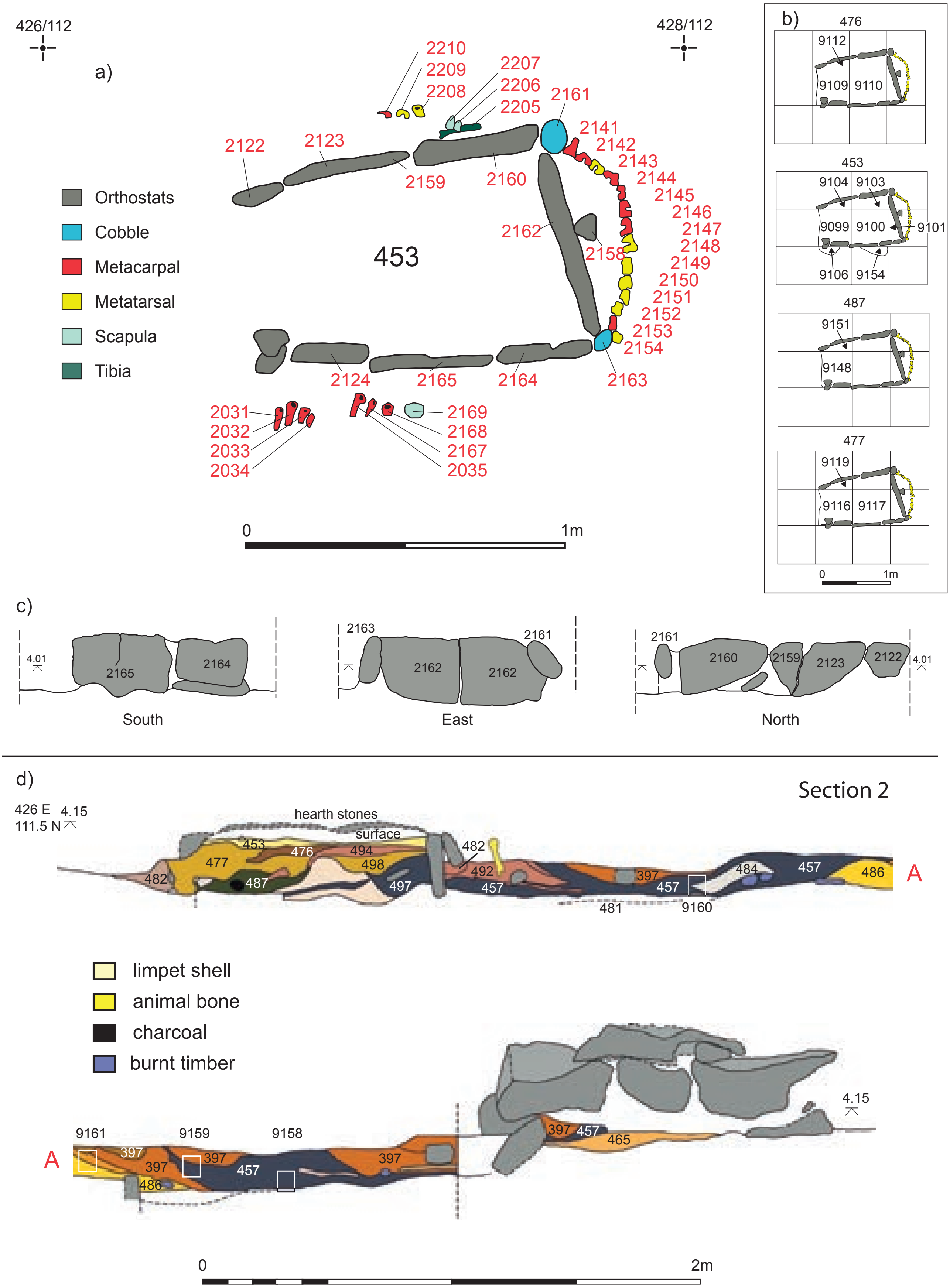


Figure 38. A plan of the hearth showing a. the detailed arrangement of cattle metapodials; b. the sample plans of the layers infilling the hearth; c. external elevations of the hearth stones; d. section 2 an east-west section through the hearth and floor deposits (located on Figure 23)

Figure 39. A view of the metapodials on the south side of the hearth

Figure 40. A view of the metapodials at the east end of the hearth during excavation

south sides of the hearth the majority of which retained their proximal end but had been split with the exposed distal end worn away. The northern line consisted of three metapodials, two fragments of scapula blade (one worn) and a sheep tibia; the southern line consisted of seven metapodials and another scapula blade fragment. A radiocarbon date was obtained from a cattle metapodial in the southern line (Figure 38, 2035). OxA- 15416 has a radiocarbon age of 1530±28 BP which calibrates to a date of cal AD 510–590 (95% probability).

The hearth was a stone box. It was constructed in a shallow scoop (Figure 36), cut into the charcoal layer (457), which was filled with a brown sand (482). On the north and south sides of the hearth the stones (489) were set 0.25 to 0.3 m inside the edge of this feature. To the west of the hearth the layer of brown sand extended at least 0.75 m in front of the hearth. The hearth stone that defined the east edge sat flush against the edge of the scoop. The hearth stones were held in place by mounding up sand against the inside edge. This sand layer was in places indistinguishable from 482 but in other areas a dark brown sand (496, 497) was used. The cattle metapodials to the north and south of the hearth were embedded within brown sand (482; Figure 39) but to the east they were embedded in an ash layer (492; Figure 40) which is equivalent to the floor layer (397).

The deposits inside the box that relate to its use as a hearth can be split into two sequences. The east end of the hearth appeared to contain *in situ* deposits, whereas the west end contained ash material dragged out from the east end (Figures 26, 41). The sequence begins with an orange-yellow sand (498) which was overlain by a vivid pink/orange sand (494). This formed a bowl with a depression in the middle and was more orange at the edges. This was the highest layer in the east end and appeared to be stratigraphically equivalent to the lowest layer, a patchy red-brown sand (487), in the west end. Above this was a thick yellow sand (477) with charcoal flecks, which was in turn overlain by a more restricted dark brown sand (476). The final layer covering both sides of the hearth was orange sand (453). This had a conspicuous patch of unburnt shells above the west end of the hearth which is very similar to a patch of shells visible in the hearth of the earlier house. Close to the cluster of shells was an unburnt red deer calcaneum and this was used to obtain a radiocarbon date. Two duplicate determinations were made from this bone (OxA-15417 and OxA-15418); these produced comparable radiocarbon determinations of 1481±27 BP and 1493±27 BP which produced a combined calibrated date of cal AD 540–625 (95% probability).

Figure 41. A section across the hearth showing the ash layers infilling the hearth box

The principal occupation deposit associated with the use of House 2 was a compact orange-black sand layer (397/306). This was a very patchy layer and, as has already been noted, it was very difficult to separate it from the underlying destruction layer 457. In many places a layer of charcoal had to be removed to identify a red sand layer. It is clear that a considerable mixing of these different layers took place and this is presumed to reflect the problems of reoccupying a building that has been burnt down. Indeed, the orange-black sand may be a deposit created by the burning down of the structure. However, it has clearly been reused to create a deliberate surface. The layer was excavated in 0.5 m squares in order to accurately locate the material present within the layer (Figure 42). Two radiocarbon dates were obtained from material in this

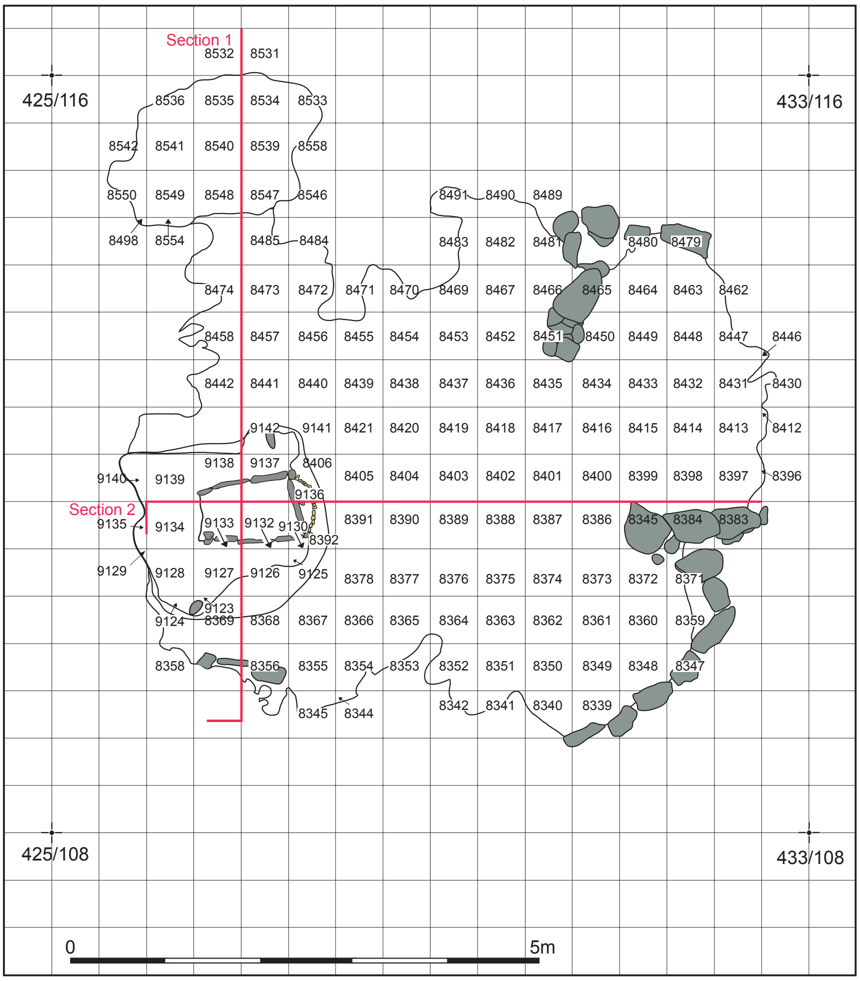


Figure 42. A sample number plan of floor 397 etc.

layer. SUERC-7642 was obtained from a concentration of barley grains in sample square 8365 and has a radiocarbon age of 1580±35 BP which can be calibrated to produce a date of cal AD 400–560 (95% probability). SUERC-7643 was obtained from a concentration of barley grains in sample square 8403 and has a radiocarbon age of 1545±35 BP which can be calibrated to produce a date of cal AD 420–600 (95% probability). To the north of the hearth a thick deposit of red ash was used to create a firm footing for the arc of cattle metapodials (inside the metapodials this red layer was numbered 492 with a slightly more orange sand, 447, on top). A couple of small patches of yellow sand (459, 460) were found within this layer.

To the north of the house directly in line with the hearth were two discrete patches of compact orange-black and brown sand (462 and 466). The position of these might indicate the location of another entrance opposite that indicated by the threshold slabs. Immediately to the west of these two layers was a small patch of dark brown sand (471). The final outlier was a more extensive layer of dark brown sand (847) which occured against the west edge of the trench; this was separated from the main floor layer, and may be unconnected with the structure.

The precise size and shape of this house is as difficult to distinguish as it was for the earlier house. The west side was badly damaged by recent erosion and the north side was patchy and irregular. If one accepts the identification of the threshold and the nearby corner stone as surviving remnants of the south side of the house then this creates a fairly straight edge. It could therefore be argued that the house was similar in shape to the hearth, with a rounded east end, two straight sides and a straight west end. The damage to the west end is too severe ever to be certain of the shape but it seems likely that this was not a standard wheelhouse.

Micromorphology – K Milek

Four undisturbed block samples for micromorphological analysis were collected from the south-facing section of a small north-west to south-east baulk in the middle of the Late Iron Age structure (from east to west: samples 9158, 9159, 9161, 9160). These samples captured the patchy occupation deposits associated with House 1 (contexts 481 and 848), the thick charcoal-rich layer thought to have formed when the first structure burnt down (457), discrete patches of yellow sand within the charcoal layer (contexts 484 and 486), and the occupation deposit associated with House 2 (397). The location of the section from which the samples were taken is seen in Figure 23, and the section drawing showing the locations of the samples is Figure 38.

Micromorphological analysis was aimed at the provision of microscopic evidence for activities associated with the occupation of both House 1 and 2, for whether collapsed turf roofing materials formed a component of the charcoal layer, and for whether the yellow patches of sand within the charcoal layer had collapsed onto the floor with the roofing materials or whether they had been deliberately dumped. Micromorphology descriptions, which are summarised in Tables 3 and 4, therefore focused on the characteristics considered to be the most diagnostic: the microstructure and porosity of the sediment, which can provide an indication of compaction under a vertical load (*e.g.* by trampling), the proportion of calcium carbonate ($CaCO_3$) shell sand in the groundmass, which at Bornais proved useful for distinguishing the origins of layers, the nature of the fine (organo-) mineral material in the groundmass and of pedofeatures such as nodules and coatings and infillings of voids, which can indicate the presence of ash or coprolites and natural soil formation processes, and, of course, all organic and anthropogenic components. The results presented here concentrate on the micromorphology data that are most germane to the archaeological questions outlined above. In addition, it should be noted that bones in the same size range as the sand grains in thin section (250–500 µm), and which were rounded by mechanical weathering or rolling, were considered likely residual components of the sand dunes themselves, and were not included in the quantification of anthropogenic inclusions.

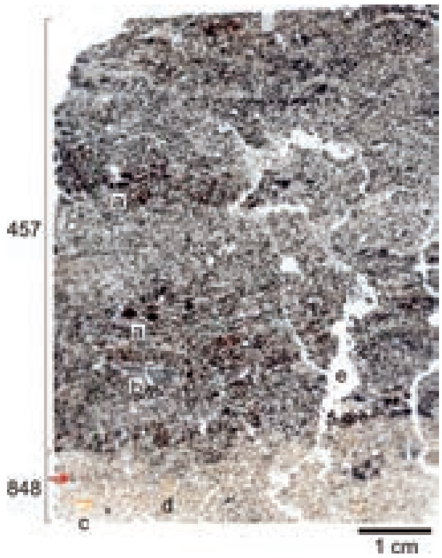
Primary floors 481 and 848

Two occupation deposits associated with House 1 were captured at the bottom of micromorphology samples. South-east of the central hearth, the brown sand 848 was present in the lowermost 16 mm of sample 9158 (Figure 43a and Table 3). The composition of this layer closely resembled the natural carbonate sands of the machair sand dunes previously studied in micromorphology samples from mound 3 at Bornais (Milek 2005), being dominated by well-sorted medium sand (250–500 µm) composed of 30–40% calcium carbonate (shell) sand, *c.*30% quartz, and *c.*30% feldspar. There was also a minor component of other minerals, including gneiss, hornblende and polycrystalline quartz. The sand was very porous (*c.*40% porosity), and the layer exhibited none of the horizontal planar voids or platy structure normally used as evidence for compaction by trampling. This could mean that the layer experienced little vertical compression; it should be noted, however, that it is most common for compaction features to be expressed in floors with a silty matrix, while 848 contained very little mineral material in the clay or silt size range. The ratio of coarse to fine material was only 90/10.

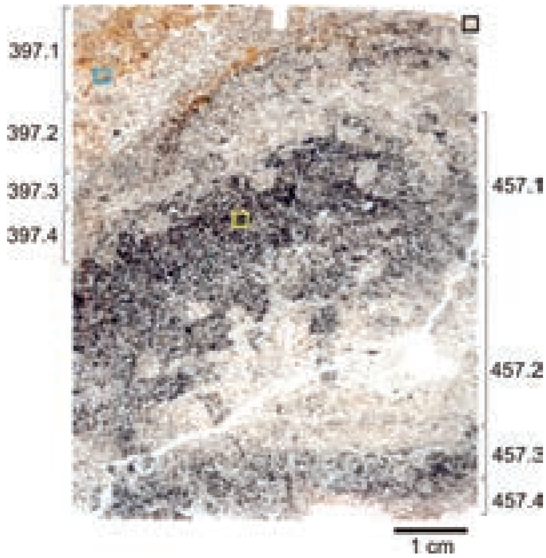
The best indication that context 848 was an active floor surface was a 2 mm-thick lens in which the sand was embedded in a higher concentration of fine organo-mineral material, including charred organic matter. Within this lens there was a localised *porphyric* microstructure (coarse grains embedded in fine material) in a layer that was otherwise characterised by a *bridged grain* microstructure (sand grains linked together by small bridges of fine material). This fine lens, seen clearly at the bottom of Figure 43a, was almost certainly created by trampling on the floor surface. The only anthropogenic inclusions captured by the thin section were bone fragments, at least one of which, a mammal or bird bone 2.5 mm in size, was too large to be anything but an anthropogenic inclusion. The micromorphological evidence therefore supports the interpretation that the primary building was a domestic structure, where, among other activities, meat was processed and/or consumed.

To the west of the central hearth of House 1, the compact red-brown sand 481 was captured in the lowermost 20 mm of sample 9160. In thin section, context 481 was divided into upper and lower microstratigraphic units on the basis of differing proportions of organic matter and sand and different concentrations of rubified iron nodules, which are probably derived from burnt soil material, burnt turf, or peat (Table 4). The lowermost part of context 481, which was designated 481.2, closely resembled the natural dune sands described above, except that it contained a higher proportion of dark brown fine organo-mineral material (30%) in the form of minute microaggregates, coatings and bridges between the sand grains. Most of this fine material consisted of organic matter that was so heavily decomposed that it was amorphous, lacking any surviving cell structure. A very small proportion (*c.*2–5%) of this amorphous organic matter was black and glittery when observed in oblique incident light, and could therefore have been charred, but this material is present in the form of rounded aggregates that are likely to have been carried downward by bioturbation from the charcoal-rich layers above. On the basis of the high proportion of amorphous organic matter, 481.2 is likely to be the remnant of an A horizon (topsoil) that had developed on the carbonate sands within the machair dune system. This A horizon was either the contemporary ground surface of the Late Iron Age structure, or, if the structure was dug down slightly into the machair, it could be the remnant of a palaeosol that had been buried by sand drift as the dune system developed (Gilbertson *et al.* 1999).

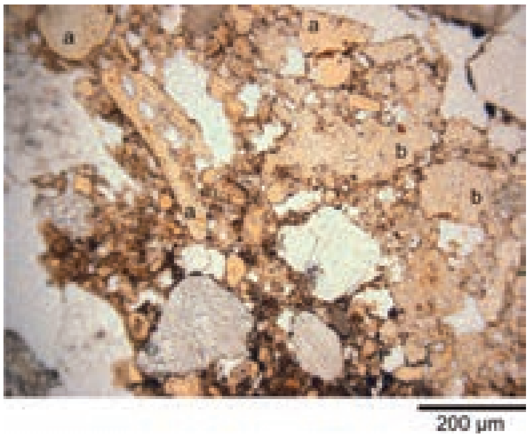
The uppermost 10 mm of 481, which was labelled as 481.1, contained the same high proportion of amorphous organic matter, which suggests it was formerly an A horizon, but in addition it contained several components that distinguish it as a floor surface. The overall proportion of fine organo-mineral material was higher, boosting the coarse/fine ratio to 50/50, and the fine material contained



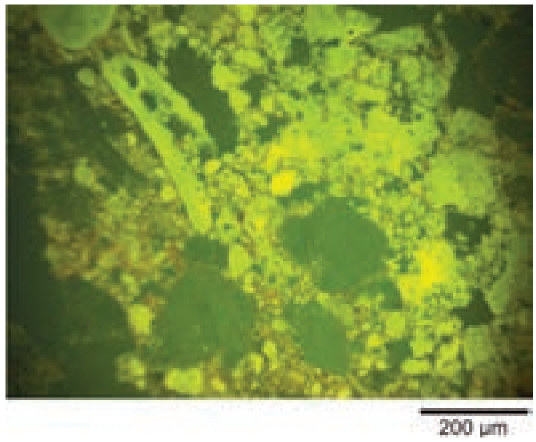
a) Thin section 9158, showing the horizontal lensing of charred organic matter in context 457 and 848 (red arrow); (a) charred plant stems and leaves; (b) charred conifer wood; (c) bone; (d) shell; (e) post-depositional earthworm channel.



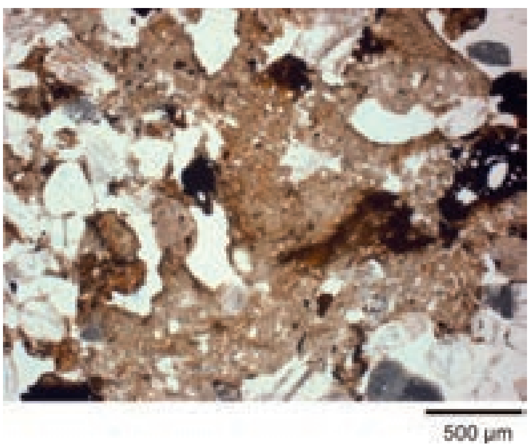
b) Thin section 9159, showing that both contexts 397 and 457 contained a series of sub-horizontal lenses alternating with cleaner sand. Black box: detail in Figure c-d. Blue box: detail in Figure e. Yellow box: detail in Figure f.



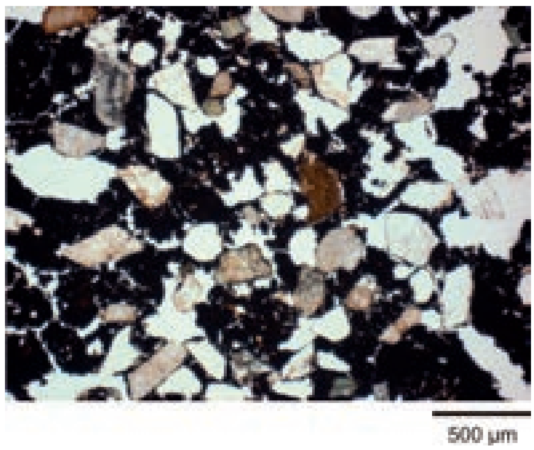
c) Context 397.3, a lens of carnivore excrement; (a) digested bones; (b) phosphate nodules.



d) As figure c, showing fluorescence of phophatic excremental material under UV light.



e) Context 397.1, a lens of peat ash. The grey-brown fine material is dominated by phytoliths and diatoms



f) Context 457.1, burnt turf. The black fine material is dominated by charred amorphous organic matter (decomposed) and recognisable plant tissues.

Figure 43. Soil micromorphology samples through the charcoal layer 457 and secondary floor 397

Sample	Layer and microstratigraphic unit	Maximum thickness in thin section	Microstructure and Porosity: Microstructure	Microstructure and Porosity: Porosity	Groundmass – Mineral Components: Texture class and sorting	$C/F_{(100\ \mu m)}$ ratio	$C/F_{(100\ \mu m)}$ related distribution	Ratio of $CaCO_3$ (shell) sand to other	Nature of fine material (PPL)	Birefringence fabric of fine material (XPL)	Groundmass – Organic and Anthropogenic Components: Charred wood tissues	Charred plant tissues	Amorphous fine org matter	Charred amorphous fine organic matter	Phytoliths	Diatoms	Bone	Pedofeatures: Rubified iron nodules	Yellow phosphatic nodules	Calcitic coatings/ infillings	Excremental pedofeatures
9158	457	6.0 cm	Chamber and subangular blocky	■■■ ■■	Poorly sorted fine to medium sandy silt loam	40/60	Single spaced porphyric	10/90	Black; opaque; charred amorphous organic matter with embedded silt grains	Undifferentiated and localised speckled	■■	■■■	■	■■■■■			+	+		+	■
	848	1.6 cm	Bridged grain	■■■■■■■	Well sorted medium sand	90/10	Concave gefuric, localised porphyric	40/60	Dark brown to light greyish brown; dotted; embedded charred organic matter and silt-sized $CaCO_3$ (micrite)	Crystallitic and localised undifferentiated		+	■■	■■			■	+			+
9159	397.1	0.7 cm	Vughy	■■■■	Poorly sorted fine to medium sandy silt loam	40/60	Close single spaced porphyric	10/90	Light greyish brown to dark brown; dotted; embedded phytoliths, diatoms, silt grains	Speckled					■■■■	■	+	■■■■			+
	397.2	0.5 cm	Bridged grain	■■■ ■■	Well sorted medium sand	95/5	Concave gefuric	30/70	Dark brown; dotted; organic pigmentation	Speckled							+	■■			
	397.3	0.4 cm	Vughy (regular and star-shaped) and bridged grain	■■■ ■■	Poorly sorted fine to medium sandy silt loam	60/40	Concave and convex gefuric; porphyric	40/60	Black and opaque to yellow and dotted; mainly amorphous organic matter and phosphatic nodules	Undifferentiated and localised speckled		+	■■■■	■■			■■		■■■■		+
	397.4	1.3 cm	Bridged grain	■■■ ■■	Well sorted medium sand	95/5	Concave gefuric	30/70	Black; opaque; mainly charred amorphous organic matter	Undifferentiated	+		■	■■							+
	457.1	2.7 cm	Chamber, sub-angular blocky	■■■■■■	Poorly sorted fine to medium sandy silt loam	30/70	Single spaced porphyric	15/85	Black; opaque; charred amorphous organic matter with embedded silt grains	Undifferentiated and localised crystallitic		■■■	■■	■■■■■■				+			■
	457.2	2.0 cm	Single grain	■■■ ■■	Well sorted medium sand	95/5	Coarse monic, fine enaulic	40/60	Black; opaque; mainly charred amorphous organic matter	Undifferentiated				■■							+
	457.3	0.5 cm	Chamber, sub-angular blocky, crumb	■■■■■■	Poorly sorted fine to medium sandy silt loam	60/40	Single spaced porphyric, fine enaulic	15/85	Black; opaque; charred amorphous organic matter with embedded silt grains	Undifferentiated		■■	■■	■■■■							■
	457.4	0.5 cm	Intergrain micro-aggregate	■■■■■■	Poorly sorted fine to medium sandy silt loam	60/40	Single spaced fine enaulic	2/98	Reddish brown; opaque; amorphous organic matter with embedded silt grains	Undifferentiated	+	■	■■■ ■■	■	■■	+	+				■■■■

\+ Present in trace amounts, ■ <2%, ■■ 2-5%, ■■■ 5-10%, ■■■■ 10-20%, ■■■ ■■ 20-30%, ■■■■■■ 30-40%, ■■■■■■■ 40-50% (of visible area)

Table 3. Summary micromorphology descriptions of samples 9158 and 9159 from the Late Iron Age house

Sample	Layer and microstratigraphic unit	Maximum thickness in thin section	Microstructure and Porosity: Microstructure	Microstructure and Porosity: Porosity	Groundmass – Mineral Components: Texture class and sorting	C/F$_{(100\ \mu m)}$ ratio	C/F$_{(100\ \mu m)}$ related distribution	Ratio of $CaCO_3$ (shell) sand to other	Nature of fine material (PPL)	Birefringence fabric of fine material (XPL)	Groundmass – Organic and Anthropogenic Components: Charred wood tissues	Charred plant tissues	Amorphous fine org matter	Charred amorphous fine organic matter	Phytoliths	Diatoms	Bone	Egg shell	Pedofeatures: Rubified iron nodules	Yellow phosphatic nodules	Calcitic coatings/ infillings	Excremental pedofeatures
9160	457	1.6 cm	Chamber and subangular blocky	■■■■■■	Poorly sorted fine to medium sandy silt loam	50/50	Single to double spaced porphyric	15/85	Black; opaque; mainly charred amorphous organic matter	Undifferentiated and localised crystallitic	■■■ ■■	■■■	■	■■■ ■■					+			+
	484	3.1 cm	Single grain	■■■■■■	Well sorted medium sand	98/2	Coarse monic	30/70	Black; opaque; mainly charred amorphous organic matter	Undifferentiated	■■			■							+	+
	457	1.0 cm	Complex: convex gefuric and subangular blocky	■■■■■■	Poorly sorted fine to medium sandy silt loam	50/50	Single to double spaced porphyric	20/80	Black; opaque; mainly charred amorphous organic matter	Undifferentiated and localised crystallitic	■■■ ■■	+	■■	■■■ ■■					■		■	■
	481.1	1.0 cm	Chamber and subangular blocky with localised spongy	■■■■■■	Poorly sorted fine to medium sandy silt loam	50/50	Close to single spaced porphyric	15/85	Dark brown to black; dotted to opaque; mainly amorphous organic matter with embedded silt grains	Crystallitic with localised undifferentiated	■	+	■■■ ■■	■■■			+	■	■■■			■
	481.2	1.0 cm	Spongy	■■■■■■	Poorly sorted medium sandy loam	70/30	Close to single spaced porphyric	25/75	Dark brown to black; dotted to opaque; mainly amorphous organic matter with embedded silt grains	Crystallitic			■■■■	■■			+		+		■	■
9161	397	1.3 cm	Chamber and subangular blocky	■■■ ■■	Poorly sorted fine to medium sandy silt loam	50/50	Single spaced porphyric	30/70	Black; opaque; mainly charred amorphous organic matter with embedded silt grains	Undifferentiated		■	■■	■■■ ■■								■
	486	6.0 cm	Intergrain micro-aggregate	■■■ ■■	Well sorted medium sand	90/10	Chitonic, convex gefuric, and fine enaulic	30/70	Reddish brown to black; opaque; mainly charred and uncharred amorphous organic matter with embedded silt grains	Undifferentiated		+	■■	■■			+					■■

+ Present in trace amounts, ■ <2%, ■■ 2-5%, ■■■ 5-10%, ■■■■ 10-20%, ■■■ ■■ 20-30%, ■■■■■■ 30-40%, ■■■■■■■ 40-50% (of visible area)

Table 4. Summary micromorphology descriptions of samples 9160 and 9161 from the Late Iron Age house

significant proportions of both charred and uncharred organic matter. The different mineralogy of the sands in this layer, which included a much lower proportion of shell sand (only 15%), suggests that the organic component included turf that had originally been taken from an area off the machair. There were trace amounts of charred plant material with cell structure still visible, and several fragments of charred wood (*c.*2% of the visible area in thin section), all of which belonged to coniferous species. Most distinctive about this layer was the high proportion of rubified iron nodules (5–10%), which exhibited bright orange and red colours under oblique incident light, and which indicates that soil materials that naturally contained iron were heated under oxidizing conditions. It was this rubified mineral material that had heightened the reddish appearance of context 481 and caused it to be described in the field as red-brown sand. Besides the presence of heated soil materials, which probably resulted from the cleaning out of the central hearth, the most distinctive anthropogenic inclusions in this floor layer were two pieces of eggshell 2–3 mm in length.

Overall, the micromorphological characteristics of 481 suggest that it was a former A horizon on the machair that was subsequently altered during its use as the primary floor surface of a domestic building. Activities that occurred in this structure revolved around the use of the central hearth, which, when it was cleaned out, resulted in burnt soil material being deposited to the west of the hearth, rather than to the east. Turf taken from an area outside the machair had been added to the floor, presumably used as construction or flooring material, and the presence of microscopic bone and eggshell fragments indicates that meat and eggs were processed and/or consumed in the building.

Charcoal layer 457 and internal sand layers 484 and 486

Context 457, the thick layer of charcoal-rich sand that capped the features and deposits associated with the primary building, was captured in micromorphology samples 9158, 9159, and 9160. As can be seen in Figures 43a–b, context 457 was not a homogeneous layer but contained several irregular and patchy internal lenses: darker lenses containing relatively higher proportions of charred organic matter, and lighter lenses containing relatively higher proportions of sand. In sample 9159, the differences between these lenses were so significant that context 457 was divided into four separate units for the purposes of micromorphological analysis (Figure 43b, Table 3). In the field, some of the sandy layers within 457 were large enough to warrant their own context number. Context 484, a discrete patch of pale yellow sand just west of and slightly overlying the central hearth of the primary building, was captured in micromorphology sample 9160, where it was sandwiched by thin layers of charred wood and plant material belonging to 457 (see section drawing Figure 38 and Table 3).

Context 486, a discrete patch of yellow sand overlying carbonised timbers belonging to 457 directly above the central hearth of the primary building, was captured in micromorphology sample 9161.

Although there were very slight variations in the composition of the charcoal-rich layers in 457 (Tables 3–4), in all cases the layer was dominated by charred amorphous organic matter, which reached concentrations of 20–40% (Figure 43f). This material, which lacked cell structure, and must therefore represent plant matter that had decomposed *prior* to being charred, was identified on the basis of its black colour in plane polarised light and faintly glittery aspect in oblique incident light. These optical characteristics resemble those of the charred wood and plant tissues that still had cell structure and were therefore identifiable in thin section. Charred wood and plant tissues were ubiquitous in context 457, although their relative proportions, which ranged from 2–30%, varied from thin section to thin section. The highest relative proportion of charred wood tissues (20–30%) was in sample 9160, towards the western edge of the building, where it sandwiched the pale yellow sand layer 484. In contrast, in the micromorphology samples taken from the eastern half of the building, 9158 and 9159, there was relatively little charred wood, but here 5–10% of context 457 consisted of charred plant tissues and organs. Throughout 457, the identifiable plant parts included stems, leaves, floral organs and seeds, and all of the wood that could be identified in thin section was coniferous.

In addition to containing 20–40% charred amorphous organic matter, the charcoal-rich layers in 457 also contained low concentrations (2–5%) of amorphous organic matter that was dark brown in colour, that did not glitter under oblique incident light, and was therefore likely to be unburnt. The fine- and medium-sized sand grains embedded in the fine matrix of charred and uncharred amorphous organic matter consisted of only 10% shell sand, a significantly lower proportion than the better sorted, medium-sized carbonate dune sands observed in contexts 481 and 848 in samples 9160 and 9158 (described above). This difference in mineralogy indicates that much of the mineral material in 457 came from some distance from the site, probably off the machair entirely. In addition, throughout the layer there were 1–2% soil fauna excrements that were also composed of charred amorphous black organic matter. Some of these excremental pedofeatures were partially infilling faunal channels that had clearly been created post-depositionally, but others formed part of a patchy and localised crumb microstructure that appears to have existed in the soil material *prior* to the deposition of 457 when the building burned down. Taken as a whole, this evidence strongly suggests that context 457 is largely made up of turf: the A horizon of soils that had developed on quartzose sands rather than on the carbonate sands of the machair. This turf appears to have been used in the construction of the roof of the primary building, and consequently charred and collapsed onto the floor when the building was destroyed by fire. It is notable that if the fire in the house had reached temperatures over 550°C, the organic matter would have been completely combusted, leaving only ash residues composed of mineral materials such as calcium carbonate crystals, silica phytoliths, and any diatoms or sands that had been present in the peat or turf. In contrast, the abundance of charred plant material and the lack of plant, wood, or turf ash, all point to the primary structure having been destroyed in a low temperature fire.

Sand lens 457.2 (sample 9159) closely resembled the two discrete sand patches that were given their own context numbers: pale yellow sand 484 and yellow sand 486. All of these layers consisted predominantly of well-sorted medium sand, with relatively high proportions of shell sand (30–40%), similar to the carbonate dune sands underlying the site. The grain size and mineralogy of these sand layers, compared to the fine- to medium-sized, carbonate-poor sands of the charcoal-rich layers in 457, indicate that these discrete sand layers did not originate within the turf roof collapse but were the product of separate, possibly deliberate dumping events. The colour differences between these sand layers, as noted both in the field and in a 1:1 study of the thin sections, were a product not of the coarse mineralogy but of the nature and quantity of the fine mineral material that was present in low quantities in and amongst the sand grains.

457.2 and 484, which appeared grey to the naked eye, contained very low quantities of fine organo-mineral material (coarse/fine ratios of 95/5 and 98/2 respectively), and the fine material was black, closely resembling the charred amorphous organic matter observed in such large quantities in the charcoal layer. Moreover, this black fine material was in the form of small aggregates (*fine enaulic* coarse/fine related distribution in 457.2), which strongly suggests that it was introduced into the sand layer from the charcoal layers above and below by post-depositional bioturbation.

In contrast, sand layer 486 contained more fine organo-mineral material than the grey sand layers (coarse/fine ratio of 90/10). The fine material was mostly composed of reddish brown (uncharred) amorphous organic matter, which formed coatings around the sand grains, bridges between the sand grains, and microaggregates between the sand grains. It is this reddish brown organic component that gave the sand an orange or yellow appearance in the field. Although some charred amorphous organic matter was also present, this was mainly in the form of clusters of microaggregates, which are likely to have been introduced into the layer by bioturbation. Considering the mineralogy and the organic component of sand layer 486, it is likely that this material was derived from an incipient A horizon or a transition zone between an A and a B horizon in a weak soil that had developed on the carbonate sands of the machair.

All of the sand layers within charcoal layer 457 had a particle size and mineralogy consistent with the interpretation that they were dug out of the carbonate machair sands, unlike the turf used to construct the roof. While the more organic-rich yellow layer, 486, was taken from an incipient A horizon or a buried A horizon within the machair, pale yellow sands 457.2 and 484 were derived from 'cleaner', less organic horizons within the machair. The yellow sand layers described here were located both above and below charred timbers belonging to 457, and must therefore be interpreted as dumping events that took place *while* the house was burning down – perhaps in an effort to quench the flames.

House 2 floor 397

The House 2 floor (397) was captured at the top of micromorphology samples 9159 and 9161 (Figure 43b). In thin section, the multi-lensed, heterogeneous nature of this floor deposit was very evident, with every lens exhibiting a substantially different composition. The common characteristic of 397 is that it contained 30% medium-sized shell sand, indicating that it was derived largely from carbonate machair sands and, at least in the locations of the samples examined here, did not develop directly on top of the charred timber and turf roof collapse. Where sample 9161 was taken, 397 directly overlay part of the yellow sand deposit 486 (see section drawing Figure 38), which, as discussed above, was probably an incipient A horizon developed on carbonate sand. Where sample 9159 was taken, a thin grey sand layer (397.4; Figure 43b), which closely resembled sand 457.2 (described above), overlay charcoal layer 457 and it is on this grey sand that floor 397 developed. It is therefore possible that reasonably clean sand dug out of a sand dune was deliberately deposited over the charred ruins of the primary structure in order to tidy up and even out the floor surface prior to the reoccupation of the structure.

Where it was captured at the top of sample 9161, floor 397 was described in the field as a patch of orange-black sand. In thin section, it was evident that the dark colouring was due to the fact that 50% of the layer was composed of black, fine organo-mineral material (coarse/fine ratio of 50/50), including 20–30% charred amorphous organic matter and 2–5% unburnt amorphous organic matter. This black fine organo-mineral material very closely resembled the fine matrix in charcoal layer 457, and it is possible that this dark patch of 397 simply represents redeposited material from 457 that was dumped here during digging activities associated with the reconstruction of the house. Subsequent to the deposition of the charred organic matter, the layer was substantially reworked by bioturbation. The boundary between 397 and the underlying yellow sand, 486, was very undulating, and there were many partially infilled earthworm channels revealing that black, organic material from 397 had been dragged down into 486, and that sandy material from 486 had been dragged up into 397. Overall, the part of 397 captured by sample 9161 appears to consist of redeposited and subsequently reworked charcoal layer 457. There was no evidence for trampling and no other anthropogenic inclusions.

A more interesting and informative part of floor 397 was captured at the top of thin section 9159. Here, major colour differences between different lenses required the floor layer to be divided into four distinct units for the purposes of micromorphological analysis (see Figure 43b and Table 3). The uppermost lens, 397.1, was distinguished by large quantities of silica phytoliths and diatoms (*c.*20% and *c.*2% respectively), which dominated the fine mineral material in the groundmass and gave it a characteristic light grey-brown colour (Figure 43e). The fine mineral material also contained significant amounts of *micrite*, silt-sized calcium carbonate grains, which, when viewed between crossed polarisers, imparted a crystallitic birefringence fabric. Importantly, 10–20% of lens 397.1 consisted of rubified iron nodules, which is indicative of iron-rich soil material oxidised under high temperatures, and which gave the lens the bright orange colour that can be seen at the top left corner of Figure 43b. Taken together, the rubified iron, the micritic calcium carbonate and the abundant phytoliths and diatoms indicate that lens 397.1 was composed of peat ash. This lens was much less porous than any other context, and it is likely that peat ash from the hearth was first dumped and then trampled on the floor surface.

Below 397.1 was a thin lens of fairly clean grey sand derived from the machair (397.2); below this sand lens was a very distinctive, organic-rich lens, only 4 mm thick, which was designated 397.3. This lens was distinguished by the nature of the fine organo-mineral material, 10–20% of which was yellow under plane polarised light and fluoresced yellow under ultra-violet light, indicating that it was rich in phosphorous (Figures 43c–d; Table 3). This lens was also distinguished by the fact that 2–5% of it was composed of rounded, highly weathered bone fragments. These appeared yellow and well-preserved under plane polarised light, and fluoresced yellow under ultra-violet light, indicating that they were rich in apatite, a calcium phosphate (Figures 43c–d). Between crossed polarisers, however, the bones were isotropic, having lost the fibrous yellow birefringence that is normally characteristic of bone, and indicating that that the bone had been leached of its protein component, collagen. Taken together, the yellow phosphatic material and the rounded bones in 397.3 indicate that the lens was composed of a carnivore coprolite – probably from a dog – that had been trampled into the floor surface. It is possible that the sand layer covering the coprolite lens was deliberately dumped there in order to bury the faeces and maintain the floor.

Overall, the micromorphological characteristics of floor 397 suggest that it developed on a prepared surface made from carbonate sands dug out of the sand dune and spread over the charred ruins of the primary structure. Activities that took place on the floor include digging activities that resulted in some redeposition and reworking of the charred turf and charcoal layer, defecation by a carnivore such as a dog, the spreading of relatively clean carbonate sand to maintain the floor, and the dumping of peat ash derived from the hearth in House 2.

Sampling data – N Sharples

Two hundred and sixty samples, 3380 litres of soil, were taken and processed from the CB contexts (Table 5): 397 (114 samples, 1613 litres of soil), 447, 453 (4 samples, 25.5 litres), 457 (84 samples, 1211 litres), 462 (15 samples, 164 litres), 465 (2 samples, 14 litres), 466, 467, 470, 471, 474, 476, 477 (3 samples, 17 litres), 479, 481, 482 (11 samples), 484, 486, 487, 492, 494, (two samples, 21.5 litres), 496, 497 (two samples, 27 litres), 498, 800, 802, 807, 812, 814, 817, 829 and 838.

The material from below 10 mm was sorted for 159 of these samples (Table 6): 397 (58 samples), 447, 453 (4 samples), 457 (44 samples), 462 (8 samples), 465 (2 samples), 466, 467, 470, 471, 474, 476 (2 samples), 477 (3 samples), 479, 481, 482 (11 samples), 484, 486, 487, 492, 494 (2 samples), 496, 497 (2 samples), 498, 800, 802, 807, 812, 814, 817, 829 (2 samples), 838.

The material from the above 10 mm sort was dominated by a large collection of bone fragments (1321 fragments, 0.39 fragments per litre of soil), most of which were burnt. Pottery was also relatively common (547 fragments, 0.16 fragments per litre). Marine molluscs were present in most samples and 620 limpets and 574 winkles were recovered (average density 0.18 and 0.17 shell/litre respectively). Charcoal had the highest density (0.45 fragments per litre) for any material category and contrasts markedly with slag and B.O.M. (burnt organic material), which, though present in a few layers, never achieve a high average density. There were occasional large fragments of coprolite and eggshell which are normally only present in the below 10 mm residues. Fish bones were very rare with only 18 bones present, a density of 0.01 fragments per litre; this represents the lowest density from the site.

The highest densities of bone (4.2 frag/litre) come from two samples (9059, 9157) from a coprolite layer (465) adjacent to pier 4; the next highest density (2.4 frag/litre) was from the fill (479) of pit/post hole (480). The densities of bone in the two heavily sampled layers (397 and 457) were similar (0.3 frag/litre) and, though these were not the lowest densities in this block, they were low. The pottery densities for these two layers were also very similar (0.1 frag/litre) and comparably low. The highest density of pottery (2.21 frag/litre) was from an isolated patch of dark brown sand (471) in front of the entrance. The highest densities of shellfish came from the isolated pits/post holes but as these are isolated samples with relatively small volumes of soil they are probably not that significant. The highest densities from a heavily sampled context were from the hearth which had a limpet density of 1.22 shells/litre and these shells were a prominent feature of the upper layers that was observed during excavation. The slag was very unevenly distributed, and only five contexts produced

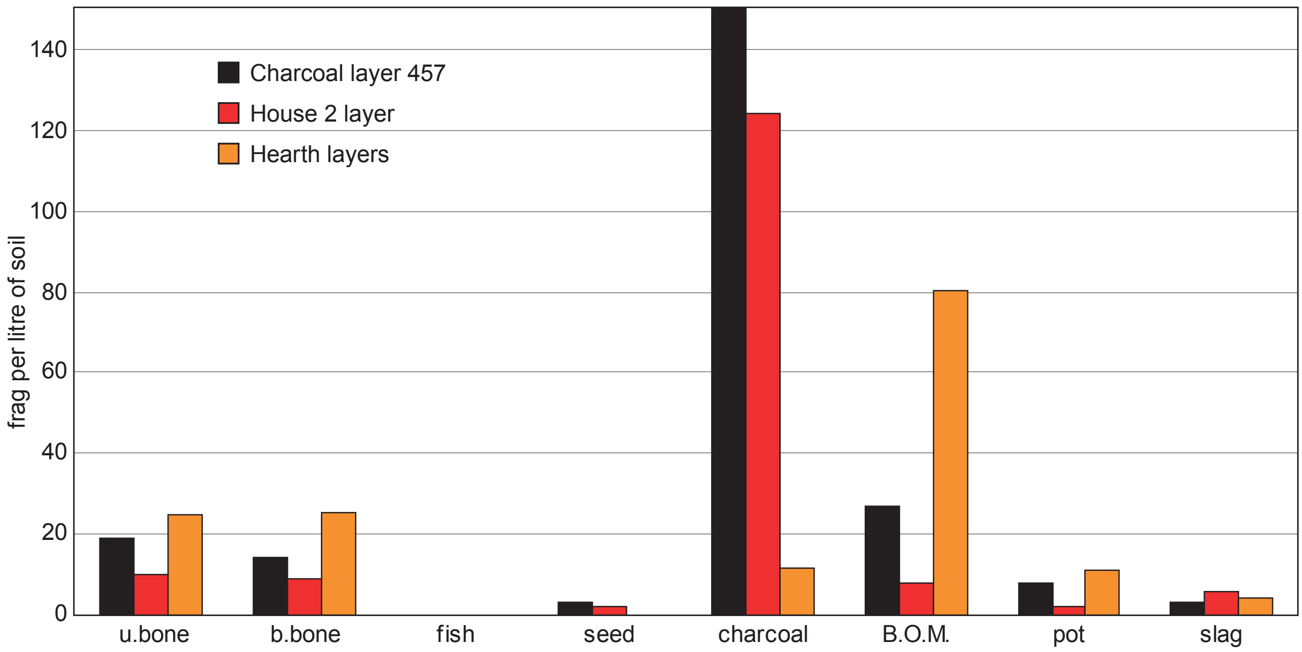


Figure 44. A histogram showing the density of different categories of material from the below 10 mm residues

pieces. The highest densities of charcoal were found in one of the sub-floor features and the charcoal layer 457, which is not surprising, but only low densities were recovered in the hearth, suggesting the primary fuel used in the house was peat. Coprolite was only an occasional discovery and the distribution reflects the number of samples taken. It is interesting that the layer (465) observed during excavation as containing significant quantities of coprolite produced only one piece of coprolite when the floated samples above 10mm were examined, despite the large quantities of bone. This suggests the matrix disintegrated during the flotation process.

The material from below 10 mm is unsurprisingly dominated by the high charcoal densities (312 pieces per litre of soil), which reflects the fact that House 1 burnt down. The much lower densities of slag and B.O.M. (5.2 frag/litre and 17.7 frag/litre respectively) suggest that this was a relatively low-intensity fire with high temperatures seldom reached. The densities of unburnt and burnt bones were relatively high (15 and 11 frag/litre respectively) but fish bones were extremely unusual discoveries (0.4 frag/litre). Pottery was relatively rare (4.1 frag/litre). Other finds included large quantities of coprolite (11 frag/litre), some eggshell and a small quantity of crab shell. An unusual and so far unique find was the discovery of large quantities of shipworm (*Teredinidae* sp.) shells (4 frag/litre). These have not been previously recorded from Bornais or any other site in these quantities. They derive from the wood used in the house and Gale has noted the presence of burrows in the carbonised timbers (see below 89).This raises the problem of why they are not normally found in other floor layers. We would expect that most of the prehistoric and Norse houses in the Northern and Western Isles of Scotland would have used driftwood in the roofing timbers and, if these timbers decayed *in situ*, then the shipworm shells should be present on the house floors to be recovered from the residues. Admittedly very few excavations process the quantities of samples that the SEARCH projects have so it is perhaps not possible to comment on other sites but, within the project, it is still surprising that so few shipworm shells have been recovered. It suggests either that driftwood was not being used in most structures (implying timber imports from mainland Scotland perhaps) or that the timbers were systematically removed from houses at the end of their life. The latter practice has been documented in Scottish ethnographic contexts and seems the most likely explanation. The Bornais shipworms are most likely to be present because the house was accidentally destroyed by fire. *Spirorbis* casts were not particularly common, indicating that seaweed was not being brought to the house.

The highest densities of unburnt bone (486 frag/litre) from the below 10 mm residues came from a sample (9157) from the coprolite layer (465) adjacent to pier 4. This was considerably higher than the next most productive sample was associated with hearth layer 482 (107 frag/litre). Burnt bone also had its highest density in 9157 (124 frag/litre) though a similarly high density was noted in one of the post hole fills (479; 100 frag/litre). The charcoal layer had relatively low densities of burnt bone but these reflect the low densities of bone in this layer. The House 2 floor and the hearth layers generally had above average densities of both burnt and unburnt bone though the main floor layers, 397 and 462, had below average densities. Fish bones were very dispersed with very few samples having densities greater than 1. The highest density (13 frag/litre) was from

	Sample	multiple samples	Context	Litres	Unburnt bone	Fish		Burnt bone	All mammal bone		Pottery		Slag		Limpet		Winkle		Other shells		Eggshell	Charcoal		Coprolite	B.O.M
						no.	density	no.	no.	density	no.	density	no.	density	no.	density	no.	density	no.	density		no.	density		
Primary activity	9059		465	10	42	0	0.00	0	42	4.20	1	0.10	0	0.00	0	0.00	1	0.10	1	0.10	0	0	0.00	0	0
	9157		465	4	17	0	0.00	0	17	4.25	2	0.50	0	0.00	2	0.50	0	0.00	4	1.00	0	0	0.00	1	0
	9097		474	2	1	0	0.00	1	2	1.00	4	2.00	0	0.00	1	0.50	1	0.50	1	0.50	0	0	0.00	0	0
	9178		481	29	12	0	0.00	1	13	0.45	18	0.62	0	0.00	20	0.69	11	0.38	4	0.14	0	0	0.00	0	0
Charcoal layer		84	457	1211	112	3	0.00	363	475	0.39	201	0.17	5	0.00	202	0.17	207	0.17	116	0.10	1	1068	0.88	24	27
	9062		467	5	0	0	0.00	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0.00	0	0
	9063		470	4	0	0	0.00	1	1	0.25	0	0.00	0	0.00	1	0.25	0	0.00	0	0.00	0	0	0.00	0	0
	9144		484	1.5	0	0	0.00	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	4	2.67	0	0
	9146		486	4	0	0	0.00	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	5	1.25	0	0
Pit fills	9098		479	9	3	0	0.00	19	22	2.44	6	0.67	0	0.00	1	0.11	2	0.22	0	0.00	0	2	0.22	0	0
	9177		800	17	0	0	0.00	6	6	0.35	4	0.24	0	0.00	0	0.00	0	0.00	0	0.00	0	6	0.35	0	0
	9179		802	9	0	0	0.00	1	1	0.11	0	0.00	0	0.00	2	0.22	1	0.11	0	0.00	0	3	0.33	0	0
	9180		807	4	0	0	0.00	6	6	1.50	1	0.25	0	0.00	1	0.25	3	0.75	0	0.00	0	0	0.00	0	0
	9181		812	15	0	0	0.00	8	8	0.53	22	1.47	0	0.00	1	0.07	3	0.20	0	0.00	0	2	0.13	0	0
	9182		814	8	2	0	0.00	1	3	0.38	2	0.25	0	0.00	3	0.38	11	1.38	0	0.00	0	14	1.75	0	0
	9184		817	1	0	5	5.00	0	0	0.00	0	0.00	0	0.00	2	2.00	0	0.00	0	0.00	0	0	0.00	0	0
	9183		829	17	7	0	0.00	5	12	0.71	11	0.65	0	0.00	14	0.82	22	1.29	1	0.06	0	2	0.12	0	0
	9186		838	22	2	0	0.00	10	12	0.55	4	0.18	0	0.00	11	0.50	6	0.27	0	0.00	0	11	0.50	0	0
Secondary floor		114	397	1613	236	4	0.00	288	524	0.32	172	0.11	11	0.01	173	0.11	247	0.15	115	0.07	1	373	0.23	12	6
	8302		447	7	0	0	0.00	0	0	0.00	0	0.00	0	0.00	3	0.43	4	0.57	1	0.14	0	0	0.00	0	0
		15	462	164	17	0	0.00	17	34	0.21	25	0.15	2	0.01	18	0.11	19	0.12	4	0.02	0	26	0.16	2	0
	9061		466	20	13	0	0.00	0	13	0.65	8	0.40	0	0.00	2	0.10	2	0.10	0	0.00	0	3	0.15	0	0
	9060		471	15	0	4	0.27	6	6	0.40	34	2.27	0	0.00	4	0.27	2	0.13	0	0.00	0	0	0.00	0	0
	9163		492	2	0	0	0.00	1	1	0.50	0	0.00	0	0.00	1	0.50	0	0.00	0	0.00	0	0	0.00	0	0
Hearth		11	482	85	59	0	0.00	20	79	0.93	14	0.16	1	0.01	39	0.46	18	0.21	16	0.19	0	1	0.01	0	1
		13	Hearth	97.5	19	2	0.02	23	42	0.43	18	0.18	2	0.02	119	1.22	14	0.14	6	0.06	0	0	0.00	4	9
	9171		496	3.5	2	0	0.00	0	2	0.57	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0.00	0	0
	9176		498	0.75	0	0	0.00	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0.00	0	0
	260 samples			3380	544	18	0.01	777	1321	0.39	547	0.16	21	0.01	620	0.18	574	0.17	269	0.08	2	1520	0.45	43	43

Table 5. The material identified in sorting the >10 mm residues from CB

	Sample	Context	Litres	Fraction sorted		Unburnt bone		Burnt bone		Fish bone		Seed		Charcoal		B.O.M		Pot		Slag		Spirorbis	Coprolite		Eggshell		Crab	Shipworm	
						no.	density	no.	density	no.	density	no.	density	no.	density	no.	density	no.	density	no.	density		no.	density	no.	density		no.	density
Primary activity	1	465	10	1	10.00	457	46	8	1	1	0	0	0	16	2	11	1	1	0	45	5	0	663	66	1	0	0	0	0
	1	465	4	0.125	0.50	243	486	62	124	0	0	0	0	0	0	0	0	0	0	0	0	0	54	108	0	0	0	0	0
	1	474	2	0.25	0.50	28	56	22	44	0	0	0	0	7	14	12	24	0	0	5	10	0	800	0	0	0	0	0	0
	1	481	29	0.125	3.63	67	18	14	4	0	0	0	0	0	0	30	8	2	1	0	0	0	1	0	0	0	0	0	0
Charcoal layer	44	457	646.5		112.70	2130	19	1526	14	27	0	360	3	106947	949	2992	27	917	8	329	3	1	299.2	3	21	0	3	96	1
	1	467	5	1	5.00	0	0	4	1	0	0	10	2	1350	270	26	5	2	0	1	0	0	0	0	0	0	0	0	0
	1	470	4	0.25	1.00	1	1	1	1	0	0	2	2	700	700	80	80	0	0	3	3	0	0	0	1	1	0	0	0
	1	484	1.5	1	1.50	6	4	4	3	0	0	0	0	294	196	14	9	0	0	32	21	0	0	0	1	1	0	0	0
	1	486	4	1	4.00	4	1	7	2	0	0	0	0	2800	700	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Pif fills	1	479	9	0.0313	0.28	4	14	28	100	0	0	0	0	202	718	50	178	2	7	3	11	0	0	0	0	0	0	0	0
	1	800	17	0.25	4.25	20	5	108	25	0	0	0	0	487	115	103	24	15	4	1	0	0	9	2	1	0	0	2	0
	1	802	9	0.25	2.25	11	5	9	4	0	0	0	0	2352	1045	50	22	7	3	5	2	0	3	1	0	0	0	28	12
	1	807	4	0.5	2.00	47	24	87	44	3	2		0	103	52	41	21	9	5	4	2	0	0	0	0	0	0	6	3
	1	812	15	0.125	1.88	34	18	37	20	1	1	2	1	570	304	173	92	217	116	46	25	0	9	5	1	1	0	56	30
	1	814	8	0.25	2.00	8	4	0	0	1	1	0	0	320	160	11	6	0	0	0	0	0	0	0	0	0	0	0	0
	1	817	1	0.5	0.50	9	18	25	50		0		0	55	110	14	28	1	2	0	0	0	4	8	7	14	0	0	0
	1	829	17	0.063	1.07	39	36	11	10	0	0	0	0	563	526	23	21	1	1	31	29	0	59	55	0	0	0	0	0
	1	829	17	0.125	2.13	37	17	21	10	8	4	0	0	14	7	141	66	10	5	6	3	0	33	16	0	0	0	0	0
	1	838	22	0.25	5.50	30	5	97	18	2	0	33	6	790	144	488	89	0	0	67	12	0	0	0	0	0	0	5	1
Secondary floor	58	397	783.2		293.95	2878	10	2537	9	93	0	523	2	36358	124	2476	8	540	2	1689	6	10	945	3	19	0	17	1493	5
	1	447	7	0.125	0.88	69	79	13	15	11	13	0	0	0	0	108	123	2	2	23	26	0	20	23	0	0	17	1	1
	8	462	90		23.75	212	9	145	6	17	1	0	0	3230	136	333	14	119	5	190	8	2	31	1	1	0	0	84	4
	1	466	20	0.063	1.26	63	50	69	55	0	0	0	0	200	159	41	33	23	18	1	1	0	123	98	4	3	0	0	0
	1	471	15	0.125	1.88	125	67	21	11	0	0	1	1	111	59	87	46	60	32	0	0	0	0	0	0	0	0	0	0
	1	492	2	1	2.00	41	21	39	20	0	0	1	1	115	58	8	4	2	1	70	35	0	0	0	0	0	0	26	13
Hearth	11	482	84		9.66	1030	107	594	62	16	2	2	0	742	77	565	59	29	3	45	5	2	156	16	48	5	0	0	0
	14	hearth	100.5		12.52	313	25	317	25	0	0	1	0	557	12	1005	80	138	11	55	4	0	1544	123	13	1	1	0	0
	1	496	3.5	0.5	1.75	52	30	56	32	0	0	0	0	72	41	98	56	2	1	11	6	0	0	0	2	1	0	0	0
	1	498	0.75	1	0.75	44	59	4	5	0	0	0	0	4	5	19	25	2	3	0	0	0	705	940	1	1	0	0	0
Total	159.0		1931		509.1	8002	15.7	5866	11.5	180	0.4	935.0	1.8	158959	312.3	8999	17.7	2101	4.1	2662	5.2	15.0	5458	10.7	121	0.2	38.0	1798	3.5

Table 6. The material identified in sorting the <10 mm residues from CB

a patch of charcoal-flecked orange sand (447) associated with the cattle metapodials but this was a small sample. The highest density of pottery was from a single sample from feature fill 812 which had the anomalously high density of 116 frag/litre. The three other densities of above 10 frag/litre come from the House 2 floor and a hearth.

The highest density of charcoal was from one of the pit fills (802) which produced a density of 1045 frag/litre; one other post hole fill (479) had a density of 718 frag/litre. The contexts associated with the destruction of the first house generally had very high densities and the principal context (457) maintained an average density of 949 frag/litre. Only 484 (a discrete patch of pale yellow sand) had a much lower density (196 frag/litre). The House 2 hearth densities were well below average and the primary floor contexts had almost no charcoal. The highest density of B.O.M. also came from a post hole fill (479; 178 frag/litre) but the destruction layer (457) and the House 2 floors have generally low densities though one context (447) has the second highest density (123 frag/litre). In contrast, the hearth layers have above average densities of B.O.M. The slag patterns are less consistent, with the highest density (35 frag/litre) coming from a House 2 floor layer (492). Other above average densities are scattered around in individual samples from all the different context groups.

The highest densities of coprolite were recovered from hearth layers and 498 had the abnormally high density of 940 frag/litre. Otherwise it was noticeable that the samples from the coprolite layer (465), recognised during excavation, had high densities (108 and 66 frag/litre). The highest density of eggshell (5 frag/litre) was rather surprisingly from the hearth construction layer (482). The highest density of shipworm shell came from feature fill 812 (30 frag/litre) and 802 also had a high density (12 frag/litre). The House 2 floor layer 397 produced the largest quantity of fragments but a density of only 5 frag/litre. The principal charcoal layer (457) in contrast produced very few fragments. Apart from three fragments from the charcoal layer (457) all the crab shell came from the House 2 occupation.

Figure 44 depicts the average densities of the material from the charcoal layer (457), the House 2 floor layer (397), and the hearth layers (453, 476, 477, 487, 494, 497). It illustrates some of the general differences between these deposits. The House 2 floor layer has generally lower densities of bone (both unburnt and burnt), B.O.M. and pottery, whereas the hearth has higher densities of all these materials. Charcoal is dramatically denser in the charcoal layer than the House 2 floor but is very poorly represented in the hearth. This is probably due to the regular use of peat as a domestic fuel.

Spatial distributions – N Sharples and E Norris

It is possible to examine the distribution of the material from the charcoal layer (457) and the House 2 occupation layers (397, 471, 462, 482) as both the above and below 10 mm residues were recovered on a 0.5 m grid. The data is displayed in Figures 45 to 50. There are essentially two data sets:

- The material from the above 10 mm sort of the residues. Every sample taken was counted and the material is presented as the total number of fragments recovered from the sample (Figures 45, 48).
- The material from between 1 mm and 10 mm. Only every alternate sample has been examined and the counts represent an estimate based on a sample of the residue collected. The material is depicted in the distribution plans as both the density of material present in a litre of soil (Figures 46, 49) and as the volume of material in the square (Figures 47, 50).

Charcoal layer 457 (Figures 45, 46, 47)

The unburnt bone from both the above and below 10 mm residues is concentrated in the sample squares to the north of pier 4. This concentration is clearly associated with the presence of the underlying coprolite layer (465) and is comparable to the distribution of coprolites in all the distribution plans. The burnt bone, particularly from the above 10 mm data, whilst also highlighting the coprolite area, indicates a more generalised distribution across the house, with increased quantities on the opposite side of the cell from the coprolite location and in the area on the north-west side of the central area. The distribution of fish bone (from the below 10 mm sort) is quite different and there is no evidence of a general spread across the house. Instead there are small individual concentrations (about 16 fragments) located adjacent to the walls or piers of the house. This pattern is similar to the distribution of hammerstones (see below) and is interpreted as indicating bags hanging from the house walls. The pottery fragments again show quite a different distribution. The material recovered from the above 10 mm shows a concentration in the area on the north-west side of the central area. This concentration is also visible in the volume of material from the below 10 mm sort, but not in the density distribution. There is also a general decline in the quantity of pot in the peripheral cells compared to the central area of the wheelhouse.

The shellfish distributions are only available from the above 10 mm sort and are separated into limpets, winkles and other species. The distributions of winkles and limpets are comparable; both show a general distribution across the wheelhouse with increased densities in the north-west central area. There seems to be no major difference between the densities in the cells and the central area though the south cell has slightly enhanced quantities of winkles. The distribution of other species, in contrast, seems to be much more peripheral and there is a significant concentration in the south cell. Eggshell and shipworm shells were present in the below 10 mm residues in sufficient quantities to examine the distribution. Shipworms were present in several samples but a concentration in volume was noted on the west side of the central area. The eggshell has two

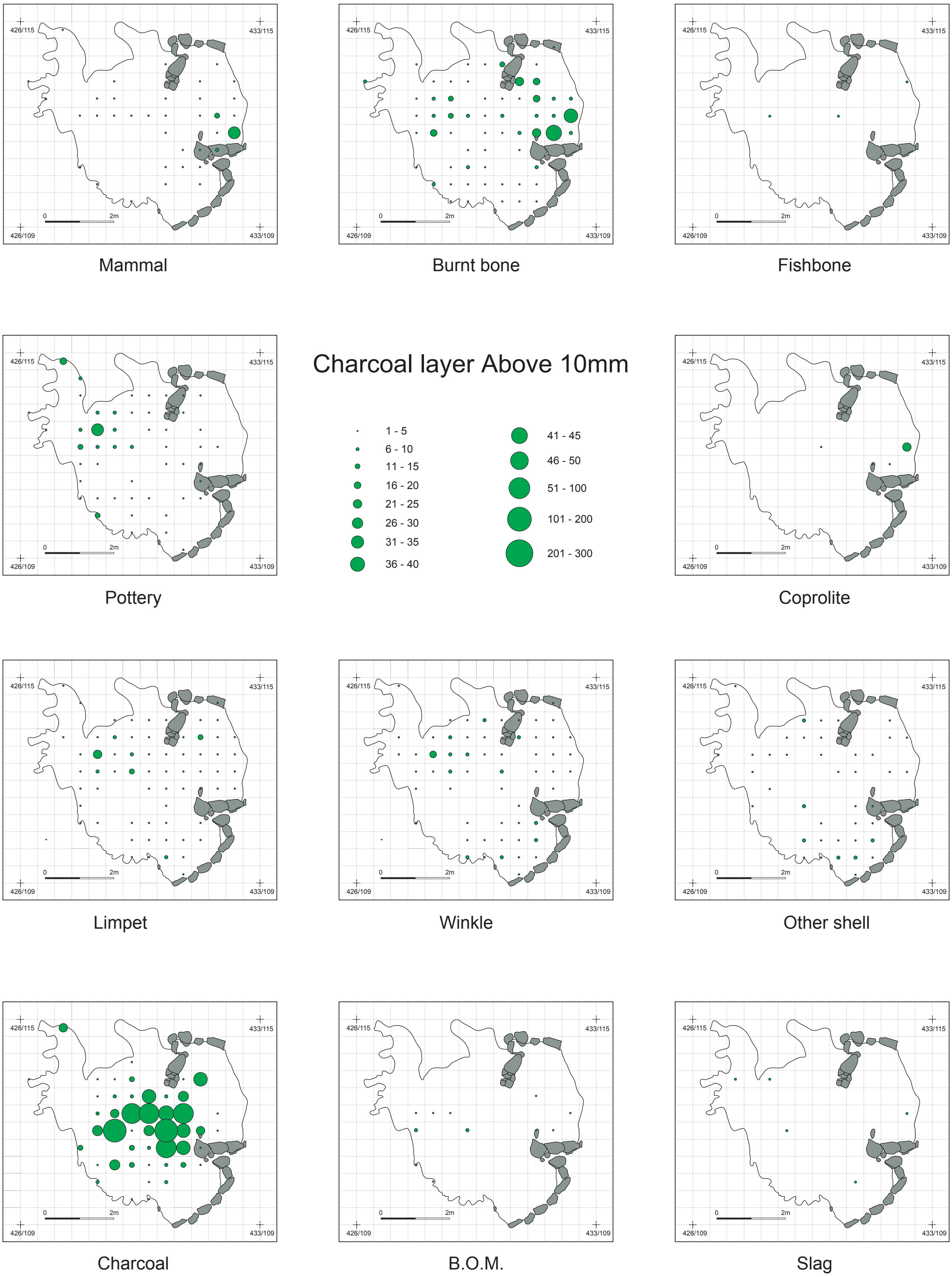


Figure 45. The distribution of the material recovered from above 10 mm sieving in charcoal layer (457)

concentrations on either side of the central area and there are isolated occurrences around the edge of the house. A concentration of crab shell was recovered from the back of the south cell.

The volume of charcoal was high in almost all the samples taken, with only the disturbed area to the north-west having samples without fragments from either the above or below 10 mm samples. There is a significant

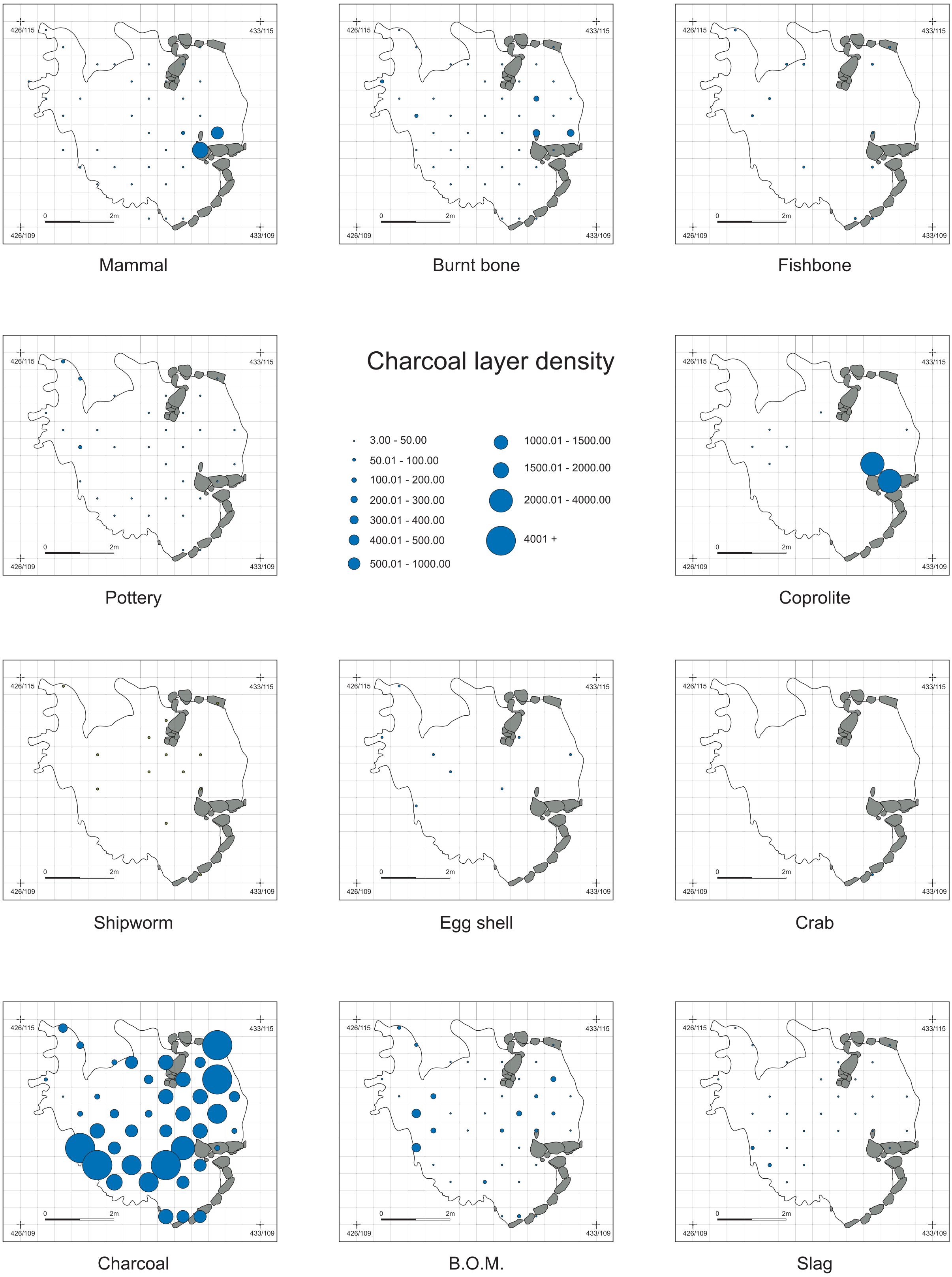


Figure 46. The distribution of the material recovered from below 10 mm, density of material, in charcoal layer (457)

difference in the distributions of the material from the below 10 mm samples and the larger fragments from the above 10 mm samples. The above 10 mm distributions are concentrated in the centre of the house whereas the below 10 mm material shows a much more even distribution with high densities present in both the peripheral cells and the central area. In some cases it is possible to note an inverse correlation between high densities in the above and below

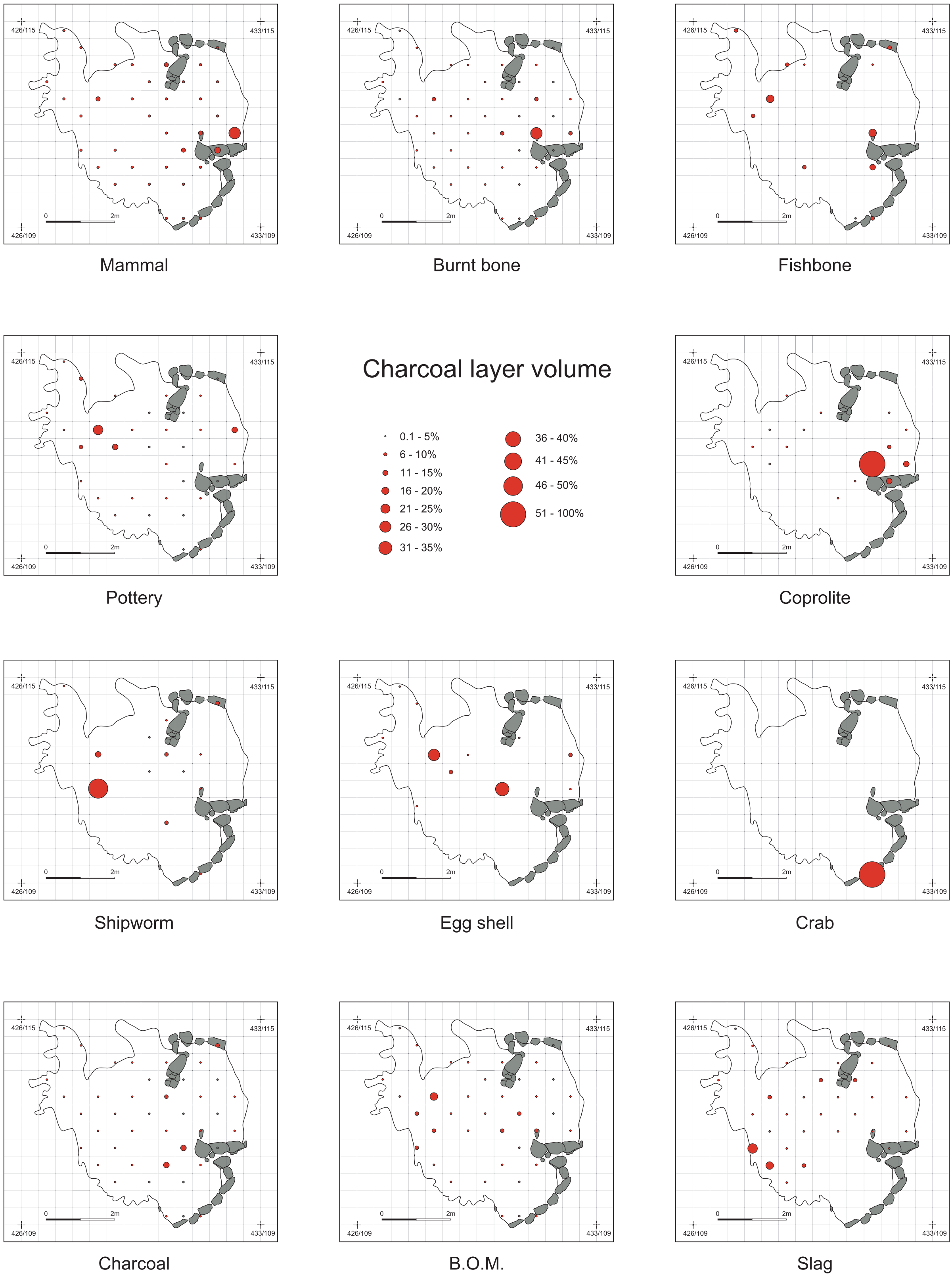


Figure 47. The distribution of the material recovered from below 10 mm, total volume of material, in charcoal layer (457)

10 mm data which suggests that the structural integrity or preservation of the charcoal is the key factor. The different distributions may, therefore, reflect the relative trampling of the charcoal layer during the later reoccupation. It is certainly true that the floor layer was much thinner and therefore less well protected in the areas towards the edge of the wheelhouse. The distribution of B.O.M. and slag is best represented by the below 10 mm data. Both materials

are found in many samples and show slightly enhanced densities and volumes on the west side.

The distribution of material recovered from the residues from the charcoal layer shows a general trend and some specific points. The general trend is the presence of slightly higher densities of pottery, limpets and winkles, eggshell, B.O.M. and bone on the north-west side of the central area of the wheelhouse. These concentrations suggest that this area was the principal activity area in the house, which is slightly surprising as the underlying hearth is clearly oriented to the south-west where the density of material found was consistently low. The principal bone concentration is associated with a coprolite concentration and forms a discrete area adjacent to pier 4 which is presumed to be the location of tethered dog. Fish bone comes in small concentrations scattered around the edge of the house. The charcoal distributions indicate areas of this destruction layer that have been more heavily trampled.

House 2 floor 397 (Figures 48, 49, 50)

The animal bone from the above 10 mm residue is dominated by two large concentrations adjacent to pier 4 and these are also visible in the distribution of burnt bone. This concentration is less significant in the below 10 mm data where the density distributions highlight the construction deposit (482) surrounding the hearth, particularly to the south of the hearth. The concentration adjacent to pier 4 probably reflects the coprolite layer in the primary occupation. The layers at the periphery of the house were very thin and it appears that there was considerable mixing between the charcoal layer and the House 2 floor layer which were always difficult to separate. The burnt bone from the below 10 mm residue shows a fairly similar pattern with an even low level distribution across the floor and increased densities to the south of the hearth. The distribution of fish bones is scattered around the periphery of the house. The largest concentration is immediately to the north of the hearth and fish bones are present in most of the samples from this area. In the above 10 mm residue pot is almost completely absent from the east half of the house; the below 10 mm distribution is more even.

The distributions of winkles and limpets show some similarities and differences. The principal difference is the large quantity of limpets found in the hearth; these were noted during excavation and appear to be a deposit marking the end of the use of the house. The limpets and winkles both show a slight increase in the quantities present to the north of the hearth and the winkles also have a slight increase in the quantities present along the southern edge of the house. This concentration is also noted in the distribution of other shells. All the distributions show a distinct gap in front of piers 3 and 4. Eggshell, shipworm shells and crab shells were also present in sufficient quantities in the below 10 mm residues to examine their distributions. The shipworm shell appears to be fairly randomly distributed across the floor, with two isolated concentrations in the southern half of the house. Crab was found in a very few samples around the hearth. Most of the eggshell came from around, or in, the hearth and there was one concentration immediately to the south of the hearth. The small quantity of eggshell from the rest of the house was scattered across the interior.

The charcoal distribution shows a significant concentration in sample 8390. Unfortunately this sample is misleading. It was one of the first squares excavated, before the distinction between the two layers (397 and 457) was fully understood and consequently the 397 sample includes material which was subsequently classified as 457. The distribution of fragments from the above 10 mm residue shows a tendency to cluster in the centre of the house whereas the below 10 mm material is more widely distributed with concentrations in the peripheral cells. Neither distribution shows any concentrations around the hearth. Most of this material is likely to have derived from disturbance of the underlying charcoal layer and does not reflect the use of the house. The B.O.M. (too small to be recovered from the above 10 mm residues) is, in contrast, concentrated around the hearth and it is likely that this reflects the use of the hearth. Slag is much less common but there is one concentration adjacent to the hearth.

Very few clear distinctions are visible in this floor deposit that would enable us to interpret the use of this house. There are concentrations of B.O.M., eggshell and animal bone close to the hearth which suggest cooking activity. The northern half of the house shows slightly higher quantities of fish, limpets and winkles but these are not particularly striking distinctions and the most characteristic feature of the material is a fairly even distribution across the interior of the house.

Geochemical analysis – H Smith and P Marshall

Sediment samples were taken from the surface of floor 397 at 0.5 m intervals. Data for each element and magnetic susceptibility were plotted with three-dimensional surface mapping (using contour and three-dimensional surfaces based on krigging gridding method) in Surfer (Golden

Element	Mean	SD	Median	Minimum	Maximum
Mag Sus	192	194.5	100.3	20.3	1022.5
P	1446	737.8	1254.6	286.3	5213
Cu	7.9	5.7	6.7	0	39.1
Cr	6.4	1.4	6.2	3.3	12.2
Mg	2044.5	830.2	1771	1001.1	5815.8
Mn	178.2	56	169.5	61.3	387
Pb	2.7	1.1	2.4	1.1	7.8
Zn	18.3	5.7	17.5	8.4	37.6
K	585	138.2	550.5	316.5	1318.8
Na	775.3	198.4	767.7	226.1	1570.5
Ni	4.8	1.2	4.7	2.5	8.7
S	403.7	87.5	7650.8	127.2	849.5

Table 7. Summary statistics for the soil samples from secondary floor layer 397. Values in ppm

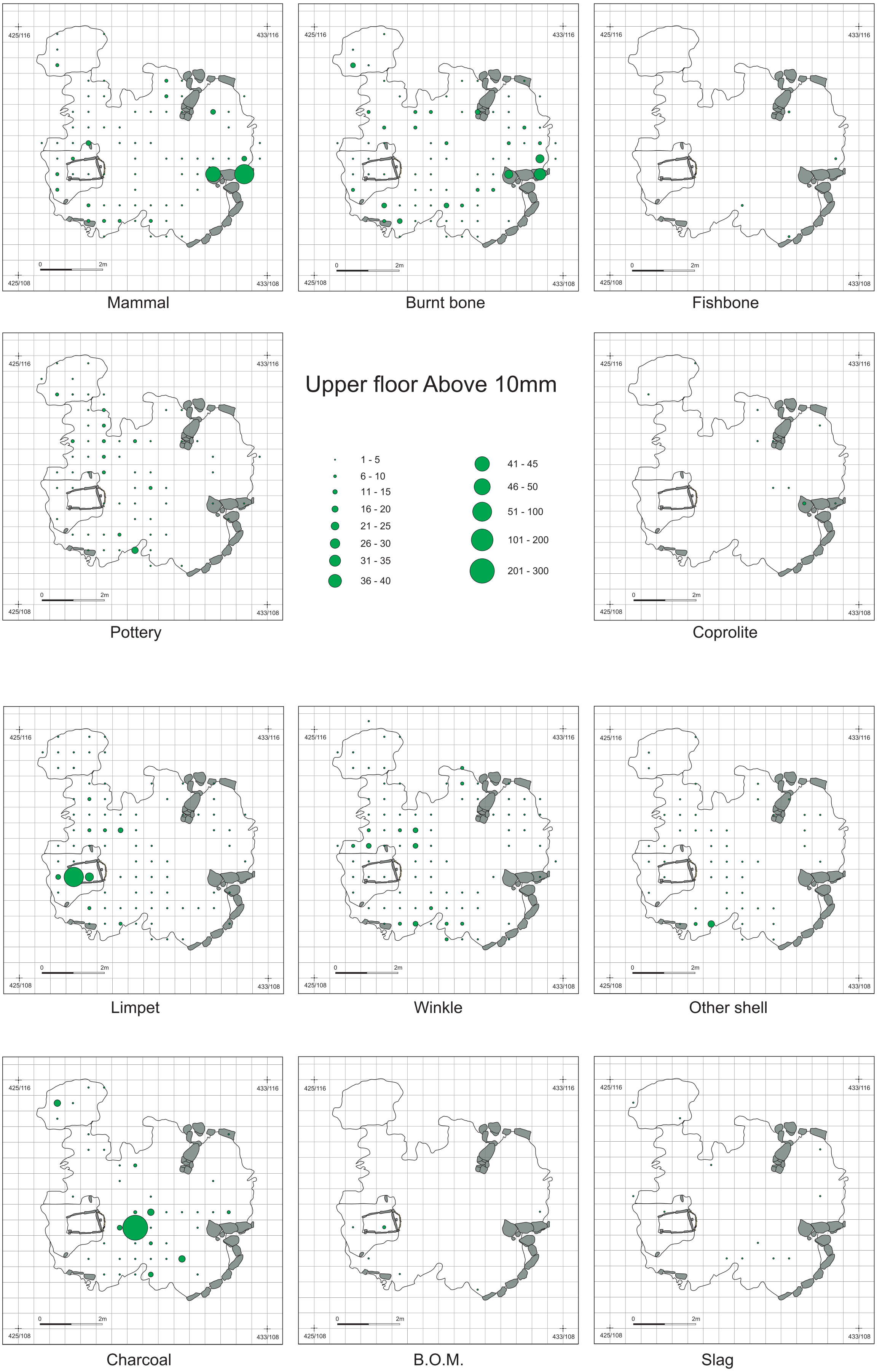


Figure 48. The distribution of the material recovered from above 10 mm sieving in floor layer (397)

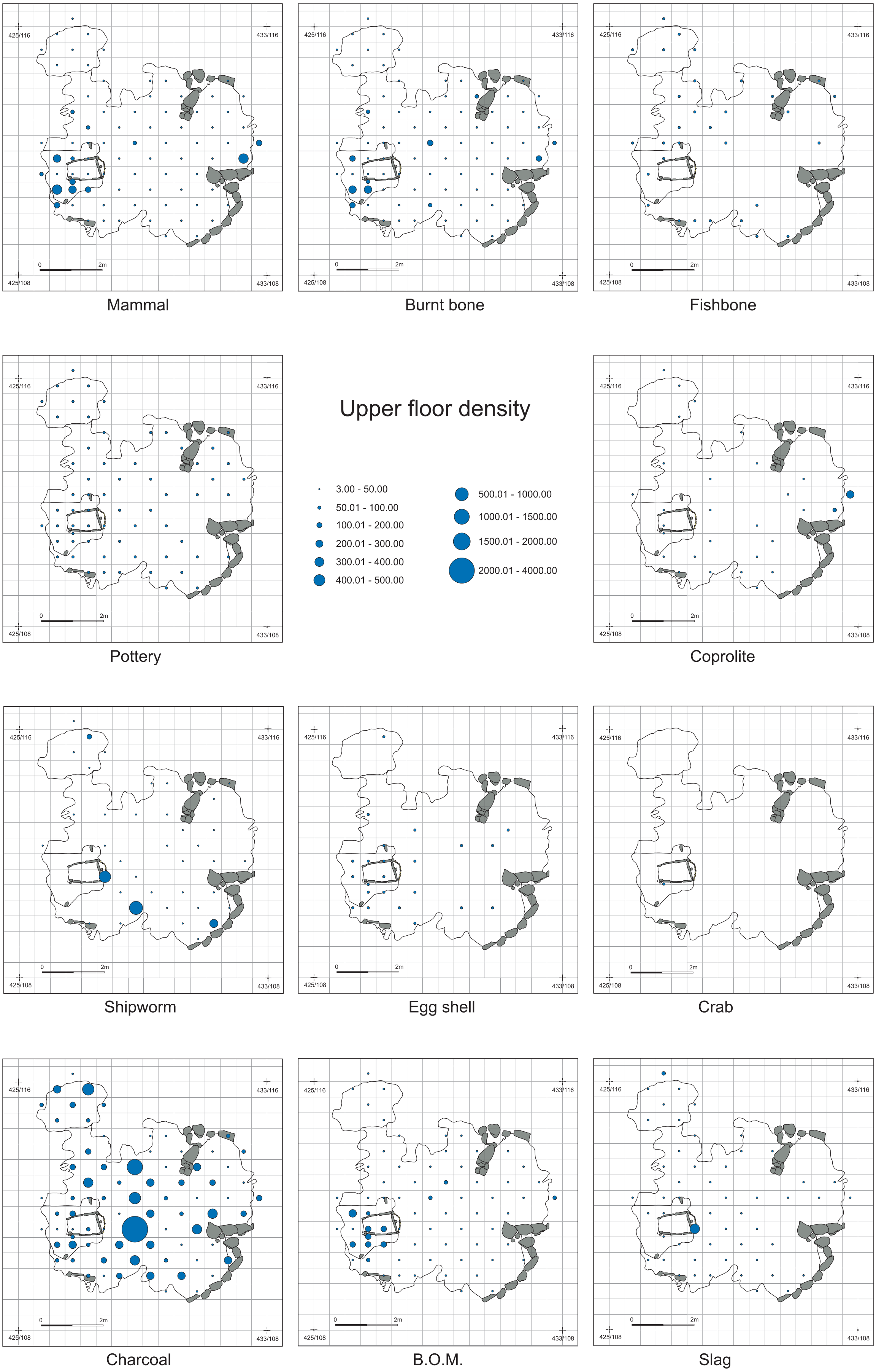


Figure 49. The distribution of the material recovered from below 10 mm, density of material, in floor layer (397)

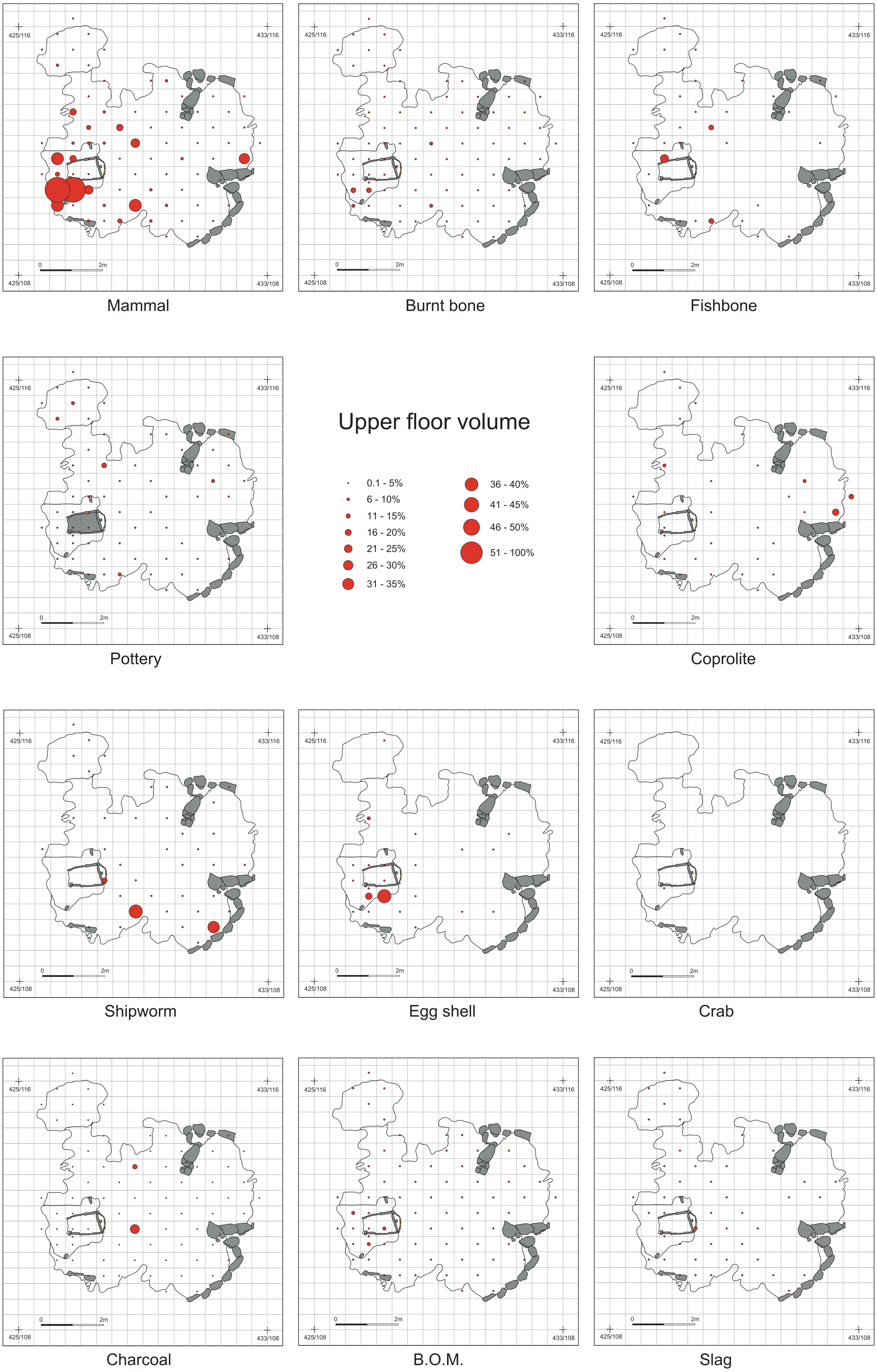


Figure 50. The distribution of the material recovered from below 10 mm, total volume of material, in floor layer (397)

Software version 8) and shown in Figure 51. Summary data are given in Table 7.

For many of the elements and for magnetic susceptibility, there are similarities in the patterns displayed. One of the most obvious correlations is the co-incidence of enhanced levels focused on the hearth. Elements with enhanced levels include phosphorus (P), magnesium (Mg), zinc (Zn), nickel (Ni), manganese (Mn) and lead (Pb) and, to a lesser extent, copper (Cu). In most cases high values are associated with the outline of the stone surround for the hearth (489), particularly the western end, northern edge and eastern end. For P, Mg and Zn the outline of the hearth is highlighted by high values, but the highest concentrations are found very clearly at the western end of the hearth, at the opening in the stone surround (where P levels are approximately 4000 ppm, whilst Mg values reach *c.*5400 ppm and Zn values are approximately 36 ppm). The increased values that coincide with the hearth 'entrance' may indicate activities such as cooking or hearth cleaning, where waste from cooking activities (fuel and food) accumulated. Mn levels are highest within the hearth, particularly the north-eastern area (*c.*400 ppm). In addition, Pb values are highest in the hearth area, especially at the western and the eastern ends. Cr and Cu levels are highest along the stone hearth surround. Cu displays high values in an isolated sample on the southern edge of the hearth (*c.*36ppm) and also in a second sample about 1m east of the hearth (*c.*40 ppm). This might represent an isolated loss of an artefact, rather than a repeated activity. S (sulphur) displays slightly elevated levels around the northern edge of the hearth (*c.*700 ppm), and also in one sample to the south of the hearth edge (*c.*700 ppm). Finally, potassium (K) shows high concentrations in two samples immediately to the east of the hearth (*c.*150 ppm).

A second area where several elements (Mn, K and to a lesser extent Zn and S) and magnetic susceptibility show enhanced values is within and around the cell and the stone piers (piers 3 and 4) in the east of the house. P shows enhanced concentrations (*c.*4000 ppm) just to the north of pier 4 where it meets the inner wall of the house. A concentration is also noted to the west of pier 3. The high levels of Mn within the cell are found just along the southern side of pier 3 and curving along the outer wall. Zn, Cr and K show slightly elevated concentrations within the cell.

Elsewhere in the house, the highest concentrations of Na (sodium; *c.*1400 ppm) form a diagonal band starting at the north-western edge of the hearth running north-east. High S values are found towards the outer edges of the house interior, and within the cell on the eastern side of the house. Manganese shows enhanced levels (*c.* 400 ppm and 10 ppm respectively) forming a small arc just to the south-east of the hearth.

Magnetic susceptibility (χ) is elevated in several small discrete areas, which would suggest spot residues. Magnetic susceptibility values (χ) vary from 20.3–1022.5 ($10^{-8}m^3kg^{-1}$) with a mean of 192.0 ($10^{-8}m^3kg^{-1}$) which is close to that (226 [$10^{-8}m^3kg^{-1}$]) from the lower house floor (614) from house 1 on mound 3 (Marshall *et al.* in Sharples 2005b, 58).

The results of the analysis of the soil deposits from mound 1 show some strong patterning in the chemical and physical properties of the floor deposits within House 2 (CB). Some of these geochemical patterns are consistent with the results from similar studies (Jones *et al.* 2010; Wilson *et al.* 2005), most especially the enhanced levels of a suite of elements (as described above) and magnetic susceptibility around hearth and cooking areas, possibly reflecting cooking activities themselves and/or the accumulation of ash residues. Indeed, Wilson *et al.* (2008) found that peat, turf and wood contained moderate amounts of lead, and that peat is also associated with moderate amounts of copper.

Discussion

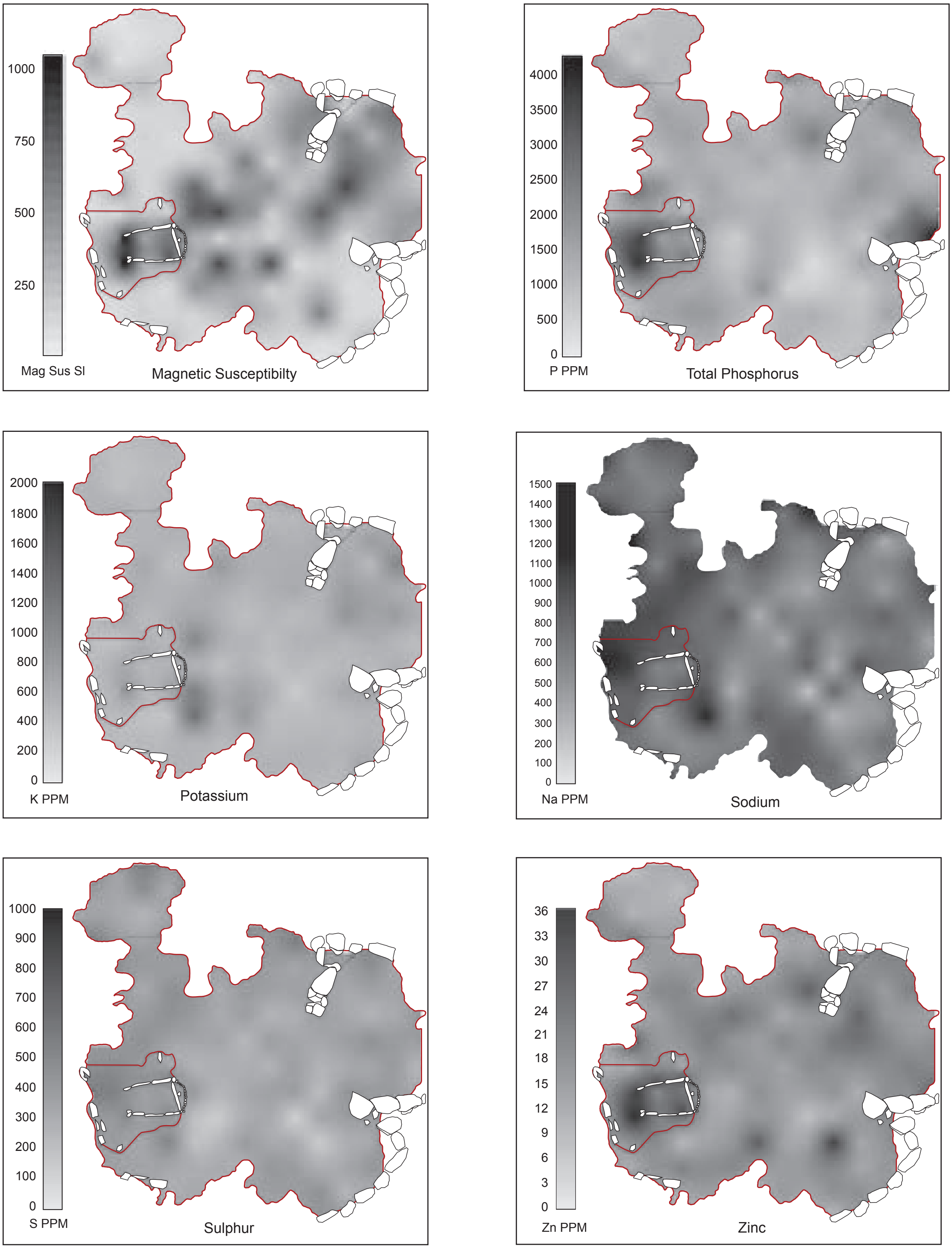
The use of the physical/chemical analyses and magnetic properties of soils and sediments for the investigation of activities that potentially took place in ancient structures has been recorded in many studies (see reviews by Oonk *et al.* 2009; Wilson *et al.* 2008). Such studies are based upon the premise that many specific human activities produce residues that will be left (either deliberately or incidentally) upon the sediment surface where the activities took place and incorporated over time.

The measurement of soil phosphorus as a tool to detect anthropogenic activity originates in the work of Arrhenius (1929) and since then many similar studies have been undertaken (see review by Holliday and Gartner 2007). Access to modern equipment such as ICP for multi-element characterisation of ancient sediments and soils has made it possible to investigate suites of elements rather than being limited to single properties or characteristics (*i.e.* soil P or magnetic susceptibility). With the multi-element analyses, enhancements in different groups of elements can then be studied alongside other physical characteristics and archaeological evidence.

Such techniques have helped in defining the location and extent of sites by identifying enhancements in particular elements (Aston *et al*. 1998; Bintliff *et al*. 1992; Entwistle *et al.* 1998; 2000). Of greater relevance to this study, however, is their use in supporting the interpretation of past activities within and around archaeological structures, and the recognition of specific activities (Bell 1990; Middleton and Price 1996; Parnell and Terry 2002; Knudson *et al*. 2004; Sullivan and Kealhofer 2004; Terry *et al*. 2004; Cook *et al.* 2006; Wilson *et al.* 2005; Wilson *et al*. 2008). In these cases, patterns of multi-elemental concentration and enhancement were identified and used alongside sediment and soil descriptions to interpret ancient activity, usually by associating them with activity areas as defined by the archaeological remains.

Interpretations of the results of soil analyses in any archaeological context are extremely difficult owing to

a



the complexities of the multiple temporal 'layers' of site use plus any post-depositional changes in the character of deposits that might have occurred subsequently as a result of natural soil processes (or later human activity).

Deeply buried deposits such as those excavated at Bornais should be less directly disturbed by later activity (for example by plough damage). Where ancient floors associated with structures are found buried, either with or without artefacts attesting to the occupation and abandonment of the buildings, it can be assumed b

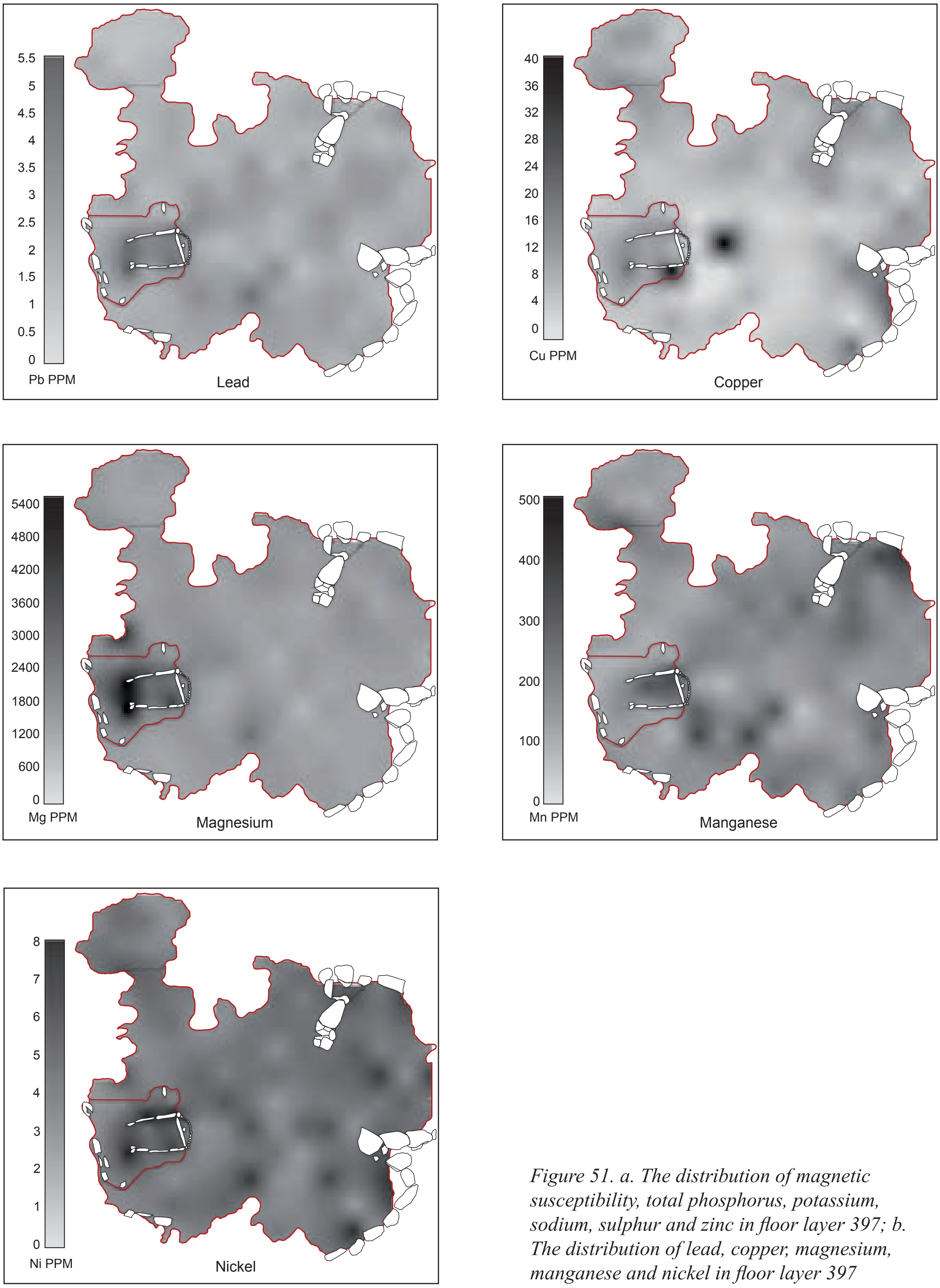


Figure 51. a. The distribution of magnetic susceptibility, total phosphorus, potassium, sodium, sulphur and zinc in floor layer 397; b. The distribution of lead, copper, magnesium, manganese and nickel in floor layer 397

that these sediments have been unmodified by people since that time. These factors may help to lessen some of the interpretational complexities associated with soil analyses.

Some of the difficulties inherent in soil analyses are also rooted in the sheer ubiquity of certain elements within the environment (*e.g.* phosphorus; Cook *et al.* 2006) and, hence, the difficulty this presents in identifying the potential sources of and inputs to the archaeological record. Furthermore, the (consequent) movement and cycling

	CB	weight (g)	sherds	rim	base	body	misc	cordon	decoration	ave wght
Primary floors	465	36.2	4	0	0	4	0	0	0	9.05
	481	15	2	0	0	1	1	?1	0	7.5
Charcoal layer	457	1657.9	261	7	5	79	170	11 + 1D	0	6.35
Pit fills	478	1890.6	73	8	2	46	17	4 + 2D	0	25.9
	800	48.6	3	0	0	3	0	0	0	16.2
	802	1.3	1	1	0	0	0	0	0	1.3
	807	33.4	4	0	0	2	2	0	1	8.35
	812	1577.2	53	5	3	38	7	3 + 2D	0	29.76
	825	21	3	1	0	1	1	0	0	7
	838	78.3	2	0	0	2	0	0	0	39.15
	847	24.2	2	0	0	1	1	0	0	12.1
Secondary floor	397	2920.1	331	22	8	121	180	20 +4D	1	8.82
	459	10.2	7	0	0	1	6	0	0	1.46
	462	422.2	58	4	8	19	27	2	0	7.28
	466	36.8	2	0	2	0	0	0	0	18.4
	471	617.9	60	1	9	20	30	2	0	10.3
	488	61.5	14	0	2	2	10	0	0	4.39
Hearth fill	477	3.7	2	0	0	0	2	0	0	1.85
	482	73.6	18	2	0	2	14	0	0	4.09
	487	13.6	1	0	0	1	0	1	0	13.6
	497	2.5	2	0	0	0	2	0	0	1.25
Total		9545.8	903	51	39	343	470	44 + 9D	2	10.57

Table 8. Pottery from CB

of these elements within the soil system, owing to their natural mobility, makes the interpretation of enhancements of any single element particularly difficult.

By studying the results of soil and sediment analysis in tandem with sound ethnographic studies to ascertain geochemical and physical 'signatures', inferences about the spatial distribution of activity areas within archaeological structures can be postulated/suggested with greater levels of confidence (Smyth 1990; Parnell and Terry 2002; Wilson *et al*. 2005; 2008). Ongoing work to characterise analogue material collected from South Uist will provide an opportunity for more detailed archaeological interpretations of results from sites such as Bornais and others in this area where a similar methodological approach has been adopted.

Pottery – A Lane

A total of 903 sherds weighing 9545.8g were recovered from the contexts associated with House 1 and its successor House 2 (CB, Table 8). The largest assemblages came from: layer 397, the floor of House 2 – 331 sherds; layer 457, the destruction layer of House 1 – 261 sherds; 478, the fill of pit 837 – 73 sherds; 471, a House 2 floor layer – 60 sherds; 462, a House 2 floor layer – 58 sherds; and 812, the fill of feature 813 – 53 sherds.

The average sherd size, 10.57g, compares with an average sherd weight of 5.91g in the Norse midden (CF) and indicates that the assemblage has not been heavily trampled. The sherds from 812, the fill of feature 813, have an average weight of 29.76g while those from 478 and 838, the upper and lower fills of pit 837, have an average weight of 26.25g.

The assemblage as a whole seems to be a fairly consistent Late Iron Age I group with some double cordoned vessels with long flaring rims. The fragmentation of the assemblage means it is impossible to establish whether single cordoned vessels are present as well. It is possible that all the definitely double cordoned sherds are from only a few vessels (*e.g*. vessels 1, 3 and 4). Sherds of vessel 1 were recovered from 397, 457 and 478 with cross-joins between all three contexts (Figure 52, 6 and 7). Another group of sherds (vessel 2; Figure 53, 13; Figure 52, 3) may be undecorated and consequently indicative of the gradual abandonment of decoration which leads to the so called Plain ware phase recognised at the Udal (Lane 1990, 117). This vessel was found in contexts 397 and 478. Vessel 3 (Figure 53, 11 and 12), with joins from contexts 812 and 397, and vessel 4 (Figure 52, 8 and 9; Figure 53, 10), with joins from contexts 457 and 812 and possibly 478, were identified on the basis of minor changes in their cordons and also, in the case of vessel 4, its more pronounced flaring rim.

There are two small incised decorated sherds which are

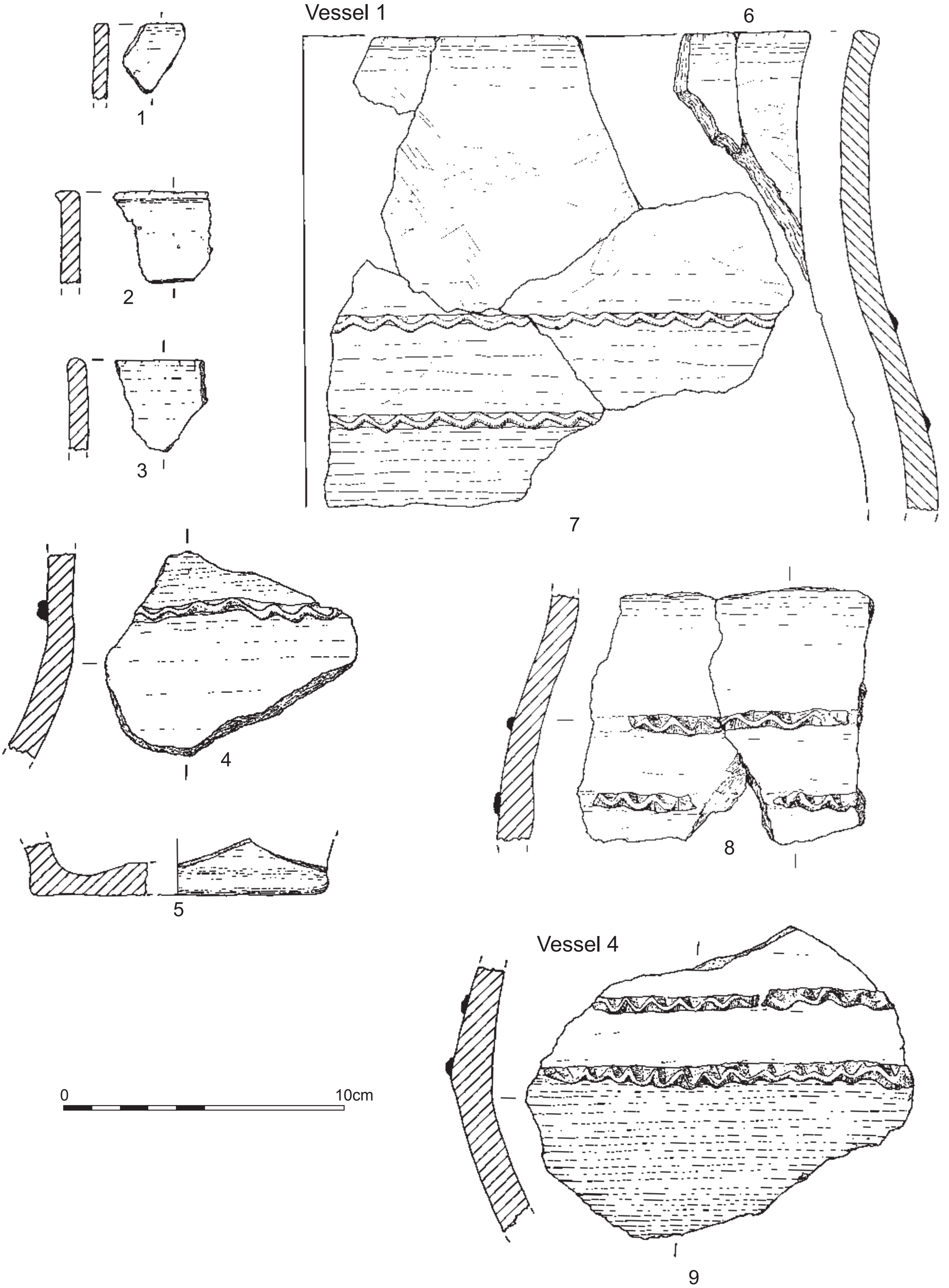


Figure 52. The pottery from CB

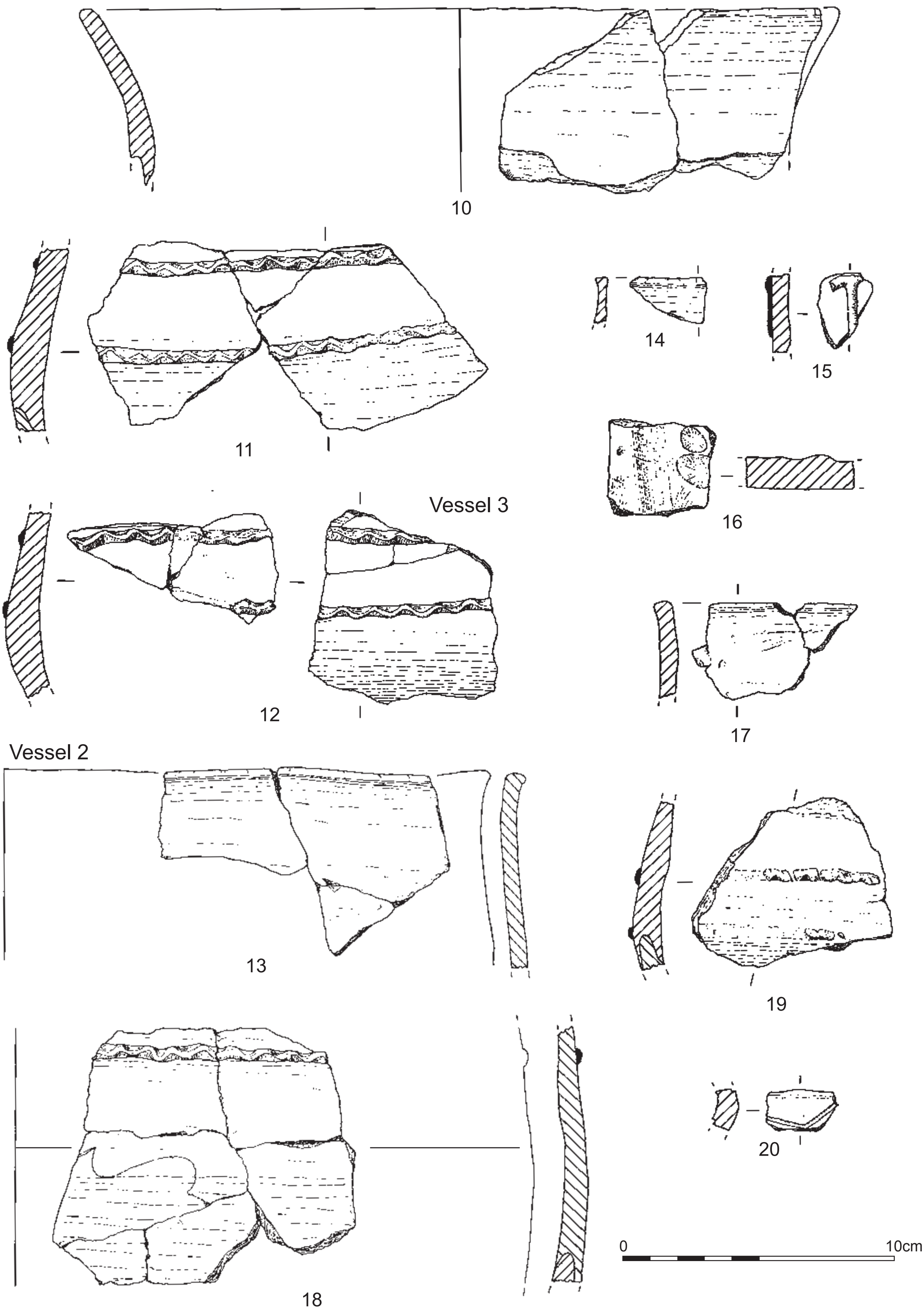


Figure 53. The pottery from CB

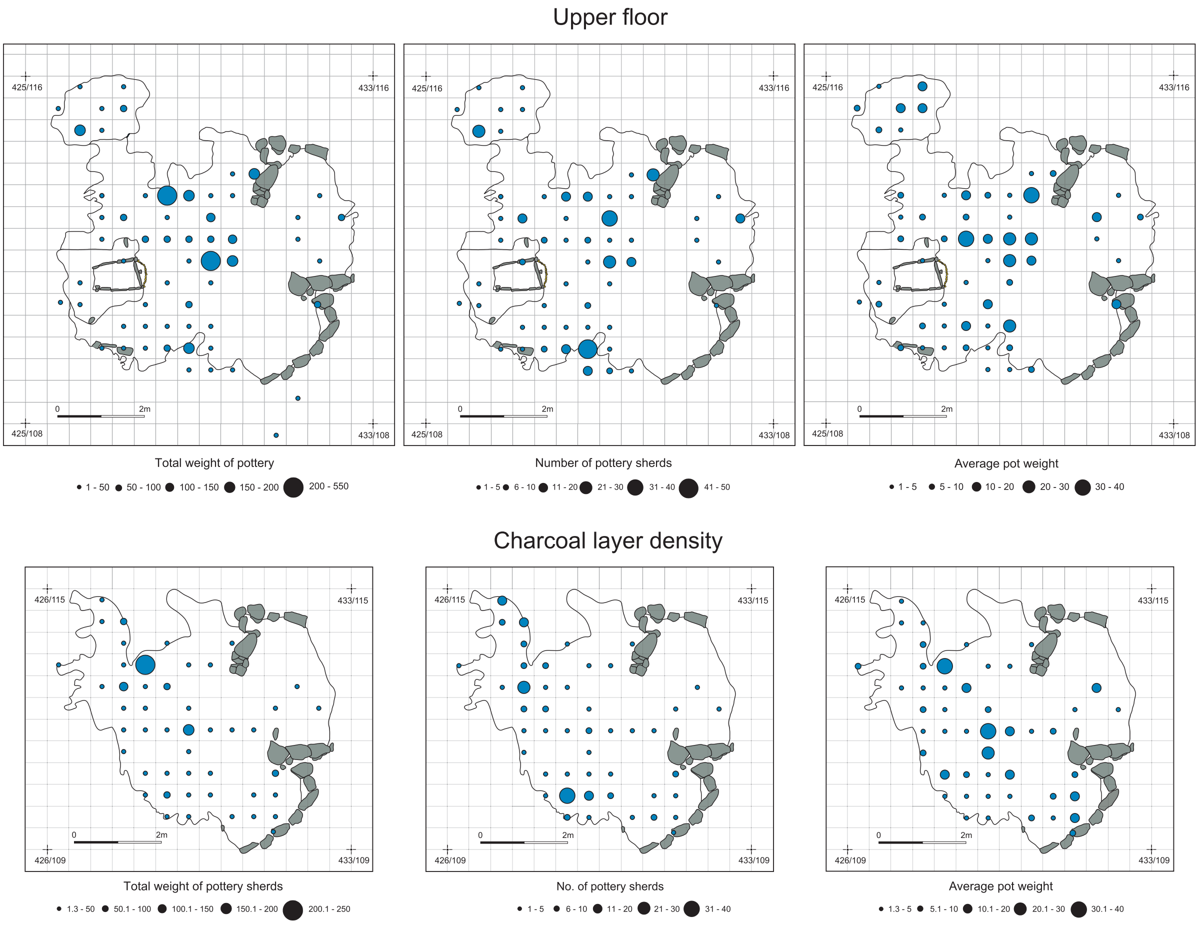


Figure 54. The distribution of pottery in the charcoal layer (457) and the secondary floor (397)

indicative of Middle Iron Age activity (Figure 53, 20). A few sherds have careful finishing or burnishing and may likewise be residual from earlier activity.

The few sherds in the floor of House 1 are not closely datable but include some with red inclusions and one possible abraded cordon. Charcoal layer 457, the destruction layer of the wheelhouse, has sherds of vessel 1, the large double cordoned pot. There are also six abraded cordons. Two sherds have been cut into roundels (Figure 56, 4790, 4791). Context 478, the upper fill of pit 837, has substantial parts of vessel 1, lots of non-joining body sherds, and parts of vessel 4. Pit fill 800 has several large sherds including several with red inclusions. Pit fill 802 has one very thin rim. Posthole fill 807 has a small decorated neck sherd from a Middle Iron Age vessel (Figure 53, 20). Pit fill 812 has double cordon sherds from vessels 3 and 4, and a large proportion of unallocated body sherds. The floor of House 2 (397) has 20 single cordon sherds and four double cordons. Eight cordons are abraded. One sherd has been cut into a roundel (Figure 56, 1866). Context 462 has two cordon sherds. One fingered base has been cut into a square (8534; Figure 53, 16). Context 471 has a group of conjoining shoulder sherds with a single cordon (Figure 53, 18). The hearth contexts have little diagnostic material apart from one abraded cordon sherd.

The fill of pit 837 is particularly important as it demonstrates the relationship of this pit, and presumably some of the other charcoal-filled pits, with the charcoal layer (457). Although the pit was only recognised as a cut feature after the removal of the charcoal layer 457, the massive concentration of pottery that filled this pit had already been recognised during the removal of the charcoal layer and the pitch of the large sherds present suggested the deposits belonged in a feature. It seems clear that the material from this pit derives from activity, pit digging, which occurred after the destruction of House 1 and before the occupation of the rebuilt house.

This observation clearly affects our interpretation of the distribution of potsherds in charcoal layer (457) depicted in Figure 54. The sherds are fairly evenly dispersed with clusters present only in the north-west and south yet the weight of sherds found indicates a larger concentration in the north and a concentration at the back of the hearth. These concentrations reflect the presence of large fresh sherds and the concentration at the back of the hearth is directly above pit 837 and probably indicates material in this pit. The large sherds to the north of the hearth probably also indicate deliberately placed material, in this case in pit 813. The only clusters which do not appear to be related to the phase of pit digging are those on the

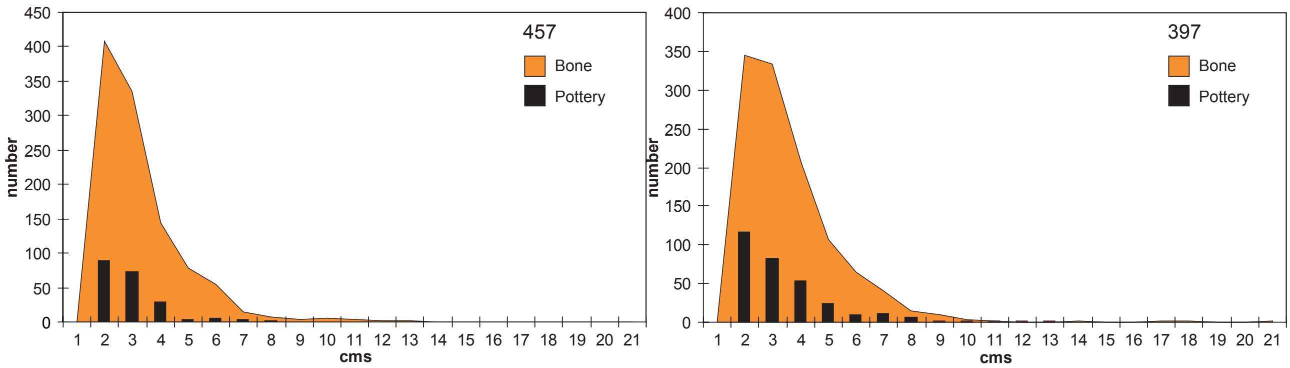


Figure 55. The size distributions of the pottery (column) and bone (area) from the charcoal layer 457 and the secondary floor 397

southern edge of the charcoal layer. This might relate to the entrance to the underlying hearth and reflect material lying on the surface of the house floor.

The distribution of pottery in the floor of House 2 (397) does not seem to be affected by the pit material. The sherds have a fairly dispersed spread and the most noticeable feature appears to be the absence of material around the hearth and in the east half of the building. This distribution is enhanced by the weight data which emphasises the north-central area of the house where most of the well-preserved sherds were located.

It is noticeable that the potsherds in the pit fills have a high average sherd weight indicating that they come from large sherds (838 = 39.2g albeit from only two sherds, 478 = 25.9g and 812 = 29.8g). The sherd weights from the charcoal layer and the House 2 floor are in contrast much lower (457 = 6.4g and 397 = 8.8g). However, the latter averages are still quite high compared to the averages from the Norse floor layers on mound 3 – 4.7g (Sharples 2005b, 68, table 10) and the CG midden layers on mound 1 – 6.4g which suggests they are probably distorted by the presence of pit material within them.

Measurements – N Sharples

Most of the contexts in block CB were relatively small and the assemblages of bone and pot were too small to justify a detailed analysis of the size distributions. Only two assemblages were thought to be large enough for analysis: the charcoal layer (457) produced 1056 measurable bones and 206 measurable potsherds and the House 2 floor (397) produced 1132 measurable bones and 308 measurable potsherds; all sherds below 10 mm were excluded from the analysis. The pottery assemblage from the charcoal layer (457) was 19.5% of the animal bone assemblage, whereas the pottery assemblage from the House 2 floor (397) was 27.2% of the bone assemblage. This is a much higher percentage than is present in the midden (CG) assemblages and is higher than many of the large assemblages in the infill layers (CC). It might be an indication that pottery is a more common loss on house floors than in other depositional environments but it is more likely that the ceramics were deliberately placed deposits associated with the underlying pits.

The size distribution of the pottery and bone from these two layers is depicted in Figure 55. Whilst the overall trends are very similar it is noticeable that the large assemblage from the House 2 floor (397) includes a small group of relatively substantial sherds, up to 130 mm in size, that are not present in the charcoal layer (457). The bone assemblage similarly has a few large pieces in the House 2 floor (397) and though the mode for both assemblages is between 10 and 20 mm, there is a much sharper decline in size in the assemblage from the charcoal layer (457). The House 2 floor (397) has 90% of the assemblage below 60 mm whereas 90% of the bone in the charcoal layer (457) was below 50 mm. In summary, this is not a particularly well preserved assemblage and most of the material is fairly heavily fragmented. Nevertheless, there are some large pieces present that indicate deliberate deposition.

Artefacts – A Clarke, P Macdonald, A Pannett, N Sharples and A Smith

There were 135.75 artefacts recovered from this block (Table 9): 37.75[1] bone/antler artefacts, 70 stone tools, four ceramic discs, eight flints, four fragments of pumice, four shell objects, two copper alloy pieces and six pieces of iron; there were two composite iron and bone objects which are counted with the bone assemblage (see Figures 56 and 57 for a selection of the objects). The overwhelming bulk of the assemblage came from the charcoal layer (457, 69 objects) and the floor of House 2 (397, 49.75 objects). As already discussed above, the distinction between these two layers is blurred and it is clear that much of the material found in the floor of House 2 (397) derives from disturbance of the underlying charcoal layers and this is clearly the case for the cobble tools discussed below. However, it is also clear from the discussion of the pottery (see above) that some of the finds in the underlying charcoal layer might indicate deposition after the destruction of House 1 and this is also argued for certain artefacts. It is therefore

CB	Object type	Material	Primary floor	Charcoal layer	Pit fills				Secondary floor						Hearth	Total
			481	457	800	830	814	836	397	306	459	462	489	492	453	
working debris	waste	antler		3												3
	waste	bone							1							1
	spillage	cu alloy							1							1
	unused cobble	stone		4					1				1			6
		flint						1	6						1	8
	fragment	pumice		1					3							4
tools	point	bone/antler		1		1			3							5
	point	whale bone							0.5							0.5
	handle	bone/antler		3					2			1				6
	socketed	antler							2							2
	perforated metapodial	bone		2												2
	grooved	bone/antler		1					2							3
	axe/comb	mixed		1								1				2
	strike-a-light	stone		4												4
	spindle whorl	stone	1													1
	faceted cobble	stone		12					2	1						15
	hammerstone	stone		4					1							5
	polisher	stone		3	1						1					5
	pounder/grinder	stone		7					3	1			1			12
	smoother	stone		3					6			1				10
personal objects	decorated	bone		1					0.25							1.25
	pin	bone		2					3							5
	bead	bone/antler							1							1
	bead	shell													1	1
	bead	stone							1							1
	ring	antler							1							1
gaming	disc	ceramic		2					2							4
	disc	shell		1					2							3
	die	bone		1												1
misc	cobble tool ?	stone		8					2					1		11
	plate	iron							2			1				3
	rivet	cu alloy							1							1
	rod	iron		1												1
	fragment	iron					1		1							2
	worked	whale bone		1												1
	pierced metapodial	bone		3												3
		total	1	69	1	1	1	1	49.75	2	1	4	2	1	2	135.75

Table 9. Artefacts from CB

important to emphasise that any distinctions between the material from contexts 397 and 457 should be treated with caution. Of the other contexts, only context 462 produced more than one or two objects.

The composition of the assemblages from the two principal layers is slightly different. The charcoal layer (457) has a limited and restricted range of working debris comprising only three pieces of antler waste and four unused cobbles. The floor of House 2 (397) in contrast has a range of possible production debris that includes unused cobbles (1), bone waste (1), flint (6) and pumice (3) and a small piece of copper alloy spillage (4688). Unfortunately the latter piece is not definite evidence for non-ferrous metalworking as spillage fragments can form anywhere that metal is exposed to fire hot enough to melt it (Bayley 1992, 779). It may be a residual piece from 457 that simply

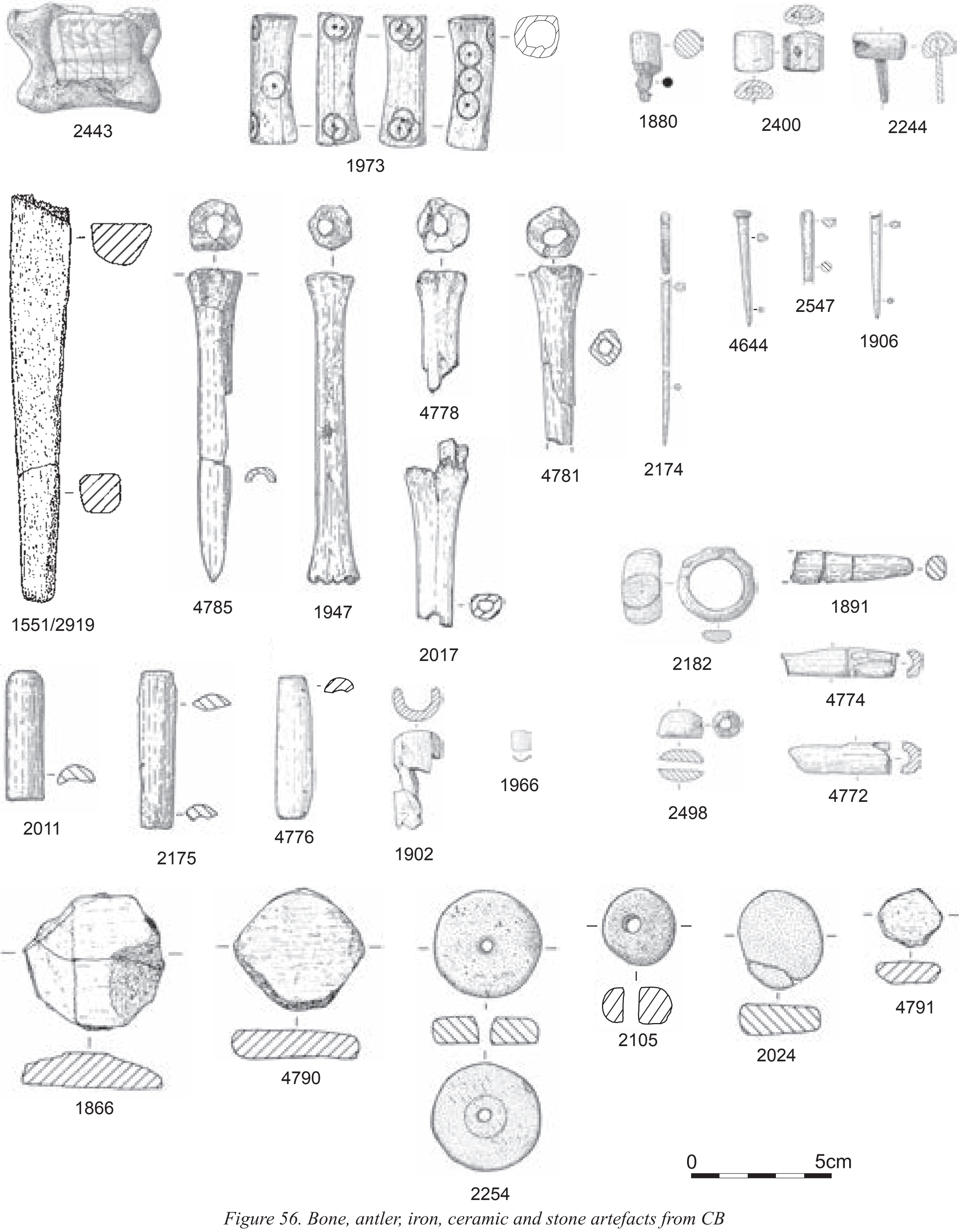


Figure 56. Bone, antler, iron, ceramic and stone artefacts from CB

reflects the destruction of the house. The flint, pumice and bone/antler waste may indicate limited *in situ* production of bone and antler tools.

The assemblage of tools, in contrast, is concentrated in the charcoal layer (457) which has 29 cobble tools (ignoring the cobble tools too decayed to confirm as tools)

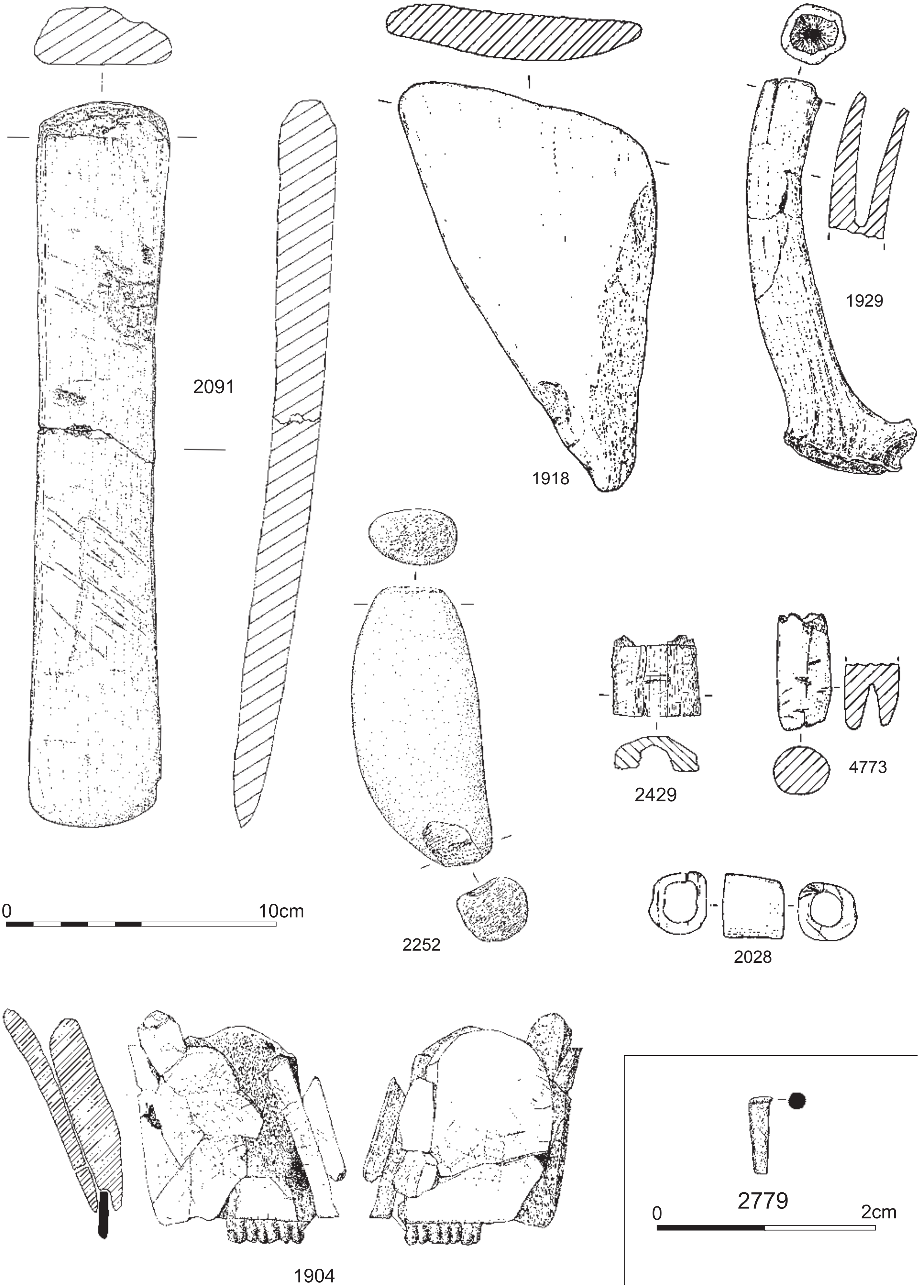


Figure 57. Bone, whale bone, antler/iron, copper alloy and stone artefacts from CB

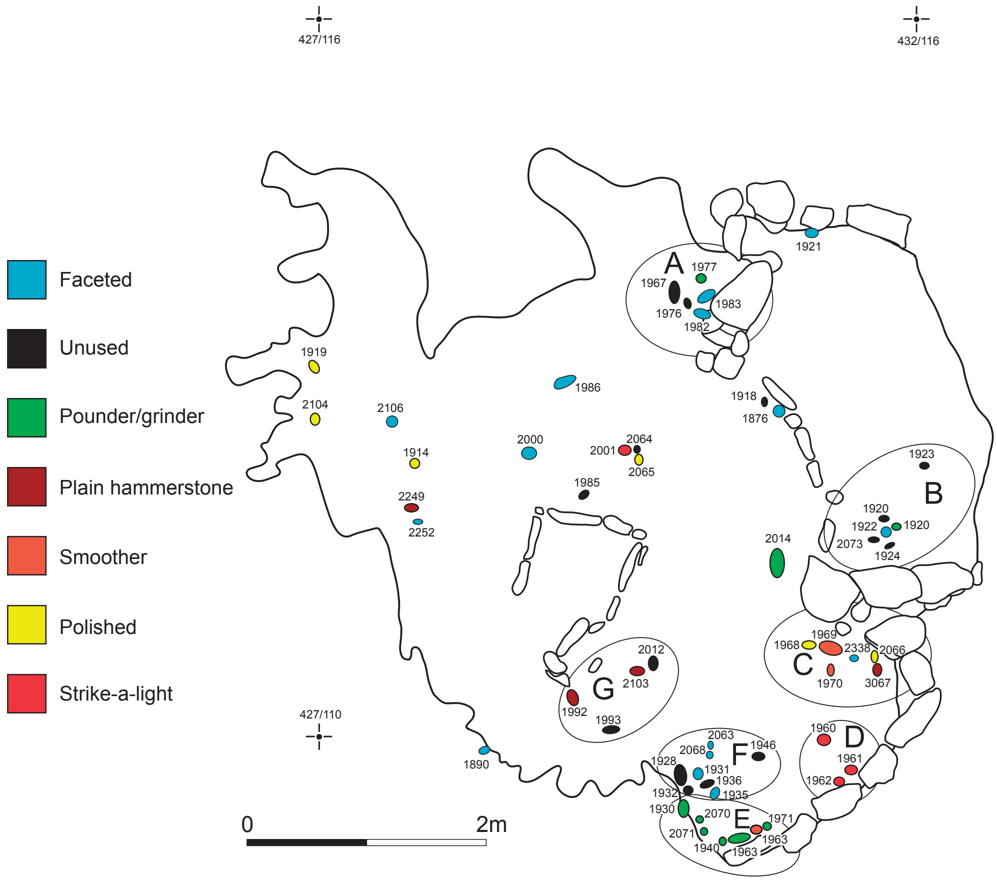


Figure 58. The distribution of stone tools from layers 457 and 397

and 12 other tools of various materials. The floor of House 2 has 21 tools; 12 of these are cobble tools (which may be derived from 457, see below) and the remaining nine are bone/antler tools of various forms. Unfortunately the function of most of the tools, such as the perforated and grooved metapodials, is difficult to interpret and others, such as the simple points, could have multiple functions. The most interesting object is a large bar-shaped object of whale bone (Figure 57, 2091) from the charcoal layer (457). This could be interpreted as either a fitting (perhaps a door bar) or an ard point, but shows none of the deep scratches and wear expected from use for this purpose. The object was found wedged between two of the carbonised roof timbers (Figure 30) and this may indicate that it was used during the construction of the house – perhaps to cut turves. It is noticeable that objects associated with textile working are rare, particularly compared to the assemblage from CC, and the only spindle whorl (Figure 56, 2254) came from the floor of House 1 (481).

Like the working debris, the personal objects are concentrated in the floor of House 2 (397). A range of objects is present including three pins (Figure 56, 4777, 1906, 4644), two beads (Figure 56, bone 2498, stone 2105) and a ring (Figure 56, 2182). The latter is an important piece which has parallels in Late Roman Britain (see below 263). The bone bead and antler ring are unburnt and therefore must belong to the occupation of House 2, whereas some of the pins are burnt and are likely to represent residual artefacts originating in the underlying charcoal layer (457). There are also two simple pins (Figure 56, 2174, 2547) from the charcoal layer (457). The only remaining personal item is a decorated cattle astragalus (Figure 56, 2443) which is closely paralleled by an object from the midden layers (CG). This object was found in the charcoal layer (457) but it is unburnt and therefore cannot relate to the destruction of this house. It is possible to relate this object to the parallelopiped die (Figure 56, 1973) which was recognized on exposure unlike the astragalus which was found with the animal bone during post-excavation processing. The unburnt die was found standing upright in the centre of the charcoal layer (457) and the simplest explanation for its location is that it was pushed into this layer from the surface. Both the die and the astragalus might have been deposited as part of an act of divination associated with the reoccupation of the house. It is possible that the decision to reoccupy or abandon the house after it was destroyed by fire had to be ritually assessed by divination and that this then led to the deliberate burial of the objects. The only other 'gaming pieces' are four ceramic counters (Figure 56, 1866, 2024, 4790 and 4791) equally distributed in the charcoal layer (457) and the House 2 floor (397).

The miscellaneous objects are distributed in both the two main layers. They include three small fragments of

Cobble tool type	*A*	*B*	*C*	*D*	*E*	*F*	*G*
Unused/Cannot determine wear	2	4				4	2
Faceted cobble	2	1	1			4	
Pounder/grinder	1	1			6		
Smoother			2		1		
Polisher			2				
Plain hammerstone			1				2
Strike-a-light				3			
Total weight of tools	1921g	3689g	2112g	425g	5040g	3570g	1929g

Table 10. Composition of the cobble tool groups from the house floor

iron and two of copper alloy, which suggests that metal was available but not commonly used. There is also a large triangular piece of worked whale bone (Figure 57, 1918) and three axially pierced metapodials (Figure 56, 1947, 4778, 4781) of unknown function.

The distribution of the cobble tools illustrates the close relationship of the charcoal layer (457) and the floor of House 2 (397) and gives some indication as to how the cobble tools were used and stored. During excavation, concentrations of these tools were noted but these often seemed to span the two different layers (397 and 457). Plotting the location of the tools (Figure 58) confirmed the preliminary observation of clusters and suggests that the tools in the floor of House 2 (397) represent displaced tools associated with the destruction of House 1 (457). Seven concentrations of stone tools are proposed (Figure 58, Table 10). Groups A and B are composed of a mix of faceted cobbles, pounder/grinders and unused cobbles (the latter category includes cobbles that are too degraded to exhibit wear patterns). In the south end of the structure two tool groups can be identified, one of which is composed almost exclusively of pounder/grinders (E) and the other of faceted cobbles (F). A group of three strike-a-lights (D) is located just to the east of these. Towards the centre and west of the house the cobble tools form a more dispersed spread and are mainly composed of faceted cobbles, polishers and smoothers.

Groups A, B and C are very discrete in plan, forming tight concentrations of 0.5 m to 0.6 m in diameter. In contrast groups D, E and F, which could otherwise merge and be interpreted to form a wide artefact spread, have been identified by virtue of the grouping of tool types (Figure 58).

These cobble tools groups most likely represent caches of stone tools that were, in the excavator's view, hung in bags from the corbelled roof of the peripheral cells and which lay where they fell when the house was destroyed. Since the most discrete groups (A, B and C) are found against the surviving walls it could be suggested that the spreads of E and F were originally tool caches, which had subsequently been disturbed by stone robbing. The total weight of the stones in these groups varies: A, B and C are just 2kg–3.6kg and the denser spreads E and F are 3.5kg–5kg (Table 10). No group would have been too heavy for suspension. Alternatively, the stone tools might have been stored in bags or baskets, set on the floor and tucked against the house wall.

The association of faceted cobbles with pounder/grinders and polishers with smoothers as indicated by the proposed storage groups (Table 10) would suggest that these tool types are linked somehow in function – perhaps the faceted cobbles are simply undeveloped pounder/grinders or were used for smaller quantities of the material being processed, whilst the polishers, with the unaltered face but traces of polish, might have been used as tools for finishing off the surface of what was being worked on by the smoothers.

The distribution of the other small finds is much more dispersed and very few could be said to relate to the stone tool clusters. The distribution of the worked bone and antler is shown in Figures 59 and 60. Figure 59 shows the burnt objects whereas Figure 60 shows the unburnt objects. This is probably a better way of examining these assemblages as the evidence discussed above clearly indicates the contextual integrity of the charcoal layer (457) and the floor of House 2 (397) is poor. The burnt objects are consistently burnt blue/black and this suggests low temperatures and lack of oxygen (Walker *et al.* 2008) which would be consistent with the burning down of the house.

The assemblage of burnt objects (Figure 59) includes most of the tools. There are two different types of pierced metapodials. Those pierced through the epiphysis (1947, 4778, 4781) were found on the east side of the house but were widely scattered within cells D and E. One of the examples (2548) pierced through the shaft was also found in cell D but the other (2017) was located on the west side of the hearth. Five burnt handles are present and again these were widely dispersed; 1902 came from just beyond the north-western extension of the charcoal layer (457), 4779 from the northern edge of the central area, 2011 from next to pier 3, 2175 from the centre and 1966 from cell E. The remaining tools and waste were widely distributed. A large fragment of shed antler (1929), with a deeply cut socket which suggests it was used as some form of handle, was found on the edge of cell D and a smaller antler fragment (4773) with a similar socket came from above the hearth. The whale bone adze (2091) was

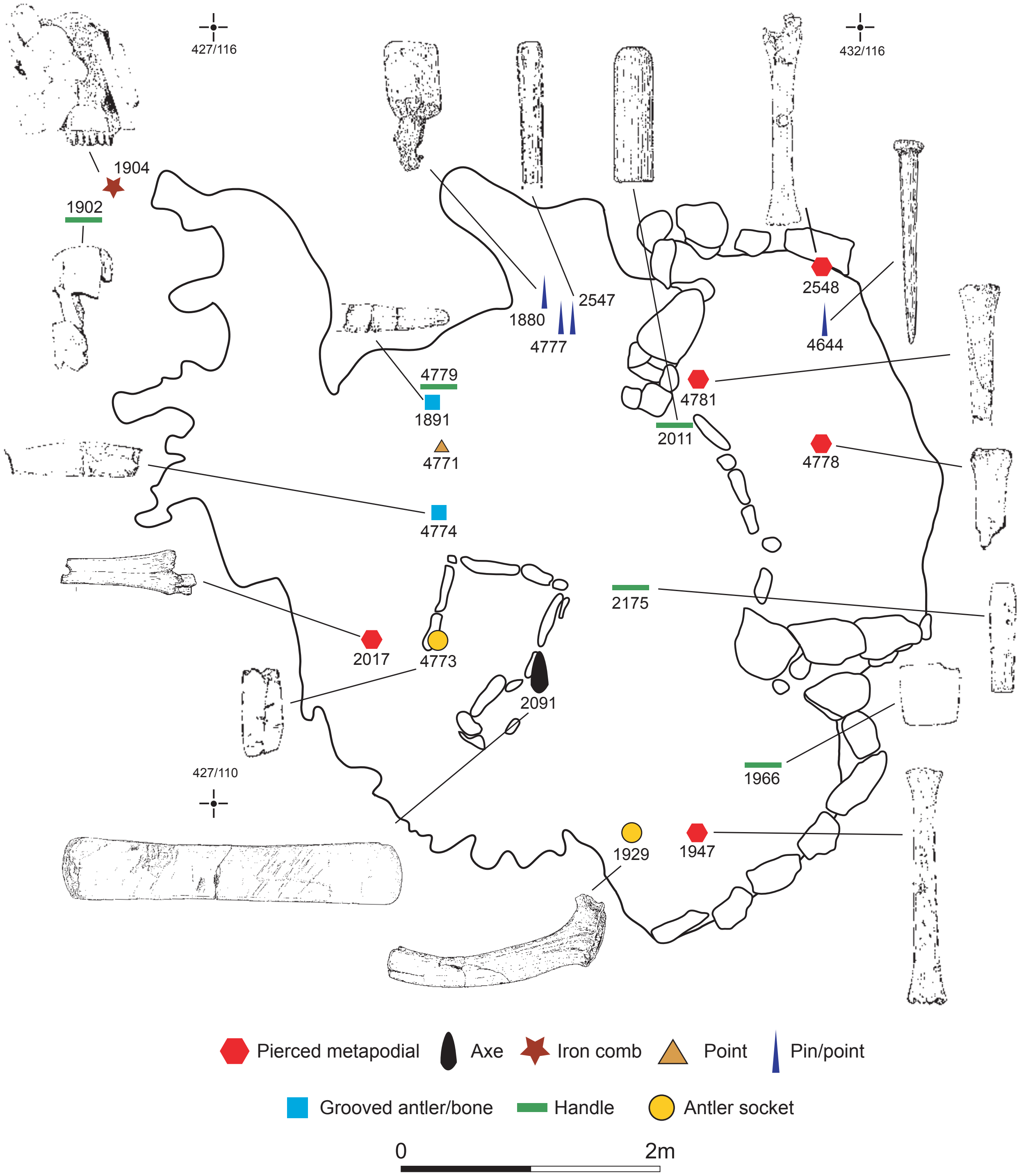


Figure 59. The distribution of burnt bone artefacts in layers 457 and 397, artefacts not drawn to scale

on the south side of the underlying hearth; a long bone point (4771) and a grooved metapodial (4774) lay to the north of the hearth and a composite iron and antler tool (1904) lay beyond the north-west extent of the charcoal layer (457). The only burnt personal items are three pins (2547, 4644, 4777) and these, together with the composite iron and antler pin head (1880), were clustered on either side of pier 3.

The unburnt material (Figure 60) includes a group of possibly religious or symbolic objects and several personal items. The die (1973), the astragalus (2443), the bone bead (2498), the unburnt pins (1906, 2174) and the ring (2182) are all located over a dispersed area in the centre of the house to the east of the hearth associated with the House 2 floor (397). The unburnt tools are more rare but they include a sheep metapodial point (4785) in the south corner of cell E, an antler handle (4776) at the back of cell D and a grooved sheep metapodial (4772) in

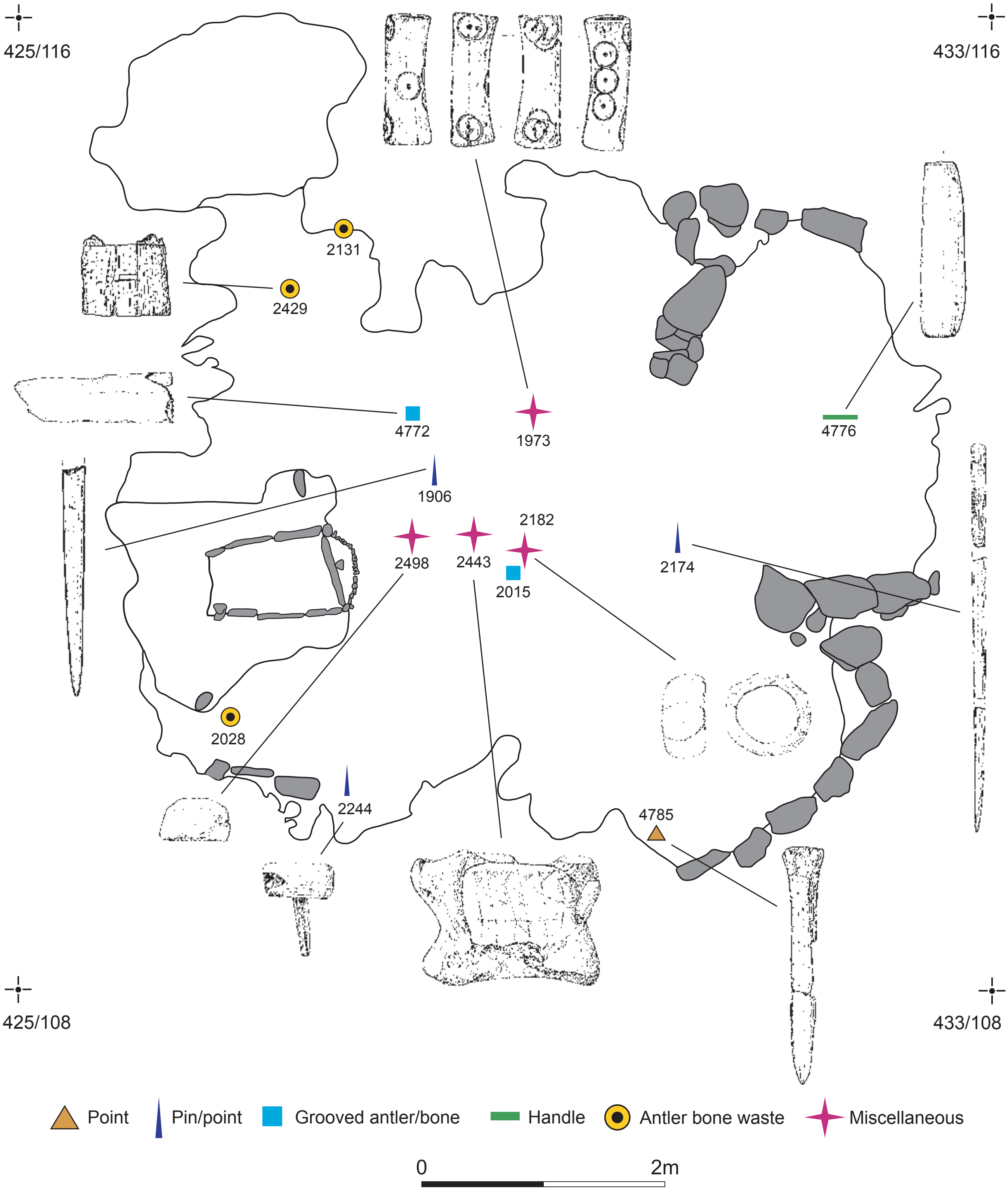


Figure 60. The distribution of unburnt bone artefacts in layers 457 and 397, artefacts not drawn to scale

the centre of the house. The antler waste and cut bone was similarly widely distributed; 2028 lay to the south of the hearth, 2131 and 2429 on the northern edge of the floor (397). An oddly cut antler tine (2015) lay in the centre of the house and perhaps is more symbolically significant than would first appear.

The analysis of the artefact assemblage suggests that there are significant differences in the use of House 1 and House 2. The assemblage from the charcoal layer (457) is dominated by cobble tools which appear to have been stored, possibly suspended in bags, around the edge of the building. Other objects definitely associated with

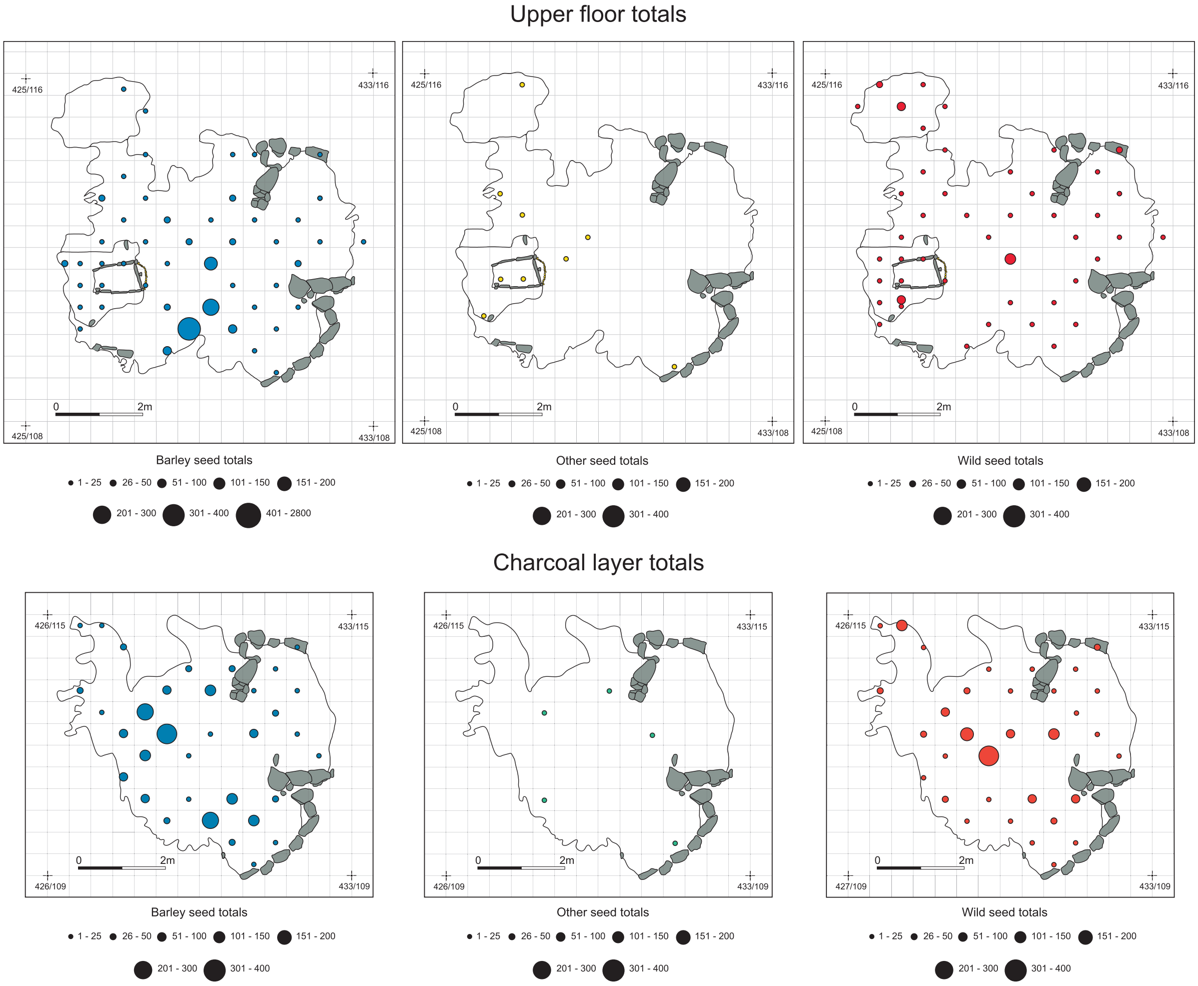


Figure 61. The distribution of carbonised plant remains (total quantity) from charcoal layer 457 and the secondary floor layer (397)

this layer are pins, perforated metapodials and a variety of handles. The pins are discussed above as decorative personal items associated with dress but perhaps they should be interpreted as tools used to secure bags as there are no other decorative items associated with this layer. In contrast, the floor of House 2 (397) has a much more varied range of objects which includes evidence for bone/antler working and tool use and has several ornaments (beads and a ring) accidentally dropped by the inhabitants. This might indicate a difference between a storage structure, which is not intensively occupied or kept relatively clean, and a domestic building used for a variety of tasks.

The period between the destruction of the building and its reoccupation appears to be marked by rituals, possibly associated with divination, which resulted in the deposition of important objects (a decorated astragalus and die) as well as large quantities of pottery.

Carbonised plant remains – S Colledge and H Smith

One hundred and twenty-four samples were examined from the occupation of the house. The samples were from the floor of House 1 (1, 481; 1, 474), the coprolite layer (2, 465), the pit fills (479, 800, 802, 815), from the charcoal layer (35, 457; 1, 467; 1, 470; 1, 486; 1, 484), from the floor of House 2 (42, 397; 1, 447; 6, 462; 1, 466; 1, 471; 1, 492), from hearth construction (10, 482; 1, 496; 2, 497) and from hearth use (1, 498; 2, 494; 2, 487; 3, 477; 2, 476; 2, 453). The identifications are listed in Tables 11, 12 and 13.

There were few (or very few) seeds from the floor of House 1, the coprolite layer and the later hearth construction. Only a small quantity of barley grains and a handful of wild/weed seeds were present and the average density of barley grains per litre of soil sieved was 0.53 grains/litre. This contrasts with an average density of grain from the charcoal layer of 2.79 grains/litre and from the floor of House 2 of 4.85 grains/litre.

The distribution of the total numbers of seeds from the charcoal layer (457) and the floor of House 2 (397) is depicted in Figure 61 and the densities are depicted in Figure 62. The assemblage is divided into barley, other crops and wild seeds. In the charcoal layer (457) the barley concentrations are visible in the northern part of the central area (sample square 9018, 214 grains; 9029, 102 grains)

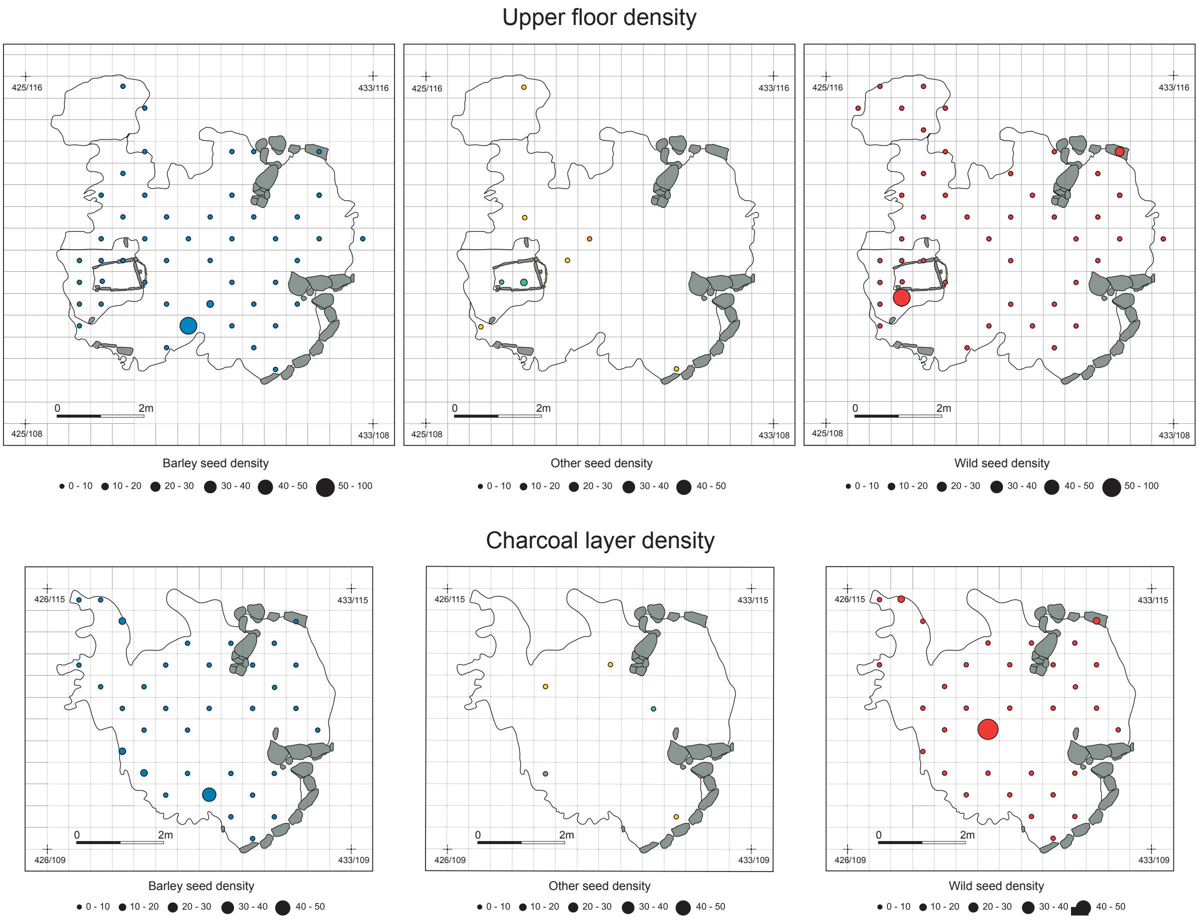


Figure 62. The distribution of carbonised plant remains (density) from charcoal layer 457 and the secondary floor layer (397)

and on the south side of the central area (sample square 8581). Sample square 8581 had high density (26.50) of grains/litre of soil and only three other samples had over 10 grains per litre; 9086/457: 12.60 grains/litre; 9067/457: 11.60 grains/litre; 8591/457: 10.40 grains/litre. Very few grains of oats were found but sample 8591 did produce two indeterminate *Triticum* sp. grains. The wild seeds are concentrated in the centre of the house and sample square 9007 has a concentration of *Rumex/Polygonum* sp. seeds (273 seeds; 136.5 grains/litre). Cell D to the east has relatively low quantities of all carbonised plant remains.

In the floor of House 2 (397) the quantities of barley are fairly low and they are evenly distributed across the floor with little evidence for high densities in or around the hearth. The only large samples come from the centre towards the southern edge of the floor (sample square 8365 had 2777 grains and a density of 92.57 grains/litre). There is also a cluster of samples with small quantities of oats and rye around the hearth. The wild seeds are fairly evenly distributed across the floor with no significant concentrations around the hearth though sample 9106, from hearth layer 453, does have a significant density of *Carex* sp. seeds.

Charcoal – R Gale

House 1

The excavation of the thick layer of charcoal-rich sand (457) resulted in the identification of a number of timbers that had become completely burnt through. Those in the northern half of the house lay randomly, while those in the southern half formed a partial grid pattern (Figure 31). Most of the best preserved timbers were allocated small find numbers and lifted separately and 23 of these finds have been examined (2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2156 and 2157). All but one consisted of spruce/larch. These are shown as multiple fragments in Table 14 but, in reality, each sample probably relates to a single timber. The fragmented charcoal contained in each sample was usually examined in its entirety to eliminate the presence of other species – a useful exercise, as sample 2085, from a large beam aligned north-south in the southern half of the house, also contained small fragments of burnt hazel wood. Sample 2083 was poorly preserved but provisionally identified as pine.

The timbers originated from wide roundwood, or poles, but, owing to subsequent fragmentation, it was not

	Sample no:	Context no:	flot volume (cm^3)	'charcoal' volume (cm^3)	volume floated (l)	'charcoal' density (cm^3/l)	Cereals	*Hordeum sativum* - grains	*Hordeum sativum* - indet frags	*Hordeum sativum* - rachis frags	*Hordeum sativum* - (cf.) naked grains	*cf. Triticum* sp. - grains	*Avena* sp. - grains	*Avena* sp. - indet frags	*cf. Secale cereale* - grains	Cereal grain frags	Cereal culm frags	Other Crops	*Linum usitatissimum*	*cf. Linum usitatissimum*	Weeds/Wild species	*cf. Cerastium* sp.	*cf. Chenopodium* sp.	*Brassica/Sinapis* spp	*Carex* sp. type 1	*Carex* sp. type 2	*Scirpus* spp	Cyperaceae indet.	*cf. Fumaria* sp.
totals			930.0	923.3	452.50			1261	890	0	2	2	4	2	0	316	1			6		121	139	58	286	90	174	0	1
charcoal layer	9156	457	20.0	20.0	7.00	2.86		2	2					1		1									3	2	1		
charcoal layer	9146	486	1.0	0.8	4.00	0.20																							
charcoal layer	9144	484	1.5	1.5	1.50	1.00		2																					
charcoal layer	9086	457	12.0	12.0	5.00	2.40		63	35							2						8	2	9					
charcoal layer	9080	457	10.0	10.0	6.00	1.67		48	5													1		29	2	1			
charcoal layer	9078	457	67.0	67.0	2.00	33.50		2	1																				
charcoal layer	9075	457	17.0	15.3	4.50	3.40		18	10							10									16	17	1		
charcoal layer	9067	457	3.0	3.0	2.50	1.20		29	9							9													
charcoal layer	9066	457	65.0	65.0	5.00	13.00		1														1			2				
charcoal layer	9065	457	25.0	25.0	9.00	2.78		1																	100	7	21		
charcoal layer	9063	470	21.0	21.0	4.00	5.25		16	2							8													
charcoal layer	9062	467	2.0	2.0	5.00	0.40		4	2							12								1	1				
charcoal layer	9048	457	39.0	39.0	3.00	13.00		2	1													19							
charcoal layer	9045	457	29.0	29.0	22.00	1.32		22	19							2									5		1		
charcoal layer	9043	457	14.0	14.0	13.00	1.08		24	19							14						1	9		1		1		
charcoal layer	9041	457	2.0	1.2	8.00	0.15		2	3													3							
charcoal layer	9037	457	25.0	25.0	20.00	1.25		26	60							17						3		1	6		33		
charcoal layer	9035	457	64.0	64.0	28.00	2.29		59	81				2			8	1								8	2			
charcoal layer	9033	457	4.0	3.2	7.00	0.46		1														1			5				
charcoal layer	9031	457	3.0	2.4	9.00	0.27		2															16		1				
charcoal layer 1570+/-35	9029	457	48.0	48.0	38.00	1.26		102	113				1	1		20							35	6	6	2	2		
charcoal layer	9023	457	15.0	15.0	12.00	1.25		22	25							5													
charcoal layer 1505+/-35	9018	457	70.0	70.0	33.00	2.12		214	107							15						1	32	1	23	9	18		
charcoal layer	9016	457	23.0	23.0	60.00	0.38		11	9							2							1		35	12	9		
charcoal layer 1550+/-35	9014	457	35.0	35.0	13.00	2.69		45	28							2				6			17		25	5	25		1
charcoal layer	9012	457	27.0	24.4	12.00	2.03		14	15							4								1	6				
charcoal layer	9009	457	10.0	10.0	12.00	0.83		99	20							80								2	1	1			
charcoal layer 1585+/-35	9007	457	29.0	29.0	2.00	14.50		3														16	16		20	9	19		
charcoal layer	9001	457	7.0	7.0	4.00	1.75		2	4																	1			
charcoal layer	8591	457	2.5	2.5	5.00	0.50		50	40			2				25							2		3	1	16		
charcoal layer	8589	457	20.0	20.0	n/a	n/a		15	4							3										1			
charcoal layer	8587	457	20.0	20.0	21.00	0.95		51	58							3								1	3	17	17		
charcoal layer	8585	457	18.0	18.0	16.00	1.13		30	20							6						65			6		2		
charcoal layer	8583	457	85.0	85.0	5.00	17.00		18	25							34								1	3	1			
charcoal layer	8581	457	50.0	50.0	6.00	8.33		157	106		2					8						1		3	1	1			
charcoal layer	8579	457	13.0	13.0	16.00	0.81		58	53							11							8	3	3		8		
charcoal layer	8572	457	1.5	1.5	11.00	0.14		26	3							3													
charcoal layer	8570	457	6.5	6.5	13.00	0.50		8					1			6						1	1			1			
charcoal layer	8567	457	25.0	25.0	8.00	3.13		12	11							6									1				

Bromus sp.				2											2				1																					5
Paniceae type - grains					2	3		23	1	5	2	21			2	8	4		3			1	2			2		8							8				16	111
Gramineae - indet grains		2		3		1	1							1		2	32	1				1					16		2			1			1	1				65
Prunella vulgaris															16																									16
Labiatae (*cf. Ballota* sp.)																																								0
small legumes		1			1																		1																	3
Liliaceae (*cf. Iris* sp.)				frgs	frgs													14+25frgs				1+3frgs																		43
Rumex/Polygonum sp. - sharp angles, smooth testa		2		1			2			1	1	273		1		13	17		4			2	2		3		3					1	2			4			1	333
Rumex/Polygonum sp. - rounded angles, textured testa													1			3								1							1				2	1				9
Rumex/Polygonum spp - kernels				2							1																													3
Polygonum sp. - flat type															1																									1
Plantago sp.																1						1																		2
Ranunculus sp.							1								21	1					1																	1	1	26
Potentilla sp.																																								0
Galium sp.		1		6								3							1			2		1	10		1													25
Umbelliferae																																								0
Urtica cf. dioica			16																																					16
Urtica cf. urens																																								0
Viola sp.																													1											1
Parenchymatous tissues																x	1tuber		x				x													x				
Amorphous vesicular frags	x				x	x							x						x				x			x	x						x					x		
Indeterminate/ Unidentified plant taxa				x	x	x	x	x?		x	x	x	x	x	x	x	x		x			x	x		x	x		x		x	x					x			x	
Insects/maggots?	1		1		5			?		1						5+beetle	3				1		1			3		x											1	

Table 11. The charred plant remains from the charcoal layer (457) and associated layers in CB

	Sample no:	Context no:	flot volume (cm³)	'charcoal' volume (cm³)	volume floated (l)	'charcoal' density (cm³/l)	Cereals: *Hordeum sativum* - grains	*Hordeum sativum* - indet frags	*Hordeum sativum* - rachis frags	*Hordeum sativum*- (*cf.*) *naked grains*	*cf.* Triticum sp. - grains	*Avena* sp. - grains	*Avena* sp. - indet frags	*cf.* Secale cereale- grains	Cereal grain frags	Cereal culm frags	Other Crops: *Linum usitatissimum*	*cf.* Linum usitatissimum	Weeds/Wild species: *cf.* Cerastium sp.	*cf. Chenopodium* sp.	*Brassica/Sinapis* spp	*Carex* sp. type 1	*Carex* sp. type 2	*Scirpus* spp	Cyperaceae indet.	*cf. Fumaria* sp.	*Bromus* sp.
secondary floor	8534	462	20.0	20.0	13.00	1.54	3	2					1		3							11		11			
secondary floor	8536	462	100.0	100.0	8.00	12.50														1		14	2				
secondary floor	8538	462	15.0	15.0	5.00	3.00	1													1		1		8			
secondary floor	8540	462	85.0	85.0	15.00	5.67														16		19	5	4			
secondary floor	8542	462	1.0	0.5	5.00	0.10									4												
secondary floor	8547	462	3.0	2.4	10.00	0.24									2							16	4				
secondary floor	9060	471	4.0	2.0	15.00	0.13	10	4							2		1				2	7	1	1			
secondary floor	9061	466	4.0	1.0	20.00	0.05	3								7							1	1				
secondary floor	8302	447	<1	<1	7.00	neg	2	1																			
secondary floor	8339	397	1.0	1.0	8.00	0.13	5	2				1	1		30												
secondary floor	8348	397	<1	<1	9.00	neg									2												
secondary floor	8350	397	2.0	2.0	12.00	0.17	11	3							2												
secondary floor	8354	397	15.0	15.0	30.00	0.50	61	21							27					1		2	1				
secondary floor	8361	397	1.0	1.0	10.00	0.10	27	1							25												
secondary floor	8363	397	5.5	4.0	33.00	0.12	30	24							33						4		1				2
secondary floor 1580+/-35	8365	397	37.0	37.0	30.00	1.23	2777	xxx	1						278				2			5	3				
secondary floor	8372	397	<1	<1	5.00	neg	1																				
secondary floor	8374	397	<1	<1	15.00	neg	1	1																			
secondary floor	8376	397	2.0	2.0	18.00	0.11	95	164							45							3		10			
secondary floor	8378	397	2.5	2.5	8.00	0.31	20	16																			
secondary floor	8386	397	1.5	1.5	15.00	0.10	1	1							1							2					
secondary floor	8388	397	<1	<1	10.00	neg	4								2												
secondary floor	8392	397	<1	<1	10.00	neg	1								2												
secondary floor	8399	397	15.0	15.0	21.00	0.71	18	11							24				2								
secondary floor 1545+/-35	8403	397	23.0	23.0	27.00	0.85	120	51							5	1			1	8		11	4	2			
secondary floor	8405	397	<1	<1	14.00	neg	5					1			1												
secondary floor	8412	397	<1	<1	1.10	neg	1												8								
secondary floor	8414	397	<1	<1	14.00	neg	12	8								1			2								
secondary floor	8416	397	2.0	2.0	34.00	0.06	4	4							1				1			2					
secondary floor	8418	397	4.0	4.0	8.00	0.50	37	8																			
secondary floor	8420	397	20.0	20.0	11.00	1.82	49							2	3								4				
secondary floor	8422	397	3.0	2.7	16.00	0.17	3								4												
secondary floor	8424	397	4.5	3.6	18.00	0.20	10	3							10							1					
secondary floor	8431	397	<1	<1	10.00	neg									1												
secondary floor	8433	397	1.0	1.0	14.00	0.07	4	3								1											
secondary floor	8435	397	1.0	1.0	9.00	0.11	9	8							3	1								4			
secondary floor	8437	397	1.5	1.5	11.00	0.14	1													1				1			
secondary floor	8439	397	17.0	17.0	30.00	0.57	28	10							3					1		1		17			
secondary floor	8441	397	4.0	2.0	10.00	0.20	12					1			20				8					2			
secondary floor	8448	397	<1	<1	14.00	neg	1	3							1				4			1					
secondary floor	8450	397	1.5	1.5	10.00	0.15	3	4							2	3						1					
secondary floor	8452	397	3.0	3.0	27.00	0.11	15	12							3						1						
secondary floor	8456	397	5.5	5.5	19.00	0.29	12	12														1					
secondary floor	8458	397	25.0	25.0	14.00	1.79	19	26				1			20	1						5					
secondary floor	8464	397	<1	<1	9.00	neg									1							1					
secondary floor	8469	397	<1	<1	7.00	neg																					
secondary floor	8473	397	1.5	1.2	8.00	0.15	3																				
secondary floor	8479	397	6.0	6.0	2.60	2.31	1	2							3				34								
secondary floor	8481	397	5.0	4.0	11.00	0.36	2	6												1		2					1
secondary floor	8482	397	1.0	0.8	20.00	0.04	3	1																			
secondary floor	8484	397	3.0	2.7	6.00	0.45	11	1							4							3		2			
secondary floor	9163	492	<1	<1	2.00	neg	1								5												
totals			447.0	434.4	708.70		3437	413	1	0	0	4	2	2	579	8	1	0	62	30	7	110	26	62	0	0	3

Paniceae type - grains	1	7		6		2	1					1				8		4	1		1			12	12			2			2		1		1	2					1			16		1		4			1		87
Gramineae - indet grains				16				1					1		3														1													1											23
Prunella vulgaris																																																					0
Labiatae (*cf. Ballota* sp.)																																							1														1
small legumes		2																																																			2
Liliaceae (*cf. Iris* sp.)														1																																							1
Rumex/ Polygonum sp. - sharp angles, smooth testa		2			1	1							2			1									48			1																4			1	1					62
Rumex/ Polygonum sp. - rounded angles, textured testa		2				1		1					1	1														1																									7
Rumex/ Polygonum spp - kernels																																																					0
Polygonum sp. - flat type																																																					0
Plantago sp.							1									1																																					2
Ranunculus sp.												1													1				1																								3
Potentilla sp.																																																					0
Galium sp.							1								2	2									23													1								1							30
Umbelliferae																							1																														1
Urtica cf. dioica																																																					0
Urtica cf. urens																																																					0
Viola sp.																																																					0
Parenchymatous tissues																x																																					
Amorphous vesicular frags	x	x				x						x	x		x															x		x	x					x	x			x	x	x					x	x			
Indeterminate/ Unidentified plant taxa	x	x		x	x								x		x	x			x					x	x						x		x	x		x		x	x					x				x					
Insects/maggots?				?																		x																													1		

Table 12. The charred plant remains from the secondary floor in CB

	coprolite layer	coprolite layer	primary floor	primary floor	pit fill	pit fill	pit fill	pit fill	hearth construction	hearth construction	hearth construction	hearth construction	hearth construction	hearth construction	hearth construction	hearth construction	hearth construction	hearth construction	hearth construction	hearth construction	hearth construction	hearth	hearth	hearth	hearth	hearth	hearth	hearth	hearth	hearth	hearth	hearth	hearth	totals
Sample no:	9059	9157	9097	9178	9098	9177	9179	9182	9124	9127	9128	9134	9135	9137	9138	9139	9140	9168	9171	9173	9175	9103	9106	9109	9110	9116	9117	9119	9148	9151	9172	9174	9176	
Context no:	465	465	474	481	479	800	802	814	482	482	482	482	482	482	482	482	482	482	496	497	497	453	453	476	476	477	477	477	487	487	494	494	498	
flot volume (cm³)	<1	5.0	1.0	20.0	42.0	45.0	70.0	50.0	1.0	3.5	2.5	3.0	neg	1.0	2.0	2.0	1.0	1.5	1.0	4.0	17.0	15.0	3.5	<1	2.5	2.0	7.0	1.5	7.0	2.0	1.0	<1	<1	314.0
'charcoal' volume (cm³)	<1	4.5	0.8	20.0	42.0	45.0	70.0	50.0	0.6	3.2	1.8	1.5	neg	0.9	1.0	0.6	0.9	1.5	0.5	3.6	17.0	12.0	3.5	<1	2.5	1.4	7.0	1.5	3.5	2.0	0.3	<1	<1	299.0
volume floated (l)	10.00	4.00	2.00	29.00	9.00	17.00	9.00	8.00	8.00	15.00	11.00	11.00	2.00	11.00	10.50	6.00	6.00	1.00	3.50	21.00	6.00	7.50	1.00	4.00	3.00	12.00	1.50	3.50	n/a	2.50	21.00	0.50	0.75	257.3
'charcoal' density (cm³/l)	neg	1.13	0.40	0.69	4.67	2.65	7.78	6.25	0.08	0.21	0.16	0.14	neg	0.08	0.10	0.10	0.15	1.50	0.14	0.17	2.83	1.60	3.50	neg	0.83	0.12	4.67	0.43	n/a	0.80	0.01	neg	neg	
Cereals																																		
Hordeum sativum - grains		1	2	7	21		7	18	4	10	4	3		8	3	1	3	5	2	1	4	2		9		7			13	2				137
Hordeum sativum - indet frags			1		5			2	12	12		8		4	5	5	23	3	13	5		1		3		3				1				106
Hordeum sativum - rachis frags							1																						1					2
Hordeum sativum- (*cf.*) naked grains																																		0
cf. Triticum sp. - grains																																		0
Avena sp. - grains																																		0
Avena sp. - indet frags									1																									1
cf. Secale cereale- grains																																		0
Cereal grain frags	1		1	14		2	1	7		2	1			1			1		4	3						4			7		2			51
Cereal culm frags																																		0
Other Crops																																		
Linum usitatissimum																										1								1
cf. Linum usitatissimum																									4									4
Weeds/Wild species																																		
cf. Cerastium sp.																																		0
cf. Chenopodium sp.	8						1																16							8				33
Brassica/Sinapis spp									1																									1
Carex sp. type 1				1	8	14	102	4						1									64											194
Carex sp. type 2		8			2	2	15			1	1					2				1				2										34
Scirpus spp.					3		10	2			17			1									16								1			50
Cyperaceae indet.																																		0
cf. Fumaria sp.																																		0
Bromus sp.								1																										1
Paniceae type - grains				1	1	5	31	5																8					1					52
Gramineae - indet grains							1																											1
Prunella vulgaris																																		0
Labiatae (*cf. Ballota* sp.)						1																												1
small legumes																																		0
Liliaceae (*cf. Iris* sp.)																																		0
Rumex/Polygonum sp. - sharp angles, smooth testa					3	1		1				1			1								1			1			2	1				12
Rumex/Polygonum sp. - rounded angles, textured testa					1																								1					2
Rumex/Polygonum spp - kernels				2																														2
Polygonum sp. - flat type																																		0
Plantago sp.						1																												1
Ranunculus sp.											1																							1
Potentilla sp.																																		0
Galium sp.					3																													3
Umbelliferae																																		0
Urtica cf. dioica																																		0
Urtica cf. urens															16																			16
Viola sp.															1																			1
Parenchymatous tissues												x								x						x								
Amorphous vesicular frags					x	x	x	x									x												x					
Indeterminate/Unidentified plant taxa							x							1																				
Insects/maggots?																																		

Table 13. The charred plant remains from the various features in CB

Sample	Context	*Alnus*	*Betula*	*Corylus*	Ericaceae	*Fraxinus*	Pomoideae	*Populus/Salix*	*Quercus*	*Picea/Larix*	*Pinus*
First house											
8585	457	-	-	-	-	-	-	-	-	10	-
8587		-	-	-	-	-	-	-	-	30	-
8589		-	-	-	-	-	-	-	-	10	-
8595		-	-	-	-	-	-	-	-	73	-
8597		-	-	-	-	-	-	-	-	8	-
8598		-	-	-	-	-	-	-	-	50	-
1937/8752		-	-	-	-	-	-	-	-	27	-
9003		-	-	-	-	7r	8r	-	-	2	-
9005		-	-	-	-	-	-	-	-	85	-
9014		-	-	-	-	-	-	-	-	13	-
9016		-	-	-	-	-	-	-	-	15	-
9018		-	-	-	-	-	-	-	-	52	-
9024		1	5r	-	-	-	-	-	-	18	-
9025		-	-	-	-	-	-	-	-	55	-
9027		-	-	-	-	-	-	-	-	54	-
9028		-	-	-	-	-	-	-	-	21	-
9029		-	-	-	-	-	-	-	-	36	-
9032		-	-	-	-	-	-	-	-	27	-
9035		-	-	-	-	-	-	-	-	43	-
9065		-	-	11	-	-	-	5	-	1	-
2076		-	-	-	-	-	-	-	-	3	-
2077		-	-	-	-	-	-	-	-	19	-
2078		-	-	-	-	-	-	-	-	11	-
2079		-	-	-	-	-	-	-	-	21	-
2080		-	-	-	-	-	-	-	-	31	-
2081		-	-	-	-	-	-	-	-	2	-
2082		-	-	-	-	-	-	-	-	26	-
2083		-	-	-	-	-	-	-	-	-	*cf* 21
2084		-	-	-	-	-	-	-	-	19	-
2085		-	-	5	-	-	-	-	-	8	-
2086		-	-	-	-	-	-	-	-	16	-
2087		-	-	-	-	-	-	-	-	44	-
2088		-	-	-	-	-	-	-	-	11	-
2089		-	-	-	-	-	-	-	-	31	-
2092		-	-	-	-	-	-	-	-	13	-
2093		-	-	-	-	-	-	-	-	18	-
2094		-	-	-	-	-	-	-	-	8	-
2095		-	-	-	-	-	-	-	-	10	-
2096		-	-	-	-	-	-	-	-	16	-
2097		-	-	-	-	-	-	-	-	11	-
2098		-	-	-	-	-	-	-	-	12	-
2156		-	-	-	-	-	-	-	-	18	-
9004/2157		-	-	-	-	-	-	-	-	4	-
HP	484	-	-	-	-	-	-	-	-	12	-
HP	814	-	-	-	-	-	-	-	-	23	-
Second house											
8352	397	-	-	-	-	-	-	-	-	17	-
8353		-	-	1r	-	-	-	-	-	-	-
8354		-	-	-	-	-	-	-	-	4	-
8355		-	-	-	-	-	-	-	-	3	-
8362		-	-	-	-	-	-	-	-	15	-
8363		-	-	-	-	-	-	-	-	5	-
8365		-	-	-	-	-	-	-	-	4	-
8390		-	-	-	-	-	-	-	-	141	-
8391		-	-	-	-	-	-	-	-	27	-
8398		-	-	-	-	3h	-	-	1h	7	-
8403		-	-	-	-	-	-	-	-	13	-
8414		-	-	-	-	6	-	-	-	-	-
8438		-	-	-	-	-	-	-	-	3	-
8454		-	-	-	1r	-	-	6r	-	19	-
8455		-	-	-	-	-	-	2	-	23	-

Table 14. Charcoal from CB

possible to assess their original dimensions. The timbers must have been fairly substantial, however, to support the weight of the turf roof. Since neither spruce nor larch is native, the timbers would have been collected as driftwood from the foreshore (Gale in Sharples 2005b). Narrow bore holes were observed on several pieces of the charred wood and these are probably from shipworms or marine borers (see above 62).

A further 20 samples from the charcoal layer (457) were selected for identification. Charcoal was very abundant in the central region of the house but sparse around the interior walls of the building. Eighteen samples (8585, 8587, 8589, 8595, 8597, 8598, 8752, 9005, 9014, 9016, 9018, 9025, 9027, 9028, 9029, 9032, 9035 and 9065) were collected largely from the central area of the floor and all comprised spruce/larch, undoubtedly mostly, if not all, from the shattered remains of the roof beams. Sample 9032 from the cell D was also identified as spruce/larch.

In addition to spruce/larch, sample 9003, from the northern edge of pier 4, contained several pieces of narrow roundwood (<15mm in diameter) from ash and the hawthorn/*Sorbus* group; and sample 9024, from close to the terminal stone of the northern pier, included birch and alder roundwood. The presence of narrow roundwood from broadleaf species in this part of the house floor may suggest the presence of either artefactual/structural components (*e.g.* wattle) or scattered firewood debris (although hearths were not recorded from this area). None of the roundwood appeared to have been exposed to stressed growing conditions.

The charcoal-rich sample 9065 was obtained from the extreme north-west corner of the mound and was selected for inclusion in the study because it appeared to be well out of the main area of collapsed roof timbers. On examination, however, the sample contained a large single piece of spruce/larch, almost certainly derived from a burnt timber, and, in addition, fragments of hazel and willow/poplar (the latter from roundwood measuring about 40 mm in diameter). The origin of this sample is uncertain – it could represent either fuel debris or structural remains, or possibly both.

Spruce/larch charcoal from context (484), a layer of pale yellow sand within layer (457), also originated from a timber, as did similar material from an isolated posthole (814) in a possible wall line of the house. Charcoal from posthole (814) may represent the remains of the post burnt *in situ*.

House 2

Charcoal was examined from fifteen bulk soil samples (8352, 8353, 8354, 8355, 8362, 8363, 8365, 8390, 8391, 8398, 8403, 8414, 8438, 8454 and 8455) from the floor of House 2 (397). Most of these samples were from the central area and were directly above the collapsed roof timbers of the first house. Charcoal was very sparse in the outer areas of the floor. The charcoal fragments present were smaller than those from the underlying layer (457) but, as might be anticipated, most of them consisted exclusively of spruce/larch (Table 14). Sample 8455, located in the central northern part of the layer, also included fragments of willow/poplar.

Evidence was sought to examine the possibility that a wattlework partition was aligned within the house between the large stone piers on the east side of the house. Charcoal was less frequent in this area, however, and many of the relevant samples produced insufficient material for identification; only two samples were considered worth detailed analysis. Sample 8398, located close to the southern pier, included ash and oak heartwood, as well as spruce/larch. Charcoal from the adjacent sample (8414) was identified as ash. Although it is feasible that oak and ash poles formed the uprights (sails) of a partition or, perhaps, some other structural members, wood mature enough to include heartwood would probably have lacked the necessary flexibility for the horizontal elements of hurdle-making unless split into lathes. Alternative origins for the charcoal could include household items or fuel debris. It may be significant that ash and other broad-leaf species were recorded from the same area in the underlying charcoal layer (*e.g.* sample 9003/457).

Contextual and spatial evidence suggests that most of the spruce/larch charcoal can be attributed to the remains of burnt structural timbers; however, the presence of spruce/larch throughout the midden (CG, see below), suggests its use as firewood was also relatively common. Although the roof timbers may account for most (if not all) of the conifer wood, any underlying deposits of similar wood originating from artefacts or fuel would have been masked by the enveloping roof timbers. It is therefore impossible to assess how much of the spruce/larch collected from the floor areas (457) and (397) (and thus not collected specifically as roof timbers) is likely to have been associated with activities within the house.

Animal bone – J Cartledge, C Ingrem, J Mulville and A Powell

The occupation deposits associated with the use of the house produced the smallest quantity of animal bone from the three main Late Iron Age blocks (617 bones; Table 15), a small quantity of fish bones (74 identified bones; 16 from above 10 mm and 58 from below 10 mm sorting, Table 16) and only 11 bird bones (Table 17).

The overwhelming bulk of the mammalian bone assemblage came from two contexts; the charcoal layer (457) produced 34% of the total and, within the floor of House 2, which accounted for over half of the mammalian bone, a single context (397) alone accounted for 46% of the assemblage. The hearth fill layers produced 5% of the CB assemblage and the deposit associated with the construction of the hearth (482) contained the majority of the bone (NISP 19). The hearth was ornamented by 24 cattle metapodials, five other cattle bones and a sheep/goat

	Context	Sheep	Sheep/Goat	Cattle	Pig	Dog	Red deer	Roe deer	Rodent	Seal	Cetacean	Cattle size	Sheep-sized	Hare/fox size	Total	
Primary floors	465	1	4	5	2										12	2%
Primary floors	481			2											2	0%
Charcoal layer	457	34	64	78	14	1	13				1	2	1		208	34%
Charcoal layer	486		1	1											2	0%
Pit fills	479			2	2		1								5	1%
Pit fills	805		1												1	0%
Pit fills	807						1								1	0%
Pit fills	814			1											1	0%
Pit fills	838		1				1								2	0%
Pit fills	839		1												1	0%
Pit fills	847		2	3	1										6	1%
Secondary floor	397	53	108	78	14		16	1		1		6	4	1	282	46%
Secondary floor	459	1	1	2			2								6	1%
Secondary floor	462	1	9	6			1								17	3%
Secondary floor	466		1												1	0%
Secondary floor	471		4	1											5	1%
Secondary floor	488	1	1				1								3	0%
Secondary floor	491		1	29											30	5%
Secondary floor	492				1										1	0%
Hearth fills	453		1				5						1		7	1%
Hearth fills	482	1	11	3	1		3								19	3%
Hearth fills	487			3								1	1		5	1%
Total		92	211	214	35	1	44	1	0	1	1	9	7	1	617	

Table 15. Animal bone NISP from CB

tibia. The remainder of the assemblage came from the fills of various pits (3%), and from the floor of House 1.

Most of the fish bone came from the charcoal layer (457) and the floor of House 2 (397) but there was also fish bone in several of the features identified below the floor of House 2 (807, 812, 814, 829). The bird bone had a similar distribution; 397 produced four bones, 457 produced two bones with the other five layers producing individual bones. Table 16c shows the projected density of fish bone (<10 mm material) recovered from the Late Iron Age contexts in the houses. The largest concentration of remains was located in the eastern part of the house and is divided into two by an area devoid of fish bone. Another concentration was recovered from the western side. Other areas devoid of fish bone occur in the central area, to the north-west and south-west.

The principal domestic species was sheep which, with sheep/goat, made up just under a half of the NISP assemblage. Cattle account for just over a third of the assemblage and red deer were marginally more abundant than pig, at 7% and 6% respectively. Single fragments of dog, roe deer and cetacea were recorded.

A considerable proportion (30% of the >10 mm assemblage and 28% of the <10 mm assemblage) of the fish remains are identifiable to species or taxa. Most belong to saithe (*Pollachius virens*) although a variety of taxa are represented including: elasmobranchs, herring (*Clupea harengus*), salmonids (Salmonidae spp), eel (*Anguilla anguilla*), pollack (*Pollachius pollachius*), cod (*Gadus morhua*), hake (*Merluccius merluccius*), rockling (*Gaidropsarus/Ciliata* spp), and wrasse (Labridae spp). The projected estimate of species abundance confirms the predominance of saithe and suggests that salmonids were also quite numerous (Table 16). A range of bird species were present (Table 17) including a juvenile goose, Manx shearwater, gannet, cormorant and shag, puffin and two waders, probably bar-tailed godwit and golden plover. No species dominated.

The taphonomy of the mammalian assemblage is documented in Table 18. The level of burning was high, with over half of the recorded bone burnt (50%). The charcoal layer (457) had an extremely high percentage of burnt bones (74%), whilst the floor of House 2 (397) had 46% burnt bone. Some of the other contexts making up the floor of House 2 had lower levels of burning, though these were all much smaller collections of bone. This probably indicates that the floor of House 2 comprised a mixture of material from the earlier burnt down house

a

	807	397	457	Total
Clupea harengus			1	1
Salmonidae spp		1		1
Pollachius pollachius			1	1
Pollachius virens	1	1		2
Gadus morhua		1	3	4
Merluccius merluccius	1		1	2
Large gadid		1	3	4
Labridae bergylta			1	1
Total	2	4	10	16

b

	397	812	814	829	838	457	462	482	Total
Elasmobranchs				2					2
Clupea harengus	1								1
Salmonidae spp	6								6
Anguilla anguilla	1	1				2			4
Pollachius virens	14		1	4	2	8	2	2	33
Gaidropsarus/Ciliata spp	2								2
Small gadid	3			1		4		1	9
Labridae spp	1								1
Total	28	1	1	7	2	14	2	3	58

c

	397	812	814	829	838	457	462	482	Total
Elasmobranchs				16					16
Clupea harengus	1								1
Salmonidae spp	31								31
Anguilla anguilla	4	8				9			21
Pollachius virens	57		4	32	8	41	4	20	166
Gaidropsarus/Ciliata spp	9								9
Small gadid	14			8		8		16	46
Labridae spp	1								1
Total	117	8	4	56	8	58	4	36	291

Table 16. Fish from CB: a) Species representation in material >10 mm (NISP); b) Species representation in material <10 mm (NISP); c) Projected quantity of fish bone in <10 mm material (PNISP)

and new material contemporary with the reoccupation of the house. Seven percent of the bone was gnawed, and butchery marks were recorded at a similar percentage. The latter figure is lower than the levels seen in other blocks on mound 1. The small collection of material from the pit fills had the highest proportion of butchered bones and this may indicate that processed food remains are preferentially placed in the pits.

The relative abundance of the different body parts was calculated for sheep, cattle and red deer (Figure 63). For all three species the most abundant group of body parts are those of the extremities (in particular the astragalus). The sheep body parts present derive from a wider range than the other, less numerous species; although bones of the lower limb, tarsals and metapodials predominate, upper fore and hind limbs are also present. There are also small numbers of phalanges and head bones present. The distribution of cattle elements is more uneven, with toes and astragali predominating and only small amounts of other bones present. Red deer have a more limited

CB	397	457	462	465	471	479	482	total
Goose sp.							1	1
Manx shearwater			1					1
Gannet		1						1
Cormorant				1				1
Shag		1			1			2
Puffin	1							1
Wader	2							2
Gull sp	1					1		2
Total	4	2	1	1	1	1	1	11

Table 17. Bird bone from CB

distribution, with many extremities (again dominated by astragali) but few other elements present. As a hunted species it may be expected that only elements with a high meat value would be returned to site, but even in this small sample the low meat value elements (such as phalanges) were present, suggesting that entire carcasses were brought to the site.

There are a number of articulated bones present in the two larger contexts, 457 and 397, both of which are associated with the destruction of the first house and the construction of House 2. Elements found in articulation indicate that material was not separated during processing and that they were not disturbed after deposition. In the charcoal layer (457) all the articulated bones showed burning and the majority were derived from the lower rear limb elements (Table 19). For sheep there were four rear limb associations. Phalanges were not identified as fore or hind limb thus the burnt first/second phalanx associations for sheep and red deer could have derived from either. In context 397, all articulations were again burnt and therefore probably associated with the burning of the House 1. The majority were again sheep, with both fore and hind limb associations noted, although the latter were more common. The only articulated cattle bones were an unburnt set of first and second phalanges from context 397 and a metatarsal and phalanx from context 465.

The identified articulated groups are those that would be expected from the disposal of 'waste', material of the limb extremities that are removed from the carcass and deposited as a single unit. The majority of the articulated bones are complete with an average of seven out of a possible eight zones present for each bone, indicating that these bones were not further processed for fat/marrow extraction. As 'waste' elements these bones do not represent joints of meat hung in the rafters, or food stored within the house. The large numbers of complete metapodia of both sheep and cattle indicates the storage of hides, with the metapodia/phalanges still attached, prior to processing. There are cut marks relating to the removal of the skins on three of the associations that support this suggestion. The elements located higher up the limb tend to be broken with the proximal end missing. For example, the two radii with articulating magnum are incomplete, as is the tibia associated with the astragalus. These joints are unlikely to be associated with hide processing, but rather suggest the deposition of food waste; again these are lesser meat-bearing bones separated from the prime joints. The persistence of the articulations indicates a low level of post-depositional disturbance in these layers.

The majority of fish bones in the >10 mm material are caudal vertebrae (archive). The few cranial bones present belong to cod, wrasse and the large gadid category although this may, in part, reflect the small sample size. A similar pattern is apparent in the <10 mm material except that abdominal vertebrae are numerous and cranial bones belong only to salmonid and wrasse (archive). Overall, most taxa are represented by vertebrae from both the abdominal and caudal regions of the body, although elasmobranchs, rockling and wrasse are represented solely by dermal denticles, caudal vertebrae and cranial bones respectively.

One bone belonging to saithe in the <10 mm material displays evidence of gnawing. Of the identifiable remains, two large gadid bones and one wrasse bone in the >10 mm material display evidence for burning, as do three saithe bones in the <10 mm material.

The hearth bones

This hearth was defined by a stone kerb around three sides – north, east and south – which created a box filled with peat ash; outside the kerb, the edge of the hearth was further defined by lines of 29 cattle bones projecting through the floor layer (Figure 38; 64). These bones and a single sheep bone were carefully arranged in straight lines along both sides of the hearth and, around the east end, they were arranged as an arc springing from two cobbles placed at the corners of the hearth. Twenty-four cattle metapodia, five scapula fragments and a sheep tibia were recovered. The majority of the metapodia consisted of the distal half of the bone. The number of metapodia included in the hearth increases the numbers of extremities present in this block and, if included, the MNE for astragali, metacarpals, metatarsals and first/second phalanges become similar with

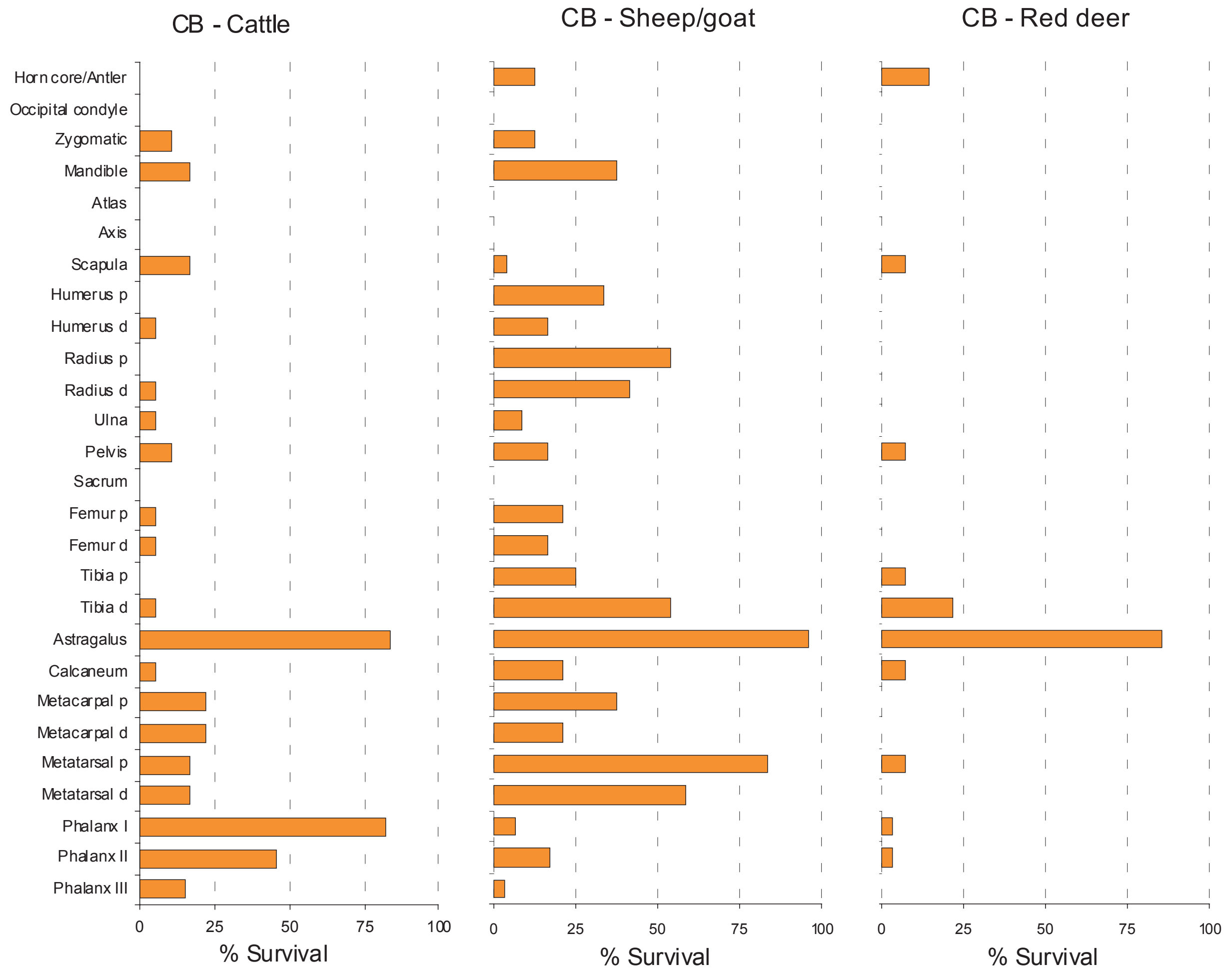


Figure 63. The relative abundance of the different body parts of cattle, sheep/goat and red deer from block CB

values of 12, 11, 13 and 9. The metapodia demonstrated post-mortem processing: four were split longitudinally and 14 were broken midshaft.

The arc of metapodials at the end of the hearth was carefully constructed and formed an ordered sequence of fourteen metapodia, (metacarpals and metatarsals), all with the distal end of the bone exposed. The array is divided into metacarpals (fore limb) and metatarsals (hind limb), the former to the north and the latter to the south, with the pattern reversed for a single bone of each towards the end of the arc. The patterning along the side is less clear with a mixture of metapodial, although the south side has a majority of metacarpals. There is only evidence for one individual animal providing a left and a right pair (metacarpals 2167 and 2168) which stand next to each other on the south side. Although the bones can be easily identified from their proximal ends as fore or hind limb, this is harder to do with the distal ends. With their proximal ends broken off, constructing this elaborate pattern would have taken some thought. The metapodials along the sides retain their proximal ends with the exposed distal ends snapped off. The edging also includes a few fragments of scapula, one a worn blade from possible shovel, and a single sheep tibia.

Metapodia are robust peripheral bones that bear little meat. Of those present, a few bear skinning marks whilst the majority have been snapped midshaft, possibly for marrow extraction. These bones are the most compact and durable in a mammal's skeleton and they were frequently used in the manufacture of artefacts, a process which was occurring within the house at this time. Some of those surrounding the hearth were highly polished at the distal ends, probably as a result of wear on the exposed condyles. Many of these metapodials can be aged: they come from individuals of around two years old, the prime age of slaughter for meat. The bones represent the remains of a minimum of seven and a maximum of twelve cattle and, although they could have been gathered over a long period of time (see below), the number of animals that they collectively represent would have constituted a large amount of meat; seven cattle have a combined carcass weight of 2800 kg (after Vigne 1992).

The presence of this collection of fractured metapodia, each with a single post-mortem break, provides an opportunity to examine the process by which the hearth material was gathered. The fresh fracture index (FFI) for the each of the metapodial breaks was calculated (Carter, internal report) to distinguish between classic fresh or green bone

	Context	Chop	Cut	Chop & Cut	Sawn	Total Butchery	Gnawed	Burnt	Total NISP	% Butchered	% Gnawed	% Burnt
Primary floors	465	0	1	0	0	1	0	1	12	8	0	8
Primary floors	481	0	0	0	0	0	0	0	2	0	0	0
Charcoal layer	457	3	17	0	1	21	14	153	208	10	7	74
Charcoal layer	486	0	0	0	0	0	0	0	2	0	0	0
Pit fills	479	0	2	0	0	2	1	3	5	40	20	60
Pit fills	805	0	0	0	0	0	0	0	1	0	0	0
Pit fills	807	0	0	0	0	0	0	0	1	0	0	0
Pit fills	814	0	0	0	0	0	0	0	1	0	0	0
Pit fills	838	0	0	0	0	0	0	2	2	0	0	100
Pit fills	839	0	1	0	0	1	0	0	1	100	0	0
Pit fills	847	0	2	0	0	2	1	0	6	33	17	0
Secondary floor	397	3	13	0	0	16	27	131	282	6	10	46
Secondary floor	459	0	0	0	0	0	0	6	6	0	0	100
Secondary floor	462	1	1	0	0	2	1	6	17	12	6	35
Secondary floor	466	0	0	0	0	0	0	0	1	0	0	0
Secondary floor	471	0	0	0	0	0	0	2	5	0	0	40
Secondary floor	488	0	0	0	0	0	0	1	3	0	0	33
Secondary floor	491	0	0	0	0	0	0	0	30	0	0	0
Secondary floor	492	0	0	0	0	0	0	0	1	0	0	0
Hearth fill	453	0	0	0	0	0	0	1	7	0	0	14
Hearth fill	482	2	2	0	0	4	2	2	19	21	11	11
Hearth fill	487	0	0	0	0	0	0	0	5	0	0	0
Total		9	39	0	1	49	46	308	617	8	7	50

Table 18. The taphonomy of the mammal bone assemblage from CB

Taxon	Context	Elements
Cattle	465	left metatarsal and phalanx I, cut
Cattle	397	phalanx I and II
Sheep/goat	457	right metatarsal and phalanx I
Sheep/goat	457	left navicular and metatarsal, former cut
Sheep/goat	457	right navicular and metatarsal
Sheep/goat	457	phalanx II and III
Sheep/goat	457	right tibia epiphysis and astragalus, latter cut
Sheep/goat	397	left radius and four articulating carpals
Sheep/goat	397	right radius, radial carpal, magnum, metacarpal
Sheep/goat	397	left astragalus and navicular cuboid
Sheep/goat	397	left metacarpal and phalanx I
Sheep/goat	397	right tibia, astragalus, navicular and metatarsal
Red deer	457	phalanx I and II

Table 19. The articulated bone groups from CB

fractures (a helical or spiral outline with acute/obtuse fracture angles to the cortical surface and a smooth fracture surface) and dry fractures (xx and y) which suggest a period of time between slaughter and the breakage of the midshaft (Figure 65) (Outram 2001). The FFI scores for the majority of breaks were 3 and 4, being neither dry nor fresh bone. A few with FFI values of 1–2 are fresh fractures, possibly consistent with marrow extraction, whilst the slightly smaller numbers at 5 and 6, suggest dry bone breaks. Thus whilst a small number of these metapodia were first exploited for marrow extraction prior to being incorporated into the hearth, this intensive exploitation did not occur for all. Others were curated for some time prior to being incorporated in the hearth, allowing the majority of the bones to dry out slightly. The FFI also indicates that extracting marrow was not the primary consideration in processing these metapodia.

We can further interrogate these data in comparison with the age of other cattle whose remains were deposited in the house floor. The majority of floor material is also

Figure 64. The metapodials at the east end of the secondary hearth

Figure 65. A selection of some of the metapodials used in the secondary hearth showing the different types of fracture present. The bone on the right has a low FFI index of 1–2 indicating it was fresh when fractured whereas the bone on the left has a high index of 5–6 indicating it had been exposed and weathered before it was fractured; the bone in the middle is intermediate

derived from mature animals over two years of age with only one quarter (26%) of bones unfused and 9% neonates (see below 235). This age profile is unusual within the overall Late Iron Age assemblage, and suggests that the bone of mature animals is being preferentially retained within the houses.

Conclusion – N Sharples

The excavation of the Late Iron Age house on Bornais mound 1 was remarkably informative despite the systematic destruction of a structure which we should assume included walls over 2 m high and corbelled roofs over the peripheral cells. It has proved possible to suggest a ground plan for this structure and, though some of this is hypothetical, much of it has an evidential basis. Of more importance, however, was the presence of substantial occupation deposits which seemed to have been deliberately protected from destruction on two separate occasions, initially when the house was reoccupied and rebuilt after it had been burnt down and subsequently when the walls of the house were totally removed after it was finally abandoned. The mess produced by the movement of people with large stones in both these periods would normally be expected to have caused widespread disturbance of the deposits inside the house but this does not seem to have happened.

This is highlighted by the survival in good condition of the upright metapodials that surrounded the hearth at the centre of the House 2 floor (397). This was a relatively fragile feature that was probably deliberately covered with sand (425, CC) before the dismantling got underway. The significance of the hearth was clearly important but it should not be assumed that the robbing of the walls means these structural elements were of lesser importance. The stones from these walls were probably taken specifically to be reused in another structure and, therefore, they provide an important link between the people who lived in this ancient structure and the people who were about to occupy a new house.

The practice of preserving the interior has resulted in the survival of some unique deposits that have no parallels from the excavation of any other Iron Age structure in the Western Isles. I have already mentioned the very unusual hearth at the centre of the rebuilt house but there was also a substantial hearth at the centre of the original house. Of considerable importance is the evidence for destruction of the original house. Large carbonised timbers were found in a thick charcoal-rich deposit which would appear to represent the collapsed remains of the timber and turf roof that covered the space at the centre of the house. The timber used was spruce driftwood and not only demonstrates the availability of substantial quantities of driftwood but emphasises the lack of suitable native timber. The turves used in the roof came from somewhere off the machair and again indicate the careful selection of suitable materials and their transportation to the site from areas some distance away.

Contained within this deposit and the floor deposits of the later reoccupation was a large assemblage of materials which tells us a considerable amount about Iron Age society in the period at the beginning of the Late Iron Age. The destruction of the house appears to have been particularly important in preserving material. The unusually large quantities of small finds reflect not only the fact that the contents of the house were not removed prior to its destruction but also that the reoccupation of the house involved rituals which included the deposition of special objects. The site has produced one of the largest assemblages of stone tools that has yet been recovered from the Western Isles and an impressive collection of worked bone that includes some classic Hebridean types and a few unique objects of considerable intrinsic interest. The complete and systematic excavation of the occupation

Figure 66. Sections through the deposits infilling the abandoned house and photographs of these sections (located on Figure 23)

deposits also resulted in the recovery of a large and unusual assemblage of animal bone and a collection of carbonised grain which is amongst the largest from an Iron Age site in the Western Isles. All of this material is examined in some detail in chapters 6 and 7 and then put into a wider context in chapter 8.

Destruction and infilling (CC) – N Sharples

The abandonment of the Late Iron Age house (CB) appears to have been a fairly dramatic event. If we assume that this structure had substantial stone walls like any other machair settlement, then these walls have been systematically demolished and removed from the area excavated. There was practically no building stone present in the overlying deposits described here. Furthermore if, as seems likely, these walls were revetments set within an existing sand dune, then the demolition would also have involved the substantial disturbance of deposits that backed, and therefore preceded, the construction of the original house. None of this is clearly visible in the section (Figure 66) through the deposits overlying the house. Ideally the stratigraphy should indicate a pit surrounding the remains of the house, which would have been gradually infilled by deposits tipping in from the sides. This may be present but it is difficult to see because these layers eroding into the pit are relatively indistinguishable from either the blown sand surrounding the pit or the blown sand accumulating within it. Furthermore, the deposits were later disturbed by Norse pit digging, by burrowing rabbits and by cattle trampling. Comprehension was not helped by the excavation of the deposits in four quadrants, each excavated and numbered separately, though the benefits of this method are the informative sections (Figure 66).

The earliest deposit appears to be a layer of grey sand (425) which surrounded and covered the hearth and extended south-west to the threshold stones that mark the entrance to the final house (Figure 67). This layer may have been deliberately deposited to protect the hearth during the demolition of the house. The sequence in the centre continues with a sand layer most clearly identified

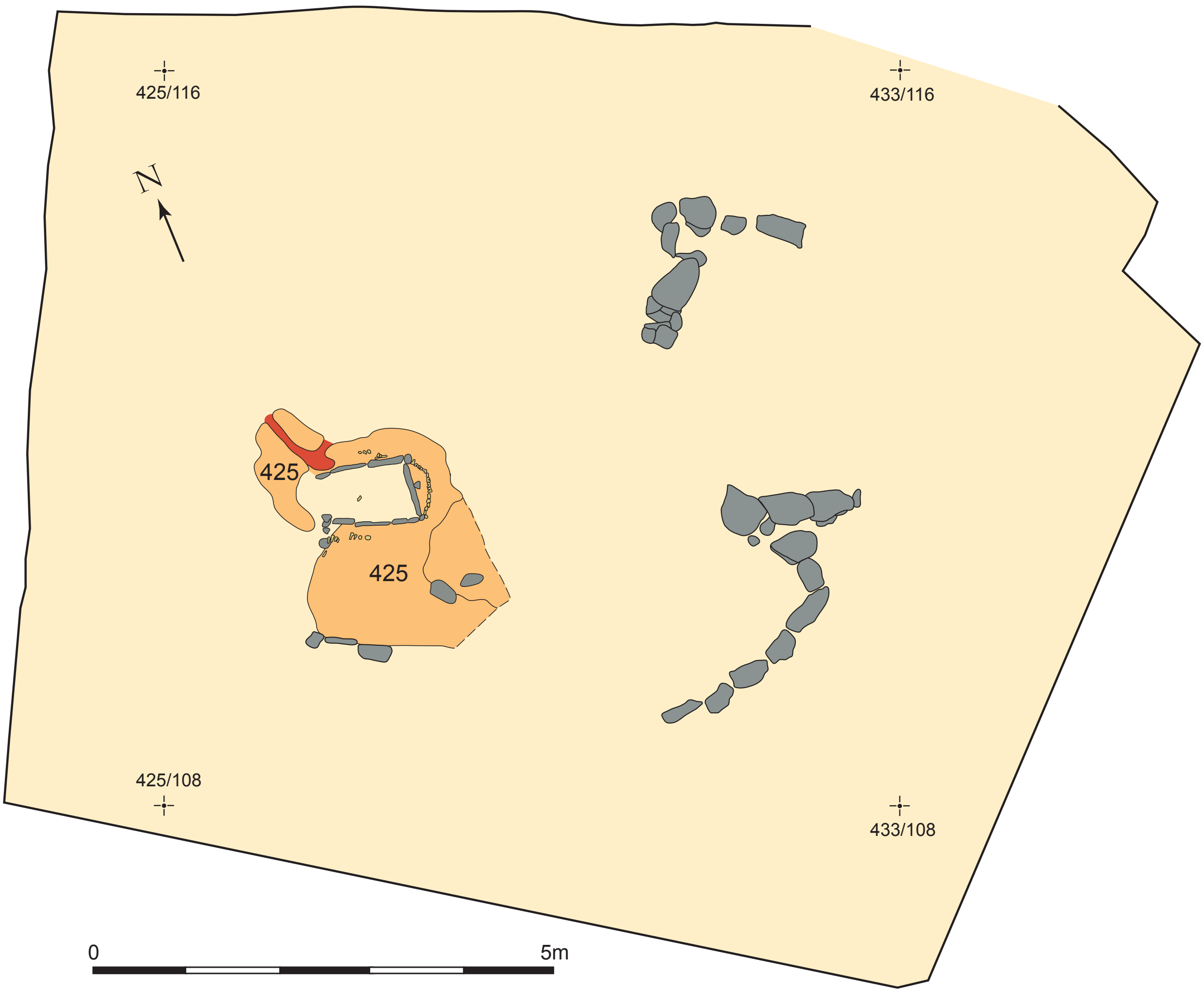


Figure 67. The extent of context 425

	Sample	Context	Litres	Fish		Bone		Pottery		Limpet		Winkle		Other shells		Charcoal	
				no.	density	no.	density	no.	density	no.	density	no.	density	no.	density	no.	density
primary sand	5677	408	16	0	0.00	5	0.31	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
primary sand	5678	409	4	0	0.00	1	0.25	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
primary sand	5679	410	24	0	0.00	3	0.13	4	0.17	1	0.04	5	0.21	0	0.00	0	0.00
primary sand	5684	419	12	0	0.00	3	0.25	3	0.25	0	0.00	0	0.00	0	0.00	0	0.00
primary sand	8300	425	43	0	0.00	52	1.21	2	0.05	18	0.42	13	0.30	8	0.19	3	0.07
charcoal layer	5571	337	19	0	0.00	1	0.05	1	0.05	0	0.00	2	0.11	4	0.21	27	1.42
charcoal layer	5682	413	24	0	0.00	80	3.33	5	0.21	4	0.17	6	0.25	0	0.00	0	0.00
charcoal layer	5583	314	22	0	0.00	80	3.64	0	0.00	0	0.00	1	0.05	0	0.00	1	0.05
charcoal layer	5675	406	10	0	0.00	0	0.00	3	0.30	0	0.00	3	0.30	0	0.00	0	0.00
charcoal layer	5683	414	20	1	0.05	20	1.00	0	0.00	4	0.20	7	0.35	0	0.00	0	0.00
charcoal layer	5685	418	17	0	0.00	9	0.53	6	0.35	2	0.12	2	0.12	0	0.00	0	0.00
charcoal layer	5582	308	36	0	0.00	121	3.36	3	0.08	2	0.06	2	0.06	1	0.03	9	0.25
charcoal layer	5666	392	11	3	0.27	4	0.36	0	0.00	0	0.00	1	0.09	1	0.09	0	0.00
charcoal layer	5667	398	23	0	0.00	19	0.83	2	0.09	1	0.04	8	0.35	1	0.04	0	0.00
charcoal layer	5676	407	27	1	0.04	43	1.59	2	0.07	5	0.19	40	1.48	31	1.15	0	0.00
sand	5674	404	16	4	0.25	9	0.56	6	0.38	5	0.31	26	1.63	6	0.38	0	0.00
16 samples			324	9	0.03	450	1.39	37	0.11	42	0.13	116	0.36	46	0.14	40	0.12

Table 20. The material identified in sorting the >10 mm residue from CC

	Sample	Context	Litres	Fraction sorted		Unburnt bone		Burnt bone		Fish bone		Seed		Charcoal		B.O.M		Pottery		Slag		Spirorbis	Coprolite	Eggshell
						no.	density	no.	density	no.	density	no.	density	no.	density	no.	density	no.	density	no.	density			
primary sand	5677	408	16	0.25	4.00	333	83.3		0.0	23	5.8	0	0.0	63	15.8	0	0.0	1	0.3	2	0.5	0	79	1
primary sand	5678	409	4	1.00	4.00	64	16.0	8	2.0	6	1.5	0	0.0	0	0.0	45	11.3	3	0.8	7	1.8	3	22	1
primary sand	5679	410	24	0.13	3.00	145	48.3	5	1.7	8	2.7	0	0.0	200	66.7	0	0.0	15	5.0	42	14.0	0	12	2
primary sand	5684	419	12	0.50	6.00	90	15.0	15	2.5	14	2.3	0	0.0	270	45.0	0	0.0	17	2.8	0	0.0	0	0	0
primary sand	8300	425	43	0.13	5.38	616	114.6	202	37.6	9	1.7	18	3.3	470	87.4	450	83.7	21	3.9	112	20.8	2	40	121
charcoal layer	5682	413	24	0.13	3.00	25	8.3	427	142.3	11	3.7	14	4.7	146	48.7	2	0.7	11	3.7	0	0.0	0	0	0
charcoal layer	5675	406	10	0.50	5.00	68	13.6	11.00	2.2	13	2.6	8	1.6	121	24.2	14	2.8	29	5.8	7	1.4	1	0	1
charcoal layer	5683	414	20	0.13	2.50	70	28.0	24	9.6	0	0.0	1	0.4	340	136.0	1450	580.0	0	0.0	29	11.6	0	0	0
charcoal layer	5685	418	17	0.13	2.13	70	32.9	18	8.5	0	0.0	0	0.0	380	178.8	40	18.8	20	9.4	0	0.0	0	0	0
charcoal layer	5666	392	11	0.25	2.75	52	18.9	36	13.1	0	0.0	0	0.0	375	136.4	9	3.3	1	0.4	50	18.2	0	0	0
charcoal layer	5667	398	23	0.06	1.45	97	66.9	104	71.8	0	0.0	16	11.0	63	43.5	593	409.2	0	0.0	0	0.0	0	0	0
charcoal layer	5676	407	27	0.06	1.70	93	54.7	6	3.5	0	0.0	2	1.2	1000	587.9	0	0.0	1	0.6	200	117.6	0	0	0
sand	5674	404	16	0.06	1.01	102	101.2		0.0	25	24.8		0.0	31	30.8	0	0.0	1	1.0	340	337.3	0	0	1
	13 samples		247		41.91	1825	43.5	856	20.4	109	2.6	59	1.4	3459	82.5	2603	62.1	120	2.9	789	18.8	6	153	127
primary sand totals			99		22.38	1248	55.8	230	10.3	60	2.7	18	0.8	1003	44.8	495	22.1	57	2.5	163	7.3	5	153	125
charcoal layer totals			132		18.53	475	25.6	626	33.8	24	1.3	41	2.2	2425	130.9	2108	113.8	62	3.3	286	15.4	1	0	1

Table 21. The material identified in sorting the <10 mm residue from CC

in the east quad. In this quad it was split into a pale orange sand (419) which lay above another pale orange sand (408). These layers thickened considerably adjacent to the remains of the house (CB) wall (see section Figure 66) and the layer may represent sand that has fallen into the house pit immediately after the removal of the house walls. In the north quad this deposit was represented by what was described as a pale brown sand (309) and a pale orange sand (332). In the west quad the layer is again described as a pale orange sand (424). In the south quad the sequence appears to be very similar to that exposed in the east, a basal layer of pale brown sand (410) surrounded by a bank of pale orange sand (409, 394).

Above this pale sand the hollow that marks the location of the house was infilled with a sequence of charcoal-rich and burnt bone-rich sand layers. As can be seen in the photographs of the sections through these deposits these layers are diffuse and difficult to define but, in all but the south quad, three layers were identified and these are clearly visible in the photograph of the north-east facing section (Figure 66). In the east quad the sequence began with 413 and this was followed by 406 and then 398. These three layers were also clear in the north quad; here 337 was the basal layer followed by 314 and then 308/329/363 (the numbers are duplicate as a result of the expansion of the original trench in 1996). The excavation of the west quad was much more complicated as the layers had been truncated by later Norse features and were disturbed along the west edge by cattle erosion and rabbit burrows. Nevertheless three layers were located; the lowest was 421, over this was 418 and on top of this was 415. Unfortunately none of these layers are clearly visible in the section (Figure 66). In the south quad the lowest layer was 414/393, over this was 438 and they were covered by 407/392.

Four radiocarbon dates were obtained from these layers. SUERC-7638 comes from a concentration of barley grains in the basal layer 413 in the east quad. It has a radiocarbon age of 1575±35 BP which calibrates to a date of cal AD 410–570 (95% probability). SUERC-7624 comes from a cattle metapodial in layer 438 in the south quad, which is most likely to be the middle layer of the three deposits. It has a radiocarbon age of 1470±35 BP which calibrates to a date of cal AD 530–650 (95% probability). SUERC-8171 comes from a concentration of barley grains in the upper layer, 398, in the east quad. It has a radiocarbon age of 1550±35 BP which calibrates to a date of cal AD 420–590 (95% probability). SUERC-7645 came from a concentration of barley grains in the upper charcoal layer, 407, in the south quad. This has a radiocarbon age of 1200±35 BP which calibrates to a date between cal AD 690–950 (95% probability). The latter date is probably too late and may represent contamination of the Late Iron Age deposits by Norse material, probably as a result of rabbit action.

These layers were surrounded by a pale brown or yellow sand which is assumed to be the deposit in which the house pit was excavated. In theory then the deposits from these layers could precede the house deposits. However these layers do seem to have been substantially mixed when the house was destroyed and as they cannot be separated from the sand layers that covered the charcoal layers, it would be misleading to assume chronological precedence. The most extensive sand deposit 404 was in the east quad and, as this deposit was extensive and relatively sterile, it was shovelled off without sieving. In the north quad the equivalent layer is 302 and to the north-west 388/430. In the west quad context 422 was identified as a relatively sterile layer adjacent to the charcoal layers. There was also a very pale sand layer 429/444 on the southern edge of the trench which was numbered 393 in the south quad.

Sampling data – N Sharples

Sixteen samples, 324 litres of soil, were taken and processed from the CC contexts: 308, 314, 337, 392, 398, 404, 406, 407, 408, 409, 410, 413, 414, 418, 419 and 425 (Table 20) and the material from below 10 mm was sorted for 13 samples from contexts 392, 398, 404, 406, 407, 408, 409, 410, 413, 414, 418, 419 and 425 (Table 21).

The material from the above 10 mm sort was dominated by a large collection of bone (450 fragments, average density of 1.39 fragments per litre of soil), charcoal and pottery were present (40 and 37 fragments respectively, with a density of 0.1 frag/litre) and there was a very small quantity of fish bones (nine fragments, average density 0.03 frag/litre). Marine molluscs were not common and only 42 limpets and 116 winkles were recovered (average density 0.13 shell/litre and 0.36 shell/litre respectively). There was no slag or B.O.M. The contexts with the highest average densities of bone were 314 (3.64 frag/litre), 413 (3.33 frag/litre) and 308 (3.36 frag/litre), all charcoal layers. Pottery densities were highest in the sand layer 404 (0.38 frag/litre) and charcoal layer 418 (0.35 frag/litre). Winkle densities were also highest in 404 (1.63 shells/litre) but limpets were more common in the sand (425) layer covering the CB hearth (0.42 shells/litre).

The material recovered from the below 10 mm samples had high average densities of charcoal (83 frag/litre) and burnt organic material (62 frag/litre), unburnt bone was relatively common (44 frag/litre) and burnt bone (20 frag/litre) and slag (19 frag/litre) were less common. Pottery was as usual present in small quantities (3 frag/litre). If the contexts are split between the primary sand layers and the charcoal layers, then it is noticeable that the sand layers only have higher averages of unburnt bone and fish bone whereas the charcoal layers have conspicuously higher averages of burnt bone, charcoal, B.O.M and, to a lesser extent, slag. The surrounding sand layer 404, which was not included in the group of primary sand layers, had the highest average density of fish bone (25 frag/litre) and slag (337 frag/litre) and a very high density of bone (101 frag/litre) though the highest density was from primary sand layer 425 (115 frag/litre). The other

	Context	Weight	Sherds	Rim	Base	Body	Misc	Cordon	Dec	Ave wght
primary sand	309	141.7	3	0	0	1	2	0	0	47.23
primary sand	394	16	5	0	0	0	5	0	0	3.20
primary sand	408	290.1	47	1	2	19	25	6	0	6.17
primary sand	409	20.9	7	1	0	0	6	0	0	2.99
primary sand	410	85.1	20	1	0	1	18	1	0	4.26
primary sand	419	98.5	18	1	2	7	8	3	0	5.47
primary sand	423	120.2	14	2	0	9	3	0	0	8.59
primary sand	424	323	10	7	1	2	0	0	0	32.30
primary sand	425	71.6	6	0	0	6	0	0	0	11.93
charcoal layer	337	3253.4	179	12	6	127	34	8	0	18.18
charcoal layer	413	657.9	47	3	1	22	21	1	0	14.00
charcoal layer	308	621.5	28	5	0	17	6	1	0	22.20
charcoal layer	314	562.2	45	6	1	25	13	4	0	12.49
charcoal layer	406	207	21	0	0	4	17	2	0	9.86
charcoal layer	414	796.1	66	2	1	31	32	1, 1D	0	12.06
charcoal layer	418	3288.7	473	28	9	128	308	4, 2D	2	6.95
charcoal layer	438	56.9	6	0	0	5	1	0	0	9.48
charcoal layer	398	1142	141	5	5	48	83	6, 1D	0	8.10
charcoal layer	407	660.3	42	5	0	17	21	1	0	15.72
charcoal layer	440	7.2	1	0	0	0	1	0	0	7.20
sand	393	69.7	8	0	1	1	6	0	0	8.71
sand	404	667.5	145	3	8	40	94	4	1	4.57
sand	430	36.3	2	0	0	2	0	0	0	18.15
sand	444	26.3	3	0	0	2	1	0	0	8.77
miscellaneous	377	26.4	6	0	1	0	5	0	0	4.40
miscellaneous	387	194.3	28	2	0	4	22	1	0	6.94
miscellaneous	426	32.9	52	0	0	13	38	1	0	0.63
miscellaneous	428	9.7	1	0	0	1	0	0	0	9.70
miscellaneous	431	22.3	2	0	0	2	0	0	0	11.15
	Total	13505.7	1426	84	38	534	770	44 & 4D	3	9.47

Table 22. Pottery from CC

high densities were dispersed between different contexts. Burnt organic material was highest in 414 (409 frag/litre) whereas charcoal was highest in 407 (588 frag/litre). Burnt bone was highest in 413 (142 frag/litre) and pottery in 418 (9 frag/litre). Coprolite was present in four primary layers: 408 had the largest quantity but it was also present in 409, 410 and 425. Eggshell was also present in these four layers and in 406 and 404; sand layer 425 was exceptional, however, as it contained 121 fragments. *Spirorbis* was rare and crab was not found in any of the samples.

Pottery – A Lane

There are 1426 sherds in the CC layers weighing 13,506g (Table 22). The average sherd size, 9.47g, compares with the underlying CB average of 10.57g, and with the Norse midden sherd weight in stratigraphic block CF of 5.91g and indicates the assemblage is relatively well preserved and has not seen heavy trampling. The largest groups are 473 sherds in charcoal layer 418 in the west quad, 179 in charcoal layer 337 in the east quad, 145 sherds in the yellow sand 404, and 141 sherds in charcoal layer 398 in the east quad. The charcoal layers produced several contexts with large, well-preserved assemblages; 308 with an average weight of 22.2g, 337 with an average weight of 18.18g, 407 with an average weight of 15.72g, 413 with an average weight of 14g, 314 with an average weight of 12.49g, and 414 with an average weight of 12.06g. The other contexts with high average weights tend to be small assemblages.

Large sherds of double cordoned vessels, similar to those in CB, appear in the charcoal sand layers 414 and 418, and in the final charcoal layer 398 (*e.g.* Figure 68, 10; Figure 69, 25; Figure 70, 31). These would suggest a relatively unchanged assemblage and a short time period for the infilling of the structure, or redeposition of CB material. The number of undecorated flaring rim vessels in 337, 424, 418 and 407 (*e.g.* Figure 69, 26 and 27) may indicate later developments and a slightly longer period for the infilling phase.

It is clear that material derived from the earlier sand layers around the side of the wheelhouse is mixed in with the later infilling deposits. In the primary sand layer (408) a dot impressed narrow cordon (Figure 69, 21) and a slashed rope cordon (Figure 69, 22) are probably of

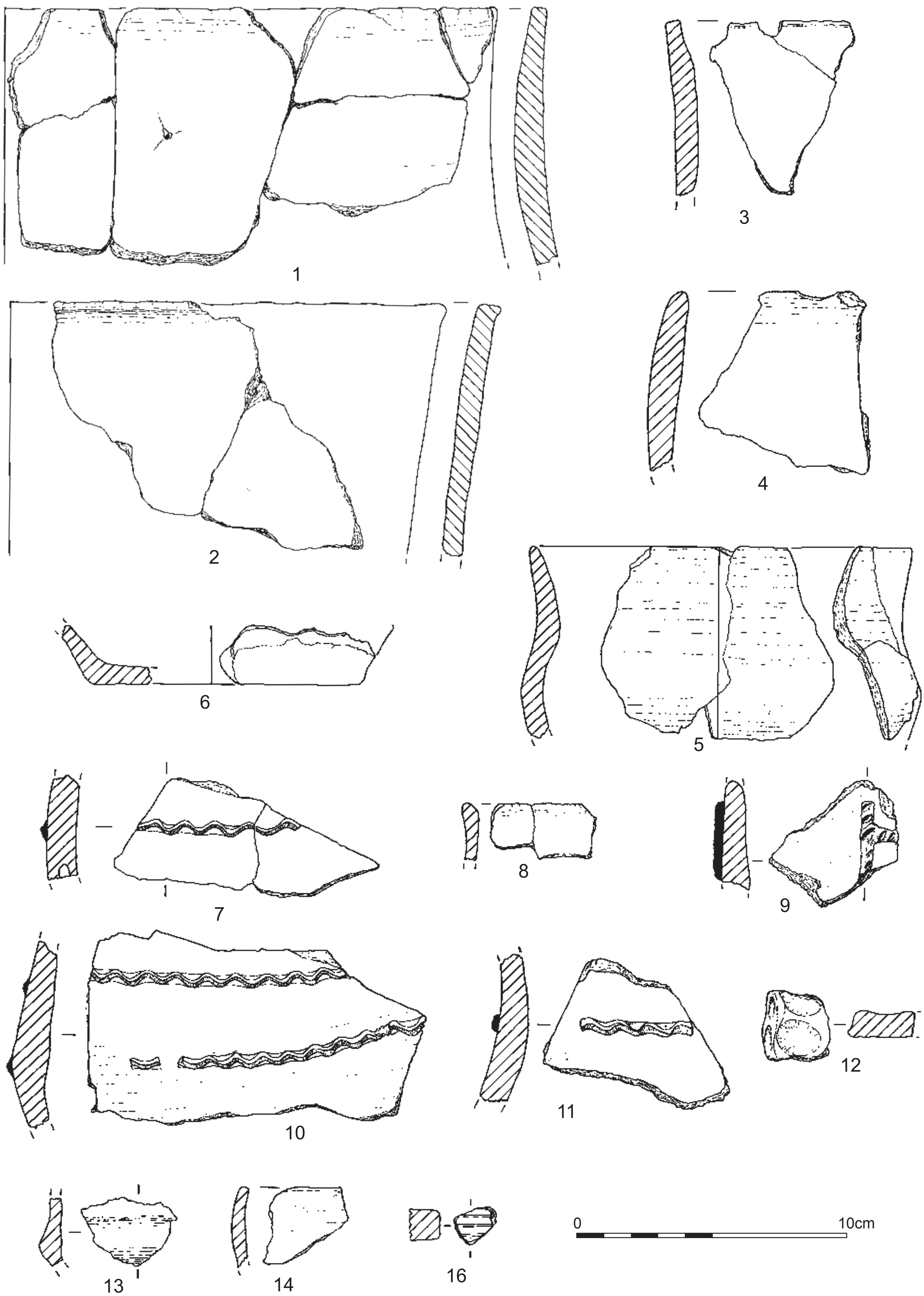


Figure 68. The pottery from CC

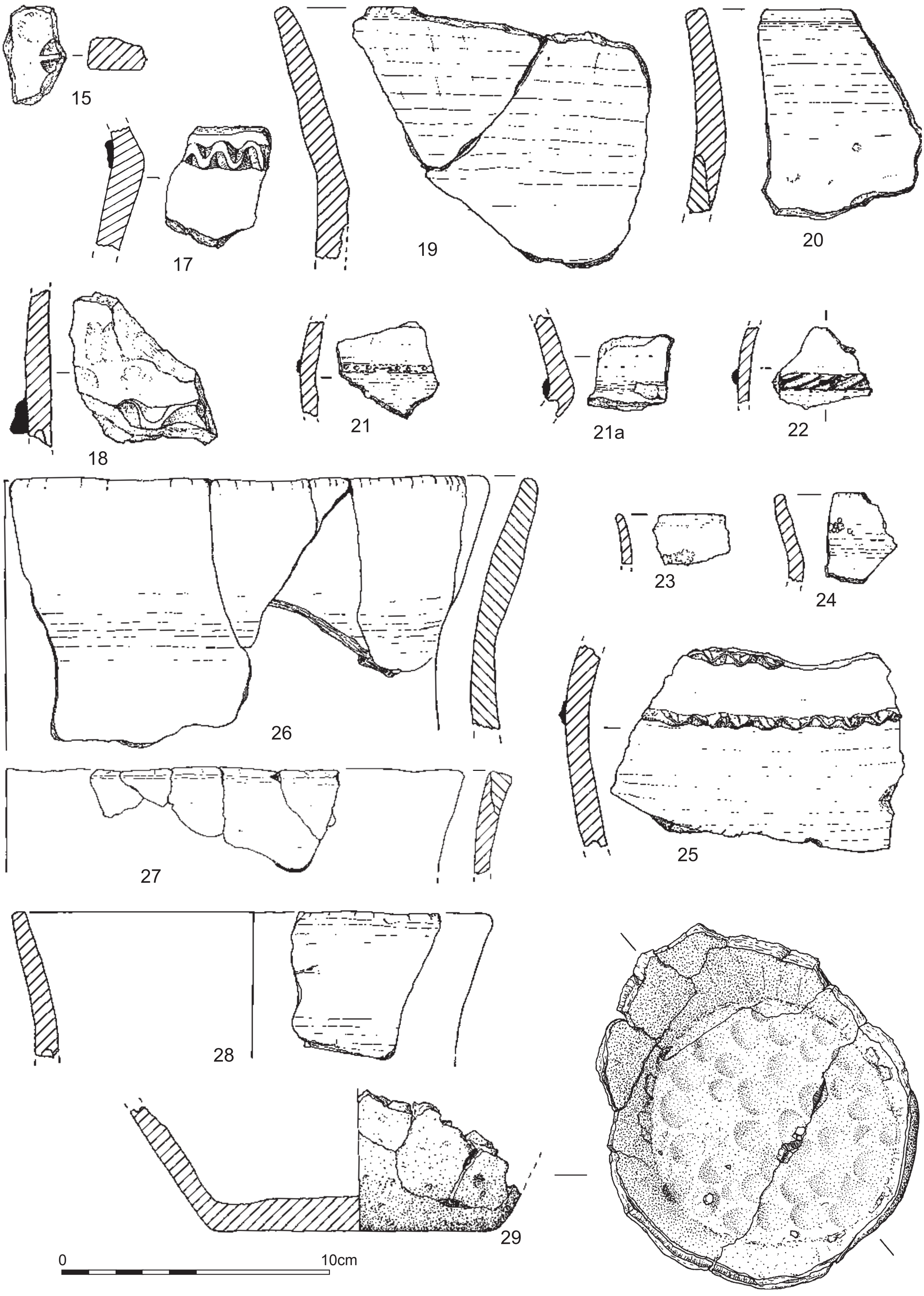


Figure 69. The pottery from CC

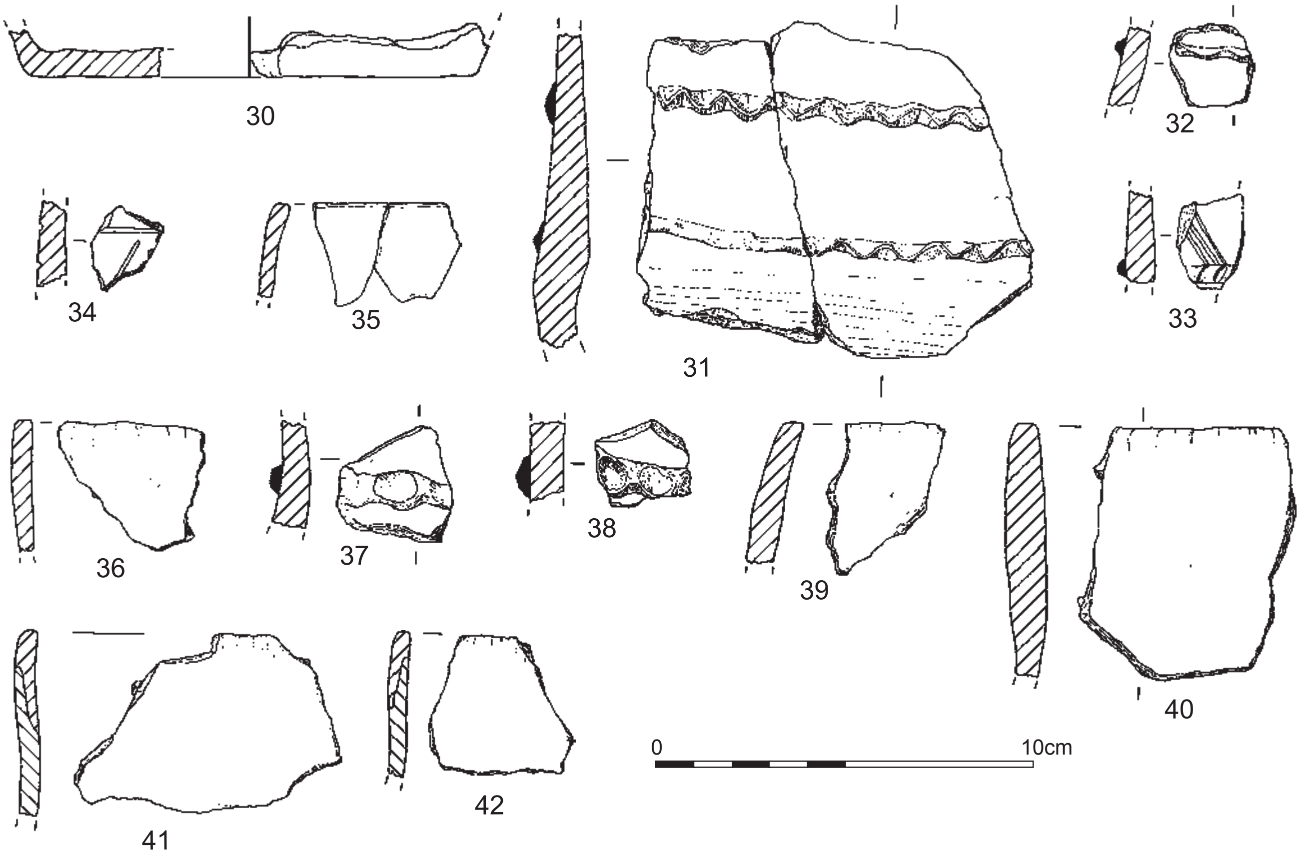


Figure 70. The pottery from CC

Middle Iron Age date. One definite and a second, possible, cordoned sherd from an everted neck are identical to those in CA (Figure 69, 21a). Middle Iron Age cordon forms are also present in the sand (404) surrounding the fill layers (*e.g.* Figure 69, 17 and18) as is an incised sherd (Figure 68, 16). In the second charcoal layer the large assemblage from 2418 includes some small incised Middle Iron Age sherds (*e.g.* Figure 70, 33 and 34); the third charcoal layer 398 produced a T-shaped cordon (Figure 68, 9). Two sherds have been made into roundels – 1497 in context 413 and 1484 in context 424 (Figure 72).

Norse sherds appear in a wide range of contexts (314, 377, 393, 404 and 424). These include a possible grassmarked base from 393, and in 404 platter sherds, grassmarked base sherds and thin cup forms (Figure 68, 12–14; Figure 69, 15). This material supports the observation made during excavation that there was widespread rabbit disturbance of these contexts.

The material from the CC contexts contains a small collection of small sherds which predate the construction of the wheelhouse (CB) and which are very similar to the CA material. It contains some material – double cordoned flaring rims – identical to the CB material. It also has undecorated rim forms which may be later than the decorated vessels or which may indicate that there is a transitional phase present here where decorated and undecorated forms are in contemporary use. There is also a small quantity of Norse material indicating the introduction of later material by rabbits.

Measurements – N Sharples

The animal bone and pottery from eight contexts (charcoal layer 1 [337, 413, 414], charcoal layer 2 [314, 406], charcoal layer 3 [398, 407] and sand layer 404) were measured to provide some assessment of fragmentation. The relative proportions of pot and bone were quite variable within each layer. In charcoal layer 1 the pot as a percentage of the bone is 16% in context 413, 11.9% in context 414 but 42.9% in context 337. In charcoal layer 2 the pottery ranges from 10.4% in context 406 to 28.7% in 314. In charcoal layer 3 the pottery ranges from a low of 9.3% in context 407 to 26.3% in context 398. In the surrounding sand layer (404) pottery is 26.6% of the bone assemblage. These results clearly indicate the variable nature of the deposition in these contexts.

This variability is also clearly visible in the histograms produced for the bone and pot measurements (Figure 71). However, a consistent feature of the assemblage is that the mode never lies below 20 and 30 mm. This indicates that the assemblage is relatively well preserved compared to that of the Late Iron Age house (CB) and the middens (CG). Charcoal layer 1 (337 and 413) has particularly well-preserved assemblages of both bone and pottery. The

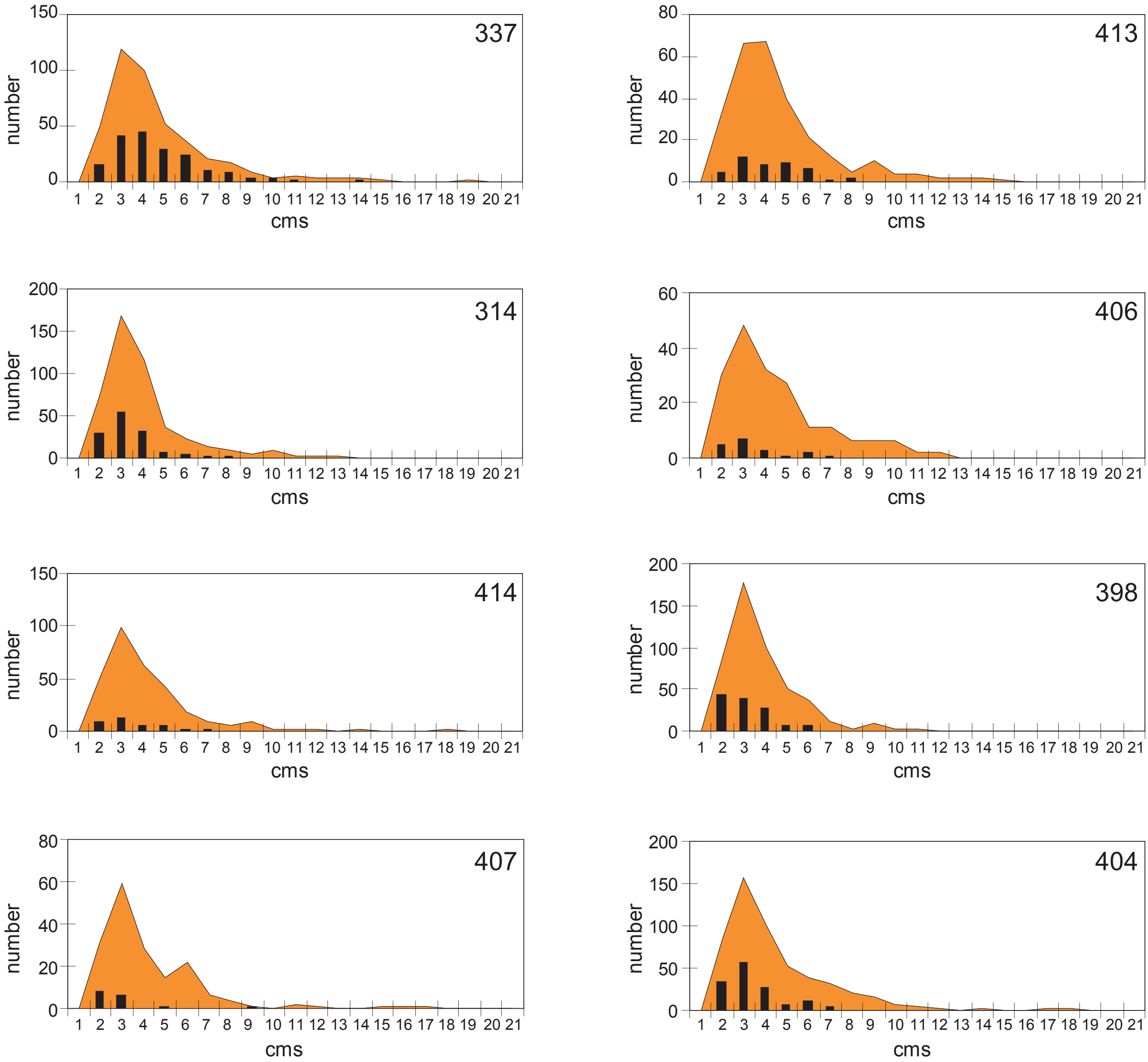


Figure 71. The size distributions of the pottery (column) and bone (area) from selected CC contexts

relatively small assemblage from 406 has a well-preserved bone assemblage but an average pottery assemblage. The assemblages from 314, 398 and 414 are relatively poorly preserved. The overall quality of the assemblages must indicate that the material in CC was protected from post-depositional trampling and the exceptional quality of the material in 413 and 337 may be related to their position at the base of sequence. It seems likely that these layers would have been quickly covered by sand collapsing from the sides of the hollow.

Artefacts – A Clarke, P Macdonald, A Pannett and A Smith

There were 122.25 artefacts from this block; 52.25 pieces of bone/antler, 40 pieces of worked stone, two fragments of steatite vessel, two ceramic and one shell disc, ten flints, seven pieces of pumice, five iron objects and three fragments of copper alloy sheet (Table 23). Most of the artefacts came from the three charcoal layers with the largest numbers (42.5) coming from the second layer (314/406/418/438). There was also a reasonable assemblage (22) from the yellow/orange sand that surrounded the occupation deposits (302/393/404) though most of these were stone tools rather than worked bone/antler. A couple of objects indicate the intrusion of later Norse finds into these Late Iron Age layers. These certainly include the two fragments of steatite vessel which must be Norse in date and probably include the anvil stone which is very similar to an example from CE. The anvils were linked with the

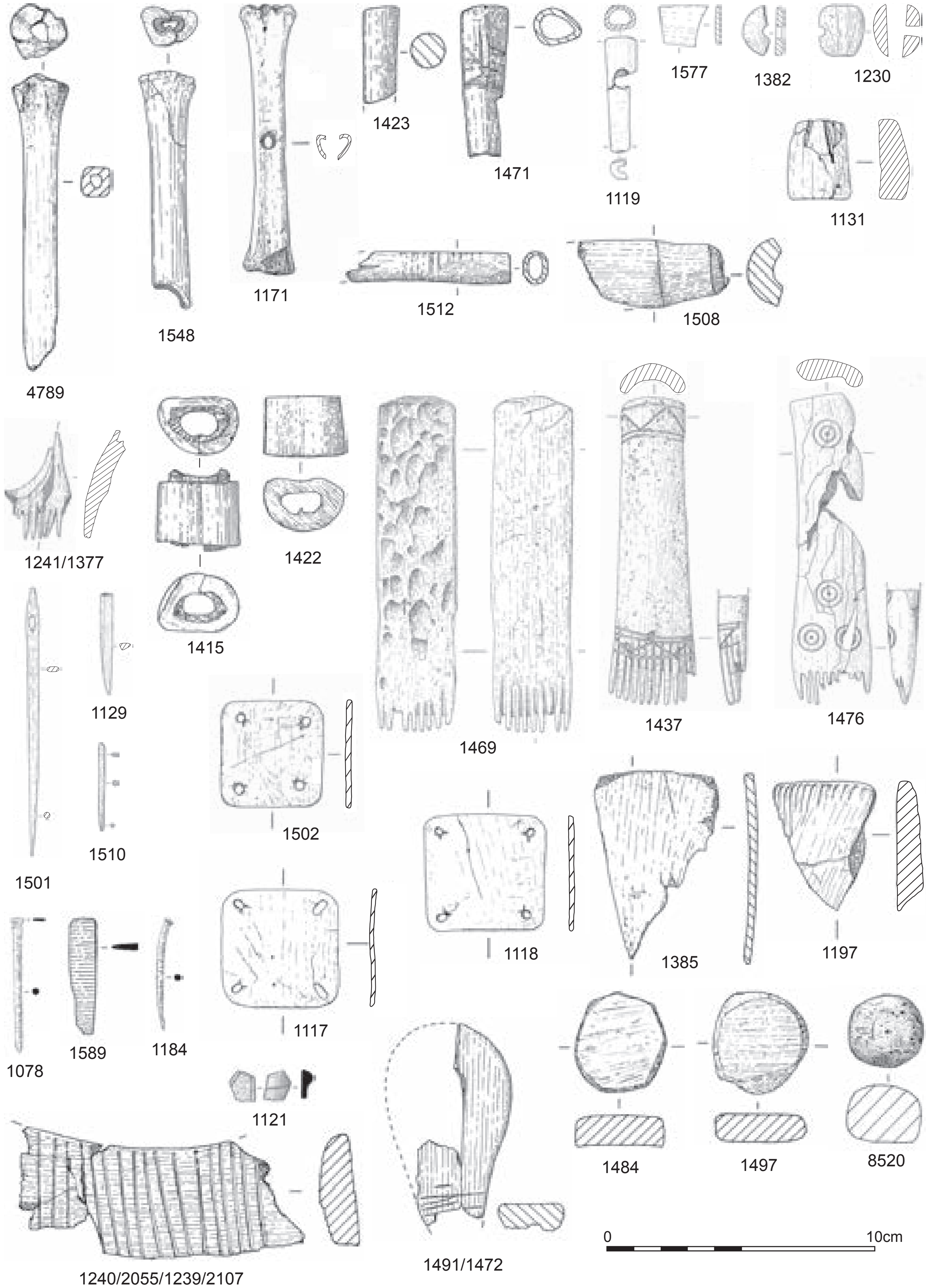


Figure 72. Worked bone and antler, metal and ceramic artefacts from block CC

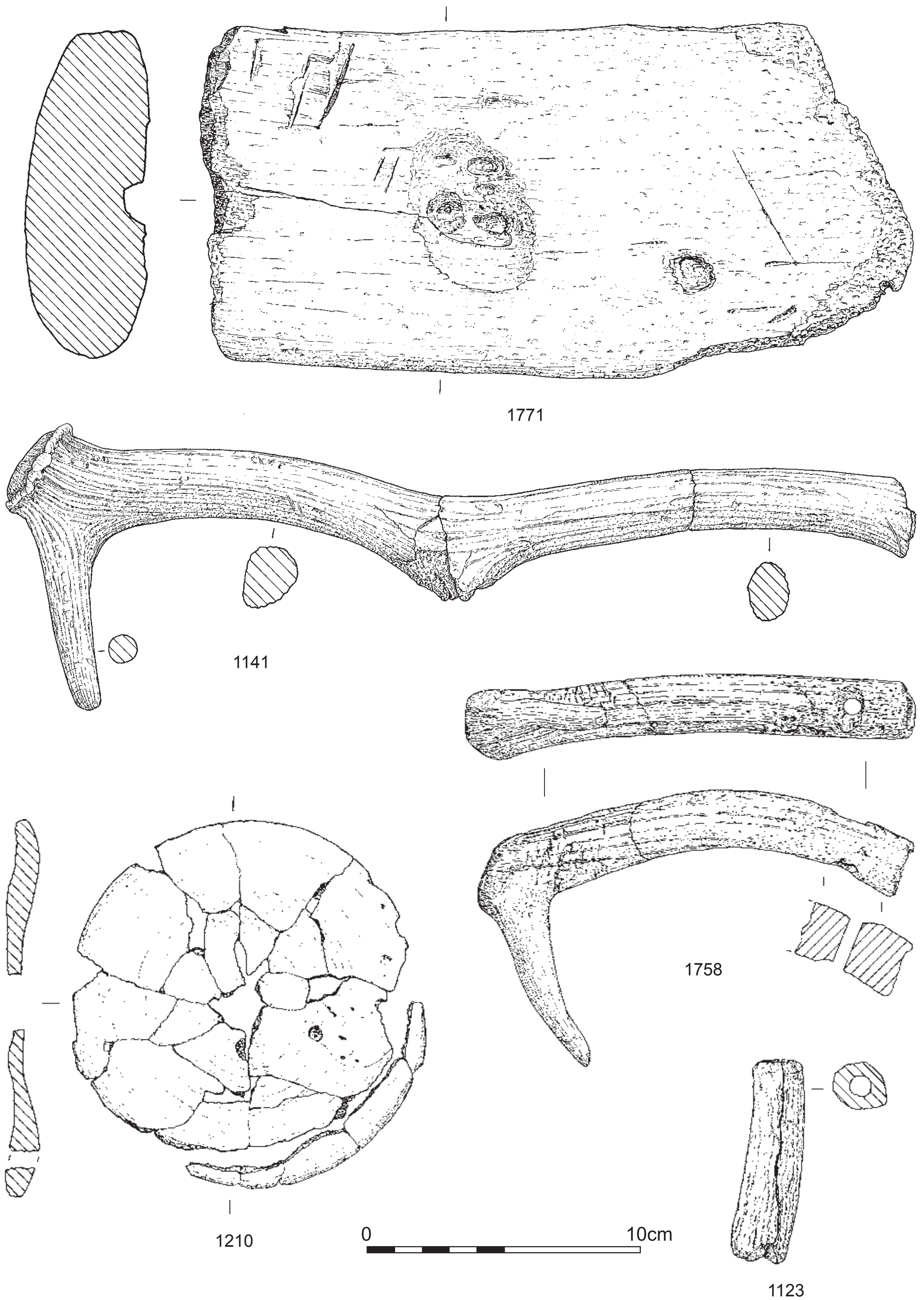


Figure 73. Worked whale bone and antler from CC

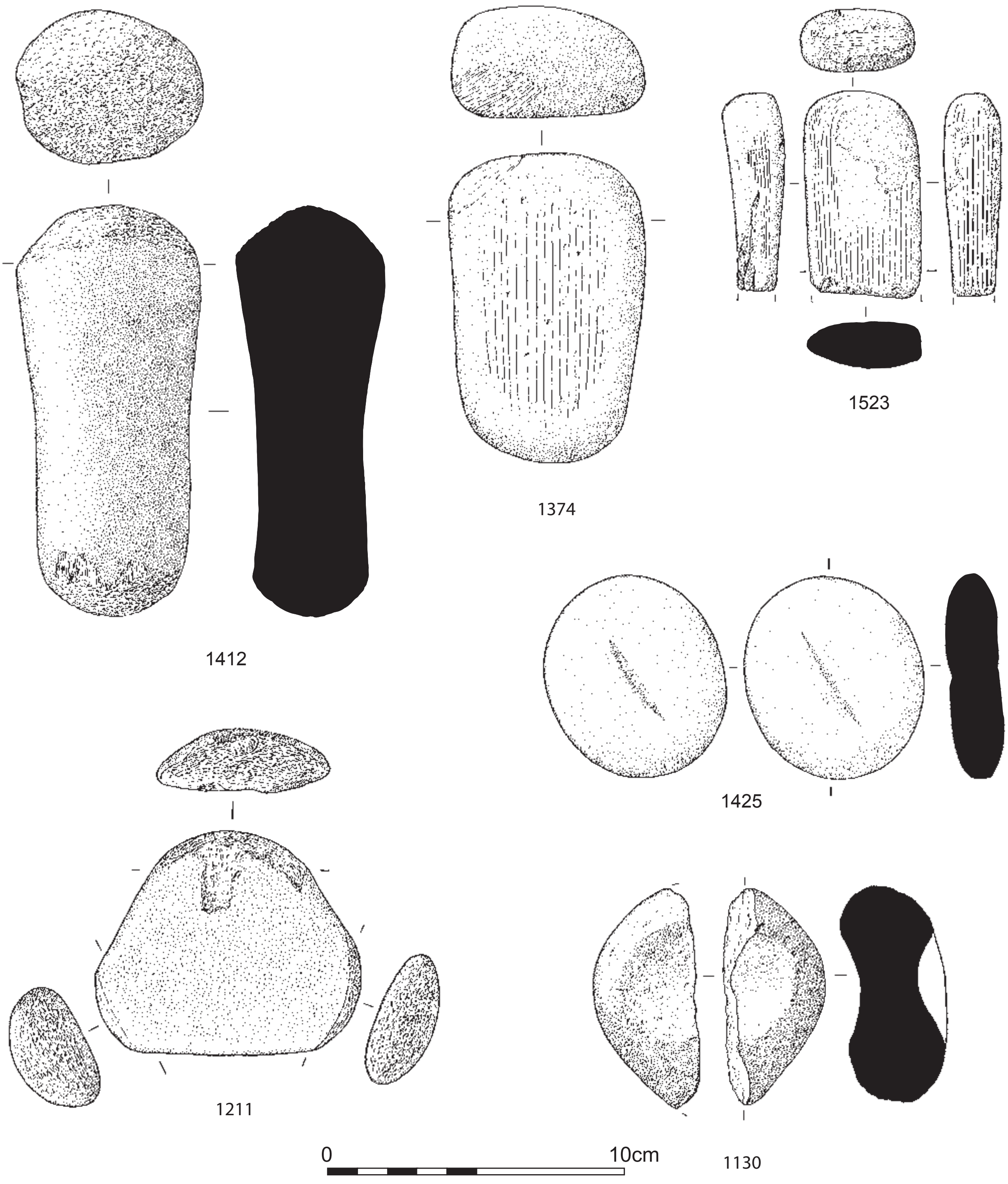


Figure 74. Stone tools from CC

two hearths of Norse date (CE). There is little obvious difference in the material found in the three charcoal layers and the other sand layers and the horizontal distribution again shows little evidence for patterning.

The assemblage is characterised by high quantities of antler and bone working waste and a very distinctive group of tools. The waste materials comprise a large number of cut fragments of antler and bone (*e.g.* Figure 72, 1415, 1422) and these include a possible weaving tablet rough-out (Figure 72, 1385). There are also a number of flints and fragments of pumice that may be associated with bone working.

The tool assemblage is varied. The stone tools include a variety of cobble tools, a strike-a-light, a whetstone and

			Primary sand					Charcoal 1				Charcoal 2				Charcoal 3			Sand			Misc		total
CC			425	309	394	408	424	337	413	414	421	314	406	418	438	398	392	407	302	393	404	428	431	
working debris	waste	antler					1	3		1	1			1	1	1			1	1				11
	waste	bone		1	1				2				1					1						6
	unused cobble	stone						1					1								1			3
		flint					1			1		1		3			1	1	1		1			10
	fragment	pumice								1		1		1	2			2						7
tools	pick/hook	antler													1				1					2
	point	bone						1					1		1									3
	point	whale bone								0.5														0.5
	scraper	bone						1																1
	perforated metapodial	bone																	1					1
	grooved	bone/antler								1								1						2
	handle	antler								1		1				1								3
	socketed	antler													1			1						2
	needle	bone	1																					1
	weaving tablet	bone	1									2												3
	comb	bone/antler						0.5	2					1		0.5								4
	spoon	whale bone											0.5			0.5								1
	strike-a-light	stone								1														1
	whetstone	stone												1										1
	counter-sunk hollow	stone										1												1
	anvil	stone																			1			1
	faceted cobble	stone						3				3		1							4			11
	hammerstone	stone												1		1					1			3
	polisher	stone					1	1						1					1					4
	pounder/grinder	stone				1												1		1	1	1		5
	smoother	stone					2					1		2				1	2		1			9
personal objects	decorated	whale bone						0.5										0.25						0.75
	toggle	whale bone										1												1
	bead	bone																			1			1
	pin	iron						1											1					2
	pin	bone				1						3												4
gaming	disc	shell												1										1
	disc	ceramic					1		1															2
	cone	stone												1										1
vessel	rim	steatite																			1		1	2
miscellaneous	binding	iron												1										1
	bar	iron												1										1
	strip	iron																1						1
	sheet	cu alloy										1		1			1							3
	perforated scapula	bone						1																1
	perforated strip	antler										1												1
	door pivot?	whale bone	1																					1
	epiphyseal disc	whale bone					1	1																2
		total	3	1	1	2	7	14	5	6.5	1	16	3.5	17	6	4	2	9.25	8	2	12	1	1	122.25

Table 23. Artefacts from CC

a pebble with a counter-sunk hollow (Figure 74, 1425, 1523, 1130). The bone/antler tools include a pick, a hook (Figure 73, 1141, 1758), three points (*e.g.* Figure 72, 4789), a possible bone scraper (Figure 72, 1197), both longitudinally and transverse perforated metapodials (*e.g.* Figure 72, 1548, 1171), some possible handles (Figure 72, 1423, 1471 and Figure 73, 1123) and grooved long bone cylinders (Figure 72, 1512, 1508). There is also what appears to be a decorated whale bone spoon (Figure 72, 1491/1472) and a large piece of whale bone possibly used as a pivot plate (Figure 73, 1771).

The most distinctive feature of this assemblage is the presence of a group of tools associated with textile production and use. These include four long handled 'weaving' combs (Figure 72, 1241/1377, 1437, 1469, 1476), three weaving tablets (Figure 72, 1117, 1118, 1502) and a needle (Figure 72, 1501). Three of the weaving combs, all the tablets and the needle were deposited complete and could be interpreted as special deposits, though only two of the tablets were together. They are certainly a significant group of objects that are not common discoveries from archaeological excavations in the region.

Personal items are present in reasonable numbers but they are not as distinctive as the examples from the house floor (CB). They comprise two probable bone pin shanks (Figure 72, 1129, 1510), two bone pin heads (Figure 72, 1131, 1230), two iron pins (Figure 72, 1078, 1184), a disc bead and a toggle (Figure 72, 1382, 1119). Possible gaming pieces are restricted to the two ceramic discs (Figure 72, 1484, 1497), a travertine cone (Figure 72, 8520) and one shell disc (1450, not illustrated).

Miscellaneous objects include a collection of iron and copper alloy pieces, some perforated bones and two large

	primary sand	primary sand	primary sand	primary sand	charcoal 1 1575+/-35	charcoal 1	charcoal 2	charcoal 2	charcoal 3	charcoal 3 1550+/-35	charcoal 3	charcoal 3 1200+/-35	miscellaneous	total
Sample no:	5677	5678	5679	8300	5682	5683	5675	5685	5666	5667	5669	5676	5681	
Context no:	408	409	410	425	413	414	406	418	392	398	392	407	387	
flot volume (cm^3)	3.0	0.1	2.5	12.0	14.0	n/a	3.0	5.0	29.0	33.0	2.5	11.0	4.0	119.1
'charcoal' volume (cm^3)	3.0	0.1	2.5	12.0	14.0	n/a	3.0	5.0	29.0	33.0	2.5	11.0	4.0	119.1
fraction sorted	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
volume floated (l)	16.00	4.00	24.00	43.00	24.00	20.00	10.00	17.00	11.00	23.00	6.50	27.00	20.00	245.5
'charcoal' density (cm^3/l)	0.19	0.03	0.10	0.28	0.58		0.30	0.29	2.64	1.43	0.38	0.41	0.20	0.49
Cereals														
Hordeum sativum - grains			6	59	40	13	14	6	1	320	3	90	10	562
Hordeum sativum - indet frags			1	42	21	5	4	3		157	3	60	8	304
Hordeum sativum - rachis frags														0
Hordeum sativum - (*cf.*) naked grains														0
cf. Triticum sp. - grains														0
Avena sp. - grains			2			28					1	5	1	37
Avena sp. - indet frags						32						5		37
cf. Secale cereale- grains														0
Cereal grain frags			8	14	12	33	9			31			8	115
Cereal culm frags														0
Other Crops														
Linum usitatissimum							1			1	2			4
cf. Linum usitatissimum														0
Weeds/Wild species														
cf. Cerastium sp.						1							1	2
cf. Chenopodium sp.		1				4							13	18
Brassica/Sinapis spp					1			1				1		3
Carex sp. type 1				3	5	7				1		3	9	28
Carex sp. type 2					2	9						2	1	14
Scirpus spp				1	3									4
Cyperaceae indet.														0
cf. Fumaria sp.														0
Bromus sp.														0
Paniceae type - grains	1				4	3						6	4	18
Gramineae - indet grains				1										1
Prunella vulgaris														0
Labiatae (*cf. Ballota* sp.)														0
small legumes					1	2	1					1	1	6
Liliaceae (*cf. Iris* sp.)														0
Rumex/Polygonum sp. - sharp angles, smooth testa	1		1	1	2	2		1					1	9
Rumex/Polygonum sp. - rounded angles, textured testa													1	1
Rumex/Polygonum spp - kernels				1										1
Polygonum sp. - flat type														0
Plantago sp.														0
Ranunculus sp.						2								2
Potentilla sp.										2				2
Galium sp.	1					1				16				18
Umbelliferae														0
Urtica cf. dioica														0
Urtica cf. urens														0
Viola sp.														0
Parenchymatous tissues														
Amorphous vesicular frags				x										
Indeterminate/Unidentified plant taxa					2	2	1	1					1	
Insects/maggots?														

Table 24. The charred plant remains from CC

Sample	Context	*Alnus*	*Betula*	*Corylus*	*Juniperus*	*Picea/ Larix*
HP	398	-	2	3	*cf* 2	10
HP	407	-	-	-	-	1
HP	414	-	1	-	-	37
HP	438	-	-	-	-	9
HP	441	-	-	-	-	14
HP	418	1	2	-	-	20
HP	377	-	-	-	-	1
HP	377	-	-	-	1	6
HP	302	-	-	-	-	12
HP	404	-	-	-	-	3

Table 25. The charcoal from CC

	Context	Sheep	Sheep/Goat	Cattle	Pig	Horse	Cat	Red deer	Roe deer	Otter	Seal	Cetacean	Cattle-sized	Cattle/red deer	Sheep-sized	Total	%
Primary sand	302		59	37	12	1		13					3		3	128	11
Primary sand	309		23	6											1	30	3
Primary sand	408		14	9	1					1					2	27	2
Primary sand	409		1													1	0
Primary sand	410		3	1												4	0
Primary sand	419		11	1												12	1
Primary sand	422			3									1			4	0
Primary sand	423		4		3											7	1
Primary sand	425	2	10	6	1							1			1	21	2
Primary sand	439	4	4	9	1											18	2
Charcoal layer 1	337	34	4	27	2		2	10				1	1	1	4	86	8
Charcoal layer 1	413		18	17	5			5								45	4
Charcoal layer 2	314	38	50	29	1			7	1				1		5	132	12
Charcoal layer 2	406		11	8	5			4						1	1	30	3
Charcoal layer 2	414	2	21	19	3			7		1			6		2	61	5
Charcoal layer 2	438	1	4	7				1					2			15	1
Charcoal layer 2	418		69	95	17			12		1	1	2	4		15	216	19
Charcoal layer 3	308		13	9				7					1		1	31	3
Charcoal layer 3	398		28	20	1			3					1		5	58	5
Charcoal layer 3	407	1	14	28	10			6		1					1	61	5
Charcoal layer 3	440		4		1											5	0
Miscellaneous	377		3	4												7	1
Miscellaneous	387	1	3	1	2										2	9	1
Miscellaneous	426			2											1	3	0
Miscellaneous	428		4	3									1			8	1
Miscellaneous	429		4	1	1											6	1
Miscellaneous	430		1													1	0
Miscellaneous	431		2	3	1											6	1
Miscellaneous	443		1	1												2	0
Sand	393		6	1	1			1					1		2	12	1
Sand	404		30	33	1	1		4			1	1	2		5	78	7
Total		83	419	380	69	2	2	80	1	4	2	5	24	2	51	1124	

Table 26. Animal bone NISP from CC

a

	302	Total
Gadus morhua	2	2
Total	2	2

b

	332	404	408	409	410	413	425	Total
Clupea harengus		2	1		1			4
Salmonidae spp	1					1		2
Anguilla anguilla							1	1
Pollachius virens			1	1	4			6
Total	1	2	2	1	5	1	1	13

c

	332	404	408	409	410	413	425	Total
Clupea harengus		32	4		8			44
Salmonidae spp	2					8		10
Anguilla anguilla							8	8
Pollachius virens			4	1	32			37
Total	2	32	8	1	40	8	8	99

Table 27. Fish from CC: a) Species representation in material >10 mm (NISP); b) Species representation in material <10 mm (NISP); c) Projected quantity of fish bone in <10 mm material (PNISP)

CC	314	337	404	407	408	413	414	438	total
Duck sp.	1							1	2
Teal				1					1
Gannet			1				1		2
Cormorant			1		1				2
Shag	1		1						2
Common crane							1		1
Gull spp	1	3	3		1	1	1	1	11
Guillemot/Razorbill				1					1
Great auk		1	1						2
Total	3	4	7	2	2	1	3	2	24

Table 28. Bird bone from CC

fragmented whale bone epiphyseal plates (Figure 73, 1210) which are best interpreted as pot lids. There is also a section of whale jaw bone carefully incised with 17 straight lines (Figure 72, 1240/2055/1239/2107)

Carbonised plant remains – S Colledge, R Gale and H Smith

Thirteen flotation samples were examined from this block (Table 24). All but two of the samples contained barley, five samples contained oats and three samples contained flax. The quantities of oats and flax in most samples were very low but one sample (5683) from charcoal layer (414) in the south quad produced 60 possible grains of oat. Barley was more common with a total of 562 grains identified, indicating an average of 1.22 grains/litre The bulk of the assemblage (320 grains) came from the upper charcoal layer (5667/398) in the east quad and a Late Iron Age date was confirmed by radiocarbon dating. Another sample from the upper charcoal layer (5676/407) in the south quad produced 90 grains but the radiocarbon date from this sample is more ambiguous, suggesting that it may be Norse contamination. Wild/weed seeds were present in all the samples, with the exception of 5666/392 and 5669/392.

Charcoal from ten contexts belonging to block CC was examined and identified (Table 25). Spruce/larch was common to each sample as either the dominant taxon or the only taxon. Other taxa were sparsely represented and showed no significant spatial differences. Birch, hazel and

	Context	Chop	Cut	Chop & Cut	Sawn	Total Butchery	Gnawed	Burnt	Total NISP	% Butchered	% Gnawed	% Burnt
Primary sand	302	0	1	0	1	2	2	8	128	2	2	6
Primary sand	309	0	0	0	0	0	0	6	30	0	0	20
Primary sand	408	3	0	0	1	4	5	3	27	15	19	11
Primary sand	409	0	0	0	0	0	0	0	1	0	0	0
Primary sand	410	0	0	0	0	0	1	0	4	0	25	0
Primary sand	419	0	1	0	0	1	1	2	12	8	8	17
Primary sand	422	1	1	0	1	3	2	0	4	75	50	0
Primary sand	423	0	1	0	0	1	3	0	7	14	43	0
Primary sand	425	1	2	0	1	4	1	1	21	19	5	5
Primary sand	439	1	1	0	0	2	3	1	18	11	17	6
Charcoal layer 1	337	1	2	0	0	3	9	34	86	3	10	40
Charcoal layer 1	413	7	0	0	0	7	1	2	45	16	2	4
Charcoal layer 2	314	5	0	0	0	5	6	76	132	4	5	58
Charcoal layer 2	406	6	0	0	0	6	2	3	30	20	7	10
Charcoal layer 2	414	4	3	1	0	8	4	7	61	13	7	11
Charcoal layer 2	418	13	16	0	2	31	80	24	216	14	37	11
Charcoal layer 2	438	0	3	0	0	3	0	3	15	20	0	20
Charcoal layer 3	308	0	0	0	0	0	0	17	31	0	0	55
Charcoal layer 3	398	6	3	0	0	9	8	5	58	16	14	9
Charcoal layer 3	407	1	1	0	0	2	5	8	61	3	8	13
Charcoal layer 3	440	0	1	0	0	1	0	4	5	20	0	80
Miscellaneous	377	0	1	0	0	1	1	4	7	14	14	57
Miscellaneous	387	0	1	0	0	1	1	1	9	11	11	11
Miscellaneous	426	1	0	0	1	2	2	0	3	67	67	0
Miscellaneous	428	2	1	0	2	5	3	1	8	63	38	13
Miscellaneous	429	1	0	0	0	1	0	1	6	17	0	17
Miscellaneous	430	0	0	0	0	0	0	0	1	0	0	0
Miscellaneous	431	2	0	0	0	2	3	0	6	33	50	0
Miscellaneous	443	0	1	0	0	1	0	0	2	50	0	0
Sand	393	2	1	0	0	3	0	0	12	25	0	0
Sand	404	6	1	0	1	8	7	0	78	10	9	0
Total		63	42	1	10	116	150	211	1124	10	13	19

Table 29. The taphonomy of the mammal bone assemblage from CC

cf. juniper occurred in the eastern quadrant (398); birch in the southern quadrant (414); and alder and birch in the west quadrant (418). The high proportion of spruce/larch may suggest that some redeposition of the underlying CB deposits might have occurred. However, it is also probable that spruce/larch was the dominant timber fuel throughout the occupation.

Animal bone – J Cartledge, C Ingrem, J Mulville and A Powell

The occupation deposits associated with the abandonment of the Late Iron Age house produced 1124 mammalian bones (Table 26), a small quantity of fish bones (15 bones identified, Table 27; 2 from above 10 mm and 13 from below 10 mm sorting) and 24 bird bones (Table 28).

The main concentration of mammalian bone came from the three charcoal layers and together they accounted for over two-thirds of the bone in this block. Charcoal layer group 2 produced 42% of the bone, with the majority derived from context 418. The other major bone-producing contexts were the primary sands with 22% of the bone; context 302 provided over half of this figure. No other group of contexts in this block provided more than 14% of the assemblage. The fish bone assemblage was scattered across eight contexts with the only quantity greater than two being a group of four saithe bones from the brown sand (410). The bird bone was similarly scattered but the largest group of seven bones came from the sand surrounding the house (404).

The principal domestic species was sheep and they make up 45% of the assemblage (Table 26). Cattle account for 34% of the assemblage and there is a substantial assemblage of pig (6 %) and red deer (7 %). Other species include small numbers of horse, cat, roe deer, otter and seal. The highest number and proportion of whale bone fragments were found within the infill layers (CC), where five identifiable elements were recorded.

The only identifiable fish bones in the >10 mm material are two cod bones from the charcoal layers – a maxilla and a caudal vertebra. The 13 identifiable specimens in the <10 mm material are all vertebrae and include bones belonging to herring, salmonid, eel and saithe (Table 27b). Herring and saithe are represented by bones from both the abdominal and the caudal region whilst the salmonid vertebra is from the abdomen (archive). The projected

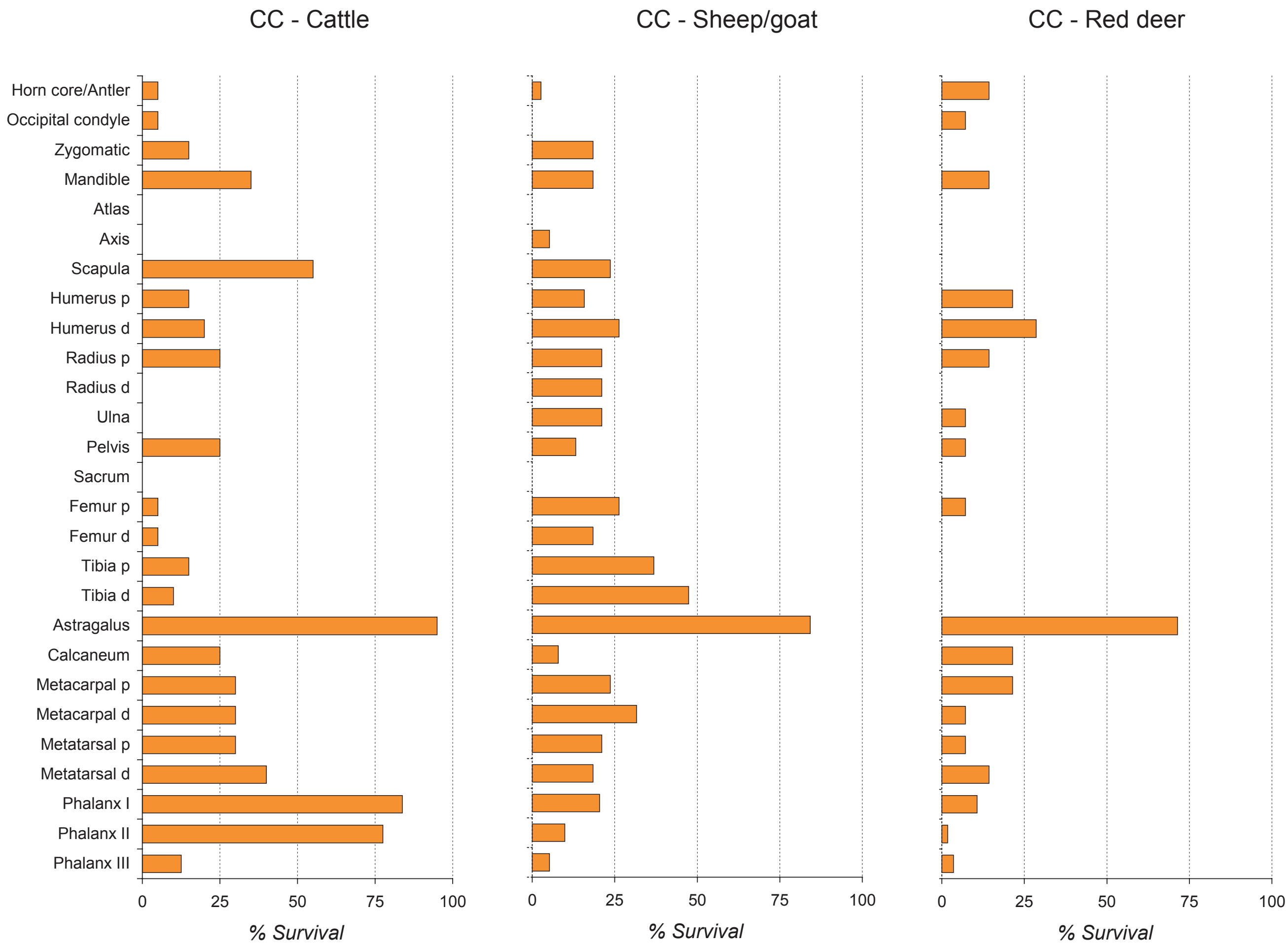


Figure 75. The relative abundance of the different body parts of cattle, sheep/goat and red deer from block CC

estimate of species abundance shows a predominance of herring and saithe with salmonids again fairly numerous (Table 27c). However, the calculation is based on a very small sample of identifiable remains (n=13) and may be unreliable (Table 27b).

The assemblage of bird bones included ducks (one slightly larger than a mallard and one probably an eider), gannet, cormorant and shag, crane, guillemot or razorbill and great auk. The most frequent species are the gulls, which make up 46% of the assemblage (Table 28).

The taphonomic summary of the mammal bones for this block (Table 29) indicates a lower level of burning than CB with only about 19% of the bone burnt. The charcoal layers have the greatest proportion of burnt material (26%). Most of the individual charcoal layers contain fewer than 100 fragments; therefore, some will be biased by the small sample size. However, the principal bias is the inclusion of burnt cetacean fragments which may derive from a single bone, *e.g.* 314.

The levels of butchery and gnawing are similar (10% and 13%) to those found in the floor layers (CB). For context groups with more than 100 fragments, the charcoal layers show raised levels of butchery compared to the primary sand and the greatest proportion of butchered bone was found in charcoal group 2. Gnawing levels are high in charcoal group 2 although this reflects the figures from context 418. The combined gnawing and butchery evidence suggests that this context may contain food waste, butchered and then left exposed and accessible to canids.

The relative abundance of the different body parts was calculated for sheep, cattle and red deer (Figure 75). For all three species the most abundant element is the astragalus. The sheep body parts represented derive from a wider range than for the other, less numerous species. Although bones of the lower limb, tarsals and metapodials predominate, upper fore and hind limbs are also represented. There are also small numbers of phalanges and head bones present. The distribution of cattle elements is more uneven, with toes and astragali predominating and small quantities of other bones present. Red deer elements have an even more limited distribution, with a large number of astragali and few other elements present. As a hunted species it may be expected that only elements with a high meat value would be returned to site, but even in this small sample, bones of the head, ankle, pelvis and phalanges were present, suggesting the returning of entire carcasses to the site.

Two cattle bone articulations were noted: a front lower leg (context 438), from the carpals down to the second

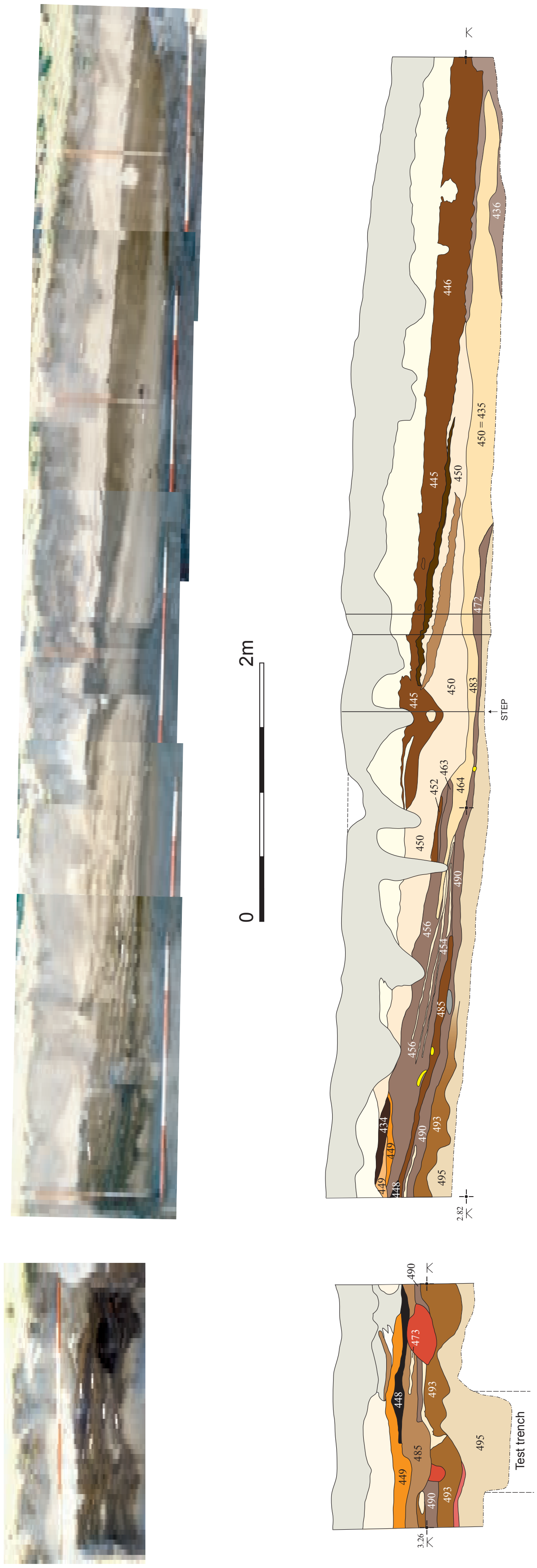


Figure 76. The north-facing section of the western trench

phalanx, and a lower hind leg (context 337) from the metatarsal to the third phalanx. Both of these grouping are waste articulations, commonly reported to be associated with hides.

Conclusion – N Sharples

The deposits belonging to this block appear to derive from two quite different sources. In the centre of the excavated area are charcoal layers that appear to be deliberately placed in the hollow created by robbing the structural remains of the earlier house (CB). These deposits were surrounded by a thick layer of yellow sand which represents sand present prior to the construction of the earlier house (CB). There was considerable mixing between these two groups of contexts as a result of the natural infilling of the hollow caused by collapse of the surrounding sand as the charcoal layers were being deposited. There was also later disturbance in the Norse period and mixing of deposits of the two periods by modern rabbit activity.

The assemblage of material recovered from this block must be treated with caution as it includes earlier material that precedes the construction of the house. However, analysis of the pottery assemblage identified very little earlier material and what there was, was fragmentary. This is probably because the surrounding sand was not particularly rich in finds. This observation and the presence of many complete unabraded artefacts suggests that the distinctive character of the assemblage of worked bone accurately reflects deposition during the infilling of the hollow. In contrast the stone assemblage almost certainly reflects both earlier activity and later Norse contamination.

The bone and antler assemblage includes an interesting group of material that can be interpreted as production debris and a range of tools focused on textile production; it was noted that objects associated with textile production were rare in the deposits associated with the use of the earlier house. Weaving tablets and combs are not particularly common on Hebridean Iron Age sites though they are 'classic' types for the period and this is an impressive collection of largely complete pieces. The quality of these objects and their completeness suggest they were deliberately deposited. Much of the material deposited in these charcoal layers might indeed have been deliberately placed to indicate the significance of the destruction of the earlier house. It seems very unlikely that a hollow in relatively unconsolidated sand would exist for any length of time and three of the four radiocarbon dates suggest the material present in CC was deposited not long after the CB material. The possible evidence for ceramic evolution is, at best, tentative. It is possible the act of deposition was perhaps associated not so much with the destruction of this house but the creation of a new house elsewhere. The mammal bones, particularly those in 418, may represent the debris from a celebratory feast.

The Late Iron Age midden (CG) – N Sharples

The western edge of mound 1 was examined by a trench 2 m wide and 17.6 m long. This trench ran northwest–southeast, with a gap left between the two trenches (see Figures 1, 2 and 18). It was positioned to start at a point where the visible extent of mound 1 ceased and it was thought that archaeological deposits would be dying out.

The stratigraphy exposed in the trench can be characterised as consisting of a series of rich, dark brown midden layers, extending into the trench from the east (Figure 76). In the east these layers are thicker and lie on top of each other; as one moves west they thin and become separated by yellow wind-blown sand layers. Eventually the brown sand layers run out and the yellow sand layers merge to become one thick homogeneous sand layer; though relatively sterile, this layer still contained large quantities of mammal bone.

The sequence begins with a pale yellow sand (495). This was only excavated at the east end of the trench and against the south-east section a sondage was dug which demonstrated that this layer was at least 0.5 m thick. Some charcoal flecks were present in this layer and these appeared to increase with depth so it is clear that this layer does not represent sterile natural existing prior to the occupation of the site. It is more likely to represent a wind-blown sand deposit accumulating over or against an existing archaeological mound which lies to the east beneath the Late Iron Age settlement discussed here. Two radiocarbon samples were obtained from this layer. OxA-15421 came from a cattle phalanx and has a radiocarbon age of 1542±28 BP which calibrates to a date of cal AD 420–600 (95% probability). OxA-15452 came from a red deer tarsal and has a radiocarbon age of 1606±26 BP which calibrates to a date of cal AD 390–540 (95% probability).

The lowest occupation layer was a grey-brown sand (493), though in the north-east corner of the trench a thin red ash layer was noted in section but not identified in plan or given a separate context number. Layer 493 extended for 4.7 m into the trench and was up to 0.25 m thick. A radiocarbon date (SUERC-7627) was obtained from a sheep radius in layer 493. This has a radiocarbon age of 1450±35 BP which calibrates to a date of cal AD 550–660 (95% probability). This was covered by a dark brown sand (490) which was up to 0.1 m thick and which extended up to 1.9 m from the east edge of the trench. Above this was a slightly orange, brown sand (485) which was up to 0.08 m thick and extended 3 m into the trench. Two radiocarbon dates were obtained from this layer; SUERC-7626 was obtained from a red deer astragalus and calcaneum and SUERC-7633 was obtained from a red deer radius. The former has a radiocarbon age of 1500±35 BP which calibrates to a date of cal AD 430–490 and cal AD 510–650 (95% probability). The latter has a radiocarbon age of 1530±35 BP which calibrates to a date of cal AD 530–610.

These layers were represented in the middle of the trench by two detached layers, grey sand (483) and mottled dark brown sand (472). The former is probably similar to 485, the latter to 490. Above, or possibly within, 485 was a dark orange-brown sand (473) and against the west section these layers were both sealed by a dark brown sand (448) which in turn was sealed by a yellow-brown sand (456). These merged into a distinctive orange-brown sand (449) which probably represents a dump of peat ash from a hearth. This was in turn sealed by dark brown sand (434) which was restricted to the area immediately adjacent to the east section. 449/456 was the most substantial midden deposit excavated and it produced two samples for radiocarbon dating. SUERC-7628 was from a pig calcaneum and astragalus and has a radiocarbon age of 1515±35 BP which calibrates to a date of cal AD 450–620 (95% probability). A radiocarbon date (OxA-15419) was obtained from a cattle calcaneum in layer 456. This has a radiocarbon age of 1547±28 BP which calibrates to a date of cal AD 420–590 (95% probability).

To the west (in the centre of the trench) 456 was split into a number of distinct layers labelled from the bottom up: orange-brown sand (468), pale yellow sand (464), pale orange sand (463/461), mottled dark brown sand (455) and orange-brown sand (452). A radiocarbon date (SUERC-7632) comes from a red deer astragalus and calcaneum in 463. It has a radiocarbon age of 1460±35 BP which calibrates to a date of cal AD 540–650 (95% probability) These layers interdigitate with and were overlain by the thick yellow sand layer (450/435). This layer was in turn overlain by a light brown sand (446) which could well be a later redeposition of midden material eroding from further up the slope. The final layer of dark brown sand (445) was a narrow band 1.2 m wide running across the trench. This seems a more significant feature but it is difficult to interpret. Most of 450/435 and 446 were removed by JCB.

Sampling data – N Sharples

Sixteen samples, 269.5 litres of soil, were taken and processed from the CG contexts: 434, 445, 448, 449, 450, 452, 455, 456 (two samples) 463, 472, 473, 483, 485, 490 and 493, and the material from below 10 mm was sorted for all of these samples (Tables 30 and 31).

The material from the above 10 mm sort was dominated by a large collection of unburnt bone (401 fragments, average density of 1.49 fragments per litre of soil); burnt bone was also a very common occurrence (209 fragments, average density 0.78 frag/litre), pottery was the next most frequent material (109 fragments, average density of 0.4 frag/litre) and there was a very small quantity of fish bones (11 fragments, average density 0.04 frag/litre). Marine molluscs were slightly more common than in the other Iron Age contexts but only 270 limpets and 44 winkles were recovered (average density 1.00 and 0.16 shell/litre respectively). There was no slag and only isolated

	Context	Ltrs	Unburnt bone		Fish		Burnt bone		All mammal bone		Pottery		Limpet		Winkle		Other shells		Charcoal	B.O.M
			no.	density	no.	density	no.	density	no.	density	no.	density	no.	density	no.	density	no.	density		
8306	434	2.5	2	0.80	0	0.00	0	0.00	2	0.80	0	0.00	1	0.40	0	0.00	0	0.00	0	0
8301	445	12	5	0.42	0	0.00	0	0.00	5	0.42	6	0.50	6	0.50	1	0.08	1	0.08	0	0
8305	448	10	4	0.40	0	0.00	0	0.00	4	0.40	1	0.10	20	2.00	2	0.20	2	0.20	0	0
8304	449	14	6	0.43	0	0.00	0	0.00	6	0.43	0	0.00	6	0.43	3	0.21	1	0.07	0	0
8323	450	19	10	0.53	0	0.00	4	0.21	14	0.74	3	0.16	7	0.37	0	0.00	0	0.00	0	0
8324	452	28	11	0.39	0	0.00	3	0.11	14	0.50	3	0.11	11	0.39	0	0.00	1	0.04	0	0
8527	455	20	4	0.20	0	0.00	17	0.85	21	1.05	3	0.15	9	0.45	1	0.05	3	0.15	0	0
8526	456	24	8	0.33	0	0.00	14	0.58	22	0.92	14	0.58	44	1.83	3	0.13	2	0.08	0	1
8564	456	18	10	0.56	0	0.00	24	1.33	34	1.89	13	0.72	47	2.61	3	0.17	0	0.00	0	0
9058	463	9	1	0.11	0	0.00	1	0.11	2	0.22	5	0.56	3	0.33	0	0.00	2	0.22	0	0
9166	472	22	98	4.45	0	0.00	9	0.41	107	4.86	25	1.14	27	1.23	3	0.14	0	0.00	0	0
9143	473	14	17	1.21	0	0.00	49	3.50	66	4.71	2	0.14	22	1.57	1	0.07	3	0.21	0	0
9165	483	2	34	17.00	0	0.00	0	0.00	34	17.00	12	6.00	17	8.50	0	0.00	3	1.50	0	0
9147	485	9	18	2.00	1	0.11	41	4.56	59	6.56	0	0.00	2	0.22	0	0.00	9	1.00	0	3
9162	490	45	143	3.18	7	0.16	32	0.71	175	3.89	17	0.38	30	0.67	17	0.38	1	0.02	1	0
9164	493	21	30	1.43	3	0.14	15	0.71	45	2.14	5	0.24	18	0.86	10	0.48	2	0.10	0	
16 samples		269.5	401	1.49	11	0.04	209	0.78	610	2.26	109	0.40	270	1.00	44	0.16	30	0.11	1	4

Table 30. The material identified in sorting the >10 mm residue from CG

Sample	Context	Litres	Fraction sorted		Unburnt bone		Burnt bone		Fish bone		Seed		Charcoal		B.O.M		Pottery		Slag		coprolite		eggshell		Misc
			no.	density	no.	density	no.	density	no.	density	no.	density	no.	density	no.	density	no.	density	no.	density	no.	density	no.	density	
8306	434	2.5	0.5	1.25	59	47.20	10	8.00	2	1.60	1	0.80	30	24.00	35	28.00	1	0.80	9	7.20	0	0.00	0	0.00	
8301	445	12	0.125	1.50	105	70.00	54	36.00	4	2.67	3	2.00	124	82.67	82	54.67	18	12.00	18	12.00	9	6.00	11	7.33	
8305	448	10	0.125	1.25	240	192.00	120	96.00	2	1.60	1	0.80	160	128.00	80	64.00	2	1.60	23	18.40	1	0.80	20	16.00	
8304	449	14	0.125	1.75	80	45.71	35	20.00	1	0.57	0	0.00	68	38.86	66	37.71	4	2.29	18	10.29	0	0.00	0	0.00	
8323	450	19	0.25	4.75	62	13.05	123	25.89	0	0.00	0	0.00	64	13.47	70	14.74	8	1.68	1	0.21	7	1.47	0	0.00	1 worked bone
8324	452	28	0.125	3.50	42	12.00	38	10.86	0	0.00	0	0.00	72	20.57	108	30.86	0	0.00	1	0.29	11	3.14	0	0.00	
8527	455	20	0.125	2.50	109	43.60	97	38.80	22	8.80		0.00	85	34.00	229	91.60	29	11.60	44	17.60	15	6.00	0	0.00	1 bronze
8526	456	24	0.063	1.51	105	69.44	111	73.41	1	0.66	1	0.66	107	70.77	185	122.35	46	30.42	18	11.90	23	15.21	2	1.32	
8564	456	18	0.125	2.25	104	46.22	415	184.44	1	0.44	1	0.44	110	48.89	405	180.00	67	29.78	137	60.89	0	0.00	0	0.00	
9058	463	9	1	9.00	121	13.44	127	14.11	0	0.00	1	0.11	50	5.56	302	33.56	37	4.11	73		11	1.22	22	2.44	1 spirorbis
9166	472	22	0.063	1.39	345	248.92	147	106.06	0	0.00	0	0.00	140	101.01	167	120.49	4	2.89	31	22.37	436	314.57	2	1.44	
9143	473	14	0.125	1.75	88	50.29	235	134.29	10	5.71	0	0.00	0	0.00	0	0.00	1	0.57	4	2.29	0	0.00	4	2.29	
9165	483	2	0.125	0.25	232	928.00	176	704.00	2	8.00	1	4.00	113	452.00	61	244.00	7	28.00	6	24.00	109	436.00	1	4.00	
9147	485	9	0.125	1.13	230	204.44	353	313.78	86	76.44		0.00	234	208.00	255	226.67		0.00	240	213.33	0	0.00	0	0.00	1 spirorbis
9162	490	45	0.063	2.84	379	133.69	151	53.26	500	176.37	2	0.71	280	98.77	96	33.86	18	6.35	19	6.70	62	21.87	2	0.71	1 worked bone
9164	493	**21**	0.0625	1.31	78	59.43	40	30.48	25	19.05	0	0.00	120	91.43	65	49.52	9	6.86	15	11.43	0	0.00	2	1.52	
16 samples		269.5		37.92	2379	62.74	2232	58.86	656	17.30	11	0.29	1757	46.33	2206	58.17	251	6.62	657	17.33	684	18.04	66	1.74	

Table 31. The material identified in sorting the <10 mm residue from CG

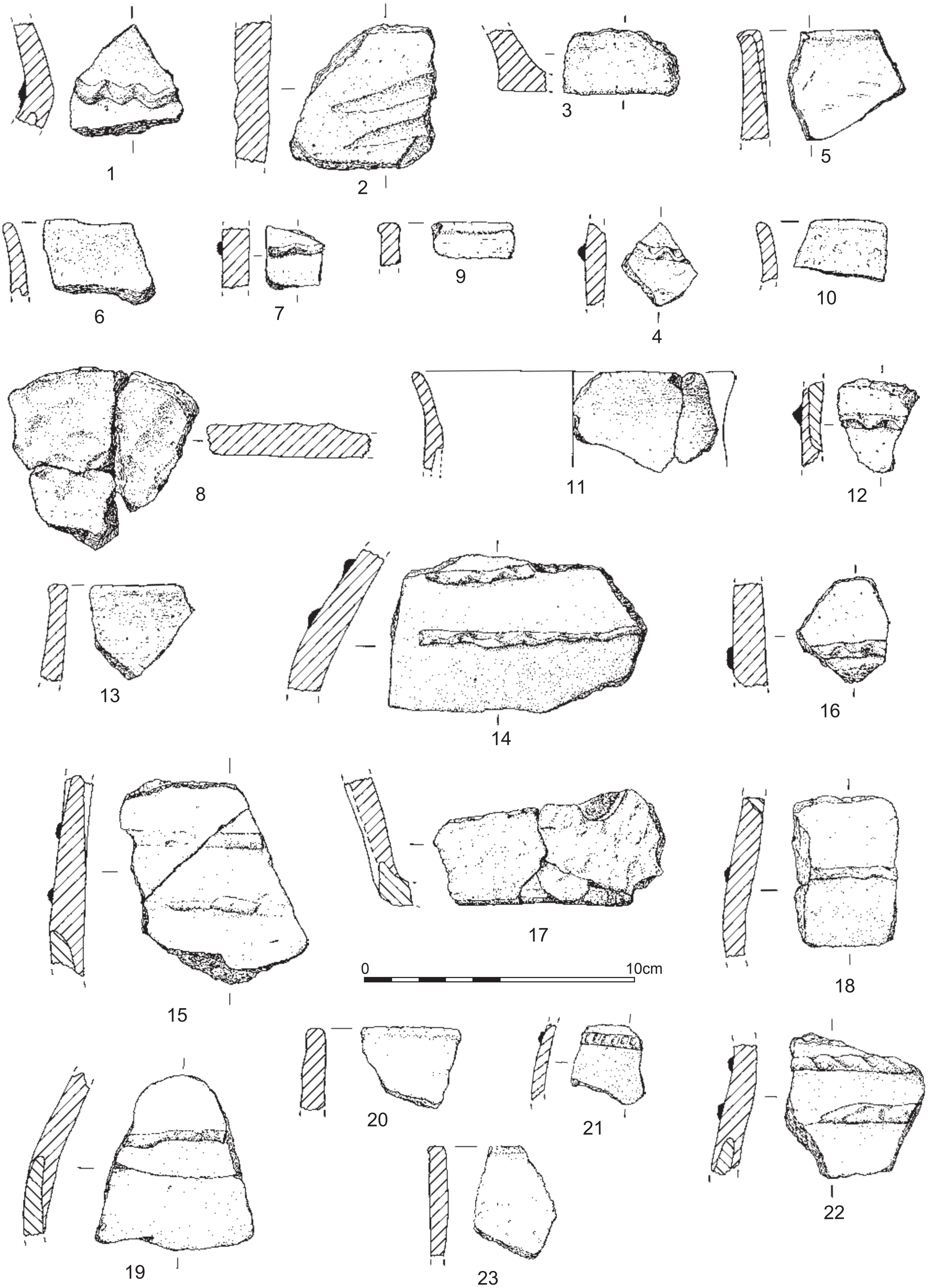


Figure 77. The pottery from CG

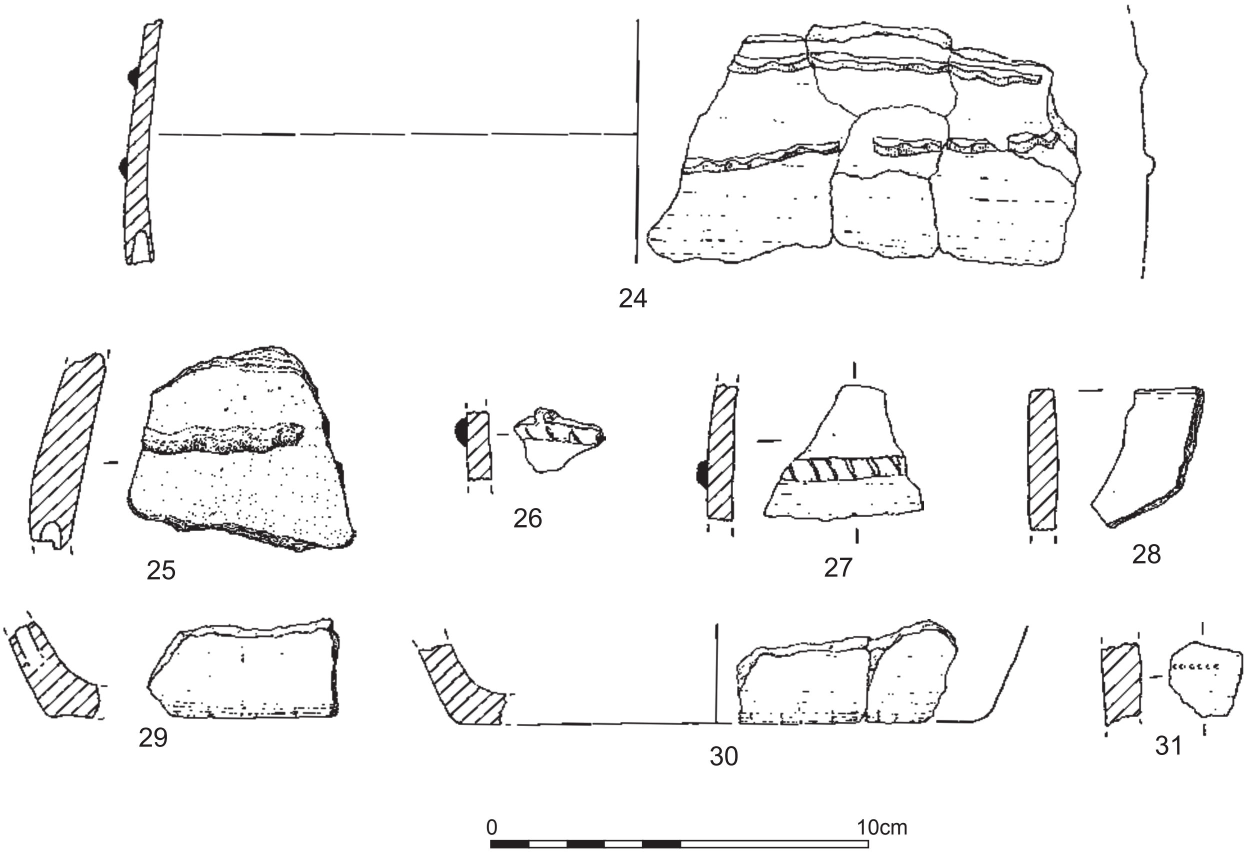


Figure 78. The pottery from CG

fragments of charcoal and B.O.M. The context with the highest average density of bone was 483 (17.00 frag/litre, all unburnt) and this layer also has the highest densities of pottery (6.00 frag/litre) and limpets (8.50 shell/litre). However, the prominence of this layer is misleading as the volume of soil sieved was only 2 litres and the figures must be treated with caution. Layers 472 and 485 also had high densities of bone (4.86 and 6.56 frag/litre respectively) and the latter assemblage was dominated by burnt bone. Pottery densities were also high in 472 (1.14 frag/litre) and suggest that this was a rich midden layer. Limpet densities were high in two layers, 448 (2.00 shell/litre) and 456 (2.61 shell/litre) but winkle density never reached more than 0.48 shell/litre (in layer 493). The only concentration of fish bones was in 490 which reflects the densities of fish bone found in the below 10 mm sort.

The material from the below 10 mm sample had very high average densities of bone (unburnt 63 fragments per litre and burnt, 59 frag/litre). Charcoal and burnt organic material were also quite common (46 frag/litre and 58 frag/litre respectively) but slag was generally rare (17 frag/litre). Pot and fish bone were the rarest of the commonly found materials (7 frag/litre and 17 frag/litre respectively). The densest concentrations of all these materials came from the layers at the bottom of the midden sequence. Grey sand 483 had the highest densities of unburnt and burnt bone (928 frag/litre and 704 frag/litre), charcoal (452 frag/litre) and burnt organic material (244 frag/litre) though, as noted above, this is problematic as only 2 litres were sieved. There were high densities of charcoal and B.O.M. in brown sand 485 which also had the highest densities of slag (213 frag/litre) and high densities of burnt bone (314 frag/litre) and fish bone (76 frag/litre). The highest density of fish bones, however, came from dark brown sand 490 which produced an exceptional assemblage of 500 bones (176 frag/litre). The only material to have high densities outside of these stratigraphically early layers was pottery where the highest densities (30 frag/litre) came from the two samples in yellow-brown sand 456, though 483 also had above average densities. There was a significant amount of coprolite from CG (684 fragments; 18 frag/litre) and eggshell was also present in high quantities but crab and *Spirorbis* were rare. The largest quantities of coprolite came from 472 and 483 (314 frag/litre and 436 frag/litre respectively) which also contained the highest densities of unburnt bone. Most of the eggshell assemblage was concentrated in 463 and 448 (2 frag/litre and 16 frag/litre respectively).

Pottery – A Lane

A total of 1995 sherds weighing 12,832g were recovered

CG	weight	sherds	rim	base	body	misc	cordon	dec	ave wght
446	320.1	108	1	0	27	80	2	0	2.96
445	547.7	134	4	1	37	92	6	0	4.09
450	1400.9	288	9	8	59	212	0	0	4.86
434	81.6	9	0	1	6	2	1	0	9.07
449	2188.78	155	8	5	85	57	10+5D	0	14.12
456	3545	580	23	4	164	389	11+1D	0	6.11
452	37.5	9	0	0	3	6	0	0	4.17
455	94	17	0	0	4	13	1?	0	5.53
463	308.1	47	0	0	17	30	5+2D	0	6.56
464	65.2	19	0	0	4	15	0	0	3.43
468	320.4	67	4	1	20	42	0	0	4.78
483	70.1	10	0	0	3	7	1	0	7.01
448	441.8	66	7	2	18	39	1	0	6.69
454	160.2	35	2	0	11	22	1	0	4.58
485	1025.9	123	6	12	41	64	1	0	8.34
473	39.1	5	0	0	2	3	0	0	7.82
472	719	105	5	11	26	63	1	0	6.85
490	736	91	2	0	30	59	2	0	8.09
493	433.7	61	1	0	19	41	1	1	7.11
495	296.9	66	0	1	10	55	0	0	4.5
	12831.98	1995	72	46	586	1291	44+8D	1	6.43

Table 32. Pottery from CG

CG			445	450	434	449	456	455	463	448	473	485	472	490	493	495	total
working debris	waste	antler		1				1					1	2			5
	waste	bone			1												1
	weaving tablet roughout	bone												1			1
		flint			1		4		2	6		1					14
	fragment	pumice										1					1
tools	point	bone			1									2	1		4
	perforated disc	whale bone				1										1	2
	spindle whorl	ceramic					1										1
	hammerstone	stone			1		1						1				3
	countersunk hollow	stone												1			1
personal objects	decorated	bone	1						1								2
	bead	antler									1						1
	bead	shell							2			1		1			4
	pin	cu alloy						1									1
	pin	bone													1		1
gaming	disc	ceramic									1						1
	disc	shell											1				1
	die	bone											1				1
misc	pierced metapodial	bone												1			1
		total	1	1	4	1	6	2	5	6	2	3	4	8	2	1	46

Table 33. Artefacts from CG

from the Late Iron Age midden CG (Table 32). The largest group came from layer 456, a yellow-brown sand in the middle of the midden sequence. Three other layers produced more than 1000g of pottery – 449, 450 and 485. 450 is the general yellow sand accumulation covering the west half of the trench and the sheer volume of this layer partially explains the size of the assemblage. Contexts 449 and 485, in contrast, are relatively restricted midden layers and the quantities of pottery recovered highlight the quantity of material in these layers. The best preserved

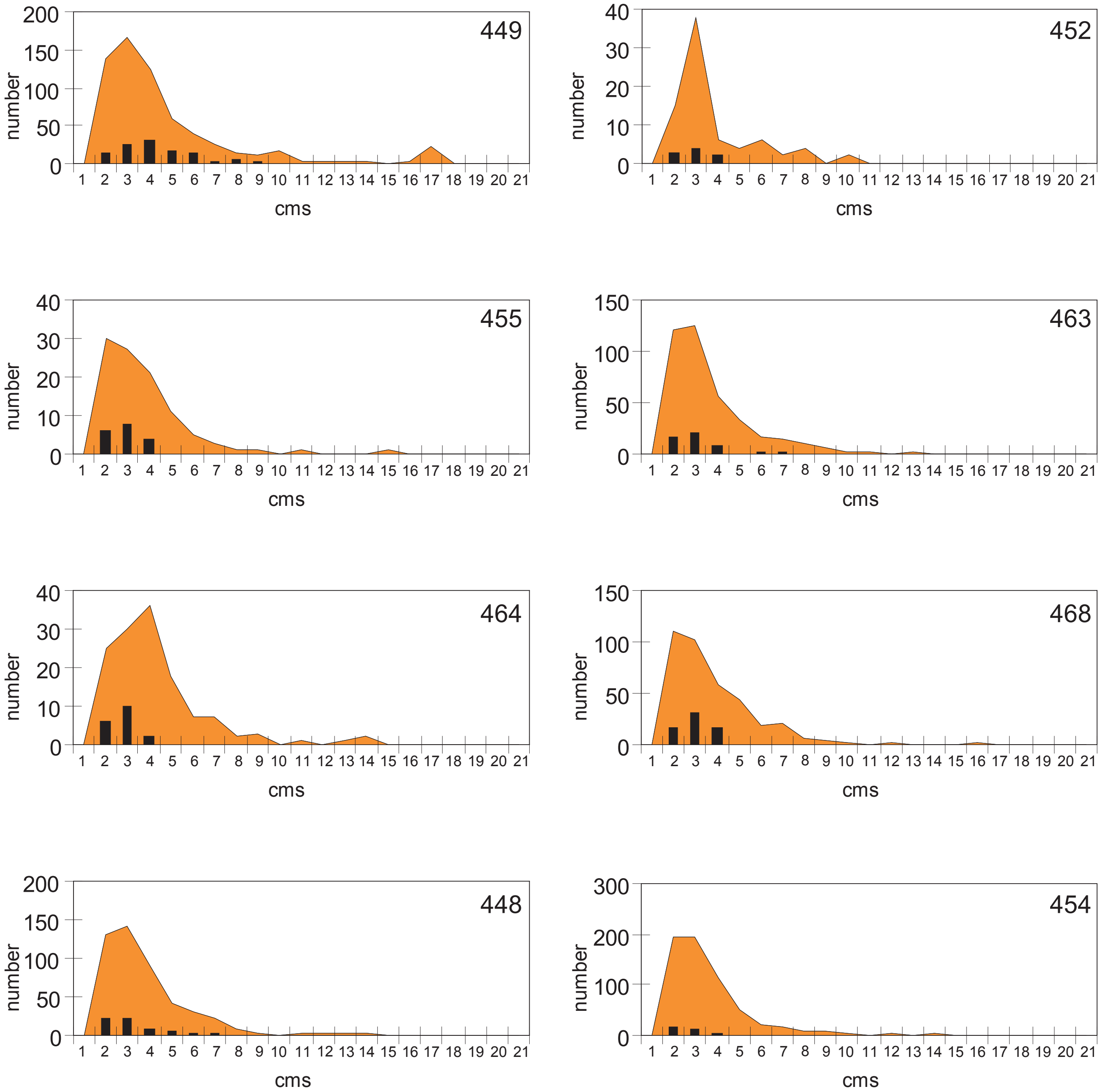


Figure 79. The size distributions of the pottery (column) and bone (area) from selected CG contexts

ceramics (those with the highest average weight) came from midden layer 449. The next highest average weights (ignoring 434 with only nine sherds) all came from the bottom of the stratigraphy – 485, 490 and 473**.** Sherd size in layers 434, 445, 446 and 450 may be distorted by the recovery process which was hurried and did not include sieving.

The CG assemblage seems to be a fairly coherent Late Iron Age I assemblage of bucket-shaped vessels with slight shoulders, flaring or upright rims and flat bases. All bases are flat though they are numerically under-represented as a consequence of the difficulty of separating fragmented base sherds from body sherds. Decoration is restricted to cordons, in some cases double cordons (*e.g.* Figure 77, 14), but the fragmentation of the assemblage means the incidence of double cordons is bound to be underestimated and it is not impossible that all the decorated vessels (an unknown percentage) had double cordons. A small quantity of sherds have incised decoration or more complex cordons. These are thought to be residual material of earlier (*i.e.* late Middle Iron Age) date. Construction marks, where visible, are of tongue and groove type (*e.g.* Figure 78, 24).

The lowest contexts 495, 493, 490 and 472 have cordon-decorated neck sherds (including one of the more sharply

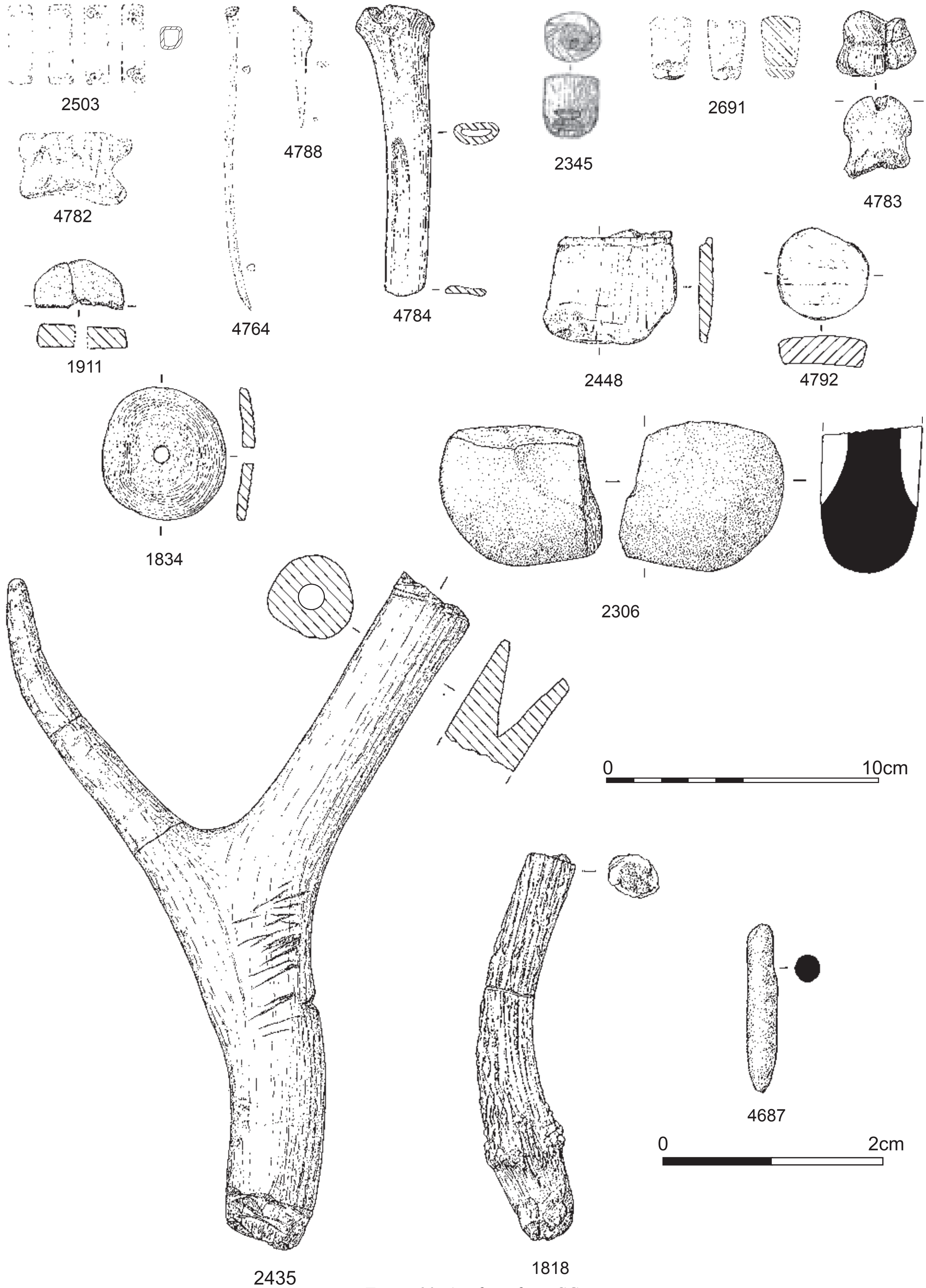


Figure 80. Artefacts from CG

Sample no:	8306	8301	8305	8304	8323	8324	8527	8526	8564	9058	9143	9165	9147	9162	9164	total
Context no:	434	445	448	449	450	452	455	456	456	463	473	483	485	490	493	
	CG	CG	CG	CG	CG	CG	CG	CG	CG	CG	CG	CG	CG	CG	CG	
flot volume (cm^3)	<1	<1	6.0	<1	1.5	2.0	2.0	8.0	neg	<1	4.0	1.0	3.0	20.0	5.0	52.5
'charcoal' volume (cm^3)	<1	<1	4.8	<1	1.0	1.5	1.6	4.0	neg	<1	1.2	0.6	1.5	14.0	2.5	32.7
fraction sorted	100%	100%	100%	100	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
volume floated (l)	2.50	12.00	10.00	14.00	19.00	28.00	20.00	24.00	18.00	9.00	14.00	2.00	9.00	45.00	21.00	247.5
'charcoal' density (cm^3/l)	neg	neg	0.48	neg	0.05	0.05	0.08	0.17	neg	neg	0.09	0.30	0.17	0.31	0.12	
Cereals																
Hordeum sativum - grains		5	4	3		5	3	6	11	2	1	3	4	75	18	140
Hordeum sativum - indet frags		1	4					4	2	1	1		3	37	3	56
Hordeum sativum - rachis frags																0
Hordeum sativum - (*cf.*) naked grains																0
cf. Triticum sp. - grains																0
Avena sp. - grains														17		17
Avena sp. - indet frags																0
cf. Secale cereale - grains																0
Cereal grain frags				6	2	1	2	7	5	3	1			5	18	50
Cereal culm frags																0
Other Crops																
Linum usitatissimum																0
cf. Linum usitatissimum																0
Weeds/Wild species																
cf. Cerastium sp.						1										1
cf. Chenopodium sp.																0
Brassica/Sinapis spp																0
Carex sp. type 1			1	1				1	2	1				2		8
Carex sp. type 2				9					1					2		12
Scirpus spp											1			16		17
Cyperaceae indet.				1												1
cf. Fumaria sp.																0
Bromus sp.																0
Paniceae type - grains														1		1
Gramineae - indet grains											1					1
Prunella vulgaris																0
Labiatae (*cf. Ballota* sp.)																0
small legumes																0
Liliaceae (*cf. Iris* sp.)																0
Rumex/Polygonum sp. - sharp angles, smooth testa							2			2					6	10
Rumex/Polygonum sp. - rounded angles, textured testa									1							1
Rumex/Polygonum spp - kernels																0
Polygonum sp. - flat type																0
Plantago sp.																0
Ranunculus sp.																0
Potentilla sp.																0
Galium sp.				3										3	2	8
Umbelliferae																0
Urtica cf. dioica																0
Urtica cf. urens																0
Viola sp.						1										1
Parenchymatous tissues								x				x				
Amorphous vesicular frags			x			x							x	x	x	
Indeterminate/Unidentified plant taxa			x								1					
Insects/maggots?																

Table 34. The charred plant remains from CG

angled CA forms; *e.g.* Figure 77, 1), shoulder sherds, and tongue and groove construction. One vessel has fingermarks on the inside of the base but not in a regular pattern (*e.g.* Figure 77, 8). There are also several burnished sherds and fabric C sherds which may be indicators of material earlier than the bulk of the assemblage. The contexts above these, 473 and 485, have the standard forms including upright or flaring rims. Context 485 has some reasonable sized sherds. Context 473 includes one sherd which has been made into a roundel or playing piece (Figure 80, 4792).[2]

The assemblage from 448 has some reasonable sized sherds showing shoulders and upright and flaring rims. Although the material from contexts 468, 464, 463, 455 and 452 consists mainly of small sherds, 463 contains the

Sample	Context	*Alnus*	*Quercus*	Salicaceae	*Picea/ Larix*
HP	445	-	-	-	4
HP	446	-	-	-	7
HP	450	2	1h	-	8
HP	468	-	-	3r	2

Table 35. The charcoal from CG

Context	Sheep	Sheep/Goat	Cattle	Pig	Cat	Red deer	Otter	Seal	Cattle-sized	Hare/fox size	Total	%
434	5	15	11	7		5			2		45	3
435	4	1	4			1			1		11	0
436		7	1			1			3		12	1
445	5	34	37	5		8			3		92	5
446	3	10	8	7		6	1		1		36	2
448	4	6	9			15			2		36	2
449	10	39	15	10		9			10		93	5
450	17	77	107	15		37	1		18		272	15
452		1	1	1							3	0
454	9	25	18	1	1	17			4	1	76	4
455		7	7								14	1
456	22	56	48	12		22		1	8		169	10
463	1	12	10	1		6			1		31	2
464	2	5	6			3			2		18	1
468		9	8	2		9			1		29	2
472	14	38	70	6		12			6		146	8
473		3	5			13					21	1
483	1	7	4	1				1	2		16	1
485	11	75	42	4		122	3		6		263	15
490	25	56	47	4		20	14		10		176	10
493	12	25	49	2		10			6		104	6
495	7	36	30	6		24	1		4		108	6
Total	152	544	537	84	1	340	20	2	90	1	1771	

Table 36. Animal bone NISP from CG

substantial portion of one vessel – a thin-walled bulbous vessel with double cordons (*e.g.* Figure 78, 24) – and two sherds from a flaring neck vessel. As noted already 456 has the largest CG pottery group. Its average sherd size is similar to that of the rest of this block but it contains some substantial and conjoining sherds (Figure 77, 12–14).

The assemblage from 449 is the second largest group by weight and it has a significantly higher average sherd size even though several sherds are quite abraded. A number of sherd groups conjoin. It has the substantial part of a probably undecorated vessel with a slight shoulder. It also has the largest number of cordon sherds in the block and these include one sherd which has a rare fine impressed cordon which may be of late Middle Iron Age date (Figure 77, 21). Context 434 is a small group including one small abraded cordon.

The assemblage from contexts 450, 445 and 446 came from the western half of the trench and 450 is one of the largest assemblages from this block. The average sherd size is medium to low and this probably reflects the derived nature of the material present in these layers. There are no cordons present in the assemblage from 450 and the cordons occurring in 446 all have a small average size. One cordon fragment may be from a more complex T-shaped design (Figure 78, 26) and a second is a slashed linear cordon (Figure 78, 27).

As noted already, the assemblage seems a fairly consistent Late Iron Age I assemblage with neck cordons and

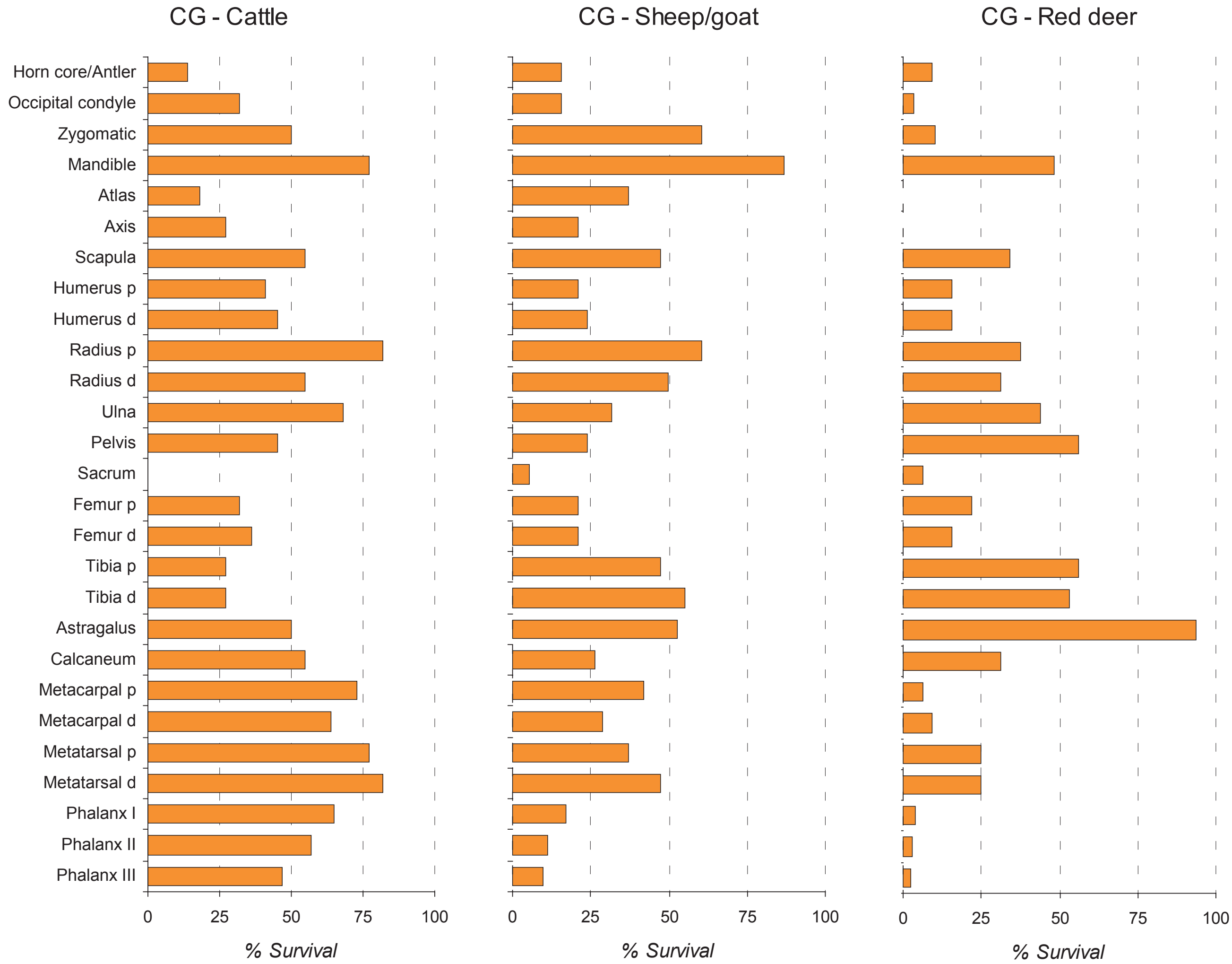


Figure 81. The relative abundance of the different body parts of cattle, sheep/goat and red deer from block CG

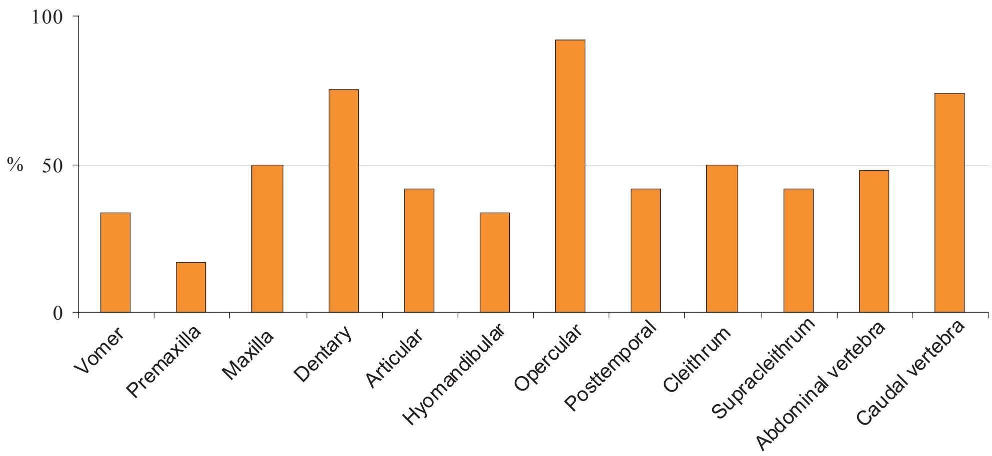


Figure 82. The percentage presence of selected elements of the saithe assemblage

flaring rims. These are concentrated in the lower contexts which also include a few probably earlier Middle Iron Age sherds. The scarcity and abrasion of cordons in the uppermost layers may be chronologically significant.

Measurements – N Sharples

The animal bone and pottery from 13 contexts were measured to assess sherd/fragment size. The quantity of pottery sherds in relation to bone fragments was relatively

	495	434	445	454	456	463	485	490	493	Total
Acipenser sturio				3			11			14
Salmonidae spp								5		5
Pollachius virens	1									1
Gadus morhua	3	1			1	1	5	7		18
Merluccius merluccius	4				1		1	1	2	9
Molva molva				1						1
Large gadid	1			2			3		1	7
Labridae spp				1				2		3
Pleuronectes platessa			1							1
Flatfish			1				1			2
Total	9	1	2	7	2	1	21	15	3	61

	455	456	473	483	485	490	493	Total
Clupea harengus						1		1
Salmonidae spp			2			89		91
Anguilla anguilla					2			2
Pollachius virens	1	1		2		335	12	351
Small gadid						28		28
Flatfish						14		14
Total	1	1	2	2	2	467	12	487

Table 37. Fish from CG: a) Species representation in material >10 mm (NISP); b) Species representation in material <10 mm (NISP)

low compared to other Late Iron Age contexts. Pot is normally between 5% and 18% of the bone assemblage but context 473 has an exceptionally low proportion of pot (1.4%) and context 493 has an exceptionally high proportion of pot (42%).

The condition of the assemblage is generally poor and the pottery in particular is heavily degraded (Figure 79). The majority of contexts have assemblages where all the sherds are smaller than 40 mm (452, 454, 455, 464, 468, 473). These contexts do not, however, have noticeably badly preserved bone assemblages, except for 454 and 485. It would appear that bone and pottery had quite different paths into this assemblage, as very few contexts show consistent preservation between the pottery and bone assemblages. The two contexts that have relatively well preserved bone and pot assemblages are layers 493 and 449. These layers are at the opposite end of the stratigraphy, 449 being one of the latest layers whereas 493 is one of the earliest layers. Contexts 464 and 490 have relatively well preserved bone assemblages whereas layers 463 and 448 have well preserved pot assemblages.

Artefacts – A Clarke, A Pannett, N Sharples and A Smith

There are 46 artefacts from the Late Iron Age middens, comprising 19 pieces of worked bone/antler, four stone tools, two ceramic objects, 14 flints, five shell objects, a copper alloy pin and a fragment of pumice (Table 33). This assemblage is considerably smaller than those from the other Late Iron Age blocks. The assemblage is fairly evenly distributed between the different midden layers, though 490 has a sizeable assemblage of bone/antler tools (six) and 448 has a large assemblage of flints (six).

Most of the assemblage could be characterised as production waste. There are a number of large fragments of antler (*e.g.* Figure 80, 1818, 2435) and a possible weaving tablet roughout (Figure 80, 2448). The large flint assemblage and the piece of pumice could be associated with bone and antler working. Utilitarian tools consist mostly of hammerstones and bone points; the latter include a fine bone point (Figure 80, 4788) and spatulate sheep radius point (Figure 80, 4784). There is also a pierced sheep metapodial (2614, not illustrated) and a perforated cetacean vertebral disc (Figure 80, 1834) whose function

CG	434	435	436	445	446	448	449	450	452	454	455	456	463	464	468	472	473	485	490	493	495	total
Brent goose									2													2
Goose sp				1															1			2
Duck sp	2							1	2													5
Great northern diver								1														1
Fulmar										1												1
Manx shearwater					1			2				1	6					1				11
Gannet																		1		1		2
Cormorant												1				8		1	6	5	2	23
Shag		1				2				1						11		3	9	8	10	45
Peregrine falcon																		1				1
Lapwing																			1			1
Curlew	1																	4				5
Wader sp																	1	1				2
Gull spp	1	2	3	8		1	14	21	1	8	2	6	16	4	3	7	4	31	18	13	7	170
Guillemot/Razorbill	1																					1
Great Auk								1		3		2							1			7
Total	5	3	3	9	1	3	14	26	5	13	2	10	22	4	3	26	5	43	36	27	19	279

Table 38. Bird bone from CG

is unclear. Personal items are restricted to a bird bone pin (Figure 80, 4764), a fragment of a copper alloy pin (Figure 80, 4687) and an antler bead or pendant (Figure 80, 2691). The most distinctive finds are a parallelopiped bone die and a decorated red deer astragalus (Figure 80, 2503, 4782). Both of these are smaller and more heavily worn than the examples, made from cattle bones, found on the house floor (CB). An enigmatic find is a cattle phalanx (Figure 80, 4783) decorated with a crude cross cut into the distal surface.

Carbonised plant remains – S Colledge, R Gale and H Smith

Fifteen flotation samples were examined from this block (Table 34). These samples had very low densities of carbonised plant remains. Only one sample (9162), from the thick brown sand (490) near the base of the midden sequence, produced a large quantity of barley (75 grains) and this also produced the only oat grains in this block. These numbers are particularly poor given the volume of soil floated for most samples and it suggests that carbonised plants were either not transported to these midden deposits or that exposure, likely to be characteristic of these deposits, resulted in their destruction.

Charcoal was examined from several layers of the midden (CG) including contexts 445, 446, 450 and 468 (Table 35). As these layers were mainly composed of domestic waste, it is suggested that the charcoal represents domestic fuel debris. A small amount of charcoal from the bottom layer (468) included spruce/larch and narrow roundwood from willow/poplar. A few layers above 468 a thick covering of yellow sand (450) included alder, oak heartwood and spruce/larch. Above 450, spruce/larch charcoal was present in layers 445 and 446.

Animal bone – J Cartledge, C Ingrem, J Mulville and A Powell

The midden layers produced substantial quantities of mammal bone (1771 identified bones, Table 36), fish bone (61 bones identified from >10 mm and 487 bones from <10 mm, Table 37) and bird bone (279 identified bones – an exceptionally large assemblage, Table 38).

Most of the layers produced some mammal bone (Table 36) and seven layers, spread through the midden sequence (450, 456, 472, 485, 490, 493 and 495), produced over 100 fragments. The two largest assemblages came from contexts 450 and 485, and these each account for 15% of the assemblage. Context 450 was the most substantial layer in the trench but 485 was a thin layer which clearly had a high density of mammal bones. The majority of the fish bones (95% of <10 mm, 26% of >10 mm) came from 490, one of the earliest midden layers deposited. Many of the other midden layers produced small collections of bones and there was a notable collection of sturgeon (*Acipenser sturio*) bones in 485. The bird bones were widely dispersed,

Context	Chop	Cut	Chop & Cut	Sawn	Total Butchery	Gnawed	Burnt	Total NISP	% Butchered	% Gnawed	% Burnt
434	2	4	0	0	6	6	2	45	13	13	4
435	1	0	0	0	1	0	0	11	9	0	0
436	1	1	0	0	2	1	0	12	17	8	0
445	1	7	0	0	8	11	3	92	9	12	3
446	1	2	0	0	3	3	1	36	8	8	3
448	3	0	0	0	3	5	0	36	8	14	0
449	7	5	0	0	12	18	15	93	13	19	16
450	12	19	0	0	31	39	7	272	11	14	3
452	0	0	0	0	0	0	0	3	0	0	0
454	4	4	0	0	8	7	0	76	11	9	0
455	1	0	0	0	1	2	1	14	7	14	7
456	3	14	0	0	17	12	22	169	10	7	13
463	1	1	0	0	2	3	2	31	6	10	6
464	1	1	0	0	2	0	0	18	11	0	0
468	2	2	0	0	4	0	1	29	14	0	3
472	1	14	0	0	15	6	2	146	10	4	1
473	1	3	0	0	4	1	0	21	19	5	0
483	0	3	0	0	3	0	0	16	19	0	0
485	11	12	0	0	23	18	11	263	9	7	4
490	5	12	0	0	17	8	2	176	10	5	1
493	4	5	0	0	9	10	0	104	9	10	0
495	3	6	0	0	9	16	0	108	8	15	0
Total	65	115	0	0	180	166	69	1771	10	9	4

Table 39. The taphonomy of the mammal bone assemblage from CG

Taxon	Context	Elements
Cattle	450	left immature radius & ulna
Sheep/goat	493	right radius & ulna, radius has proximal cutmarks
Sheep/goat	450	right radius & ulna
Pig	456	right astragalus & calcaneum; astragalus cut
Red deer	435	left radius & ulna
Red deer	456	right radius & ulna
Red deer	463	right astragalus & calcaneum
Red deer	485	right astragalus & calcaneum
Red deer	485	right astragalus & calcaneum
Red deer	485	left navicular, cuneiform & metatarsal
Red deer	485	left navicular, cuneiform & metatarsal
Red deer	485	right navicular & metatarsal
Red deer	485	right navicular, cuneiform & metatarsal
Red deer	485	right radius & ulna
Red deer	485	left radius & ulna, radius cut
Red deer	485	left radius & ulna, radius cut

Table 40. The articulated bone groups from CG

with almost every identifiable context producing some bones – the largest quantities were recovered from the lower midden layers 485, 490 and 493.

Sheep were the most numerous species in the midden (40% NISP). There was a smaller quantity of cattle (30%) and a much higher proportion of red deer (19%) than in the other Late Iron Age and Norse blocks. Although red deer occurred in most layers, 36% of the red deer in this block came from context 485, and about half of the material in this context was red deer. Pig made up 5% and otter 1% of the NISP assemblage. At least three otters were represented by the 20 elements present. The only other species identified were seal (two elements) and cat (one bone).

Sixty-one identifiable fish bones were found in the >10 mm material. Cod are the most numerous species followed by sturgeon (14 scutes, possibly from the same fish) although a relatively wide range of taxa were present with salmonid, saithe, hake, ling (*Molva molva*), wrasse and plaice (*Pleuronectes platessa*) all represented. The <10 mm material is dominated by saithe which comprises almost three-quarters of the assemblage, salmonids are fairly well represented (19%) whilst flatfish, herring and eel are present as trace taxa. The projected estimate of species abundance confirms the predominance of saithe and the abundance of salmonid (Table 37).

The majority of the bird bones were gull species (170) but there were also considerable quantities of Phalacrocoracidae (cormorant, 23 and shag, 45) and a significant number of great auk and Manx shearwater bones. Other species present were brent goose, other goose species (*cf. Anser* and a medium-sized goose), duck species (*cf.* eider, two *cf.* shelduck, two *cf.* mallard), peregrine falcon, fulmar, gannet, great northern diver, guillemot/razorbill, lapwing, curlew and other wader species (*cf.* curlew).

The taphonomy of the mammal bone assemblage from CG is documented in Table 39. This assemblage had a very low percentage of burnt bones (4%) which makes it very different to the other Late Iron Age blocks. The highest percentage of burnt bones came from the smaller contexts 449 and 456 (16% and 13%, although the former has a NISP of <100). The former was a distinctive orange deposit, which had clearly derived from a peat fire, and the latter also had a clearly identifiable ash component. At 9% the level of gnawing in this block is lower than that found in the infill layers (CC). For the larger samples, gnawed bone was concentrated in the wind-blown sand layers 450 and 495, with elevated levels also found in 449. Only 10% of the bones had butchery marks and this figure varied little in contexts producing more than 100 fragments.

In all these categories context 449 stands out as slightly unusual and it would seem to represent a different type of waste material to that normally deposited on these midden layers. It is much more similar to that deposited in the infill layers above the house (CC).

The large assemblages of block CG produced a more even distribution of elements than blocks CB and CC (Figure 81), indicating that more of the carcass was deposited in the midden layers than in the house floors (CB) or the infill layers (CC). The most abundant sheep bones were those from the head, the zygomatic and mandible, with scapula, radius, metacarpal and tibia, tarsals, metatarsals the next most abundant elements. Although few phalanges, sacrum or neck vertebrae were present, the entire carcass was represented.

Cattle were also mostly represented by cranial elements but, as with sheep, there is a more even distribution of post-cranial elements than in other blocks. All elements apart from the atlas and sacrum were present at over 25%. The most abundant groups of elements were the radius, ulna, metacarpal and the calcaneum, metatarsal, phalanx 1 and 2.

The predominant red deer elements were the pelvis, tibia and astragalus, all present at over 50%. Other elements present at over 25% were the mandible, scapula, radius, ulna and the calcaneum. The latter was no doubt associated with the predominance of the other hind limb elements. Cranial elements were present in small quantities, as were the metapodia, sacrum and phalanges.

Articulated bone was found in five contexts (435, 450, 456, 463, 485, 493) and was mostly derived from red deer (Table 40). There were 12 recorded red deer articulations, of which nearly half (five) were associations of the ulna/radius; the remainder were articulating navicular cuboids and metatarsals and astragalus/calcaneum. There were also radius/ulna articulations noted for cattle and sheep, with the only pig example a hock joint articulation (calcaneum and astragalus). The predominance of red deer articulations is of interest; sheep and cattle make up a greater proportion of the assemblage but it may be that, as is usual with food mammals, their carcasses were subject to greater processing and destruction, making it more difficult to identity associations. The prevalence of radius/ulna articulation is not unexpected as these bones are lightly fused during life; however, their predominance in this block and not others could be indicative of different disposal patterns.

The only fish taxa represented by both cranial and vertebral bones in the >10 mm material are cod and wrasse; sturgeon is represented solely by scutes, salmonid and ling by cranial bones, saithe and hake by vertebrae alone (archive). The <10 mm sample is more substantial and provides clear evidence for the presence of cranial and vertebral bones belonging to salmonid and saithe (archive). The probable reason for the survival of unusually large numbers of otoliths belonging to saithe was discussed above (page 34); the number involved imply that at least 30 saithe were originally present. For the trace taxa, apart from a single articular belonging to a flatfish, all of the fragments are vertebrae.

The 'percentage presence' (which takes into account the number of times each bone occurs in the skeleton) has been calculated for selected elements belonging to saithe recovered from the <10 mm material and is presented graphically in Figure 82. This indicates a fairly equal representation of certain cranial, appendicular and abdominal bones such as the maxilla, cleithra and abdominal vertebrae. In comparison, the opercular, dentary and caudal vertebrae appear over-represented. Evidence for burning is present on three unidentifiable fragments.

Conclusion – N Sharples

The excavation of the trench on the periphery of the mound has provided a dataset complementary to that recovered from the more contextually complicated Late Iron Age blocks (CB, CC). The radiocarbon dates and finds clearly indicate that the deposits excavated were broadly contemporary with the structure to the east and there seems to be no reason to doubt that this represents a peripheral area used for refuse disposal by the occupants of this structure.

The material deposited in this midden is different to that deposited in the contemporary structures. A larger and more representative assemblage of animal bones is present and this includes an important collection of fish bones. In contrast the assemblage of carbonised plant remains is poor. The size and quality of the artefact assemblage is also poor, with the exception of the die and the astragalus, both of which are worn from extensive handling.

Notes

1 The fractions indicate broken objects where conjoining pieces are found in contexts that are in different blocks.

2 One bag from context 485 (13) has sherds with Viking/Norse features including angle slab construction, rounded bases and basal angles, and crazed/roughened basal surfaces. In view of the consistency of the rest of the assemblage this must be a recording error.

3 Norse reoccupation

Introduction – N Sharples

The relatively limited area of excavation on mound 1 makes it impossible to make a definitive statement about the sequence of activity on this mound but, on the basis of the excavated area, it appears that mound 1 was abandoned at the end of the fifth or the beginning of the sixth century AD and reoccupied sometime in the ninth century AD (see chapter 5). During this period of abandonment the inhabitants of Bornais probably occupied mound 2 (Sharples 2003a).

The Norse activity on mound 1 can be separated into three blocks that aid description of the excavated area. Overlying the Late Iron Age house and its infill deposits (CB and CC) were a number of features and layers (CE) that indicate activity on the surface of the mound. To the north-east the Late Iron Age deposits were truncated by a pit containing a rectangular house (CD). This house was subdivided at some point during the Norse occupation and then filled with midden (CF).

The Norse activity was not the main focus of the mound 1 excavations and only a limited area was explored. Nevertheless the deposits excavated produced some interesting finds and these and the structure exposed contribute to our understanding of the Norse settlement at Bornais.

The Norse activity area (CE) – N Sharples

On top of the Late Iron Age deposits were a series of features and layers (Figure 83) that can be dated to the Norse period on the basis of their associated finds. The discrete features consist of two scoops (376, 378), two small pits (386, 389) and another suspected pit (451), two hearth pits (405, 411) and a large pit or hollow (355).

Scoop 376 was a shallow feature (Figure 83), approximately pear-shaped, 0.6 m by 2 m and 0.2 m deep. The initial fill was a thin layer of limpet shells in a charcoal-flecked sand (420) and above this the pit was filled with a brown sand (375/401). A similar feature may have been present in the north half of the trench though here it was only really identifiable in section. A charcoal-rich lens (324/378) was recorded within brown sand layer (371) and in the section (Figure 66) this appears to be the fill of a shallow scoop, at least 0.9 m across and 0.1 m deep.

Pit 386 was a circular pit (Figures 83, 84), 0.7 m in diameter and approximately 0.9 m deep, with steep sides and a relatively flat bottom. It was filled with pale brown sand (383) that contained a large stone, a whale bone 'bat' (1354; Figures 85, 89) and some pottery. Pit 389 was an oval pit (Figure 83) roughly 1.4 m long by 0.75 m wide and 0.4 m deep, though it was quite difficult to identify and was only recorded on one of the major sections (Figure 66). It was filled with a homogeneous brown sand (328/373) and a few stones. SUERC-8170 comes from oat grains in the fill (373) of pit 389. It has a radiocarbon age of 1155±40 BP which calibrates to a date of cal AD 770–980 (95% probability).

Another feature (451) probably indicates a pit that was not recognised during the excavation of these deposits. This layer was initially thought to be a remnant of floor belonging to the Late Iron Age house, as the layer was only observed at that level. However, the finds assemblage contained fish and slag concentrations that were very different to those of the other Late Iron Age deposits and two radiocarbon dates confirmed the suspicion that this feature does not belong to the earlier period of occupation. SUERC-7652 was obtained from barley grain in sample square 8313 and produced a radiocarbon age of 1145±35 BP which calibrates to a date of cal AD 770–990. SUERC-7653 was obtained from a grain of oat in sample square 8314 and produced a radiocarbon age of 1130±35 BP which also calibrates to a date of cal AD 770–990. It seems likely that this pit had a relatively indiscriminate yellow sand fill above the basal layer (451) which was impossible to distinguish from the surrounding yellow sand.

The hearth pits (405, 411) were similar in basic form; both were roughly rectangular structures partially defined by vertical slabs and filled with ash and slag-rich sand. Both were very badly disturbed by rabbits and this affects not only the stratigraphic integrity of the fills but the understanding of the form. Hearth 411 was 1.7 m by 0.7 m and oriented roughly north–south (Figures 83, 86). The ends of the pit were very unclear. A single upright stone defined the north end but there were no comparable stones at the south end. This area was defined by a pit filled with very loose sand and, though this was originally assumed to be rabbit disturbance, it may be a stone hole. A similar area of disturbance occurred at the west end of 405. The fill of 411 (Figure 84) was removed as a single context but in section three distinct layers were visible: a basal fill of dark brown charcoal-flecked sand (412c), covered in the centre of the hearth by a thick layer of pale grey sand

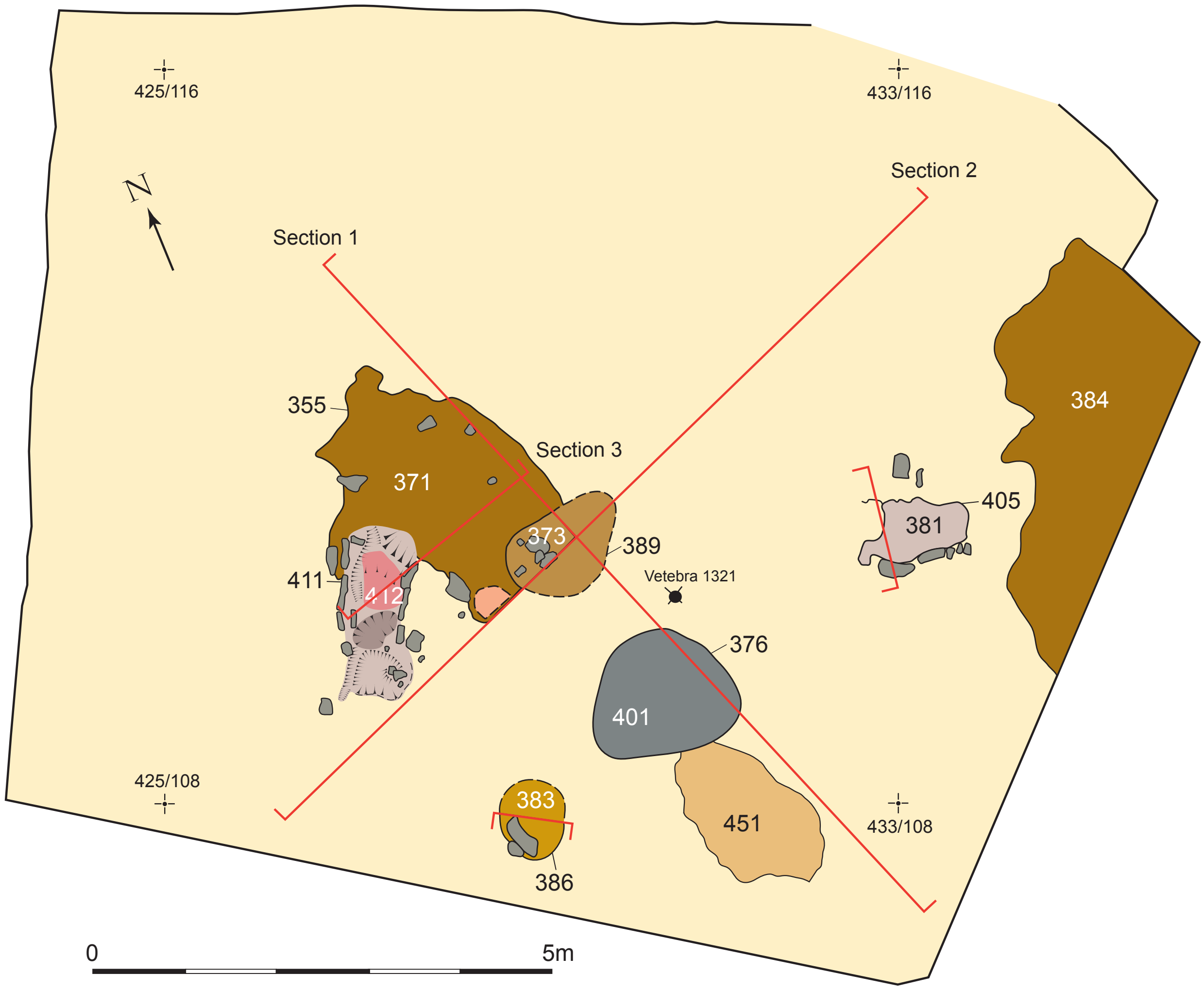


Figure 83. The features in the Norse activity area CE

(412b) over the top of which was a discontinuous layer of orange-grey sand (412a). It is also clear in this section that the vertical stones that defined the edge of the hearth were pushed into the underlying sand layer (417).

Hearth 405 survived as a feature 1.2 m by 0.9 m, oriented roughly east–west (Figure 83) but the west end appeared to be truncated and it is possible it was originally comparable in size to hearth 411. Edge-set stones were only present along the south side of this feature, though there were a couple of stones on the north side. The hearth was filled with an orange sand (381) though a basal fill of brown charcoal-rich sand similar to fill 412c in hearth 411 might have been present.

Pit 355 was the most substantial feature of this group. It was approximately 1.7 m in diameter and 0.4 m deep (Figures 66, 84). It had gently sloping sides and a relatively flat bottom. It was filled with several distinct layers. The lowest fill was a grey or pale brown sand (416); above this was a layer of bright orange sand (390). Both these layers were at their thickest along the lower part of the southern edge of the feature. A radiocarbon date (SUERC-7637) was obtained from an oat grain in layer 390. This has a radiocarbon age of 1130±35 BP which calibrates to a date of cal AD 800–990 (93.6% probability). The layers over this were all excavated as 379/326 but in section (Figure 84) it is possible to split this fill into three: a lower layer of dark brown sand overlain by an orange sand overlain by a black charcoal-rich sand. A red sand layer (403) in the south quadrant is possibly an extension of this pit.

The fills of both pit 355 and hearth 411 contained very large quantities of a distinctive lightweight slag (see below, Young 289). This slag included large pieces that suggest the material was not transported any great distance from its source. It seems likely that the hearths were responsible for the creation of the slag and that it was then dumped in the adjacent pit.

There was some stratigraphy to suggest a sequence for these features. The latest features were the two shallow scoops (376 and 378) and pit 389. These quite clearly cut through a dark brown sand (370, 371, 374, 382), which covered much of the trench and overlay the large hollow (355). A brown sand layer (384) in the north-east corner and similar layer (380) along the west side of the trench may be equivalent to 370, *etc*. The relationship between the

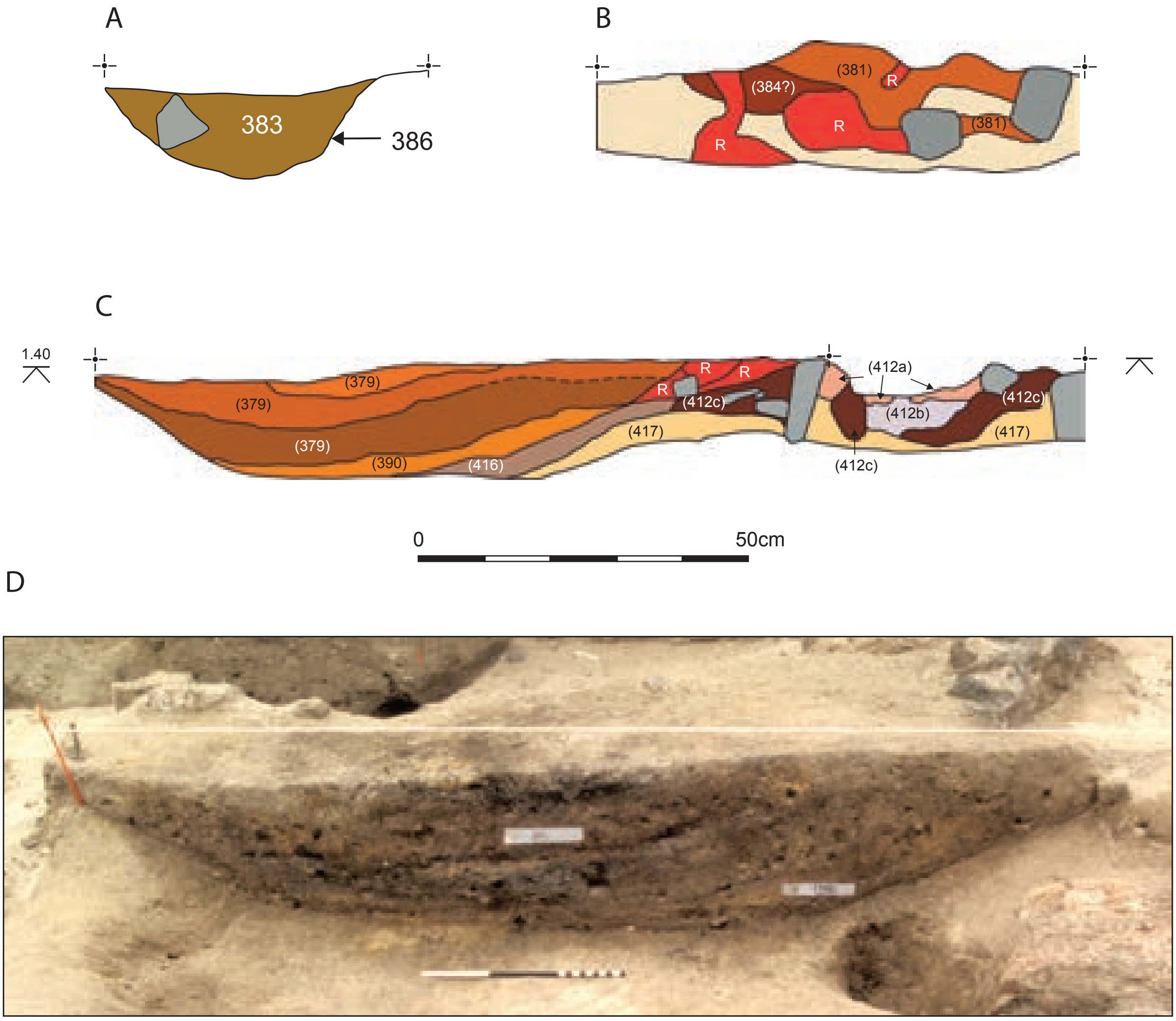


Figure 84. Sections through the features in the Norse activity area CE. A) pit 386, B) hearth 405, C) pit 355 and hearth 411 D) a view of the section through pit 355

Figure 85. Two views of pit 386 during excavation

Sample	Context	Litres	Mammal bone		Fish		Pottery		Slag		Limpet		Winkle		Other shells	Coprolite	B.O.M
			no.	density	no.	density	no.	density	no.	density	no.	density	no.	density			
5592	325	22	2	0.09	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0
5651	371	24	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0
5655	372	29.5	18	0.61	14	0.47	4	0.14	0	0.00	30	1.02	17	0.58	1	0	0
5653	373	3	2	0.67	0	0.00	0	0.00	0	0.00	2	0.67	0	0.00	0	0	0
5652	374	19	5	0.26	1	0.05	0	0.00	0	0.00	14	0.74	22	1.16	3	0	0
5658	378	10	0	0.00	0	0.00	0	0.00	0	0.00	3	0.30	4	0.40	0	0	0
5660	379	31	1	0.03	0	0.00	0	0.00	0	0.00	4	0.13	2	0.06	0	0	0
5659	380	27	9	0.33	1	0.04	8	0.30	0	0.00	10	0.37	7	0.26	0	0	0
5664	381	10	1	0.10	6	0.60	16	1.60	0	0.00	10	1.00	26	2.60	1	0	0
5661	382	13	1	0.08	1	0.08	3	0.23	0	0.00	7	0.54	6	0.46	0	0	0
5662	383	28	5	0.18	0	0.00	7	0.25	0	0.00	4	0.14	19	0.68	1	0	0
5663	384	22	0	0.00	0	0.00	1	0.05	0	0.00	5	0.23	8	0.36	0	0	0
5665	390	8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0
5670	400	18	22	1.22	2	0.11	3	0.17	0	0.00	5	0.28	6	0.33	2	0	0
5672	401	14.5	11	0.76	0	0.00	3	0.21	0	0.00	207	14.28	100	6.90	0	0	0
5673	403	22	2	0.09	0	0.00	0	0.00	0	0.00	4	0.18	4	0.18	3	0	0
5680	412	19	8	0.42	0	0.00	0	0.00	0	0.00	5	0.26	8	0.42	0	0	0
8307	451	1	0	0.00	0	0.00	0	0.00	5	5.00	0	0.00	0	0.00	0	0	0
8308	451	0.2	0	0.00	0	0.00	0	0.00	0	0.00	1	5.00	0	0.00	0	0	0
8309	451	3	0	0.00	0	0.00	0	0.00	3	1.00	0	0.00	2	0.67	0	0	0
8310	451	12	6	0.50	0	0.00	0	0.00	4	0.33	3	0.25	1	0.08	0	0	0
8311	451	6	3	0.50	3	0.50	0	0.00	19	3.17	3	0.50	3	0.50	0	0	0
8312	451	1	7	7.00	0	0.00	1	1.00	0	0.00	0	0.00	0	0.00	0	0	0
8313	451	10	11	1.10	1	0.10	1	0.10	22	2.20	1	0.10	0	0.00	0	0	0
8314	451	13	3	0.23	0	0.00	36	2.77	0	0.00	0	0.00	0	0.00	0	2	0
8315	451	3	1	0.33	0	0.00	1	0.33	26	8.67	1	0.33	0	0.00	0	0	0
8316	451	2	1	0.50	0	0.00	1	0.50	1	0.50	2	1.00	0	0.00	0	0	0
8317	451	7.5	4	0.53	3	0.40	1	0.13	11	1.47	0	0.00	1	0.13	0	0	0
8318	451	3	0	0.00	0	0.00	0	0.00	6	2.00	1	0.33	0	0.00	0	0	6
8322	451	0.2	0	0.00	0	0.00	0	0.00	1	5.00	0	0.00	0	0.00	0	0	0
30 samples		381.9	123	0.32	32	0.08	86	0.23	98	0.26	322	0.84	236	0.62	11	2	6

Table 41. The material identified in sorting the >10 mm residue from CE

large pit 355 and hearth pit 411 is slightly more complex. It seems that these features were roughly contemporary and that most of the fill of the pit went in after the creation of the hearth. The second hearth (405) is stratigraphically unrelated to these features but it closely resembles 411 and may be roughly contemporary. Pit 386 is unfortunately unrelated to the other features. All of these features cut through light brown sand (325, 372, 400, 417, 439), which accumulated over the Late Iron Age features.

Sampling data – N Sharples

Thirty samples, 382 litres of soil, were taken and processed from the CE contexts: 325, 371, 372, 373, 374, 378, 379, 380, 381, 382, 383, 384, 390, 400, 401, 403, 412 and 13 samples from 451 (Table 41). The below 10 mm residues from 372, 373, 374, 378, 379, 380, 381, 382, 383, 384, 390, 400, 401, 403, 412 and six samples from 451 were examined (Table 42). Several other samples were taken and processed but, as a result of confusion over the sorting procedures, the sorting data is unquantifiable.

The material recovered from the above 10 mm sort (Table 41) was rather poor, with the highest densities belonging to the marine molluscs; 322 limpets and 236 winkles (average density 0.84 and 0.62 shells per litre) were recovered. The next most common find was bone (123 fragments, 0.32 frag/litre), then pottery (86 fragments, 0.23 frag/litre) and finally fish (32 fragments, 0.08 frag/litre). No charcoal was recovered in this sorting but slag was present in the samples from context 451 (98 fragments, 0.26 frag/litre). Isolated fragments of coprolite and B.O.M. were also present and a human tooth (see below, Carter 201) was recovered from 372 (2675).

The highest density of shellfish (both limpets, 14.28 frag/litre, and winkles, 6.90 frag/litre) came from a dark brown sand layer (401) that fills shallow scoop 376. This also produced an above average density of bone (0.76 frag/litre) but the highest densities of bone came from sample 8312 of context 451 (7.00 frag/litre) and the highest densities of pottery (2.77 frag/litre) also came from this context (sample 8314). The fill (381) of hearth 405 had the highest density of fish bones (0.60 frag/litre) and high densities of shellfish but a noticeably low density of bone (0.10 frag/litre).

The material recovered from the below 10 mm sort (Table 42) was dominated by microscopic slag which had an average density of 697 fragments per litre of soil. Burnt organic material was also very common (112 frag/litre). Both of these materials reflect the presence of the hearths but the highest concentrations were found not in the hearth but in the adjacent pits and scoops. The highest density of burnt organic material (6451 frag/litre) was from shallow scoop (378). The highest density of slag (5504 frag/litre) was from the fill (390) of pit 355, though sand layer 403 also had a high density (3529 frag/litre) as did 378 (3226 frag/litre). The hearth fills (381 and 412) actually had very low densities of slag.

Sample	Context	Litres	Fraction sorted		Unburnt bone		Burnt bone		Fish bone		Seed		Charcoal		B.O.M		Pot		Slag		Spirorbis	Coprolite	Eggshell	Crab	Shipworm
					no.	density	no.	density	no.	density	no.	density	no.	density	no.	density	no.	density	no.	density					
5655	372	29.5	0.063	1.86	160	86.09	0	0.00	38	20.45	1	0.54	50	26.90	0	0.00	6	3.23	600	322.84	0	0	1	1	0
5653	373	3	0.125	0.38	33	88.00	0	0.00	3	8.00	0	0.00	0	0.00	0	0.00		0.00	1100	2933.33	0	1	0	0	0
5652	374	19	0.063	1.20	79	66.00	0	0.00	7	5.85	0	0.00	18	15.04	0	0.00	1	0.84	600	501.25	0	0	2	0	0
5658	378	10	0.031	0.31	6	19.35	1	3.23	0	0.00	0	0.00	0	0.00	2000	6451.61		0.00	1000	3225.81	0	0	0	0	0
5660	379	31	0.031	0.96	4	4.16	1	1.04	3	3.12	0	0.00	17	17.69	119	123.83		0.00	2460	2559.83	0	3	0	0	0
5659	380	27	0.125	3.38	168	49.78	36	10.67	52	15.41	3	0.89	180	53.33	65	19.26	8	2.37	1774	525.63	0	0	6	0	0
5664	381	10	0.063	0.63	3	4.76	3	4.76	26	41.27	0	0.00	54	85.71	101	160.32	14	22.22	20	31.75	0	0	15	10	0
5661	382	13	0.063	0.82	52	63.49	13	15.87	13	15.87	7	8.55	47	57.39	36	43.96		0.00	753	919.41	0	6	1	0	0
5662	383	28	0.125	3.50	221	63.14	62	17.71	34	9.71	1	0.29	22	6.29	65	18.57	6	1.71	419	119.71	1	0	1	0	0
5663	384	22	0.125	2.75	187	68.00	44	16.00	62	22.55	16	5.82	155	56.36	92	33.45	2	0.73	645	234.55	0	5	0	0	0
5665	390	8	0.031	0.25	1	4.03	0	0.00	1	4.03	0	0.00	7	28.23	29	116.94		0.00	1365	5504.03	0	0	0	0	0
5670	400	18	0.063	1.13	72	63.49	20	17.64	0	0.00	0	0.00	6	5.29	31	27.34	2	1.76	16	14.11	0	2	1	0	0
5672	401	14.5	0.125	1.81	109	60.14	4	2.21	20	11.03	3	1.66	132	72.83		0.00	1	0.55	190	104.83	0	0	1	2	0
5673	403	22	0.031	0.68	15	21.99	0	0.00	0	0.00	0	0.00	12	17.60		0.00		0.00	2407	3529.33	0	0	0	0	0
5680	412	19	0.125	2.38	45	18.95	17	7.16	3	1.26	0	0.00	1	0.42	42	17.68	12	5.05	76	32.00	0	17	2	0	0
8307	451	1	0.5	0.50	12	24.00	4	8.00	6	12.00	0	0.00		0.00	38	76.00	3	6.00	917	1834.00	0	24	0	13	0
8309	451	3	0.125	0.38	19	50.67	29	77.33	4	10.67	2	5.33		0.00	57	152.00	3	8.00	497	1325.33	1	37	0	7	0
8311	451	6	0.125	0.75	39	52.00	3	4.00	0	0.00	0	0.00	45	60.00	33	44.00	0	0.00	956	1274.67	0	0	0	0	0
8314	451	13	0.063	0.82	21	25.64	22	26.86	5	6.11	4	4.88	47	57.39	32	39.07		0.00	1095	1337.00	0	0	1	0	1
8317	451	7.5	0.063	0.47	21	44.44	10	21.16	1	2.12	0	0.00	45	95.24	66	139.68	1	2.12	270	571.43	0	6	0	0	0
8322	451	0.2	1	0.20	4	20.00	0	0.00	1	5.00	0	0.00	6	30.00	13	65.00	0	0.00	364	1820.00	0	1	0	0	0
21 samples		304.7		25.14	1271	50.55	269	10.70	279	11.10	37	1.47	844	33.57	2819	112.12	59	2.35	17524	696.96	2	102	31	33	

Table 42. The material identified in sorting the <10 mm residue from CE

Figure 86. Two views of hearth 411 during excavation

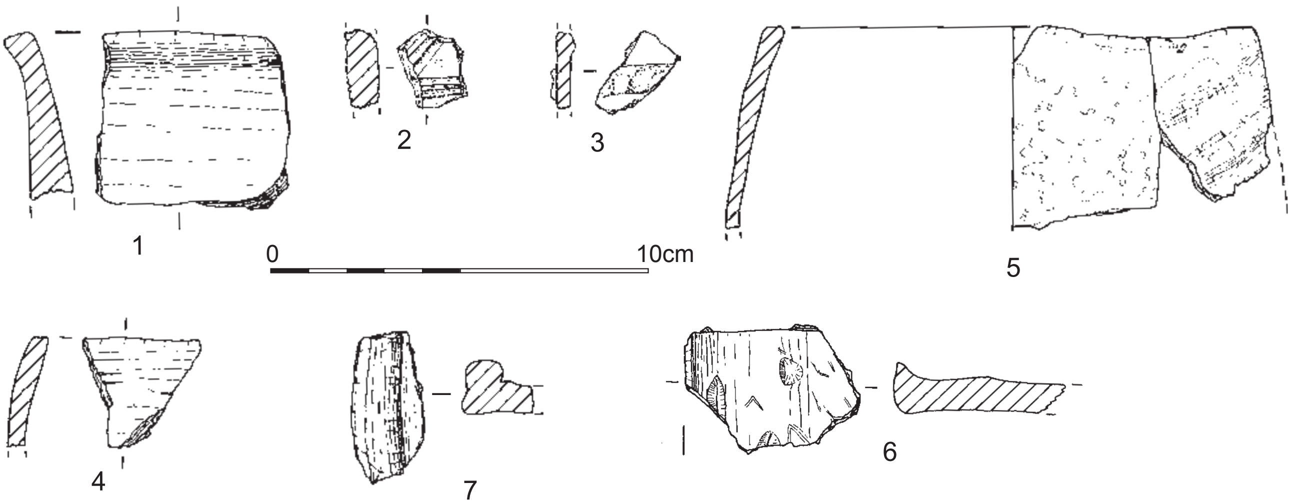


Figure 87. The pottery from the Norse activity area CE

In contrast to slag, charcoal densities from the below 10mm material were low, with one of the highest densities (86 frag/litre) from hearth fill 381, whereas hearth fill 412 had almost no charcoal (0.42 frag/litre). The hearth fill 381 also had the highest densities of pottery (22 frag/litre) and fish bones (41 frag/litre) and this reflects the patterns noted in the above 10 mm sample. The most common cultural material was unburnt bone (51 frag/litre) and this had quite a different distribution, with the densest concentrations occurring in sand layer 372 and pit fill 373 (86 and 88 frag/litre respectively). Coprolite, eggshell and crab were occasional discoveries and there was a concentration of coprolite in context 451.

Pottery – A Lane

There are 586 sherds weighing 3561g in the CE layers (Table 43). The average sherd size is 6.08g. This compares poorly with the CC layers, which have an average of 9.47g and is close to the mound 3 sherd average of 5.66g. This seems to indicate that the CE material has undergone some trampling and abrasion though it is possible that the thinner and more fragile Norse material may fragment more easily than the more robust Late Iron Age sherds in CC.

The assemblage as a whole is clearly a mixture of Late Iron Age material and Norse material with a few diagnostic Middle Iron Age sherds. There are three decorated sherds that seem to be of Middle Iron Age date. Two tiny sherds

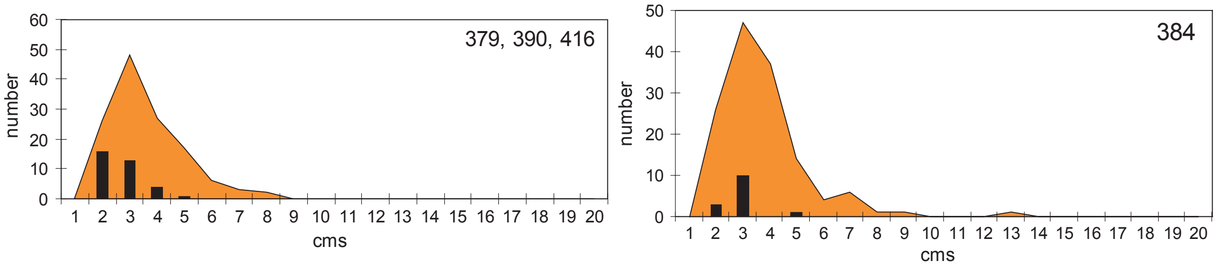


Figure 88. The size distributions of the pottery (column) and bone (area) from selected CE contexts

CE	weight	sherds	rim	base	body	misc	cordon	dec	Other feature	ave wght
325	478	44	2	1	13	28	0	0		10.86
326	79.5	6	0	0	3	3	0	0		13.25
328	25	3	0	0	1	2	0	0		8.33
371	15.9	6	0	0	0	6	0	0		2.65
372	568.7	137	7	9	17	90	1	1	13 platter	4.15
374	512	81	2	2	20	48	2	0	9 platter	6.32
375	55.3	7	0	1	1	5	0	0		7.90
379	94.2	21	1	0	5	15	0	1		4.49
381	345.7	74	0	0	4	22	?1	0	48 platter	4.67
382	173.4	28	0	0	7	19	1	0	1 platter	6.19
382B	5.2	2	0	0	0	2	0	0		2.60
383	107	23	0	0	7	16	0	0		4.65
384	55.9	14	0	1	1	12	0	0		3.99
386	19	2	0	0	2	0	0	0		9.50
390	7.6	2	0	0	0	2	0	0		3.80
400	719.8	91	7	0	31	53	0	0		7.91
401	7.5	3	0	0	0	3	0	0		2.50
403	92.4	20	1	1	6	12	0	0		4.62
411	5.8	1	0	0	0	1	0	0		5.80
412	101.8	8	0	0	3	5	0	0		12.73
416	3.4	2	0	0	0	2	0	0		1.70
420	24.7	2	1	0	1	0	0	0	roundel	12.35
422	25.2	5	1	0	1	3	0	0		5.04
439	19.6	2	0	0	1	1	0	0		9.80
451	18.7	2	0	0	2	0	0	0		9.35
Total	3561.3	586	22	15	126	350	4	2	71	6.08

Table 43. Pottery from CE

in 372 are from an incised decorated vessel (Figure 87, 2) and a fingerprint cordon (Figure 87, 3) respectively. A tiny sherd in 379 has three incised parallel lines. These are all likely to predate both the CA deposit and the CB house and their small size suggests that they have been redeposited.

There are no well-preserved sherds of Late Iron Age I double cordoned pottery. Two sherds in 374 have vestigial traces of abraded cordons and 381 probably has the same. However, many of the tongue and groove sherds and flaring necks could be Late Iron Age I or later in date, and indicative of the Plain ware phase. Many of the contexts with diagnostic material have sherds of this type, including 325, 372, 382, 386, 400, 403, 412 and 420.

Diagnostically Norse material, including platter, occurs in 372, 374, 375, 381, 382 and 383 (Figure 87, 4–7). Some of this may be quite late in sequence, in particular the fabric E sherds which are of a thin glossy appearance which may be a late indicator. No Norse everted rims were recognised which may merely be a sign of how fragmented the assemblage is or could imply a date before these rims appear in the thirteenth or fourteenth century.

Measurements – N Sharples

The animal bone and pot sherds were measured from two context groups (Figure 88), the sand layer 384 and the fill (379, 390, 416) of pit 355. In both contexts the animal bone was of average size though there were a few large fragments in 384. The pottery assemblage was relatively small in proportion to the bone assemblage and the assemblage from pit 355 was particularly poorly preserved.

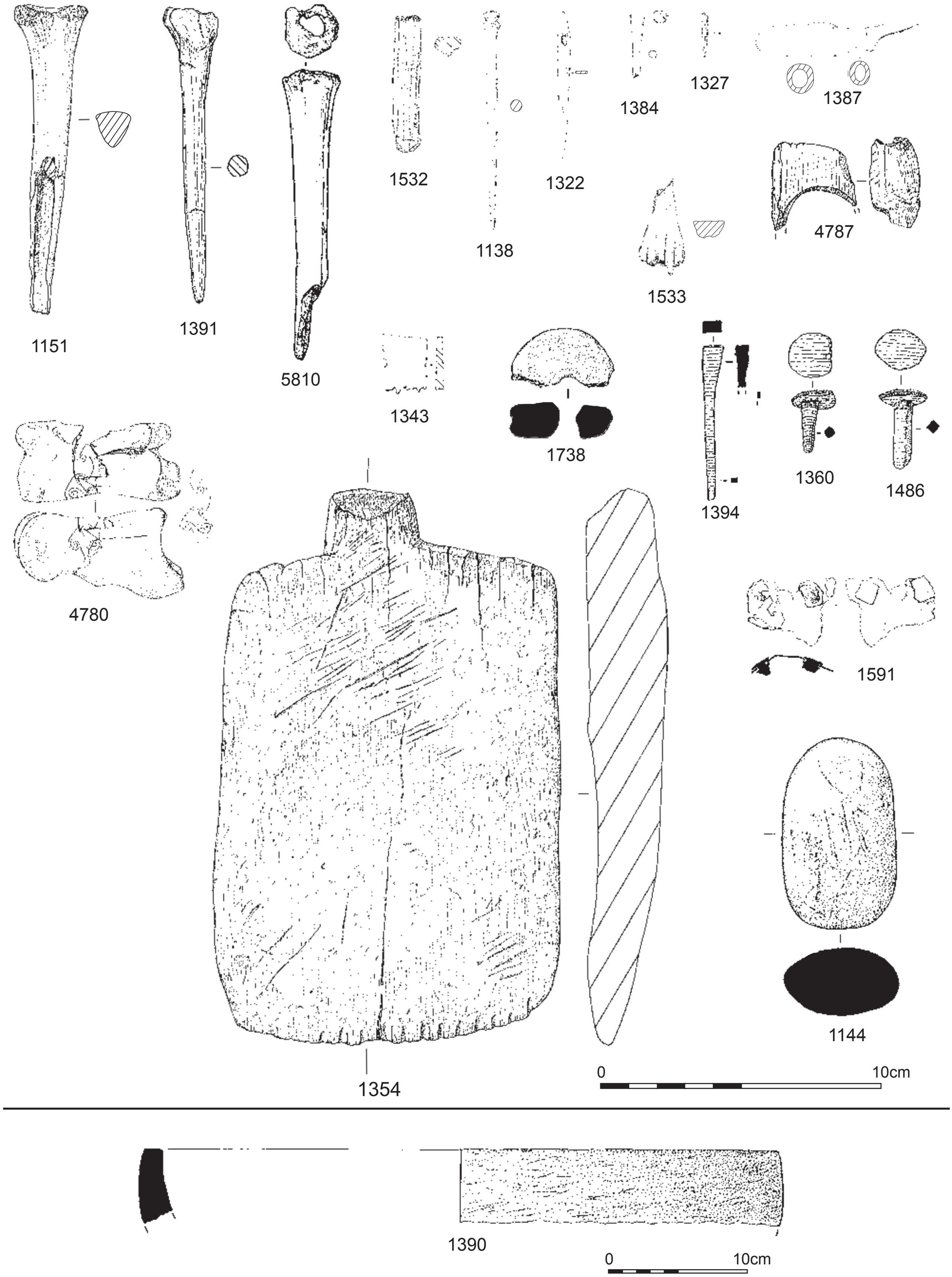


Figure 89. The artefacts from the Norse activity area CE and a steatite vessel sherd from CC

CE			325	372	373	374	375	379	382	383	384	400	401	403	405	420	total
working debris	waste	antler	1								2						3
	pin roughout	bone		1													1
	unused cobble	stone										1					1
		flint		1					1			1		1			4
tools	point	bone	2									1					3
	comb	bone		1			1										2
	needle	bone				1											1
	grooved	bone										1					1
	paddle	whale bone								1							1
	shovel	bone							1								1
	haft	antler							1								1
	strike-a-light	stone	1														1
	spindle whorl	ceramic		1													1
	smoother	stone				1											1
	pounder grinder	stone										1					1
	faceted cobble	stone										2					2
	anvil	stone													1		1
personal objects	comb	antler					2										2
	pin	bone/antler	1		1				1			2					5
	decorated phalanx	bone												1			1
gaming	disc	ceramic														1	1
structural fittings	nail	iron		1		1					1						3
	nail stems ?	iron				1					2						3
miscellaneous	bar	iron				1											1
	plate	iron						1									1
	strip	iron		1													1
	horseshoe nail	iron										1					1
	vertebra	whale bone				1											1
	pierced metapodial	bone	1														1
vessel	sheet fragment	cu alloy		1									1				2
	fragment	steatite		1					1								2
		total	6	8	1	6	3	1	5	1	5	10	1	2	1	1	51

Table 44. Artefacts from CE

Artefacts – A Clarke, P Macdonald, A Pannett and A Smith

A total of 51 artefacts were recovered from the contexts belonging to CE: 24 pieces of worked bone/antler, 10 iron objects, two copper alloy objects, seven pieces of worked stone, two ceramic objects, two steatite vessel fragments and four flints (Table 44). The decline in the quantity of stone tools and the increasing quantities of iron objects are clear indications that this is a Norse and not an Iron Age assemblage. The two fragments of weaving combs (Figure 89, 1327, 1533) are probably residual and it is possible that other finds such as the three cobble stone tools (*e.g.* Figure 89, 1144) could be derived from the earlier deposits, as they are rarely found in Norse contexts. The presence of a horseshoe nail (Figure 89, 1394) may also indicate modern contamination by rabbits.

This is a fairly eclectic assemblage; tools are the most common artefacts but there is a small but important collection of personal objects, some structural fittings and miscellaneous objects. It may be significant that there is very little waste. The tools include some simple points (Figure 89, 1151, 1391), a sheep tibia heavily grooved across the middle (Figure 89, 1387) which may be a thong stretcher and several bone objects of indeterminate function (*e.g.* Figure 89, 4787). Several objects are associated with textile working: the two comb fragments mentioned above, a needle (Figure 89, 1322), a clay spindle whorl (Figure 89, 1738) and a large whale bone 'bat' (Figure 89, 1354). The 'bat' is a particularly substantial object and the most plausible explanation of its function is that it is a flax scutcher (see below, 277). It is very unlikely that an object of this size was accidentally lost and it seems more likely that it was deliberately placed in pit 386.

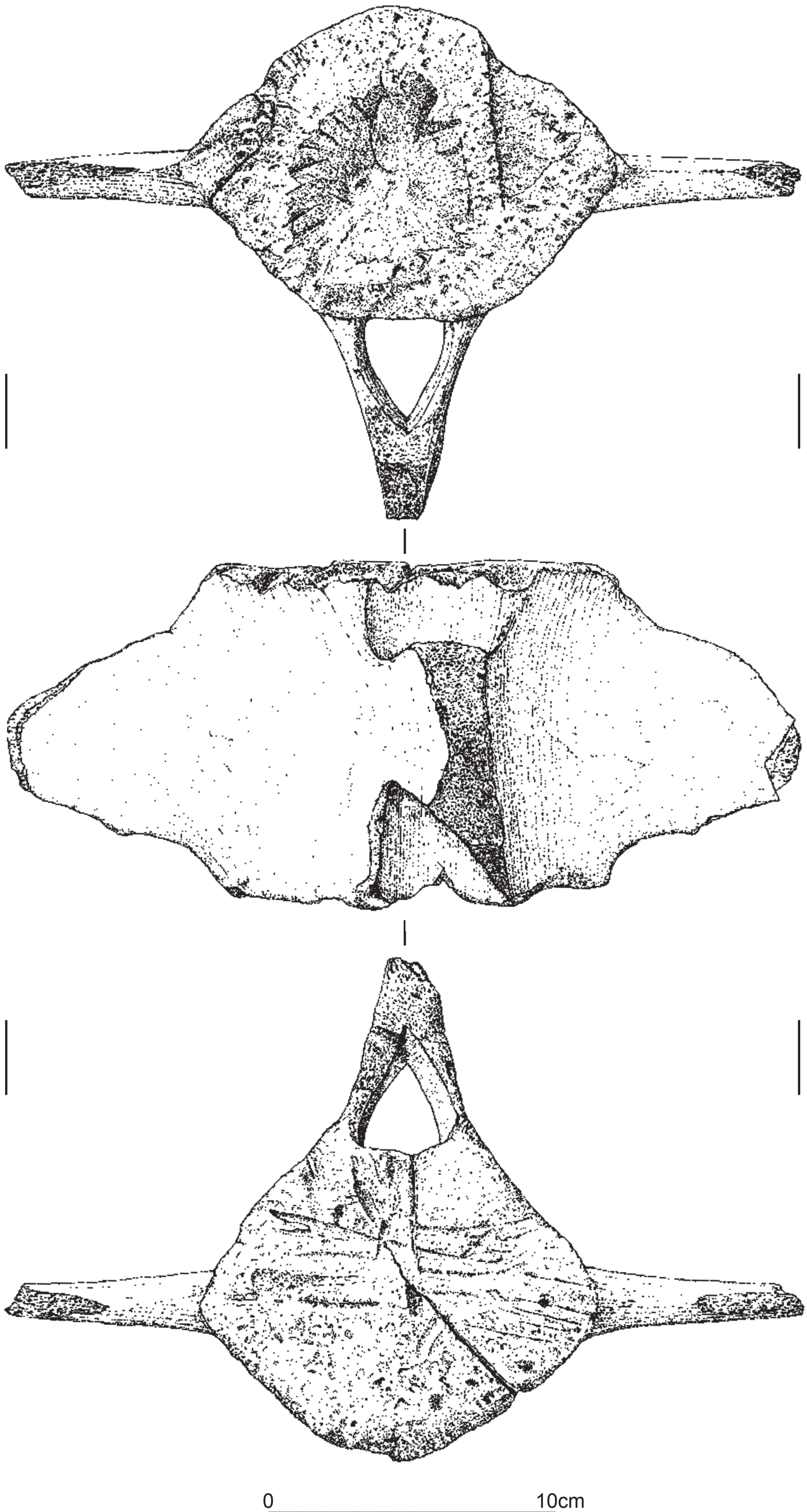


Figure 90. A worked whale bone vertebra (1321)

	1155+/-40	1130+/-35							1145+/-35, 1130+/-35			
Sample no:	**5653**	**5665**	**5672**	**5673**	**5680**	**8307**	**8309**	**8311**	**8314**	**8317**	**8322**	total
Context no:	373	390	401	403	412	451	451	451	451	451	451	
	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	
flot volume (cm^3)	7.0	2.0	7.0	11.0	2.5	1.5	1.0	2.0	6.0	3.0	<1	43
'charcoal' volume (cm^3)	7.0	2.0	7.0	11.0	2.5	1.5	1.0	2.0	3.0	3.0	<1	40
fraction sorted	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
volume floated (l)	3.00	8.00	14.50	22.00	19.00	1.00	3.00	6.00	13.00	7.50	0.20	97.2
'charcoal' density (cm^3/l)	**2.33**	**0.25**	**0.48**	**0.50**	**0.13**	**1.50**	**0.33**	**0.33**	**0.23**	**0.40**	**neg**	0.41
Cereals												
Hordeum sativum - grains	19	8	9	4	2		12	14	58	18		144
Hordeum sativum - indet frags	5	2	5	4			1	9	55	5		86
Hordeum sativum - rachis frags												0
Hordeum sativum - (*cf.*) naked grains												0
cf. *Triticum* sp. - grains												0
Avena sp. - grains	16	20	9		4	2	4	25	68	12		160
Avena sp. - indet frags	8	2	3	5			4	6	27	10		65
cf. Secale cereale - grains		1		1								2
Cereal grain frags	24	11	6	89			12	10	73	24		249
Cereal culm frags												0
Other Crops												
Linum usitatissimum										1		1
cf. Linum usitatissimum												0
Weeds/Wild species												
cf. Cerastium sp.												0
cf. Chenopodium sp.												0
Brassica/Sinapis spp												0
Carex sp. type 1				2			1		3			6
Carex sp. type 2				2								2
Scirpus spp												0
Cyperaceae indet.				1								1
cf. Fumaria sp.				2								2
Bromus sp.												0
Paniceae type - grains			1									1
Gramineae - indet grains												0
Prunella vulgaris												0
Labiatae (*cf. Ballota* sp.)												0
small legumes												0
Liliaceae (*cf. Iris* sp.)												0
Rumex/Polygonum sp. - sharp angles, smooth testa												0
Rumex/Polygonum sp. - rounded angles, textured testa		1										1
Rumex/Polygonum spp - kernels												0
Polygonum sp. - flat type												0
Plantago sp.												0
Ranunculus sp.												0
Potentilla sp.												0
Galium sp.												0
Umbelliferae												0
Urtica cf. dioica												0
Urtica cf. urens												0
Viola sp.												0
Parenchymatous tissues									x	x		
Amorphous vesicular frags						x		x				
Indeterminate/Unidentified plant taxa	1			4								
Insects/maggots?												

Table 45. The charred plant remains from CE

The anvil stone (1388, from context 405) is also worth noting as it is one of a pair; the other (1439) is recorded as belonging to CC context 404 but that is misleading as it was visible in association with the Norse features and was probably simply embedded into the early deposits from above. These stones were closely associated with the two rectangular hearths and it seems likely they had a functional relationship. If the hearths were for cooking, then the anvil stones could have been used for breaking open bones to extract marrow. When it was originally thought the slag associated with these hearths was from metalworking, then it was assumed that these were metal-working anvils but this is now thought to be unlikely. The absence of an obvious explanation for the hearths and the large quantities of slag leave the function of the anvils open to speculation.

Two steatite vessel fragments (1593, 1367 not illustrated) were recovered from the brown sand layers that covered this trench (372 and 382). These can probably be related to the two sherds of steatite (Figure 89, 1390 and 1537 not illustrated) that were found in the peripheral sand layer (404) in CC (see above) and constitute a notable collection of fragments. The evidence from mound 2 suggests that steatite vessels are a feature of the early phases of the Viking occupation of South Uist and their occurrence on mound 1 may indicate an early date for the occupation of this mound.

The personal items consist of the tooth plate of a single-sided comb (Figure 89, 1343), two complete pins (Figure 89, 1138; 1319 not illustrated) and three pin fragments (*e.g.* Figure 89, 1384). The complete pin had a finely worked thistle-shaped head (Figure 89, 1138). Also classified as a personal item is an elaborately decorated cattle phalanx (Figure 89, 4780) from a red sand layer (403). This is an important piece of insular artwork which is almost certainly pre-Viking in date. Unfortunately it is impossible to date precisely. It could be fifth to sixth century in date and derive from disturbance of the Late Iron Age infill layers (CC) but it could also be a later seventh- to eighth-century piece. The pottery disc (8521) may derive from earlier deposits.

There is a small collection of structural fittings (Figure 89, 1360, 1486) and miscellaneous fragments of iron. A worked whale bone vertebra (Figure 90, 1321) has been classed as a structural fitting as it has hollow crudely carved into one surface but the surface is still rough and the cut marks clear so this object does not appear to have been used.

The finds were fairly widely distributed; the largest concentration of objects (21) was in the lower sand layer 325/372/400. The only feature to produce more than an isolated object was scoop 376 whose fill (375/401) contained fragments from three combs and a piece of copper alloy sheet.

Carbonised plant remains – S Colledge, R Gale and H Smith

The carbonised remains were examined in 11 of the samples taken from the Norse activity area (CE, Table 45). All but one of the samples produced some carbonised remains and the exception was a very small sample. All of the remaining samples produced evidence for oats and/or barley and the barley grains had an overall density of 1.48 grains per litre. The largest quantities of both barley and oats were recovered from 8314, a sample in the centre of layer 451 which is believed to be the base of an unrecognised pit. An isolated occurrence of flax seeds was also found in sample 8317 from 451. Wild/weed seeds were generally rare in these deposits, with only sample 5673 producing more than one species. This sample came from red sand (403) which may be a fill of the large pit 355.

Charcoal was obtained from sandy layers (382) and (372) and pit fill 379 (Table 46). Charcoal was also collected from the hearths but it was not analysed because the hearth features had been badly damaged by rabbits and this is likely to have caused considerable contamination. The charcoal from 382 consisted of roundwood from birch (diameter 35 mm) and hazel (radial measurements of 8 mm, 5–7 growth rings), none of which appeared to have grown in stressed conditions. The taxa from 372 included spruce/larch, birch, heather and, probably, juniper. Spruce/larch and birch were also present in 379. All of the material could be interpreted as fuel debris from Norse hearths.

Animal bone – J Cartledge, C Ingrem, J Mulville and A Powell

The occupation deposits associated with block CE produced a small assemblage of mammal bone (436 identified bones; Table 47), an even smaller fish bone assemblage

Sample	Context	*Betula*	*Corylus*	Ericaceae	*Juniperus*	*Picea/ Larix*
HP	372	3	-	1r	*cf* 2	6
HP	379	1	-	-	-	2
HP	382	1	3r	-	-	-

Key. HP = hand-picked sample; r = roundwood (diameter <20 mm)

The number of fragments identified is indicated

Table 46. Charcoal from Norse activity area CE

Context	Sheep	Sheep/Goat	Cattle	Pig	Horse	Dog	Cat	Red deer	Otter	Seal	Blue whale	Cetacea	Carnivore	Cattle-sized	Cattle/red deer	Sheep-sized	Total	%
325	36	2	30	2				4			1		1		2	3	81	19
326			2					1									3	1
328	1		5														6	1
371		2	1	1												2	6	1
372	10	38	40	8	1	1		8		1		1		2		1	111	25
373		2															2	0
374		24	26	1				3	1			1				1	57	13
375		5	2											1			8	2
379		3	4	1													8	2
380		1															1	0
381		1	1					1									3	1
382		16	11	1				3								1	32	7
382b		4	5	1				1									11	3
383		1															1	0
384		10	2				1	2									15	3
386		1	4		1			2									8	2
399		1	3	1				2						1			8	2
400		24	17					4								3	48	11
401		1							1								2	0
403		3	2														5	1
411		2														1	3	1
412		1	3		1			3				3		1			12	3
416		1	1														2	0
420																1	1	0
451			1											1			2	0
Total	47	143	160	16	3	1	1	34	2	1	1	5	1	6	2	13	436	

Table 47. Animal bone from CE

	451	Total
Large gadid	6	6
Total	6	6

	383	326	372	374	379	384	401	451	Total
Clupea harengus	2	1	3	2	1	6	1	5	21
Anguilla anguilla				1					1
Pollachius pollachius						1			1
Pollachius virens				1				2	3
Merluccius merluccius									0
Gaidropsarus/Ciliata spp			1						1
Large gadid			1						1
Labrus bergylta						1			1
Total	2	1	5	4	1	8	1	7	29

Table 48. Fish from CE: a) Species representation in material >10 mm (NISP); b) Species representation in material <10 mm (NISP)

CE	325	372	374	382	412	439	total
Duck sp					1		1
Shag		2					2
Snipe				1			1
Wader sp		1					1
Gull spp	1	4	2		2	1	10
Guillemot/Razorbill		2					2
Total	1	9	2	1	3	1	17

Table 49. Bird bone from CE

Context	Chop	Cut	Chop & Cut	Sawn	Total Butchery	Gnawed	Burnt	Total NISP	% Butchered	% Gnawed	% Burnt
325	8	1	0	0	9	5	2	81	11	6	2
326	1	0	0	0	0	0	0	3	0	0	0
328	1	0	0	0	1	0	0	6	17	0	0
371	0	0	0	0	0	1	0	6	0	17	0
372	5	2	0	0	7	15	4	111	6	14	4
373	0	0	0	0	0	0	0	2	0	0	0
374	4	6	0	0	11	10	3	57	19	18	5
375	0	1	0	1	2	3	1	8	25	38	13
379	1	0	0	0	1	0	3	8	13	0	38
380	0	0	0	0	0	0	0	1	0	0	0
381	0	1	0	0	1	0	0	3	33	0	0
382	3	1	0	1	5	15	0	32	16	47	0
382b	0	0	0	0	0	1	1	11	0	9	9
383	0	0	0	0	0	0	1	1	0	0	100
384	3	2	0	0	5	1	3	15	33	7	20
386	0	0	0	0	0	3	0	8	0	38	0
399	1	0	0	1	2	1	0	8	25	13	0
400	4	1	0	0	5	11	2	48	10	23	4
401	0	0	0	0	0	0	0	2	0	0	0
403	0	0	0	0	0	1	2	5	0	20	40
411	0	0	0	0	0	0	0	3	0	0	0
412	1	0	0	0	1	1	2	12	8	8	17
416	0	0	0	0	0	0	0	2	0	0	0
420	0	0	0	0	0	0	0	1	0	0	0
451	0	0	0	0	0	1	0	2	0	50	0
Total	32	15	0	3	50	69	24	436	11	16	6

Table 50. The taphonomy of the animal bone from CE

(35 bones: six from the material greater than 10 mm and 29 from the material less than 10mm; Table 48) and only 17 bird bones (Table 49).

The largest proportion of the mammal bone assemblage came from the brown sand layers that probably represent a soil horizon separating Late Iron Age and Viking activity. The majority (25%) came from (372) and this layer also produced most of the bird bones. The other productive layers were 382, 374, 325 and 400. The fish bone assemblage was dispersed across eight contexts and the largest quantities were eight bones from sand layer 384. All of these layers may contain residual material from the earlier deposits as they are essentially soil horizons developing on top of the Late Iron Age infill layers. The pits generally produced very little material.

The principal domestic species was sheep which, with sheep/goat, make up 44% of the assemblage. Cattle account for 37% of the assemblage and red deer (8%) are more abundant than pigs (4%). Other species identified include horse (three fragments making up <1% of the assemblage), dog, cat, otter and seal and cetacean.

The most common species of fish in the <10 mm sample

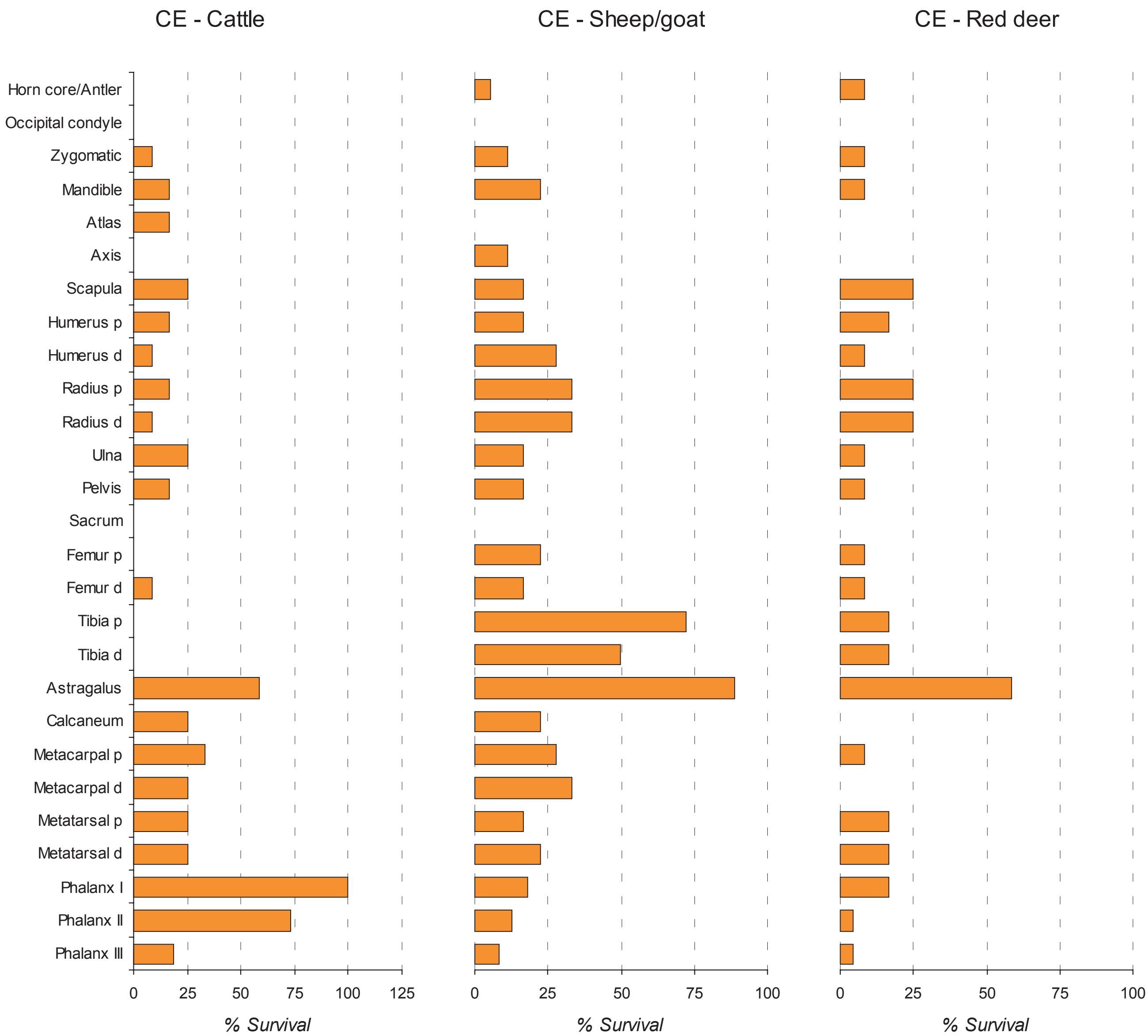


Figure 91. The relative abundance of the different body parts of cattle, sheep/goat and red deer from block CE

was herring although a wide range of taxa were represented, including eel, pollack, saithe, rockling and ballan wrasse (*Labrus bergylta*). The projected estimate of species abundance confirms the abundance of herring although to a lesser extent than is apparent in the Norse midden (CF). There were six large gadid specimens in the >10 mm material. The bird bone assemblage was dominated by 10 bones of gull species; the other species present were guillemot/razorbill, shag, waders, snipe and *cf.* duck.

Taphonomic information (Table 50) indicates that 16% of the animal bone showed evidence for gnawing and 6% of the bone was burnt. Both these figures are comparable with the Norse infill (CF) assemblage. The figure for the butchered bone, at 11%, is slightly elevated compared to all other blocks and this suggests (as for context 418 in the occupation deposits CC) that these occupation deposits were subject to more processing by humans. The evidence for gnawing suggests this material was accessible to dogs before being incorporated in these deposits.

The most common elements present (Figure 91) in the assemblage of sheep bone were tibia and astragali but distal humerus, radius and metacarpals were also present at over 25%. A range of other elements was present in lower proportions. The cattle assemblage was dominated by phalanges 1and 2, with astragali the only other prominent element present. There are few upper limb bones recorded with the exception of the scapula, but even this is only present at 25%. The red deer assemblage was dominated by astragali, with a range of other bones present in small quantities. Again bones of the head, limbs and toes are present, suggesting entire animals were brought to the site. A left red deer tibia and astragalus (context 325) and a cattle phalanx 1 and 2 (context 439) are the only articulated bones noted in this block.

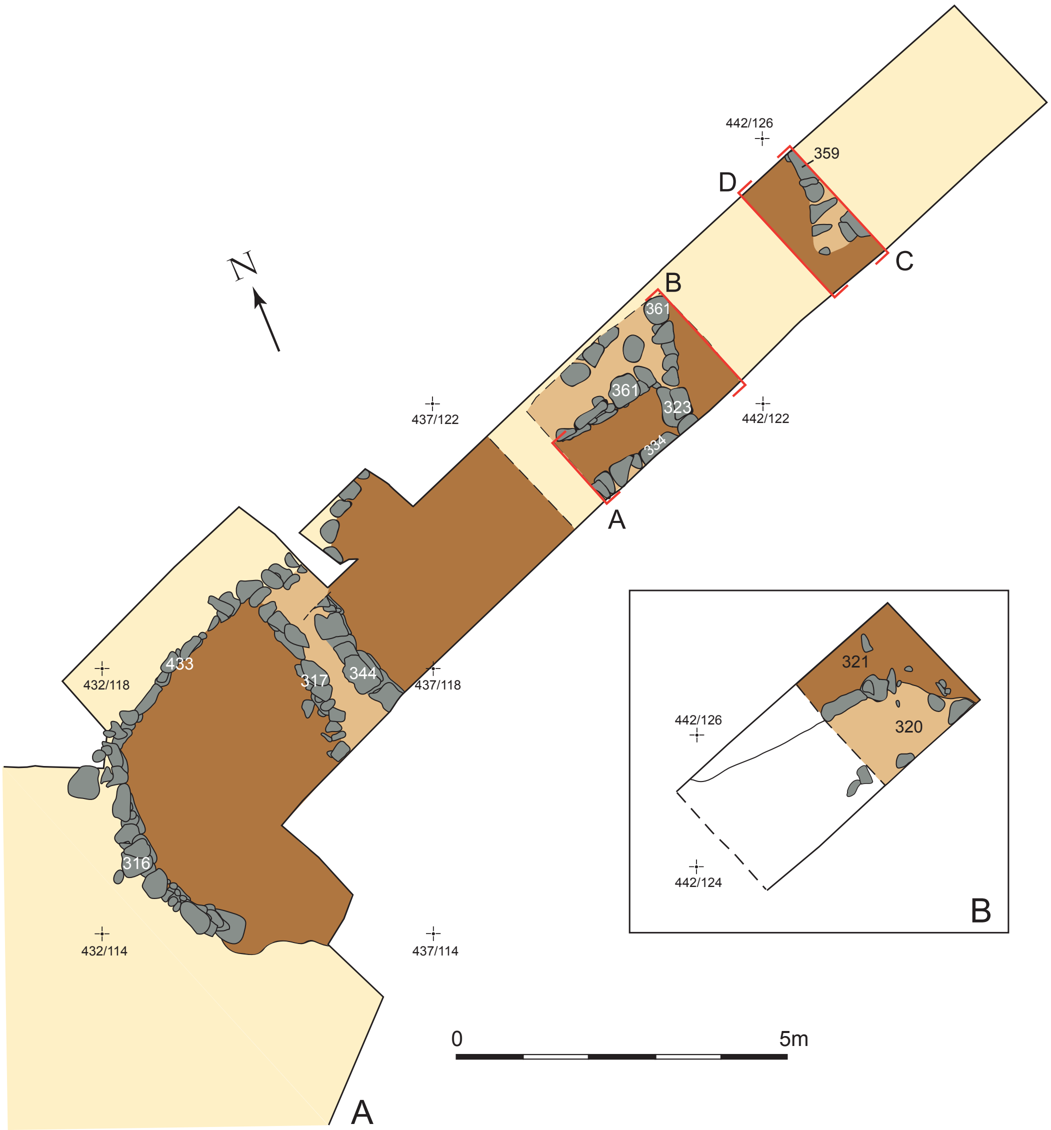


Figure 92. A The east trench showing the structural remains of the Norse house (CD) and the location of the sections in Figure 97. B An inset of the eastern end of the trench showing the surface remains of a late Norse structure

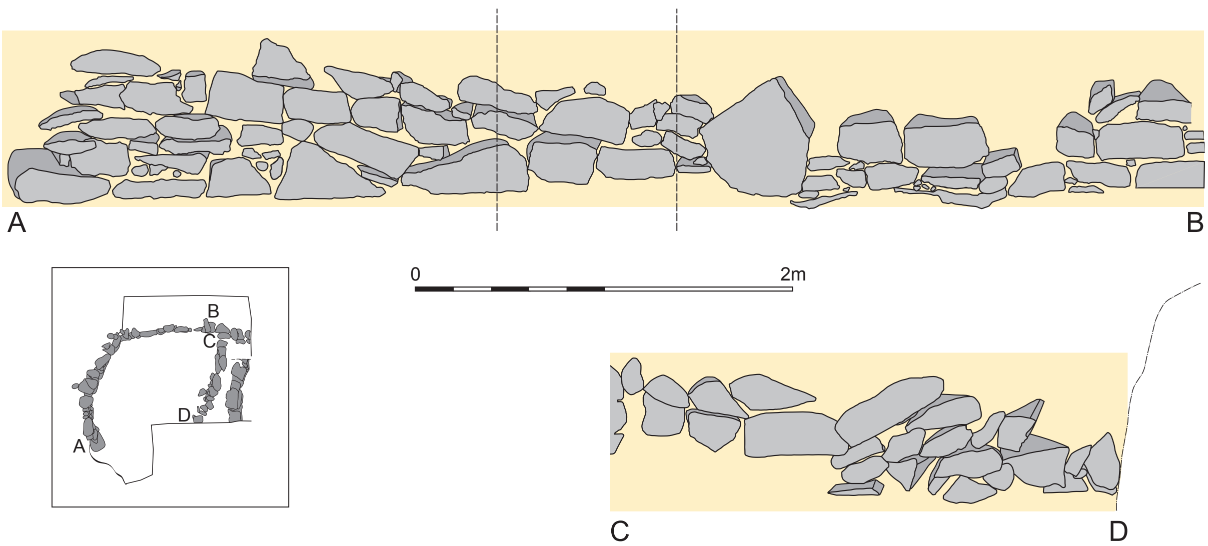


Figure 93. The elevations of walls 316 and 317

Fragmentation levels in the activity area are higher than those in the Late Iron Age midden CG, with only 8% of cattle and 10% of sheep more than 50% complete. The smaller pig and red deer samples indicate that pig and red deer are also more fragmented, although with one of the eight pig long bones more than 50% complete, pig is the least fragmented species. All twelve of the red deer long bones present are less than half complete.

As in the other blocks, most of the fish bones in the <10 mm material are vertebrae, apart from a herring opercular and a large gadid lower pharyngeal. In addition to cranial bones, herring is represented by both abdominal and caudal vertebrae (archive). In contrast the large gadid remains from the >10 mm material are all cranial bones. Of the identified remains, one large gadid bone in the >10 mm material and four herring bones in the <10 mm material display evidence for burning.

Conclusion – N Sharples

The archaeological contexts collected into block CE provide an enigmatic glimpse into what is potentially a very important phase of the history of the settlement. The radiocarbon dates suggest that this mound was occupied in the ninth or tenth centuries AD during the period of the Viking raids along the west coast of Scotland. The presence of steatite vessel fragments is a feature of the early Viking colonisation period (Forster 2004) and suggests a Viking presence on mound 1 rather than another shift in settlement by the indigenous inhabitants. This early Viking phase of occupation is not, however, reflected in any other items of material culture and the fragmentary pins and combs and the ceramic assemblage appear to indicate a generically Norse assemblage of the tenth to thirteenth century, contemporary with structures and middens described below (CD, CF). The quality of the archaeological record is also not sufficiently clear to interpret what was happening on this mound or to separate out the earlier and later phases of this activity. The excavation of this area was determined by the presence of severe surface erosion, which truncated many of the layers, and also intensive rabbit damage (best seen in Figure 66) which undermined the integrity of many of the contexts.

The most distinctive features present are the hearths. These rectangular features are not dissimilar to the hearths one expects to find inside a Norse building and though no structures were observed the level of destruction might have obscured their existence. The presence of large quantities of non-metallurgical slag implies high temperatures, however, and differentiates these hearths from the internal domestic hearths excavated on mound 3 (Young 2005) which did not produce large quantities of slag. This suggests the hearths in CE were open to the elements and that the wind might have had a direct influence on the quantities of slag present. If these are Viking features, then it could be suggested that the occupation was more in the nature of a temporary camp than a permanent settlement.

The Norse structure (CD) – N Sharples

The principal feature of the Norse occupation in the area excavated was a rectangular building (Figure 92). The geophysical survey discussed in chapter 1 suggests this house could be one of a group of houses laid out in a rectangular arrangement around the periphery of mound 1. The house discussed here lay on the north-east side of the rectangle and was oriented north-east to south-west which is unusual for the site. The house was constructed by digging a pit at least 0.8 m deep into the wind-blown sand (404, 302) that surrounded the Late Iron Age house (CB). The pit was then faced with a stone wall (316) that survived up to 0.8 m high. Only a limited area of the house was excavated and the full extent of the walls was not exposed. It is also clear that the house was substantially modified during the occupation.

The revetment wall of the primary building was exposed at the west end (316) and along the north side (433) from the west end (Figure 93). The south-west corner had been completely removed in the past, as had the adjacent stretch of the south wall. Despite this robbing the cut of the pit in which the wall was placed indicated that the house would have had an internal width of approximately 4.5 m. This west end of the house had a pronounced curve and could even be said to come to a point in the middle of the wall. The structure of this wall and the adjacent north wall is illustrated in Figure 93. The wall was best preserved next to the robbed area at the south-west corner, where about six courses were exposed. The stones used at this point are slabs but, further to the north, the stones used become much larger irregular blocks which give the wall a much more untidy appearance. The wall defining the north side of the house was exposed for *c*.5.8 m and appears to have been built of large blocks with small slabs in between. Many of the small slabs have subsequently been removed to leave a very irregular wall.

The east end of this structure was not exposed and it probably underlies a baulk in the 1996 trench, which we did not have time to remove. The surface contours of the overlying deposits certainly suggest the presence of a wall at this point. On the other side of the baulk, excavation of an area 2.8 m long revealed a passage defined by three walls (Figures 92, 94). Wall 323 faces east and cut across the trench at quite a sharp angle. It was not bottomed but two courses were visible and it stood up to 0.2 m high. A fragment of human bone was recovered from cleaning this layer (see below, Carter 201). An entrance through this wall is defined by two flat sill stones and running back from this are two walls (334, 361) of a passage 0.6 m in width. The north wall was backed by a red-brown sand (351) which is assumed to be part of the construction of the east wall of the original house. This passage appears to provide an entrance through the postulated wall that defines the east end of the house. Another 1 m-wide trench was dug 2 m to the east of this passage and this exposed the top course of a wall (359) running parallel to wall 323

(Figures 92, 95). This must be the other side of a room from which the entrance is accessed.

This house was subsequently subdivided by the construction of a wall across the centre of the main living space that clearly abutted the north wall. The wall was faced to the east and west but there was a noticeable difference in the quality of the construction. The west-facing wall (Figure 92, 93, 317) was very crudely built, comprising little more than a jumble of large cobbles which stood to a height of up to 0.6 m. Very little of the east-facing wall (344) was exposed but it appeared to be a much more carefully built construction using relatively small thin slabs. It seems likely that wall 317 represents the external support for wall 344 and that the builders were trying to create a smaller space in the east half of the original house. A dark brown charcoal-flecked sand (354) was beginning to emerge at the bottom of the fill layers and this might be the floor layer of this secondary structure.

Animal bone – J Cartledge, C Ingrem, J Mulville and A Powell

A small collection of animal bones was recovered from cleaning the house walls, comprising eight mammal bones, 21 identified fish bones and one bird bone (Table 51). The majority of the mammal bones were sheep with a single cattle bone. Most of the fish bones are herring but hake

Figure 94. A detailed view of the passage within the Norse house

Figure 95. A detailed view of wall 359 in a sondage at the east end of the trench

Context	Sheep	Sheep/Goat	Cattle	Pig	Sheep-sized	Total mammal	*Clupea harengus*	*Merluccius merluccius*	Large gadid	Total fish	Cormorant
316				1		1	2			2	
317	1	3	1			5	16	1	2	19	1
323					2	2					
total	1	3	1	1	2	8	18	1	2	21	1

Table 51. Animal bone from CD

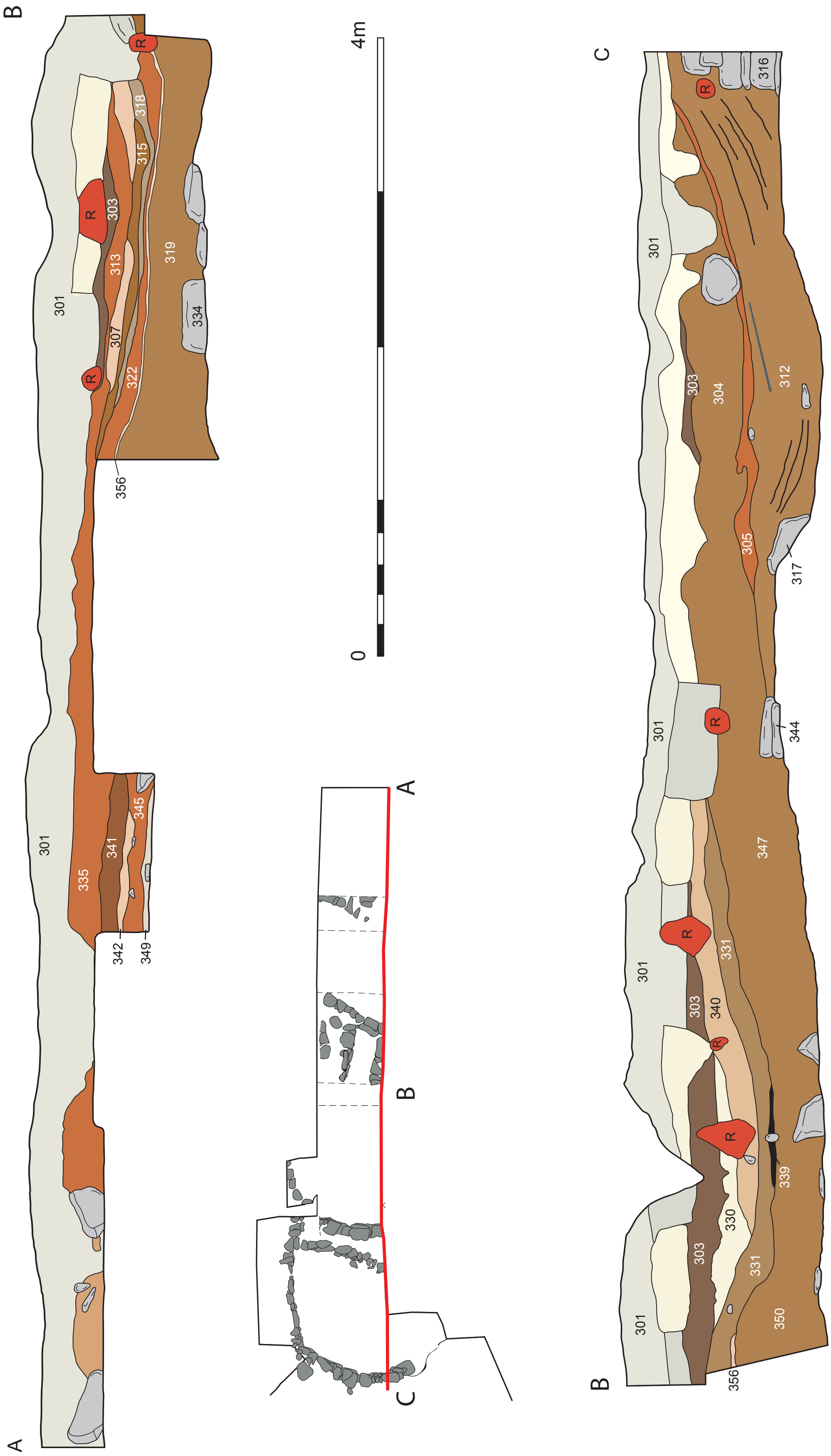


Figure 96. The north-facing section of the original 1996 trench showing the deposits infilling the Norse house

is also present. The bird bone was from a cormorant. All of the herring remains are vertebral elements with those from both abdominal and caudal regions represented. Hake is represented solely by an articular although single cranial and vertebral elements belonging to large gadid are also present (archive). One of the mammal bones had a cut mark and a single bone belonging to herring displays evidence of gnawing.

Conclusion – N Sharples

The walls exposed in the original test trench of 1996 appear to define a Norse house very similar to house 500 at Cille Pheadair (Parker Pearson *et al.* 2004b). The principal feature of that house was the presence of a large primary living space from which a subsidiary space was accessed through a passage in the end wall. The estimated dimensions, 10.4 m by 4.9 m for the main domestic space, are not dissimilar to the Bornais house and, if the Bornais house followed the Cille Pheadair plan in detail, then the principal entrance into the Bornais building should be through the south wall, immediately adjacent to the area excavated and where the wall has been completely robbed. No certain primary deposits have been examined from this house which makes the date of its construction unclear. The midden infilling the structure produced radiocarbon dates of the twelfth to thirteenth centuries and house 500 at Cille Pheadair dates to the early twelfth century AD (Parker Pearson *et al*. 2004b), suggesting a late eleventh – early twelfth century date is not unreasonable. The house may be contemporary with some of the features in the activity area (CE) but it seems more likely that these are chronologically different phases of activity.

The Norse middens (CF) – N Sharples

The trench opened in 1996 was aligned along the axis of the Norse house (CD, Figure 92). However, the structure was largely invisible at the surface and a considerable depth of deposits had to be removed before house walls were exposed. Exploration of the east half of the trench was limited and consisted of two small trenches dug into the midden layers that cover and infill this part of the house. A much larger area of the trench was dug down in the west half of the house and this was subsequently extended to try to clarify the underlying structure in 1997. The fill sequences in the east and west half of the house are quite different (Figure 96). The west half of the house is filled with relatively sterile thick sand layers, whereas the east half is filled with much richer midden layers.

The earliest layers exposed infill the original house to the west of the partition wall (317). This area appeared to be allowed to fill up with a brown sand (312) which sits on top of an unexcavated charcoal-rich layer (327/395) which may be a floor layer. The brown sand fill (312) was a thick layer which contained thin lenses dipping down from the walls on either side, suggesting a fairly gradual infilling of this area. A radiocarbon date (SUERC-7625) was obtained from a red deer astragalus and navicular cuboid in this layer. This has a radiocarbon age of 1435±35 BP which calibrates to a date of cal AD 560–660 (95% probability) and indicates the sample was redeposited from the Late Iron Age occupation layers that surround the house. Layer 312 was sealed by a distinctive orange clayey layer (305) rich in fish bones. The colour is presumed to indicate a large component of peat ash. This layer died out over wall 317/344 and probably indicates deliberate infill soon after the abandonment of the rebuilt structure. Two radiocarbon dates (SUERC-7635, from a cattle first phalanx; SUERC-17946, from a red deer phalanx) were obtained from layer 305. SUERC-7635 has a radiocarbon age of 840±35 BP which calibrates to a date of cal AD 1150–1270 (90.6% probability) and SUERC-17946 has a radiocarbon age of 930±35 BP which calibrates to a date of cal AD 1020–1190 (95% probability). These layers were sealed by another thick layer of brown sand (304) which is equivalent to a brown sand layer (347/350) that covers the area to the east of partition wall 344/317. A radiocarbon date (SUERC-7634) was obtained from a cattle lumbar vertebra in 304. This has a radiocarbon age of 810±35 BP which calibrates to a date of cal AD 1160–1280 (95% probability).

The fill of the area to the east of partition wall was largely removed by shovel and finds recovery and context definition was less thorough than on all the other areas excavated on mound 1. Excavation ceased when a possible floor layer (charcoal-rich sand, 354, and a patch of orange ash, 358) was identified. Lying on this floor was a substantial, largely soil-free, dump of winkles (348). This was concentrated in the northern part of the trench and is not visible in the drawn section (Figure 96). Above this, and covering the rest of the floor, was a thick layer of brown sand (347/350) which is equivalent to 304 to the south. Sitting on top of this thick infill layer was a discrete occupation deposit consisting of a small patch of orange clay (338) sitting on a charcoal-rich sand layer (339). These layers were at the same stratigraphic level as a thin lens of white sand at the east edge of this excavation trench which appears to be a continuation of a thin white sand lens (356) that was excavated in the adjacent trench. These charcoal and ash lenses indicate a hiatus in the gradual infilling of the structure represented by the brown sand, and indicate some form of human activity. These layers were then covered by a brown sand (331/343) pretty much indistinguishable from the underlying brown sand (347/350). A radiocarbon date (SUERC-17947) was obtained from a red deer metatarsal in 331. This has a radiocarbon age of 1510±35 BP which calibrates to a date of cal AD 430–640 (95% probability); this indicates that the sample was redeposited from the Late Iron Age occupation layers that surround the house. This brown sand (331/343) was sealed by a light brown sand (340), a white sand (330) and a dark brown sand (303). The latter deposits extended over the layers to the west (304).

The next trench to the east was only separated from the

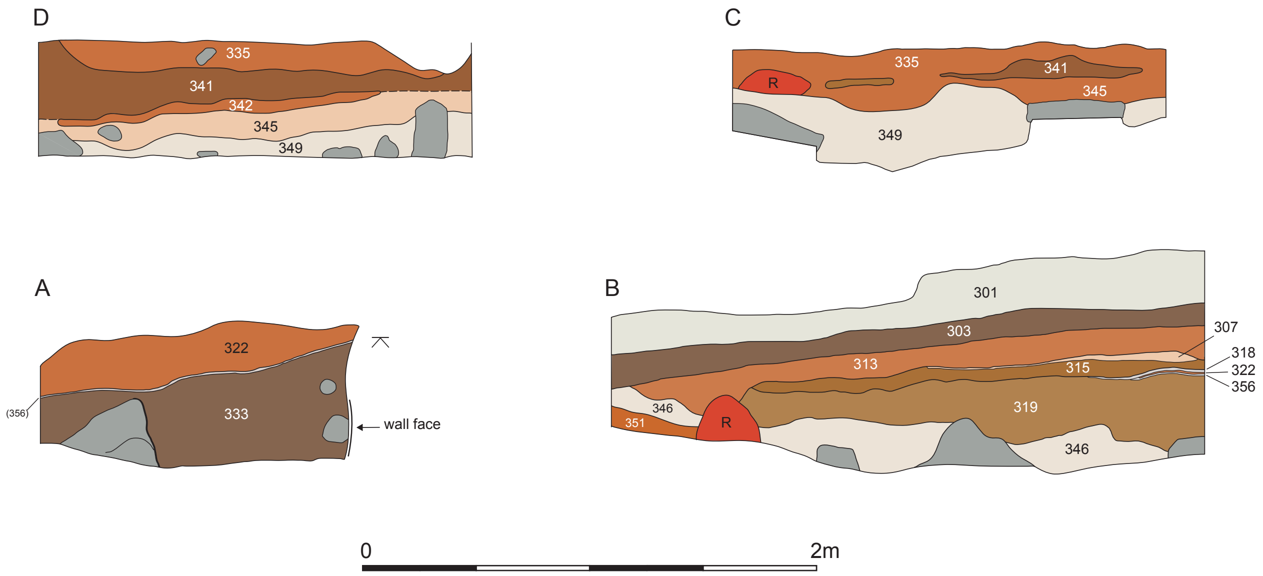


Figure 97. Various sections associated with the filling of the Norse house (see Figure 92 for the location of these sections)

previous trench by a baulk less than 0.5m wide but there was quite a significant difference between the deposits in the two areas. The layers associated with the structural remains of the passage (Figure 97) include several separate contexts that were exposed but not excavated. In front of the passage is a dark brown sand (353), over wall 361 is a light grey sand (346) and infilling the passage is dark brown sand (333) that overlay a dark brown charcoal-rich sand (352). The latter is presumed to be a floor layer, but it was clear that this layer was lying on voided rubble and it is therefore unlikely that this is a primary floor. These layers were all overlain by a compact, red-brown sand (319, Figures 96, 97), which is probably equivalent to the brown sand (350/347/304) infilling the structure to the west. Overlying the brown sand (319) was a thin layer of light grey sand (356), which also extended to the west. Above this is an orange clayey sand (322 = 345), light grey sand (318), a layer of shells (315) restricted to the north side of the trench, a light grey sand (307) and a red clayey sand (313). A large fragment of human skull and a fragment of long bone (see below, Carter 201) were found in context 322 and a radiocarbon date (SUERC-18229) was obtained from the human skull. This has a radiocarbon age of 1690±35 BP which calibrates to a date of cal AD 250–430 (95% probability). This pre-dates the Late Iron Age occupation in the adjacent areas of the site and it is not likely to indicate the erosion of adjacent deposits. Deliberate deposition of a rediscovered or curated object seems a more likely interpretation. This sequence of layers is quite different to the brown sand fills to the east as they are relatively finds-rich and more compact organic deposits. The sequence is more like the layers exposed in the final trench to the east.

The sequence in the eastern trench begins with a dark brown sand (360); above this is a thin layer of pale grey sand (349) which is possibly equivalent to the thin layer

Figure 98. A view of the east end of the 1996 trench showing a line of stones and stone holes which indicate a Late Norse structure.

of pale grey sand in the passage trench (356; Figure 97). A radiocarbon date (SUERC-17948) was obtained from a red deer metacarpal in 349. This has a radiocarbon age of 915±35 BP which calibrates to a date of cal AD 1020–1210 (95% probability). This grey sand was covered by an orange-brown clayey sand with charcoal flecks (345) which may be equivalent to the orange clay (322). There was then a sequence of grey sand with orange mottles (342), orange-brown sand with charcoal flecks (341), dark reddish-brown sand (335) and finally mottled grey-brown sand (336). The latter was equivalent to 313 in the passage trench. Both this sequence and the previous sequence were sealed by a dark brown sand (310) that lay immediately below the white wind-blown sand and turf (301)

It was originally intended to excavate another small area at the east end of the trench but, after a thorough surface cleaning, it became clear that there was some form of structural remains on the surface which would only be understood by examining a larger area. The principal feature visible in this area was a line running diagonally across the trench (Figure 98) defined by three to four stones, including a prominent upright, and a stone hole that separate a light brown sand (320) from a dark brown sand (321). These layers were both sealed by a dark brown shell-rich sand (310/311). These features could be the remains of a turf-built house similar to the fourteenth-century examples excavated on the surface of mounds 2A and 3. This potential house has been left undisturbed; the project's research strategy did not require (nor its resources permit) the excavation of a further house of this period at Bornais. The long-term survival of this structure and its associated deposits are, of course, threatened by continuing wind erosion and rabbit damage to the mound.

Sampling data – N Sharples

Seventeen samples, 353.5 litres of soil, were taken and processed from the CF contexts: 304, 305 (three samples), 312 (two samples), 318, 319, 322, 331, 333, 339, 341, 343, 345, 346 and 395 (Table 52). The below 10 mm residues were examined for 13 samples from 304, 305 (three samples), 312 (two samples), 318, 322, 331, 333, 335, 341 and 395 (Table 53).[1]

The material recovered from the above 10 mm sort was rather poor with the highest densities belonging to the marine molluscs; 410 limpets and 1102 winkles (average density 1.16 and 3.12 shells per litre) were recovered. The next most common find was bone (202 fragments, 0.57 frag/litre) but fish bones had a similar density (189 fragments, 0.53 frag/litre); pottery was much less common (81 fragments, 0.23 frag/litre) and slag was very rare (37 fragments, 0.10 frag/litre).

The highest densities of the different materials were spread throughout most of the layers and only one context had the highest density of more than one category of material. Fish were most common in 305 (4.91 frag/litre), bone in 341 (4.32 frag/litre), pottery in 345 (0.9 frag/litre), slag in 304 (0.46 frag/litre), limpets in 343 (2.95 shell/litre) and winkles in 341 (10.88 shell/litre).

Examination of the material recovered from the below 10 mm residues highlights an orange sand (322) in the trench above the passage as an important layer. It produced the highest densities of burnt bone (36 frag/litre), fish bone (294 frag/litre), burnt organic material (266 frag/litre) and slag (153 frag/litre) but very low densities of unburnt bone (5 frag/litre) and pottery (1 frag/litre). Fish bone densities were also high (90 frag/litre) in one of the 305 samples though the other two samples had average densities (29 and 38 frag/litre). The other high density of slag (141 frag/litre) was from 304 though this might indicate erosion from the deposits in CE. The highest density of bone (108 frag/litre) and charcoal (597 frag/litre) came from a discrete charcoal patch (395), which also had a high density of pottery (11 frag/litre). However, the highest density of pottery (20 frag/litre) came from orange-brown sand (341) at the east end of the house and again this had an above average density of bone (82 frag/litre).

It is interesting to note the consistent association of two groups of material. Group 1 consists of charcoal, bone and pot. Group 2 consists of slag, burnt organic material and fish bones. These groups might suggest a difference between domestic processing in the house (group 1) and specialist activities occurring outside (group 2).

Pottery – A Lane

A total of 2,031 sherds weighing 12021g was recovered from contexts associated with the infilling of the Norse house (CF, Table 54). The largest assemblage, 720 sherds, was recovered from a sand layer (312) infilling the west end of the house. There are also large assemblages from the overlying sand layers (304 and 305) which completely infilled this end of the house. There is an assemblage of 123 sherds from a midden layer (345) in the eastern trench into the house. This is a large assemblage from a relatively small excavation area; the overlying midden layers (341 and 335) also produced large numbers of sherds.

The material from the final layers at the east end of the trench (303/310/311) is mostly of Norse date with round-bottomed bowls, grassmarking and platter (*e.g.* Figure 99, 9–10). There is one abraded Iron Age cordon in 311 and a thin hard fabric E bowl in 310 which might be an indication of a later date in the Norse sequence. Though the average sherd weight in 310 is 2.5g there are some larger sherds as well. The material in the upper sand layers (331/340/343) is similar in character. Norse bowls and platter are present and there is one small cordoned sherd of Iron Age date (Figure 99, 18).

The main midden layers (335, 341, 345, 349) have Norse bowls, platter and grassmarked sherds but there is also a small group of Iron Age sherds in 322, and possibly in 349. Layer 322 has produced a high average sherd weight but only from a small number of sherds. The sherds from 345 also have a high average weight and include a

Sample	Context	Litres	Fish		All mammal bone		Pottery		Slag		Limpet		Winkle		Other shells	Charcoal	B.O.M
			no.	density	no.	density	no.	density	no.	density	no.	density	no.	density			
5580	304	24	0	0.00	1	0.04	2	0.08	11	0.46	2	0.08	19	0.79	0	0	0
5581	305	22	6	0.27	2	0.09	4	0.18	0	0.00	35	1.59	24	1.09	2	1	0
5654	305	5	1	0.20	3	0.60	0	0.00	0	0.00	2	0.40	0	0.00	0	0	0
5671	305	22	108	4.91	10	0.45	4	0.18	0	0.00	49	2.23	36	1.64	1	0	0
5585	312	26	0	0.00	2	0.08	2	0.08	3	0.12	1	0.04	16	0.62	0	0	0
5656	312	21	1	0.05	9	0.43	3	0.14	0	0.00	5	0.24	9	0.43	3	0	0
5586	318	26	8	0.31	5	0.19	2	0.08	6	0.23	18	0.69	30	1.15	0	0	0
5589	319	24	6	0.25	4	0.17	3	0.13	1	0.04	58	2.42	173	7.21	1	0	0
5588	322	24	25	1.04	3	0.13	0	0.00	4	0.17	4	0.17	14	0.58	0	0	0
5593	331	21	0	0.00	5	0.24	0	0.00	5	0.24	6	0.29	86	4.10	1	0	0
5595	333	24	5	0.21	13	0.54	10	0.42	1	0.04	33	1.38	216	9.00	8	0	0
5574	339	20	13	0.65	12	0.60	7	0.35	0	0.00	31	1.55	3	0.15	0	4	0
5599	341	25	4	0.16	108	4.32	15	0.60	2	0.08	46	1.84	272	10.88	4	7	0
5570	343	20	5	0.25	10	0.50	1	0.05	3	0.15	59	2.95	104	5.20	4	0	0
5575	345	21	3	0.14	4	0.19	19	0.90	0	0.00	51	2.43	52	2.48	3	0	5
5576	346	22	1	0.05	4	0.18	3	0.14	1	0.05	7	0.32	29	1.32	2	0	3
5669	395	6.5	3	0.46	7	1.08	6	0.92	0	0.00	3	0.46	19	2.92	1	0	0
17 samples		353.5	189	0.53	202	0.57	81	0.23	37	0.10	410	1.16	1102	3.12	30	12	8

Table 52. The material identified in sorting the >10 mm residue from CF

Sample	Context	Litres	Fraction sorted		Unburnt bone		Burnt bone		Fish bone		Seed		Charcoal		B.O.M		Pot		Slag		Coprolite		Eggshell		Crab	Spirorbis
					no.	density	no.	density	no.	density	no.	density	no.	density	no.	density	no.	density	no.	density	no.	density	no.	density		
5580	304	24	0.25	6.00	225	37.50	17	2.83	120	20.00	4	0.67	229	38.17	16	2.67	19	3.17	848	141.33	28	4.67	11	1.83		1
5581	305	22	0.125	2.75	30	10.91	42	15.27	105	38.18	20	7.27	103	37.45	180	65.45	12	4.36	112	40.73	80	29.09	92	33.45	112	4
5654	305	5	0.25	1.25	74	59.20	5	4.00	36	28.80			23	18.40			1	0.80	80	64.00	0	0.00	1	0.80		
5671	305	22	0.125	2.75	69	25.09	14	5.09	250	90.91			80	29.09	29	10.55			120	43.64	0	0.00	4	1.45	9	
5585	312	26	0.125	3.25	125	38.46	31	9.54	41	12.62	3	0.92	225	69.23	15	4.62	25	7.69	249	76.62	0	0.00	3	0.92	2	
5656	312	21	0.125	2.63	138	52.57	13	4.95	18	6.86			250	95.24			9	3.43	233	88.76	1	0.38	1	0.38		
5586	318	26	0.125	3.25	57	17.54	23	7.08	55	16.92	4	1.23		0.00	53	16.31	8	2.46	91	28.00	18	5.54	5	1.54		
5588	322	24	0.031	0.74	4	5.38	27	36.29	219	294.35			30	40.32	198	266.13	1	1.34	114	153.23	10	13.44	0	0.00		
5593	331	21	0.125	2.63	61	23.24	11	4.19	48	18.29			15	5.71	22	8.38	9	3.43	67	25.52	0	0.00	4	1.52		1
5595	333	24	0.063	1.51	134	88.62	11	7.28	93	61.51			183	121.03	7	4.63	13	8.60	74	48.94	0	0.00	5	3.31		
5597a	335	14	0.125	1.75	39	22.29	14	8.00	36	20.57	1	0.57	22	12.57	34	19.43	9	5.14	26	14.86	13	7.43	3	1.71	5	1
5597b	335		0.25	3.50	131	37.43	6	1.71	57	16.29	1	0.29	23	6.57	28	8.00	3	0.86	18	5.14	0	0.00	2	0.57	1	
5599	341	25	0.063	1.58	129	81.90	31	19.68	73	46.35			132	83.81	143	90.79	32	20.32	134	85.08	40	25.40	31	19.68	3	1
5669	395	6.5	0.125	0.81	88	108.31	16	19.69	5	6.15			485	596.92	17	20.92	9	11.08	1	1.23	9	11.08	0	0.00		
14 samples		260.5		34.39	1304	37.91	261	7.59	1156	33.61	33	0.96	1800	52.34	742	21.57	150	4.36	2167	63.01	199	5.79	162	4.71	132	8

Table 53. The material identified in sorting the <10 mm residue from CF

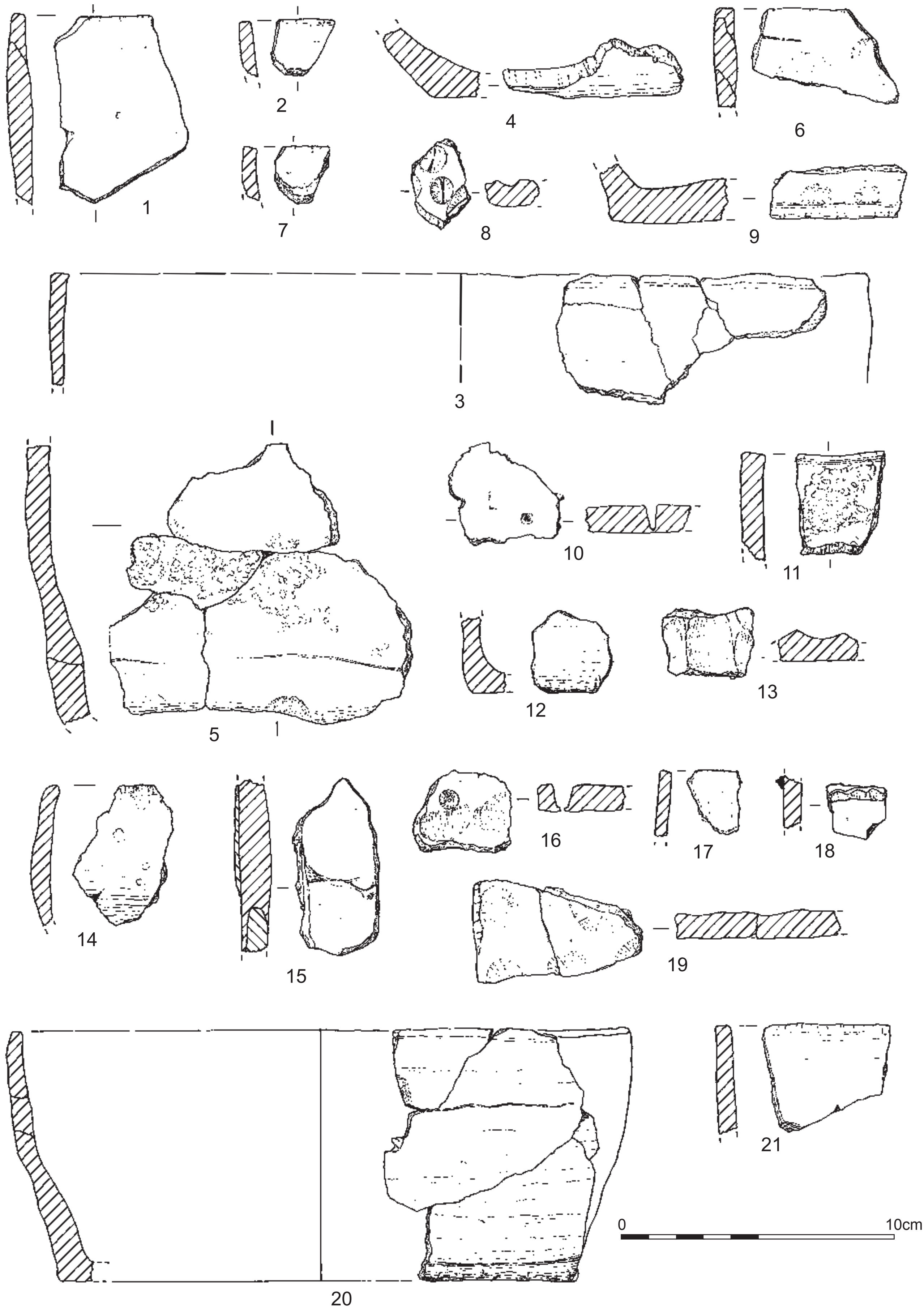


Figure 99. The pottery from CF

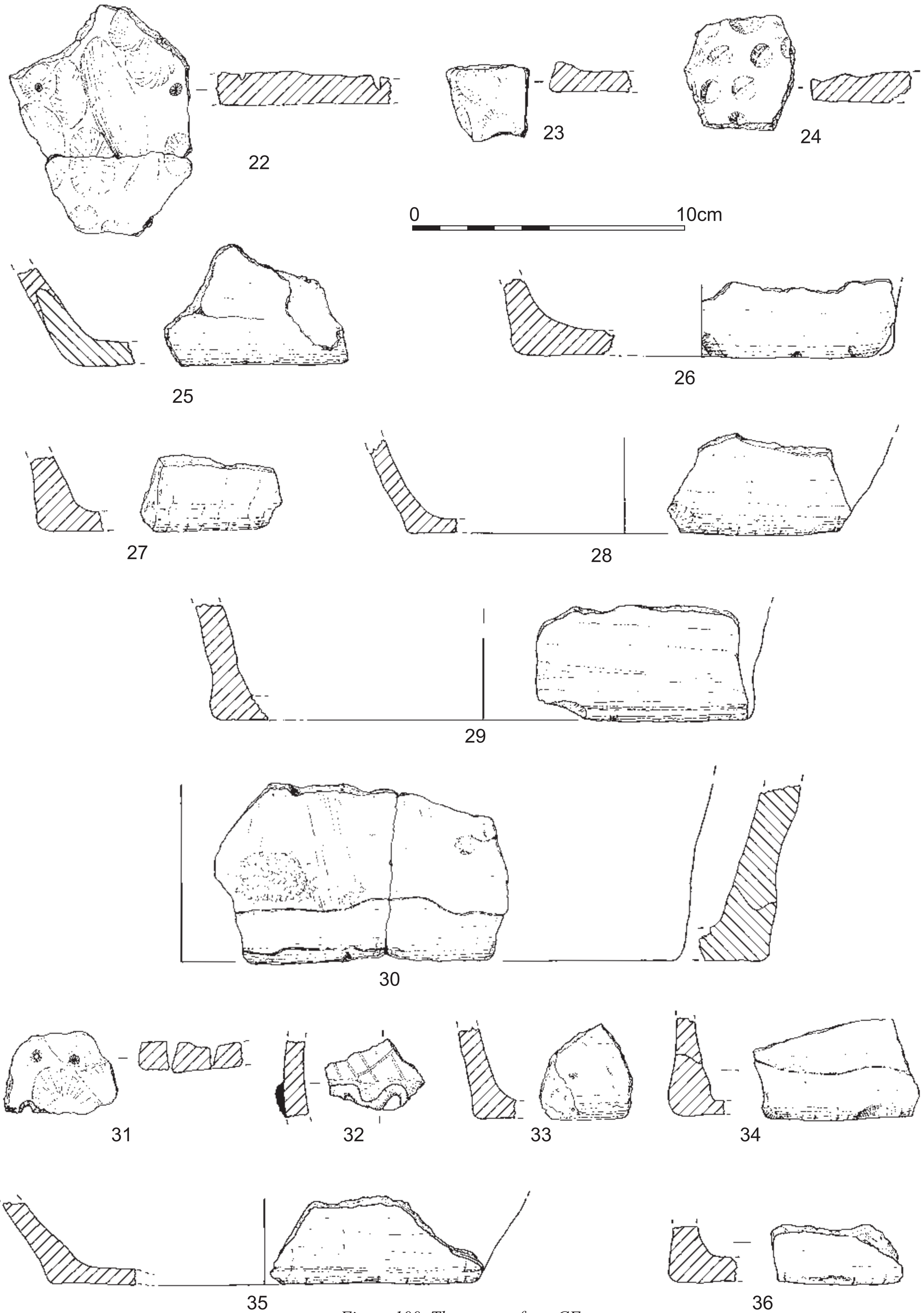


Figure 100. The pottery from CF

CF	Context	Weight (g)	Sherds	Rim	Base	Body	Misc.	Platter	Cordon	Average weight (g)
Final layers	303	36.3	2	0	0	0	0	2	0	18.15
	310	96.4	39	1	4	3	24	1+?5	0	2.47
	311	59.2	13	1	0	0	12	0	1	4.55
upper sand	304/314	598.9	95	6	3	12	71	0	0	6.30
	331	426.2	76	4	7	22	39	4	1	5.61
	340	50.5	12	1	2	0	8	1	0	4.21
	343	25.4	7	1	0	1	2	2+?1	0	3.63
midden layers	307	28	3	0	0	2	1	0	0	9.33
	313	10.2	3	0	0	1	2	0	0	3.40
	318	31.2	8	0	0	2	6	0	0	3.90
	322	85.6	6	1	1	2	2	0	0	14.27
	335	404.8	53	1	8	10	0	24+?1	0	7.64
	336	7.9	5	0	0	0	5	0	0	1.58
	341	452	60	6	4	24	15	11	0	7.53
	342	73.3	15	2	2	4	5	1+?1	0	4.89
	345	1588.3	123	9	23	33	41	?17	0	12.91
	349	357.5	49	2	8	11	23	5	0	7.30
thick sand layers	304	1785.2	379	14	14	50	262	39	3	4.71
	305	1210.3	234	11	14	42	161	6	1	5.17
	319	417.5	45	2	7	15	9	12	0	9.28
	347	108.5	13	2	4	2	3	?2	0	8.35
early deposits	312	3675.8	720	28	24	176	149	17+?18	4	5.11
	327	31.6	12	0	0	1	7	?3	0	2.63
	333	190.1	23	0	4	5	14	0	0	8.27
	346	4.2	3	0	0	0	3	0	0	1.40
	348	132.9	12	0	3	6	0	3	0	11.08
	395	133.5	21	3	0	0	13	5	0	6.36
	Total	12021.3	2031	95	132	424	877	133+?48	10	5.91

Table 54. Pottery from CF

CF			early deposits				thick sand layers		midden layers								final layers			
			312	327	333	346	304	305	307	318	331	335	339	341	343	349	303	310	311	total
debris	unused cobble	stone	2																	2
	waste	antler	2													1			1	4
		flint	3		1	1	2				4	1		1				1	1	15
Tools	spindle whorl	bone					1													1
	spindle whorl	lead	1																	1
	point	bone	1		1		1													3
	knife	iron						1												1
	hammerstone	stone	1																	1
personal objects	comb	antler					2			1		1								4
	pin	bone/antler	1								1							2		4
	buckle	iron					2													2
structural fittings	nail	iron	2				3				1				1		1			8
	nail stem ?	iron									1		1							2
	rove	iron	2	1							1			1		1	1			7
	holdfast	iron															1			1
misc	plate fragment	iron	1																	1
	strip fragment	iron					1										1			2
	sheet fragment	cu alloy													2					2
	lace- tag	cu alloy							1											1
	cut scapula	bone										1								1
	pierced metapodial	bone			1	1														2
	polished slab	porphyry															1			1
		total	16	1	3	2	12	1	1	1	8	3	1	2	3	2	5	3	2	66

Table 55. Artefacts from CF

considerable part (43 sherds) of an open bowl (Figure 99, 5). This vessel is almost certainly represented by the large number of base sherds in layer 341.

The thick sand layers also have platter, Norse bowls and grassmarked sherds (Figure 100, 33–36). There are Iron Age sherds in 304, 305 and 319. Although average weight in 304 is 4.7g, this is a large assemblage with some quite large sherds. Although there are small Iron Age sherds here, the bulk seem to be Norse. One fabric C vessel (Figure 100, 35) is part of the same vessel that occurs in 312 in the immediately preceding layer.

The early deposits have Norse open bowls, cups and platter. Context 312 has some large sherds (*e.g.* Figure 99, 20) and groups from single vessels including that found in 304. There is also Iron Age material in 312, possibly in some quantity although only a small number of sherds are diagnostic (*e.g.* Figure 100, 32). It seems likely that Late Iron Age material was redeposited into the fill of the house during the Norse period as the lowest layer (312) has many diagnostically Norse sherds. This could either be the result of the gradual natural erosion of the surrounding deposits or the deliberate filling of the house with sand including Iron Age material. The character of the layer suggests the former explanation is more likely.

Ignoring the two isolated sherds from 303, the best preserved assemblages (highest average weights) were from the midden layers 345 and 322, though the latter does not contain a large number of sherds. The average sherd weight in the midden layers as a whole is 9.4g as opposed to 5.8g in the upper sand, thick sand and early deposits. The final layers are even smaller at 3.6g. The winkle layer (348) also produced a small unabraded collection of sherds. The large assemblages from the west end of the house (304, 305, 312) are generally below the average for this block but the 312 assemblage is only marginally below and several large well-preserved sherds are present (*e.g.* Figure 99, 20).

There is very little evidence for chronological change in the assemblage during the infilling of the house. The CF pottery is a typical Norse assemblage with open bowls, cups and platters, sagging and flat bases, grassmarking and crazed basal surfaces. Platter sherds were present throughout the sequence from 395 to 303. There are no decorated Norse sherds and no everted rims, which implies the assemblage is earlier than the pottery in the upper part of mound 3 (Lane 2005a). The Iron Age sherds are mostly Late Iron Age I in date but include a few incised sherds (*e.g.* Figure 100, 32) which are likely to be earlier. They were concentrated in the west end of the house but there are also redeposited sherds in many other contexts (304/314, 311, 331, 322, 349, 304, 305, 319, and 312).

Measurements – N Sharples

Five substantial assemblages of bone fragments and pot sherds were measured from block CF (Figure 101). These

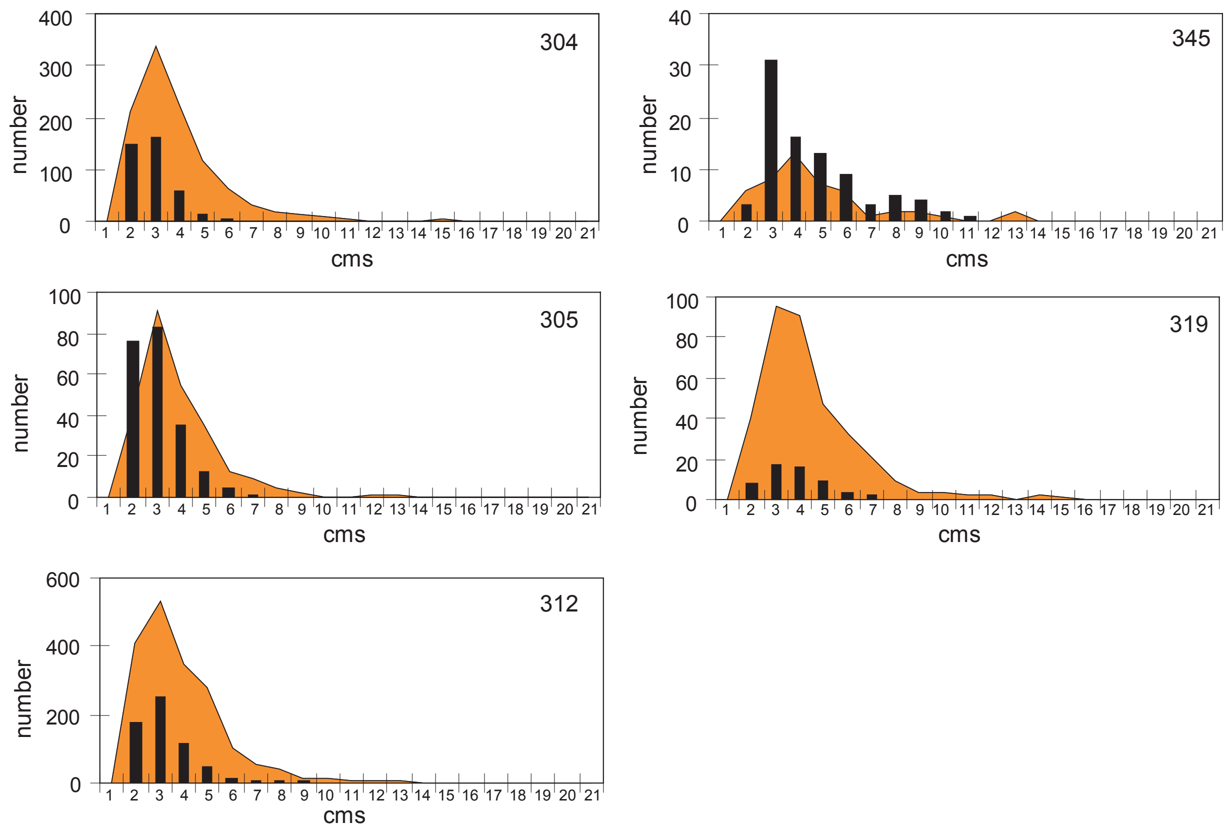


Figure 101. The size distributions of the pottery (column) and bone (area) from selected CF contexts

layers have some of the highest proportions of pot to bone observed. Midden layer 345 has almost twice as many potsherds as bone fragments and orange sand 305 has only a slightly smaller assemblage (85%). Sand layer 319 in contrast has a very low proportion of pot (16%). The pottery and small bone assemblage from midden layer 345 is very well preserved and most of the layers have generally well preserved assemblages. The mode is always between

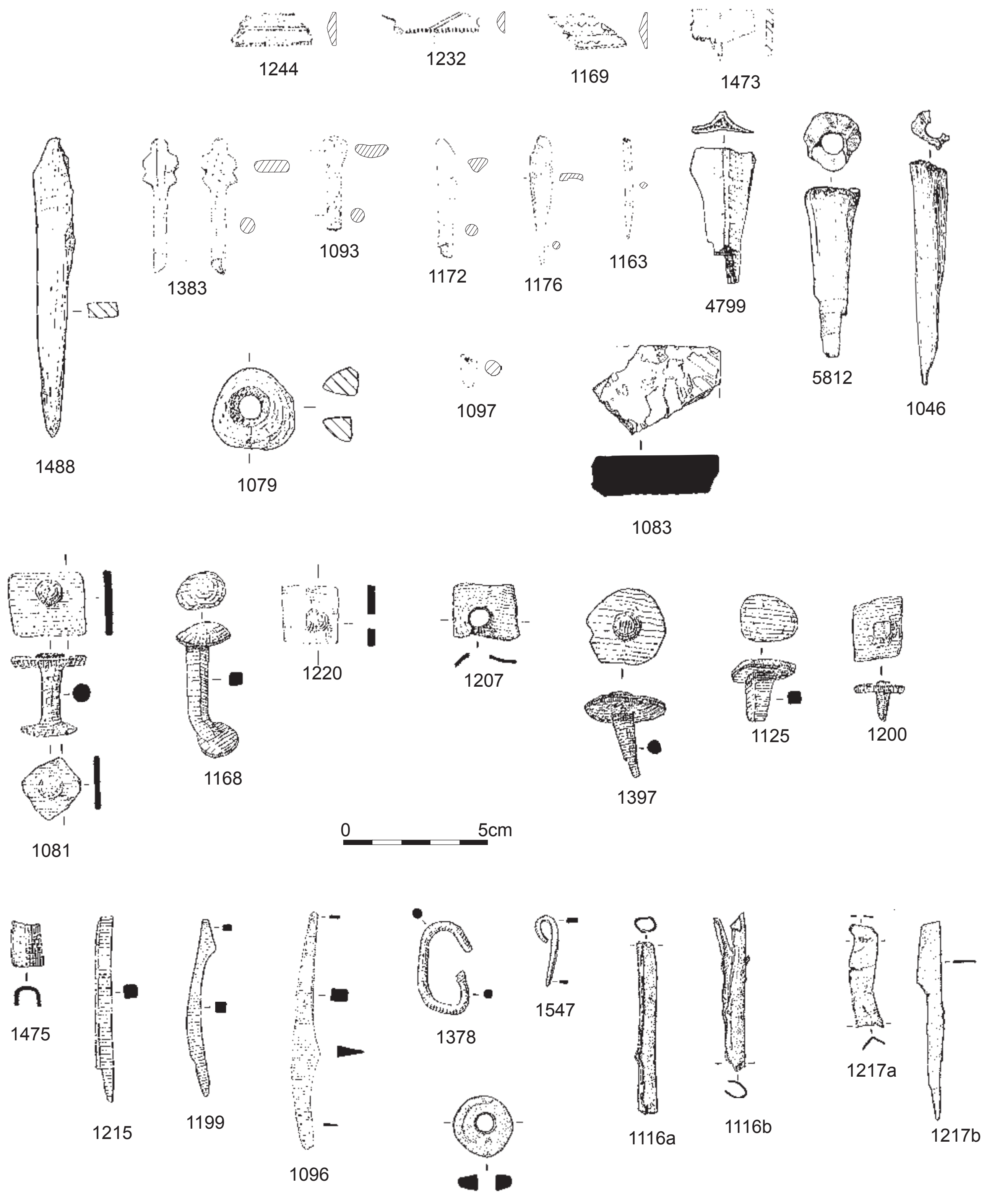


Figure 102. Artefacts from CF

30 and 40 mm and even in sand layer 319 the fall-off is quite gradual. The quality of the preservation indicates that this material was covered relatively soon after burial and the confined nature of the house probably discouraged the movement of people over the deposits.

Artefacts – A Clarke, P Macdonald, A Pannett and A Smith

A total of 66 artefacts were recovered from the contexts belonging to CF (Table 55): 24 objects of iron, three copper alloy pieces, a lead spindle whorl, 19 pieces of worked bone or antler, three stone tools, 15 flints and a fragment of a slab of porphyry. This is the only context group to have a large assemblage of iron objects. Most of the contexts produced only one or two such objects but 16 items were recovered from 312 and there were 12 objects from 304. Both these contexts lay at the west end of the area excavated and a distinctive feature of the assemblage from 312 is the presence of a cobble tool and two unused cobbles. These and the fragments of cordoned pottery noted above indicate that residual Iron Age material is present but the iron must indicate deposition in the Norse period.

A distinctive feature of the assemblage is the presence of several personal items. These include three comb side plate fragments (Figure 102, 1244, 1232, 1169), a tooth plate fragment (Figure 102, 1473) and four fragments of pins (Figure 102, 1093, 1163, 1172, 1383). A broken D-shaped iron buckle frame (Figure 102, 1378) is likely to be from a horse harness (Ottaway 1992, 683) and a buckle tongue (Figure 102, 1547) came from the same layer (304) and may be associated. The tools present included one bone and one lead spindle whorls (Figure 102, 1079, 1320), two bone points (Figure 102, 1176, 1488), two perforated metapodials (Figure 102, 5812 and 1251 not illustrated) and an iron knife (Figure 102, 1096), as well as the hammerstone (1331 not illustrated) mentioned above.

There is a large quantity of iron structural fittings comprising 10 nails or nail stems, seven roves and a holdfast (Figure 102 illustrates a selection 1081, 1168, 1220, 1207, 1397, 1125, 1200) and some miscellaneous fragments of iron. The copper alloy assemblage includes three fragments of sheet (Figure 102, 1217a and b) found together and a probable tubular lace-tag (Figure 102, 1116a). The latter was found surrounded by an organic substance (1116b) that may be leather. There is also an important fragment of green porphyry (Figure 102, 1083), unfortunately from a sand layer just below the surface. This is almost certainly an important religious relic imported from the Mediterranean.

Most of the material classed as working debris came from the earliest infill deposits (312) at the west end of the house, where the residual material was concentrated, but there are a couple of pieces of antler waste from other contexts. The assemblage of tools was concentrated in deposits at the base of the fill sequence, whereas the personal objects, structural fittings and miscellaneous items were scattered throughout the sequence. This assemblage is generally comparable to the Late Norse assemblage from mound 3. The absence of steatite vessel fragments may indicate that the assemblage dates to a later period than the assemblage from the block CE.

Sample no:	5656	5664
Context no:	312	312
flot volume (cm^3)	9.0	5.0
'charcoal' volume (cm^3)	9.0	5.0
fraction sorted	100%	100%
volume floated (l)	21.00	10.00
'charcoal' density (cm^3/l)	0.43	0.50
Cereals		
Hordeum sativum - grains	13	7
Hordeum sativum - indet frags	8	7
Avena sp. - grains	4	8
Avena sp. - indet frags	3	5
cf. Secale cereale - grains	1	
Cereal grain frags	11	14
Other crops		
Linum usitatissimum		1
Weeds/Wild species		
cf. Chenopodium sp.	1	
Rumex/Polygonum sp. - sharp angles, smooth testa	1	
Galium sp.	2	
Indeterminate/Unidentified plant taxa	2	2

Table 56. The charred plant remains from CF

Carbonised plant remains – S Colledge, R Gale and H Smith

Unfortunately most of the flotation samples from the Norse midden deposits (CF) are currently mislaid and it has only been possible to examine the carbonised plant remains from two samples from brown sand fill 312 (Table 56). These samples produced small quantities of both barley and oats and 5664 also produced a single grain of flax. Weed/wild seeds were present only in 5656. The radiocarbon date and the artefacts present in 312 indicate this layer included a reasonable amount of redeposited Late Iron Age material. However, the presence of oats and flax in these samples suggests they are most likely to derive from the Norse activity.

Charcoal was recorded as flecks in several of the layers infilling the Norse house but very little was suitable for identification. A larger sample was obtained from 312 and this included oak (10 heartwood frags), elm (two frags), heather (13 frags), the hawthorn group (one frag) and

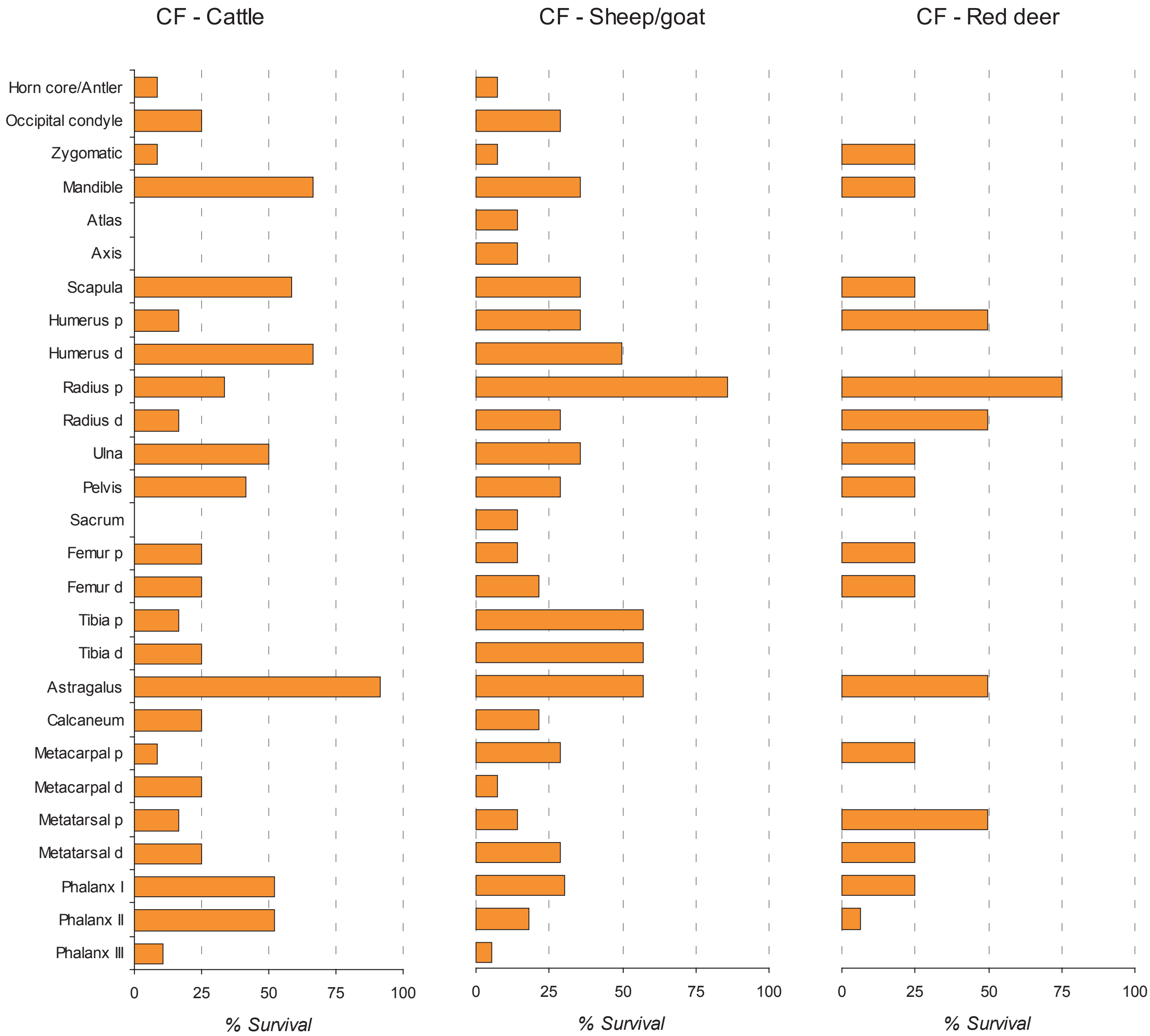


Figure 103. The relative abundance of the different body parts of cattle, sheep/goat and red deer from block CF

spruce/larch (13 frags). This was probably fuel debris from domestic use.

Animal bone – J Cartledge, C Ingrem, J Mulville and A Powell

The layers filling the Norse house (CF) produced a significant assemblage of mammal bones (633 identified bones, Table 57), fish bones (948 identified bones; 631 from the above 10 mm material and 317 from the below 10 mm samples, Table 58) and bird bones (50 identified bones, Table 59)

Most of the layers produced some bones but the largest assemblage of mammal bones (21%) and bird bones was recovered from an early layer of sand (312) accumulating at the west end of the house, and from the thick sand layers, notably context 304 (21%), which covered the infilled house. Context 312 was not the largest layer excavated and these concentrations confirm the evidence from the analysis of the artefact and pottery distributions that this was a finds-rich deposit. It is important to note that this layer does contain Late Iron Age ceramics and that an articulated bone group from this layer produced a Late Iron Age radiocarbon date. The largest assemblage of fish bones from both the >10 mm hand collected sample and the <10 mm floated sample came from a distinctive thin orange sand layer (305), which was restricted to the west end of the building and which was noted as fish-rich during excavation. Large assemblages were also recovered from the sand layers (304) and reasonable collections from midden layer 307 and upper sand layer 303. All of these layers are relatively late in the sequence. The largest assemblage of bird bones came from the early sand layer (312) but there was also a reasonable collection from another early sand layer (319) and a scatter from nine other layers.

	Context	Sheep	Sheep/Goat	Cattle	Pig	Horse	Dog	Cat	Red deer	Roe deer	Rodent	Seal	Otter	Cetacean	Cattle-sized	Cattle/red	Sheep-sized	Total	%
Final layers	303		2	7	1								2		1		1	14	2
Final layers	311		4	3	2												1	10	2
Upper sand	331	10	1	11	3				5						1		1	32	5
Upper sand	340	3		2			1		1									7	1
Upper sand	343	3		2														5	1
Midden layers	307		2	1														3	0
Midden layers	313	7		4											1			12	2
Midden layers	315	1															1	2	0
Midden layers	318			2														2	0
Midden layers	322	1						1										2	0
Midden layers	335	2		6											1	1	1	11	2
Midden layers	336			1	2													3	0
Midden layers	339		2															2	0
Midden layers	341	5	1	9					3								3	21	3
Midden layers	342	3		5					1						1		1	11	2
Midden layers	345	2		2													1	5	1
Midden layers	348	5		12											1	1	1	20	3
Midden layers	349	6		8				1	6						3	1		25	4
Thick sand layers	304	3	57	46	11	1			4	2				1	1		4	130	21
Thick sand layers	305		17	7	1				1				1	1			4	32	5
Thick sand layers	319	8		21	2				1							1	3	36	6
Thick sand layers	347																1	1	0
Early deposits	312	33	49	61	14	1	1		14		2	1		14	3		7	200	32
Early deposits	327		2		1													3	0
Early deposits	333	7	2	17											1		1	28	4
Early deposits	346	2		4	2				2						1		1	12	2
Early deposits	395		1	3														4	1
Total		101	140	234	39	2	2	2	38	2	2	1	3	16	15	4	32	633	

Table 57. Animal bone from CF

a

	303	304	305	307	310	311	318	322	339	345	304	319	335	336	342	346	Total
Clupea harengus			1														1
Conger conger			1														1
Pollachius pollachius												1					1
Pollachius virens	1	3	3	6		1				1							15
Gadus morhua	18	55	153	15	9	8							2	2	1	1	264
Merluccius merluccius	10	44	40	35	7	7	1	1			1	3					149
Molva molva	1	7	24	7	1	2						1				1	44
Large gadid	10	41	59	28	9	4		2	1								154
Labridae spp		2															2
Total	40	152	281	91	26	22	1	3	1	1	1	5	2	2	1	2	631

b

	305	339	304	305	312	318	322	331	333	335	339	341	342	345	346	Total
Clupea harengus			19	68	16	8	7	17	13	26		3	22	33	14	246
Salmonidae spp		1	1		1	1							1		2	7
Anguilla anguilla				1	1			1								3
Conger conger								1								1
Pollachius pollachius			1								1					2
Pollachius virens			2	6			10		2	5			1			26
Pollachius spp.									1							1
Gadus morhua			1	1												2
Merluccius merluccius				1		1	3			2						7
Gaidropsarus/Ciliata spp.	1															1
Large gadid				4		1	4									9
Small gadid			1			1	3			1						6
Ballan wrasse			1	1					1						2	5
Flatfish				1												1
Total	1	1	26	83	18	12	27	19	17	34	1	3	24	33	18	317

Table 58. Fish from CF: a) Species representation in material >10 mm (NISP); b) Species representation in material <10 mm (NISP)

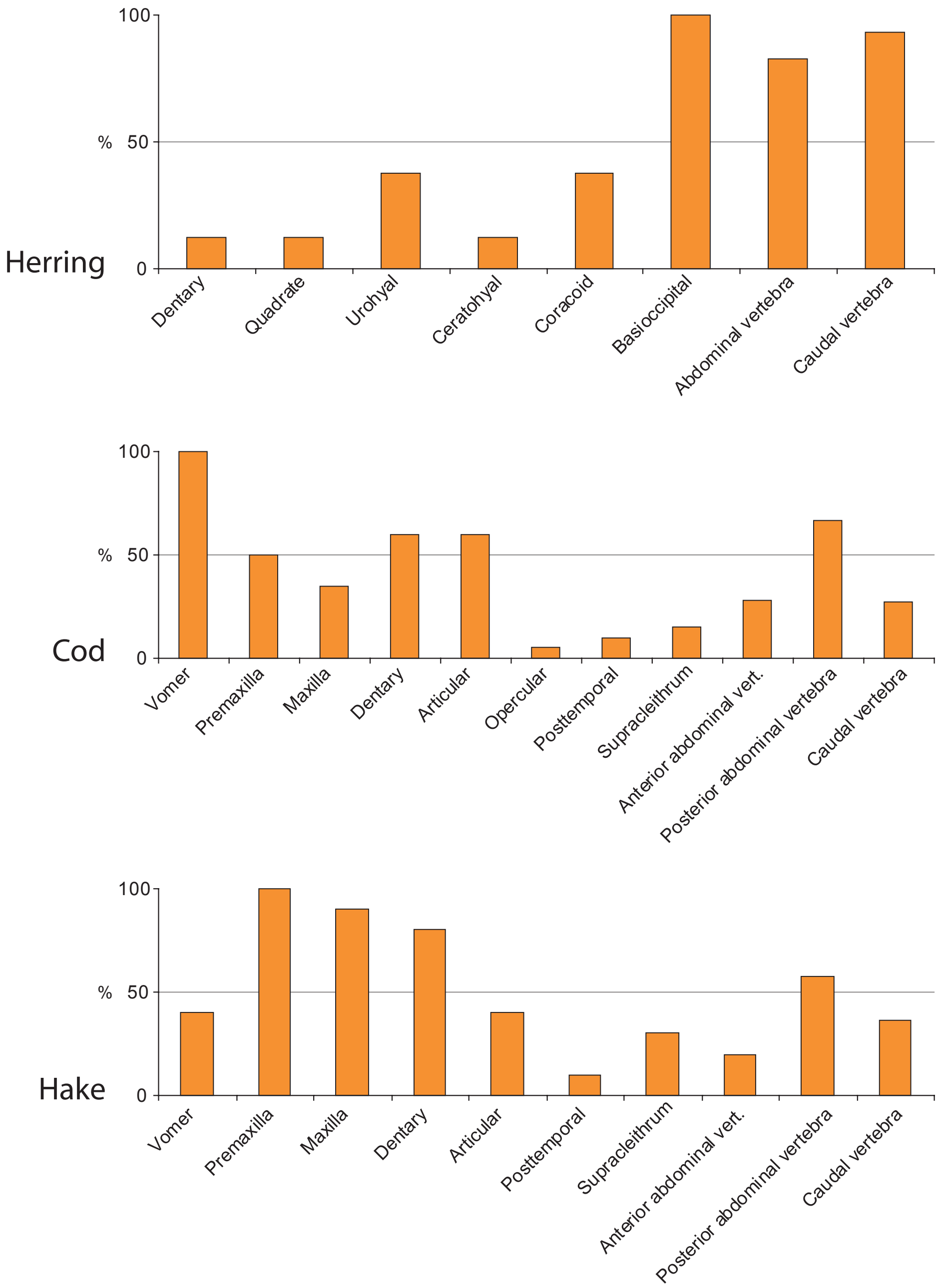


Figure 104. The percentage presence of selected elements of the herring, cod and hake assemblage

Sheep and cattle are equal in proportion in this block (38% and 37% respectively) with red deer and pig also present in similar abundances, at 6%. This increase in quantity of pig bones makes the abundance in percentage terms comparable to the Late Iron Age assemblages. Small numbers of horse, dog, cat, rodent, seal, otter and cetacean elements were also recorded.

Apart from odd fragments belonging to herring, conger eel (*Conger conger*) and wrasse the entire assemblage from the >10 mm collection belongs to cod-family fish, with cod and hake dominant. Herring are predominant in the <10 mm sample and, although it contains numerous other taxa, none are present in significant numbers. As in other Norse deposits, the projected estimate of species abundance confirms the predominance of herring although saithe make up a significant proportion.

Most of the bird bones were of gulls but there were also some gannet and guillemots. Other species present were Columbidae (*cf.* rock dove), cormorant, curlew, domestic fowl, duck species (*cf.* teal, *cf.* shelduck and mallard-sized), golden plover, goose species (*Anser* species, medium-sized goose and *Anser domesticus*), great northern diver, passerines (*cf.* starling), raven and wader. This unit contained the only definite domestic species in the shape

CF	304	312	313	319	331	333	335	339	340	341	348	total
Goose sp.	1			2								3
Duck sp.		1		1					1			3
Great northern diver				1								1
Gannet				4	2	1						7
Cormorant		2				1						3
Golden plover		1										1
Curlew		1		1								2
Wader sp.		1										1
Gull spp		5		3	1		1	1	3		1	15
Guillemot/Razorbill	1	2	1	1		1						6
Pigeon sp.			1					1				2
Raven		1										1
Starling		1										1
Passeriform		2								1		3
Domestic fowl						1						1
Total	2	17	2	13	3	4	1	2	4	1	1	50

Table 59. Bird bone from CF

Context	Chop	Cut	Chop & Cut	Sawn	Total Butchery	Gnawed	Burnt	Total NISP	% Butchered	% Gnawed	% Burnt
303					0	1	0	14	0	7	0
304	4	2			6	26	4	130	5	20	3
305					0	2	0	32	0	6	0
307					0	0	0	3	0	0	0
311					0	1	0	10	0	10	0
312	15	5		1	21	23	18	200	11	12	9
313	3				3	1	0	12	25	8	0
315					0	1	0	2	0	50	0
318					0	2	0	2	0	100	0
319	2	2			4	5	0	36	11	14	0
322					0	0	0	2	0	0	0
327					0	1	0	3	0	33	0
331					0	9	1	32	0	28	3
333	2	2			4	7	0	28	14	25	0
335		1			1	0	0	11	9	0	0
336					0	0	0	3	0	0	0
339		1			1	0	1	2	50	0	50
340		1			1	1	0	7	14	14	0
341		1			1	2	0	21	5	10	0
342					0	2	1	11	0	18	9
343		1			1	2	0	5	20	40	0
345					0	1	1	5	0	20	20
346	1				1	4	0	12	8	33	0
347					0	0	0	1	0	0	0
348					0	6	0	20	0	30	0
349		1			1	7	0	25	4	28	0
395					0	0	0	4	0	0	0
Total	27	17	0	1	45	104	26	633	7	16	4

Table 60. The taphonomy of the mammal bone from CF

of a single juvenile chicken humerus and also a possible domestic goose.

The level of gnawing is similar to that from the Norse activity area (CE) at 16%, but butchery and burning are slightly less prevalent at 7% and 4% respectively (Table 60). Body part abundance (Figure 103) for cattle indicates a high proportion of astragalus present, with lesser quantities of mandible, scapula, distal humerus, ulna and phalanx. This patterning points to the loss of the majority of the carcass, but the preservation of astragali. There was a possible pair of articulating cattle distal tibia and astragali, with both the left and right hand side present in context 312. For sheep the pattern of abundance is more even, with fore and hind limb elements present in addition to a small quantity of waste. Red deer have a range of elements present, from the skull, fore limb, a

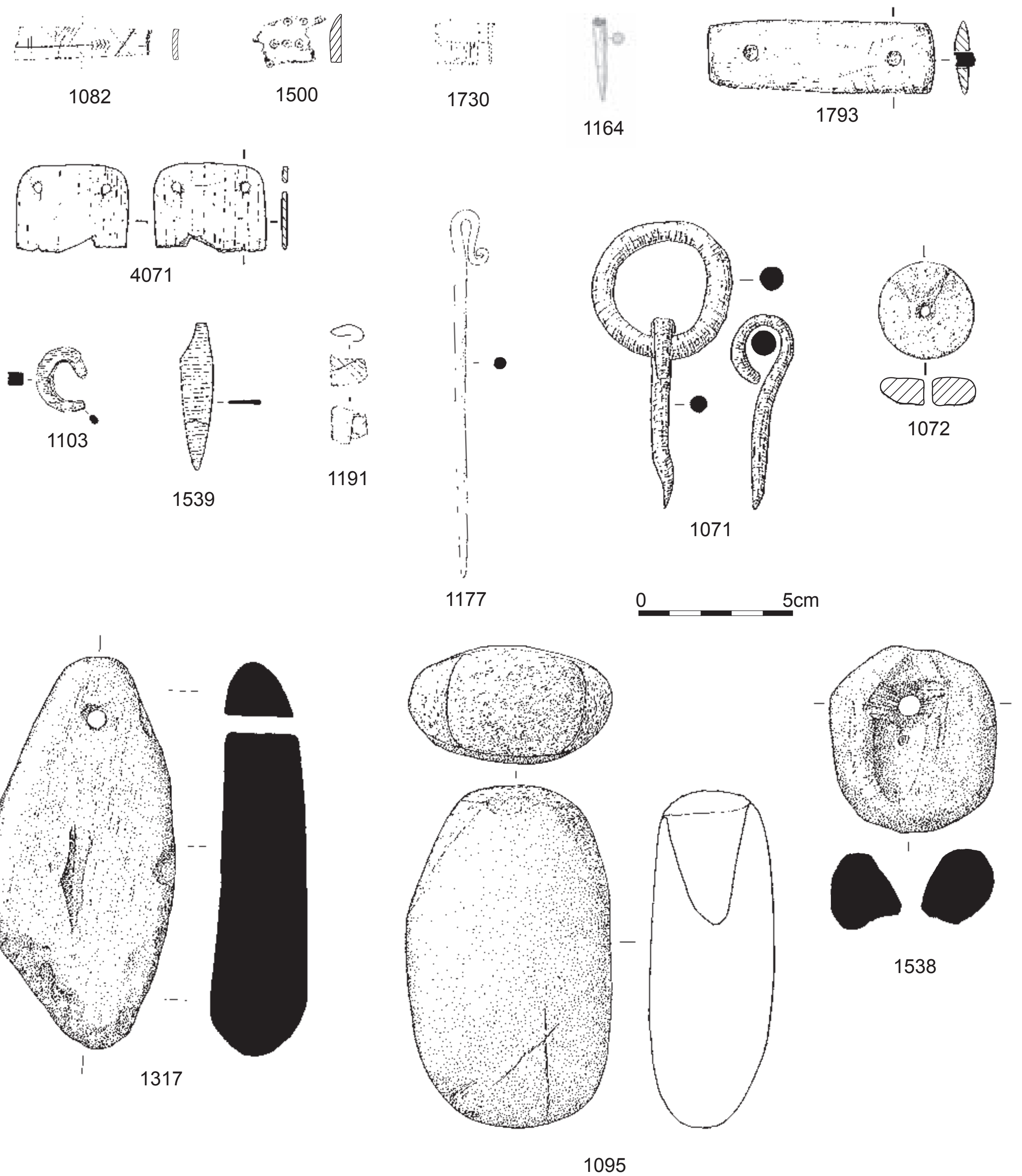


Figure 105. Unstratified artefacts

small proportion of hind limb, astragalus and metatarsal with few phalanges; the most abundant element is the proximal radius and is indicative of a focus on meat.

In the >10 mm assemblage of fish bone, saithe, cod, hake and ling are represented by both cranial and vertebral elements (archive). In the <10 mm material herring is also clearly represented by both cranial and vertebral elements, as are salmonid, saithe, cod and hake. Apart from a conger eel dentary and ballan wrasse scales, the small samples of trace taxa are represented solely by vertebrae (archive).

The percentage presence has been calculated for herring, cod and hake using a range of elements (Figure 104). A very different pattern is apparent for herring in comparison to saithe recovered from the Iron Age middens with cranial elements (apart from the basioccipital which articulates with the first vertebra) poorly represented compared to vertebrae. The percentage presence of cod and hake elements is patchy, with some cranial bones and abdominal vertebrae well-represented whilst appendicular (shoulder) bones and caudal vertebrae are relatively under-represented.

Evidence for gnawing is visible on seven herring bones from the <10 mm material. In the >10 mm material, single cod and hake bones possess evidence for burning and four herring and one saithe in the <10 mm material have been burnt.

Conclusion – N Sharples

The deposits (CF) used to infill the Norse house provide the best evidence for the Norse settlement on mound 1. Most of the artefacts present are Norse and two of the three radiocarbon dates provide determinations in the twelfth and thirteenth centuries AD. Nevertheless it is clear that at the same time as the Norse material was being deposited here, the Late Iron Age deposits which surround the house were also eroding into the abandoned house. Diagnostic Iron Age ceramics are present and a radiocarbon dated bone produced a determination identical to those from CB/CC/CG. Contamination appears to be particularly marked at the west end of the house and the assemblages of pot, small finds, animal and bird bone from sand layer 312 probably contain significant amounts of Late Iron Age material. Nevertheless the overall assemblage still provides sufficient distinctive features to indicate changes in the Norse economy which will be discussed in chapter 6.

Unstratified finds – N Sharples

During the excavation of mound 1 a considerable quantity of material was recovered from the surface exposures and rabbit burrows in the area surrounding the excavation. A total of 68 finds were felt to be pre-modern and have been catalogued (appendix 2) and a selection of the more interesting finds is illustrated in Figure 105. The assemblage consists of one piece of antler waste, three pieces of pumice, an iron knife (Figure 105, 1539) and a knife blade, a bone point, an antler plate (Figure 105, 1793) probably used as a handle, a weaving tablet (Figure 105, 4071), a ceramic spindle whorl, two steatite weights (Figure 105, 1317 and 1538), one of which (1317) was a vessel fragment also used as whetstone, 12 cobble tools (including Figure 105, 1095), a tooth plate of a single-sided comb (Figure 105, 1730) and a fragment of a ring and dot decorated side plate (Figure 105, 1500), two bone pin shank fragments (e.g. Figure 105, 1164), 10 nails or nail stems and four indeterminate fragments of iron, a small iron ring (Figure 105, 1103), an iron snaffle bit (Figure 105, 1071), five copper alloy sheet fragments, one of which was decorated (Figure 105, 1191), a lead sheet fragment and the most interesting finds – a copper alloy pin (Figure 105, 1177), an ogham-inscribed bone plaque (Figure 105, 1082) and a silver coin.

The only securely dated find is a silver coin of Olaf Kyrre, which must have been minted between 1066 and 1093 (see Williams, chapter seven). A more difficult object to date is a small bone plaque inscribed with five letters in the ogham script. This came from the continuation of the erosion area outside of the excavation boundaries. Analysis by K Forsyth (see chapter seven) suggests this is most likely a Viking period inscription. The third find is a copper alloy pin with a distinctive crook head. Crook-headed pins are a feature of the Irish stick pin tradition, which is well represented at Bornais (Sharples 2000), but this example is particularly well made and difficult to parallel in detail. It is not possible to exclude the possibility that the pin and the ogham plaque came from the Late Iron Age contexts that were also being eroded in this area, but the interpretation of these objects suggests a Viking, or Norse, date is more plausible.

Note

1 Several other samples were taken and processed but as a result of confusion over the sorting procedures, the sorting data is unquantifiable.

4 Comparative analysis of the site assemblage

Introduction – N Sharples

This chapter will present a summary of the various assemblages recovered from the excavation of mound 1. It will also examine the patterns that exist in the composition of material found in the different stratigraphic units belonging to mound 1 and briefly compare these with the assemblages from mound 3. This introduction to the assemblage will provide the basic numerical summary and description of the different categories of evidence from mound 1 to enable and encourage comparative analysis of this site with other sites on South Uist and further afield. This presentation should aid in the interpretation of the contexts discussed in chapters 2 and 3 and forms the basis for the interpretive analysis of chapters 6, 7 and 8.

Pottery – A Lane

The mound 1 assemblage is a large assemblage of 6980 sherds (Table 61) which was distributed between six stratigraphic blocks. The largest number of sherds was associated with the sand and midden layers infilling the Norse house (CF; 2031 sherds) but this only slightly exceeded the assemblage recovered from the Late Iron Age middens (CG; 1995 sherds). The Late Iron Age infill deposits (CC) and the house occupation (CB) also produced substantial assemblages (1426 and 903 sherds respectively), as did the Norse activity area (CE; 586 sherds). The smallest assemblage came from the deposits (CA) preceding the Late Iron Age house (39 sherds); although these deposits were not excavated, the small assemblage from the CA contexts does nevertheless provide some important information on the sequence.

The early structures (CA) have a small but interesting assemblage. A substantial piece of base is decorated with a circle of deep fingermarks (Figure 21, 1). Fingermarked bases have been found on a number of sites of Middle Iron Age date. At Dun Mor Vaul they appear in pre-broch contexts but also later (MacKie 1974, 159); at A'Cheardach Mhor fingermarks and grooves produce some more elaborate designs (Young and Richardson 1960, fig. 6, no. 37, plate 11, nos 7 and 9); simple fingermarking occurs at Dun Ardtreck (MacKie 2000b, 355) and at Dun Bharabhat (Harding and Dixon 2000, 32, fig. 23). While the more elaborate designs found at A'Cheardach Mhor (Young 1966, plates 3, 7 and 9) may be chronologically sensitive, the simple use of fingermarks seems unlikely to be significant. The Bornais base may be from a cordoned flaring rim vessel as the base and rim sherds are similar in colour and texture. This seems to be slightly shouldered (Figure 21, 7). The angle of the rim/neck junction is sharper than the vessels in the Late Iron Age house (CB) and this, plus the position of the cordon on the angle of the neck, is reminiscent of material such as that from Cnip phase 3 (dated to the third century AD by Armit *et al*. 2006, 102; *contra* Armit 1996, 165), though the rim length at Bornais is nearly double that of the illustrated Cnip vessels.

This group of sherds is distinguishable from the bulk of succeeding material on colour and texture as well as the rim angle of the one reasonably-preserved vessel. However the general vessel forms (flaring rims and slight shoulders) and the decoration (various finger-pinched cordons) are very similar to the subsequent style. In consequence this seems to be reasonably classified as an early form of Dun Cuier ware.

The material from the Late Iron Age house (CB) is a sizeable assemblage with some large sherds, sherd groups from single vessels, and partially reconstructable profiles. The bulk of the pottery comes from the destruction deposits of House 1, the pits dug through that deposit and the floor of House 2. There is little material attributable to the primary floor though some body sherds with red inclusions hint

	weight	sherds	rim	base	body	misc.	cordon	incised	other feature	Average Weight
CA	622	39	5	6	18	10	9	1	Fingered base	15.95
CB	9545.8	903	51	39	343	470	44+9D	2	roundels	10.57
CC	13,505.70	1426	84	38	534	770	44+4D	3	9 MIA cordons	9.47
CG	12,831.98	1995	72	46	586	1291	44+8D	1	2 MIA cordons	6.43
CE	3561.3	586	22	15	126	350	4	2	71 platter	6.08
CF	12,021.30	2031	94	132	424	1194	10		133+48 platter	5.92
Total	52088.08	6980	328	276	2031	4085	155+21D	9		7.46

Table 61. A summary of the pottery by stratigraphic block

at the presence of slightly earlier material than the main assemblage. The well-preserved sherd groups indicate large flaring rim vessels with slight shoulders of classic Dun Cuier type (Figure 52, 6 and 7). Several vessels have double cordons on the neck and shoulder.[1] These double-cordoned sherds are found in the destruction layer, the pits and the floor of House 2. Two vessel diameters of 380 mm and 360 mm come from the secondary floor (CB; 397). The attribution of the decorated sherds to individual vessels is difficult though four decorated vessels are identified (Figures 52, 53) on the basis of variations in the cordons on different vessels. These are large vessels of a size that would be difficult to use for cooking. The surface finish of these vessels is quite good. One sherd has a 'T-shaped' cordon, which may be from an applied circle or swag (Figure 53, 15). Sherds with smoothed, wet-wiped surfaces are fairly common. Tongue and groove construction is visible on many sherds. Some vessels may be undecorated.

The material from the destruction and infilling (CC) is a sizable assemblage and one which appears more mixed than from the Late Iron Age house (CB). There are cordoned everted rims, incised sherds and more elaborate cordons than in the Late Iron Age house (CB). This supports the stratigraphic argument that residual material, earlier than the deposits in the Late Iron Age house (CB), is present. There are cordoned everted rims like those in the early deposits (CA) and at least one sherd (Figure 69, 17) is from the vessel identified in CA. A number of decorated sherds seem to be from earlier Middle Iron Age vessels.[2] These are all thought to derive from earlier deposits around the edge of the house.

Large sherds of double-cordoned vessels from the main charcoal layers suggest that there is no great time difference between these and the deposits of the Late Iron Age house (CB). There are, however, some undecorated vessels with long flaring rims (Figure 68, 5) which might imply a gradual trend towards the undecorated vessels of the Udal Plain Style. Unfortunately the likelihood that this was a gradual process means it is impossible to recognise except where the pure Plain Style is present and clearly stratigraphically separate from earlier Dun Cuier ware, as at the Udal.

The Late Iron Age midden (CG) assemblage is of some size and appears to be largely of a similar period to the Late Iron Age house sequence. Consequently there is little incised decoration and some double-cordoned vessels. The lowest deposits have one flaring neck cordon (Figure 77, 1) comparable to those discussed from the early structures (CA) and the infilling (CC). There are also small, incised sherds and sherds with burnished or carefully smoothed surfaces. A small group of basal sherds have irregular fingermarks. The subsequent layers have upright or flaring rims and some narrow cordons. A double-cordoned bulbous vessel occurs in 463 (Figure 78, 24). Context 449 has several double-cordoned vessels and one fine impressed cordon of earlier date (Figure 77, 21). Several sherds have narrow cordons and finely smoothed surfaces of Middle Iron Age date. Context 445 has two unusual cordons – one T-shaped cordon may be from a swag (Figure 78, 26); the other has light slashing across it and so is likely to be earlier (Figure 78, 27).

The surface finishing on several of the cordoned sherds is better than that seen on sherds found in the house (CB). There are undecorated vessels but these seem to have shorter flaring rims than those in the infill layers (CC). The narrowness of the cordons may also hint at a pre-house (CB) date. Consequently the pottery suggests the midden (CG) material seems likely to have accumulated fairly quickly at a similar time or perhaps slightly earlier than the house (CB).

The best-preserved sherds (high average weight) were from the Late Iron Age house (CB) and the preceding deposits (CA). The character of the latter assemblage are misleading as only large sherds lying on the surface were collected. However, the preservation of the CB assemblage accurately reflects the depositional processes. The weight average varies significantly from one context to another, with most of the sizable sherds being recovered from pits (812, 838). These sherds appear to have been deliberately placed in these pits and it is still possible to recognise several distinct vessels though none of these is complete. The infill deposits (CC) also have a reasonably well preserved assemblage, concentrated in the charcoal layers (308, 337, 407, 413, 314, 414), compared to the material from the middens (CG). This probably reflects the fact that the material deposited in the hollow above the Late Iron Age house was covered with sand relatively quickly, whereas the middens accumulated over a longer period and were probably exposed for some time. The material from the Norse deposits (CE and CF) has generally lower average sherd weights which are directly comparable to those from mound 3 (Lane and Bond 2005, table 67); though this might reflect exposure of this material, it could also indicate the relatively fragile, poorly fired nature of these ceramics compared to the Late Iron Age sherds.

The main characteristics of the assemblage are well defined and the associated radiocarbon dates make this a particularly valuable assemblage for defining the Hebridean ceramic sequence. The Late Iron Age assemblage is dominated by the well-preserved assemblage from the house (CB), which comprises flaring rim vessels decorated with double cordons located on the belly and shoulder. The presence of undecorated flaring rim vessels in the infill deposits (CC) and the middens (CG) distinguishes these later groups from the CB assemblage and may indicate chronological developments towards the Plain Style of the later part of the Late Iron Age. The Late Iron Age infill deposits (CC) also produced Norse forms, which reflect the intensive rabbit disturbance in this area.

Almost all stratigraphic blocks contain a few isolated sherds with incisions or elaborate cordon decoration whose small size indicates residual material that derives from a Middle Iron Age occupation preceding the structures examined. The few stratified sherds recovered from the deposits preceding the house (CA) appear to be of Late Iron Age type but are slightly different to the main assemblage. They have flaring rims and a cordon at the neck angle, which is not a common feature in the later blocks. The colour and texture of the pottery and the presence of some sherds with finer surface finish, classed as fabric D, is also distinctive.

A substantial assemblage of Norse material was recovered from the midden infill (CF) and Late Iron Age contamination of this block appears to be largely restricted to the west end of the house (312, 304). The Norse assemblage consists of open bowls, cups (rare) and platter, sagging and flat bases, grassmarking and crazed basal surfaces. This assemblage is comparable to the material recovered from the early phases of mound 3 but the absence of everted rims suggests that activity in this part of mound 1 ceased before the fourteenth century when these forms become relatively common. The Norse assemblage from the activity area (CE) above the Late Iron Age house is much more mixed and includes large quantities of undecorated plain wares of Late Iron Age date. The mixed nature of this assemblage is at least partially the result of the considerable rabbit disturbance of this area and the exposure and erosion of the surface archaeology deposits. However, the radiocarbon dates from this block indicate activity occurring during the initial period of Scandinavian raiding or settlement and it is possible that some of the plain wares present are contemporary. However, the vessel forms present also include platter, which indicates later activity contemporary with the CF deposits (see below 222 for detailed discussion of these chronological issues).

Artefacts – A Clarke, P Macdonald, A Pannett, N Sharples and A Smith

An assemblage of 491 artefacts was recovered during the excavation of mound 1 (Table 62). These comprised 64 pieces of ironwork (not including two composite objects with antler), 17 copper alloy artefacts, two lead objects (excluding obviously modern pieces), 1 silver coin, 145 artefacts of stone (including six steatite pieces), 61 flints, 15 pieces of pumice, 165 pieces of worked bone or antler (including two objects with iron attachments), ten pieces of worked shell and ten ceramic artefacts.

The distribution of the stratified artefacts is concentrated (62%) in the Late Iron Age deposits and this reflects the relatively superficial examination of the Norse deposits of mound 1. The Late Iron Age artefacts were concentrated in the house occupation deposits (CB; 135.75 artefacts) and the infill deposits (CC; 121.25 artefacts). The midden deposits (CG) have a relatively small assemblage of finds (46 artefacts). This paucity of artefacts in CG is significant as the pottery and bone assemblages from this block were substantial; it is block CB that has the smallest assemblages of bone and pot.

There are distinct differences in the composition of the assemblages from the three different Late Iron Age blocks (Figure 106). The CB assemblage is dominated by tools; the CC assemblage is dominated by tools and working debris whereas the small quantities in CG are largely working debris. All three assemblages have small quantities of personal items, gaming pieces and miscellaneous objects. The dominance of tools in the CB and CC assemblages reflects the large quantities of cobble tools in these assemblages. In CB, the cobble tools are more than double the quantity of the remaining tools despite the presence of large numbers of bone/antler tools in these contexts. In both CB and CC, these bone/antler tools tend to be points and handles of indeterminate function but in CC there is also a group of tools clearly associated with textile production, weaving combs and weaving tablets. The CG assemblage is small and consists of only a few points and spindle whorls. A very important tool is the composite iron and antler comb (1904) in CB, which has been elaborately if incoherently decorated with fine incised lines.

The assemblages of working debris are quite variable from block to block. The smallest category of material from CB is the working debris (pumice, flint, unused cobbles, antler/bone waste and a small drop of copper alloy that may be a melted artefact). The CC assemblage, in contrast, is dominated by bone/antler waste and the bulk of the working debris, flint and pumice could be associated with the working of bone/antler. The importance of this material is emphasised by the large quantities of cetacean bone that were recorded in this stratigraphic block (see Mulville 120). This assemblage of whale bone is dominated by large dense slabs from the jaw which is ideal material for working but, unfortunately, it has been heavily burnt and fragmented and it is difficult to conclusively prove it has been worked. The working debris from CG includes seven pieces of worked bone but is dominated by a large assemblage of flint.

The personal and gaming related objects from Late Iron Age layers are quite numerous and show interesting contrasts and similarities between the different areas. Both CB and CC have a small collection of pins, beads and toggles and there is a more limited collection of these in CG. These are largely made from bone/antler but include a stone bead in CB and two iron pin fragments in CC. CB has a die and decorated astragalus that are closely paralleled by a die and decorated astragalus in CG (though there are significant differences between the two pairs of objects, see 268). The decorated objects from CC, in contrast, consist of the fragmented remains of an incised whale bone object of unknown form and purpose. (One small piece of this object was recovered from CB but this probably represents rabbit disturbance).

The miscellaneous category includes a range of small iron and copper alloy fragments that do little other than indicate the presence of metal on the site. There is also a small collection of bone/antler objects that have no clear function. The most numerous of these are sheep

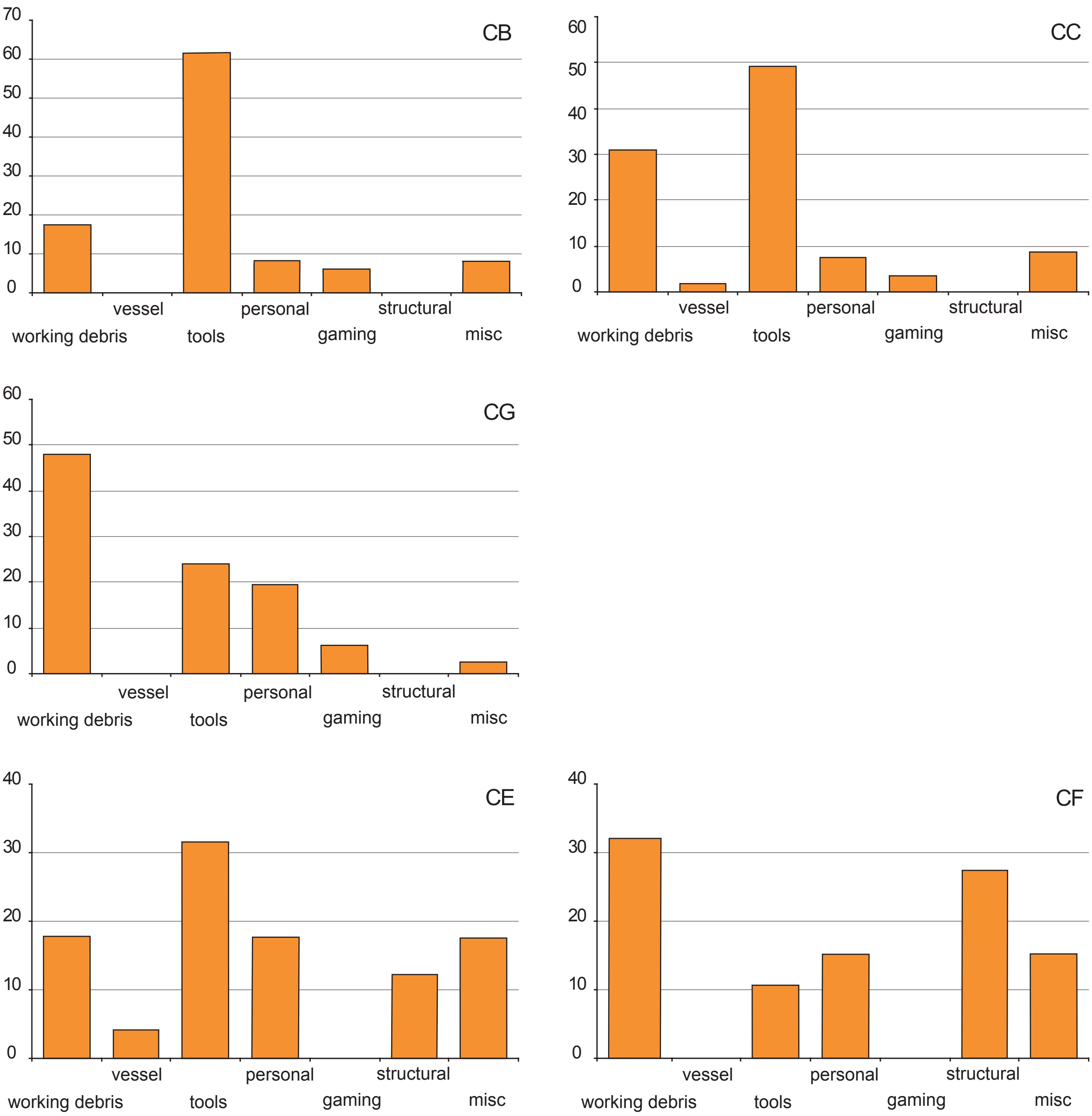


Figure 106. Histograms showing the distribution of different categories of artefact from the different blocks

metapodials pierced through the epiphysis and these are concentrated in the charcoal layer (457) in the house (CB).

The Norse assemblages show quite different patterns and are also quite different from each other. Both areas have a more even distribution across the different categories of material but the dominant categories in the middens (CF) are working debris and structural fittings, whereas the dominant category in the activity area (CE) is tools. The large number of iron roves and nails from the middens (CF) may indicate that these layers infilled an abandoned building whereas the tools from CE may indicate that this group of features was an activity area. The latter interpretation is certainly supported by the presence of the large whale bone paddle, which may be a flax scutcher, and there are also a couple of anvil stones and bone points. Both CE and CF have, however, produced comparable collections of pin and comb fragments which do little to differentiate the two areas. CE produced steatite vessel fragments (this should include the two from CC deposits that are presumably derived from Norse activity) which indicate a chronological difference between the two areas CE and CF, as the importation of steatite vessels into the Western Isles appears to occur only in the early phases of the Viking period (Forster 2004).

The small finds from mound 1 have been presented above in a fairly functionalist fashion, as though they simply represent the activities undertaken in the areas excavated.

category	object type	material	CA	CB	CC	CG	CE	CF	unstrat	total
working debris	waste	antler/bone		4	17	7	4	4	4	40
	spillage	copper alloy		1						1
	unused cobble	stone		6	3		1	2	3	15
		flint		8	10	14	4	15	10	61
		pumice		4	7	1			3	15
	vessel	steatite			2		2			4
tools	knife/blade	iron						1	2	3
	point	antler/bone/iron	2	5.5	3.5	4	3	3	1	22
	scraper/shovel	bone			1		1			2
	perf metapodial	bone		2	1					3
	handle	bone/antler		6	3					9
	socketed	antler		2	2					4
	grooved	antler/bone		3	2		1			6
	pick/hook/haft	antler			2		1		1	4
	comb/adze/spoon/paddle	whalebone		2	1		1			4
	needle	bone			1		1			2
	weaving tablet	bone			3				1	4
	weaving comb	antler/whalebone			4		2			6
	perf disc	whalebone				2				2
	spindle whorl	stone/bone/lead/ceramic		1		1	1	2	1	6
	weight	steatite							2	2
	strike-a-light	stone		4	1		1			6
	whetstone	stone			1					1
	counter-sunk hollow	stone			1	1				2
	anvil	stone			1		1			2
	cobble tool	stone		47	32	3	4	1	10	97
	? cobble tool	stone		11						11
personal objects	decorated	bone		1.25	0.75	2	1		1	6
	toggle	bone			1					1
	bead	bone/antler/stone		2	1	1				4
	perforated	shell		1		4				5
	ring	bone		1						1
	comb	antler					2	4	2	8
	pin	various		5	6	2	5	4	3	25
	buckle	iron						2		2
gaming	disc	ceramic		4	2	1	1			8
	disc	shell		3	1	1				5
	cone	stone			1					1
	die	bone		1		1				2
structural fittings	nail	iron					3	8	3	14
	nail stems	iron					3	2	7	12
	roves	iron						7		7
	holdfasts	iron						1		1
miscellaneous	binding	iron			1					1
	bar/rod	iron		1	1		1		1	4
	strip/plate	iron		3	1		2	3	3	12
	fragment	iron		2					1	3
	snaffle bit	iron							1	1
	ring	iron							1	1
	sheet/plate	copper alloy/lead			3		2	2	5	12
	rivet/horseshoe nail	copper alloy/iron		1			1			2
	lace tag?/ferrule	copper alloy						1	1	2
	perf/cut scapula	bone			1			1		2
	worked	whalebone		1	3		1			5
	perf strip	antler			1					1
	pierced metapodial	bone		3		1	1	2		7
	polished slab frag	porphyry						1		1
currency	coin	silver							1	1
			2	135.75	122.25	46	51	66	68	491

Table 62. A comprehensive list of the artefacts from mound 1

As was discussed in the detailed stratigraphic analysis of chapters 2 and 3, however, this is probably not a sensible way to view their deposition and, to anticipate the later discussion chapters, this underplays the exceptional nature of the assemblage. The artefacts from the Late Iron Age deposits are a much more complex collection of objects whose deposition reflects many varied motivations.

The richness of the assemblage from the house (CB) was certainly enhanced by the event that destroyed House 1. This seems to have captured a group of objects that would normally have been removed and has resulted in the survival of a very distinctive collection of tools, particularly cobble tools which are not normally this common. Many of these objects were probably hanging from bags around the edge of the house and this and other features, such as the coprolite patch, suggest this was not an occupied home but a subsidiary building. Only with its reoccupation do we appear to have a domestic occupation. The burning down of House 1 also resulted, however, in some specific acts of deposition that might have been an attempt to reconsecrate the house. There seem to be no obvious special deposits comparable to those at Sollas (Campbell 1991) that can be associated with the original construction and this may reflect the restricted role of House 1. The special depositions after the burning down of House 1 included the deposition of a die and a decorated astragalus and most of the large assemblage of well-preserved potsherds.

The significance of these deposits supports the suggestion that House 2 had a more important role than House 1 and the elaborate hearth would certainly sustain this interpretation. It also seems likely that much of the material placed in the infilling deposits (CC) was deliberately deposited as an act of closure. Many of the artefacts are complete and there also seems to be an element of deliberate burning which mirrors the history of the house. It is difficult to explain why a very unusual collection of objects relating to textile production (weaving combs, weaving tablets and a needle) was chosen for this deposit but perhaps they reflect the role or interests of the last inhabitant. In contrast, the relatively mundane nature of the objects in the midden layers (CG) might suggest that this was an area of refuse disposal. However, the middens still produced a die and decorated astragalus that are reminiscent of the examples found in the house.

The Norse assemblages are similarly difficult to characterise but the quantities of material recovered from a relatively limited excavation area are worth noting. The assemblage compares favourably to that recovered from mound 3 (51 objects from trench D, 22 objects from trench F), particularly as those assemblages were dominated by flint which directly reflects the amount of sieving undertaken on mound 3. There could be a number of reasons for the relative wealth of mound 1 and the poverty of mound 3 but the current thinking is that this is due to the chronological differences in the deposits excavated. It appears that earlier Norse phases are more abundant in finds than the later fourteenth-century deposits. This need not reflect the economic wellbeing of the settlement but rather a culturally specific approach to material culture that emphasises waste in the tenth to twelfth centuries.

Carbonised plant remains – S Colledge and H Smith

One hundred and sixty-five samples were examined from mound 1 contexts: 124 samples were from Late Iron Age floor contexts (CB: 4 from House 1 contexts, 4 from the pit fills, 39 from the charcoal layer, 52 from the floor of House 2, 13 from the hearth construction, 12 from the hearth use); 13 samples were from Late Iron Age infill after the house was abandoned (CC); 15 samples were from Late Iron Age midden deposits (CG); 11 samples were from contexts associated with Norse activity (CE) and two samples were from a context associated with Norse middens (CF). The total volume of sediments floated for the samples examined for carbonised plant remains was 2039.65 litres and the average sample volume was 12.51 litres (for 163 samples; data is not available for the remaining two samples). The plant taxa represented in the samples from contexts dated to the Norse period (CE and CF) have not been included in the overall site comparisons.

As with the analyses of the mound 3 samples, the aim was to investigate spatial variations in the overall composition of the samples in order to define differences in use of space within the Late Iron Age house. Comparison of the crop spectrum represented at the mound 1 house with that of the later mound 3 house would also highlight similarities and/or differences in the plant-based economy and in patterns of land use through time. The same statistical techniques were used to describe and compare the taxonomic composition of the samples. Preservation of the remains in the house was by charring and a range of plant types and plant parts was identified; insect remains and textile fragments were also present in some of the samples. Identifications of the plant taxa were confirmed by comparison with modern specimens in the reference collection housed at the Institute of Archaeology, University College London. Overall, the state of preservation of the plant materials was poor to moderate and in many instances the condition of specimens was such that it was impossible to make identifications beyond the lowest taxonomic level. Kelly Reed sorted and identified the remains from samples in CE and CF.

Overall description of the samples: densities of charred plant remains

The density of charred plant material (*i.e.* ratio of volume of all charred material in the sample to the volume of sediment floated; previously referred to as 'charcoal density') is a measure of the amount of plant remains preserved by charring, and this is related to the degree or frequency of

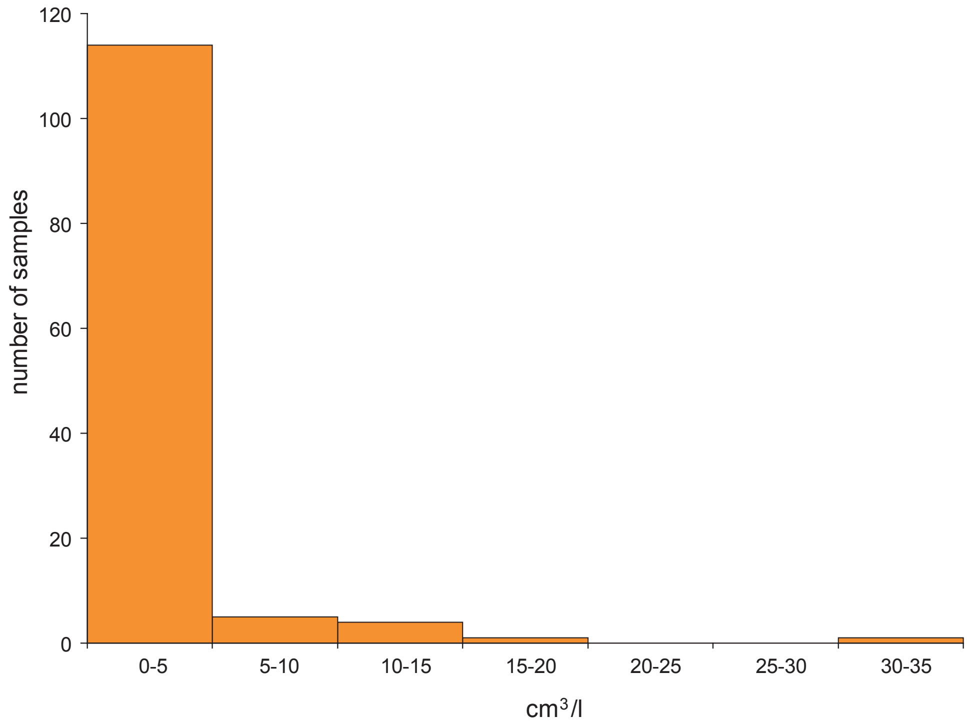


Figure 107. A frequency histogram showing the distribution of Late Iron Age samples according to the densities of charred plant remains (mean =1.87 cm³/litre [for 125 samples; 24 samples: neglible amounts; 3 samples: volumes not recorded]; 28 samples with densities greater than mean)

burning, the rate of deposition and/or the effects of the formation processes (*etc*.). The mean density for the Late Iron Age contexts is 1.87 cm³/litre (for 125 samples; 24 samples had insignificant amounts of charred material and were thus not included in the calculations and flot volume was not recorded for three samples) and only 28 samples had values above the mean. The mean density of the Norse samples from CE and CF was 0.41 cm³/litre (for 12 samples; one sample had a negligible/insignificant amount of charred material and was not included in the calculations).

The frequency histogram (Figure 107) showing the distribution of samples according to density illustrates clearly that a majority of samples have low densities, thus indicating that the remains are thinly dispersed throughout the sediments, and only very few have moderately high values, *e.g*. above 5 cm³/litre. The Late Iron Age density is only slightly higher than that for the Norse contexts of mound 3 (0.7 cm³/litre) and the percentage of samples with values above the mean is similar for both (mound 1: 22%, mound 3: 26%). The interpretation made for mound 3 with respect to the representation of charred plant remains in the deposits is thus also appropriate for mound 1; that is, they derive mainly from general scatters of burning rather than significant events involving *in situ* deliberate or accidental fires.

In order to investigate similarities and differences in the spatial distribution of plant remains within the house, comparisons of the densities of charred materials have been made between the context types (*e.g.* floors, abandonment fill and midden). It should be stated, however, that the significance of these comparisons (and others in this study – see later sections) is undermined by the fact that the sample sizes (or more specifically the numbers of samples) of the different contexts are unequal (see Jones 1991). A comparison of the mean densities of charred plant remains for the different context types (Figure 108, Table 63) shows that only the values for the charcoal layer and the pit fills are above the site mean. Five samples, dispersed across the charcoal layer, have high individual densities (8583/457: 17.00 cm³/litre; 9007/457: 14.50 cm³/litre; 9048/457: 13.00 cm³/litre; 9066/457: 13.00 cm³/litre; 9078/457: 33.50 cm³/litre). As was commented upon for the samples with high densities in mound 3, these may be indicative of discrete areas of activity involving specific

Context groups	n	cm³/l	grains/l
CB primary contexts	4	0.74	0.37
CB charcoal layer	39	3.86	3.44
CB house 2	52	0.97	2.65
CB pit fills	4	5.34	1.34
CB hearth construction	13	0.47	0.75
CB hearth use	12	1.49	0.35
CC	12	0.57	1.99
CG	15	0.18	0.49

Table 63. Mean densities of charred plant remains for the Late Iron Age stratigraphic blocks

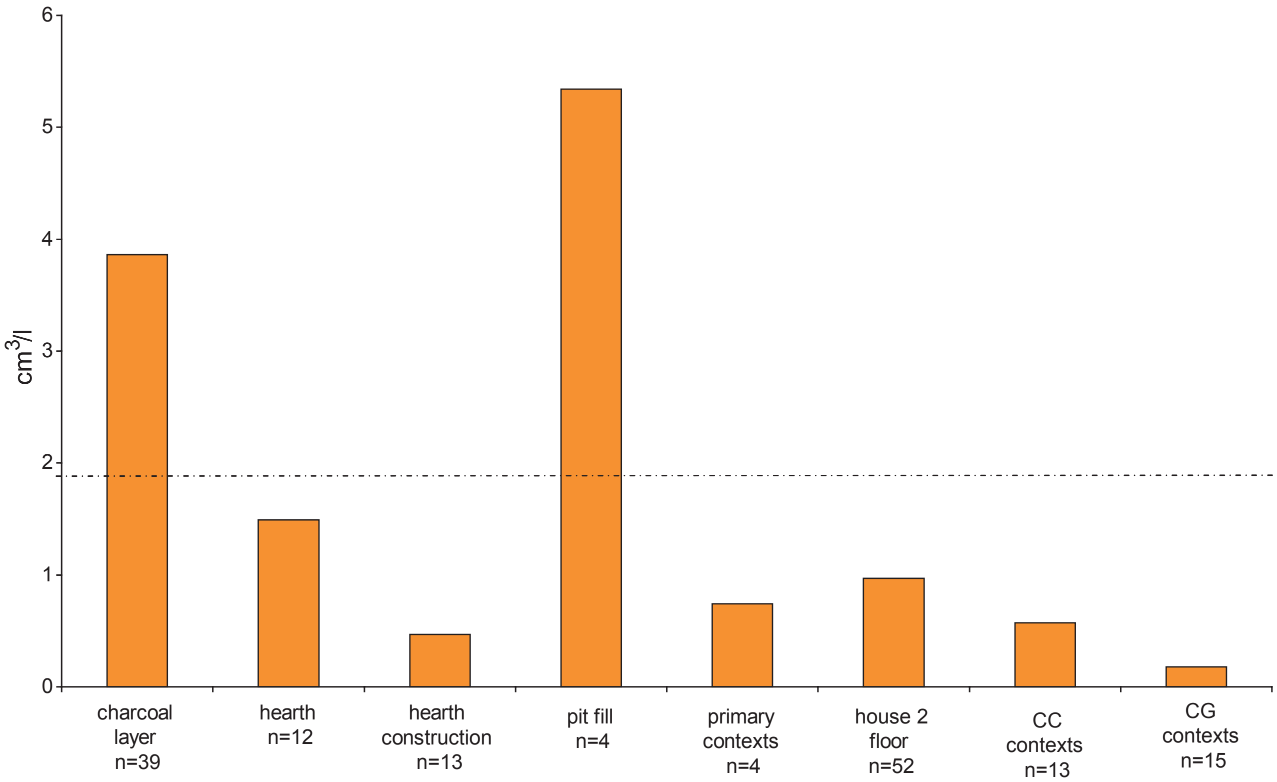


Figure 108. The mean densities of charred remains by Late Iron Age context type (site mean = 1.87 cm³/litre)

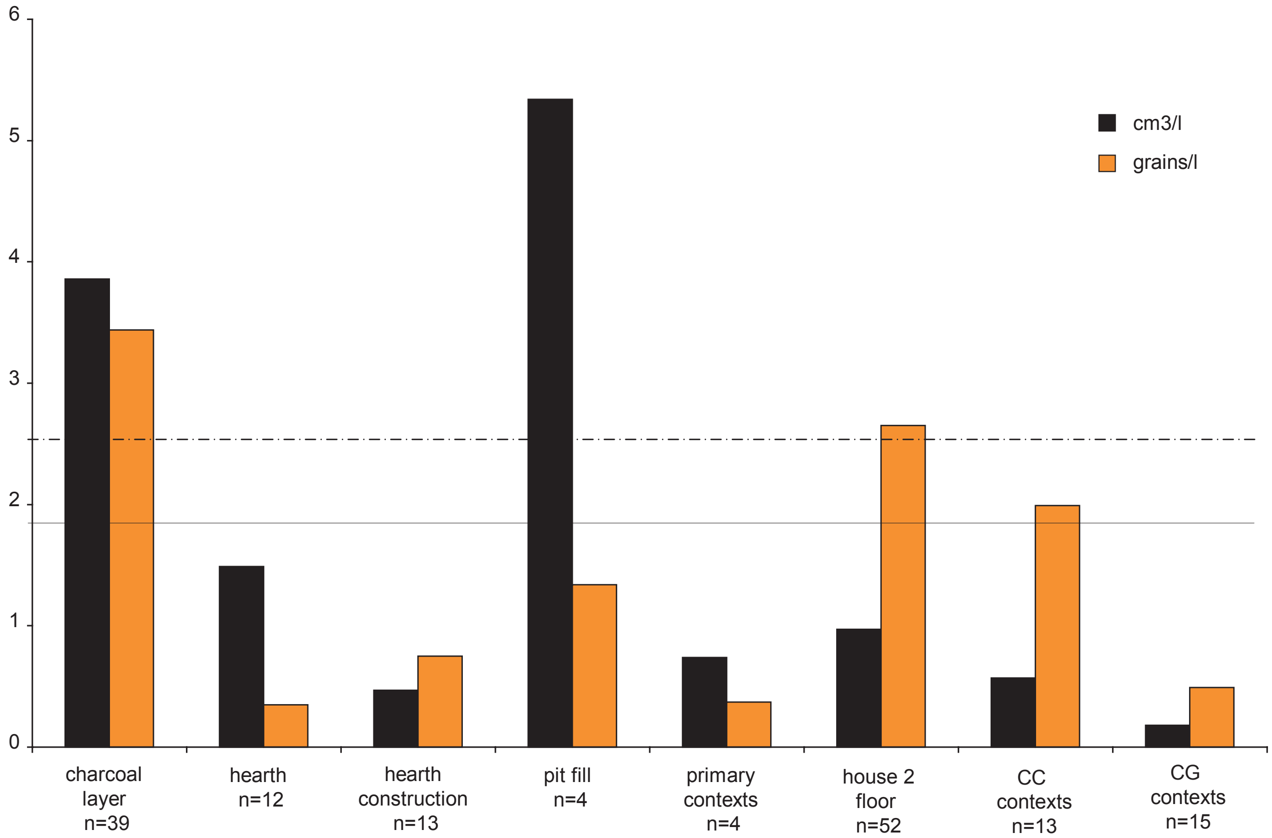


Figure 109. A comparison between the mean densities of Late Iron Age charred remains and the numbers of whole cereal grains per litre [solid line = site mean for densities of remains per litre; dashed line = site mean for whole cereal grains per litre]

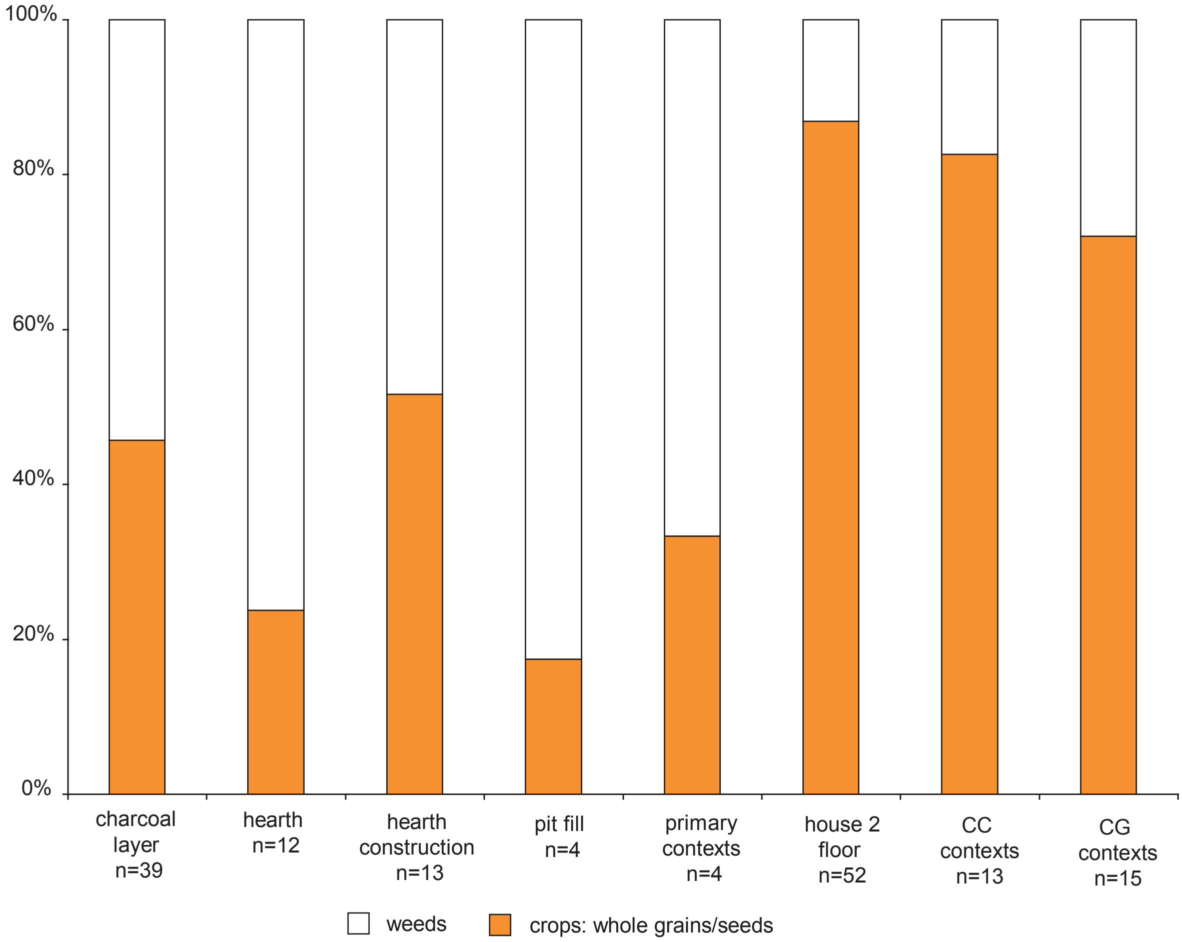


Figure 110. The relative proportions of crops and weeds in the different Late Iron Age contexts [crops comprise cereals identified to species/genus, and flax; only whole grains and whole grain equivalents are included in the calculations]

use of (and subsequent burning of) plant resources. The sample from 9078, on the western edge of the charcoal layer, deserves special mention because it has an extremely high value (relative to all other samples).

Taxonomic composition of the samples

A total of 34 taxa were identified in the mound 1 samples (inclusive of family level identifications, but not of indeterminate types, parenchymatous specimens and amorphous fragments); this is a larger number compared with the range of taxa represented in mound 3. The increase in numbers may, however, be due in part to the fact that identifications of some taxa recovered from mound 3 were taken further for the mound 1 analyses (*e.g.* certain family level identifications have been refined and split into several genera for mound 1) and so does not necessarily represent greater taxonomic diversity.

A majority of the mound 1 samples are dominated by cereal grains, as was the case for mound 3. Figure 109 illustrates clearly that, for four context groups, the crop taxa (comprising mainly cereals) in the samples represent more than 50% of the total numbers of items identified but for the other four (the charcoal layer, hearth deposits, pit fills and primary contexts) there are high percentages of wild/weed taxa. The ratios of intact cereal grains to fragments are variable (Figure 111); the samples in the floor of House 2, pit fills and hearth have more whole grains than fragments and in all other context groups the ratios are reversed. The degree of fragmentation of specimens has previously been used as an index of the state of preservation of charred plant materials and, if this was applied for the mound 1 results, it would tend to suggest that the floor of House 2, the pit fills and the hearth samples were better preserved than those of the other context types (see 'Final report on the archaeobotanical analyses' in Mathews and Postgate 2001). As was stated above, however, the inequality of the sample sizes of the different contexts is likely to have introduced an element of bias into any comparisons, including those concerning the relative proportions of whole to fragmentary items.

In order to be consistent with the mound 3 analyses, the densities of cereal grains per litre of sediment floated for the mound 1 samples were determined after 'whole grain equivalents' (*i.e.* the largest number of either apical or embryo ends for each of the cereal species) had been

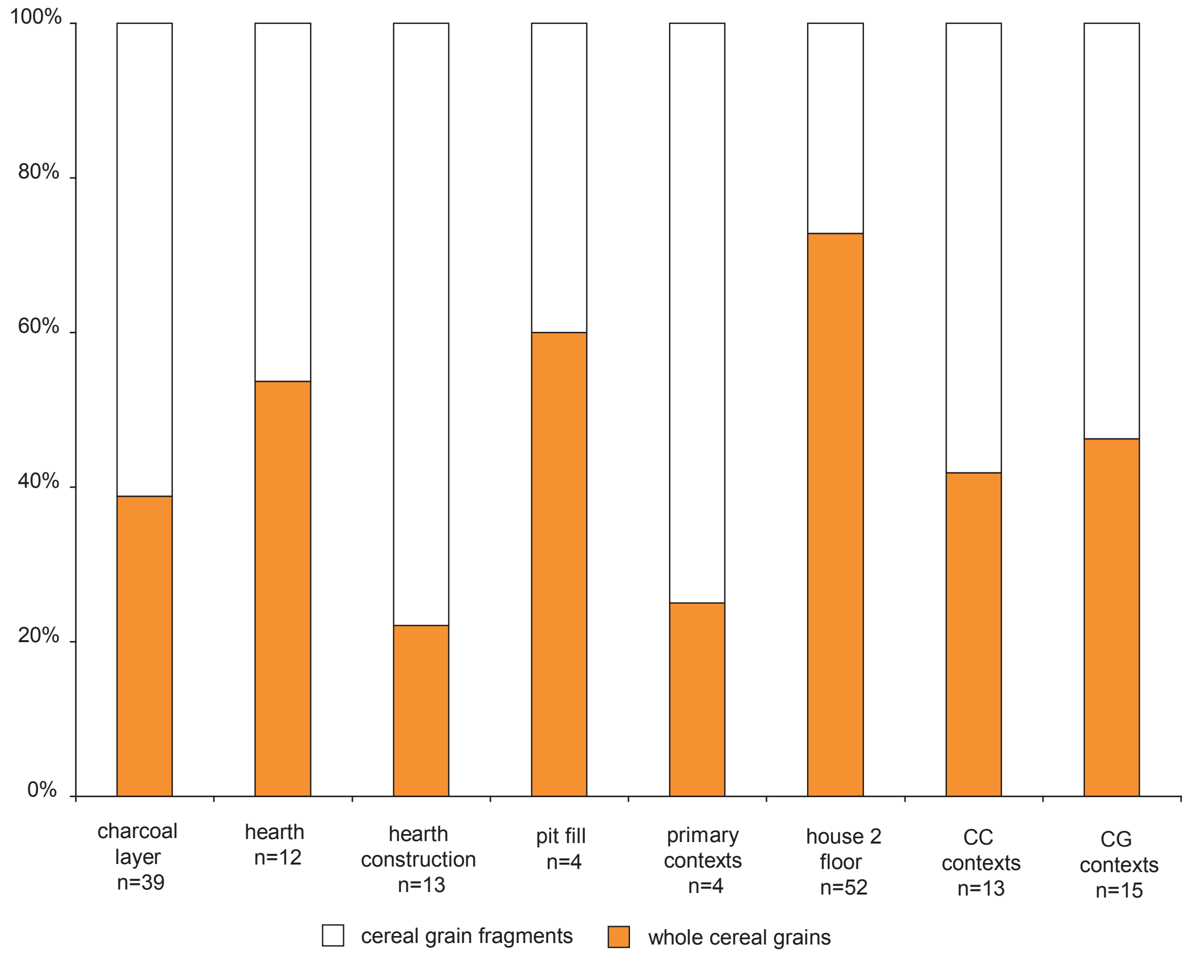


Figure 111. The relative proportions of whole to fragmentary cereal grains in the different Late Iron Age contexts [indeterminate cereal fragments included in the calculations]

calculated and added to the total numbers of intact/whole grains. The mean number of cereal grains (*e.g.* whole grains + whole grain equivalents) per litre for mound 1 is 2.54 (for 127 samples: in 23 samples there were no whole grains or whole grain equivalents and for two samples there were no records of volumes floated) and this value is much lower than that for mound 3 (18.0 cereal items per litre; NB rachis fragments (n=242) as well as grains were included in the totals for mound 3 whereas the three rachis fragments of barley have been excluded from the mound 1 calculations).

A slightly lower percentage of mound 1 samples (17%, n=22) had values higher than the overall mean (26% of mound 3 samples had above average numbers of cereal items). Over half the samples (60%, n=76) had very low densities of less than one grain per litre. A comparison of the mean numbers of grains per litre for each of the context types (Table 63) indicates that two have values above the site mean: the charcoal layer and House 2 floor. Of these, only the charcoal layer was recorded as having a comparably high mean density of charred plant materials, which was also above the site mean. Contrary to the results from mound 3, therefore, it appears that there is minimal correspondence between the density of charred remains and numbers of cereal grains per litre (*cf.* Figure 109), whereas for mound 3 there was significant positive correlation between the two values (a correlation coefficient of 0.975; at 99% confidence level, df=146). All but one of the samples with the highest densities of charred remains had below the mean values for numbers of cereal grains per litre, the exception being sample 8583/457 with a value of 3.60 grains per litre. This suggests that the samples with high densities of charred remains comprised mainly wood charcoal; most of the charcoal-rich samples derived from areas within the house where large burnt structural timbers were excavated (N. Sharples pers. comm.).

The cereals represented in the mound 1 samples are dominated by hulled barley (*Hordeum sativum*) grains (and fragments) and they comprise well over 50% of the total cereal component of each of the context types with the exception of only one: in the samples from the primary contexts, indeterminate cereal fragments are predominant (Figure 112); oat grains (and fragments) occur much less frequently, most notably in the infill layers (CC) and the midden (CG). Their presence in the infill layers (CC) may

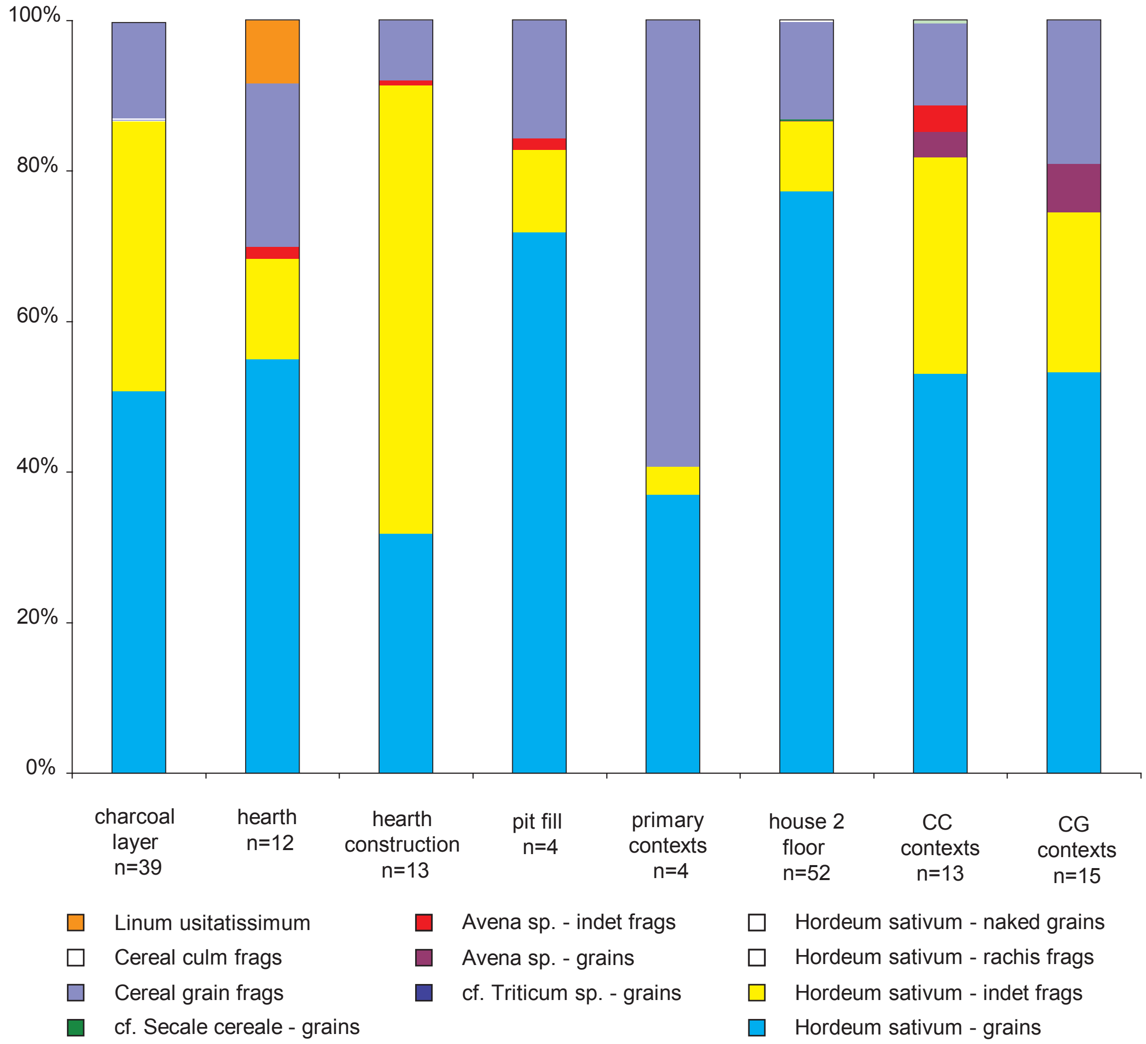


Figure 112. The relative proportions of crop taxa in the different Late Iron Age contexts

	CB	CC	CG	CE	CF
no of samples	124	13	15	11	2
flot volume (cm^3)	930	119.1	52.5	43	14
volume floated (l)	425.5	245.5	247.5	97.2	31
Hordeum sativum	2153	866	196	230	35
cf. Triticum sp. - grains	2	0	0	0	0
Avena sp.	0	74	17	225	20
cf. Secale cereale - grains	6	0	0	2	1
Cereal frags	317	115	50	249	25
Linum sp.	6	4	0	1	1
Weeds/Wild species	1528	127	61	13	4

Table 64. A summary of the charred plant assemblages

indicate contamination from the overlying Norse deposits but the middens are not likely to be contaminated. Grains and chaff of other species are present only in very small numbers, *e.g. Hordeum sativum* rachis fragments in the pit fills and the hearth deposits, *Hordeum sativum* naked grains and *Triticum* indeterminate grains in the charcoal layer and *Secale cereale* grains in the secondary floor.

Flax (*Linum usitatissimum*) seeds were identified in the charcoal layer, the hearth, the secondary floor and the infill deposits (CC) but again the numbers were very low. Full lists of taxa for all samples are presented in Tables 11, 12, 13, 24, 34, 45, 56 and the data are summarised in Table 64.

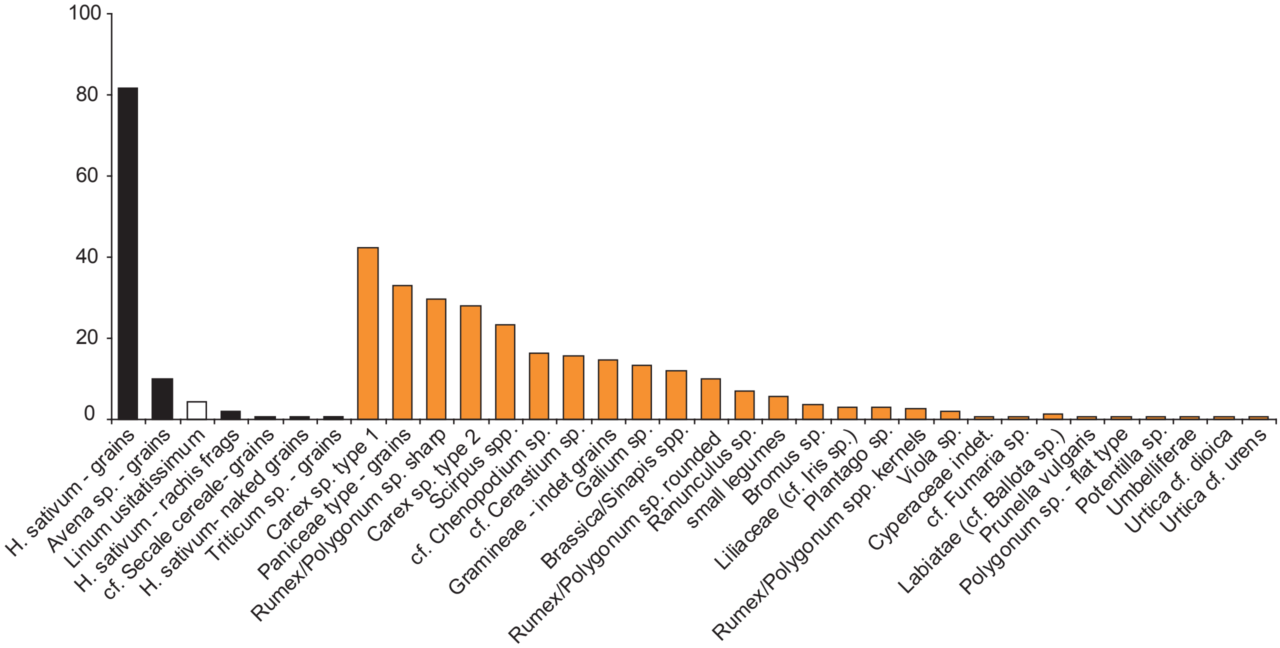


Figure 113. The percentage presence of taxa from mound 1 – all samples

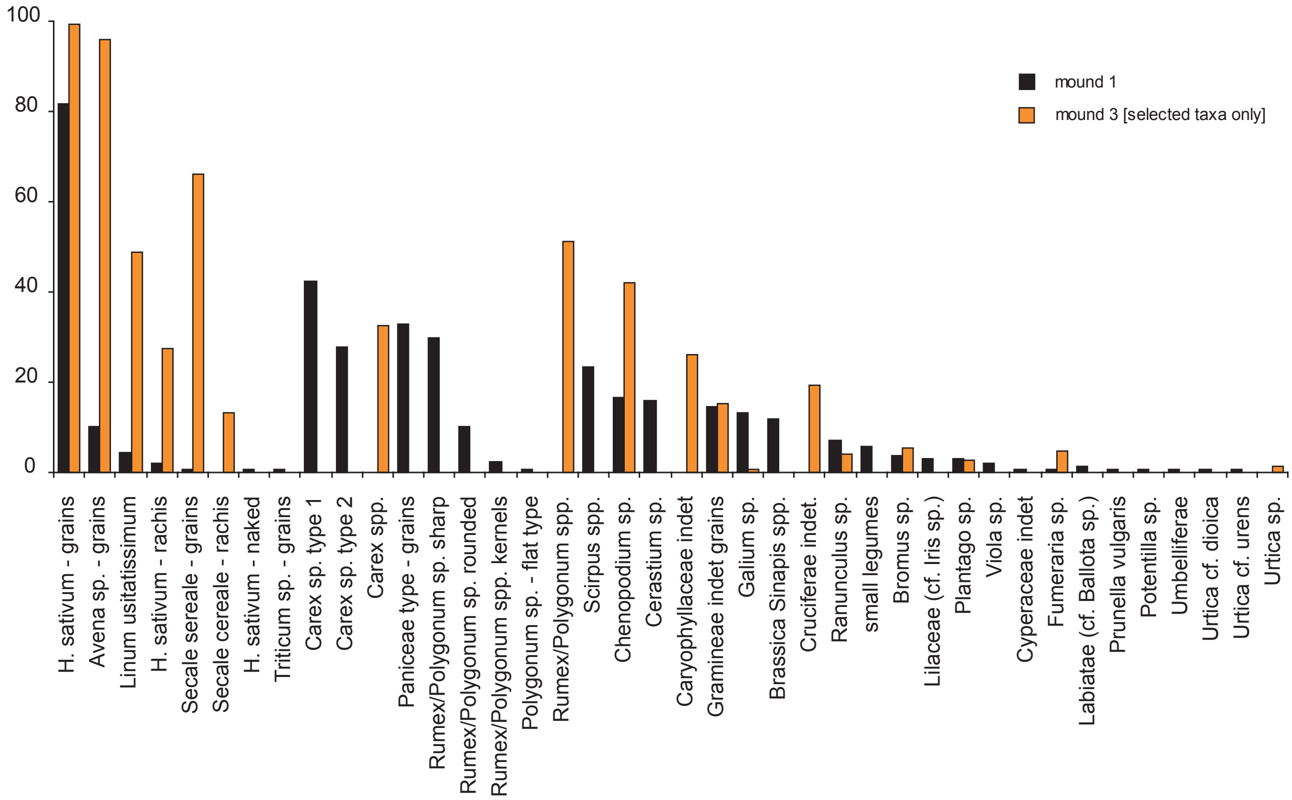


Figure 114. A comparison of the percentage presence of taxa common to both mound 1 and 3 samples

Ubiquity analyses

The analysis of ubiquity (number of samples in which a taxon is present as a percentage of the total number of samples) highlights the predominance of the cereals (more specifically barley) in the mound 1 samples. Figure 113 presents the percentage presence for all the taxa in descending order of frequency of occurrence for the crops and for the wild/weed species; by way of comparison Figure 114 presents the mound 3 data in the same format. The prevalence of hulled barley grains is obvious in mound

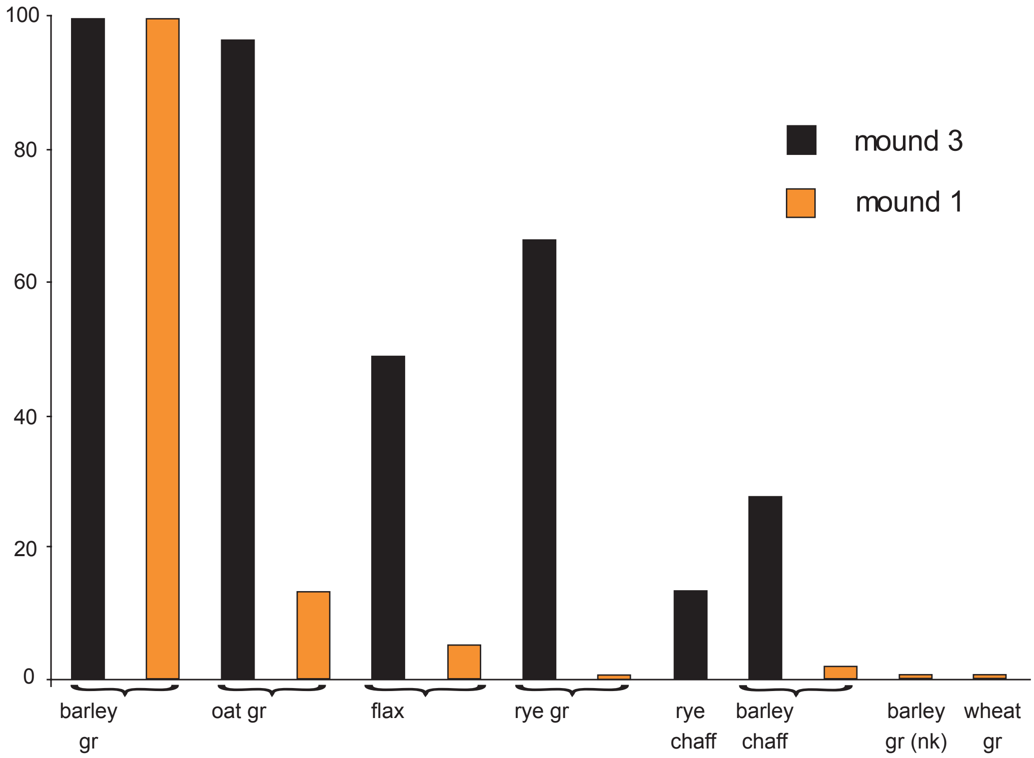


Figure 115. A comparison of the percentage presence of cereals and flax from mounds 1 and 3

1, as is the relative rarity of the other cereal taxa. This is in contrast with the crop spectrum in mound 3 where, in addition to barley, oats and rye were also present in over 50% of the samples. Flax is also far less common in the mound 1 samples, as is cereal chaff, which is only represented by barley rachis fragments (see also Figure 115). Mound 1 appears to have a greater range of wild/weed taxa but, as stated above, this is due to some extent to the fact that certain identification categories in mound 3 have been subdivided (*e.g.* mound 3: *Carex* spp is equivalent in mound 1 to *Carex* types 1 and 2; mound 3: *Polygonum/Rumex* spp is equivalent in mound 1 to *Rumex/Polygonum* sp. round angled and sharp angled types, and *Polygonum* sp. flat type). Certain taxa are represented in mound 1 but not in mound 3, for example, Paniceae types, small legume species, Liliaceae (*cf. Iris* sp.), *Viola* sp., Labiatae (*cf. Ballota* sp.), *Prunella vulgaris*, *Potentilla* sp. and Umbelliferae indeterminate. Conversely, there are notable omissions from the mound 1 list of taxa, for example, *Buglossoides* sp., *Lolium* sp., *Rubus fruticosus*, Compositae indeterminate, *Phalaris* sp. and Solonaceae indeterminate.

As was the case for mound 3, the wild/weed taxa were found in extremely low numbers in a majority of the mound 1 samples. It is interesting to note that the same wild/weed taxa (or taxonomic groups) in both mounds are the most common (*i.e.* present in >10% of samples: Cyperaceae, Gramineae, *Rumex/Polygonum* spp, *Chenopodium* sp., Caryophyllaceae and Cruciferae), with the exception only of *Galium* sp., which was found in one mound 3 sample; five are amongst the least frequently represented in the two mounds (*i.e.* present in <10% of samples: *Ranunculus* sp., *Bromus* sp., *Plantago* sp., *Fumaria* sp. and *Urtica* spp).

Crop taxa

All context types have relatively high proportions of hulled barley grains (and fragments) and cereal fragments and, as has been suggested above, these taxa characterise the samples from mound 1. Oats (grains and fragments) and flax are more common in the infill deposits (CC) than in the other Late Iron Age contexts (Table 64). Samples from the hearth have consistently low presence of barley (grains and fragments) and cereal grain fragments. Otherwise differences between the samples are manifest as crop taxa that are present in small proportions in one or two context types; barley chaff is present only in samples from the hearth, pit fill and the floor of House 2; the charcoal layer has small quantities of grains tentatively identified as naked barley and wheat, and cereal culm fragments were found in this layer and the floor of House 2. The greater range of crop taxa present in the charcoal layer and the floor of House 2 could, however, be due to the fact that there were far more samples taken from these two context types and hence greater likelihood of better representation of the full suite of plants (or plant parts) originally brought to the house (see discussion below).

For comparison, Figure 117 presents the numbers of main crop items per 10 litres of sediment floated for the same context groups. The highest densities of barley grains

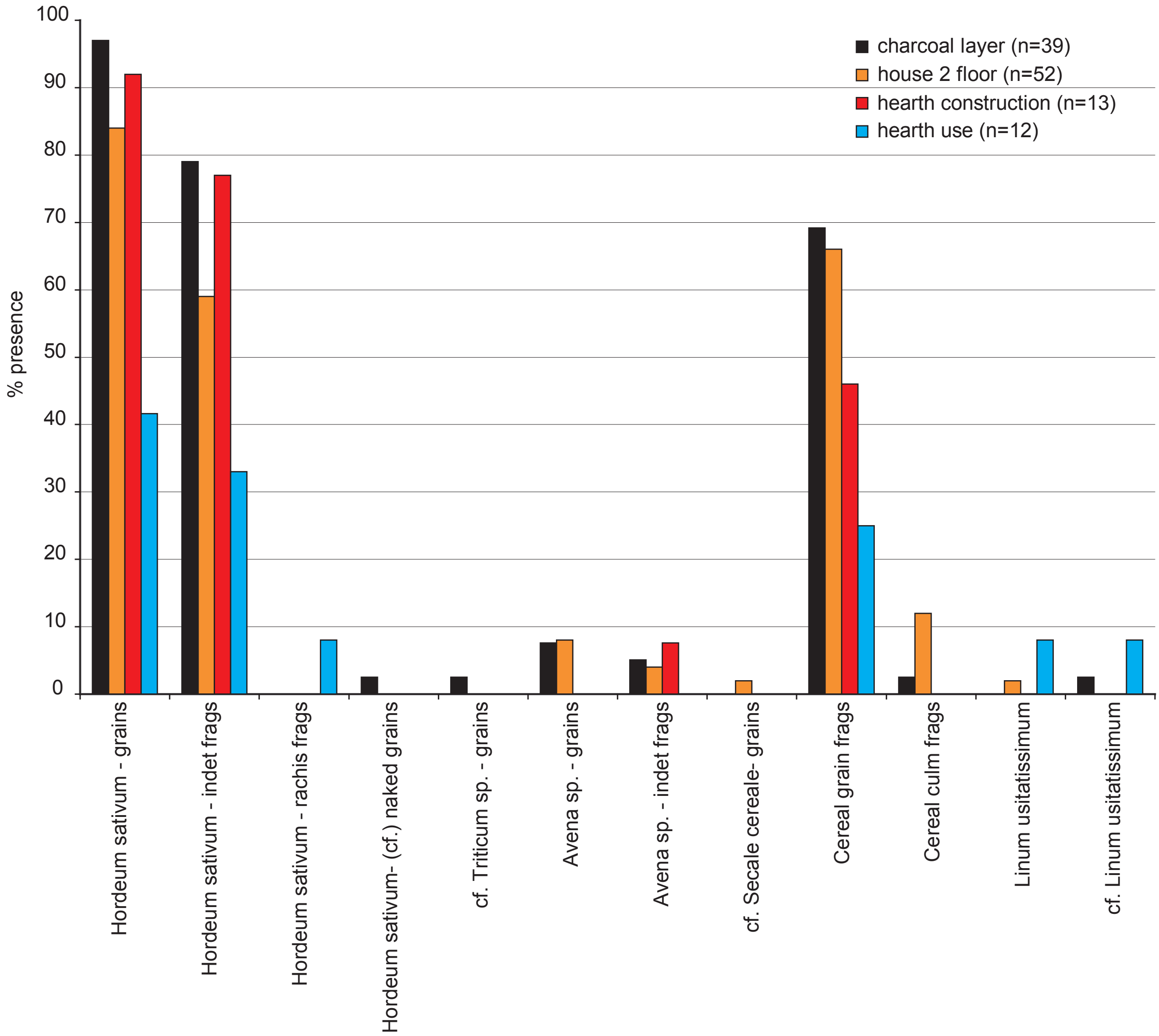


Figure 116. The percentage presence of crop items per litre of sediment

and fragments come from the charcoal layer, the floor of House 2 and the infill deposits (CC) and the highest densities of cereal grain fragments come from the same three context groups. The deposits associated with the hearth construction and use have low densities of both barley and cereal grains. The other contexts have quite variable patterns.

Wild and weed taxa

It appears that the numbers of taxa represented in the different contexts from mound 1 are directly proportional to the numbers of samples that were taken (*cf.* Figure 110 for proportions of weeds to crops). The greater representation of wild and weed taxa in contexts such as the charcoal layer and the house 2 floor (Figure 118) could be due simply to the fact that larger numbers of samples were taken from these two floor layers (Figures 119, 120; as suggested in the discussion of the representation of the crop taxa, see above). Similarly, the lower taxon diversity in the smaller context groups associated with the use of the house (CB) and the infill and midden deposits (CC and CG) can be accounted for by their relatively small sample size. It is with caution, therefore, that comparisons are drawn from the taxonomic composition of the samples from the different context types in mound 1.

Three taxonomic 'groups' occur more frequently in the mound 1 contexts: Cyperaceae (sedges, including *Carex* spp types 1 and 2, and *Scirpus* spp), Gramineae (grasses and in particular Paniceae types) and Polygonaceae (docks/knotgrasses, including *Rumex/Polygonum* spp types and kernels) (Figure 119). Figure 120 shows the low numbers of wild and weed taxa that are represented in the samples from the different context types, with the exception of some belonging to the three above mentioned 'groups', which occur in one or all of the house floors in higher densities than the other taxa.

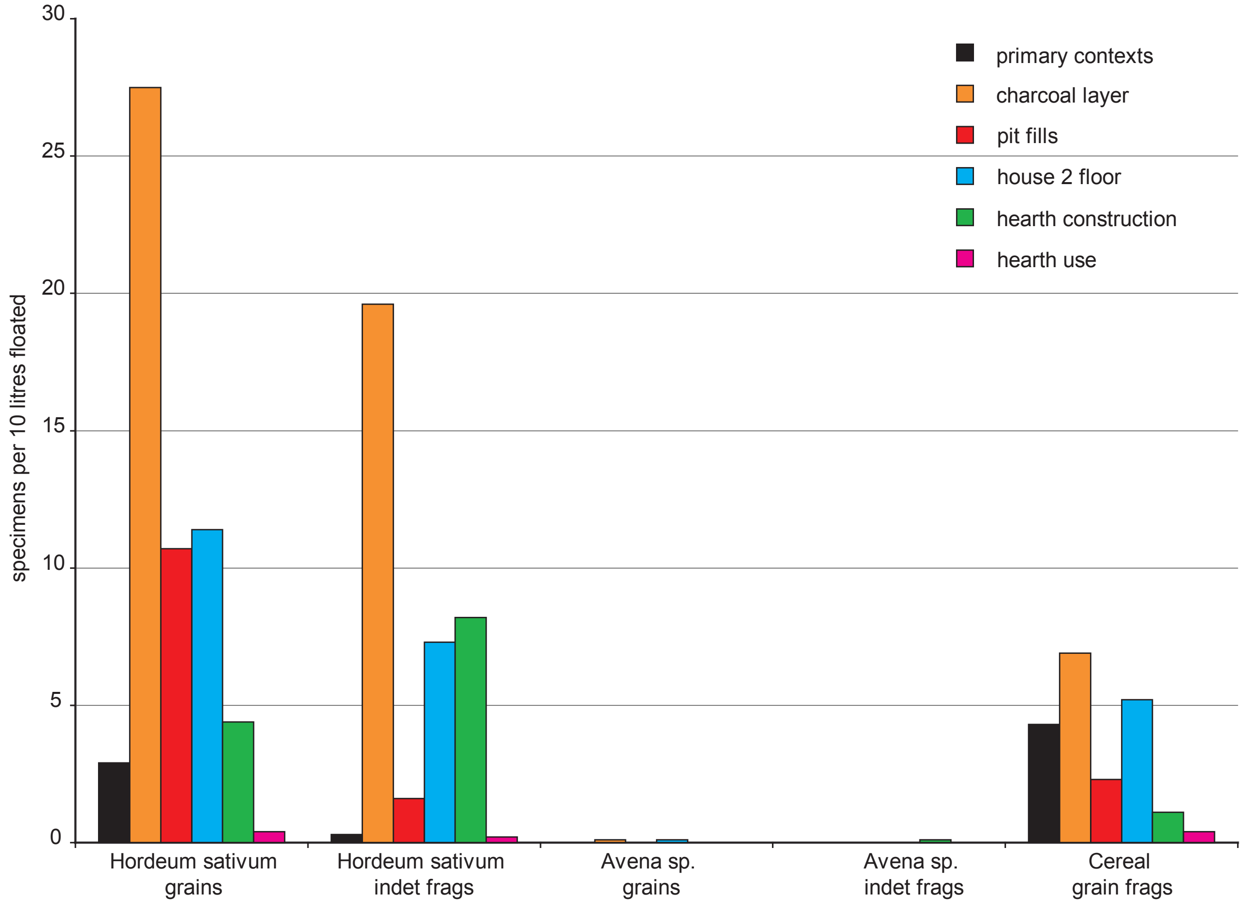


Figure 117. The number of crop items per litre of sediment

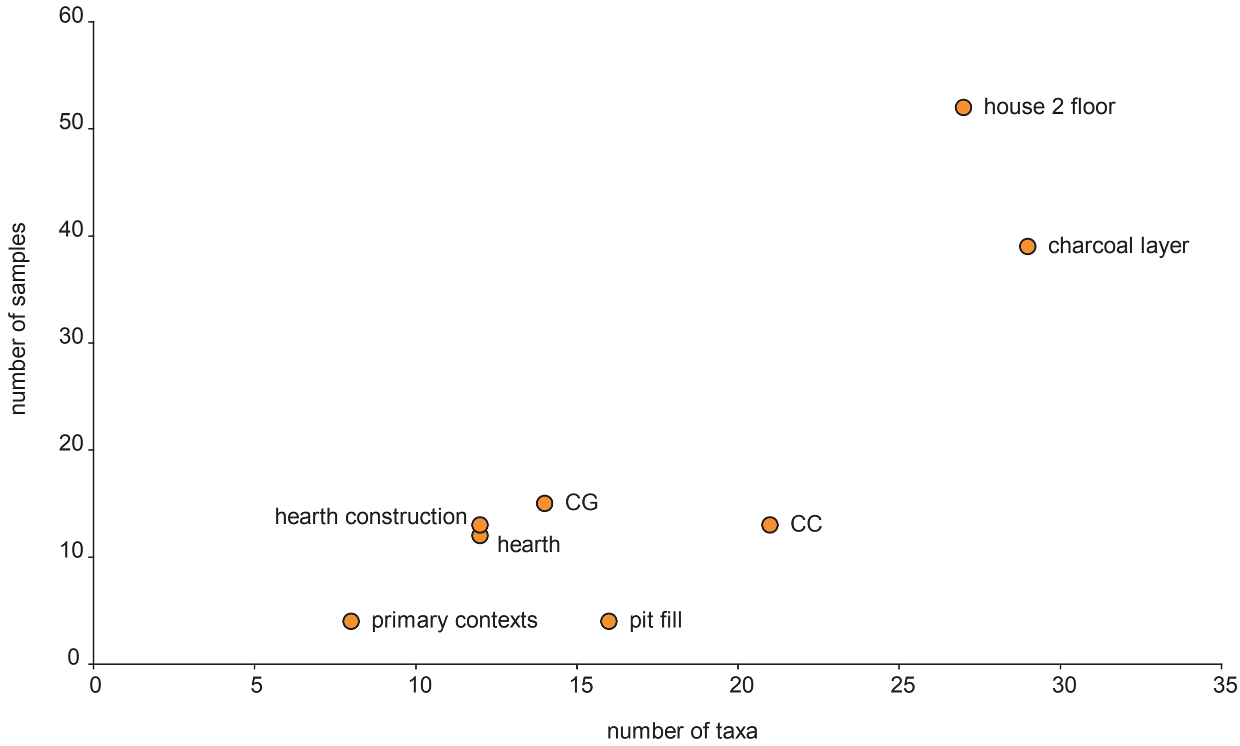


Figure 118. The percentage presence of wild/weed taxa

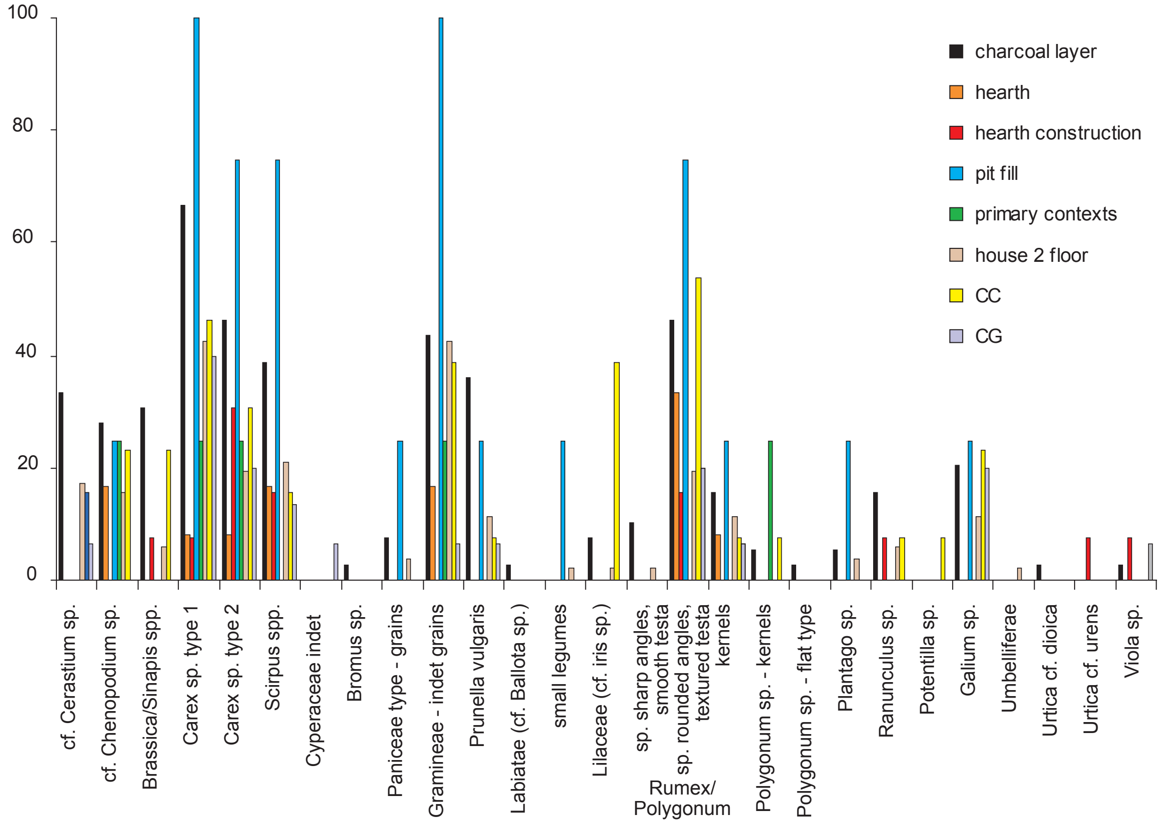


Figure 119. The relationship between numbers of samples and numbers of wild/weed taxa

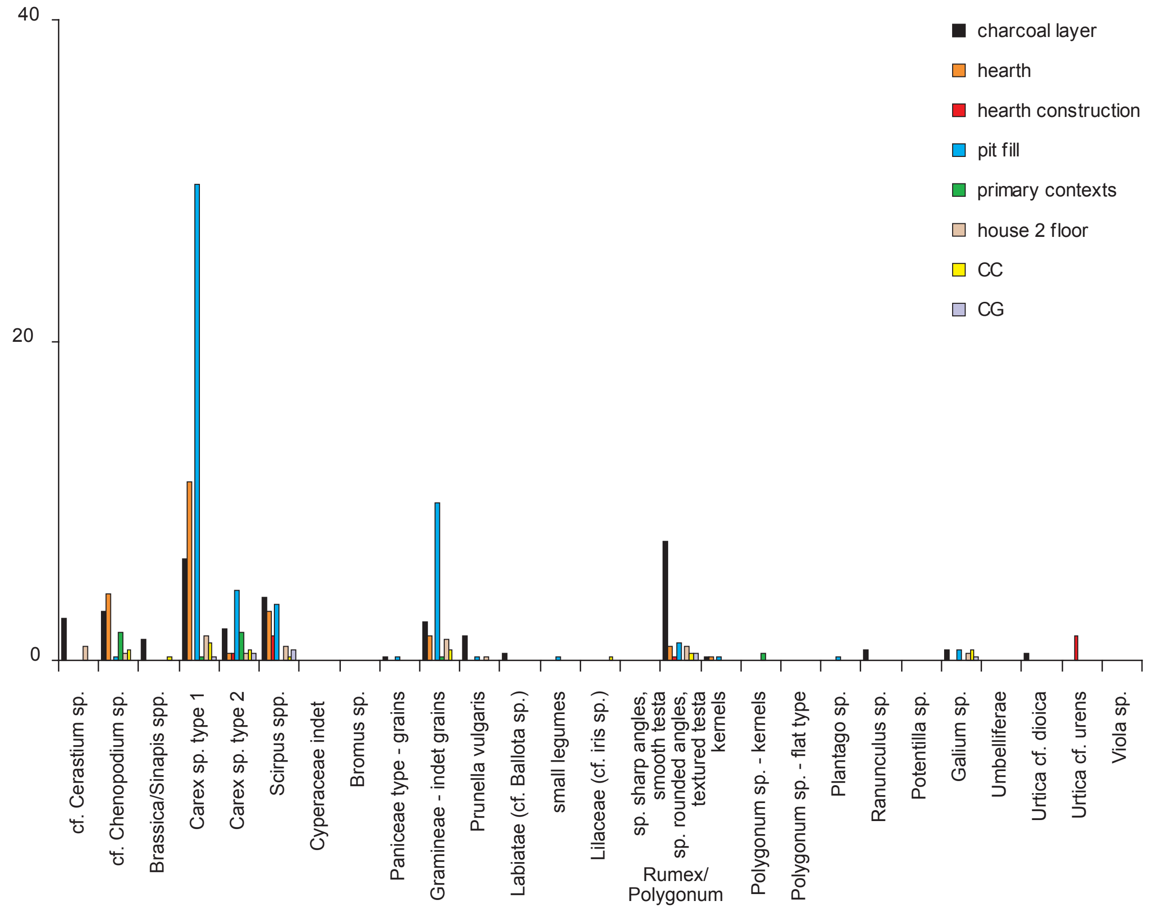


Figure 120. The number of wild/weed taxa per 10 litres of sediment floated

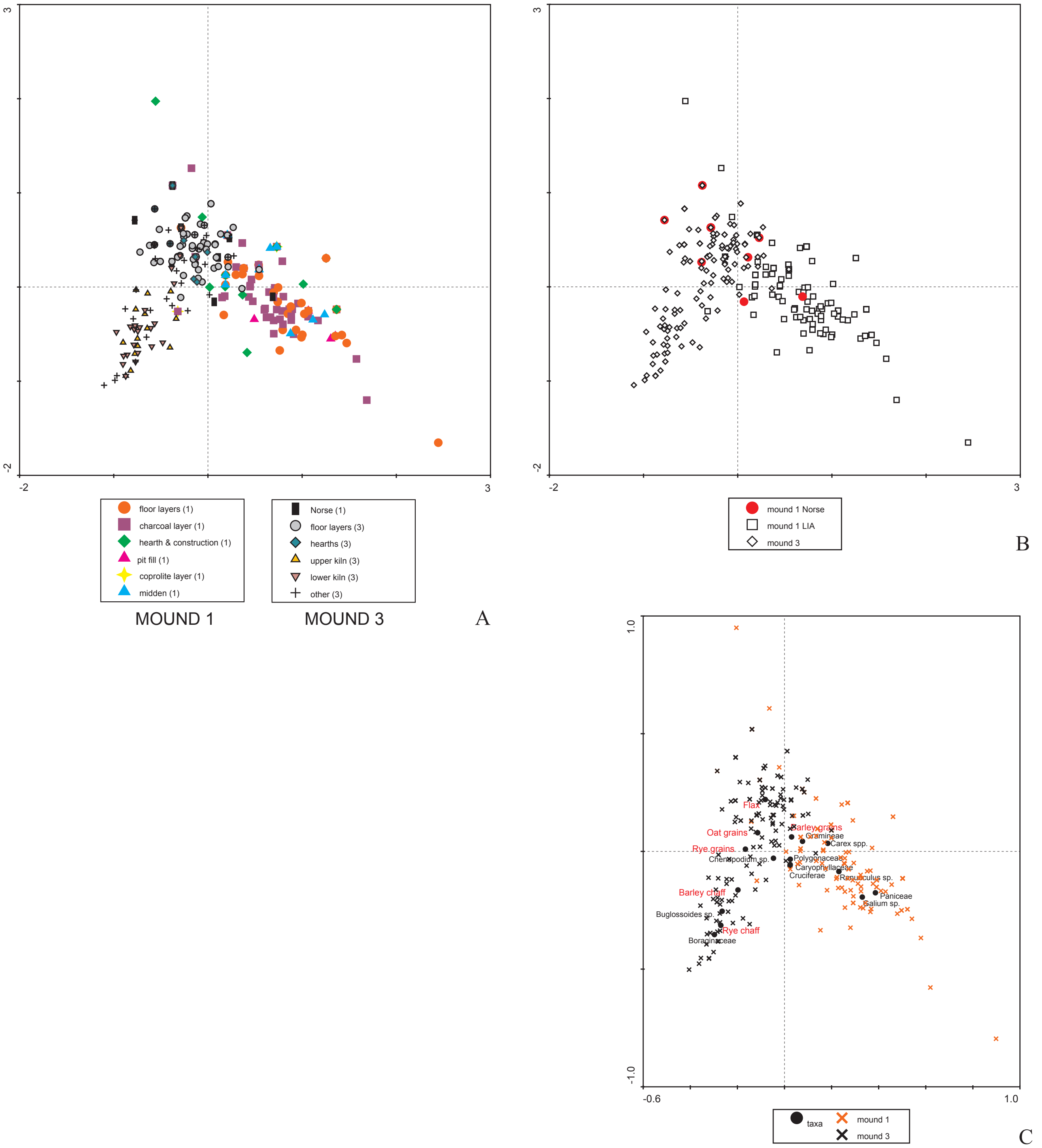


Figure 121. A) A correspondence analysis plot (samples only) for a data set comprising mound 1 and mound 3 samples (context types denoted by different symbols). B) A correspondence analysis plot (samples only) for a data set comprising mound 1 and mound 3 samples (Norse period mound 1 samples highlighted). C) A correspondence analysis plot (bi-plot) for a data set comprising mound 1 and mound 3 samples showing the relationship between the taxa of the samples from the two mounds

Correspondence analysis

Correspondence analysis of an amalgamated dataset of mound 1 and mound 3 samples (Figure 121a) using presence/absence data demonstrates that there is clear separation of the two sets on the first principal axis (axis 1: horizontal), thus showing that the composition of the samples from the two is quite distinct. The dataset in this analysis comprises taxa that are present in more than 5% of samples (those in less than 5% have been excluded) and includes a total of 305 samples and 17 taxa (for the purposes of this analysis the taxonomic categories from both mounds have been standardised to prevent distinction of samples on the basis of 'levels' of identification).

The samples from mound 1 do not show any obvious

Block		Number of samples	*Alnus*	*Betula*	*Corylus*	Ericaceae	*Fraxinus*	Pomoideae	*Quercus*	*Populus/ Salix*	Salicaceae	*Ulmus*	*Juniperus*	*Picea/Larix*	*Pinus*
CB	457	45	1	1	2	1	1	1		1				44	1
	397	15			1	1	2		1	2				13	
CC		10	1	3	1								1	10	
CG		4	1						1		1			4	
CE		3		3	1	1							1	2	
CF		1				1		1	1			1		1	
	Total	78	3	7	5	4	3	2	3	3	1	1	2	74	1
	%		3.85	8.97	6.41	5.13	3.85	2.56	3.85	3.85	1.28	1.28	2.56	94.87	1.28
DB		3			1	2									
DD		24		5	3	15			1		1			2	
DE		1				1									
FC		1		1											
FD		4	1	2	1	1									
FE		1		1											
FF		3		2		1								2	
FG		2		1	1									1	
	Total	39	1	12	6	20			1		1			5	
	%		2.56	30.77	15.38	51.28			2.56		2.56			12.82	

Table 65. A comparison of the occurrence of charcoal in the samples from mounds 1 and 3

differentiation on the basis of the different context types yet it is of note that the house floors and upper/lower layers in the kiln from mound 3 are separated on axis 2. The Norse period samples from mound 1 (blocks CE and CF) have been given different symbols in Figure 121b (using the same dataset) and it is perhaps unsurprising to see that a majority align closely with the distribution of mound 3 samples. This demonstrates the similarity in composition between the later mound 1 samples and those of the same date from mound 3 (see below).

Figure 121c presents a bi-plot for the same analysis (*i.e.* showing the relationship of taxa and samples in the same two-dimensional space). Of note is the fact that the scatters of samples from the two mounds overlap (albeit minimally) or are coincidental at axis 2 and align closely at this point with the distribution of the barley grains; of interest also is that the mound 3 floor layers and hearths (and associated deposits) appear to be have greater internal integrity of composition than the similar context types in mound 1. The separation of the samples from the two mounds on axis 1 can be accounted for not only by the crops that are present in mound 3 but absent (or present in low numbers in a few samples) from mound 1 (*e.g.* barley and rye rachis, rye and oat grains, and flax) but also by the weed taxa that are present or dominant in samples from one or other of the mounds. Descriptions in the previous sections of the samples from mound 1 have already highlighted the most significant differences in composition and correspondence analysis merely clarifies or emphasises the disparity between the two sets of samples.

Charcoal – R Gale

The overall frequency of the charcoal occurrences from mound 1 is presented in Table 65 alongside the results from mound 3. The figures represent the presence of a species in a particular sample not the number of fragments identified. Spruce and/or larch occurred most frequently, recorded in *c.*95% of the samples examined. Both taxa are exotic to Britain and must indicate the collection of driftwood from the foreshore. The overwhelming bulk of the samples were recovered from the Late Iron Age house and large carbonised timbers were observed during excavation in charcoal layer 457 and individually sampled. All but one of these timbers, possibly pine, were identified as spruce/larch and these probably represent the roof of the building.

Spruce/larch was also the dominant species in the other blocks, including those associated with the Viking activity (CE and CF), though very few samples from these deposits produced identifiable charcoal. The predominance of spruce/larch might indicate the presence of residual material in these blocks and this would be not be surprising given the quantities of charcoal that were generated by the burning of the house (CB). However, the presence of spruce/larch in the midden deposits, which are some distance away from the house, could indicate the use of this species as a fuel and suggests that the taxon was commonly available to the inhabitants.

Birch was present in seven samples, largely in blocks CC and CE but including one fragment in the charcoal

	Iron Age					Norse			
Block	CA	CB	CC	CG	Total	CD	CE	CF	Total
Sheep	7	92	83	152	334	1	47	101	149
Sheep/Goat	4	211	419	544	1178	3	143	140	286
Cattle	10	214	380	537	1141	1	160	234	395
Pig	1	35	69	84	189	1	16	39	56
Dog		1			1		1	2	3
Cat			2	1	3		1	2	3
Horse			2		2		3	2	5
Red deer	2	44	80	340	466		34	38	72
Roe deer		1	1		2			2	2
Rodent								2	2
Otter			4	20	24		2	3	5
Carnivore							1		1
Seal		1	2	2	5		1	1	2
Cetacean		1	5		6		6	16	22
Cattle-sized		9	24	90	123		6	15	21
Cattle/red deer			2		2		2	4	6
Sheep-sized		7	51		58	2	13	32	47
Hare/fox size		1		1	2				
Total	24	617	1124	1771	3536	8	436	633	1077

Table 66. The number of identified specimens (NISP) by stratigraphic block

Period	Method	Cattle	Sheep/goat	Pig	Total N
Late Iron Age	NISP	40	53	7	2842
	MNE	49	43	8	1326
	MNI	37	58	5	79
Norse	NISP	44	49	6	886
	MNE	52	40	8	472
	MNI	38	54	8	29

Table 67. Relative abundance (%) of the main species

layer (457) in CB. The examples in CB and in CE were definitely from roundwood and the branch in CE had a diameter of roughly 35 mm. The structure of the roundwood indicated origins from trees growing in optimal or fairly stress-free conditions; if the roundwood was obtained from local sources, the woodland environment must have been relatively sheltered. Hazel was found in five samples in blocks CB (three samples), CC and CE. The fragments from CE included roundwood with a diameter of 8 mm and five to seven growth rings. Four samples included evidence of the heather family (Ericaceae), two coming from CB and the others from CE and CF. Ericaceous species predominate throughout the samples examined from mound 3, being present in 20 of the 39 samples. Whilst not as common as heather, birch and hazel were still more frequent discoveries in the mound 3 samples, occurring in 12 and 6 samples respectively.

The remaining species found on mound 1 (alder, ash, oak, willow, elm, juniper, pine and some members of the hawthorn/*Sorbus* group [Pomoideae]) are present in three or less samples from mound 1. All of the species except for elm and juniper were present in the Late Iron Age house (CB). Alder and juniper were found in infill deposits (CC). Alder, oak and willow appear in the middens (CG). Juniper appears in the Norse activity area (CE) and oak, elm and a member of the Pomoideae appear in the one sample from the Norse middens (CF). Of these species, only isolated examples of alder, oak and willow were found in the samples from mound 3, suggesting a sharp decline in the availability of native timber in the Norse period.

Mammalian bone – J Mulville and A Powell

Four and a half thousand fragments of bone (4613) were identified, of which 77% derived from the Late Iron Age deposits (Table 66). The taxa present demonstrate considerable exploitation of both marine and terrestrial wild resources in addition to the domestic livestock.

The assemblage is subdivided into the stratigraphic units that constitute the site (Table 66). Two of the units, CA and CD, contain less than 26 fragments, and are not included in the detailed analyses. The larger Late Iron

Age units – the house (CB), post-house infill layers (CC) and midden (CG) – contain around 600, 1100 and 1700 identified fragments. The two larger Norse units – the activity area (CE) and midden (CF) – contain around 400 and 600 identified fragments. All three Norse units are affected by problems of residuality, although the midden infilling the house (CF) is the least affected.

Main food species

The main domestic mammals – cattle, sheep/goat and pigs – account for the majority of identifiable bone in the assemblage (Tables 66 and 67), 80% and 82% in the Late Iron Age and Norse periods, respectively. The proportion of the NISP for the major domestic species (cattle, sheep/goat and pig) between the units in the two phases of occupation can be compared. In the Late Iron Age assemblage sheep dominate the domestic stock. The three larger blocks contain 53–55% sheep, 39–41% cattle and 6–7% pig. The Norse material is different with a slight decrease in the numbers of sheep (47–52%) and an increase in cattle (44–45%); pigs continue to make up similar proportions of the stock overall.

Table 67 shows the relative abundance of these taxa by period using the three main methods of quantification NISP, MNI and MNE. By comparing the results indicated by all three methods of quantification, we can estimate the actual populations on the site. All of the methods of quantification have biases and this can be seen in the way the proportions vary; for example, in both periods the predominance of sheep increases using the MNI calculation whilst the proportion of cattle decreases. This increase is often seen and probably relates to the difficulty in identifying and recovering fragments of smaller species. The small amount of pig bone varies in each phase. There is a decrease in abundance using the MNI in the Late Iron Age and an increase in the Norse period. This probably relates to the small quantity of pig present as a figure of 100 NISP per species is recommended for comparison (Hambleton 1999).

The variation in the relative abundance of cattle and sheep between these estimates of abundance suggests that cattle are represented by more bones per individual than sheep and dividing the total MNE by the MNI for each phase bears this out. There are between 20 and 23 bones per individual for cattle and only 12 to 14 for sheep. Thus more sheep material is lost, destroyed, unidentifiable or disposed of elsewhere. Pig have 26 bones per individual present in the Late Iron Age, when the relative abundance falls using the MNI calculated, and only 11 per individual in the Norse period, when the MNI calculation increases their importance. The presence of more pig bones per individual than for any other species in the Iron Age indicates that this species has more of its carcass deposited and recovered from the site. Many zooarchaeological accounts state that pig bone is preferentially destroyed and recent work has verified that the bones of immature modern domestic pig are, on average, more porous than those of other artiodactyls and likely to degrade faster after burial (Robinson *et al.* 2003). Additionally their remains have been reported as preferentially targeted by canids. The greater susceptibility of pig bone to damage does not seem to affect pig representation in the Iron Age, and in the Norse period pig remains have a similar number of elements per individual as sheep. This may again be due to the benign preservational conditions.

As noted on other sites (Mulville in Parker Pearson and Sharples 1999; Mulville in Sharples 2005b), the pronounced difference in the age of cattle at slaughter over time will affect the contribution that different species make to the diet. An adult cow would provide about 400 kg of meat, about 13 times that of an adult sheep at 30 kg (Vigne 1992). A neonatal calf's total weight of around 23.5 kg (*e.g.* Dexter calf average weight; Peacock and Koger 2003) would, in contrast, provide much less meat than an adult sheep. Thus in the Iron Age the diet was probably made up of similar amounts of young beef and mutton but in the Norse period would have been dominated by beef, given the larger carcass size of adult cattle.

Minor species: domestic resources

The distribution of the minor domestic species is presented in Table 66. The few cat bones present were widely dispersed through the site. The Late Iron Age infill layers (CC) contained a cat right humerus and ulna, and a single cat metacarpal was recovered from the middens (CG). In the Norse period cat was represented by a mandible from the activity area (CE) and a right ulna and left radius from the midden (CF). Dog remains were rare, particularly in comparison to the proportion of gnawed bone. There was a dog metapodia in the Iron Age house (CB), whilst the Norse contexts contained one tibia in the activity area (CE) and a second tibia and a metapodia in the midden (CF).

A tiny fragment of horse mandible and a fused first phalanx were recovered from the Iron Age infill layers (CC). Horse remains were also identified in the Norse contexts: another first phalanx from the midden (CF), an axis fragment, a tibia fragment and a third molar in the Norse activity area (CE).

Goat was only identified from a distinctive third phalanx in the Norse period.

Minor species: terrestrial wild resources

Although the mound 1 assemblages were dominated by sheep and cattle, there was a significant proportion of wild terrestrial mammals in the identified mammal bone from Bornais: 13% in the Late Iron Age deposits, decreasing to 8% in the Norse deposits (Table 66); this material consisted almost entirely of red deer. It is evident that red deer constituted an important part of the diet of the inhabitants, more so than pig. The proportion of red deer relative to the main domestic species (Table 69) ranges from 7% to

Phase	Block	Atlas	Mandible	Rib	Vertebra	Earbone	Cetacean NISP	Cetacean Unid	Cetacean Total	% of total NISP plus Unid cetacea
Late Iron Age	CA						0	0	0	0%
	CB			1			1	69	70	11%
	CC	1	2	1	5	1	10	724	734	67%
	CG						0	31	31	2%
	All areas	1	2	2	5	1	11	824	835	24%
Norse		Atlas	Mandible	Rib	Vertebra	Metacarpal		Unid		
	CD			1			1	4	5	63%
	CE		1		5		6	57	63	14%
	CF			14	1	1	16	74	90	14%
	All areas	0	1	15	6	1	23	135	158	14%

Table 68. The distribution of cetacean bone

Taxon	CA	CB	CC	CG	Total LIA	CD	CE	CF	Total Norse
Sheep/Goat	11	303	502	696	1512	4	190	241	435
Cattle	10	214	380	537	1141	1	160	222	383
Pig	1	35	69	84	189	1	16	39	56
Red deer	2	44	80	340	466		34	38	72
Total	24	596	1031	1657	3308	6	400	540	946
% Red	*8%*	*7%*	*8%*	*21%*	*14%*	*0%*	*9%*	*7%*	*8%*

Table 69. NISP by block

8% in the Late Iron Age in all but the midden (CG) which has an astounding 21%. In the Norse period red deer range from 9% to 7% in the activity area (CE) and midden layers (CF). An examination of body part abundances (see below 306) demonstrates that whilst antler is important, it does not predominate. For example, the high proportion of red deer in the midden is not accounted for by an excess of antler pedicles/tines, even though these elements are hard to quantify. Red deer carcasses are therefore being deposited in the midden. The use of antler in comb and tool production will remove antler in the form of finished objects; the pedicles and tips are, however, generally discarded along with other waste fragments.

There was a relatively high number of individual deer compared to the minimum number of elements they were represented by. For example, in the large Late Iron Age blocks there were between 3 and 10 specimens per individual, and in the two Norse blocks between 4 and 10. These figures are less than those for the domestic species, including the smaller pig sample, and suggest that very few bones of any individual were found on-site. This could either indicate that they were a hunted species, and the entire carcass was not returned to site, or that these bones were being preferentially destroyed on the site. The lower values of three bones per individual are found in the floors (CB) and infill layers (CC); this suggests that only a small part of the carcass was being deposited within these contexts. More of the carcass was being deposited in the midden (CG), where values of 10 bones per individual approach those of the other domestic species.

In contrast to red deer, roe deer (*Capreolus capreolus*) was rare. It was represented by only four specimens, an antler and a fused proximal femur both recovered from Late Iron Age contexts and two scapulae recovered from the Norse period, one of which was cut and the other gnawed. The femur was fused, indicating an adult animal (*i.e.* over three years old). Previous work has indicated that roe deer are a small, but constant presence in Hebridean assemblages (Smith and Mulville 2004). Their low numbers are hard to reconcile with an endemic population; roe deer always form only a small part of the assemblages from mainland Britain and the elements present do not point to a sustained trade for meat or antler.

A small quantity of otter (*Lutra lutra*) bones was present, mainly from the Late Iron Age deposits and concentrated in block CG. Table 70 demonstrates the range of elements present. Based on the epiphyseal fusion data, at least three individuals are represented: the midden (CG) contains a fused proximal radius and an unfused proximal ulna, both being elements that fuse by the end of the first year of life (Zeiler 1988), while the house infill (CC) produced a fused proximal femur which must have come from an animal older than two years. Of the remaining elements bearing ageing information, two come from animals older than one year and three from animals younger than two years of age. At least one individual is represented in the Norse deposits.

With both cranial and post-cranial elements the anatomical distribution suggests the presence of otter carcasses rather than just furs. There is some evidence for post-mortem usage of the animals in the presence of chop marks on the femur from the house infill (CC) and it may have been eaten. Although otters are known to have been exploited for their dense fur they appear only in small numbers on other Iron Age and Norse Hebridean sites (*e.g.* Smith and Mulville 2004).

Anatomy	LIA		Norse		Total
	CC	CG	CE	CF	
Mandible	1	2		1	4
Scapula		1			1
Humerus		2		1	3
Radius		1			1
Ulna		1	1		2
Metacarpal		1			1
Pelvis	1				1
Femur	1	1			2
Tibia		1			
Calcaneum		1		1	1
Astragalus		1			1
Metatarsal		3			3
Metapodial	1	2			1
Thoracic Vertebra		1			1
Rib		2			
Total	4	20	1	3	22

Table 70. Otter

The few rabbit bones present are recent intrusions. Two mouse bones, post-cranial and therefore unidentified to species, occur in the Norse material.

Minor species: marine wild resources

The material identified as grey seal includes a mandible fragment and two lower canines recovered from Iron Age infill (CC), with an unfused first phalanx and rib in the midden (CG). In the Norse period there is a seal metapodial (CF) and phalanx (CE). The canines are highly recognisable and, being large, might have been collected for ornamentation or use, whilst flipper bones are usually associated with the presence of seal skins.

As a result of the high degree of modification of whale bone and the predominance of burnt and shattered whale bone, most material could only be allocated to a size grouping with just two species firmly identified, sperm and blue whale. A range of elements were present: mandibles, ribs, vertebrae, a metacarpal and an ear bone (Table 71). Material could be only identified to element when it was either relatively unmodified or the characteristics of the bone indicated a particular element (*e.g.* the dense bone found in cetacean mandibles). Other material could only be described as cancellous bone and, when extremely fragmented, could have derived from whale bone or antler.

Block	Anatomy	Blue whale	Sperm whale	Large cetacean	Dolphin	Small cetacean	Cetacean
CB	Rib						2
	Unidentified						69
CC	Mandible						2
	Atlas				1		
	Ear bone						1
	VT						1
	VX		1			1	2
	Unidentified						724
CG	Unidentified						31
CD	Rib			1			
	Unidentified						4
CE	Mandible						1
	VX						5
	Unidentified						57
CF	Metacarpal	1					
	Rib						14
	VX						1
	Unidentified						74
Grand Total		1	1	1	1	2	988

Table 71. The cetacean bone

Species	CA	CB	CC	CG	LIA		CD	CE	CF	Norse	
					NISP	%				NISP	%
Great northern diver (*Gavia immer*)				1	1	0.3			1	1	1.5
Fulmar (*Fulmarus glacialis*)				1	1	0.3					
Manx shearwater (*Puffinus puffinus*)		1		11	12	3.8					
Gannet (*Sula bassana*)		1	2	2	5	1.6			7	7	10.3
Shag (*Phalacrocorax aristotelis*)		2	2	45	49	15.6		2		2	2.9
Cormorant (*P. carbo*)		1	2	23	26	8.3	1		3	4	5.9
Brent goose (*Branta* cf *bernicla*)				2	2	0.6					
Grey goose (*Anser* sp.)		1		2	3	1.0			3	3	4.4
Duck cf teal (*Anas cf crecca*)			1		1	0.3			2	2	2.9
Duck cf mallard (*Anas cf platyrhynchos*)			1	2	3	1.0					
Duck cf shelduck (*cf Tadorna tadorna*)				2	2	0.6					
Duck cf eider (*cf Somateria mollissima*)			1	1	2	0.6					
Duck sp. (*Anas* sp.)					0	0.0		1	1	2	2.9
Peregrine falcon (*Falco peregrinus*)				1	1	0.3					
Domestic fowl (*Gallus gallus*)									1	1	1.5
Crane (*Grus grus*)			1		1	0.3					
Plover (*Pluvialis cf apricaria*)					0	0.0			1	1	1.5
Lapwing (*Vanellus vanellus*)				1	1	0.3					
Snipe (*Gallinago gallinago*)								1		1	1.5
Curlew (*Numenius arquata*)				5	5	1.6			2	2	2.9
Wader (cf *Haematopus ostralegus*)				2	2	0.6		1	1	2	2.9
Wader (cf *Limosa lapponica*)		2			2	0.6					
Gull cf common (*Larus* cf *canus*)		2	1	9	12	3.8					
Great black-backed gull (*Larus marinus*)			1	32	33	10.5		3	7	10	14.7
Herring/lesser b.-b. gull (*L. argentatus/fuscus*)			9	129	138	43.8		7	8	15	22.1
Great auk (*Pinguinis impennis*)			2	7	9	2.9					
Guillemot/razorbill (*Uria/Alca* spp.)			1	1	2	0.6		2	6	8	11.8
Puffin (*Fratercula arctica*)		1			1	0.3					
Dove (*Columba* cf *livia*)									2	2	2.9
Raven (*Corvus corax*)									1	1	1.5
Passerine	1				1	0.3			4	4	5.9
Total	1	11	24	279	315		1	17	50	68	

Table 72. The bird bone

Bird bone – J Cartledge

Six hundred and thirty-three bird bones or bird bone fragments were examined from mound 1, of which 383 were identified to family or species (Table 72). The species/families identified include gulls, auks, Phalacrocoracidae (cormorants and shags), gannet, great northern diver, Manx shearwater, Columbidae, ducks, geese and several species of wader. There were also single bones from peregrine falcon, crane, raven, fulmar and domestic fowl. There were seven bones from passerines (Passeriformes).

Although there was a wide range of species, mainly seabirds, the majority of the bones came from a range that was relatively limited. The most frequent group was the gull sub-family (Larinae; 54%), mainly large species (herring and/or lesser black-backed and greater black-backed). Phalacrocoracidae (cormorant and shag) were also common, forming 21% of the identified bones. Other more frequent groups were Manx shearwater (3%) and the auk family (Alcidae; 5%). The auk species included razorbill/guillemot, puffin and the now extinct great auk. These few groups account for 87% of the identified bones. If the Minimum Number of Individuals is calculated from the numbers of humeri present (Table 73), the significance of the gull species declines (41%), and the importance of Phalacrocoracidae (26%) and the auk family (13%) increases.

The bulk of the assemblage (73%) came from the Late Iron Age middens (CG) and the next largest assemblage (13%) came from the Norse middens (CF). The latter assemblage must be treated cautiously, however, as the most productive context (312) is one known to be contaminated with Late Iron Age material. Even if this layer were removed from the calculations, however, this would still be the second most productive block on mound 1 and though the

Species	CB	CC	CG	total LIA	CE	CF	total Norse
Great northern diver						1	1
Fulmar			1	1			
Manx shearwater			1	1			
Shag	1		7	8			
Cormorant	1		5	6			
Grey goose			1	1			
Teal						1	1
Eider		1		1			
Domestic fowl						1	1
Common gull			1	1			
Greater black-backed gull			4	4		1	1
Herring/Lesser black-backed gull			15	15	1		1
Great auk			3	3			
Guillemot/Razorbill		1		1		3	3
Puffin	1			1			
Passeriform						3	3
Total	3	2	38	43	1	10	11

Table 73. The minimum number of individuals based on the number of humeri per bird

importance of gulls would decrease, they would still be the most common species. A comparison of the species present in the Late Iron Age and the Norse blocks (Figure 122) shows the Late Iron Age assemblage was dominated by large gulls, cormorants and shags but it also had slightly higher numbers of auks, Manx shearwater, waders, geese and ducks and the only examples of crane and peregrine falcon. The distinctive features of the Norse assemblage were the quantity of gannet remains, the rock dove and the only domestic fowl. Many passerine bones were found, of which most are starlings. The Norse assemblage is similar to the assemblage recovered from mound 3 (Figure 122).

Fish bone – C Ingrem

The >10 mm assemblage produced a total of 716 identifiable fragments of fish bone and included 10 species: sturgeon, herring, conger eel, pollack, saithe, cod, hake, ling, ballan wrasse and plaice. In addition, specimens belonging to the family Salmonidae are present but it was not possible to distinguish between salmon *(Salmo salar)* and brown trout *(Salmo trutta)* during recording. Had it been possible to differentiate between the salmonid species, it would still be impossible to determine whether the bones belong to fish caught in fresh or marine water because sea trout, brown trout and lake trout are all variants of the same species, with only brown trout being non-migratory. The majority of the >10 mm assemblage derives from the Norse middens whilst the other blocks produced comparatively small numbers of fish bone >10 mm. Large gadids dominate this material with cod and hake the most numerous species (Table 74).

The <10 mm material produced a slightly larger sample comprising 925 identifiable specimens (Table 75). In addition to the taxa present in the >10 mm material, eel, elasmobranchs and rockling are also represented. Seven specimens considered identifiable proved problematic and are therefore recorded as unidentified. Overall 17% of the material is identifiable, although this figure is extremely variable by stratigraphic block, ranging from 4% to 44%. The majority of the <10 mm assemblage derives from the Late Iron Age (CG) and Norse (CF) middens, with relatively small amounts recovered from other deposits. A few specimens were recovered from the Late Iron Age infill layers (CC) and the Norse activity area (CE) but because of the disturbed nature of these deposits these are not considered further.

The total amount of fish remains present in the sieved samples has been projected (PNISP) according to the fraction of each sample sorted (Table 76). This indicates that the <10 mm material is likely to contain more than 12,000 identifiable fish bones derived mainly from the Late Iron Age and Norse midden deposits.

Although saithe can grow to over a metre in length, almost all of the bones recovered from Late Iron Age deposits belong to fish estimated to have been small (300–150 mm) or very small (<150 mm) (Figure 123a). The saithe assemblage recovered from Norse deposits contains fewer specimens yet a considerable proportion are from large (600–1200 mm) saithe and most of the remains of other cod-family fish also derive from large individuals (Figure 123c).

Herring do not grow much above 400 mm so it is unsurprising that most belong to the small/medium size category (Figure 123b), estimated as approximately 300 mm total length.

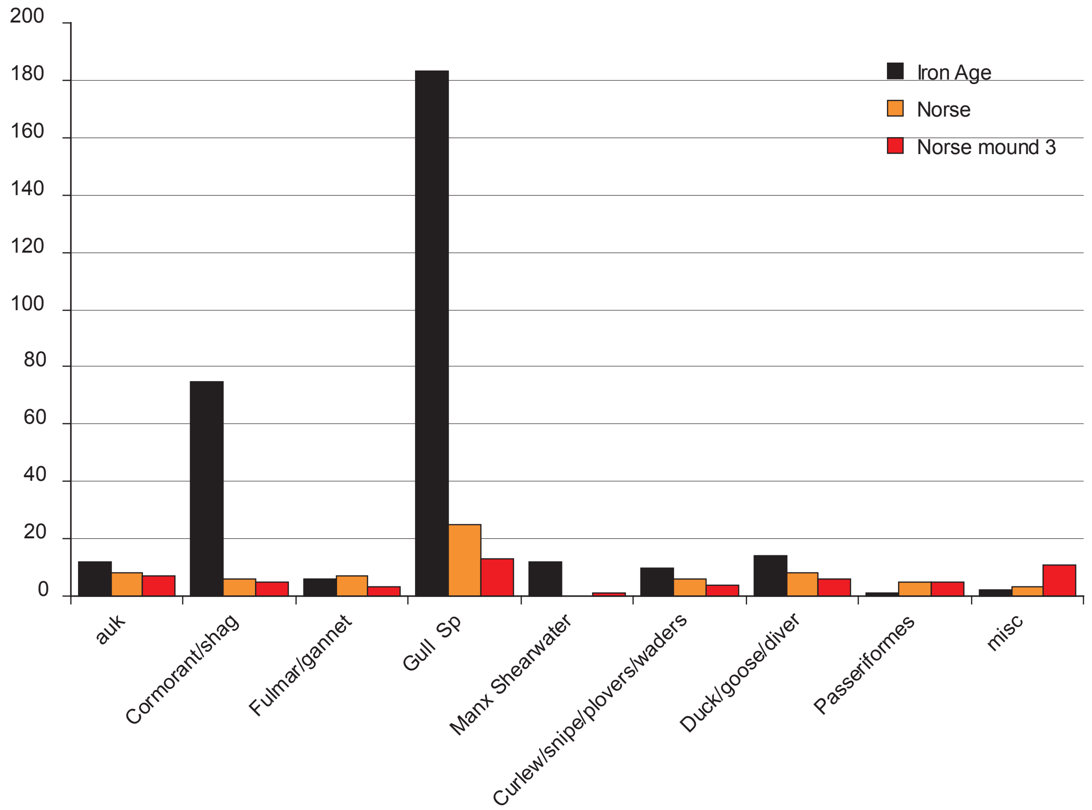


Figure 122. The bird species recovered from the Late Iron Age and Norse contexts on mound 1 and the Norse contexts on mound 3

	Late Iron Age			Norse		
	CB	CC	CG	CE	CF	Total
Acipenser sturio			14			14
Clupea harengus	1				1	2
Salmonidae spp	1		5			6
Conger conger					1	1
Pollachius pollachius	1				1	2
Pollachius virens	2		1		15	18
Gadus morhua	4	2	18		264	288
Merluccius merluccius	2		9		149	160
Molva molva			1		44	45
Large gadid	4		7	6	154	171
Labrus bergylta	1					1
Labridae spp			3		2	5
Pleuronectes platessa			1			1
Flatfish			2			2
Unidentifiable	38		23	4	743	808
Total	54	2	84	10	1374	1524
Total identified	16	2	61	6	631	716
% identified	*30*	*100*	*73*	*60*	*46*	*47*

Table 74. Fish species representation in >10 mm material (NISP)

	Late Iron Age				Norse				Total	u/s
	CB	CC	CG		CD	CE	CF			CC/CE
	n	n	n	% of identifiable	n	n	n	% of identifiable	n	n
Elasmobranchs	2								2	
Clupea harengus	1	4	1	<1	18	21	246	77	291	3
Salmonidae spp	6	2	91	19			7	2	106	
Anguilla anguilla	4	1	2	<1		1	3	1	11	1
Conger conger							1	<1	1	
Pollachius pollachius						1	2	1	3	
Pollachius virens	33	6	351	72		3	26	8	419	1
Pollachius spp							1	<1	1	
Gadus morhua							2	1	2	
Merluccius merluccius					1		7	2	8	
Gaidropsarus/Ciliata spp	2					1	1	<1	4	
Large gadid					2	1	9	3	12	
Small gadid	9		28	6			6	2	43	
Ballan wrasse						1	5	2	6	
Labridae spp	1								1	
Flatfish			14	3			1	<1	15	
Crab							1	<1	1	
Unidentified	2		2				3		7	
Unidentifiable	148	277	617		162	189	3192		4585	46
Total	208	290	1106		183	218	3513		5518	51
Total identified	58	13	487		21	29	318		926	5
% identified	*28*	*4*	*44*		*11*	*13*	*9*		*17*	*10*

Table 75. Fish species representation in <10 mm material (NISP)

	Late Iron Age						Norse						Total
	CB		CC		CG		CD		CE		CF		
	n	%	n	%	n	%	n	%	n	%	n	%	
Elasmobranchs	16	5											16
Clupea harengus	1	<1	44	44	16	<1	216	90	240	71	2360	69	2901
Salmonidae spp	31	11	10	10	1440	19					48	1	1529
Anguilla anguilla	21	7	8	8	16	<1			16	5	24	1	149
Conger conger											8	<1	8
Pollachius pollachius									8	2	20	1	28
Pollachius virens	166	57	37	37	5592	72			33	10	472	14	6364
Pollachius spp											16	<1	16
Gadus morhua											12	<1	12
Merluccius merluccius							8	3			124	4	132
Gaidropsarus/Ciliata spp	9	3							16	5	4	<1	29
Large gadid							16	7	16	5	164	5	196
Small gadid	46	16			448	6					112	3	608
Ballan wrasse									8	2	36	1	44
Labridae spp	1	<1											1
Flatfish					224	3					8	<1	232
Total	291		99		7736		240		337		3408		12265

Table 76. Projected quantity of fish bone in <10m m material (NISP)

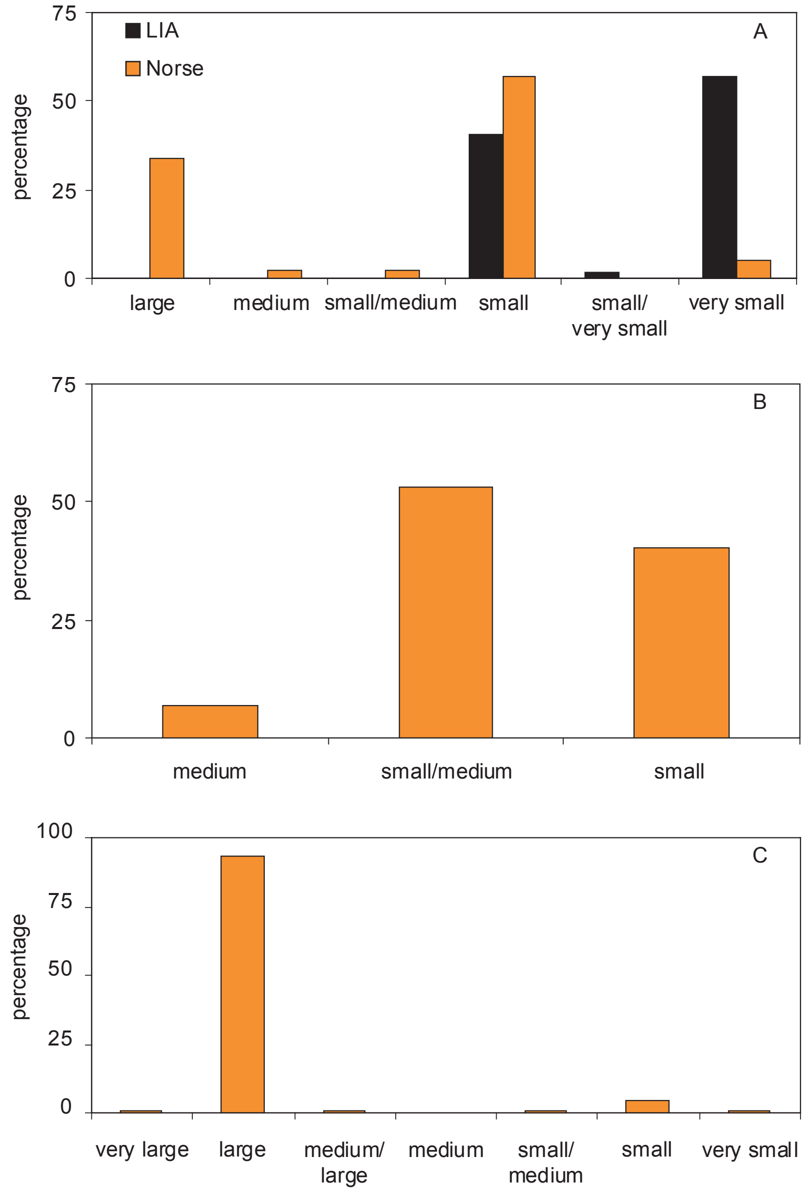


Figure 123. Estimated size of selected fish taxa (%): a) Pollachius virens in the Late Iron Age and Norse deposits (LIA n=392, Norse n=44); b) Clupea harengus from Norse deposits (n=251); c) All Gadidae taxa from Norse deposits (n=694)

Comparison of blocks

The small size of the samples from all but the midden deposits renders comparative analyses of the characteristics of the assemblage unreliable, apart from possibly the relative representation of the various taxa and the density of fish bone.

Species representation

Figure 124 shows species representation (based on NISP for the >10 mm material and PNISP for <10 mm material) for taxa that comprise more than 5% of the identifiable assemblages. Saithe are predominant in Late Iron Age deposits; they comprise more than half of fish bone from the Late Iron Age house (CB) and about three-quarters of the remains from the Iron Age midden layers (CG). The abundance of herring in the infill layer (CC) is therefore surprising and in light of the small number of identifiable bones (NISP=13) is likely to be a function of sample size. Most of the other remains belong to salmonid (Figure 124).

The pattern of species representation in deposits dated to the Norse period is very different (Figure 124). Herring are the dominant species in all deposits but particularly so in deposits recovered from the Norse structures (CD). Members of the Gadidae family, namely saithe, cod and hake, comprise a considerable proportion of the midden assemblage (CF) and most of their remains derive from large fish (Figure 123c).

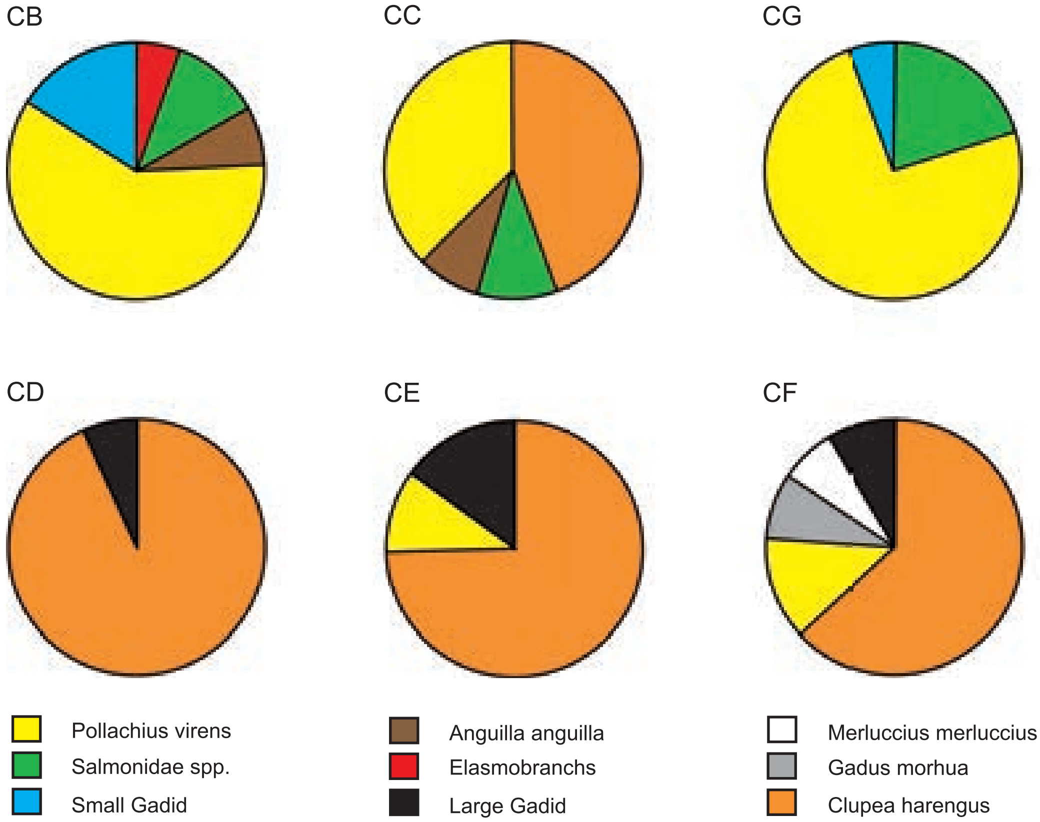


Figure 124. Relative fish species abundance according to block (% NISP and PNISP)

	Late Iron Age			Norse			Total
	CB	CC	CG	CD	CE	CF	
Acipenser sturio			14				14.0
Elasmobranchs	0.9						0.9
Clupea harengus	1.1	2.6	0.4	19.6	16.5	120.0	160.1
Salmonidae spp	3.3	0.4	34.6			2.2	40.5
Anguilla anguilla	2.0	0.2	1.8		0.8	1.1	5.9
Conger conger						0.4	0.4
Pollachius pollachius	0.8				0.4	2.0	3.1
Pollachius virens	17.5	1.8	138.3		7.1	22.5	187.2
Pollachius spp						0.7	0.7
Gadus morhua	2.4		18.0			2.8	23.2
Merluccius merluccius	1.8		8.8	1.1		8.7	20.4
Molva molva			1.0			1.0	2.0
Gaidropsarus/Ciliata spp	0.9				0.5	0.2	1.6
Large gadid	3.8		7.0	2.3	6.8	6.9	26.8
Small gadid	4.1		10.0			4.9	18.9
Labrus bergylta					0.4	1.6	1.9
Labridae spp	0.3		3.0				3.3
Pleuronectes platessa			1.0				1.0
Flatfish			7.0			0.4	7.3
Total	38.8	5.0	244.7	23.0	32.5	175.3	519.4

Table 77. Density of identified fish bone (per litre of soil excavated) in <10 mm (Projected NISP) and >10mm material (NISP)

Density of fish bone

Density has been calculated for the identifiable material recovered from floated samples where the number of litres excavated is known; for the <10 mm material the calculation is based on projected NISP and for the >10 mm material the actual NISP (Table 77). As the litreage is not known for the >10 mm material collected on site, comprised mainly of material from the Norse midden (CF), it is excluded from the density calculation. The number of excluded fragments is shown separately in Table 78.

In the Late Iron Age deposits, the midden layers (CG) produced the highest density of identified fish bone with 224 fragments per litre; this is considerably higher than other Late Iron Age deposits as only 39 fragments per litre came from the house (CB) and just five fragments per litre were recovered from the infill layers (CC).

The Norse midden layers (CF) also produced a high density of fish bone with 170 fragments per litre. Although this is slightly lower than the density associated with the Late Iron Age midden (CG), the figure has been deflated by the exclusion of the large number (n=615) of >10 mm remains recovered on site. Densities from the activity area (CE) and structures (CD) are considerable lower at 37 and 23 fragments per litre respectively.

Human bone – A L Carter

The collection of human skeletal remains from mound 1 comprised seven fragments and the distribution of these bones and tooth is summarised in Table 79. The Norse deposits were the more productive: a large fragment of skull and one fragment of long bone came from the midden deposits (CF), and a possibly related skull fragment was associated with a wall (CD) in the same part of the site. Finally an isolated tooth was found in a soil horizon in the activity area (CE)

The fragment of skull from the Norse midden layer (322, CF) is roughly 70 mm by 52 mm but has been broken into four pieces in antiquity. There is evidence for burning or charring on two sides. It probably comes from the parietal area of the skull, given the deep vein indentations on the interior surfaces. A lack of identifiable markings, such as sutures, means that these skull fragments could not be identified any more precisely. The thickness and shape of the further fragment from CD suggest it belonged to the frontal area of the skull. It has longitudinal markings on one side of the bone. The long bone fragment (322, CF) has a spiral fracture on the bone showing the internal cancellous bone covered by the harder compact bone. There has been some possible bone re-growth on the external surface towards the more angular end. Estimating the diameter of the bone and the thickness of the compact bone indicates a large bone but it has not been possible to collect dimensions.

The tooth is a human permanent maxillary tooth. It is a second premolar tooth from the right-hand side of the mouth. A small cavity is evident at the distal end of the cusp fold. The cavity is very small, suggesting that it only developed a short time prior to the individual's death. Dentine is evident on the lingual side of the tooth, as a result of wear. The tooth can be aged to a minimum of 12–13 years given the total formation of the root. A maximum age cannot be determined owing to the lack of other teeth from the same maxilla or mandible but the amount of wear suggests a person older than a teenager. A fracture is evident bucco-lingually across the tooth. It is not possible to say whether it is ante-, peri- or post-mortem as teeth do not remodel after damage.

	Late Iron Age		Norse		Total
	CB	CC	CE	CF	
Clupea harengus				1	1
Conger conger				1	1
Pollachius virens				15	15
Gadus morhua		2		258	260
Merluccius merluccius				142	142
Molva molva				42	42
Large gadid			1	154	155
Labrus bergylta	1				1
Labridae spp				2	2
Total	1	2	1	615	619

Table 78. Fish bone from >10 mm material excluded from 4.17a (NISP)

Context	Sample	Block	Element
322		CF	Skull fragment (parietal)
322		CF	Skull fragment (parietal)
322		CF	Skull fragment (parietal)
322		CF	Skull fragment (parietal)
322		CF	Long bone fragment
323		CD	Flat bone fragment
372	2675	CE	2nd premolar

Table 79. The human bone from mound 1

Marine shell and crab – N Sharples and J Light

The marine shells are dominated by a large assemblage of limpets and winkles. The >10 mm residues from the sorted samples produced a total of 1664 limpets and 2072 winkles but the preferences for different species vary from period to period and block to block. The preference in the Late Iron Age appears to be for limpets and only the small assemblage from the infill layers (CC) shows a preference for winkles (Table 80). The deposits in the middens (CG)

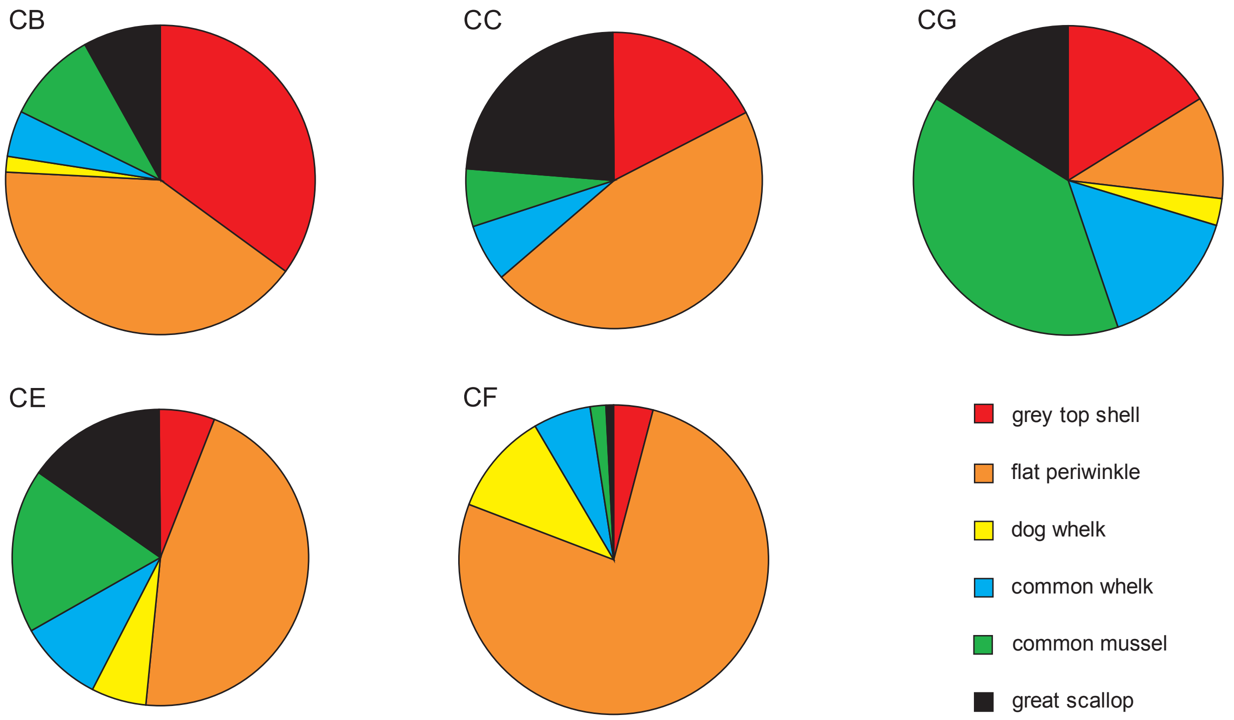


Figure 125. A comparison of the six most common species of sea shell, other than limpets and winkles, from the main stratigraphic blocks

have a strong preference for limpets whereas the deposits in the house show only a slight preference for limpets. In the Norse activity area (CE) there is a slight preference for limpets but this is masked by a massive increase in the amount of winkles present in the middens (CF) infilling the house, but both species are much more common in these samples than in all the other blocks. The increased importance of shellfish is also indicated by an enormous pile, probably containing thousands, of winkles (context 348) which was one of the first fills of the Norse house (CF). The Norse preference for winkles was also visible in the mound 3 samples where they were seldom less than 75% of any assemblage (Sharples 2005b).

The other identified shellfish present are blue-rayed limpet, grey and painted top shell, flat periwinkle, northern cowrie, common whelk, dog whelk and netted dog whelk, common mussel, great and queen scallop, oyster, Icelandic cyprine, cockle, chequered carpet shell and razor shell (Table 80). Quantifying the assemblage is difficult as the collection strategy varied. Excavators were encouraged to collect any non-limpet or winkle shells encountered and this has resulted in the recovery of a reasonable assemblage of mussel, scallop, oyster and common whelk shells as these are large noticeable shells. Most of the smaller species, notably the top shells and the periwinkles, were recovered from the flotation samples. The mixed nature of the collection therefore makes detailed quantified comparisons difficult as many more Late Iron Age deposits were floated. Nevertheless, there is a significant difference between the material in the Late Iron Age and Norse assemblages (Figure 125). In both assemblages the largest group of shells other than limpets and winkles consists of flat periwinkles but in the Late Iron Age assemblage the house floors (CB) have a substantial assemblage of grey top shells (and a few painted top shells) and both the house (CB) and the midden (CG) have produced assemblages of common whelk, common mussel and great scallops. None of these species are common in the Norse period where the second most common species is the dog whelk.

Three crab taxa have been identified from the mound 1 samples, based upon the chelae (Table 81). Although fewer in number and containing less well-preserved material than the assemblage from mound 3, the mound 1 assemblage shows distinct patterning. Very little crab shell was present in the Iron Age contexts. In contrast the contexts assigned to Norse middens contain larger quantities of crab shell, most of which is *Cancer pagurus.* A minority is *Carcinus maenas* with one *Liocarcinus* sp. chela fragment. The crab shell fragments are from small animals, even of the large species *Cancer pagurus*.

These differences may be caused by a number of possible factors including a change in dietary preferences, differential use of seaweed, landscape changes or chance as the assemblages are not large. It is possible that the presence of the scallops, common whelks and top shells in the Late Iron Age deposits reflects an interest in these as shells. It has been noted (see below 262, 271) that all of these shells have been made into artefacts by deliberate shaping into discs and/or piercing a hole for suspension. Many of the scallop shells could be either raw material or

	Patella vulgata (L.), common limpet	*Halcion pellucidum* (L.), blue-rayed limpet	*Calliostoma zizyphinum* (L.), painted topshell	*Gibbula cineraria* (L.), grey top shell	*Littorina littorea* (L.), winkle	*Littorina obtusata* (L.), flat periwinkle	*Trivia artica* (L.), northern cowrie	*Nucella lapillus* (L.), dog whelk	*Buccinum undatum* (L.), common whelk	*Hinia reticulata* (L.), netted dog whelk	*Mytilus edulis* (L.), common mussel	*Ostrea edulis* (L.), common or flat oyster	*Pecten maximus* (L.), great scallop	*Aequipecten opercularis* (L.), queen scallop	*Artica islandica* (L.), Icelandic cyprine	*Cerastoderma edule* (L.), common cockle	*Tapes decussatus* (L.), chequered carpet shell	*Ennis* spp, razor shell	*Terenidae* spp. shipworm
CA													2						
CB	620	1	9	97	574	113	8	5	13	4	27	2	22				1		+++
CC	42	2	4	11	116	29	1	0	4	1	4	1	16						
CG	270		3	12	44	8	3	2	11		29		12	1		1			+
CD													1						
CE	322		0	2	236	15	1	2	3		6	2	5						+
CF	410	1	1	5	1102	92		13	7		2	2	1		1	1		3	+
total	1664	4	17	127	2072	257	13	22	38	5	68	7	59	1	1	2	1	3	

Table 80. Marine shell

Context	Sample	Block	Identification	Comments
397	8414	CB	Unidentified crab chela fragment	½ of 1
397	8431	CB		½ of 1. ?Burnt crab shell. Severe alteration?
457	8570	CB	Very small fragments including chela	Unidentified
451	8309	CB	1 small *Cancer* pereipod	
453	9106	CB	1 carapace fragment unidentified	
401	5672	CE	2 worn crab chela fragments	Unidentified
372	5655	CE	1 carapace fragment unidentified	
381	5664	CE	Chela fragments	Mixture of *Cancer* and *Carcinus*
339	5574	CF	2 fragments of ? *Cancer* chela	
335	5597	CF	Chela fragments of *Carcinus maenas*	
312	5585	CF	1 carapace fragment unidentified	
335	5897	CF	Chela fragments	At least one *Cancer pagurus* chela
341	5599	CF	*Carcinus* chela	
305	5671	CF	Numerous chela fragments, larger than most samples	Mainly *Cancer* carapace, one *Carcinus* and 1 *Liocarcinus* sp. chela .
305	8581	CF	Numerous fragments	Nearly all *Cancer* fragments + *2 Carcinus* chela

Table 81. Crab fragments from mound 1

waste from the production process. Many of the whelks are broken and this may be deliberate, to make it possible for them to be suspended or attached to another object. Smooth fracture edges may result from wear. The Norse pattern in contrast does not seem to reflect an interest in the shells as shells and the species present on mound 1 are very similar to those on mound 3. The winkles and limpets probably represent food debris but the other smaller shells probably represent the accidental deposition of shells attached to seaweed. It may be significant that the largest quantity of crab shell came from layer 305 which also produced a large quantity of fish bones. The crab shell fragments could, therefore, represent the residue of gut contents discarded in the middens.

The residue analysis – N Sharples

A total of 339 samples, 4709 litres of soil, were processed from mound 1 (Table 82). All of these samples were floated and the residues over 10 mm sorted. Fine sorting of the residues between 10 and 0.5 mm was restricted to 223 samples (Table 83) and most of these samples were sub-sampled, reducing the quantity of soil examined to an estimated 648 litres.

	No of samples	%	Litres	Pot		Mammal bone		Fish bone		Limpet		Winkle	
				no.	density	no.	density	no.	density	no.	density	no.	density
CB total	260	76.70	3380	547	0.16	1321	0.39	18	0.01	620	0.18	574	0.17
CC	16	4.72	324	37	0.11	450	1.39	9	0.03	42	0.13	116	0.36
CG	16	4.72	270	109	0.4	610	2.26	11	0.04	270	1	44	0.16
CE	30	8.85	381.9	86	0.23	123	0.32	32	0.08	322	0.84	236	0.62
CF	17	5.01	353.5	81	0.23	202	0.57	189	0.53	410	1.16	1102	3.12
Total	339		4709.4	860		2706		259		1664		2072	

Table 82. A summary of the residue data from the above 10 m sort

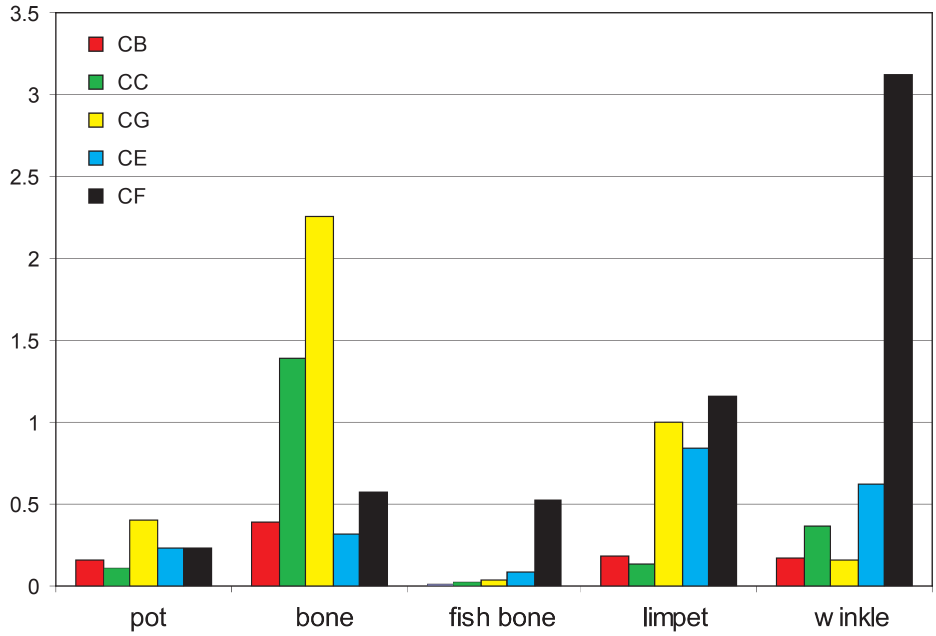


Figure 126. The density of the main categories of material recovered from the above 10 mm sort

The bulk (76% of the original samples, 71% of the below 10 mm samples) of the material examined came from the Late Iron Age house (CB) as the sampling goal for the charcoal layer, the floor of House 2 and any other extensive spread was total recovery. All layers were excavated on a 0.5 m grid and each sample square had a unique sample number. The detailed sorting of these layers (<10 mm) proved too time-consuming and costly and only every other sample has been examined (see Sharples and Smith in Sharples 2005b, 34 for a detailed methodology). The remaining stratigraphic units were consequently relatively under-explored though all the main units had over ten samples taken, providing a reasonably firm basis for analysis of the density of the main materials in each stratigraphic unit.

Sorting the material from the >10 mm residues normally produces limpets, winkles, pot sherds, bone and fish bone and the average densities per litre of soil in the different stratigraphic units are displayed in Figure 126. Pottery is a consistent presence but in low numbers, only reaching a maximum of 0.4 sherds/litre in the Late Iron Age midden (CG) and it is most infrequent in the Late Iron Age infill layers (CC). Bone has a much more variable distribution than most of the other categories. The Late Iron Age middens (CG) again produce the highest densities (2.26 frag/litre) but the Late Iron Age infill layers (CC) are the next most prolific with the most sparse assemblage coming from the Norse activity area (CE). Fish bone is rare in most samples, with only the Norse middens (CF) producing significant quantities (0.53 frag/litre). Limpets are uncommon finds in the Late Iron Age house and infill deposits (CB, CC) but are relatively common in the Late Iron Age middens (CG, 1 frag/litre) and both the Norse activity area (CE, 0.8 frag/litre) and the Norse middens (CF, 1.2 frag/litre). Winkles in contrast are uncommon in all the Late Iron Age blocks, get slightly more important in the Norse activity area (CE) and are very common in the Norse middens (CF).

The material categories routinely recovered from the below 10 mm sort are more numerous and the data is best

	No of samples	%	Litres	%	Pot		Unburnt bone		Burnt bone		Fish bone		Charcoal		B.O.M.		Slag	
					no.	density	no.	density	no.	density	no.	density	no.	density	no.	density	no.	density
CB total	159	71	509.1	79	2101	4.1	8002	15.7	5866	11.5	180	0.4	158959	312.3	8999	17.7	2662	5.2
CC	13	6	41.9	6	120	2.9	1825	43.5	856	20.4	109	2.6	3459	82.5	2603	62.1	789	18.8
CG	16	7	37.92	6	251	6.6	2379	62.7	2232	58.9	656	17.3	1757	46.3	2206	58.2	657	17.3
CE	21	9	25.1	4	59	2.3	1271	50.6	269	10.7	279	11.1	844	33.6	2819	112.1	17524	697
CF	14	6	34.39	5	150	4.4	1304	37.9	261	7.6	1156	33.6	1800	52.3	742	21.6	2167	63
total	223		648.41															

Table 83. A summary of the residue data from the below 10 m sort

presented in two separate histograms. Figure 127 shows the average densities of the pot, bone (unburnt and burnt) and fish recovered from the different stratigraphic units. These clearly indicate that the Late Iron Age midden (CG) has the highest densities of most of these material categories; only the density of fish bone present in the Norse middens (CF) is greater. The deposits associated with the occupation of the Late Iron Age house (CB) appear to be the poorest in most material categories, though the density of pottery present is greater than that from the infill deposits (CC) and the Norse activity area (CE) and it also has a marginally higher density of burnt bone than the Norse activity area.

Figure 128 shows the average densities of charcoal, B.O.M. and slag. Superficially it might be thought that these different materials should present a similar pattern as they are all the accidental products of fire yet this is not the case. The contexts associated with the occupation of the Late Iron Age house (CB) have the highest densities of charcoal, which reflects its destruction in a fire. These deposits produced very little slag which is a much more common feature of the Norse activity area (CE), which had the lowest average density of charcoal. The mutually exclusive nature of these two materials is clearly demonstrated in Figure 129 where the samples keep closely to the horizontal and vertical axes. This pattern could reflect the temperature of the fire, the time exposed to heat and the presence of reducing or oxidising conditions. The burning down of House 1 is likely to have been initially quite spectacular but the collapse of the roof might have resulted in a slow-burning low-temperature fire, with little oxygen getting to the timbers. In contrast the hearths in the Norse activity area (CE) appear to have been open to the elements and a strong wind would result in very high temperatures in a highly oxidising environment. The relationship with the B.O.M. is less clear but it is at its most frequent in the samples from the Norse activity area (CE) and is least common in the samples from the Late Iron Age house (CB) so a relationship with high temperatures is most likely.

The distribution of the material is presented in greater detail in Figure 130, the Late Iron Age deposits, and Figure 131, the Norse deposits. These diagrams indicate the numerical distribution of the different material categories from the below 10 mm residues. The Late Iron Age distributions (Figure 130) are overwhelmed by the large numbers of samples analysed from the house but it is thought that sufficient quantities were taken from the other blocks to justify presenting the data on the same graphs. The graph of the density of pot and unburnt mammal bone illustrates one of the problems with the large number of samples from the house (CB). The very large number of low densities provides a very low average density and obscures the presence of many samples with very high densities of bone, in particular, and (to a lesser extent) pot. This pattern is also seen in the burnt bone distribution. The fish bone distribution in

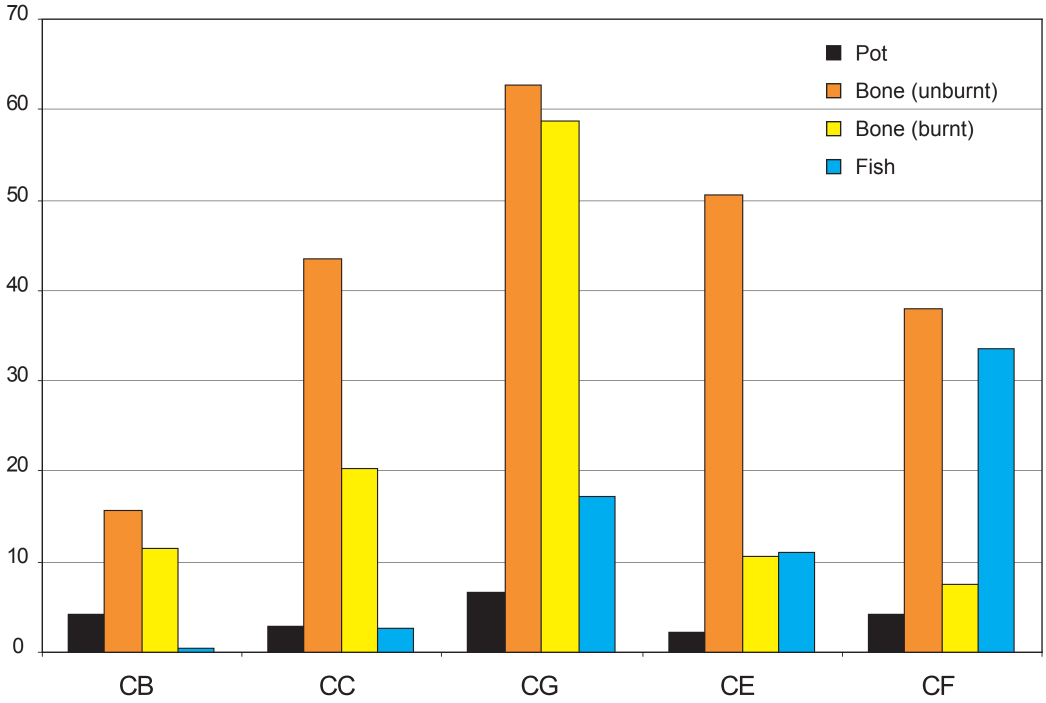


Figure 127. The density of pot, bone (unburnt and burnt) and fish bone from the below 10 mm sort

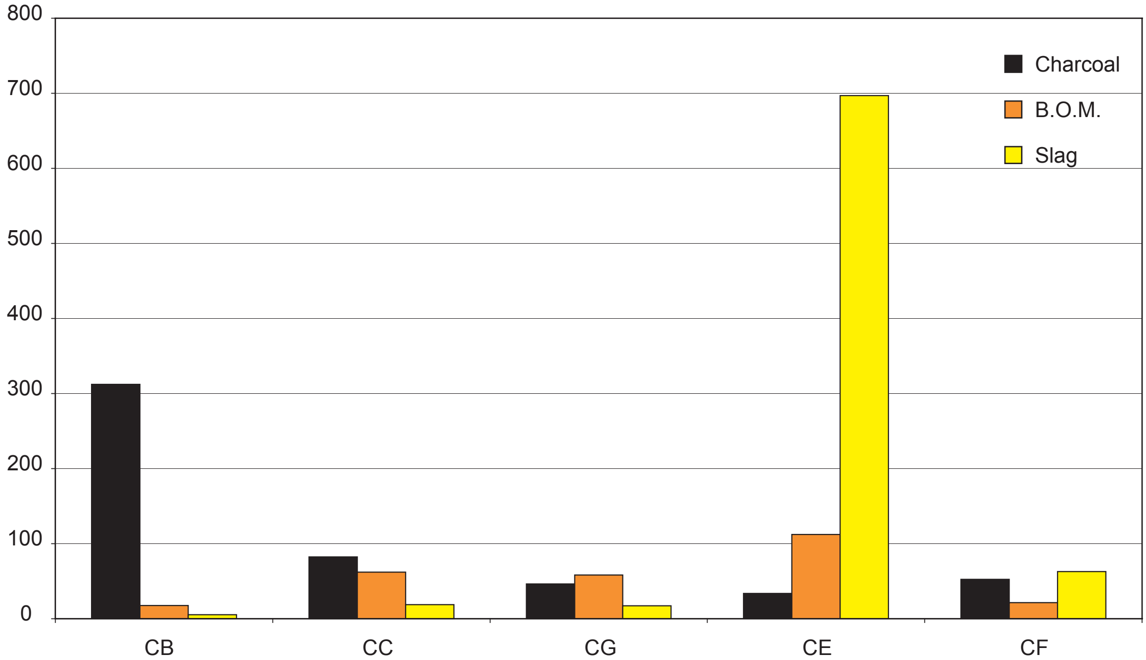


Figure 128. The density of charcoal, B.O.M. and slag from the below 10 mm sort

contrast re-emphasises the low densities of the house (CB) and emphasises the presence of some very rich samples in the midden (CG). The charcoal distribution from the house (CB) has an interesting bimodal pattern which may reflect the patterns noted when the spatial distributions were examined. In Figure 45 there is a clear concentration of samples with a high density of charcoal fragments in the centre of the house and samples with low densities around the periphery. The slag densities indicate generally very low densities from the house (CB) but a large sample was present which is comparable to the largest sample from the infill layers (CC).

The small number of samples processed from the Norse contexts makes the patterns more visible (Figure 131). The histograms clearly highlight the low quantities of pottery compared to bone, the increased density of

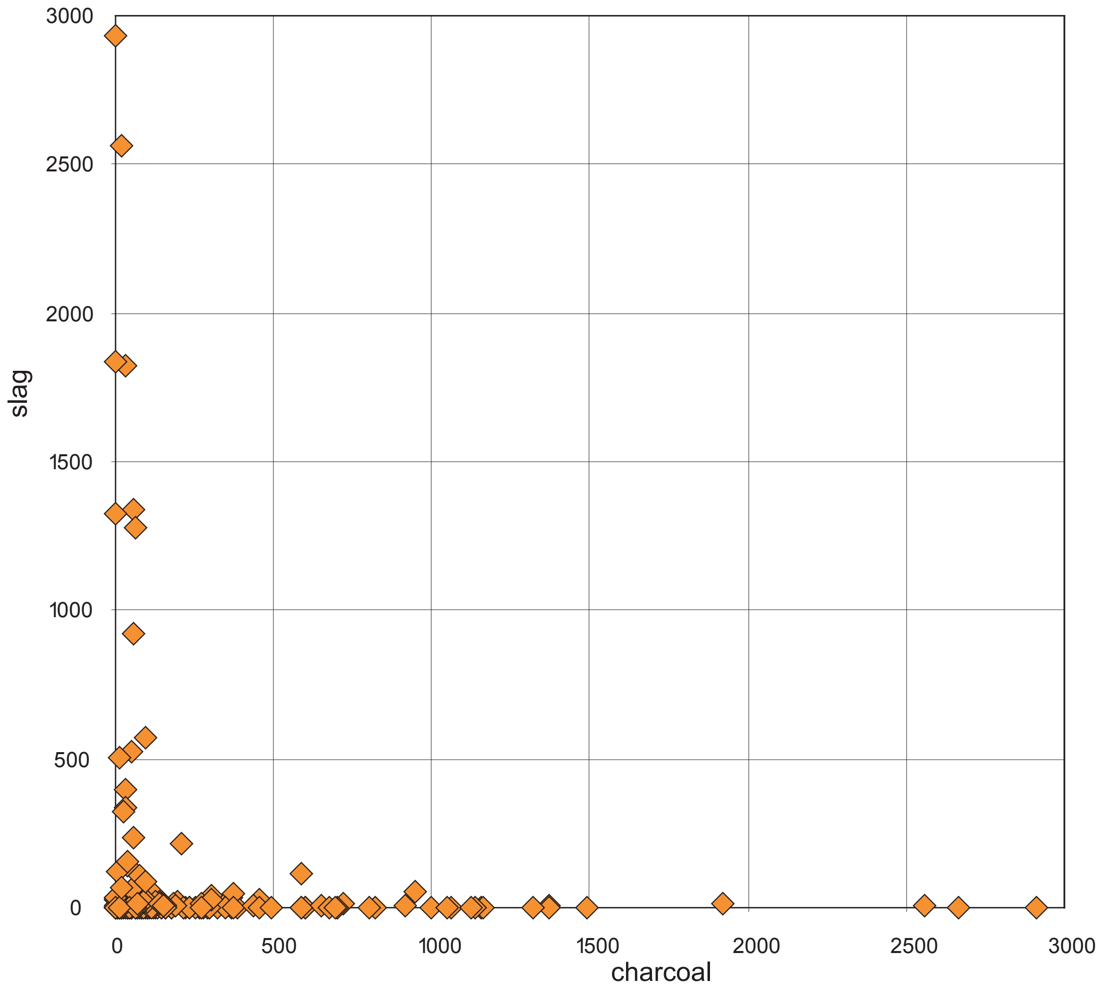


Figure 129. The relationship of charcoal and slag from all the mound 1 samples. Each sample is located on the graph in relation to the fragments of charcoal and slag present

fish bones particularly in the midden samples (CF) and the relatively low quantities of charcoal and B.O.M. but note that both categories have a sample with a very high density. The slag histogram is distinguished by a bimodal distribution which, whilst not as dramatic as that for the Late Iron Age charcoal, is nevertheless significant. It is possible that the variability reflects two separate contexts of production, with the low levels of material being associated with domestic indoor hearths, and the high levels of material coming from specialist hearths that achieved high temperatures.

Conclusion – N Sharples

The excavation of mound 1 proved remarkably productive and a large assemblage of artefacts, pottery, carbonised plant remains, animal, fish and bird bone was recovered from what was a very limited excavation of a very large mound. The analysis presented in this chapter has highlighted significant variability in the material deposited in the different stratigraphic units.

The Late Iron Age house (House 1, CB), whilst generally having a background of low numbers of poorly preserved sherds, included contexts containing substantial sherds from a small number of individual pots that had probably been deliberately placed. A similar pattern can be observed with the artefact assemblage, which is dominated by a large group of simple tools but within this assemblage is a group of exceptional objects which again appear to have been deliberately placed. These acts of placement probably reflect ritual activity occurring between the destruction of the house and its reconstruction.

The act of destruction involved a conflagration that resulted in the exceptional preservation of timbers which can be interpreted as the roof of House 1. The roof timbers are almost all identified as spruce/larch and must be driftwood ultimately derived from North America. The burning down of House 1 seems to have been an accidental rather than a deliberate event and it resulted in the preservation of the simple tools, noted above, and an unusual collection of animal bones, dominated by ‘waste’ bones, which might have been stored in House 1 as a raw material for future manufacture into tools. The

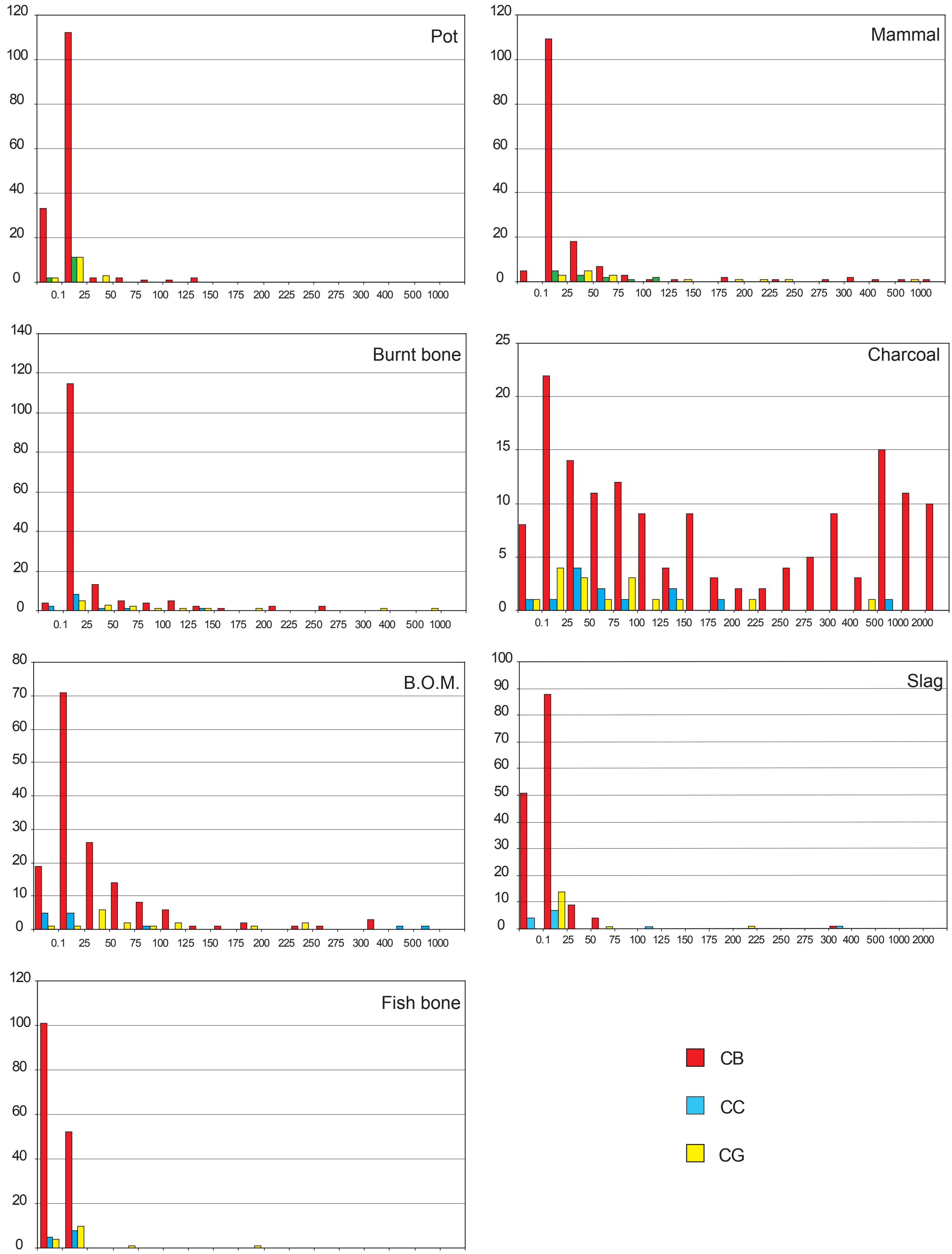


Figure 130. The distribution of various categories of residue in the Late Iron Age stratigraphic blocks. The x-axis indicates the quantity of material present, the y-axis the number of samples

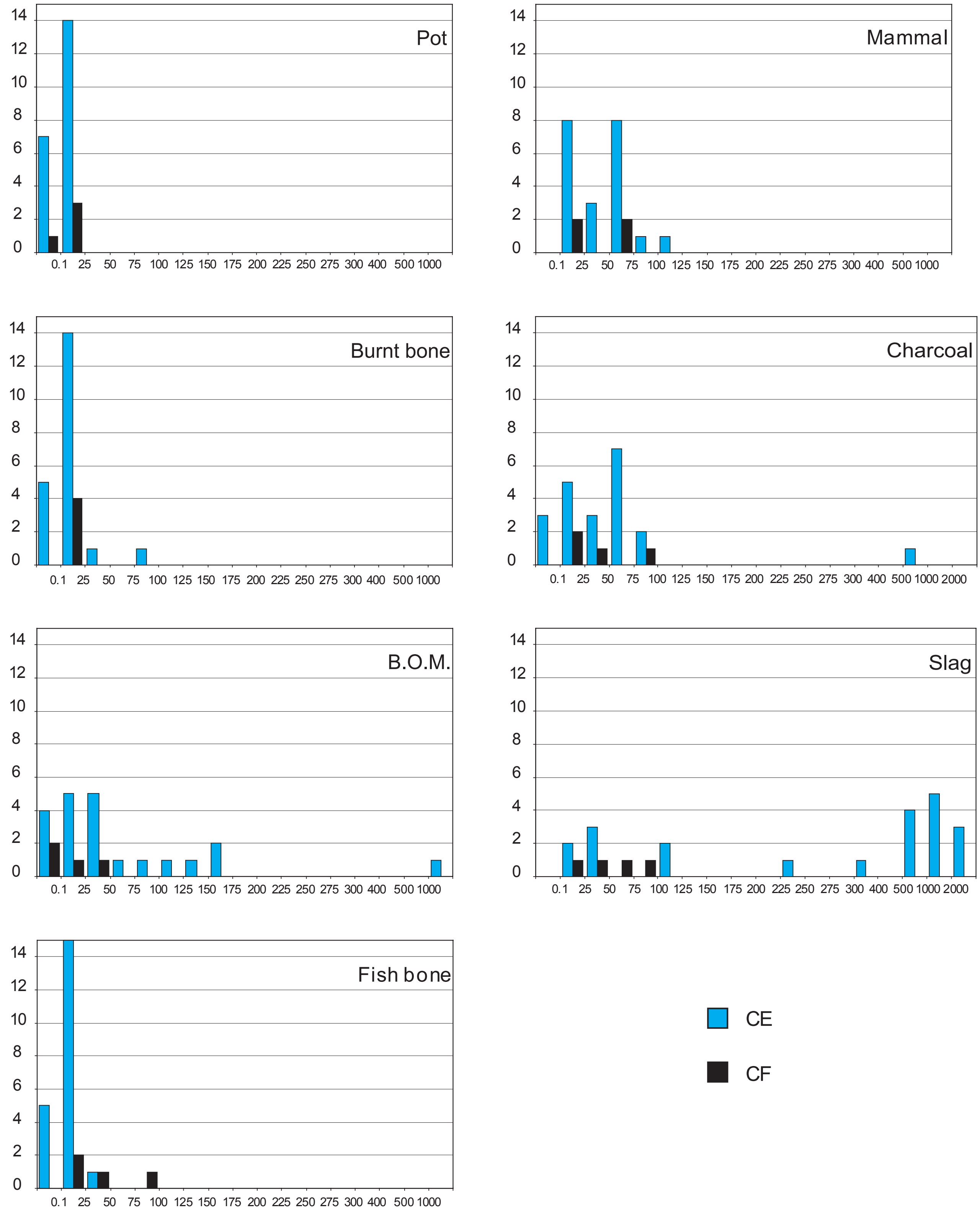


Figure 131. The distribution of various categories of residue in the Norse stratigraphic blocks. The x-axis indicates the quantity of material present, the y-axis the number of samples

house also produced high densities of carbonised plant remains, in particular grains of hulled barley (*Hordeum sativum*). However, it is not clear if these derive from the conflagration event as they do not appear to be much more prolific than they are in the assemblages recovered from the Norse house on mound 3.

The assemblage from the infilling deposits (CC) appears to have some similarity to the house deposits

(CB). There is an interesting collection of artefacts and a very large pottery assemblage, both of which were well preserved. Much of this material appears to have been deliberately placed and some of these artefacts appear to have been deliberately burnt. This may indicate a ritual act of closure. The bone assemblage is also similar to that found in the house (CB) with the unusually high representation of peripheral bones and the same pattern of species, though whale bone fragments are a much more significant presence. Carbonised plant remains are much less common.

The Late Iron Age middens (CG) provide quite a dramatic contrast with these deposits. The animal bone assemblage is significantly different. Red deer, which was present in the house (CB) and infill deposits (CC), becomes a major component of the assemblage and there are also very important assemblages of fish, predominantly saithe with salmon/trout, and birds, mostly gull. The anatomical representation of the animal bones is also quite different, with a more even representation of meat and waste elements. The artefact assemblage in contrast declines in significance. Fewer artefacts were deposited and most of these were simple tools or waste, though there are a couple of exceptions, notably the bone die and decorated astragalus. The pottery assemblage is substantial but the sherds are not as well preserved as the other assemblages.

The Norse assemblages are relatively small but there are clear differences between the assemblage from the activity area (CE) and that from the middens infilling the house (CF). This might be affected by relative proportions of residual Iron Age material present in each block. The activity area (CE) clearly included a lot of Iron Age material and one part of the midden (CF) was also heavily contaminated but nevertheless there are differences which probably reflect Norse activity. The middens produced a much larger pottery assemblage than the activity area and, though the small find assemblages are not that different, the quantity of metal objects in the middens is higher. The animal bone assemblage is not that dissimilar but the middens have large quantities of bird bones and much higher quantities of fish. This increasing interest in the sea is supported by the increasing density of shellfish, particularly winkle, and crab present in the midden. Very few Norse samples of carbonised plant remains and charcoal were examined but it is clear that oats are much more important in the Norse deposits.

Notes

1. In all there are 44 cordoned sherds and nine double-cordoned sherds; it is, however, impossible to establish if all the cordons are from double-cordoned vessels or if some vessels are single-cordoned.
2. There are three incised sherds, all quite small, and several sherds with more elaborate or larger cordons, which suggests that Middle Iron Age material similar to that found at Sollas is present.

5 Chronology

The radiocarbon dates – P Marshall, C Bronk Ramsey and G Cook

A total of 33 radiocarbon determinations have been obtained from 32 samples of material from mound 1 (19 animal bones and 13 carbonised seeds).

Five animal bone samples were submitted to the Oxford Radiocarbon Accelerator Unit in 1999–2000. These samples were subject to collagen extraction (Law and Hedges 1989; Hedges *et al*. 1989) followed by gelatinisation and separation by filtration (Bronk Ramsey *et al*. 2000). They were measured by Accelerator Mass Spectrometry (AMS) according to the methods outlined in Hedges *et al.* (1989) and Bronk Ramsey and Hedges (1997). However, following the identification of a problem with the ultrafiltration procedures undertaken as part of bone pre-treatment at Oxford in October 2002 (see Bronk Ramsey *et al*. 2004a) all five of these results were subsequently withdrawn (OxA-9640, OxA-9641, OxA-9643, OxA-9665, OxA-9677). These samples were subsequently re-processed according to the new pre-treatment ultrafiltration stage outlined in Bronk Ramsey *et al.* (2004a) and measured by Accelerator Mass Spectrometry as described by Bronk Ramsey *et al.* (2004b) to provide the results listed in Table 84 (OxA-15416 to OxA-15452). Duplicate measurements were made on one sample (OxA-15417, OxA 15418) but the two determinations were subsequently combined to provide one date.

This problem with samples (summarised briefly thus: '*…. with low mass yields and recent ages, significant bias to older 14C ages has been shown to arise'* [Bronk Ramsey *et al.* 2004a, 162]) also affects dates from mound 3 published in the first Bornais volume (Marshall 2005) and dates from mound 2 which have been discussed in the interim reports and in other articles (Sharples 2000; Sharples 2003a). These new measurements for mound 3 are discussed in appendix 5.

Twenty-seven samples (13 animal bones, 1 human bone and 13 carbonised seeds) were processed at the Scottish Universities Research and Reactor Centre in East Kilbride, and measured by Accelerator Mass Spectrometry at the Scottish Universities Environmental Research Centre AMS Facility. These samples were prepared using methods outlined in Longin (1971) and Stenhouse and Baxter (1983), cinverted to carbon dioxide (Vandeputte *et al*. 1996), graphitised (Slota *et al.* 1987), and measured as described by Xu *et al.* (2004).

Both these laboratories maintain continual programmes of quality assurance procedures, in addition to participation in international inter-comparisons (Scott 2003). These tests indicate no laboratory offsets and demonstrate the validity of the precision quoted.

The radiocarbon results in Table 84 are quoted in accordance with the international standard known as the Trondheim convention (Stuiver and Kra 1986). They are conventional radiocarbon ages (Stuiver and Polach 1977).

The calibration of the results, relating the radiocarbon measurements directly to calendar dates, is given in Table 84 and in Figure 132. The radiocarbon determinations have been calibrated with data from Reimer *et al.* 2009 using OxCal (v4.1) (Bronk Ramsey 1995; 1998; 2001; 2009). The date ranges have been calculated according to the maximum intercept method (Stuiver and Reimer 1986), and are cited at two sigma (95% confidence). They are quoted in the form recommended by Mook (1986), with the end points rounded outwards to 10 years if the error term is greater than or equal to 25 radiocarbon years, or to 5 years if it is less. The ranges quoted in italics are *posterior density estimates* derived from mathematical modelling of archaeological problems (see below). The probability distributions (Figures 132–137) are derived from the usual probability method (Stuiver and Reimer 1993).

Stable isotopes and C:N ratios

The stable isotope results (Table 84) indicate that the animals consumed a diet predominantly based upon temperate terrestrial C_3 foods (Schoeninger and DeNiro 1984; Katzenberg and Krouse 1989). The radiocarbon results are therefore unlikely to be affected by any significant reservoir effects (Bayliss *et al.* 2004) and the calibrated date ranges can be regarded as accurate estimates of the ages of their samples. See Madgwick, Mulville, Stevens and O'Connell below 241 for a more detailed discussion of the dietary implications of the isotope evidence.

The δ13C values of the other samples are within typical ranges (Bowman 1990, table 1) and show no evidence for fractionation.

The C:N ratios (Table 84) suggest that bone preservation was sufficiently good for us to have confidence in the accuracy of the radiocarbon determinations (Tuross *et al.* 1988). The C:N ratio of one sample, SUERC-18229, is outside the range usually quoted as being indicative

Laboratory Number	Sample reference	Block	Material	Radio-carbon Age (BP)	Weighted mean	$\delta^{13}C$ (‰)	$\delta^{15}N$ (‰)	C:N ratio	Calibrated date range (95% confidence)	***Posterior density estimate (95% probability)***
SUERC-7624	BO99/9346/438	CC	bone, cattle	1470±35		-21.6	3.7		cal AD 540–660	*cal AD 580–655*
SUERC-7625	BO97/9347/312	CF	bone, red deer	1435±35		-21.7	5		cal AD 560–660	*cal AD 570–660*
SUERC-7626	BO99/9348/485	CG	bone, red deer	1500±35		-22	3.7		cal AD 430–650	*cal AD 465–490 (3%) or 500–580*
SUERC-7627	BO99/9349/493	CG	bone, sheep	1450±35		-21.4	4.4		cal AD 540–660	-
SUERC-7628	BO99/9350/456	CG	bone, pig	1515±35		-20.8	6.5		cal AD 430–630	*cal AD 535–605*
SUERC-7632	BO99/9351/463	CG	bone, red deer	1460±35		-21.7	4.8		cal AD 540–660	*cal AD 540–635*
SUERC-7633	BO99/9352/485	CG	bone red deer	1530±35		-21.7	2.9		cal AD 420–610	*cal AD 470–490 (3%) or 500–580 (92%)*
SUERC-7634	BO96/9353/305	CF	bone, cattle	810±35		-20.9	4.5		cal AD 1160–1280	*cal AD 1180–1275*
SUERC-7635	BO96/9354/305	CF	bone, cattle	840±35		-21.4	4.8		cal AD 1050–1270	*cal AD 1050–1085 (8%) or 1120–1140 (1%) or 1150–1255 (86%)*
SUERC-7636	BO99/9059/465	CB	bone, cattle	1565±35		-21.3	4.1		cal AD 410–570	*cal AD 405–490*
SUERC-7637	BO97/5665/390	CE	carbonised seed, *Avena* sp.	1130±35		-24.8			cal AD 780–1000	*cal AD 775–960*
SUERC-7638	BO97/5682/413	CC	carbonised seed, *Hordeum* sp.	1575±35		-22.7			cal AD 400–570	-
SUERC-7642	BO99/8365/397	CB	carbonised seed, *Hordeum* sp.	1580±35		-22.4			cal AD 400–570	*cal AD 485–580*
SUERC-7643	BO99/8403/397	CB	carbonised seed, *Hordeum* sp.	1545±35		-23.6			cal AD 420–610	*cal AD 495–600*
SUERC-7644	BO99/9014/457	CB	carbonised seed, *Linum* sp.	1550±35		-27.6			cal AD 420–600	*cal AD 430–530*
SUERC-7645	BO97/5676/407	CC	carbonised seed, *Hordeum* sp.	1200±35		-22.6			cal AD 690–950	*cal AD 690–750 (11%) or 760–900 (84%)*
SUERC-7646	BO99/9007/457	CB	carbonised seed, *Rumex* sp.	1585±35		-25.9			cal AD 400–570	*cal AD 430–530*
SUERC-7647	BO99/9018/457	CB	carbonised seed, *Hordeum* sp.	1505±35		-23.7			cal AD 410–580	*cal AD 430–530*
SUERC-7648	BO99/9029/457	CB	carbonised seed, *Hordeum* sp.	1570±35		-23.7			cal AD 410–580	*cal AD 430–530*
SUERC-7652	BO99/8313A/451	CE	carbonised seed, *Hordeum* sp.	1145±35		-22.4			cal AD 770–990	*cal AD 775–960*
SUERC-7653	BO99/8314B/451	CE	carbonised seed, *Avena* sp.	1130±35		-25.2			cal AD 770–990	*cal AD 770–965*
SUERC-8170	BO97/5653/373	CE	carbonised seed, *Avena* sp.	1155±40		-25.9			cal AD 770–990	*cal AD 800–975*
SUERC-8171	BO97/5667/398	CC	carbonised seed, *Hordeum* sp.	1550±35		-23.7			cal AD 410–600	-
SUERC-17946	BO96/7772/305	CF	bone, red deer	930±35		-21.4	6.6	3.4	cal AD 1020–1210	*cal AD 1020–1180*
SUERC-17947	BO96/5206/331	CF	bone, red deer	1510±35		-21.4	4.7	3.5	cal AD 430–640	*cal AD 430–635*
SUERC-17948	BO96/5538/349	CF	bone, red deer	915±35		-21.6	4.9	-	cal AD 1020–1220	*cal AD 1030–1210*
SUERC-18229	BO96/--/322	CF	bone, human	1690±35		-21.3	11.6	3.9	cal AD 250–430	*cal AD 255–425*
OxA-15416	BO99/2035/482	CB	bone, cattle	1530±28		-20.4	4.3	3.3	cal AD 430–610	*cal AD 505–590*
OxA-15417	BO99/9105/453	CB	bone, red deer	1481±27	1487±19	-20.8	5.4	3.2	cal AD 540–625	*cal AD 545–610*
OxA-15418	BO99/9105/453	CB	bone, red deer	1493±27		-20.8	5.1	3.3		
OxA-15419	BO99/8565/456	CG	bone, cattle	1547±28		-20.5	4.8	3.3	cal AD 420–590	*cal AD 530–600*
OxA-15421	BO99/9170/495	CG	bone, cattle	1542±28		-20.5	4.7	3.3	cal AD 420–600	*cal AD 440–555*
OxA-15452	BO99/9169/495	CG	bone, red deer	1606±26		-21.8	5.3	3.2	cal AD 390–540	*cal AD 420–550*

Table 84. Radiocarbon results

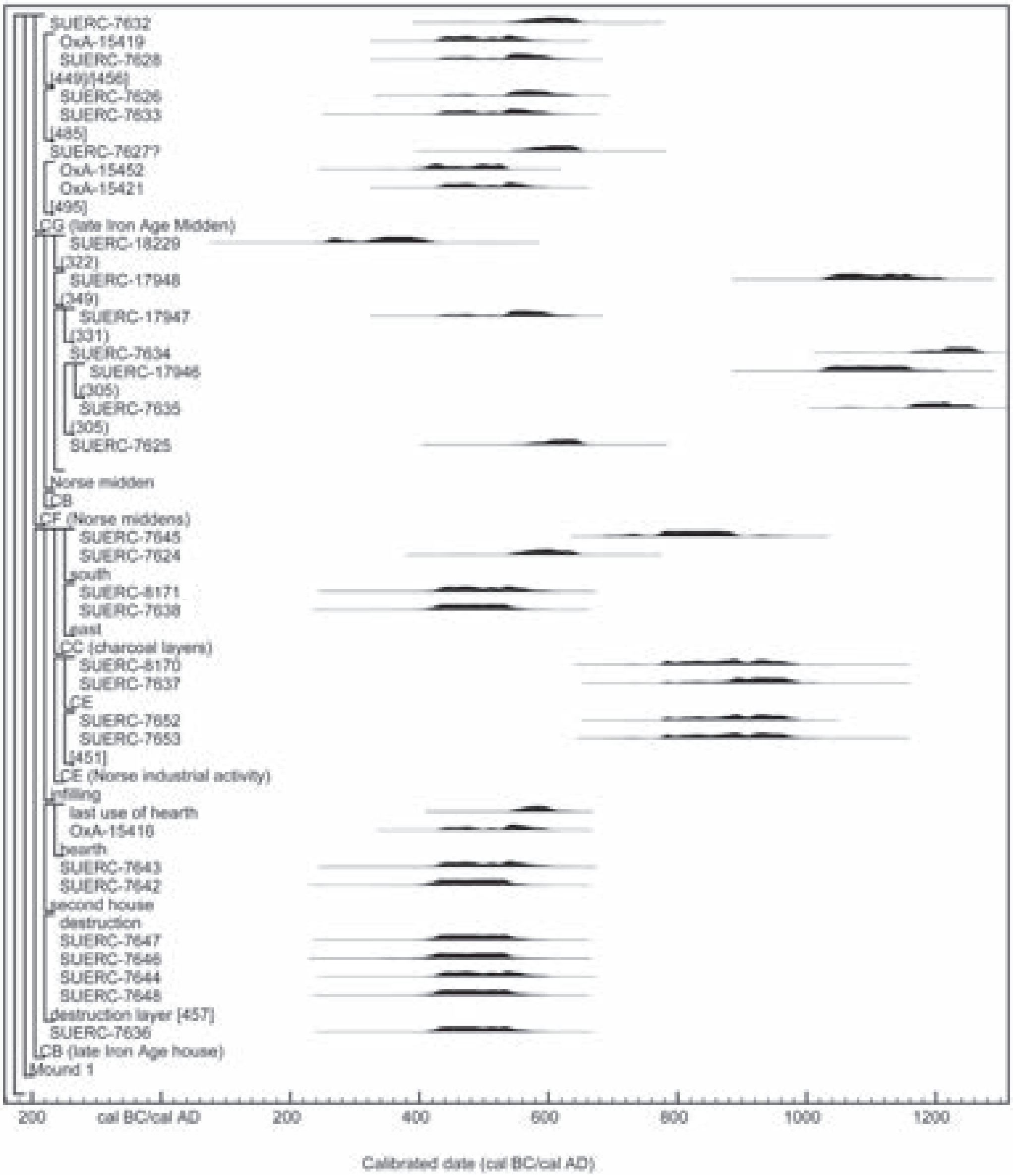


Figure 132. Probability distributions of dates from Bornais mound 1: each distribution represents the relative probability that an event occurred at a particular time. These distributions are the result of simple radiocarbon calibration (Stuiver and Reimer 1993)

of good quality collagen preservation (2.9–3.6, DeNiro 1985); those ratios should only be used as a guide, however, because variability does exist (G Cook pers. comm.).

Methodological approach

A Bayesian approach has been adopted for the interpretation of the chronology from this site (Buck *et al.* 1996). Although the simple calibrated dates are accurate estimates of the dates of the samples, this is usually not what archaeologists really wish to know. It is the dates of the archaeological events, which are represented by those samples, which are of interest. In the case of mound 1, it is the chronology of the mound that is under consideration, not the dates of the individual samples. The dates of this activity can be estimated not only using the absolute dating information from the radiocarbon measurements on the samples, but also by using the stratigraphic relationships between samples.

Fortunately, methodology is now available which allows the combination of these different types of information explicitly, to produce realistic estimates of the dates of archaeological interest. It should be emphasised that the *posterior density estimates* produced by this modelling are not absolute. They are interpretative *estimates*, which can and will change as further data become available and as other researchers choose to model the existing data from different perspectives.

The technique used is a form of Markov Chain Monte Carlo sampling, and has been applied using the program

OxCal v4.1 (http://c14.arch.ox.ac.uk/). Details of the algorithms employed by this program are available from the on-line manual or in Bronk Ramsey (1995; 1998; 2001; 2009). The algorithm used in the models described below can be derived from the structures shown in Figures 133–135 and 137.

The following section concentrates on describing the archaeological evidence, which has been incorporated into the chronological model, explaining the reasoning behind the interpretative choices made in producing the models presented. These archaeological decisions fundamentally underpin the choice of statistical model.

Objectives and sampling strategies

The radiocarbon programme was designed to achieve the following objectives:

1. to provide a precise date for construction of the wheelhouse (CB);
2. to establish when the wheelhouse was burnt down;
3. to establish when the rebuilt wheelhouse was constructed;
4. to establish when the rebuilt wheelhouse was abandoned and destroyed;
5. to provide an estimate of the date of infilling of the hollow of the house (CC);
6. to ascertain the chronological relationship of the midden (CG) in the extension trench to the wheelhouse (CB);
7. to provide a precise date for the first Norse activity (CE and CF);
8. to confirm the integrity of the Norse red deer assemblage;
9. to date the human bone;
10. to compare the date of activity from mound 1 with mound 3.

The first stage in sample selection was to identify short-lived material that was demonstrably not residual in the context from which it was recovered. The taphonomic relationship between a sample and its context is the most hazardous link in this process, since the mechanisms by which a sample came to be in its context are a matter of interpretative decision rather than certain knowledge. All samples consisted of single entities (Ashmore 1999). Material was selected only where there was evidence that a sample had been put fresh into its context.

The main categories of material that met these taphonomic criteria were:

- Articulated animal bones. Articulated animal bone deposits must have been buried with tendons attached or they would not have remained in articulation, and so were almost certainly less than six months old when buried (Mant 1987, 71). A number of these were observed during the excavations and consequently must demonstrably be *in situ.*
- Articulating bone. Groups of animal bone from the same context which were found to articulate during analysis but which were not recorded as articulated at the point of excavation. These samples were probably articulated in the ground, or only slightly disturbed, and hence are likely to be as close in age to their contexts as articulated bone.
- Bone with articulating epiphyseal plates.
- Concentrations of seeds/cereals where they formed substantial and discrete deposits likely to represent a 'single event'.
- Small groups or isolated seeds belonging to rare plants where the context was not the issue but the date of the seed assemblage was important.
- Single bones thought to be deliberately placed.

The exceptions to this selection process were three red deer bones (SUERC-17946, SUERC-17947, SUERC-17948) and the human skull fragment (SUERC-18229) from the deposits infilling the Norse house (CF). These were selected to date the bones and were not assumed to have a primary relationship with the contexts in which they were found. Thus they have all been treated as providing *terminus post quems* for their contexts in subsequent modelling (see below).

The sequence

The radiocarbon measurements can be dealt with as two separate groups: the determinations from the main area excavated (which includes samples from the stratigraphically related blocks CB, CC, CE and CF), and those from the west extension trench (from block CG). In both areas stratigraphic relationships exist that allow the contexts dated to be placed in a relative stratigraphic order.

SUERC-7636, a cattle phalanx, came from the coprolite-rich layer (465) adjacent to the south pier 4. This deposit is associated with the primary use of the wheelhouse (CB). The occupation features associated with the primary use of the wheelhouse, including (465), are sealed by a charcoal-rich 'destruction layer' (457) that can be interpreted as the result of a massive fire which destroyed the house. The four samples from the charcoal-rich destruction deposit (457) all come from concentrations of seeds and are thought to represent stored material that was carbonised during the fire. SUERC-7644 is from a concentration of flax seeds in sample square 9014, SUERC-7646 is from a concentration of *Rumex* seeds in sample square 9007, and SUERC-7647 and 7648 are from concentrations of barley grains in sample squares 9018 and 9029. All four measurements are statistically consistent (T'=0.5; T' (5%)=7.8; ν=3; Ward and Wilson 1978) and could therefore all be of the same actual age. The consistency of the radiocarbon measurements confirms the interpretation that the charcoal-rich deposit (457) is the result of a single catastrophic event.

House 2 was constructed directly above the destroyed wheelhouse, with a number of features cutting directly through the charcoal layer (457), including a trapezoidal hearth defined by lines of cattle metapodials. These cattle metapodials could have been put in as part of the hearth construction process but they could also have gone in during its use. OxA-15416 came from a cattle metapodial forming part of the southern line. After the final use of the hearth a number of items were deliberately placed in the

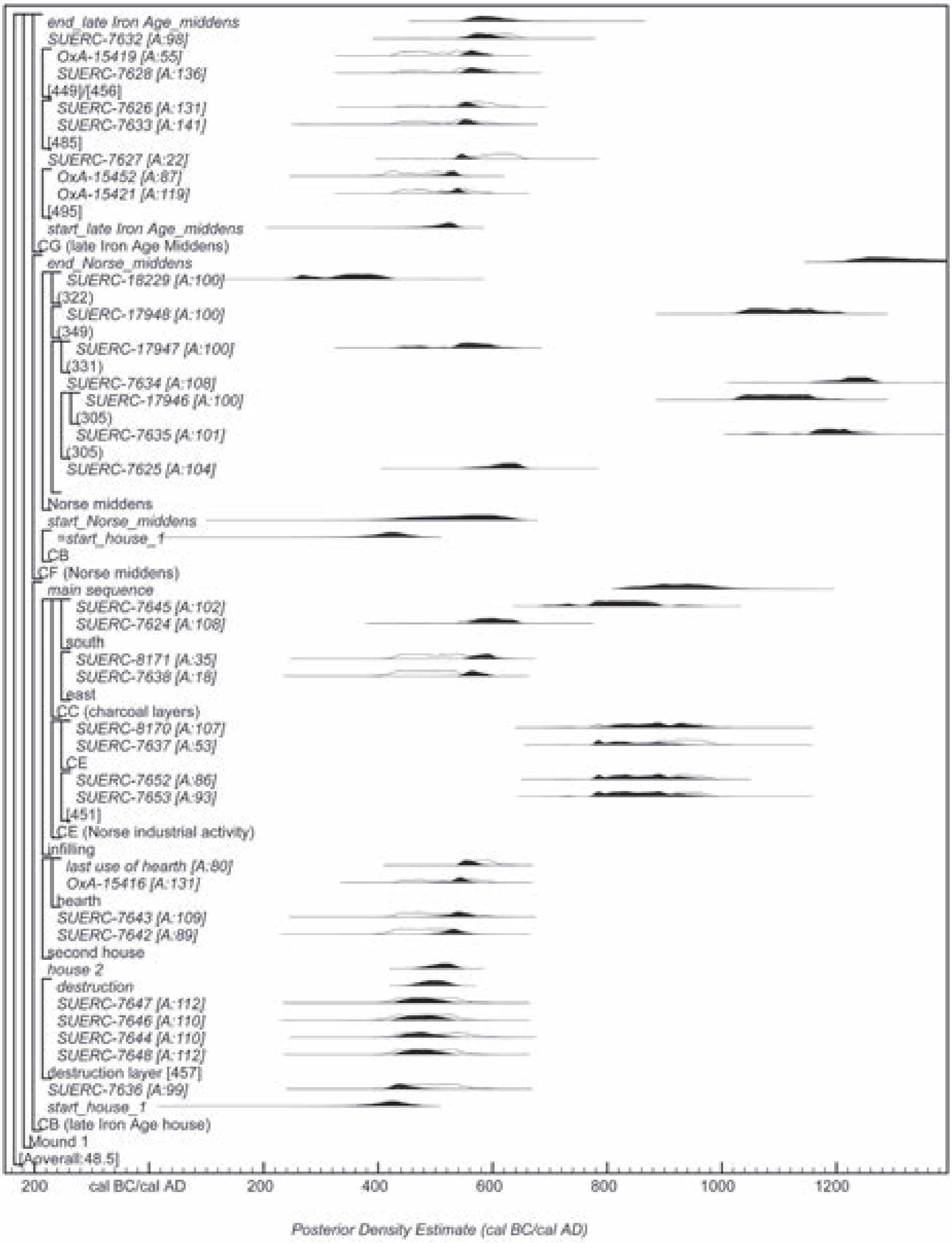


Figure 133. Probability distributions of dates from Bornais mound 1: each distribution represents the relative probability that an event occurred at a particular time. For each of the radiocarbon dates two distributions have been plotted, one in outline, which is the result of simple radiocarbon calibration, and a solid one, which is based on the chronological model used. Distributions other than those relating to particular samples correspond to aspects of the model. For example, the distribution 'house 2' is the estimated date when the second wheelhouse was constructed. The large square brackets down the left-hand side along with the OxCal keywords define the model exactly

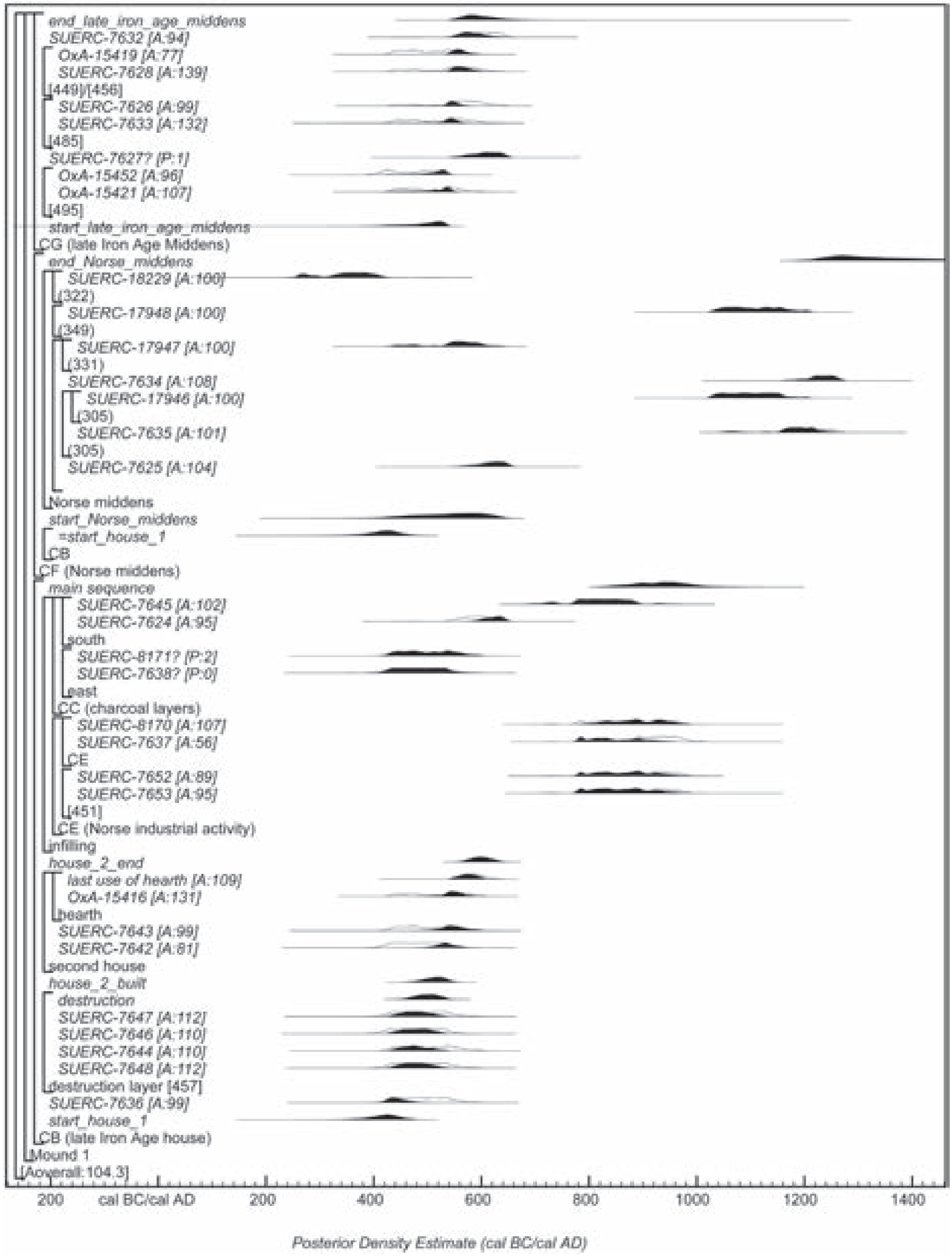


Figure 134. Probability distributions of dates from Bornais mound 1: each distribution represents the relative probability that an event occurred at a particular time. For each of the radiocarbon dates two distributions have been plotted, one in outline, which is the result of simple radiocarbon calibration, and a solid one, which is based on the chronological model used. A question mark (?) indicates that the result has been excluded from the model. The large square brackets down the left-hand side along with the OxCal keywords define the model exactly

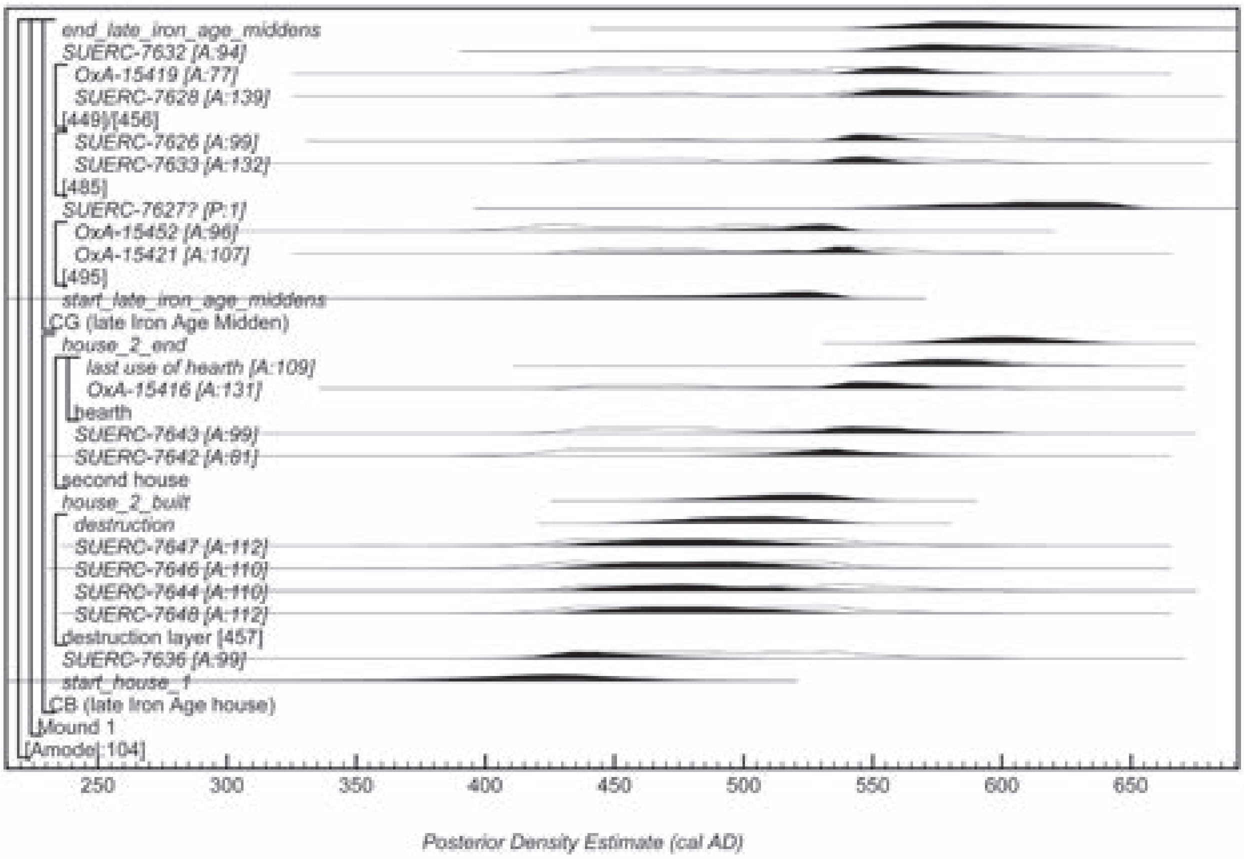


Figure 135. Probability distributions of dates relating to late Iron Age activity (Blocks CB and CG). The format is identical to that of Figure 133

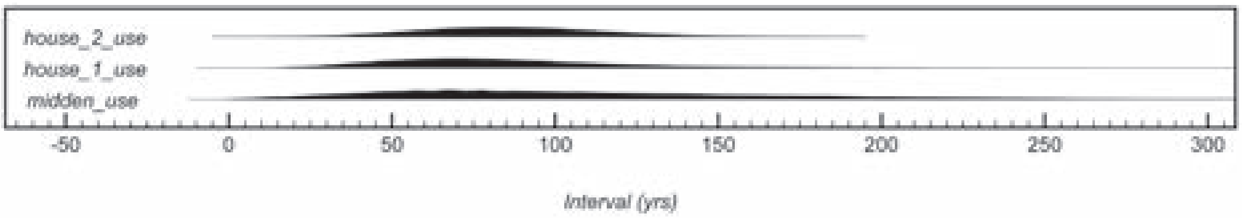


Figure 136. Probability distributions showing the number of calendar years during which House 1, House 2, and the Late Iron Age midden were in use at mound 1. The distributions are derived from the model shown in Figure 133

last ash layer, including a number of unburnt limpet shells and a red deer calcaneum. Replicate measurements on the red deer calcaneum (OxA-15417 and OxA-15418) are statistically consistent (T'=0.1; T' (5%)=3.8; ν=1; Ward and Wilson 1978) and can therefore be combined before calibration (1487±19 BP).

Two samples were submitted from the floor layer of House 2 (397) and are associated with the hearth and occupation of this structure. SUERC-7642 and 7643 were obtained from concentrations of barley grains in sample squares 8365 and 8403. These measurements are statistically consistent (T'=0.5; T' (5%)=3.8; ν=1; Ward and Wilson 1978) and could therefore be of the same actual age.

Behind the orthostats of the inner wall of the house was a discrete oval of orange-brown sand (451) that was thought initially to represent the floor of a cell accessible from the main building but with all the structural stones removed. However, post-excavation analysis indicated that the constituents of this putative 'floor' were quite different to that of the other floors and the presence of fish bones and oats suggested a later, probably, Norse date. A barley grain (SUERC-7652) and oat grain (SUERC-7653) were submitted from sample square 8314 of this deposit and the measurements are statistically consistent (T'=0.0; T' (5%)=3.8; ν=1; Ward and Wilson 1978). The two radiocarbon dates confirmed the re-interpretation of the date for this layer and suggest that it is the base of a

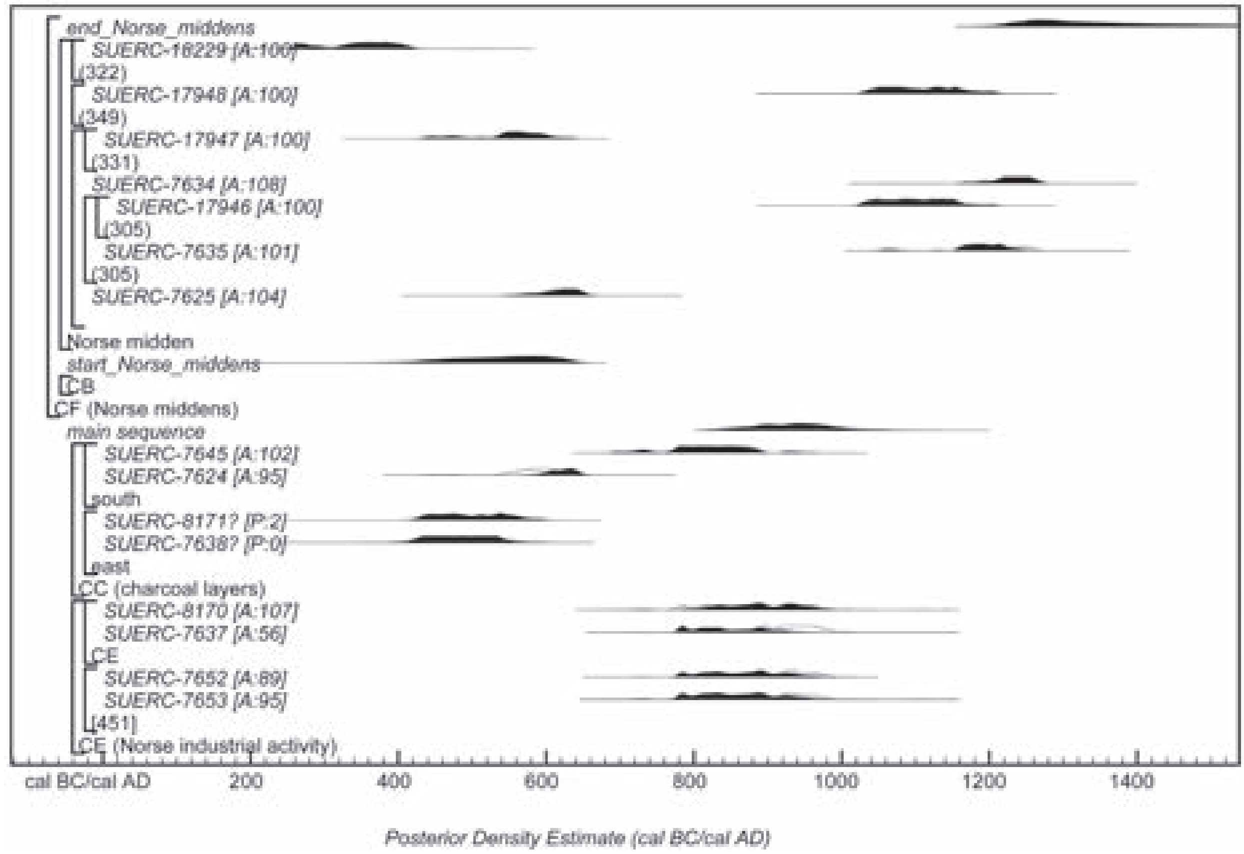


Figure 137. Probability distributions of dates relating to Norse activity (Blocks CE and CF). The format is identical to that of Figure 133

Norse pit filled with yellow sand indistinguishable from that surrounding the wheelhouse, rather than a deposit associated with House 2.

The occupation of House 2 was followed by the complete demolition of this structure and the infilling of the resulting hollow by a series of layers rich in occupation debris. Excavation of the deposits in four quadrants each excavated and numbered separately makes direct correlation of contexts between quadrants difficult. However, direct stratigraphic relationships between samples from two quadrants (east and south) are clear. SUERC-7638 came from a single barley grain from a concentration in the basal layer (413) in the east quad and SUERC-8171 came from the upper charcoal layer (398). The two samples from the south quadrant are SUERC-7624, a cattle metapodial from the middle layer (438), and SUERC-7645 from a concentration of barley grains in the upper layer (407).

On top of the Late Iron Age deposits were a series of features and layers indicating activity on the surface of the mound (CE). Pit 355 was the most substantial feature of this group. A single oat grain (SUERC-7637) came from a bright orange sand layer (390) near the base of pit 355. Pit 389 cut through a brown sand (371) that overlay pit 355 and SUERC-8170, a single oat grain, came from the brown sand fill (373) at the base of pit 389. Oat grains were chosen because they are not common in the underlying deposits (CC). These features are associated although not by a direct stratigraphic relationship with pit 451.

The final deposits dated in this trench come from layers infilling (CF) the abandoned Norse house (CD) to the north-east of the main area excavated. This house clearly cuts the sand associated with the construction of house CB but there is no secure stratigraphic relationship with the deposits infilling the abandoned house (CC) or the Norse features above this area (CE). Seven samples were submitted, all from the sequence of layers (CF) infilling the west end of the house. The earliest stratigraphic sample, SUERC-7625, came from a red deer astragalus and its articulated navicular cuboid in a brown sand (312). Two samples came from the immediately overlying midden layer (305); SUERC-7635 came from a cattle first phalanx and SUERC-17946 from a red deer first phalanx. This layer was covered by a brown sand layer (304) from which sample SUERC-7634, an articulated group of unfused cattle lumbar vertebra, was submitted. A later deposit of brown sand (331) in the area to the east produced sample SUERC-17947 from a red deer metatarsal shaft. Two areas to the east which have no secure stratified links with these deposits produced two further samples: SUERC-17948 came from a red deer metacarpal in grey sand (349) and SUERC-18229 came from a fragment of human skull in orange sand (322).

The western edge of mound 1 was examined by a trench where the visible extent of the mound ceased and it was thought the archaeological deposits would be dying out. The stratigraphically earliest context was (495) and is thought to represent a wind-blown sand deposit accumulating against an earlier phase of mound 1 to the east. Two samples from (495) – OxA-15452, a red deer tarsal, and OxA-15421, a cattle phalanx – are statistically consistent (T'=2.8; T' (5%)=3.8; ν=1; Ward and Wilson 1978).

Immediately overlying (495) was the first occupation layer (493). A single sample came from this context (SUERC-7627, a sheep radius). Layer 493 was sealed by another midden layer (485) from which SUERC-7633, a red deer radius, and SUERC-7626, a red deer astragalus and calcaneum, produced statistically consistent measurements (T'=0.4; T' (5%)=3.8; ν=1; Ward and Wilson 1978). This layer was sealed by a thick midden layer (456) which produced two samples: OxA-15419, a cattle calcaneum, and SUERC-7628 from an articulating pig astragalus and calcaneum. Both these measurements are also statistically consistent (T'=0.5; T' (5%)=3.8; ν=1; Ward and Wilson, 1978). The final sample from the midden, SUERC-7632, came from (463), a discrete patch of pale orange sand which is probably contemporary with the final deposition of 456.

Results

The model shown in Figure 133 shows poor agreement between the radiocarbon results and stratigraphy ($A_{overall}$=48.5%) as presented in the previous section. Three samples in particular have poor individual index of agreements, indicating poor agreement between their radiocarbon age and stratigraphic position. SUERC-7627 (A=22%) is too young for its position in the midden and therefore seems to be intrusive. Given the heavy disturbance of archaeological deposits caused by rabbits at Bornais (Sharples 2000), displacement and re-deposition of material would seem a likely scenario.

SUERC-7638 (A=18%) and SUERC-8171 (A=35%) both appear to be too old for their stratigraphic position and therefore seem to represent residual material. However, given that both barley grains come from concentrations that probably represent 'single event' deposits, residuality is unlikely. It may therefore simply be that SUERC-7638 and SUERC-8171 are statistical outliers as even at 95% confidence there is a one in twenty chance that the true result lies outside this range (Bowman 1990).

Running the model defined in Figure 133 with only SUERC-7627 excluded increased the overall index of agreement to $A_{overall}$=56.6%, just below the rejection threshold of $A_{overall}$=60% (Bronk Ramsey 1995). Values of less than 60% generally indicate a high likelihood (>95%) that there is a problem with the model (Bronk Ramsey 1995), *i.e.* the radiocarbon dates and stratigraphy are contradictory. Thus in the model in Figure 134, in addition to excluding SUERC-7626 we have also excluded SUERC-7638 and SUERC-8171; this increases the overall index of agreement to $A_{overall}$=104.3%. This is because a more plausible archaeological interpretation for the incorrect position of these two samples is that the east quadrant contains material that surrounded the house and which gradually infilled the pit used for construction of the wheelhouse when the walls of the house were removed. This, combined with the fact that these deposits were also disturbed by Norse pit digging, by burrowing rabbits and by cattle, means that the stratigraphic sequence might not be as intact as it seems.

The best estimate for the construction of the wheelhouse is provided by *start_house_1 (cal AD 320–490; 95% probability*; Figure 135) although the probability distribution shows it much more likely that it was built in the first half of the fifth century cal AD. The catastrophic fire that destroyed the first wheelhouse is estimated to have occurred in *cal AD 475–525 (68% probability; destruction*; Figure 135). Following the fire House 2 was constructed in *cal AD 470–555 (95% probability; house_2_built;* Figure 135*)*, although more probably in the first half of the sixth century cal AD, and abandoned in *cal AD 560–640 (95% probability; house_2_end;* Figure 135*)*. The infilling of the hollow of House 2 might have followed on immediately from the abandonment of the structure although, as discussed above, the stratigraphy in block CC is complex and thus the dated samples might not actually relate to infilling but may derive from earlier material slumping into the pit of the wheelhouse.

The midden (CG) probably started to accumulate at the same time as the building of House 2, in *cal AD 465–540 (68% probability; start_late_iron_age_middens;* Figure 135) and went out of use about the same time as House 2, estimated at *cal AD 560–625 (68% probability; end_late_iron_age_middens*; Figure 135*)*.

The model estimates that House 1 was in use for between *40–110 years (68% probability,* Figure 136) or *15–175 years (95% probability*) before the fire that destroyed it. House 2 was probably in use for a very similar period of time, estimated at *55–115 years (68% probability,* Figure 136) or *35–145 years (95% probability*). The Late Iron Age midden is probably associated with House 2 and is estimated to have been in use for between *25–160 years (68% probability,* Figure 136) or *1–265 years (95% probability*).

Estimating the date of the first Norse activity on the mound cannot adequately be addressed at present for a number of reasons. Firstly, the number of available samples that are clearly from the earliest phase of activity is limited and secondly problems of interpretation are apparent in one of the Norse sequences (the Norse midden CF). The basal sample from CF (SUERC-7625) is clearly too early as it predates the Norse period and is compatible with the Late Iron Age dates from CC and CB. Given the

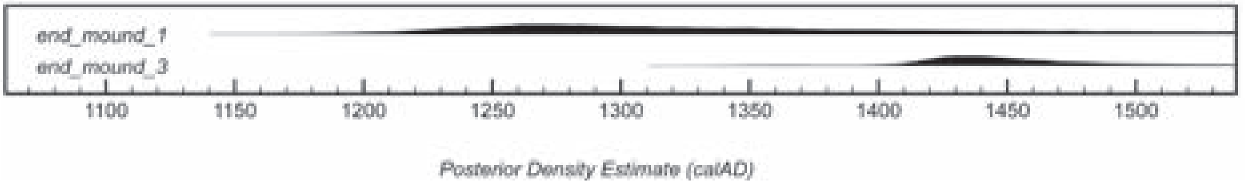


Figure 138. Probability distributions showing the estimated end dates for activity on mounds 1 and 3 (derived from Figure 134 and Appendix 4)

sample comes from a red deer astragalus and its articulated naviculocuboid, however, the chances of it being residual are extremely small. The Norse midden CF does though clearly contain other residual material as shown by samples SUERC-17947 (red deer) and SUERC-18229 (human), but as these are single bones there is doubt over their taphonomy. Samples SUERC-17946 and SUERC-17948 are also single bones and, as such, have been treated as simply providing *tpq*'s in the model; they are clearly evidence of Norse activity but do not date the contexts from which they were recovered. The clear implication is that the red deer assemblage from midden CF does not just contain material relating to Norse activity.

Figure 137 shows an extract of the modelled results from blocks CE and CF (Norse activity); suggesting when Norse activity started is fraught with difficulties yet the end of activity can be estimated as taking place in *cal AD 1205–1550 (68% probability; end_mound_1*; Figure 138). Simple visual inspection of the results does though raise the possibility, although it would need to be tested with a much more comprehensive radiocarbon dating programme, that the Norse activity on mound 1 starts before that on mound 3 (estimated at *cal AD 1050–1140* [*63% probability*] or *cal AD 94–1150* [*95% probability*]; see Appendix 5).

The end of activity on mound 3 is estimated as ending in *cal AD 1410–1475 (68% probability)* or *cal AD 1390–1570 (94% probability*; see Appendix 5). Analysis of the results shows a 59% probability that activity on mound 1 ends before that on mound 3.

Artefact chronologies – A Lane and N Sharples

In contrast to the material recovered from mound 3, the artefact assemblage from mound 1 includes several objects that potentially contribute to our understanding of the chronology of the settlement. The chronological information here is a summary of arguments more fully expressed by the specialists in chapter 7.

Late Iron Age

The closest comparison for the ceramic assemblage from Bornais is the material from Eilean Olabhat, North Uist which Campbell reports as fifth to sixth centuries AD (Campbell *et al.* 2004). These dates are very similar to the Bornais dates and replace the misleading impressions created by previous radiocarbon assays which dated this material rather earlier (Sharples 2000, 24–6; Lane 1990, 122–3). It is possible that the CA pottery with slightly more sharply everted rims lies at the beginning of the sequence but these forms are still typologically later than the shorter forms from Cnip phase 3 for which a third-century date has been cited (MacSween in Armit 2006, 100–3).

Consequently we now have two substantial assemblages with Dun Cuier ware radiocarbon dated to *c.*400–600 AD, Bornais and Eilean Olabhat. These are important as they seem to be fairly securely stratified and separable from earlier and later forms. Though some residual material was noted, the nature of the 'Dun Cuier' assemblage is clear and the more elaborate decoration of the Middle Iron Age has ceased. This dating of the cordoned Dun Cuier ware implies that the Udal dates from Crawford's North Hill sequence have to be pushed later than argued previously (Lane 1990, 117–23). It confirms the view that the Udal sequence has a break between classic wheelhouse decorated material at the bottom of the North Hill sequence associated with ironworking and cremations (Lane 1983, 38, 41–4) and the Plain style found higher up associated with cellular houses (Lane 1983, 44–50). Crawford has reported late third-century Roman ceramics in a horizon postdating his Udal South wheelhouse complex (Crawford 2002, 120) and a first to third-century radiocarbon date for classic wheelhouse material on the North Hill (Crawford 2002, table 15). Unfortunately the pottery from the Udal South wheelhouse has not yet been studied and it is not clear if there is any Dun Cuier material on the South Hill. The start date of *c.*400 AD for the Plain ware style does, however, need to be revised up to about 600AD or even slightly later.

It still seems likely that the pottery assemblage at Dun Cuier is of more than one phase (Lane 1990; forthcoming). As Armit (1988; 1992a, 34–8) has argued there may be a Middle Iron Age phase associated with the primary structure there (*contra* MacKie 2005, 17–18). The short sharply everted rims (Young 1956, fig. 8, nos 23, 25, 27), neck cordons (*e.g.* Young 1956, fig. 10, no. 85), and cordon variations (Young 1956, fig. 11, nos 94, 96, 97) look comparable to Cnip phase 3. The presence of a few incised sherds and one ring-stamped sherd also hints at earlier activity (Young 1956, fig. 110, nos 106–109). As Young clearly argued, however, the bulk of the ceramic material needs to be divided in two, with undecorated material coming later (Young 1966, 54; Lane 1990, 120–3). Bornais and Eilean Olabhat demonstrate that there is a phase where cordon-decorated flaring rim pottery is recognisable, for which the term Dun Cuier ware is appropriate. The Udal evidence supports Young's view that this was replaced by a phase of undecorated pottery, which can be called the Plain Style and which should be dated to the seventh to ninth century though it may start in the sixth century.

Harding and Armit report similar cordoned material stratified below a Plain ware assemblage associated with cellular structures built into a broch at Beirgh (Loch na Berie in some publications), Lewis (Harding and Armit 1990, 102–6; Armit 1996, 178–9) but no detail is available about the pottery assemblage (Harding and Gilmour 2000). Without a pottery report it is difficult to establish how similar the Beirgh sequence is but the dating of this site reported so far seems to confirm the Bornais and Eilean Olabhat dates (Harding and Gilmour 2000**).** Parker Pearson and Sharples reported some material of Dun Cuier type at Dun Vulan (1999, 210). However the published drawings do not show long flaring rims with cordons and the pottery range generally implies earlier material. Some Plain ware sherds may be present (*e.g.* Parker Pearson and Sharples 1999, 82–7, fig. 4.24 no. 4, fig. 4.25 nos 4, 5) but not in well-stratified contexts. The broad late dates suggested – sixth to ninth century AD – would be compatible with the Plain ware dates suggested at the Udal.

The terminal date of the Plain ware phase is uncertain given the poverty of published early Viking contexts. At the Udal, Plain ware sherds are found in the primary Viking layers but without clear evidence of whether the native pottery tradition continues after the 'Viking arrival' (Lane 1990, 123). Given the changes in forms and construction techniques in the Viking period, there still seems to be a significant social and cultural rupture in the ceramic sequence though not necessarily a chronological break. The presence of the Udal Plain ware phase at Bornais mound 1 is uncertain since the absence of decoration is one of the key features and distinguishing residual cordoned sherds from contemporary use is extremely difficult. Decoration may be fading out in the upper parts of the CC and CG deposits though this is not clear. Perhaps more convincing is the suggestion that the CE deposits contain Plain style material and by this time the only cordoned sherds are very abraded. Unfortunately this phase also contains Norse material though some contexts are not mixed. The radiocarbon dates for CE which cluster around cal AD 800–1000 could either represent continuing Plain style in the ninth century and/or early Viking material in the ninth or tenth century (Lane forthcoming). Unfortunately the stratigraphy of this area does not allow us to choose between the very different cultural implications which this material might have.

The chronological significance of the many diagnostic artefacts from the Late Iron Age deposits is unfortunately negligible. The most dateable find is an antler finger ring from the secondary floor of house (CB). This is reminiscent of Late Roman rings of 'Brancaster' type (see below 263; Johns 1996, 53–56) that would normally be dated to the fifth century AD, a date compatible with the late fifth to sixth century AD radiocarbon dates for the reconstruction of the wheelhouse.

The parallelopiped die (1973) from the house floor (CB) can be paralleled in size but not design with an example from Scalloway (Smith and Wilson in Sharples 1998b, 174, fig. 111.8), which was placed in the final phase of occupation, late phase 3, dated to AD 650–900. It therefore appears to be several centuries later than the Bornais example. The smaller example (2503) from the midden (CG) is comparable to the smaller examples from Scalloway (Smith and Wilson in Sharples 1998b, 174, fig. 111.9, 10). These came from the destruction layer in the broch, which was securely dated to the period AD 400–550 (Campbell *et al.* in Sharples 1998b, 185) a period comparable to, though slightly earlier than, that suggested for the Bornais midden. The close similarity in the delineation of the numbers between the two dice at Bornais suggests that they are contemporary and this is supported by the radiocarbon dates from the different contexts. It therefore undermines the suggestion that small dice are always earlier than large dice (Lane 1987, 55).

Weaving combs do not appear to have a clear chronology (see below 277). Stratified examples have been found during the recent excavations at the Howe (Ballin Smith 1994), Pool (Hunter 2007) and Skaill, Orkney (Buteux 1997) and these suggest that, though they may originate in the first millennium BC, they continue well into the first millennium AD in Atlantic Scotland. The Bornais examples are amongst the latest known and there is no evidence that weaving combs continue to be used in the seventh and eighth centuries AD (Late Iron Age II). It is worth noting that no composite bone combs or hipped pins were found on mound 1. These objects would be expected if activity dating to the seventh to eighth centuries AD, Late Iron Age II, took place on mound 1. Examples have been found on mound 2 (Sharples 2003a) where there are deposits radiocarbon dated to the eighth century AD.

Two objects may suggest that activity contemporary with the seventh to eighth-century occupation of mound 2 might be present on mound 1: a decorated phalanx (4780) and an ogham-inscribed plaque (1082). The phalanx came from a red sand layer (403) associated with the Norse activity area (CE). The decoration is unfortunately too simple to date precisely (see below 266) and it is possible that it represents a fifth to sixth-century AD piece that has eroded out of the earlier deposits or that it represents a later seventh to eighth-century AD piece that was curated into the Viking period. The ogham-inscribed plaque was an unstratified piece from an erosion scar immediately to the west of the excavated trench. Whilst it is possible that this piece dates to the seventh to eighth centuries AD, it is more likely to be a post-conquest piece of Viking origin (see Forsyth, below 271)

Norse

The presence or absence of platter sherds has been thought to be a chronologically significant factor in assessing the Viking/Norse assemblages (Lane 2005a, 194–5). These ceramic platters were first recognised in Iain Crawford's excavations of the Udal, North Uist and were seen as diagnostic of his secondary Viking phase IXc (Crawford 1974a, 12–13; Crawford and Switsur 1977, 131). Subsequent analysis of the pottery confirmed that platter sherds comprised less than 1% of the primary Viking layer at the Udal whereas they had become *c.*12% in the secondary Viking layer (Lane 1983, 182 and 204). The presence of platter sherds in the primary layer may indicate disturbance or stratigraphic confusion, an issue which will only be resolved if the site is published. Graham-Campbell and Crawford have suggested that the platters at the Udal date to the tenth and eleventh centuries (Crawford 1974a, 12–13; Graham-Campbell 1975, 20; Graham-Campbell and Batey 1998, 174–5) and, indeed, Crawford believed the platters were confined to that phase (Crawford 1974a, 12–13).

Subsequent work at Bornais and Cille Pheadair has indicated, however, that platters continued to be used in the Hebrides in the later Norse and medieval periods and indeed has raised questions about how early this form of pottery was introduced. The Bornais mound 3 evidence suggests that ceramic platters continued in use as late as the fourteenth century and were not present in the limited material on mound 3 of late tenth/eleventh century date (Lane 2005a, 194–5). At Cille Pheadair platter was present throughout the occupation of the site from *c.*1020–1220 (Parker Pearson in litt.). The date at which platter emerged has been suggested to be later partly because these ceramic plates have been seen as skeuomorphs of steatite baking plates, which do not appear in Norwegian contexts till *c.*1100 (Lane 2005a, 194–5). However, Forster's study of steatite in the Norse North Atlantic settlements has suggested that crude locally-produced steatite baking plates may be an earlier feature in this zone than in Scandinavia (Forster 2004, 182–98). They are present in the earliest Viking phases at Scatness and in pre-AD 1000 contexts at Norwick on Unst (Forster 2004). This means that the Oslo dates cannot be used to date the inception of the Hebridean baking plates. The terminal date for the Hebridean platters may be as late as the fourteenth century (Lane 2005a, 194–5).

The radiocarbon dates for the CE contexts seem to show platter in the tenth-century contexts. This is an important piece of evidence yet, as this is a miscellaneous group of features exposed by wind erosion and badly disturbed by rabbits, it cannot be relied on. Further understanding of the date and nature of the earliest Viking pottery in the Hebrides requires the analysis and publication of several sites. These include the Bornais mound 2 timber house and its pottery assemblage, which apparently lacks platter, and the Bostadh, Lewis site which also has early pottery of possible ninth or tenth-century date, again without platter (Johnson 2005).

The radiocarbon dates of *c.*1200 from the midden (CF) on mound 1 are associated with sagging bowls and platter and align well with the Cille Pheadair chronology for such Norse bowls and platter *c.*1020–1220. This helps to confirm that Norse assemblages do undergo changes *c.*1300 when everted rims appear in the mound 3 house (Lane 2005a, 194–5). However, a more certain understanding of the relationship of the new Viking pottery styles to the pre-Viking pottery tradition and its implications for the nature of Viking/native relationships may require the excavation of well-preserved ninth-century sites.

An interesting feature of the stone assemblage is the presence of four fragments of steatite vessels from the stratigraphically successive blocks CC and CE. It has been argued above (111) that the fragments in Late Iron Age deposits (CC) are probably contamination, as a result of rabbit burrowing, from the overlying Norse activity area (CE). Whilst this is a small concentration of small vessel fragments, it is noteworthy given the complete absence of vessel fragments in the Norse middens (CF) and the presence of only one fragment in mound 3 (Clarke *et al.* in Sharples 2005b, 133). Steatite vessels appear to indicate early Viking activity (Forster 2004) and this supports the radiocarbon determinations that suggest a ninth or tenth-century AD occupation in this area (Table 84). Unfortunately none of the other diagnostic Norse artefacts appears to belong to the ninth or tenth centuries AD, though the best parallels for the lead spindle whorl present in the mixed context infilling the Norse house (312; CF) come from the ninth to tenth centuries AD (see below 275). The combs are fragmentary but are more likely to date to the period after AD 1000 (see below 260) and though the only complete bone stick pin (1138) was found in the activity area (CE), it is not a particularly diagnostic type.

Evidence for eleventh and twelfth-century AD occupation is confirmed by the presence, on the surface of the excavated area, of a coin of Olaf the Peaceful of Norway (1066–1093). This provides a *terminus post quem* of 1066, or probably a little later, but it could have been deposited in the twelfth or even the thirteenth century (see below 259). Another distinctive unstratified metal object is a copper alloy crook-headed stick pin (1177) which can be loosely dated to the eleventh to twelfth centuries AD (see below 261).

The end of the occupation is indicated by a copper alloy lace-tag which is most likely dated to the thirteenth or fourteenth century AD (see below 265). It was found in a midden layer (307) at the top of the sequence infilling the Norse house (CF). The date range suggested is important as it extends the chronology of the deposits infilling the house.

The three radiocarbon samples obtained from these deposits come from contexts that are stratigraphically earlier than this context and it is likely that the occupation of mound 1 continues later than the radiocarbon dates suggest. Another possible Late Norse find is a comb fragment (1232) that may derive from a comb with two pairs of side plates. A comparable example from Jarlshof dates to the Late Norse period (see below 261) and this piece was also found in one of the latest midden layers (337), infilling the Norse house (CF). It is, however, interesting to note that no everted rim sherds were recorded from the pottery assemblage. These are present in the mound 3 assemblage (Lane 2005a, 194–5) and seem to indicate a ceramic development occurring in the fourteenth century AD. Their absence from mound 1 may be the result of taphonomic factors. There was only a very limited excavation of the late deposits on mound 1 and the heavily trampled nature of these surface deposits might make it very difficult to recognise these diagnostic sherds. This absence of everted rims may also indicate, however, that mound 1 was abandoned slightly earlier than mound 3.

Conclusion – N Sharples

The deposits excavated on mound 1 appear to be securely dated by a combination of radiocarbon dating and artefactual analysis. The presence of small residual sherds of Middle Iron Age pottery perhaps indicates that the occupation originates as early as the first centuries AD. However, the bulk of the deposit blocks CB, CC and CG belong to the fifth to sixth centuries AD or Late Iron Age I. The radiocarbon dates provide precise and statistically quantifiable determinations for the construction of the house and its reconstruction and then abandonment as well as estimates for the use of both houses and the midden. These dates provide a firm chronology for the associated artefacts, many of which have only rarely been found in stratified and dated contexts before.

There then seems to be a gap in the occupation that lasts throughout the seventh and eighth centuries AD and the evidence suggests the inhabitants abandoned mound 1 and moved to the area that became mound 2.

The radiocarbon dates suggest that mound 1 was re-occupied in the ninth century AD and the likelihood of early Viking occupation is supported by the presence of steatite vessel fragments. The bulk of the material recovered from the two Norse blocks (CE and CF) suggests that a Norse house (CD) was constructed sometime in the eleventh century AD and that it was gradually infilled through natural erosion and deliberate dumping in the twelfth and thirteenth centuries AD. The limited excavation of the final deposits at the north-east end of the excavated area suggests a structure was then constructed but the discovery of only a few dateable finds and the absence of radiocarbon dates associated with this structure make it unclear if the occupation of mound 1 ended in the thirteenth or fourteenth century AD.

6 Resource exploitation

Introduction – N Sharples

In the report on the excavation of mound 3 the discussion of resource exploitation in the Norse period considered the landscape of South Uist as divided into zones aligned north-to-south and this approach still provides the most useful means of conceptualising the different resource areas on the island.

The waters of the Atlantic coast of the island are relatively shallow as an extensive shelf extends some distance to the west. Most of this coastline is defined by a sandy beach with a high coastal dune but in the township of Bornais a rocky promontory, Rubha Ardvule, projects beyond the coastal dunes and the coast of the promontory is exposed rock with substantial storm deposits of cobbles and pebbles. The promontory also provides a relatively sheltered bay on its south side, which is used as a summer anchorage for small inshore fishing boats.

In the vicinity of the settlement at Bornais the machair plain is approximately 500 m wide and relatively flat. It is extensively cultivated by the local community on a two-year rotation between crops, largely oats, and cattle grazing. However, a large low-lying area between the settlement mounds and the coastal dunes is seasonally flooded in the winter and is not cultivated (Figures 139, 140). This part of the Bornais machair plain is relatively stable but high dunes in the southern half of the township have been unstable in the recent past (Angus 1997, 167–9).

The current inhabitants of the township of Bornais occupy the area immediately to the east of the machair plain, inhabiting a landscape characterised by rocky outcrops interspersed between small lochs and boggy ground. Most of this landscape is covered in thick peat deposits but, in the settlement area adjacent to the machair plain, human

Figure 139. The Bornais machair flooded in winter looking south with Barra in the distance

Figure 140. The Bornais machair flooded in winter looking towards Beinn Mhor

activity, and the addition of shell sand by both natural and anthropogenic means, has improved the quality of the soils. These areas have been intensively cultivated in the recent past though drainage is a problem. Generally as one moves east the ground rises, initially quite gradually, the lochs become smaller and the peat becomes thicker and more extensive. The peat in this area is exploited for fuel by the islanders but the agricultural potential of the land is limited to poor quality grazing. About halfway across the island the land becomes increasingly mountainous and the most important peaks at Beinn Mhor and Hecla reach heights of 620 m and 606 m.

The mountains drop relatively precipitously to the east coast where there is very little low-lying ground capable of substantial human settlement. In the area to the east of the settlement at Bornais, however, the mountain spine of the island is penetrated by a sea loch, Loch Aoineart, which stretches westwards to just over 3 km from the machair plain. The loch may have been extended by human action to provide access to some of the inland lochs adjacent to the machair. The coast around Loch Aoineart is the location for several small communities and the loch is currently used by local fishing boats and is the site for several fish farms. The comparable sea loch to the south, Lochboisdale, is the current base for the ferry that connects South Uist to the mainland and these sea lochs would always have provided the principal means of access to the Minch and the adjacent areas of mainland Scotland.

The site at Bornais is therefore positioned in a central location on the island of South Uist. It is surrounded by a relatively substantial area of the machair plain which is flat and suitable for extensive cultivation. Unusually for South Uist, and for a settlement on the machair, it has relatively easy access to the east and west coasts and to sheltered anchorages on both coasts. Bornais is therefore in an ideal position to maximise agricultural production, to exploit the sea and coast, and to maintain long-term connections with the areas beyond the island. This chapter will explore whether these potentialities were transformed into actualities.

The Sea. 1. Fish – C Ingrem

The predominance of small saithe in the Late Iron Age deposits indicates that immature saithe were the main focus of fishing activities at this time. For the first three years of their lives, saithe grow at an average rate of 150 mm annually (Wheeler 1969) and therefore the majority recovered from mound 1 were probably below two years of age. In southern waters young saithe remain inshore for only one year before moving offshore; in more northerly latitudes such as the Faroes, however, more than 10% remain inshore for two years. Once immature saithe leave the shore they remain near the surface just offshore. In light of this, it is interesting that a large proportion of the Late

Iron Age midden material belongs to very small saithe, especially when compared to the larger size of many of the Norse specimens. It suggests a change in strategy from inshore fishing during the Late Iron Age to the exploitation of offshore waters during the Norse period. There are numerous examples in the ethnographic and documentary records of saithe fishing; according to Martin (1995), its popularity is demonstrated by the variety of names it has been given, such as 'cuddy', 'coalfish' and 'sillock'. It is known to have been plentiful, dependable and easily caught by hook and line, poke or seine net from the shore (Martin 1995). In 1773, Johnson and Boswell (Cutting 1956, 171) wrote of their visit to the Western Isles that 'cuddies are so abundant at some times of the year that they are caught like whitebait in the Thames, only by dropping a basket and drawing it back'.

Of the other taxa represented in Iron Age deposits only salmonids are present in sufficient numbers to suggest they might have been deliberately targeted. Salmon, trout and common eel inhabit both marine and freshwater habitats and could have been caught in either. Elasmobranchs, herring, conger eel and rockling are at least occasionally found in inshore waters and are therefore likely to represent incidental catches whilst fishing for saithe.

The predominance of herring in the Norse deposits indicates that immature saithe were no longer the primary target of fishing activities. Although young herring inhabit shallow water and can concentrate close to the banks on which they spawned, they are pelagic fish generally found in offshore waters from the surface to depths of 200 metres (Wheeler 1969). The fact that very small herring are absent suggests that the remains recovered from mound 1 derive from fish that had reached the end of their third year (Wheeler 1969), by which time they would have moved into deeper water. This implies that offshore fishing was now taking place, an hypothesis supported by the virtual absence of very small saithe. It is thought that herring shoaled on the edge of the continental shelf to the west and in the Minch to the east of South Uist in spring or summer (Harden Jones 1968). The larvae of those spawned to the west are carried a considerable distance to the north by the Atlantic current whereas many of the young fish spawned in the Minch probably grow up in the lochs and bays along the coastline (Harden Jones 1968). It is known that the Dutch exploited offshore waters in the Minch during the fifteenth century (Boyd and Boyd 1996, 67) and it is likely that such sheltered waters were also the target of Norse fisher folk. According to Boyd and Boyd (1996), herring shoaled in exposed offshore waters during the summer in the nineteenth century.

Unlike saithe, herring are unpredictable fish and their capture can involve a wait of several days, even weeks, during which time, according to Martin (1995) 'the crew became bonded by their mutual purpose'. Herring fishing was generally carried out at night and, until the late nineteenth century, most herring fishing was done from open boats using drift-nets (Martin 1995), which Serjeantson (in prep.) believes probably predates the early Middle Ages. The high cost, in terms of the investment in technology and the risks involved in offshore fishing, suggests that herring fishing was probably carried out at the community rather than individual level.

Of the other taxa present in Norse deposits, large cod-family fish, particularly cod and hake, are present in sufficient numbers to suggest that they might have been deliberately targeted. It is possible that they were caught on lines whilst fishing for herring in offshore waters. Similarly, the remaining taxa may represent incidental catches or occasional fishing from the shore. Eel and salmonid fish are present only as trace taxa in the Norse deposits, therefore if freshwater was regularly exploited during the Late Iron Age, it appears this was no longer the case.

The Sea. 2. Mammals – J Mulville

The range of marine mammals present at Bornais is likely to have been collected by active hunting and the scavenging of carcasses. Few seal bones were recovered and in both the Iron Age and Norse periods these derived from a range of elements from skull fragments to phalanges with no emphasis on any particular element. These low numbers suggest that seal were not a staple of the diet. In the Iron Age assemblage both a neonatal and an older seal were present. The sparse butchery evidence – the butchered maxilla of the older individual and a metapodia – points to exploitation of seal meat, but hunting seal must have been an occasional encounter. Whilst the active hunting of seal can be identified at other sites and periods (*e.g.* Dun Vulan, Mulville 1999) it cannot be concluded from this assemblage.

There is a large quantity of cetacean bone present at Bornais, although the majority is unidentifiable to species or element, as is the case at most sites (Mulville 2002). Whale bone itself if a valuable resource, and many have argued that its presence on site is mostly a reflection of its artefactual, architectural and fuel utility: the meat and blubber can be easily removed prior to return to the sites (2002). As a result it is difficult to reconstruct procurement strategies; however, a consideration of the species present can provide some clues as some cetaceans, for example the blue whale, identified from a metacarpal, are highly unlikely to have been hunted. This animal is large and fast and would be difficult to encounter and track; thus the bones from this animal were probably scavenged. A range of cetacea continues to be stranded on the Isles each year (Figure 141). On the other hand the presence of smaller whales and dolphin vertebrae may suggest active hunting as pods of these animals can be hunted from small boats or driven ashore and killed close to the land. In a review of the cetacean material from the Hebrides it was noted that in general the range of species, the proportion of whale bone and the range of artefacts is greater in the

Figure 141. A whale on the west coast of South Uist, September 2010

Norse period (Mulville 2002). The Hebrideans had the opportunity, the maritime skills and technology to actively hunt cetacea from shore or from boats but would also have welcomed any stranded animals as providing easily obtainable resources.

The Sea. 3. Birds – J Cartledge and D Serjeantson

The environmental preferences of the birds discussed in this chapter are taken from Heinzel *et al.* (1974), Cunningham (1983) and Thom (1986). We can be fairly sure how some of the birds were caught, but some might have come from more than one of the various different environments near the settlement.

Some of the birds whose remains were found at Bornais must have been either collected from their breeding sites on distant islands during boating expeditions or caught by fishermen. Seabirds were sometimes caught accidentally or deliberately on baited fishing lines. The birds from the sea include the fulmar, Manx shearwater, gannet, guillemot and/or razorbill, great auk, puffin and the great northern diver.

Seabirds were usually caught at the time when they came ashore to breed (Baldwin 2005) as they spend much of the rest of the year out to sea. The fulmar nests colonially on sea cliffs and feeds at sea. Today it nests around much of the coast of the British Isles but its only breeding site until the late nineteenth century was on St Kilda. This island group also has the nearest breeding colony to South Uist of gannets, which breed on clifftops. The Manx shearwater today breeds on Rhum and a few other islands but in the past there was a nearer colony on Mingulay. The razorbill and the guillemot both use sea cliffs for breeding; their nearest colonies today are on Mingulay and Berneray. There are large puffin colonies on St Kilda and the Shiant Islands and smaller ones on Mingulay and the Monach Islands.

The breeding sites of the great auk in Scotland are unknown. It was a flightless seabird that became extinct in the nineteenth century. It used to come ashore for six to eight weeks to breed and the juveniles would take to the sea while still very young (Birkhead 1993). Its known breeding colonies were on a few isolated offshore islands, but it bred more widely in the past. The large quantity of great auk remains at nearby Dun Vulan suggests that it must have bred not far away at the end of the first millennium BC, perhaps on the Monach Islands. The great auk became rare in Scotland after the end of the first millennium AD, something which is supported by its absence from Norse levels at Bornais. One of the bones is from a juvenile bird, so it was probably caught by a fisherman at sea.

The eider is a large marine duck which is rarely seen far from the sea. It breeds near the coast. In one of its Gaelic names, it is *lacha heisgeir* after the islands of Heisker (the Monach islands) offshore from the coast of North Uist, indicating that these islands were a breeding site in the past as today, though it might have bred nearer the settlement in the past. The great northern diver breeds in Iceland and winters off South Uist so will have been caught at sea in winter.

The Shore. 1. Shellfish – N Sharples

The exploitation of the principal species of shellfish, winkle and limpet, was extensively discussed in the previous report on mound 3 (Sharples 2005b, 159–62). It was concluded that the presence of large numbers of limpet and winkles on the site reflects the importance of the coast and the resources it could provide. Visits to the shore, particularly by children and women, would have been routine and, though other resources such as driftwood might have been more important, the collection of shellfish would have guaranteed some return from these visits. The bringing of shellfish from shore to settlement would have established a relationship between the community and particular parts of the shore whose exploitation is likely to have been carefully controlled. The disposal of the shells onto the middens surrounding the settlement would have then demonstrated this connection to people visiting the settlement or even people viewing the settlement mound from a distance.

The results from mound 1 do not radically alter the conclusions from the previous work but highlight a slight change from a Late Iron Age preference for limpets to a Norse preference for winkles (see above 201 for data). There is also a significant increase in the variety and numbers of the lesser species in the Late Iron Age deposits. Large quantities of flat periwinkles (*Littorina obtusta* L.) and grey top shells (*Gibbula cineraria* L.) were found in the samples from the house (CB). The most obvious likely explanation for this is that seaweed was brought to the house either as part of the construction process or to be processed within the house. Both species live amongst the seaweed and would then have been accidentally brought to the settlement. It is also worth noting, however, that both species are attractive brightly coloured shells which are often found in concentrations on the beach (Figure 142). They may have been collected because they were attractive and brought home as decorations or children's playthings. Certainly some of the more elaborate painted top shells (*Calliostoma zizyphinum* L.) have been perforated for suspension and must have been used as decorations. The scallop (*Pecten maximus* L.) shells and probably the common whelks (*Buccinum undatum* L.) and oyster (*Ostrea edulis* L.) shells are also likely to have been collected because they are substantial and interesting shells. Isolated examples of both whelk and scallop have been worked (see below 271).

This interest in shells appears to have died away in the Norse period. There is no evidence for worked shells in these deposits and most of the species present, apart from the winkles and limpets, are likely to be accidental inclusions brought in with seaweed. It is interesting to note that though the Norse deposits in both mounds 1 and 3 contain flat periwinkles, neither has significant quantities of grey top shells. This would be surprising if the presence of these shells in the Iron Age deposits simply reflected the use of seaweed.

Figure 142. A concentration of periwinkles on the south coast of South Uist

The Shore. 2. Birds – J Cartledge and D Serjeantson

The shag and cormorant are similar, with the shag, the smaller bird, more common in the Hebrides today. Both are resident and nest on rocky coasts and in sea caves so will have been caught on the shore. Relative numbers of shag decline in the Norse period, perhaps because culling temporarily reduced their numbers locally. The rock dove, which is still widespread in the Outer Hebrides, nests in coastal caves and in rock crevices on sea cliffs.

Though large numbers of waders feed on the shores, where they can be caught in nets, their numbers are few at Bornais, so those captured are more likely to have been taken from the nest.

The Shore. 3. Wood – R Gale

The charcoal assemblage from mound 1 is dominated by the

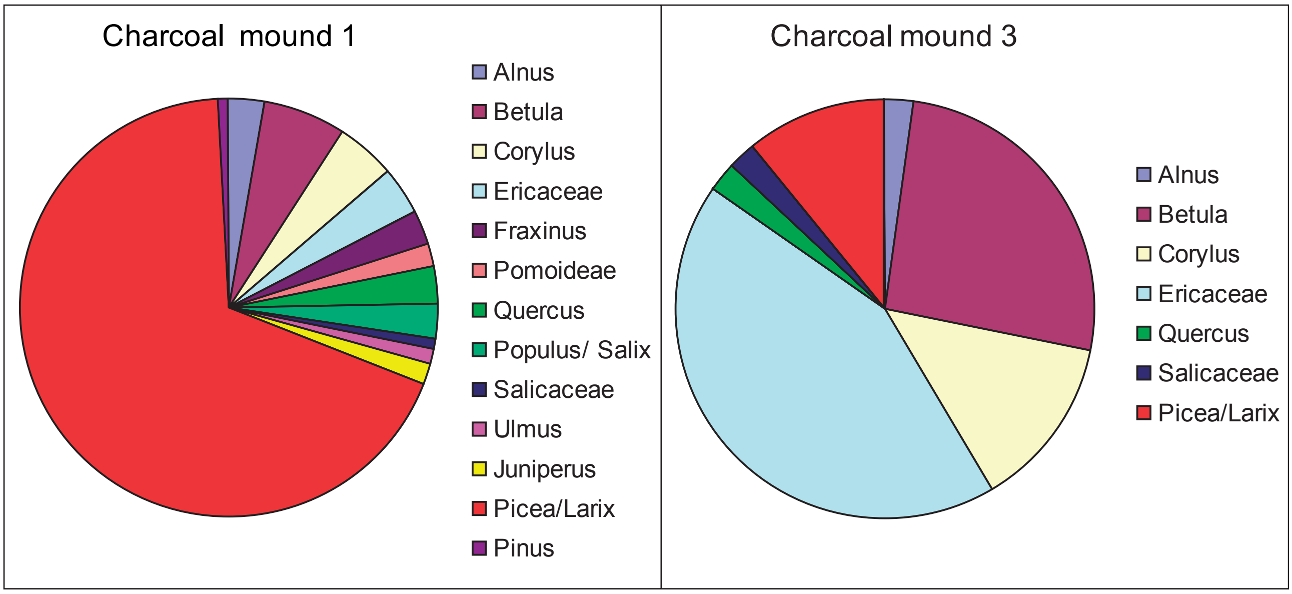


Figure 143. A comparison between the charcoal from mound 1 and mound 3

presence of spruce/larch (*Picea/Larix*) with a wide range of other species occurring but only in very small quantities. Neither spruce nor larch is native to Britain and the timber present in these deposits must have been recovered from the foreshore (Gale in Sharples 2005b) where it appears as driftwood having crossed the Atlantic from America. Narrow bore holes were observed on several pieces of the charred wood and the presence of shells of Teredinidae sp. in the sieved residues from the associated layers (457 and 397) is confirmation of the timber's watery origin.

Most of the spruce/larch material was associated with the destruction of the Late Iron Age house but it also dominates the material from the other blocks and the prevalence of this material contrasts markedly with the assemblage from mound 3 (Figure 143). It is possible that the material in the other blocks derives from disturbance of the timbers in the burnt-down house but it is also possible that it indicates the use of off-cuts from the structural material as firewood. The occurrence of spruce/larch in the middens to the west of the main excavation area is more likely to indicate its use as fuel.

If all the spruce/larch derives from the conflagration of the Late Iron Age house, then the significant difference between the frequency of its discovery on mound 1 and mound 3 simply reflects the unusual destruction of a building on mound 1. However, if one accepts the presence of spruce/larch in the other blocks represents its use as fuel, then the infrequent occurrence of this material in mound 3 is more meaningful. It may indicate a significant decline in the availability of this material in the Norse period. This could indicate the driftwood present on the beaches in the Norse period was not as common, or as well preserved, as it was in the Late Iron Age, or that the Norse inhabitants of the house on mound 3 did not have access to a productive area of the coastline. Sharples (2005b, 162) has argued that access to the coastline would have been carefully controlled and partitioned out between the different families.

The Shore. 4. Stone – A Clarke and A Pannett

Almost all the stone tools are made from beach cobbles of rock that would have been available locally. The site lies in an area of metamorphic activity though sedimentary rocks are also available, being deposited as glacial erratics from the Torridonian beds of the mainland (Johnstone and Mykura 1989, 166). The most common of the metamorphic rocks is gneiss, and within the gneiss deposits there occur other metasediments and metavolcanic rocks such as schist, quartzite, diorite and amphibolite (Johnstone and Mykura 1989). Gneiss has a characteristic banded structure formed by the quartz and feldspar layers alternating with layers of dark minerals. Feldspars weather readily to clay, however, and the gneiss can decay quickly when it is exposed. The water-rolled cortex (the weathered outer 'skin' of a cobble) found on beach cobbles provides a tough protective surface over the cobbles of gneiss that can prevent, or substantially delay, the weathering processes. When decay of the gneiss does occur, the original nodule crumbles as the quartzite crystals are released from the matrix of feldspar. Several gneiss cobbles tentatively classified as unused cobble tools were in such a state of decay that no observations could be made of the wear patterns at all.

The flint assemblage is also likely to be beach-derived, with primary pieces showing characteristically abraded cortex, although the flint is generally devoid of the flaws often seen in beach pebbles.

The Machair. 1. Carbonised plant remains – J Summers and J Bond

Within the carbonised plant remains assemblages from mound 1 there is evidence of the exploitation of different ecosystems around the site. Given the nature of archaeobotanical assemblages and the biases imposed by preservation and identification, the most dominant signature is from the cultivation of cereals on the machair plain (Figure 144).

Cultivars

In the Late Iron Age samples from mound 1, as with the Norse material already reported from mound 3 at Bornais (Colledge and Smith 2005a), the most commonly occurring cultivated taxon is barley (81.6% ubiquity). The overall number of barley grains is also considerably higher than any other type of cultivar. Although the amount of chaff is very low, with only three fragments of barley rachis recovered from the entire site, it is very probable that barley was cultivated by the site's inhabitants, most likely on enriched machair soils nearby. There is a preservation bias against chaff elements in carbonised plant assemblages (Boardman and Jones 1990) and since preservation of archaeobotanical remains in the mound 1 samples was generally quite poor, it can be expected that the conditions of charring are likely to have selected against these more fragile parts of the barley plant. Furthermore, it is now quite widely recognised that crop processing by-products, especially from earlier stages of processing, have significant economic values, including use as fodder and, in many situations, are unlikely to be deliberately burned in any substantial quantity (*e.g.* van der Veen 1999).

The most likely economic use of barley is for consumption. It is also possible that barley straw was used for thatching houses during this period, as results from a conflagration at Dun Bharabhat appear to suggest (Church 2002a). The most commonly occurring form is hulled barley, although whether it was a two-row or a six-row variety is difficult to determine from the evidence in the assemblages. Hulled, six-row barley is identified as the dominant later prehistoric crop in numerous archaeobotanical investigations in the Outer Hebrides, such as at Dun Vulan (Smith 1999), Hornish Point and Baleshare (Jones 2003), Cnip (Church and Cressey 2006) and Dun Bharabhat (Church 2000), most likely in no small part a result of its hardiness and tolerance of a range of soil conditions and increased salinity (Dickson and Dickson 2000, 230–3). The presence of naked barley is very limited and is likely to represent little more than genetic variation within the barley population.

As already stated, oat has a lower ubiquity than barley and occurs in much lower numbers. The ubiquity values of oat show that it is most common in the Late Iron Age infill (CC) and midden deposits (CG), as well as occurring in the charcoal layer and the secondary floor surface. The type of oat grown cannot be determined without the presence of floret bases yet, based on the type of environment represented in this part of South Uist, with machair dominating the cultivated areas, it may be possible to postulate that black/bristle oat (*Avena strigosa*) is most likely to have been grown. This type of oat has a higher tolerance of calcareous shell sand than the other major cultivated variety (*A. sativa*) (Dickson and Dickson 2000, 234–5). In addition, it was the most commonly cultivated oat on poorer soils in historic times, at least in the Northern Isles (Dickson and Dickson 2000, 234–5; Fenton 1978, 335).

It can be estimated that oat is likely to have been grown by the Late Iron Age inhabitants at Bornais but only in the later phases of occupation. The higher ubiquity scores from the Late Iron Age infill (CC) along with its high density in these deposits would suggest that oat played a more significant role in the economy in later periods. Based on the environmental tolerances of black oat and evidence from other palaeoeconomic research in the region, it is likely that the introduction of this crop and its increased representation over time indicate an extension of the agricultural system onto less improved land further from the settlement. The evidence from mound 3 indicates that these developments continued into the Norse period, a situation that is also mirrored elsewhere in the region (Bond 2007; Church 2002b).

The increasing importance of oat from the Late Iron Age onwards in the Northern Isles has been taken to suggest an expansion of the farming system, both as part of a risk-buffering strategy and a way of extending cultivation into less fertile areas of land (Bond *et al.* 2004, 142). Whether this was to increase amounts of human food or to provide more fodder for a more intensive dairying strategy is not easy to prove categorically on current evidence, although the correspondence between the increase in oat cultivation and the archaeozoological evidence for increased dairying is well demonstrated (Bond 2003; Mulville *et al.* 2005). A second possibility for the early use of oat is the cultivation of maslins, perhaps for a proportion of the crop, whereby two or more cultivars are grown together as a risk-buffering strategy in the event of adverse weather or poor growing conditions (van der Veen 1995). This could result in a gradual uptake, culminating in the decision to grow oat as a crop in its own right. Unfortunately this is not easy to detect in the types of deposits excavated from this site.

In the mound 1 samples, rye (*Secale cereale*) makes a negligible impact, which is in stark contrast to its 66% ubiquity in mound 3 deposits. This would suggest that rye played little or no part in the Late Iron Age economy at Bornais, being instead a purely Norse introduction. Wheat also appears in the mound 1 assemblages, with the same very low ubiquity as rye. Wheat occurs only rarely in archaeobotanical assemblages from Atlantic Scotland and most evidence suggests that cultivation, if it ever occurred, was not attempted beyond the Neolithic, with small amounts of wheat present among remains of six-row naked barley (Boardman 1993; Bond 2007). As with rye, the results indicate that wheat was not cultivated by the

Figure 144. Current crops on the machair plain of South Uist

site's inhabitants, perhaps occurring as a weed in other cereal crops, an alien in imported seed or potentially as an imported product.

Flax was present in a number of mound 1 assemblages with a ubiquity score of 4.4%. This would initially seem very low and of little significance but it is important to consider the fact that the way in which flax is generally used (for oil, fibre or perhaps fodder) would not result in the frequent contact of the seeds with fire. As a result one may expect it to be under-represented in carbonised botanical assemblages, often instead being recovered from waterlogged deposits (*cf*. Bond and Hunter 1987, 176). Although numbers are low, flax is known to compete poorly with other plants (Bond and Hunter 1987, 177), making the possibility that it is present as a weed in the cereal crop or as a wild plant less likely. In none of the samples were flax capsule fragments identified, which may indicate that processing was not undertaken in the structure, although preservation issues may also be at work. Interestingly, flax capsule fragments are also absent from mound 3 assemblages, which had far greater concentrations of *Linum* seeds.

Evidence for flax growing in mainland Scotland can be traced back to the Neolithic at Balbridie (Fairweather and Ralston 1993, 319) and it would seem unlikely that inhabitants of the Western Isles were completely unaware of its presence and its potential prior to the Viking invasion. It must be considered that the gradual uptake of this crop could have started in the Iron Age, with a subsequent expansion of cultivation in later periods. It is likely that the taphonomic issues of preservation associated with the oily seeds of this plant and the processing methods employed will mask the identification of early, small-scale cultivation. There is indeed now much more evidence of *Linum* in various Late Iron Age assemblages from across the region, such as Scalloway (Holden 1998, 127) and Old Scatness (Bond *et al.* 2010) in Shetland and Warebeth broch (Bell and Dickson 1989, 118) and the Howe (Dickson 1994, 135) in Orkney. Cumulatively it is now arguably possible to consider these as representing early cultivation. Whether the very small concentrations of flax from certain Middle Iron Age contexts in Atlantic Scotland such as at Crosskirk broch (Dickson and Dickson 1984, 152) and Old Scatness (Bond and Summers forthcoming) represent even earlier stages of this process remains to be fully understood at present.

Despite this it is apparent that flax is far less common in deposits from mound 1 than it was in deposits from mound 3 (Colledge and Smith 2005a). In addition, the sheer number of flax seeds from mound 3 contexts (*e.g*. Colledge and Smith 2005b) suggests a change in the way this plant was used in later periods, when it was presumably grown in greater quantities and processed more intensively. As with other sites, such as Cille Pheadair, South Uist (Smith 2005), Pool (Bond 2007) and Saever Howe (Dickson 1983) in Orkney, the heavy use of flax appears to be a Viking/Norse phenomenon; for the Late Iron Age inhabitants of mound 1, it is unlikely to have been a key economic resource. Based on all of the above evidence it is not possible to categorically say that flax was being cultivated at Bornais in the Late Iron Age. The main viable mechanisms for its occurrence are either through local cultivation or import from elsewhere, such as mainland Scotland, since it is unlikely that it would survive well in an unmanaged habitat.

Weed taxa

The range of wild plant taxa recovered includes plants that can commonly be interpreted as arable weeds, including goosefoots (*Chenopodium* sp.), of which a number of species are weeds of cultivated and enriched land; nettles (*Urtica urens* and *Urtica dioica*), which are nitrophilous weeds of enriched soils and might well have occurred in the manured fields used for barley cultivation; cabbages/mustards (*Brassica/Sinapis* sp.), which could include charlock (*Sinapis arvensis*), a common arable weed; docks/knotgrasses (*Rumex/Polygonum* sp.) and bedstraws (*Galium* sp.) of which many species occur as weeds of arable and waste ground (Stace 1997). Some sedges (*Carex* sp.) could represent damper areas of arable fields, although they could also have entered the assemblages by other means (see below). Although the nitrophilous goosefoots and nettles would most likely be associated with the enriched soils expected to be used for barley cultivation, it is not possible to distinguish whether others would be more specific to either barley or oats.

Of the weed taxa listed as being associated with flax by Bond and Hunter (1987, 177), two appear with relatively high ubiquity scores in association with the highest flax ubiquity scores from the Late Iron Age infill (CC). The first is the *Rumex/Polygonum* sp. (sharp angles, smooth testa) group, which is most likely to correspond to docks (*Rumex* sp.) and the second is *Brassica/Sinapis* sp., which could potentially correspond to charlock (*S. arvensis*), although these taxa are difficult to distinguish based on the seeds alone. However, this is not mirrored in mound 1 hearth samples or those from the secondary floor where flax also occurs. It is likely that the growing conditions for flax would have been similar to those for barley, utilising enhanced machair soils, to which it is well suited. It is therefore likely that a number of the other wild taxa in the assemblages could potentially have grown amongst a flax crop as well as barley crops.

It is possible that the local machair soils could be shown by the presence of mouse-ears (*Cerastium* sp.) in the charcoal layer (457) and the secondary floor layer (397). Many mouse-ear species prefer calcareous soils and grow in open grassland. They can also occur as weeds of cultivated ground and some grow in coastal areas and in sand dunes (Stace 1997, 163–6). It is possible that at least a proportion of the mouse-ears entered the assemblages as part of the weed flora associated with the cereal crops. However, they could also be grouped with other grassland taxa, which include the numerous grasses identified (Gramineae), buttercups (*Ranunculus* sp.), cinquefoil (*Prunella vulgaris*) and plantains (*Plantago* sp.) (Stace 1997). Some of these taxa could represent deliberately gathered grasses, perhaps as straw gathered for fodder from the margins of the blacklands. A significant problem lies in the difficulties of precise identification of some of these groups, especially within the grasses. There is the potential for other habitats to also be represented, including cultivated land, as probably represented by the brome grass (*Bromus* sp.) recovered from the pit fills, charcoal layer and secondary floor layer.

The evidence is taken here to represent cultivation of machair soils, as has been interpreted for Iron Age sites studied in Lewis (Church 2000; Church and Cressey 2006). The resolution given by the fairly limited range of weed taxa does not provide a definitive answer but there are no taxa that strongly suggest cultivation of more acidic blackland soils, as was thought possible at Dun Vulan (Smith 1999). There is also some logic in arguing that settlements would have been located close to the main areas of cultivation, as shown for example in the location of enhanced soils around the Old Scatness settlement (Bond *et al.* 2004, 140). Such a hypothesis would also point towards machair cultivation. Between the assemblages from mound 1 and the Norse material from mound 3 there are many similarities in the weed communities identified. This indicates that, despite the increased diversity of crops in the Norse period, the conditions under which cultivation was undertaken and most likely the methods employed show a great deal of continuity from earlier periods.

Within the group of 'wild' taxa, there are some that could be of economic value. For example *Brassica/Sinapis* sp. could represent the deliberate cultivation or gathering of plants from the family Brassicaceae, which can be used for their leafy parts or for their oily seeds. However, brassicas can also commonly occur as arable weeds. In none of the assemblages from mound 1 do any taxa show increased values that could help identify deliberate gathering.

The Machair. 2. Birds – J Cartledge and D Serjeantson

The machair, the dunes, the dune slacks and the Rubha Ardvule headland are the habitats where most of the birds from Bornais were caught. Some species breed in this environment and some winter there or pass through on migration. The gulls, the birds found in greatest numbers in both the Late Iron Age and the Norse period, will have bred in colonies on the dunes or the headland. They, like the seabirds, were traditionally caught when they came ashore to breed in late spring and early summer. The decline in numbers from the Late Iron Age to the Norse period may reflect either pressure from annual culling or loss of habitat from an increase in grazing by cattle and sheep, which would have disturbed breeding colonies.

The shelduck breeds in the Outer Hebrides but migrates south between July and November. It nests in burrows on coastal dunes and estuaries. The habitat of the teal, the smallest duck, ranges from lochs to moorland pools; they are still abundant in South Uist. The mallard breeds near slow-moving water and today occurs in large concentrations. The fact that there are few ducks in the assemblage might suggest that there were fewer large bodies of fresh water near the settlement in the past than there are today.

Some of the waders breed in the wet low-lying grasslands. Distinguishing the bones of the smaller waders is sometimes difficult but curlew, golden plover, lapwing, snipe, and godwit appear to be present. The lapwing breeds abundantly throughout the Outer Hebrides. Snipe were abundant in the Outer Hebrides in the nineteenth century but are less frequent today. They were usually trapped in nooses laid on the ground. The oystercatcher is still a widely distributed resident which today breeds on the machair. The common crane, which breeds in wet meadows and bogs, might also have bred on the machair and dunes in the first millennium AD. Today it is seen only rarely and then as a passage migrant.

Other species winter on the flooded machair or pass through on migration. Large flocks of curlews pass through the Outer Hebrides and some winter on the machair. Godwits sometimes breed but are predominantly birds of passage and winter visitors. The brent goose breeds on Arctic sea-shores and winters in estuaries in Britain. They mostly occur on South Uist as they pass through on their spring passage, when they feed on the machair. The greylag and the other grey geese frequent coastal marshes in the winter.

The Machair. 3. Animal management – J Mulville and A Powell

The management and movement of animals and humans in the landscape and seascape can be traced through an analysis of the species present, their behaviour and exploitation patterns.

Sheep and cattle were the most abundant species at Bornais and pasture will therefore have been a critical resource that required careful management. The lack of pre-modern field boundaries in the landscapes of South Uist suggests that stock were relatively free to roam across the island. The absence of large terrestrial predators would preclude the necessity of protecting animals from their attentions by the use of dogs (it is, however, possible for golden eagles to take lambs and young deer). On the other hand grazing animals pose a serious threat to crops in an open landscape and the destruction of another community's crops by stock could cause serious problems. Controlling stock in an open landscape normally requires constant supervision. If the animals were kept close to the settlement then they would have to have been penned at night and moved onto pasture away from crops during the day. Alternatively the animals could have been kept away from the settlement during the crop-growing period of the year. In this region that means taking them up to the hills and would have entailed the creation of temporary shelters or shielings. One of the reasons for keeping animals close to settlements is the access to animal manure. This is required to fertilise the machair which is very poor in nutrients. Stock might have been folded on the arable land up to the point at which the crops were sown, and then excluded from these areas until the crops were harvested. Thus the management of grazing stock was clearly closely related to the creation and use of arable areas.

Transhumance occurred on the islands in historic times (see Raven 2012b for archaeological and documentary evidence) and the continuation of this tradition back through time is feasible, with shielings acting as shelters and stores for those caring for stock on summer pastures higher up on the peaty hills. Once cattle had calved they could be moved to new grazing, milked and the milk stored as cheese or butter in the shielings until it was returned to the settlements. Some cows might have been retained at the permanent settlement to provide fresh milk for the remaining inhabitants.

Whilst the control of stock during the growing season posed one series of problems, the maintenance of stock over the dormant winter period introduced another set of problems including the need to provide winter grazing, shelter and fodder (see Smith 2012 for historical accounts of winter strategies).

The management of wild resources was also a consideration. Red deer were the only wild mammal present in large numbers and, as a terrestrial grazing animal, they too posed a threat to arable crops at particular times of year. Although they are likely to have spent much of the year up in the hills, the small distances involved would have allowed deer to move from hill to machair within a day. They are also likely to have moved to lower grazing areas during the autumn rutting season and to have remained in these lower areas for the winter. These areas would have been much closer to the settlement and, as well as competing with domestic animals for relatively limited winter grazing, deer could have encroached on the cultivated landscape and damaged autumn-ripening crops, any autumn-sown crops and spring seedlings. Keeping red deer at bay, or alerting people to their presence, might have been one of the tasks of the small number of dogs kept at the settlements.

Ageing

We can track animal production strategies through an examination of mortality profiles, produced from dental and fusion evidence. This reveals differences in the focus of animal production strategies between species and phases.

For the Iron Age the dental evidence indicates that sheep were mostly slaughtered between 6 months and 2 years, with over half the population dead by their second year; there is a second peak in slaughter between 3 and 6 years (Figure 145; Table 85). The presence of young animals is indicated in the fusion data: although only 16%

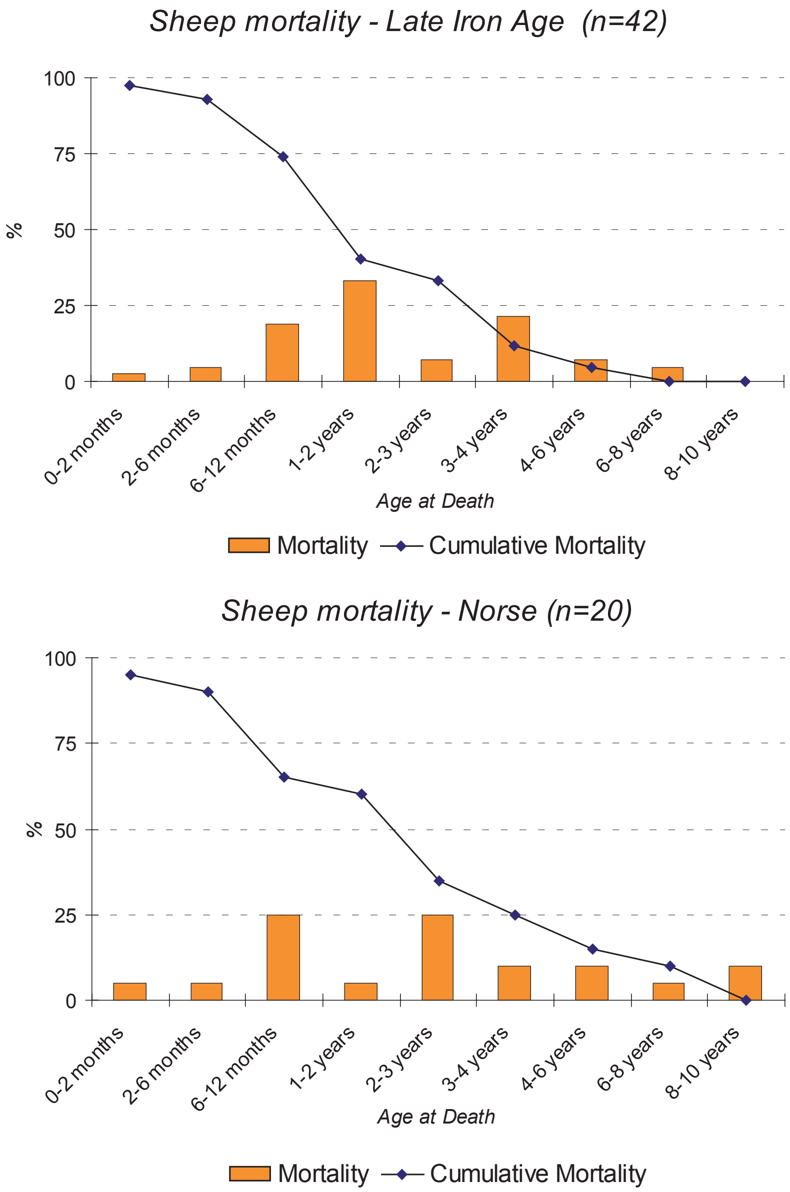


Figure 145. Dental ageing for sheep in the Late Iron Age and Norse periods

overall of bones in the first age stage of under 1 year are unfused, this figure rises to 49% for the second age stage of under two years (Table 86). The general absence of very young animals in the dental data is supported by the fusion data, where only 4% of the bone is identified as neonatal. This pattern suggests meat and wool production and the equal numbers of male and female pelves are consistent with this interpretation (Table 87).

It is not yet possible to determine if animals were slaughtered in the autumn, winter or spring. Given the problems of over-wintering stock, it is likely that animals were slaughtered in their first or second autumns, when they were in good condition and prior to the winter when fodder supplies diminished. It is also possible that sheep were slaughtered during late spring when they would have recovered their condition, restored fat levels and gained carcass weight.

The rarity of neonates at the site suggests a number of options: animals might have been birthing away from the settlements, with stock being removed from the closer protected arable land as crops begin to appear in the spring, and newborn fatalities were not returned to the settlement; alternatively, neonatal bones are so fragile that they have possibly been entirely destroyed by gnawing or other taphonomic processes. Sheep can be kept with minimal supervision for most of the year but they are often provided with support over the period of birth and initial feeding to reduce herd mortality (Tani 2005). This may be provided at the settlement or further afield, although often some sort of isolation pen is useful in order to get mother and lamb to correctly imprint, for suckling to be initiated and to protect the newborn lambs.

In the Norse phases, sheep mortality indicates peaks in slaughter at 6–12 months and 2–3 years, with animals

Period	Species	Neonatal	Juvenile	Immature	Sub-adult	Adult	Elderly	Total
Late Iron Age	Cattle	14	14	1	1	2		32
	Sheep/goat			3	11	20		34
	Pig					3		3
	Red deer		5	8		13		26
Norse	Cattle		1			2	1	4
	Sheep/goat		1			2	1	4
	Red deer		1					1

All but one of the juvenile LIA cattle specimens are at stage b; the neonatal cattle include stage a

Table 85. Age groups from tooth eruption and wear data for main mammalian species

Element	Fused	Unfused	Neonate	% Immature*	
Humerus, d	26	2	1		
Radius, p	36	1	1		
Scapula	25	4			
Pelvis	15	2			
Phalanx II	41	6			
Phalanx I	57	20			
Sub-total <1 year	200	35	4	16	
Tibia, d	35	10	2		
Metapodia, d	22	32	3		
Sub-total < 2 years	57	42	12	49	
Calcaneum	7	9			
Femur, p	9	12			
Humerus, p	6	10	1		
Radius, d	11	15	1		
Ulna, p	6	11			
Femur, d	4	10			
Tibia, p	15	21	1		
Sub-total < 3 $^{1}/_{2}$ years	58	88	3	61	% Neonates
Total	315	165	19	37	4%

* = unfused plus neonatal material

Table 86. Sheep/goat epiphyseal fusion from the Late Iron Age blocks

probably killed in their first and third autumns (Figure 145; Table 88). After this age the rate of slaughter reduces. The emphasis therefore is not solely on meat production, with older animals providing a number of fleeces, and possibly milk, before their slaughter. Again there is little evidence for the death of very young animals and we can assume that animals were cared for over the birthing period but birthing occurred off site.

Cattle show a different pattern of exploitation (Table 89; Figure 146) with a large proportion of animals killed, or dying, shortly after birth in the Late Iron Age and only a few older immature animals and adults present. The dental evidence demonstrates an extremely high level of early mortality in cattle: 90% of the animals are dead by eight

Period	Species	Element	Female	Male
Late Iron Age	Cattle	Pelvis	1	1
	Sheep	Axis	1	
		Pelvis	3	4
	Pig	Upper canine	5	2
		Lower canine	6	5
Norse	Cattle	Pelvis	1	
	Pig	Lower canine	2	1

Table 87. Sexed mammal bones from mound 1

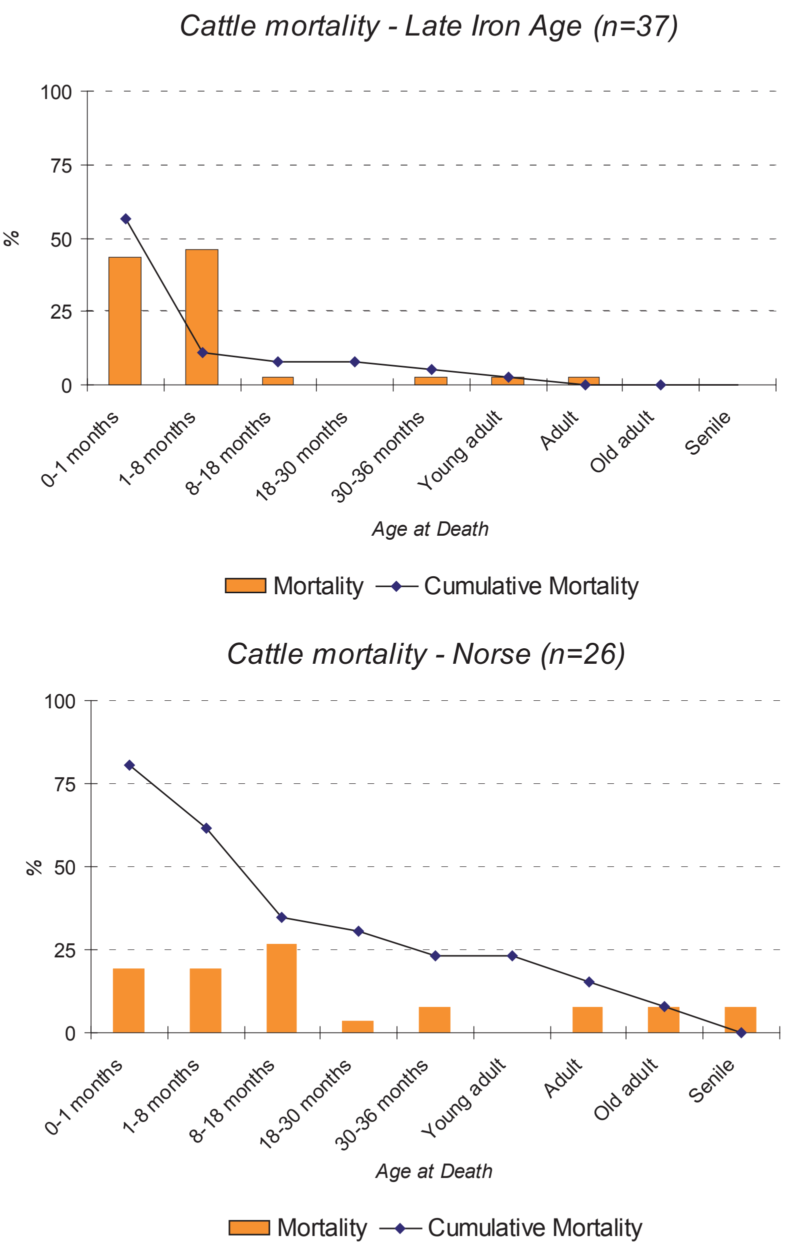


Figure 146. Dental ageing for cattle in the Late Iron Age and Norse periods

months, probably before their first winter, and there is little evidence for older animals and none older than adult. This high level of mortality is mostly recorded in the high number of loose dp4's which either have no wear at all ('foetal/neonatal'), slight *in utero* enamel wear, or slight dentine exposure on the mesial cusps (all but one jaw in the 'juvenile' category). The epiphyseal fusion data for cattle broadly supports the dental ageing, indicating a kill-off in the first year, when most specimens are neonatal, but it provides less evidence for animals dying in this age range. The difference is probably due to the increased vulnerability to damage of fragile neonatal bone; thus the dental evidence can be considered more accurate for this age group. Fusion provides evidence for more cattle surviving to between one and two years, and indicates that a few animals survive to over four years old. The low numbers of animals of breeding age suggest that these deposits consist of only part of the population, otherwise the herd would have been unsustainable.

As with sheep, cattle would have been cared for during the birthing period but the presence of neonates suggests either that this took place close to the settlements or that, unlike newborn lambs, it was worth returning dead calves to the settlements for further processing and usage. The Iron Age assemblage is unusual in that the low numbers of mature animals present suggest that the adult population is being disposed of elsewhere, with very few available for consumption at mound 1. The use of mature cattle in activities such as ploughing or milk production is not indicated from this data. Given the absence of adult

Element	Fused	Unfused	Neonate	% Immature*	
Humerus, d	8	0	3		
Radius, p	11	0	2		
Scapula	6	2			
Pelvis	5	2			
Phalanx II	14	3			
Phalanx I	22	10	1		
Sub-total <1 year	66	17	6	26	
Tibia, d	6	8			
Metapodia, d	12	23	5		
Sub-total < 2 years	18	31	5	67	
Calcaneum	4	6			
Femur, p	1	1			
Humerus, p	2	2	2		
Radius, d	1	2			
Ulna, p		3			
Femur, d		3			
Tibia, p	2	5			
Sub-total < 3 $^{1}/_{2}$ years	10	22	2	71	% Neonates
Total	94	70	13	47	7%

* = unfused plus neonatal material

Table 88. Sheep/goat epiphyseal fusion from the Norse blocks

Element	Fused	Unfused	Neonate	% Immature*	
Scapula	11	6	7		
Pelvis	3	4	18		
Sub-total <1 year	14	10	25	71	
Radius, p	6	1	7		
Phalanx II	103	34	20		
Humerus, d	4	1	7		
Phalanx I	92	51	29		
Sub-total < 2 years	205	87	63	42	
Tibia, d	2	4	1		
Metapodia, d	30	16	20		
Calcaneum	3	8	5		
Sub-total < 3 years	35	28	26	61	
Femur, p		1	7		
Humerus, p	1	2	7		
Radius, d		9	4		
Ulna, p	3	4	12		
Femur, d		1	8		
Tibia, p	2	3	2		
Sub-total < 4 years	6	17	40	90	% Neonates
	260	142	154	53	28%

Table 89. Cattle epiphyseal fusion from the Late Iron Age blocks

material there are few sexed cattle bones; only one female and one male pelvis were recorded from the Late Iron Age contexts (Table 87).

The evidence for Norse cattle husbandry indicates a lower degree of neonatal mortality than in the Late Iron Age (Figure 146). Dentition indicates that more of the

Element	Fused	Unfused	Neonate	% Immature*	
Scapula	6	2			
Pelvis	2	1	5		
Sub-total <1 year	8	3	5	50	
Radius, p	3	0	0		
Phalanx II	37	7	5		
Humerus, d	4	1	1		
Phalanx I	42	16	5		
Sub-total < 2 years	86	24	11	29	
Tibia, d	2	1	0		
Metapodia, d	7	11	3		
Calcaneum	2	3	0		
Sub-total < 3 years	11	15	3	62	
Femur, p	1	1	0		
Humerus, p	0	0	1		
Radius, d	1	0	0		
Ulna, p	1	2	2		
Femur, d	0	1	0		
Tibia, p	2	1	0		
Sub-total < 4 years	5	5	3	62	% Neonates
	110	47	22	39	12%

* = unfused plus neonatal material

Table 90. Cattle epiphyseal fusion from the Norse blocks

population survived the first few months, with a much lower rate of first year mortality. About one-fifth of animals died in their first month, double this by the end of eight months; this rate of slaughter continues with one-third of the population surviving to over 18 months. Unlike the Iron Age pattern, this suggests a sustainable breeding population: with one-third of the stock adult and older, the herd would have been able to replace itself in addition to providing milk and traction animals. The fusion data (Table 90) broadly supports the dentition evidence, with a substantial rate of slaughter in the first year, but differs in that fewer animals are identified as dying during their second year. Instead the evidence indicates that animals continued to die in their third and fourth years with a number of animals surviving to an older age. Similar to sheep, this pattern probably suggests a seasonal autumnal slaughter in the first two or three years, but not the high level of cattle neonatal mortality seen in the Late Iron Age. There are sufficient young animals to suggest that breeding is taking place at or near the site although it is likely that cattle were removed from the settlements on a daily or seasonal basis in order to protect arable crops.

The small body of ageable pig material shows disagreement between the tooth wear and fusion data from the Late Iron Age. Less than half of the earliest fusing bones (those which fuse by the end of the first year) were fused. The proportion of unfused bone increases for bone fusing in the second and third years with only 5% of fused bone derived from elements that fuse at around 3½ years (Table 91). In contrast, the only ageable mandibles are from animals around 2 years of age; thus neither the youngest nor the oldest animals indicated by the bone evidence are represented (Table 85). In the sparse Norse sample, no ageable mandibles are present. Fusion suggests a higher first year kill-off (as only about 14% of first year fusing bone present is fused) and thus very limited survival into skeletal maturity (Table 92). Neonatal bones are present but rare in the Iron Age and suggest only a few accidental fatalities. As proposed for other stock, first year deaths probably represent animals slaughtered in their first autumn. The increase in animals killed in this age group in the Norse period, if the small dataset is taken at face value, may indicate a preference for pork or ham but it may also reflect greater utilisation of meat preservation techniques developed for the fish trade (Ingrem 2005). An analysis of loose pig teeth indicates a possible preference for breeding females, with females and males evenly represented in lower canines (Table 87) and female maxillary canines outnumbering male ones.

Economic pig-keeping requires either substantial unmanaged woods or marshland for free-ranging pannage or some source of feed for penned sty-kept animals (Ward and Mainland 1999). Environmental evidence to date suggests that unmanaged woodland and marshland habitats were rare or unavailable on South Uist and it is more likely that the pigs were contained. As omnivores pigs could have been fed on any surplus food, including meat, fish and vegetable waste. The evidence from stable

Element	Fused	Unfused	Neonate	% Immature*	
Scapula	2	1			
Humerus, d	1	1			
Radius, p	2	1			
Pelvis	4	3			
Phalanx II	5	6			
Sub-total <1 year	14	12	0	46	
Tibia, d	3	1			
Metapodia, d	4	12	2		
Phalanx I		8			
Sub-total < 2 years	7	21	2	77	
Calcaneum		6			
Ulna, p		2			
Femur, p		3			
Humerus, p	1				
Radius, d		3			
Femur, d		1			
Tibia, p		3			
Sub-total < $3\,^{1}/_{2}$ years	1	18	0	95	% Neonates
	22	51	2	71	3%

* = unfused plus neonatal material

Table 91. Pig epiphyseal fusion from the Late Iron Age blocks

isotope analysis (see below 244) indicates that pigs had both a plant and animal food based diet with a possible marine component.

Size

The entire set of metrical data from mounds 1 and 3 is presented in the archive. The question of whether there was a change in animal body size between the Late Iron Age and Norse livestock populations is difficult to address from the mound 1 and mound 3 data alone as the data set of measurements from the Norse phase is not very large, even for the more numerous taxa. The plot of greatest peripheral length against proximal breadth for cattle first phalanges (Figure 147) suggests that, while the size range was similar in both phases, there were more large animals, including some outside the Late Iron Age range, in the Norse group. The Norse sheep/goat sample also contained a few specimens outside the upper limit of the Late Iron Age sample (Figures 148, 149, 150) but given the small size of the sample, the results are only tentative.

A simple comparison of animal size can be undertaken by calculating withers height from single bones by use of the multiplication factors of Teichert (1975) and Matolsci (1970) and comparison with the published data from Late Iron Age Dun Vulan (Mulville 1999, 253–6) and initial data from Bronze Age Cladh Hallan (Mulville and Powell forthcoming). The lack of complete adult cattle bones at Bornais mound 1 results in only two withers heights, one of 1113 mm for the Late Iron Age and the other of 1098 mm for the Norse period, both larger than the few calculated for Dun Vulan, where the average is 1045 mm (range 1024 to 1096 mm; Mulville 1999, 256) and Cladh Hallan (average 1096 mm; Mulville and Powell forthcoming). There is a larger body of data for sheep, with an average of 600 mm (range 528–644 mm) and 597 mm (535–645 mm) for the Late Iron Age and Norse respectively; again these are both larger than the average at Dun Vulan of 572 mm (range 483–662 mm) or Cladh Hallan 564 mm (range 547–587 mm). However, these figures do not point to any dramatic changes from the Bronze Age to the Norse period in the overall size of stock.

It is also possible to compare individual measurements against a calculated standard for that species, for example Shetland sheep (Davies 1996). By using the log ratio of the difference between the individual measurements and the standard measurements in a particular dimension (e.g. length, breadth and width) the size can be compared for each element. In this way the maximum amount of each available dataset can be utilised. The expansion in data only occurs if the various elements included are derived from different individuals and it is entirely possible that this method samples a single individual more than once.

The most abundant sheep dataset at Bornais consists of the breadth measurements. The log ratio values for the breadth of proximal radius, distal humerus and distal tibia reveal an obvious difference between the Bronze Age and the later material (Figure 151). The earlier breadth

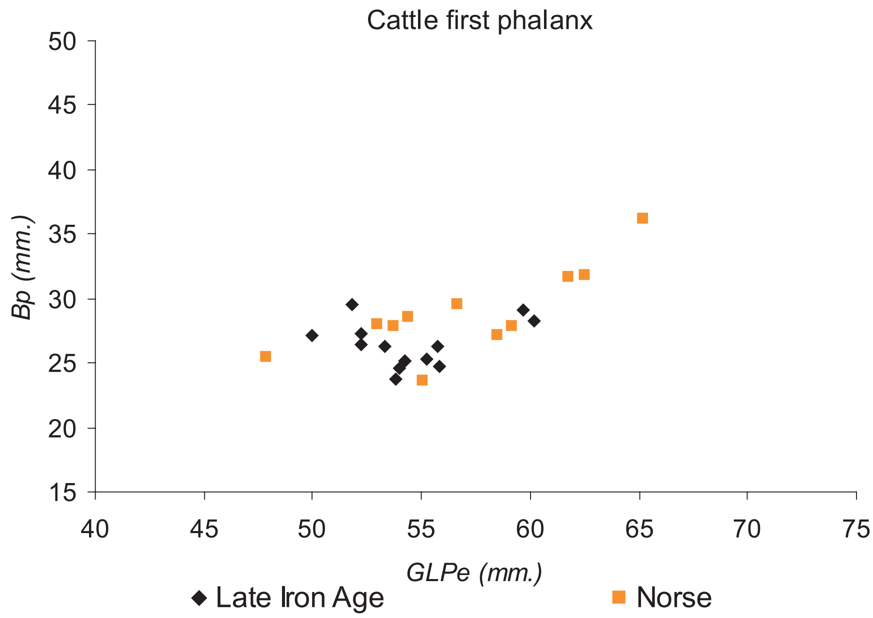


Figure 147. A comparison of the size of Late Iron Age and Norse cattle phalanges

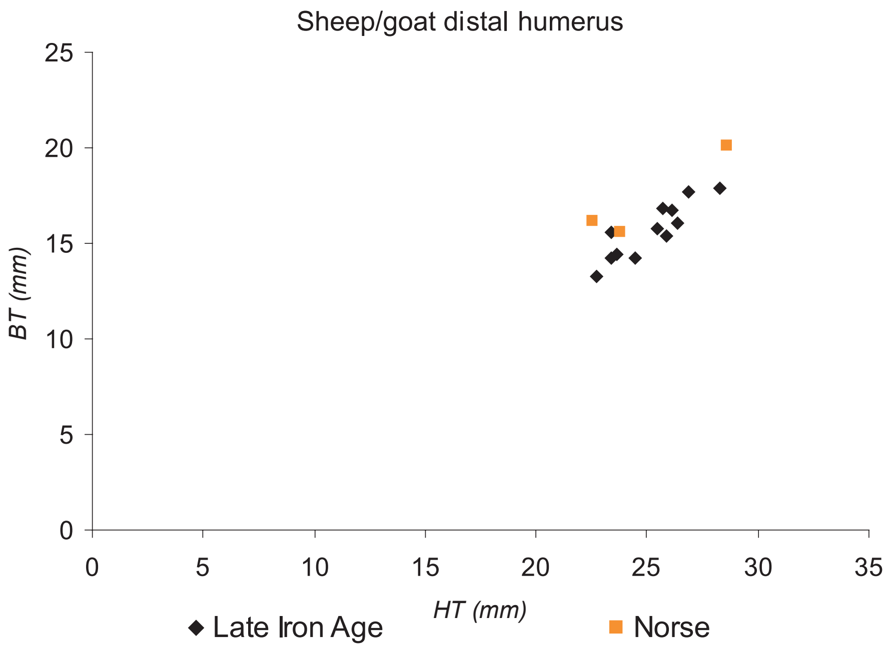


Figure 148. The size of the sheep/goat distal humerus

measurements peak at around -0.05 (range -0.08 to 0.01) (significantly smaller than the comparative dataset of modern Soays whose values are set at zero). The Iron Age range is larger (-0.08 to 0.04) with a peak at 0.02. These size differences may also relate to sexually dimporphic size differences, with the larger individuals reflecting an increased proportion of larger males. The larger group of log ratio length data from the astragalus (Figure 151) compares material from the Late Bronze Age settlement at Cladh Hallan with the Late Iron Age and Norse material from Bornais mound 1 and indicates that the Bornais mound 1 material is larger but that the Norse lengths are smaller than those of the Iron Age.

There are few pig measurements but a comparison of the greatest length measurements of the astragalus indicates that the Bornais mound 1 measurements (average 36 mm) are similar to those at Dun Vulan (average 37 mm). The few dog and horse measurements available provide only limited information on these species.

Individual measurements can also be compared with the material recovered from Late Iron Age/Norse Bostadh and Late Iron Age Beirgh, Lewis. The cattle at Bornais

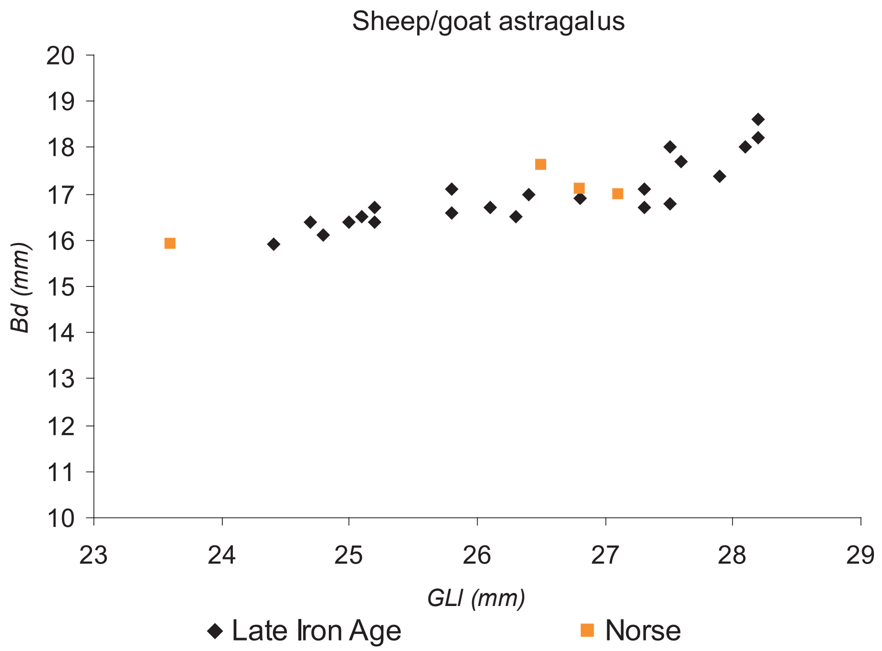


Figure 149. The size of the sheep/goat astragalus

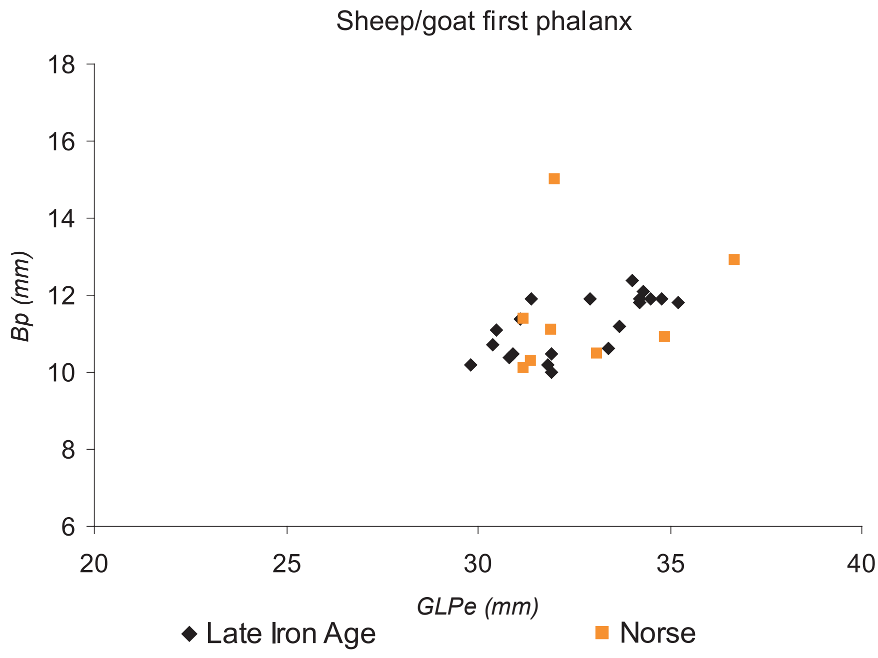


Figure 150. The size of the sheep/goat first phalanx

were on average slightly larger than those from Bostadh and a similar size to those at Beirgh (Thoms 2004, table 4.44, 142 and table 5.32, 183).

Conclusion

Evidence for an increase in the size of sheep after the first century AD in both the Western and Northern Isles has been identified by Cussans (pers comm), and he relates this to agricultural intensification and improvements in animal nutrition through foddering. This increase can be seen at Bornais and the evidence suggests that the Late Iron Age animals are larger than those from comparible Western Isles sites, including those in South Uist. There is as yet no evidence for an overall change in stock size as a result of Norse animal management. There are a few larger individuals present, but in general the size profile for Norse animals, both in terms of withers heights and

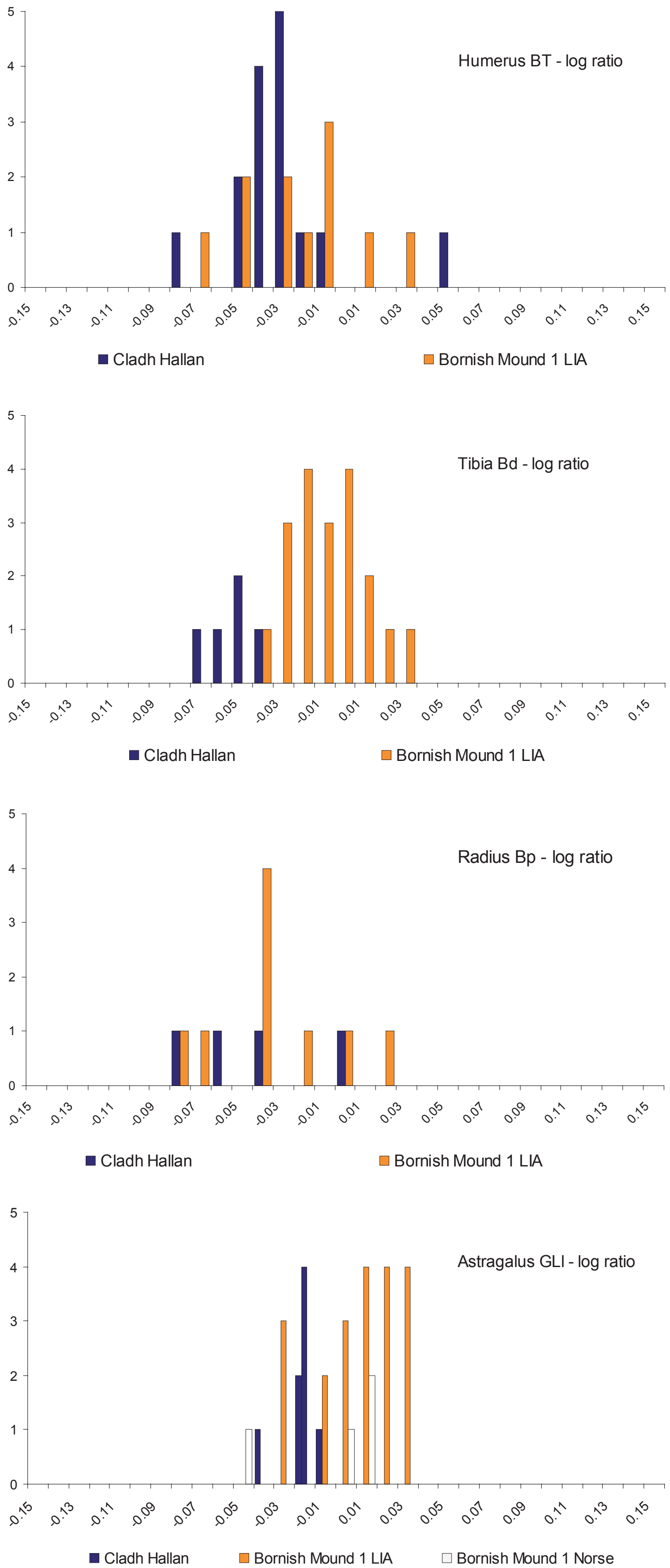


Figure 151. A comparison of the size of the sheep bones from Cladh Hallan and Bornais mound 1

Element	Fused	Unfused	Neonate	% Immature*	
Scapula	0	0	1		
Humerus, d	0	2	1		
Pelvis	0	1	0		
Phalanx II	1	1	0		
Sub-total <1 year	1	4	2	86	
Tibia, d	0	0	1		
Metapodia, d	0	1	0		
Phalanx I	0	3	0		
Sub-total < 2 years	0	4	1	100	
Calcaneum	0	1	0		
Femur, p	0	2	0		
Humerus, p	0	0	1		
Tibia, p	0	0	1		
Sub-total < 3 $^1/_2$ years	0	3	2	100	% Neonates
	1	11	5	94	29%

* = unfused plus neonatal material

Table 92. Pig epiphyseal fusion from the Norse blocks

individual measurements, as seen in Figure 151, is smaller. Further research on the mound 2 and 2A assemblages should clarify if the Norse size changes are due to changes in husbandry or stock.

The Machair. 4. Isotopic analysis of the fauna – R Madgwick, J Mulville, R E Stevens and T C O'Connell

Data are presented here for 54 Late Iron Age faunal isotopic values from mound 1 specimens. A further four specimens of Norse date were analysed from mound 1 but these will be discussed in a later volume concerned with the Viking period. Forty of the samples were analysed in 2007 at the McDonald Institute, Cambridge specifically for the aim of dietary reconstruction. Results from a further 15 bones were obtained from radiocarbon dating programmes. Analysis of these was carried out at the Scottish Universities Environmental Centre (SUERC) and the Oxford Radiocarbon Accelerator Unit (ORAU). The 2007 samples were selected on a number of criteria, namely to include a range of terrestrial species, to avoid duplication of results from any one individual and to avoid age-related dietary changes. Samples from three domestic (cattle *Bos taurus*, sheep *Ovis aries*, pig *Sus scrofa*) and one wild (red deer *Cervus elaphus*) species were selected and, when possible, separate animals were identified (*e.g.* by repeatedly sampling the same part and side of a particular element). Ageing information was employed to ensure that juveniles below weaning age were omitted. Collagen from material analysed in 2007 was extracted following a modified Longin method (Longin 1971).

Results and discussion

Results of the analysis are presented in Table 93 and Figure 152. As might be expected, the cattle and sheep cluster relatively closely on the graph, with respective mean δ^{13}C values of -21.1‰ and -21.3‰ and mean δ^{15}N values of 4.3‰ and 4.4‰. These ratios are typical for herbivores in a temperate environment devoid of C_4 plants. Mean red deer values are similar (-21.7‰ for δ^{13}C and 4.4‰ for δ^{15}N) to those of the domestic herbivores, although deer have a slightly wider range of δ^{13}C ratios with some individuals exhibiting lower values. The broader range of values for red deer may result from environmental factors, with wild animals having the freedom to graze in a broader territory than domesticates, which might have been confined to a restricted area. Larger samples are required, however, to ascertain whether this difference is real or the result of limited sampling.

Results from analysis of pig samples differ markedly from those of the herbivores, with mean ratios of -20.6‰ for δ^{13}C and 6.9‰ for δ^{15}N. Only a single pig sample falls within the range of the herbivores, with the remaining eight samples clustering in two groups. Six of the samples are enriched in δ^{15}N but fall within the herbivorous δ^{13}C range. This is likely to be indicative of an omnivorous diet. As is often the case with isotopic analyses, however, interpreting this pattern is complicated by problems of equifinality. The inflated δ^{15}N ratio provides evidence for the contribution of animal products as well as plant-based dietary sources to the protein part of the diet. These could have taken the form of meat scraps or dairy products from human meals or alternatively could result from faeces having been utilised for pig fodder. It is also possible that plant-based dietary resources might have derived from

Species	δ13C	δ15N	std dev δ13C	std dev δ15N	sample
Cattle	-21.1	4.3	0.4	0.5	15
Red Deer	-21.7	4.4	0.4	0.7	19
Sheep	-21.3	4.4	0.3	0.6	12
Pig	-20.6	6.9	0.4	0.8	9

Table 93. Means and standard deviations for δ13C and δ15N isotopic ratios for the different faunal taxa from mound 1

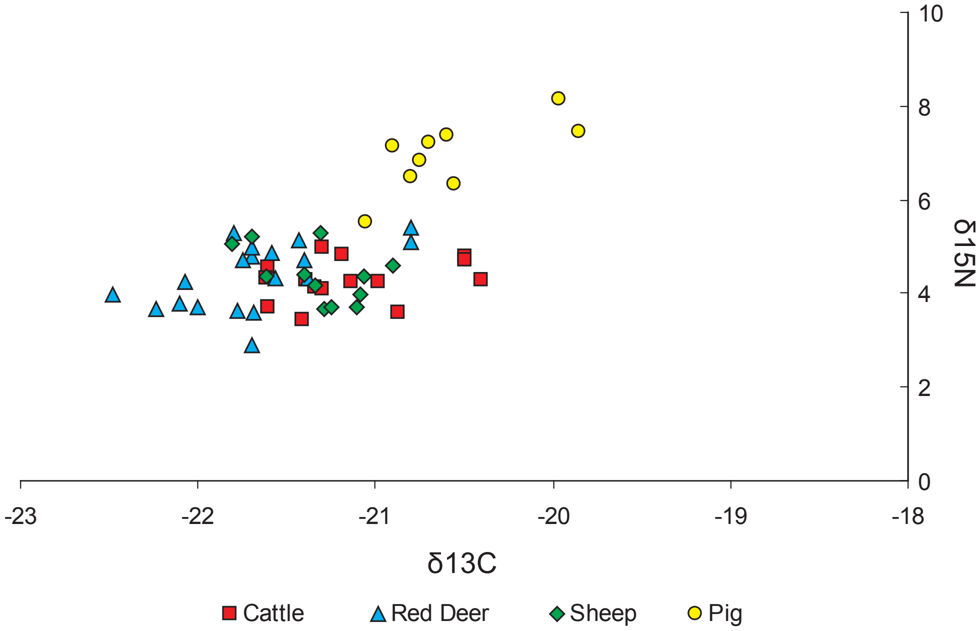


Figure 152. The δ13C and δ15N isotopic ratios for fauna from mound 1

land close to the sea and therefore had inflated δ^{15}N ratios from ocean-derived nitrate from sea spray (Britton *et al*. 2008; Virginia and Delwiche 1982). A further two porcine samples are inflated in both δ^{15}N and δ^{13}C and, as shown on Figure 152, exhibit a markedly different signature from all other samples. These individuals had an omnivorous diet as indicated by the enrichment in δ^{15}N and δ^{13}C. The δ^{13}C enrichment suggests, however, that there might have been a marine component in their diet. This signature may result from periodic feeding on scraps of fish or shellfish, or from the exploitation of seaweed as fodder. However, δ^{13}C values are not so high as to suggest that marine resources played a pivotal role in the foddering strategy for pigs and the sea spray effect on plant resources might once again have impacted on the high δ^{15}N ratio. Although these results provide potential indications of both inter- and intra-taxon variation in feeding patterns, sample sizes are at present too small for confident interpretations to be made as these limited datasets may contain individuals that are outliers to the general population.

Wider context

The mound 1 cattle and sheep δ^{13}C and δ^{15}N values fall within the range found at comparative island and mainland Iron Age sites (see Table 94, adapted from Mulville *et al.* 2009). Overall the δ^{13}C values for herbivores (cattle, sheep and red deer) from these comparative sites range from -22.7 to -20.6‰, with the Lismore animals forming the bottom end of the range (-21.9 to -22.7‰) and occasional higher values scattered across the sites. The δ^{15}N values are more variable with high sheep δ^{15}N values noted from Newark Bay, Orkney, Broxmouth, East Lothian and Yarnton, Oxfordshire with cattle values also elevated at the latter two. In a recent review of a number of these sites this variation in nitrogen values was attributed to variation in 'baseline' environmental values (from the plants) at different locations (Jay and Richards 2007). At individual sites this has been attributed to different management strategies, with animals grazing particular plants (*e.g*. salt-marsh vegetation, Britton *et al*. 2008) and/or a greater exposure to a sea spray/salinity effect (Heaton 1987; Richards *et al*. 2006). The data reviewed in Table 94 do not support the existence of similar mechanisms for δ^{15}N enrichment at all coastal environments (*contra* Britton *et al*. 2008). Cattle and sheep values in the Western Isles and Cornwall, and cattle values in two East Lothian sites, are relatively low. Thus high δ^{15}N values in the Bronze Age Severn estuary (Britton *et al.* 2008) may be directly related to the salt-marsh vegetation in particular rather than to coastal vegetation in general.

The pig δ^{13}C values at the comparative sites are similar

Location	Site/date/animal	$\delta^{13}C$	$\delta^{15}N$	Std dev $\delta^{13}C$	Std dev $\delta^{15}N$	Number
Western Isles	***Cladh Hallan Bronze Age***					
	Cattle	-21.7	5	0.5	0.6	12
	Sheep	-20.1	5.9	0.4	0.6	2
	Red Deer	-21.2	4.9	0	0.5	2
Inner Hebrides	***Lismore Iron Age***					
	Cattle	-22.4	4.6	0.5	0.6	5
	Sheep/goat	-22.7	6	0.4	0.9	10
	Pig	-21.9	6	0.7	0.8	4
	Red deer	-22.1	4	0.5	0.1	2
Northern Isles	***Newark Bay Norse***					
	Cattle	-21.8	5.5	0.2	0.8	9
	Sheep/goat	-21.8	7	0.8	0.9	5
	Pig	-20.6	8.4	1.3	1.6	6
East Lothian	***Broxmouth Iron Age***					
	Cattle	-21.9	6.1	0.2	0.7	5
	Sheep/goat	-21.6	6.4	0.2	0.8	7
	Pig	-21.8	7.7	0.4	0.4	6
	Red deer	-22.1	4.4	0.4	1.4	4
	Dryburn Bridge Iron Age					
	Cattle	-21.8	5.6	0.1	1.1	4
	Sheep/goat	-21.8	6.3	-	-	1
	Pig	-21.3	6.8	-	-	1
	Port Seaton					
	Cattle	-21.7	5.5	0.3	1.2	4
	Sheep/goat	-21.8	7.4	0.3	0.4	3
	Pig	-21.6	9.2	-	-	1
Yorkshire	***Wetwang Slack Iron Age***					
	Cattle	-21.5	4.6	0.5	1.1	10
	Sheep/goat	-21.6	4.9	0.6	1	17
	Pig	-21.6	6.4	0.6	1.5	11
Oxford	***Yarnton Iron Age***					
	Cattle	-21.6	6.9	0.3	1.4	12
	Sheep/Goat	-21.5	6.6	0.2	1.3	12
	Pig	-21.7	8.1	0.4	0.8	12
Hampshire	***Micheldever Wood Iron Age***					
	Pig	-21.3	6.1	0.5	0.2	5
	Winnall Down					
	Cattle	-21.8	4.5	0.4	1.1	11
	Sheep/goat	-21.7	4.2	0.6	0.8	9
	Pig	-21.4	5.7	0.6	1	4
	Red deer	-21.9	5.2	-	-	1
Cornwall	***Harlyn Bay Iron Age***					
	Cattle	-21.9	5.8	0.1	-	2
	Pig	-22.4	5.7	-	-	1
	Trevelgue Head					
	Cattle	-22	4.8	0.3	2	7
	Sheep/goat	-21.8	5.8	0.3	0.5	8
	Pig	-21.5	7.1	0.4	1.4	8
	Red deer	-22	5.4	0.2	0.5	4

Table 94. Means and standard deviations for δ13C and δ15N isotopic ratios for different faunal taxa from a range of British sites

to herbivores but the range of $\delta^{15}N$ values is higher (5.7 to 9.2‰), suggestive of an omnivorous diet at some of the sites, as has been described for the mound 1 pigs. This is not true of all sites and at Lismore, Argyll, the similar $\delta^{13}C$ and $\delta^{15}N$ isotope values of the pig compared to sheep and/or cattle are indicative of an herbivorous diet. There is no evidence for higher carbon isotope values in pigs at other sites comparable to those of the two outlying pigs from mound 1. This highlights the unusual nature of these individual animals' diets and further research on the possible input of marine foods is required.

Red deer values are reported from six sites and, as at mound 1, generally show lower $\delta^{13}C$ values than sheep and cattle, although two other Hebridean assemblages exhibit higher $\delta^{13}C$ values. Two red deer from Bronze Age Cladh Hallan have an average $\delta^{13}C$ ratio of -21.2‰ and a single red deer of Pictish date from mound 2A at Bornais exhibits an exceptional $\delta^{13}C$ signature of -19.0‰, potentially indicating a marine element in feeding which might result from the exploitation of seaweed as fodder (Mulville *et al*. 2009). Red deer otherwise exhibit a narrow range of $\delta^{15}N$ values (4.0 to 5.4‰) across all sites.

The Machair. 5. Worked bone – A Smith

The exploitation of raw material for the production of tools and other artefacts indicates use of wild and domestic resources and of both terrestrial and marine resources. Most of the mammal bone is from domesticated species, such as cattle and sheep, with a small amount of pig and red deer (Table 95). These bones would have been readily available as a by-product of butchering animals for food, and there is evidence from a number of unworked but gnawed and punctured items that bones were exposed on the midden and accessible to scavengers such as dogs.

Both the Iron Age and Norse worked bone assemblages are dominated by mammal bone and antler but much of the antler consists of discarded raw material rather than usable or used artefacts. Whale bone forms only around 10% of the assemblage, which is in contrast to some other Atlantic Iron Age sites such as Scalloway, where mammal bone, antler and whale bone each made up about one-third of the assemblage. The relatively low proportion of whale bone in the assemblage is, however, similar to the site of Bostadh, on Great Bearnaraigh. Although the number of artefacts from the Norse blocks is much smaller, these proportions appear to be approximately the same as in the Iron Age.

Antler can be obtained in two principal ways, either by removing antlers from deer hunted and killed during the antler-bearing period (autumn and winter for fully-grown, hardened antler), or by seeking out naturally cast antlers in late winter and spring out on the hill. It is usually best to try to find the antler before it has been exposed for too long, as deer gnaw the cast antlers, it is thought to recover calcium lost in antler growth (Olsen 1989), and the antlers can weather and deteriorate in quality. Weathering and gnawing are not strongly in evidence at mound 1 although some pieces from the charcoal layers CC are eroded and pitted. There are six pieces that indicate origin; five shed pieces (two from CB, two from CC and one unstratified), and one unshed antler pedicle and beam (from CG).The latter piece is small, heavily guttered and lacking a brow tine, and may be from a roe deer rather than a red deer. Some of the antler is small in diameter and may indicate a population under stress, perhaps from increasing competition for habitat from people or other grazing animals. The deer in South Uist would probably have been concentrated in the eastern moors and hills, where they were less likely to be disturbed by people, so some hours' travel would have been required to hunt deer or search for cast antlers.

Sheep and cattle are of equivalent significance in the worked bone assemblages of the Norse period but in the Late Iron Age assemblage sheep are more important in the house floor (CB) and middens (CG) but not in the infill layers (CC) where objects made from sheep and cattle bones are roughly equal in number. There is one worked bird bone from the Late Iron Age middens (CG) and one worked pig bone from the Norse activity area (CE). The small quantity of whale bone in the artefact assemblage is indicative of opportunistic use of occasional strandings of the larger cetaceans.

The Moorland. 1. Red deer – J Mulville and A Powell

A small sample of red deer fusion and dentition information is available and provides evidence for a difference in exploitation between the Late Iron Age and Norse assemblages. Dentition evidence for the larger Late Iron Age assemblage suggests that a wider age range of animals was targeted (Table 85). Half of the mandibles in the Late Iron Age sample were aged as immature or juvenile, that is between 5 and 11 months (Brown and Chapman 1991), and this is a high proportion for a hunted species.

The epiphyseal fusion information is consistent with the dental data (Table 96). Only half of the bones in the early fusing groups are complete, demonstrating the procurement of young animals with fewer animals were targeted in the age range indicated by the second group of fused bone. Fusion evidence suggests that, compared to cattle and sheep, there was a greater emphasis on mature deer, with half of all bone in the latest fusing group complete. Fusion also demonstrates the procurement of neonates.

Red deer are born between late May and early to mid June, weigh between 6 and 9 kg, and sport a spotted coat. Calves are generally weaned at the ages of 5 to 8 months, and gain weight rapidly after birth, increasing to about 30 kg total body weight by November. Offspring will stay with the hind until at least 2 years of age, when the male offspring leave to join bachelor groups. The peak in red

		combs	pins	pin heads	pin roughouts	beads/rings/toggles	dice	inscribed	weaving tablets	weaving combs	discs/whorls	needles	points	points, long bone	grooved	perf metapodials	plates	miscellaneous	hooks/picks	handles/sockets	unknown	pier shp metapodial	waste	Total
Antler		5	2			2				3			1		1		2		2	12	1		30	61
Mammal bone	unknown	3	10			2			4			2		2										23
	red deer							1																1
	sheep					1	2						2	13	4	3				2	1	7		35
	cattle			1	1			4	2		1			3	1						4		6	23
	large			1																				1
	pig		1																					1
Bird			1																					1
Cetacean										3	2							8			1		1	15
Unknown		1	5							1														7
Total		9	19	2	1	5	2	5	6	7	3	2	3	18	6	3	2	8	2	14	7	7	37	168

Table 95. The use of different animal species for the production of tools

deer mortality between 5 and 11 months shown in the data suggests that the autumn and winter months (late October until April) were spent deliberately targeting the recently weaned juvenile/immature animals. This time of year would have been relatively quiet in terms of animal husbandry, stock would have returned from the hills, crops were harvested and little work was required on the land, freeing up time to hunt. Meat and fat from wild species would also have provided a useful source of food over the winter, at a time when other fresh products were in short supply.

Hunting strategies are traditionally thought to target the individuals providing the best return in terms of effort expended, so why would the inhabitants of Bornais have targeted the smaller juvenile/immature deer? Does the hunting of such young animals indicate a society running low on food, forced to catch whatever they could to survive or are alternative strategies being played out? It is possible that, if the inhabitants chose to supplement their diet over the winter season, young red deer provided the best available food resource. Juveniles, and yearlings, would have been in relatively good condition compared to adult males who can lose up to 20% of body weight during the autumnal rut. If the animals came down from the hills to graze during the winter season, they would have been easy to locate and it is possible that younger animals with less speed, stamina and experience were opportunistically picked off rather than the larger bodied, greater meat-yielding, mature individuals being targeted. This strategy would have been facilitated by the lack of wooded cover for the quarry**.** It is possible, but hard to prove, that intense exploitation of the red deer had already removed many of the larger and older animals. On the other hand the islanders were already skilled farmers, managing their domestic herds in a sustainable manner, and it is likely that the limited red deer population would also have been carefully husbanded by the island population.

The presence of neonates suggests that predation on deer continued until late spring; at this point the adult females would have been running low on their reserves but the unborn/newborn calves might have provided another seasonal food source, particularly valuable in the case of fat (Malainey *et al.* 2001), or they were targeted for other reasons, such as their spotted coats. The presence of a large proportion of neonatal cattle within the midden, some of which were butchered (see below), both here and at other Bronze and Iron Age sites, suggests that the use of extremely young animals as food was a usual practice in the islands.

In the Norse period the smaller red deer sample provides dental evidence for only a single juvenile specimen (Table 85). Fusion indicates that no animals were dying before the middle fusion stage, with less than a third of the animals surviving beyond this age (Table 97). Although a very small sample, this profile conforms to the expected pattern for a hunted species, with prime adult animals targeted. Thus at mound 1 the Norse did not supplement their winter diet with young venison but instead preferred to target

Element	Fused	Unfused	Neonate	% Immature*	
Scapula	7	4			
Pelvis	10	6	2		
Sub-total, early fusing	17	10	2	41	
Radius, p	13	1			
Phalanx II	4	1	1		
Humerus, d	3	1			
Phalanx I	11	3			
Sub-total, mid fusing	31	6	1	18	
Tibia, d	9	7			
Metapodia, d	6	1			
Calcaneum	8	5			
Femur, p	2	5			
Humerus, p	4	1			
Radius, d	2	3			
Ulna, p	6	5			
Femur, d	5	1			
Tibia, p	5	5			
Sub-total, late fusing	47	33	0	41	% Neonates
	95	49	3	35	2%

* = unfused plus neonatal material

Table 96. Red deer epiphyseal fusion from the Late Iron Age blocks

older animals; they might have continued to hunt during the winter season but they had an emphasis on a different age cohort over this timescale.

It is possible to use metrical data to examine change over time in the size of red deer. The small sample is biased toward the larger Late Iron Age sample but measurement of the most common element, the astragalus GLm (Figure 153), does suggest that the size range is similar in both phases. It might be thought that steady hunting pressure on a small island population would have had an effect on the average body size of the herd but the metrical evidence shows there is no evidence for any change.

The Moorland. 2. Birds – J Cartledge and D Serjeantson

A few birds only were caught in the moorland. The habitat of the peregrine falcon is open country; it breeds on mountain crags or cliffs. The raven, which is still abundant in the Outer Hebrides, nests on inaccessible rock ledges. Of the waders, the golden plover and the curlew, which are also still widespread in South Uist, breed on the moorland, though they feed on the low-lying marshes and lochs and the shore at other seasons. Greylag geese also bred on the damp moorlands of Uist in the past and moved to the machair to feed after the harvest.

The Moorland. 3. Carbonised plant remains – J Summers and J Bond

There is little evidence in the archaeobotanical assemblages for the exploitation of moorland habitats. No edible moorland or heathland taxa are represented, although this does not rule out the possibility of plants such as crowberry and bilberry being gathered as a supplement, as has been hypothesised at other prehistoric sites (*e.g.* Dickson 1994). Wetter environments are evidenced primarily by Cyperaceae taxa, which are represented by *Carex* sp. and *Scirpus* sp. In all contexts the combined values for all Cyperaceae taxa are greater than any other group in the assemblages. If combined with grasses, which could also have occurred in similar habitats, these two groups represent a significant component of all assemblages. Sedges and grasses can be deliberately gathered for use as floor covering, animal bedding, thatch or fodder.

There is also the possibility that specimens of these taxa were collected with peats or heathy turves that could have been gathered for fuel. In what is likely to have been a relatively treeless landscape, peat, turf and/or animal dung are the most likely sources of fuel and the regular uses of these fuels could easily account for the elevated contribution of some of these taxa common to moor, heath and wetland habitats. Unfortunately, the difficulties of accurate species level identification means that both Cyperaceae and Gramineae taxa could have originated from a broad range of habitats both close to and distant from the site.

Element	Fused	Unfused	Neonate	% Immature*	
Scapula	1				
Pelvis					
Sub-total, early fusing	1	0	0	0	
Radius, p	2				
Phalanx II	2	1			
Humerus, d					
Phalanx I	9				
Sub-total, mid fusing	13	1	0	7	
Tibia, d	1				
Metapodia, d			1		
Calcaneum					
Femur, p	1				
Humerus, p		1			
Radius, d		1			
Ulna, p					
Femur, d					
Tibia, p	1				
Sub-total, late fusing	3	2	1	50	% Neonates
	17	3	1	19	5%

Table 97. Red deer epiphyseal fusion from the Norse blocks

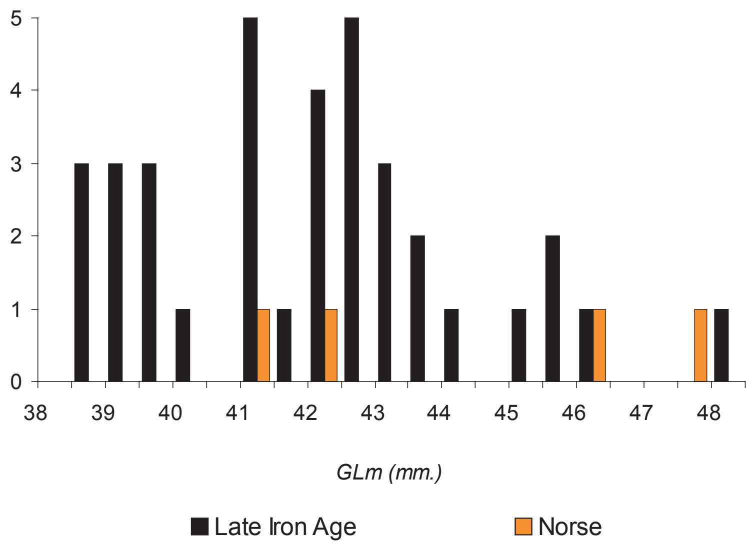


Figure 153. The size of the red deer astragalus

The Moorland. 4. Trees – R Gale

The much wider range of species present in the deposits on mound 1 is markedly different from the relatively limited range present on mound 3 (Table 67). This might indicate that the island environment supported a slightly greater diversity of tree species in the Late Iron Age than in the Norse period. The additional taxa present on mound 1 include ash (*Fraxinus excelsior*), the hawthorn/*Sorbus* group (Pomoideae), elm (*Ulmus* sp.) and pine (*Pinus* sp.), all of which have been recorded at other prehistoric sites in the Western Isles and mainland Scotland (Dickson and Dickson 2000). These species probably survived in small numbers in the sheltered coves or on the lower regions of the blacklands but not on the exposed moorland. *S. aucuparia* (rowan) is the most likely member of the Pomoideae group to be represented (a suggestion supported by the strong spiral thickenings on the vasicular elements of the charcoal), although crab apple, *Malus sylvestris*, has also been recorded at prehistoric sites on both the mainland and the Scottish islands (Hebrides and Orkney; Dickson and Dickson 2000, 247).

The Moorland. 5. Clay – A Lane

There is no clear evidence for the source of the clay used to produce the ceramics used on the site. Neither the inclusions nor the clay have yet lent themselves to locational analysis. Attempts have been made to find possible clay sources but South Uist clays seem to be fairly rare and of poor quality (Sharples pers. comm.). Lewisian gneiss is the local dominant rock for almost all of the Western Isles. We have no evidence as to whether the pottery was produced on site or by semi-specialists elsewhere (La Trobe-Bateman 1999, 213). Some of the Late Iron Age I vessels in the Dun Cuier ware tradition are of considerable size and would have required some skill to build but we have no evidence that these were not locally produced. Basically we cannot tell if this is local domestic production or not. Some of the decorated vessels of the Middle Iron Age are more finely finished but all the pottery forms including the rather crude Viking period forms require understanding of ceramic technology.

Exotic imports – A Clarke, J Cartledge, R Gale, D Serjeantson and N Sharples

The local environment was probably rich enough to have provided most of the requirements for life in the settlement but the inhabitants definitely had access to a few items from areas outside the Hebrides and these became increasingly important in the Norse period.

The evidence from mound 1 indicates that copper alloys and iron were available to the settlement's inhabitants. Neither copper nor the metals used in its alloys, *i.e.* tin, lead and zinc, are found in the Western Isles and these must therefore have been imported. No detailed analysis has been undertaken of the copper alloys to try to accurately identify the source of the copper alloys; as the material is likely to have been recycled from existing copper alloy objects, it is very unlikely that a single source could be identified. The silver coin is another obvious Norse import which in this case clearly came from Norway.

Iron is locally available as pan deposits in the peat bogs and glacial tills but it is unclear how important these deposits were to the inhabitants of the settlement. The relatively minimal numbers of iron objects present in the Late Iron Age contexts may indicate that only local material was used. This might also be a reason for the relative simplicity of the objects produced. This pattern is widespread in Atlantic Scotland and even in mainland Scotland iron objects are rare and relatively simple until the final stages of the Late Iron Age (Sharples 2003b). For the Norse period the number of iron objects recovered increases dramatically and the range of objects present and the quality of the tools produced show the increasing importance of metalworking to the inhabitants of the settlement. The source of this material will be considered in detail in future volumes. There is currently no evidence for any metalworking on mound 1 in either the Late Iron Age or Norse periods and no substantive evidence for metalworking in the Norse deposits in the excavated areas on mound 2 and 2A. Most of the settlement has not been explored, however, so this does not exclude the possibility that metalworking was part of the activities undertaken in both periods.

Three types of stone were most certainly imported: the steatite, the travertine and the green porphyry. The steatite found at Bornais is unsourced and the nearest sources would have been in Shetland but, depending on the extent and means of external contacts, it might have come from as far away as Norway. Travertine is found on Skye but the small size of the travertine gaming piece may mean it came from some distance away. The porphyry arrived at Bornais as a fragment of a polished tile. This material was widely used in the decoration of the buildings of Imperial Rome, falling out of use in the fifth century AD (Lynn 1984) so the exotic porphyry, which is occasionally found in Norse or early ecclesiastical sites around Britain and Ireland, must have been removed from its original position and, for whatever reason, brought long distances some 500 years later (see below 273).

It has been suggested that structural timber might have been imported to the islands from mainland Scotland during the Middle Iron Age (Fojut 2005) and, even though the fragments present at Bornais are likely to represent wood used as fuel, these could be waste from wood working. Sharples (2003b) has argued that a wood trade is, however, unlikely given the very fractured and self-sufficient nature of the Middle Iron Age societies in the Atlantic province. The over-exploitation of local woodland resources in the Late Iron Age or Viking period is a much more likely interpretation of the reduced spectrum of taxa on mound 3.

Some birds might have been obtained through gift or exchange rather than collected by the inhabitants of the settlement. Seabirds can be preserved using the same techniques as are used for fish preservation, so can be exchanged and traded just as fish were. This is particularly likely for the gannets in the Norse period, as the nearest place where gannets could have been caught was St Kilda.

Conclusion – N Sharples

The materials used by the occupants of mound 1 come from a range of different environments on South Uist. In the Late Iron Age the coastal zone provided a considerable amount of resources. Routine visits to the beach would have been used to collect water-rolled pebbles that could be made into tools, and shellfish. These were normally for consumption but some smaller species could also have been collected for aesthetic reasons and they were also used to create decorations and as gaming pieces. These regular visits would also have enabled the coast to be monitored for more irregular discoveries such as large

Figure 154. Peat cutting on the moorlands in the centre of South Uist

pieces of driftwood, which were important as structural timbers in the houses, and whales, which provided a wide range of resources including oil, bone and meat. Most of the fishing in this period appears to have been from the shore and there is little evidence that boats and sea fishing were an important feature of the economy in the Late Iron Age. However, the presence of materials not available on the island, such as copper alloys, and the nature of the artefact assemblage, which implies knowledge of the material culture of southern Britain, both indicate sea travel between different regions was not uncommon. Nevertheless, the limited exploitation of the sea suggests that the site was not specifically located to take advantage of the good harbours that were available at this time.

In the Norse period the exploitation of the shore appears to have been slightly different. There are significant differences between the amount of driftwood present on mound 1 and on mound 3 which cannot be totally due to the destruction of the wheelhouse. This difference suggests that either the amount of driftwood available had declined or the desire to use this as a major resource had declined. Cobble stone tools seem to have been much less important. The importance of shellfish as a food source increased but the symbolic or decorative value of shells appears to have disappeared. Fishing was reorganised and was now no longer a shoreline activity but instead occurred from boats that travelled some distance from the coast. The presence of exotic materials also increases and material such as the coin, steatite and the green porphyry imply the movement of materials over considerable distances; it is clear from the excavation of mound 2 (Sharples and Smith 2009) that long-distance movement of materials was very important in the Norse period.

The machair was the most important resource for the agricultural economy of the islands and provided an advantageous location for the cultivation of barley from the Bronze Age. The Late Iron Age I occupants of mound 1 appear to have been initially quite happy to cultivate the barley alone, the monoculture that was traditional in the Iron Age of Atlantic Scotland, but in the final phase (CC) there is a slight indication of the introduction of oats which might indicate an expansion onto areas of the machair that had previously seemed unsuitable for cultivation. The introduction of new species continues in the Late Iron Age II assemblage from mound 2 and is considerably expanded in the Norse period when rye and flax are regular presences and oats become at least as important as barley. The expansion of the arable exploitation of the machair associated with the use of these crops might eventually have led to increased erosion and ultimately forced the abandonment of the settlement in the fourteenth century.

The absence of any clear system of land boundaries in either the Late Iron Age or the Norse period suggests that the management of the domestic animals involved moving them away from the crops on the machair in the summer but bringing them back to manure the arable in the winter. The absence of any obvious indoor shelter for animals also suggests they were left out in the open over the winter. The high numbers of cattle dying at an early age in the Late Iron Age suggest the herds were located close to the settlement in spring whereas the relatively low numbers of young sheep suggest these were not kept in the vicinity of the settlement. This may indicate quite different exploitation of these animals, with the sheep roaming relatively freely on the moorlands and exploited for meat and wool whereas the cattle were kept for milk and had a more carefully controlled existence that involved close supervision and long periods on the machair. It was hoped that an analysis of the carbon and nitrogen isotopes of the Late Iron Age animals might have highlighted the different grazing regimes but the patterns are not that clear. There are some subtle variations in the principal herbivores which might become clearer with further analysis but the principal difference is the ratios for the pig. This clearly indicates the omnivorous diet of pigs and some of these animals might have been fed marine foodstuffs.

Evidence for the exploitation of the moorlands (Figure 154) is not particularly strong in the Late Iron Age. Peat was clearly being introduced as a fuel and the distinctive orange layers of the hearth and floor of the secondary structure (CB) are a clear indication of this. A much wider range of wood appears to have been available than we find in the Norse deposits on mound 3 and it seems as though, in sheltered areas of the uplands, trees such as ash, hawthorn, elm and pine might have survived though only as isolated clumps. In contrast there is little evidence for the collection of wild heath plants in the carbonised plant assemblage. Another important resource on the uplands was the red deer; these were systematically hunted during the Late Iron Age when it seems that the inhabitants were deliberately targeting immature or juvenile deer in the autumn and winter. This is a slightly surprising discovery and it would not be expected if you were hunting for meat and trying to sustain a viable herd of animals. It might be that red deer fauns are relatively easy prey to catch but another possibility is that they were targeted for their distinctive spotted coats. This would fit in with an emphasis on ornamentation that seems to be developing during the Late Iron Age and which will be discussed in the next chapter.

7 Site activities

Introduction – N Sharples

Chapter 4 summarised and itemised the similarities and differences between the various structural and depositional sequences on mound 1. In this chapter the assemblages found will be explored in greater depth and the use of the different material categories will be interpreted to try to understand the activities undertaken on mound 1. The analysis begins with a consideration of the large assemblage of finds which are divided by the functional categories outlined in chapter 4. The discussion includes a detailed consideration of the external parallels for the more important objects. A large assemblage of 'slag' was recovered during the excavations and the discussion begun in the volume on mound 3 on this enigmatic material is continued. The bone and carbonised plant remains provide a considerable amount of information on the nature of food preparation and consumption on the settlement.

Artefactual evidence – A Clarke, P Macdonald, N Sharples and A Smith

Manufacturing evidence

The evidence for artefact production on mound 1 is widespread and consists of several categories of material: copper alloy, antler and bone waste, unused cobble stones, flint and pumice. Not all of this material need necessarily be considered evidence for artefact production and both the flint and pumice assemblages may include waste and objects used for specific tasks. It does, however, seem useful to bring this material together at this point as it provides the only means of assessing the nature of productive activity on the site. The large quantities of slag (see Young 289) found on this mound should also be noted even though this is not thought to relate to metalworking activity.

Copper alloy

The only possible evidence for metalworking on mound 1 is a plano-convex fragment of spillage or casting waste (4688). However, this is not conclusive evidence of non-ferrous metalworking as spillage fragments can form anywhere that metal is exposed to a fire hot enough to melt it (*cf.* Bayley 1992, 779). As this piece was found in the secondary floor layer (397) just above the destruction layer, this is the most likely explanation for its presence.

Antler and bone waste

The quantity of antler and bone working debris from mound 1 is not large, and comes mainly from the Late Iron Age blocks (Table 98). There is a marked concentration of tine discards (Figure 155) and, to a lesser extent, cut sections of bone in the Late Iron Age infill layers (CC). It is also significant that the assemblage from the Late Iron Age house floors (CB) is relatively small as the house produced a very large assemblage of artefacts. The charcoal layers also produced large quantities of whale bone (see Mulville 194); although this could not be proved to be worked, it is an important raw material that is likely to have been collected for future use. The antler assemblage differs from the mound 3 debris in that the mound 1 material appears to be more generalised waste. The kind of objects being produced are the long-handled combs, sleeve-type handles, and 'opportunistic' tools such as the antler hook (1758) and the pick (1141), which utilise the natural shape of the antler for the finished product. There is none of the characteristic debris left from manufacture of composite combs, apart from one rather dubious possible tooth plate offcut (1577).

There are six cut sections of cattle-size long bone (Figure 156 shows five of them), from Late Iron Age blocks, all deliberately sawn part-way through the solid material and then snapped. These could possibly be either

	Raw material	Cut sections antler	Cut sections bone	Tine discards	total
CB	1	1	1	2	5
CC	1		4	10	15
CG	1	2	1	2	6
CE		1		2	3
CF	1			3	4
total	4	4	6	19	33

Table 98. Antler and bone working debris

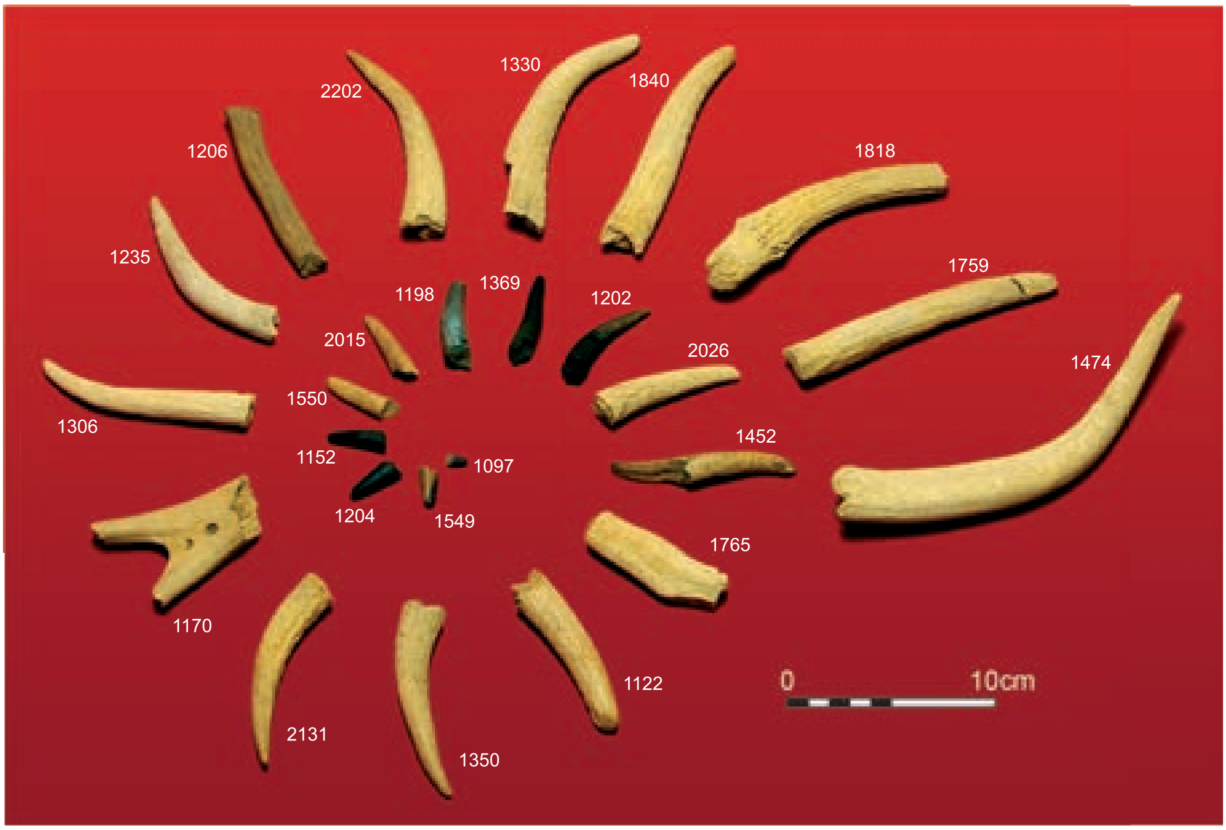


Figure 155. Antler tine pieces from all stratigraphic blocks

Figure 156. Five of the six sections of cut cattle long bone

roughouts or waste from the production of parallelopiped dice. Three pieces of cut bone can be specifically related to other artefact types. Two cut sections of flat bone (2448, 1385; Figure 157) might well have been intended to be weaving tablets, and one piece of faceted long bone (1532) could be for the production of a pin.

Marks left on the antler indicate the use of the following tools: a heavy-bladed cleaver or hatchet-type tool used in a chopping motion to separate off large or thick pieces of beam and tine; a saw used to cut around the diameter of beam/tine before snapping across the spongy core; a sharp knife used for paring and trimming. None of these tools have been found at the site and their absence suggests the careful curation and recycling of relatively large metal tools.

Stone

During the excavation all the stones that might have been cobble tools were collected, irrespective of whether they exhibited obvious signs of wear. This recovery strategy was largely designed to make sure tools with minimal evidence for use were collected but it also resulted in the recovery of a collection of unworn cobbles. These cobbles must have been deliberately selected and brought to the site, probably from the beach, and since they were not good building material, it seems likely they were intended to be used as tools. The lack of wear on some cobbles could indicate either that they were never used once brought to site, or that they were used in such a way as to leave no visible wear traces – perhaps they were covered with leather and used for polishing. Most of them were found in the house (CB) where there were also large numbers of cobble tools. An unworked and unstratified piece of rock (1272) is of the same crystalline sandstone used to make

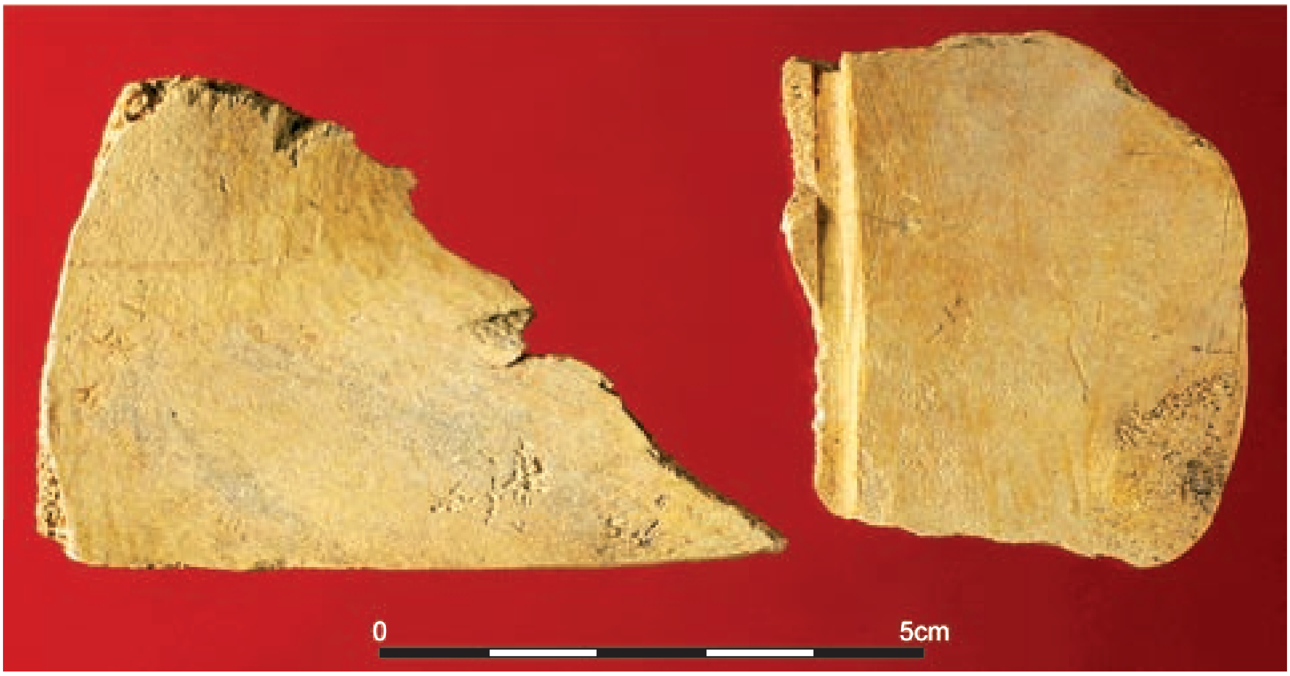


Figure 157. Two pieces of worked bone (2448 and 1385) that might be blanks for the production of weaving tablets

the stone spindle whorls and it may be an imported blank from which whorls were intended to be made.

Pumice

The pumice is generally only lightly used. Two of the pieces bear signs of light faceting from wear (1852, 4760) whilst the most worn piece (1761) has adjacent faces worn flat from rubbing which also bear some striations and light grooves. Half of the assemblage is composed of fragments with very large vesicles and these do not have obvious evidence for smoothing or abrading. They could be fragments of artefacts such as net or line floats but again no definite evidence for these exists.

Flint – A Pannett

The assemblage comprises 61 lithics, predominantly grey flint but including two brown pieces (see appendix 3). Around 34% of the assemblage comprises chunks of flint, and pebbles from which irregular flakes have been removed. The remainder of the assemblage consists of heavy, irregular flakes, although a single blade has also been identified (1560). Six pieces show signs of heat treatment to varying degrees, four others are lightly patinated and three are rolled. The remainder of the assemblage is fresh.

Cortex is present on 75% of the material, with the majority of chunks retaining at least some of the original pebble exterior. Cortical platforms were identified on a high proportion of the flakes, indicating the lack of a structured technology in their manufacture. Several flakes have crushed or broken platforms, suggesting the use of a hard hammer, although the presence of hinge and stepped terminations on a number of pieces indicates that a low-powered knapping technique was employed, with nodules probably supported on a knee.

A single patinated amorphous core (4728) was identified. This represents the last vestiges of a flake core, worked until it is no longer useable.

Several pieces show signs of use, with four roughly retouched to form tools. Non-invasive retouch was identified along one or more edges of one flake (1567) and the blade (1560), although this did not modify the original shape of the blank. Retouch was identified on one of the chunks (1569), where it has been used to create a basic scraper edge. Abrupt retouch has been applied around all the edges of a heavy cortical flake (4743) to form a small scraper.

Edge damage relating to use was also identified on five pieces, three flakes (2574, 2575 and 4742) and two chunks (1556 and 4640). Chunk 1556 and flake 4742 appear to have been struck repeatedly along one edge, and may represent strike-a-lights. A further flake (2574) might also have been used in this way, although the edge is not as heavily abraded. The third flake appears to have been used for scraping.

A high proportion of the assemblage appears to relate to the production of irregular flakes, with the majority of chunks probably the remnants of flint nodules brought to the site for that purpose. It is clear, however, that no specific reduction techniques were employed – the creation and maintenance of a defined core did not feature in the lithic technology. Instead, it would appear that nodules of flint were simply struck using a hard hammer, and the resulting flakes and chunks utilised. The alteration of a small number of pieces using retouch suggests that

Figure 158. Fragments of vessel 1, a large double cordoned jar with flaring rim, from CB

specific tools were required, although the retouch is rough and uneven, and does not alter the shape of the original blank. This is clearly an expedient technology with rough tools manufactured for specific purposes.

In contrast to this, two pieces – the blade (1560) and the amorphous core (4728) – appear to have derived from a more considered technology, one based on core preparation and curation. These pieces are likely to be residual, perhaps originating from the subsoil or from a lithic scatter in the local area.

It is thought probable that the assemblage of crude pieces, evidently struck without a proper understanding of lithic technologies, is contemporary with the occupation of the site.

Vessels

The bulk of the assemblage of vessels comprises ceramics but there is also a small quantity of stone vessels (which will become more significant in the Early Norse deposits on mound 2) and the fragmentary remains of some metal vessels which would have been of some importance.

Pottery – A Lane

The pottery is all thought to have had domestic functions. Many of the sherds show signs of sooting and might have been used for cooking (Figure 158). Campbell's analysis of the Sollas assemblage suggested that all the forms present had exterior sooting and carbon and limescale residues on the interiors and consequently that even finely decorated vessels were used for cooking (1991, 150). La Trobe-Bateman suggested that the longer sequence at Dun Vulan has a 'reduction in sooting on sherds, finer potting techniques and a slight reduction in size… indicating….. a move away from primary cooking uses to a storage function' (1999, 214).

Burnt residues are found on some sherds but no analysis has been undertaken on the Bornais material. Campbell *et al.* (2004; *cf.* Campbell 2000) undertook chemical analysis of charred food residues on Middle Iron Age material from the Sollas wheelhouse and on both Early Iron Age and Late Iron Age material from Eilean Olabhat. The Early and Middle Iron Age material produced interesting signals indicative of meat, including beef and venison, dairy milk, cheese and sheep fats, barley and nuts, and one sample of marine produce (2004, table 3; *cf.* the slightly different table 3 in Campbell 2000). Unfortunately the later material from Eilean Olabhat, taken from a vessel identical to the Bornais CB material, did not have distinctive compounds (Campbell *et al.* 2004, 77). It is worth noting that the attempt to use radiocarbon dating of the food residues was less successful and produced contradictory dates in conflict with what now seems, at least at a general level, to be a consistent ceramic typological sequence (Campbell *et al.* 2004, 83). Craig *et al.* (2005) have also identified bovine milk residues on ceramic vessels from South Uist by examining lipids and proteins extracted from pottery

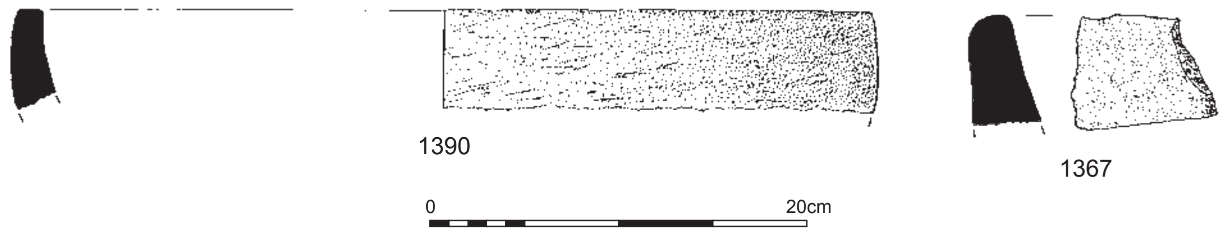


Figure 159. Two steatite vessel sherds

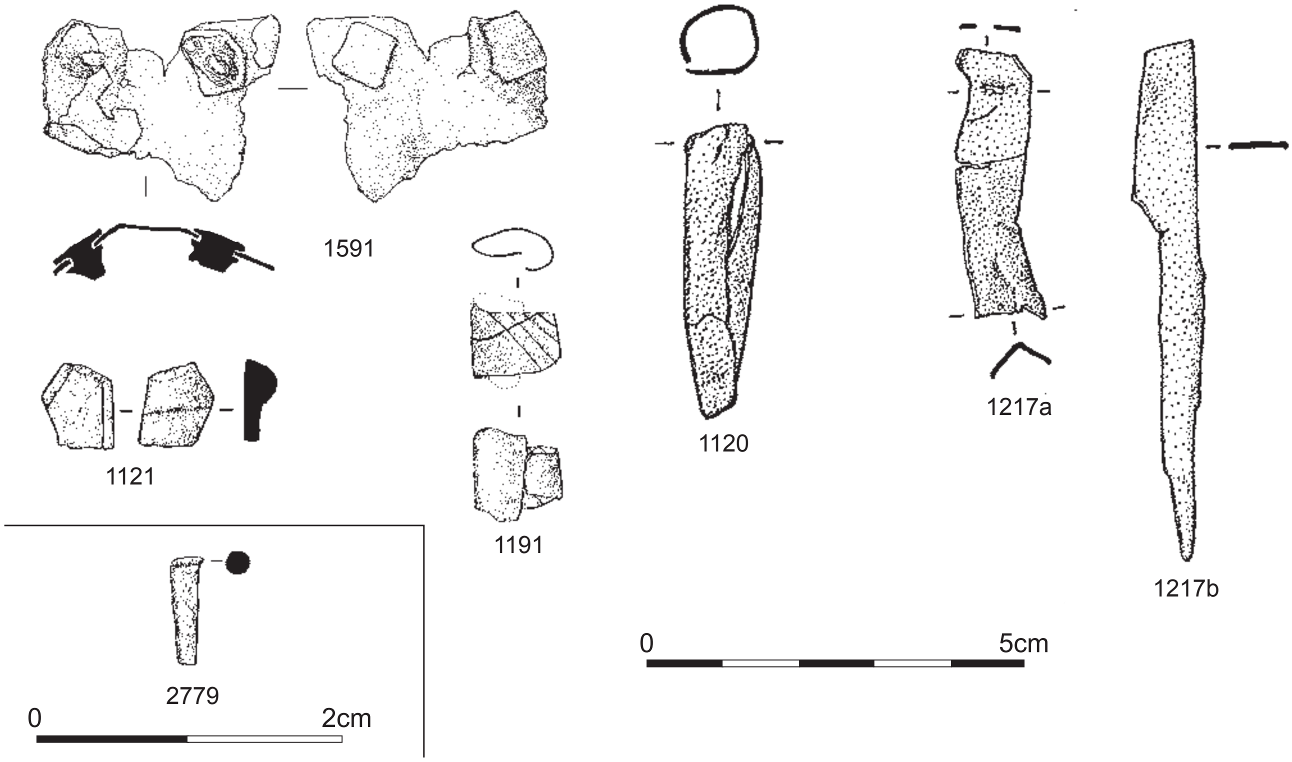


Figure 160. A selection of copper alloy sheet fragments

fabrics. These occurred on both Late Bronze Age/Early Iron Age and Middle Iron Age material. Evidence of vegetables and pulses was also noted (Parker Pearson *et al.* 2004a, 79).

The variation in size of the vessels from mound 1 at Bornais may suggest some variation in function. The relatively broken-up nature of the assemblage does hinder this evaluation as only 15 vessels were sufficiently preserved to give measurable diameters. Some of the Late Iron Age Dun Cuier vessels are as much as 380 mm in diameter. These seem too big to function as cooking vessels and some kind of storage function can be envisaged. The undecorated vessels in block CC seem smaller. The Plain style at the Udal had vessels up to 340 mm in diameter (Lane 1983, fig. 12).

The platters found in the later Viking and Norse phases are thought to be for cooking flat bread (Lane 2005a, 195). The emergence of small vessels in cup-like forms in this later period may indicate drinking from ceramic vessels or that individuals were eating from these small containers in separate portions rather than sharing food from a common large pot. We do not yet know what the changes in pottery style mean between the Middle Iron Age and the Viking/Norse periods. Analysis of residues and lipids from Dun Cuier ware, Plain Style and Norse assemblages would be desirable for comparison with the results for earlier ceramics particularly in the light of La Trobe-Bateman's (1999, 214) suggestion of an increased use of pottery vessels for storage. Though the later ceramics after the Dun Cuier style can seem crude, it is worth noting Blinkhorn's observation that coarse handmade ceramics nevertheless represent 'conscious decisions having been made at every stage of production from the selection of the fabric temper to the final shape of the pot' (Blinkhorn 1997, 113).

The ceramic assemblage from mound 1 is important in our definition of the mid/later first millennium sequence. A comparison with the Sollas assemblage would suggest that the bulk of the Bornais mound 1 pottery postdates that site which seems to have been in use as late as the second or third century AD (Campbell 1991, 166–9; *cf.* Campbell *et al.* 2004, 82–4). The radiocarbon dates show that the main phase of activity excavated at Bornais starts around AD 500, which is clearly after the abandonment of the wheelhouses at Sollas and at Cnip (Armit 2006) where more highly decorated ceramic forms predominate.[1]

The Bornais mound 1 material is an important addition to the published Hebridean pottery sequences and is a key assemblage for discussion of the early part of the Late Iron Age phase (Late Iron Age I). The small numbers of incised sherds and the rare, more complex cordons do indicate earlier material on the site, but in such small numbers as to be clearly residual. None of these sherds are large enough to indicate vessels or full decorative schemes but they are all compatible with Middle Iron Age material such as is known from the Sollas wheelhouse in the first to third century AD (Campbell 1991; Campbell 2002, 141).

The CA, CB, CC and CG pottery seems to be a fairly coherent Late Iron Age I assemblage showing forms and decoration which have been classed as Dun Cuier ware (Campbell 2002, 142). This consists of large bucket-shaped vessels with flaring rims, or upright rims, over weak shoulders. The only decoration is applied cordons on the shoulder or neck, some (possibly all) of which occur as double cordons (Figure 158). These cordons are simple, with finger-pinching the sole elaboration. Undecorated vessels probably occur though it is difficult to estimate their frequency. Bases are flat, some 'decorated' with internal fingermarks though not in elaborate patterns. Construction marks are frequently of the tongue and groove type. The term Dun Cuier ware is confusing (Lane 1990, 122–23) as the Dun Cuier site has pottery of the later Plain ware phase as well as the earlier cordoned material, as Young recognised (1966, 54). However, as the term 'Dun Cuier ware' has become established in the literature, it seems appropriate to use it for the decorated phase of that site rather than to invent a new clumsy descriptive term, such as Late Iron Age flaring rimmed cordoned pottery (Lane 2007; forthcoming).

If we accept the definition of Dun Cuier ware, where else does it occur apart from Bornais, Eilean Olabhat and probably Loch na Beirgh? At the eponymous Dun Cuier on Barra it occurs in the, probably secondary, stone sub-circular house structure (Young 1956, fig. 6a) inserted into what Armit argues is a developed Atlantic roundhouse/broch (Armit 1988; 1992a, 34–8; *contra* MacKie 2005, 17–18).[2]

A small-scale excavation of one intra-mural cell at Dun Carloway (Tabraham 1977) recovered a quantity of flaring rim pottery including one double-cordoned vessel identical to the Bornais material (Close-Brooks 1977, 161–7, figs 4–6, especially fig. 6, no. 49). The number of cordons recovered was quite small and there was no evidence of earlier Middle Iron Age decorated material. However, the presence of one definite sherd of Viking Age platter stratified below the cordoned vessel and the pottery analyst's observation that 'it is very difficult to find any two sherds that seem to be from the same pot' suggest this is not a securely stratified assemblage but one representing some kind of secondary deposition (Close-Brooks 1977, 167; Lane 1983, 264–7; Lane 1990, 122). Nevertheless the cordoned vessel can be firmly dated to the Dun Cuier phase and Dun Carloway can be regarded as showing use in the AD 400–600 date range. Some of the rims can be compared to the Udal Plain ware phase (Lane 1983, 266, fig. 24, nos 20–23) and it is possible that occupation continued into the later pre-Viking period.

Young also cited pottery from other sites that she thought might be comparable to the flaring rim Dun Cuier material (Young 1966, 54). From Dun Scurrival, Barra (Young 1956, 291–2, fig. 2; Lane 1983, 259–60) she published surface finds of similar flaring rims and cordons, a site which Armit lists as a massive galleried structure (Armit 1992a, 161). At both Unival and Clettraval, North Uist, flaring rims are reported but are not certainly diagnostic and may belong to the Plain ware phase (Lane 1983, 260–2).

MacKie (1966) published a small group of sherds from Gress Lodge, Lewis as Dun Cuier ware. These are unstratified finds from an eroding coastal site of some complexity including a souterrain structure. In all likelihood there is Dun Cuier phase material here as well as the subsequent Plain ware but the site is likely to have been of considerable longevity (Lane 1983, 263–4) and has produced important surface finds of Early and Middle Iron Age date in the course of erosion survey work (Trevor Cowie pers. comm.). MacKie also cited two rims from his Dun Mor Vaul, Tiree, excavations as similar to Dun Cuier ware (MacKie 1974, 90, fig. 18, no. 362, and fig. 19, no. 483). These are thicker and more sharply everted than the examples from the Outer Hebrides and, in the absence of any evidence that the site continued as late as the Dun Cuier phase, they can be dropped from discussion of this type (Lane 1983, 267–8; fig. 25, no.1).

A number of other sites have produced flaring rim sherds, which could be of Dun Cuier ware or the succeeding Plain ware phase. These include finds from Berneray, Harris; Kilpheder (Bruthach a' Sithean), South Uist; Cnoc a'Comhdalach, North Uist; Dun Toloman, North Uist; Foshigarry, North Uist; Garry Iochdrach, North Uist; Northton, Harris; and Vallaquie, North Uist (Lane 1983, 269–79). Of these Cnoc a'Comhdalach, Foshigarry and Garry Iochdrach all have wheelhouse structures as do Unival and Clettraval noted above (Armit 1992a, *passim*). However, as none of this material is usefully stratified and as all the sites are clearly multi-period in nature, it adds little to the discussion of the pottery.

Bornais mound 1 has some material that may belong to the succeeding Plain ware phase but it is not stratigraphically separated from earlier or later material. As noted above, the differentiation of the Dun Cuier phase from the succeeding Plain ware phase is difficult since it is the absence of decoration which is the key factor. The Udal remains the key assemblage for this material but, since the site stratigraphy remains unpublished, the pottery is as yet only available from an interim analysis (Lane 1983; Lane 1990). A significant Plain ware assemblage was reported from Beirgh stratified with metalwork, metalworking debris and bone combs, and a Late Iron Age pre-Viking date seems certain (Harding and Gilmour 2000, 64–6). Another major assemblage has now been reported from the well-preserved cellular structures at Bostadh, Lewis (Neighbour and Burgess 1997). This has a very similar assemblage to the Udal and Loch na Beirgh Plain ware phases (Johnson 2005) and is dated by multiple radiocarbon dates to the late pre-Viking centuries (Late Iron Age II).

Stone

The four steatite vessel sherds, including two rim sherds, have a finely ground finish on both the interior and exterior. Both rims are slightly rounded and the vessel wall expands in thickness away from the rim from 14 mm to 23 mm (Figure 159, 1390) and from 12 mm to 17 mm (1367, CE). Encrustations of soot are present on the exterior of three of the sherds, indicating their use as cooking vessels.

Steatite vessels were being produced in both Norway and Shetland and the evidence from the main area of the site suggests both sources are present at Bornais (Forster pers. comm.). The quantities of steatite present in the Western Isles are much smaller than in the Northern Isles and this may be related to the early development of a pottery industry by the Norse settlers of the Western Isles (Forster 2004). Steatite also becomes increasingly rare in the later phases of the Norse settlement.

Copper alloy and lead sheet

There are 11 copper alloy sheet fragments and one piece of lead sheet (1314), not all of which need to have come from metal vessels. The most interesting find (1591; Figure 160) is an irregular-shaped sheet fragment from the Norse activity area (CE) which has been repaired by the application, in antiquity, of two copper alloy 'paper clip patches'. These suggest this may be the remains of a sheet metal vessel. So-called paper clip patches, also known as folded rivets, are designed to repair small splits in copper alloy sheet vessels. The arms of an elongated hexagonal-shaped piece of copper alloy sheet are folded over on themselves and pushed through the tear and then folded back, sometimes over a washer, to hold the broken edges together (*cf.* Burns 1969, 29, fig. 2a). The employment of a paper clip patch prevents the need to rivet a plate directly over a tear, which is a technique that can easily cause further damage to a thin sheet vessel.

The paper clip patch is not chronologically indicative; examples are known ranging in date from the Late Iron Age to the post-medieval period. Examples of so-called paper clip patches include those attached to the Abercairney, Perthshire and Elvanfoot, Lanarkshire, Iron Age cauldrons (MacGregor 1976, nos 300, 303; Burns 1969), several found at Site 3, Cnip, Lewis of Late Iron Age or pre-Norse date (Armit and Dunwell 1992, 145–6, illus. 5–6), an unspecified number attached to six copper alloy sheet fragments at the Late Norse site at Freswick Links, Caithness (Batey 1987, 120, 145, fig. 27, nos 4.10.5–11), several recovered from excavations in London which range in date from the mid twelfth to the fifteenth centuries AD (Egan 1998, 176–7, fig. 144, nos 488–494), 14 mostly from late fourteenth to sixteenth-century contexts in Perth (Cox 1996, 768, illus. 19, nos 115–116) and five from Norwich ranging in date from the thirteenth to the seventeenth centuries AD (Margeson 1993, 93, fig. 59, nos 574–8).

Two of the sheet fragments have incised lines that may be decorative. 1191 (Figure 160) was an unstratified fragment of tapering sheet rolled up to form a flattened cylinder. Only just visible on the inside of this cylinder are five straight incised lines apparently forming a lattice pattern. The other small fragment (1590; CC) had two parallel lines. Two other fragments of sheet appear to have specific functions. 1120 (unstratified) was folded over to create a tapering ferrule whereas 1217 (CF; Figure 160) included a rectangular-shaped fragment which has distinctive transverse tears consistent with the type of damage that occurs to fixing holes when a mount has been prised away from whatever it was attached to.

Currency – G Williams

The only coin found is an unstratified Norwegian silver penny of the late eleventh century (1575; Figure 161). The design is fairly typical of coins of Olaf the Peaceful of Norway (1066–1093), with a crude bust facing left on the obverse, and a voided cross in the field on the reverse. However, the dies from which the coin was struck do not correspond with any known from the Gresli hoard in Norway, nor does the design of the bust correspond particularly closely with any of the types in Stenersen's classification, derived from the same hoard (Stenersen 1881). There is also nothing exactly like it in the Coin Cabinet of the University of Oslo, nor have any other examples of this precise type been traced. The bust has individual hairs, which go from the inner of the two lines which define the head and out through the outer line. This can also be seen on some coins of Stenersen's Type O, and the Bornais coin looks more like Type O than any other type. However, Type O busts normally have drapery below the throat but this is not the case on the Bornais coin, on which the throat meets the base of the sceptre almost at the edge of the coin**.** The majority of Type O coins also have blundered inscriptions around the bust and these too are absent from the Bornais coin. It is possible that the die from which the coin was struck could have had drapery, and/or an inscription, but that this was off the flan when the coin was struck. However, since the coin is of a typical size and the bust is in the centre of the coin (as is typical

Figure 161. A silver penny (1575) of Olaf the Peaceful of Norway

for Olaf's coins), this seems unlikely. The reverse does carry a blundered inscription, with Latin characters rather than runes, and this corresponds with Type O, but also with several other types. The coin can thus be best interpreted either as a variation of Type O or as a completely new type (Williams and Sharples 2003).

The coin is one of a number of eleventh-century Scandinavian coins found in Britain. The majority of these were catalogued by Marion Archibald (Archibald 1991). Since then, only two new examples have been recorded: the Bornais coin and a penny of Harald Hardruler found near Doncaster in 1996, and now in Doncaster Museum (Coin register 1997). The presence of these coins, predominantly found in Scotland and eastern England, suggests a substantial trade based on a monetary economy between Scandinavia and the British Isles from the mid-eleventh century onwards. This corresponds with historical evidence for the presence of a Norwegian trading ship at Grimsby in 1069, and for a flourishing Anglo-Norwegian trade in place by the early twelfth century (Sawyer 1986). This fits with a broader pattern of English influence both on Norwegian coinage specifically, and on kingship and government in Norway more generally (Gullbekk 1991; 1992–93; Sawyer 1986; 1999; Williams 2007).

The Bornais coin is also one of a growing number of coin finds from Norse settlement sites in the Northern and Western Isles. It has often been argued, on the basis that coins are comparatively rare in Viking-Age silver hoards, that there was little or no monetary economy in Norse Scotland in the tenth and eleventh centuries. However, it is now clear that hoards only give part of the picture; recent numismatic thinking stresses the importance of single finds and especially site finds for interpreting monetary circulation (Williams 2004; 2006; 2010; Blackburn 2007). Although site finds from older excavations are comparatively rare, improvements in excavation techniques have meant that coins which might have been missed by less thorough excavation are now being discovered. A significant number of Norse settlements of this period in Scotland which have been excavated since the late twentieth century have yielded coin-finds, whether Anglo-Saxon or Norwegian (Williams 2004; 2010). This is especially clear in the Hebrides, where the Bornais coin needs to be seen in the context of a Harald Hardruler penny from the Udal and an English penny of Cnut from the recent excavations at Cille Pheadair. Together with these and other finds, the silver penny from Bornais provides evidence of the importance of coinage in Norse Scotland.

The significance of the coin for dating purposes is, however, limited. Work in progress suggests that while coins circulated more widely than was previously recognised, they circulated without much control. In a controlled economy, in which coins were formally withdrawn from circulation and replaced by new types, coins may provide very good dating evidence. Where such controls did not exist, there was no reason for coins to disappear from circulation as long as they continued to have a perceived monetary value, and their use for dating purposes is much reduced (Archibald 1988; Williams 2010). In the case of the Bornais coin, it provides a *terminus post quem* of 1066, or probably a little later, but it could plausibly have been deposited in the twelfth or even the thirteenth century rather than necessarily in the period when it was current in Norway.

Personal items

A range of objects was found that could be associated with the dress and adornment of the human body. These include the fragmentary remains of composite combs, pins, beads and toggles, a finger ring and a lace-tag.

Combs

Seven fragments of composite combs, and one isolated comb tooth, were found on mound 1 (Figure 162). All but two were stratified in the Norse deposits (four in the midden CF, two in activity area CE), and all but one represent comb types of later Norse date (AD 1000 onwards); no

Figure 162. Seven fragments of composite combs; on the top side plates (1500, 1232, 1244, 1169) on the bottom teeth plates (1343, 1730, 1473)

Viking types (types A and B, Ambrosiani 1981, 25) are present. The exception is an unstratified side plate fragment (1500) decorated with three rows of ring and dot. This had a wide and flat cross section which is a feature that is more characteristic of the Late Iron Age types, as is the decoration. Two of the Norse combs (1244 and 1169, both from the Norse middens CF) have trapezoidal section side plates with simple incised longitudinal lines along the edges and mid-rib which are similar to those from mound 3. Tenth to twelfth century dates were suggested for the mound 3 combs. The other side plate (1232, CF) is very narrow and is likely to form a comb with two pairs of side plates on each side, usually arranged with a gap in the middle. This type of comb can be paralleled at Jarlshof, Shetland (Hamilton 1956, plate XXXII, no. 7), and Lagore crannog (Hencken 1937, fig. 98, 1338). The Lagore example is a very close parallel for the decoration and size of the mound 1 fragment but is unstratified. The Jarlshof example is from a late Norse context.

Pins

There are two copper alloy pins, two iron pins, 11 bone pins, eight fragments and two possible pin heads (Figure 163). The Late Iron Age deposits produced five bone pins and pin fragments from the house floors (CB), four bone pins (including two pin heads) from the infill deposits (CC) and one bone and one copper alloy pin from the Late Iron Age middens (CG). The Norse deposits produced five bone pins from the activity area (CE) and four from the middens (CF). There are also two unstratified bone pin fragments.

The copper alloy pins are a complete copper alloy stick pin (1177, unstratified) and a circular-sectioned rod fragment (4687; CG) with a rounded point which is presumed to be from a pin. The stick pin (1177), with its distinctive crozier-shaped head, is a rare type. The only other examples of the type that are known to the author (P Macdonald) are all Irish. They are: a near-complete iron stick pin recovered during excavations at Mount Offlay, Cabinteely, Dublin (M Conway pers. comm.; for a general description of the site see Conway 1999); a near-complete iron example from Rathtinaun (Crannog 61), Lough Gara, Co. Sligo (Raftery 1984, fig. 5.3); and a complete iron stick pin from the site of Johnstown 1, Enfield, Co. Meath (Clarke and Carlin 2008, 81, fig. 4.7b).

The Mount Offlay stick pin has a uniform oval-sectioned stem and is 100 mm in length. Mount Offlay was the site of a large early medieval enclosed cemetery dating from the fifth or sixth centuries to the eleventh or twelfth centuries AD. The stick pin was recovered from a dump of redeposited occupational material situated late in the site's stratigraphic sequence. The Rathtinaun (Crannog 61) stick pin is 86mm in length with a tapering shank of circular cross-section. It was recovered during excavations by Joseph Raftery in the 1950s. Although previously thought to be a Late Bronze Age type (Raftery 1972, 3; Raftery 1984, 9–13), the validity of a prehistoric date is now questioned, and it is probable that the Rathtinaun (Crannog 61) stick pin was associated with a late phase of reuse of the crannog in the historic period, possibly in the ninth or tenth centuries AD (Becker pers. comm.; see also Edwards 1990, 36). The Johnstown 1 stick pin (find no. 02E0462:1:254) has a tapering sub-rectangular-sectioned shank and was originally 71 mm in length. It was recovered from the topsoil in the eastern quadrant of the multi-period enclosed cemetery and settlement site, activity at which extended from the middle of the first millennium AD to either the sixteenth or seventeenth century. An incomplete iron fitting from Dunadd, Argyll which has been identified as part of a possible barrel padlock key (Lane and Campbell 2000, 168, illus. 4.77 and

4.82, no. 843) has a crozier-headed terminal comparable to the Bornais and Mount Offlay stick pins. However, the Dunadd fitting has a rectangular-sectioned stem, suggesting that it is not part of a stick pin.

Unfortunately none of the three Irish parallels for the Bornais crozier-headed stick pin are closely dated. In form the crozier-headed stick pins most closely resemble those zoomorphic stick pins whose notched heads are bent over in a crook-like shape that imitates the form of a horse's or swan's head (*i.e.* Scully 1997, 442, fig. 15.1. 26–27; O Rahilly 1998, 26–27, fig. 10). Such zoomorphic stick pins were recovered from late eleventh to early twelfth-century AD contexts in Dublin (O Rahilly 1998, 27) and from contexts dating from the second quarter of the twelfth to the early thirteenth century AD in Waterford (Scully 1997, 439, table 15.1). O Rahilly suggested that an unprovenanced Irish ring pin whose looped head was bent round in the form of a bird's neck and beak (Armstrong 1921–22, 81, fig. 4.5) might have formed a prototype for the zoomorphic stick pin type (O Rahilly 1998, 27). The stylistic relationship, if any, between the zoomorphic stick pins and the crozier-headed stick pins is uncertain; the absence of expansions on their shanks, however, as well as the uniform shape of their shanks' sections, are both features suggestive of an early date within the stick pin series (O Rahilly 1998, 31) which is broadly consistent with the cited date ranges for the zoomorphic type.

Two possible iron pins were found, one complete (1078, CC) and the other a curved sub-rectangular fragment (1184, CC). Although there are no close parallels in iron known to the author (P Macdonald) for the complete pin, a bone pin with a similar notched head was an unstratified find from Area II of the Brough of Birsay, Orkney (Curle 1982, 105, fig. 48, no. 86). An alternative identification is suggested by an unusual leatherworking awl from an early fourteenth-century context from Coppergate in York (Ottaway and Rogers 2002, 3032, fig. 1338, no. 11516). The awl's circular-sectioned working arm is separated from its rectangular-sectioned tang by a series of four opposing triangular notches, which forms a potential parallel for this 'pin'.

The Late Iron Age bone pins are rather simple forms. They are small, sometimes slender examples and most have either no shaped head (2174; CB) or very slightly shaped and sloping heads (2547; CB) and there is one nail-headed pin (4644; CB). These can be paralleled by examples from the Broch of Burrian, Orkney (MacGregor 1974, fig. 6, 51, 49). There are no characteristic Later Iron Age hipped pins, though they were found on mound 2 (Sharples 2003a, fig. 8.5). There are also two pin heads (1131, 1230; both from CC; Figure 164) with iron staining around the perforation. Examples comparable to 1230 are known from a range of sites in Atlantic Scotland, notably Bac Mhic Connain in North Uist (Hallén 1994, 213, illus. 3.4) and Gurness in Orkney (Hedges 1987, fig. 2.26). Foster (1990, 155) has labelled these Globular pins and suggests that, though there are examples from the Middle Iron Age and the later part of the Late Iron Age, they are not present in the early Late Iron Age which is the suggested period for the Bornais examples. Close-Brooks (1986, 166) has also raised the possibility that these objects are not pins but pegged playing pieces and this interpretation is further discussed below in relation to the points 2244 and 2400.

The Norse pins (Figure 163) include a simple rather crude pig fibula pin (1319; CE), a finely worked thistle-headed pin (1138; CE) and an elaborately shaped antler pin head (1383; CF) decorated with incised dots and seven lines around the top of the shaft. These pins will be more fully discussed when the large Norse assemblage from mounds 2 and 2A is published.

Beads

Five beads, pendants or toggles were found and they are all quite different (Figure 165). 2498 (CB) is a cylinder, possibly a tooth root, with a longitudinal perforation. 1382 (CC) is a flat perforated disc made from the epiphyseal plate from a small cetacean. 2105 (CB) is a small piece of sandstone that has been ground to an oval outline with flat faces and a rounded edge. A small perforation has been made off-centre along the length of the piece. The latter two pieces resemble spindle whorls (*i.e.* 1834) but it is unlikely given their size that they functioned as such. 2691 (CG) is a cylinder cut from the top of an antler tine, perforated transversely at one end. The toggle (1119; CC) was a sheep tibia, trimmed and polished, and with a large oval perforation through the shaft. These were all found in Late Iron Age deposits.

Shell decorations

The excavations produced five marine shells (Figure 166) and a land snail that appear to have been deliberately perforated. These are probably decorative pieces which were either worn on the body or attached to another object or structure. 1917 and 8513 are perforated fragments of common whelk (*Buccinum undatum*), 8519 is a land snail and 8517 and 8518 are painted top shells (*Calliostoma zizyphinum*). Two of these shells (8518) were found in the same layer (463) and are identical so they will be treated as a pair. Whilst top shells are attractive shells which would originally have been colourful, the whelk fragments are plain. The top shells and whelk came from the midden (CG), the land snail from the house floor (CB). The author is not aware of any parallels for the perforated top shell but the excavations at Kilpheder wheelhouse did find a perforated common whelk shell (Lethbridge 1952, fig. 6) similar to those discovered at Bornais and perforated marine shells are also known from Gwithian (Nowakowski 2007, 68).

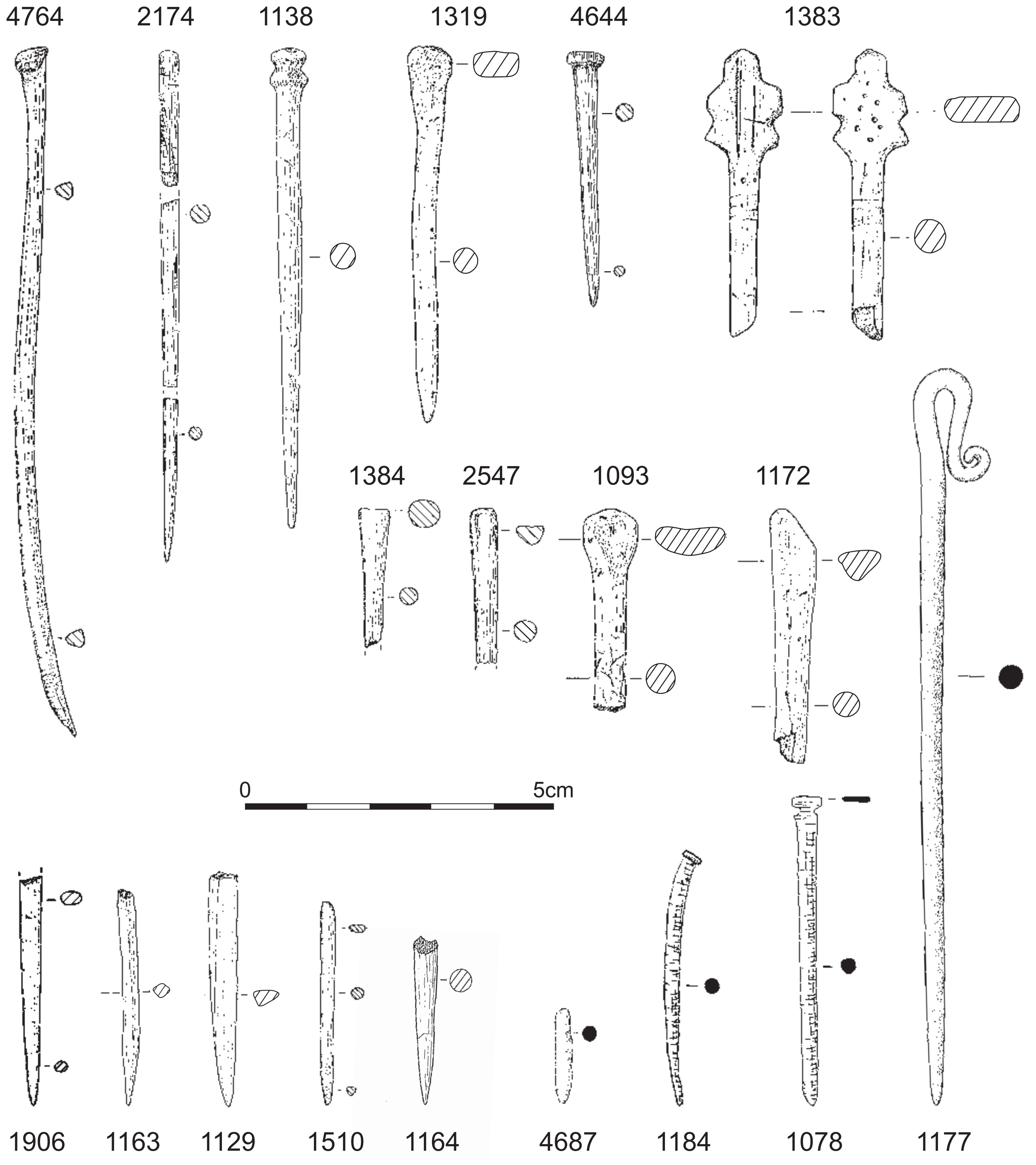


Figure 163. The pins, all bone/antler except for 4687 and 1177 which are copper alloy and 1184 and 1078 which are iron

Finger ring

The finger ring (2182; Figure 165) carved from antler is an unusual find from the floor (397) of House 2 (CB). Apart from earlier spiral rings, finger rings are not commonly found in Scotland and, in Britain as a whole, the finger ring with bezel (gem-set or carved) is thought to have been a Roman introduction (Johns 1996, 41). The Bornais ring closely resembles late Roman rings of the 'Brancaster' type, which have a wide hoop, the same width as the bezel, and a large squared bezel with stepped or decorated shoulders (Johns 1996, fig. 3.13; Henig 1974, 51, plate LIII, 801, 803). This type is dated to the late fourth to early fifth century – not a period noted for its Roman activity in Scotland, so the process by which this ring, or knowledge of this type of ring, arrived at Bornais is intriguing.

Figure 164. Complex pin heads (1131, 1230) split in two; note the iron staining around the perforation

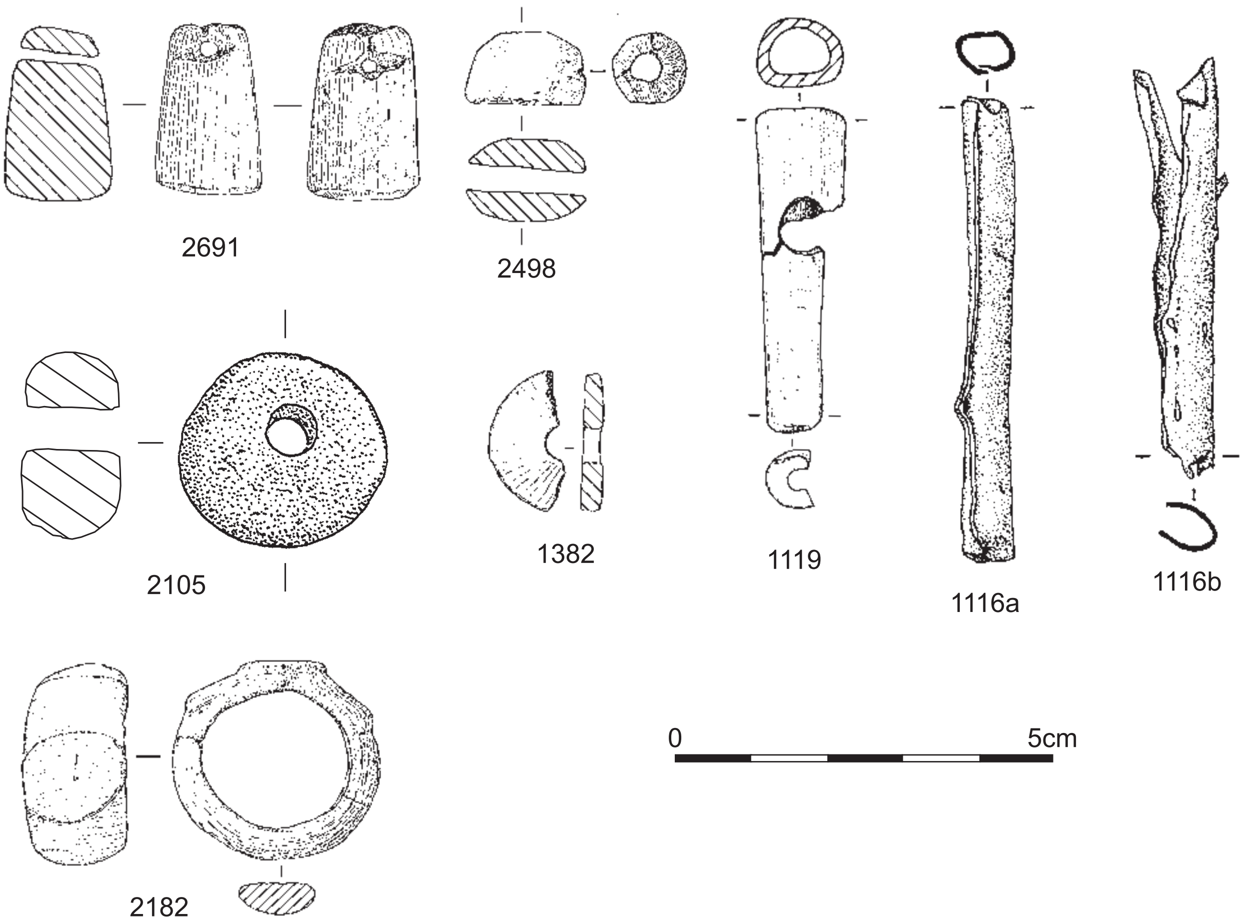


Figure 165. A selection of ornaments: bone bead (2498), bone (1382), antler (2691) and stone (2105) pendants, bone toggle (1119), antler finger ring (2182) and copper alloy lace-tag (1116a) with organic sheath (1116b)

Figure 166. Three perforated painted top shells (Calliostoma zizyphinum), 8517 and 8518 (a pair) and two perforated fragments of common whelk (Buccinum undatum), 1917 and 8513

Lace-tag

There is one example of a probable copper alloy lace-tag or chape (1116; Figure 165) from the Norse middens (CF), a simple cylinder fitted to the end of a lace to prevent it from fraying and to aid threading. As well as being used in lacing clothing, laces with such tags could have been used to fasten accessories such as bags. As a type lace-tags do not appear to pre-date the mid thirteenth century AD (Egan and Pritchard 1991, 281). Most complete lace-tags are between 25 mm and 40 mm in length so the size of the Bornais example (60 mm) is unusual. Egan and Pritchard suggest that apparent examples which are over 40 mm in length cannot be identified as lace-tags with certainty (1991, 284). Probable lace-tags of comparable length to the Bornais example are known from early thirteenth to early fourteenth century AD contexts in York (Ottaway and Rogers 2002, 2920–1, 3070, fig. 1491, nos 12913–12915) and thirteenth to mid fourteenth-century AD contexts in London (Egan and Pritchard 1991, 290, nos 1437–1449). Although the occurrence of these apparently long lace-tags becomes increasingly rare after the mid fourteenth century AD (Egan and Pritchard 1991, 290), three examples are known from later fifteenth to sixteenth-century contexts in Norwich (Margeson 1993, fig. 12, nos 121–3).

The Bornais chape had an organic sleeve (1116b; Figure 165), part of which survives although it is no longer mounted on the cylinder. It is not obvious how this organic sleeve is consistent with the object's identification as a probable lace-tag and it is therefore possible that the Bornais example is not a lace-tag. Seventeen fragments of slightly tapering copper alloy tubes, of comparable diameter, were recovered from Pictish horizons of late eighth-century AD date at the Brough of Birsay (Curle 1982, 115, illus. 39, no. 436) and, given their comparatively early date, they are unlikely to be lace-tags. A comparable tapering copper alloy cylinder, cut at both ends, but with a curved seam (Curle 1954, 54, fig. 22; Batey 1987, 122, fig. 27, no. 4.12.1) was recovered from the Late Norse site of Freswick, Caithness. With a surviving length of 82 mm, the Freswick parallel is also unlikely to have been a lace-tag. Both the Brough of Birsay and Freswick parallels suggest the possibility of an alternative function for the probable lace-tag from Bornais.

Horse fittings

Three objects may be the remains of horse harness. The most clearly defined example is an unstratified snaffle-bit (1071; Figure 167). Although small, the size of this example is not exceptional (*cf.* Ottaway 1992, 705, fig. 307, no. 3842). A comparable example is known from a burial of Viking date at Reay, Caithness (Grieg 1940, 22, fig. 5).

1378 is probably a crude D-shaped buckle frame (*cf.* Ottaway 1992, 683, fig. 294; Ottaway and Rogers 2002, 2891, fig. 1468) or possibly a chain link (Figure 190; *cf.* Ottaway 1992, 648, fig. 273; Ottaway and Rogers 2002, 2851–3, fig. 1429). D-shaped iron buckles are not an uncommon find type and are found throughout the Norse and medieval periods. Ottaway (1992, 683) has emphasised their association with bridle, spur and stirrup

Figure 167. An iron snaffle bit (1071)

fittings, although they might have had non-equestrian uses. Pre-conservation X-radiography suggests that one end of the object has been unconvincingly reconstructed from a detached fragment during the course of conservation. The frame was recovered from the Norse midden (CF) and a buckle tongue (1547) came from the same layer.

One possible horseshoe nail (1394; Figure 190) was found. That the head is bevelled on only one side suggests that this is probably an example of the so-called European-style of modern horseshoe nail. Horseshoe nails are known from contexts as early as the tenth century AD but medieval horseshoe nails have either a distinctive 'fiddle-key' expanded head with ears, or a square-headed form (Clark 1986; Clark 1995, 85–91), neither of which is consistent with this example. It is possible that the shape of the Bornais nail is the result of heavy wear, however, although the tip is missing, it does not appear that the nail has been clinched, suggesting that this is not the case. Given its length, the nail would probably have been used for larger shoes suitable for farm or draught purposes. Although recovered from a deposit associated with the Norse activity area (CE), the excavator noted that the nail was recovered from an area of animal disturbance. It is not, therefore, unreasonable to suggest that the nail is intrusive and modern.

Decorated objects, gaming pieces and religious objects

This is a miscellaneous group of material that might have had considerable spiritual significance. It comprises a cattle phalanx with a spiral and pelta motif, a phalanx with a simple cross, three fragments of whale bone covered with incised lines, two astragali incised with complex geometric patterns, two bone dice, a group of shell and ceramic discs, an ogham-inscribed plaque and a piece of imported porphyry.

Decorated bones (with help from S Youngs)

The cattle toe bone (4780; Figures 168, 169, 171) is a very intriguing and unusual find. It comes from the red sand layer (403) in the Norse activity area (CE). Someone has carefully inscribed, with the point of a sharp knife, four interlinked trumpet spirals, working around the sides of the bone. The bone has been burnt and broken, and is incomplete, and the design appears to continue onto an area where the bone has been lost. The design outline shows a few false starts and retracings, but is fairly confident. The design is one of the most common motifs of insular art in the period from the sixth to the eighth centuries; parallels can be found in both metalwork and insular manuscripts. The best parallels are with Irish motif pieces (O'Meadhra 1979, 1987) from Ballinderry, Co. Offaly, Dungiven Priory, Co. Londonderry and Garryduff, Co. Cork. The latter two pieces are on slate whereas the Ballinderry piece is on wood. In Scotland the lead disc from the Brough of Birsay (Curle 1982, 48–9) is perhaps one of the closest parallels to the design on the Bornais bone. The use of interlocking spirals is also a noteworthy feature of the great Pictish cross slabs, such as Shandwick in Easter Ross. The presence of this interlinked trumpet spiral pattern at Bornais certainly shows that the inhabitants were familiar with the milieu of insular art and knew its motifs well enough to make a good attempt at a difficult interlinked design.

Figure 168. A general view of the decorated phalanx (4780)

Figure 169. A detailed view of the decorated phalanx (4780)

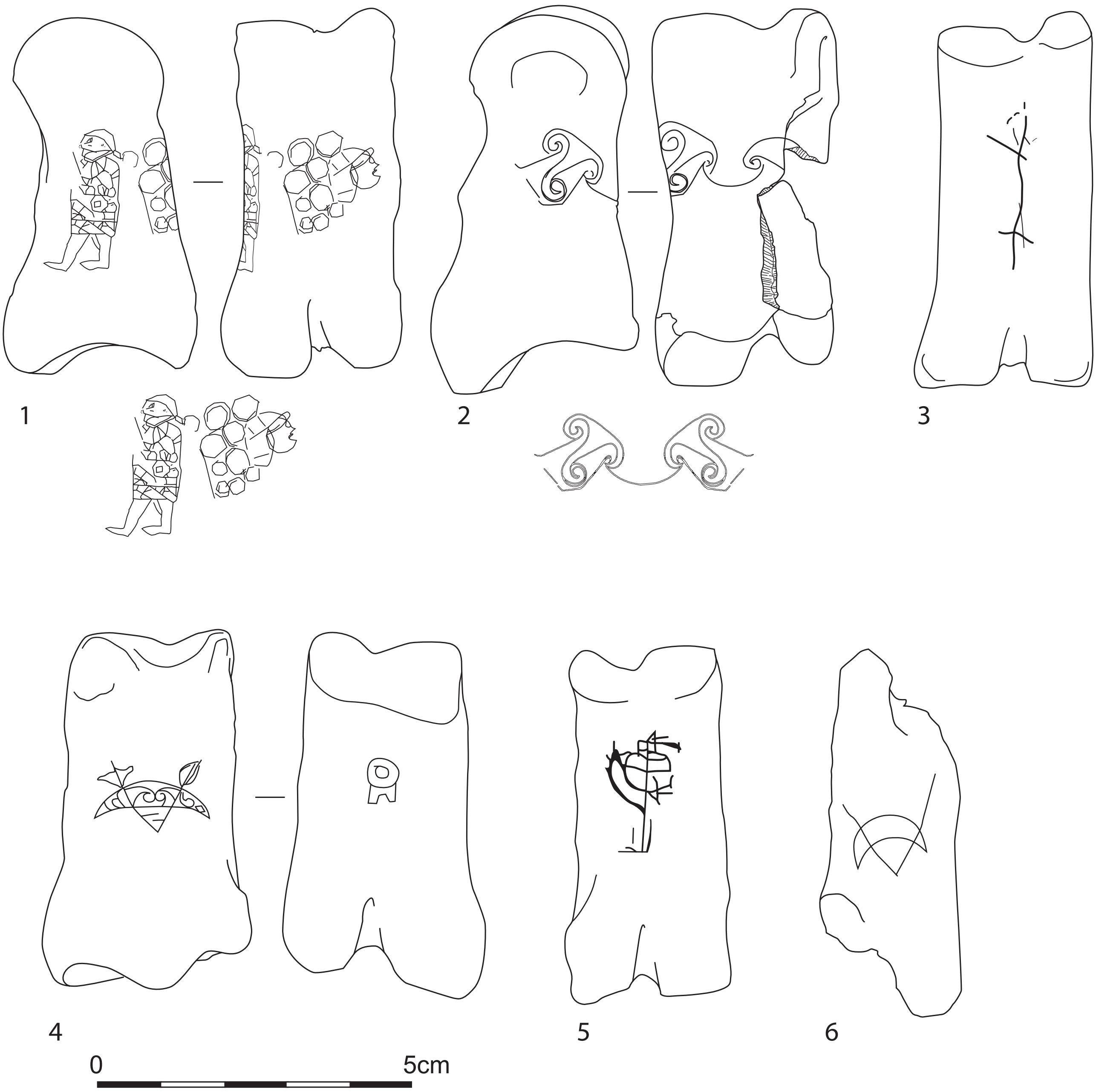


Figure 170. Decorated phalanges from Atlantic Scotland. 1. Bu Sands, Orkney; 2. Bornais mound 1; 3–5. Broch of Burrain, Orknet; 6. Poole, Orkney

The next question is whether the object could be classed as a motif piece or as an artefact in its own right. In Scotland there are very few bone motif pieces similar to the ones in Ireland, and these are generally large, flatter bone surfaces where designs could be tried out or used to make moulds. The Bornais bone is too lightly carved to use to make a mould and is not designed to be carved further into heavier relief. Four decorated phalanges are known from Orkney (Figure 170). Three well-known examples are from the Broch of Burrian, North Ronaldsay (MacGregor 1974, 88; 1985, 134–5) and these include one example with a crescent and V-rod and this symbol is also found in a recently discovered example from Pool, Sanday (Smith in Hunter 2007, 510, illus. 8.8.25). The most recently discovered phalanx from Bu Sands, Burray (Lawrence 2005) has a crudely incised figure and a series of circular marks that may incorporate a head.

The symbols present on the Burrian and Pool pieces clearly indicate an early historic date for these two phalanges. The Bornais example is in a Norse context (CE) but it is possible that it was eroded from the earlier Late Iron Age deposits (CC). It seems reasonable to suggest that the six pieces represent a contemporary early historic phenomenon. Extensive discussion of these pieces by MacGregor (1985, 134–5) and Lawrence (2005) suggests that they are gaming pieces either for a board game such as ‘tafl’ or for a game of skittles. Both games would have had a decorated ‘king’ piece but most of the playing pieces were relatively undistinguished and could comprise undecorated phalanges, clusters of which have been recorded at A’Cheardach Mhor (Young and Richardson 1960, 171) and Dun Vulan (Mulville in Parker Pearson and Sharples 1999, 169).

The other decorated bones are more difficult to parallel. A cattle phalanx (4783; Figure 171) from the Late Iron Age middens (CG) has a deeply incised cross cut into the distal surface. It is unclear what this may be for but it could possibly be more functional than decorative. A large fragment of burnt whale bone (2055/1239/1240/2107; Figure 171) has the surface incised with over 17 roughly parallel lines. The edges are heavily worn and polished suggesting the objects were used or at least handled repeatedly. Most of this fragmented object (1239/1240/2107) came from the infill layers (CC) but one small piece (2055) came from the final house floor (397, CB).

The two decorated astragali (4782, 2443; Figures 171, 172) are closely comparable and have a contextual relationship with the dice. Astragalus 2443 and die 1973 came from the charcoal layer (457) in the Late Iron Age house (CB), though they are thought to belong to the construction of House 2 (see above 84) and astragalus 4782 and die 2503 come from the Late Iron Age midden (CG). The upper surface of both astragali is decorated with an incised grid. On the larger example (2443) the grid is five by six and most of the boxes in the upper half of the grid have been half filled with fine diagonal lines; the central line of boxes in the bottom half has a single central diagonal incised line. The smaller example (4782) has been gnawed and this has damaged the surface but a grid of five by four appears to be present. Most of the boxes appear to be divided by a diagonal incised line and many boxes have been half filled though in this case with short pecked stabs. Susan Youngs (pers. comm.) suggests that this grid pattern is reminiscent of some of the panels of straight-line ornament on the shafts of the great disc-headed pins and that the best parallel is a grid of rectangles sub-divided into triangles on a bronze disc-headed pin from Treanmanagh, Co. Limerick (Ryan 1991, 150, 215) which she would prefer to date to the fifth to sixth centuries AD.

The only close parallel for this object is an astragalus from Pool, Sanday (Smith in Hunter 2007, 510, illus. 8.8.25) which had an incised grid on the flat surface but this was fragmented and had been perforated through proximal and distal condyles. Two other astragali had decorated surfaces; one might have been decorated with a much simpler incised grid or cross whereas the other had a grid of roughly executed pits which is reminiscent of the pecking on 4782. The importance of the astragalus as a gaming piece is well attested from sites outside of the Atlantic Iron Age. An urn from Caistor by Norwich produced 33 plano-convex gaming pieces and 35 astragali, one of which may have had a runic inscription (MacGregor 1985, 134; Myres and Green 1973). Groups of astragali have also been found at the Neolithic settlement at Skara Brae, Orkney (Clarke 1976a) and there are isolated decorated examples (Clarke 1976b, fig. 13.5).

It has been suggested (above 84) that the presence of the astragalus (2443) and the bone die (1973) in the charcoal layer (457) of the burnt down wheelhouse (CB) may relate to an act of divination prior to the reoccupation of the structure and this would be comparable to the way these bones were used in the Roman period. However, none of these parallels have decoration comparable to the Bornais piece. Another possibility is that this pattern is not decorative but functional. The detail and arrangement of the infill of 2443 suggest this was carried out over a period of time rather than at one sitting. It might indicate the recording of events, perhaps events associated with acts of divination that were undertaken using this astragalus.

Dice

Two parallelopiped dice (Figures 171, 172) were recovered from Late Iron Age deposits, one (1973) from the house floor deposits (CB) and one (2503) from the midden (CG). Both the dice are worn and have been well-used and handled. The numbers on the Bornais dice are created by ring and dot motifs. These are clearly visible on 1973 but less so on 2503 where the less deeply incised rings have been worn away. The number sequence on Bornais die 1973 is unusual, and appears to be 1-4-6-3. Whilst the 1 and 3 numbers are neatly executed (Figure 173), the 4 and 6 are less well done. The 6 is represented by two overlapping

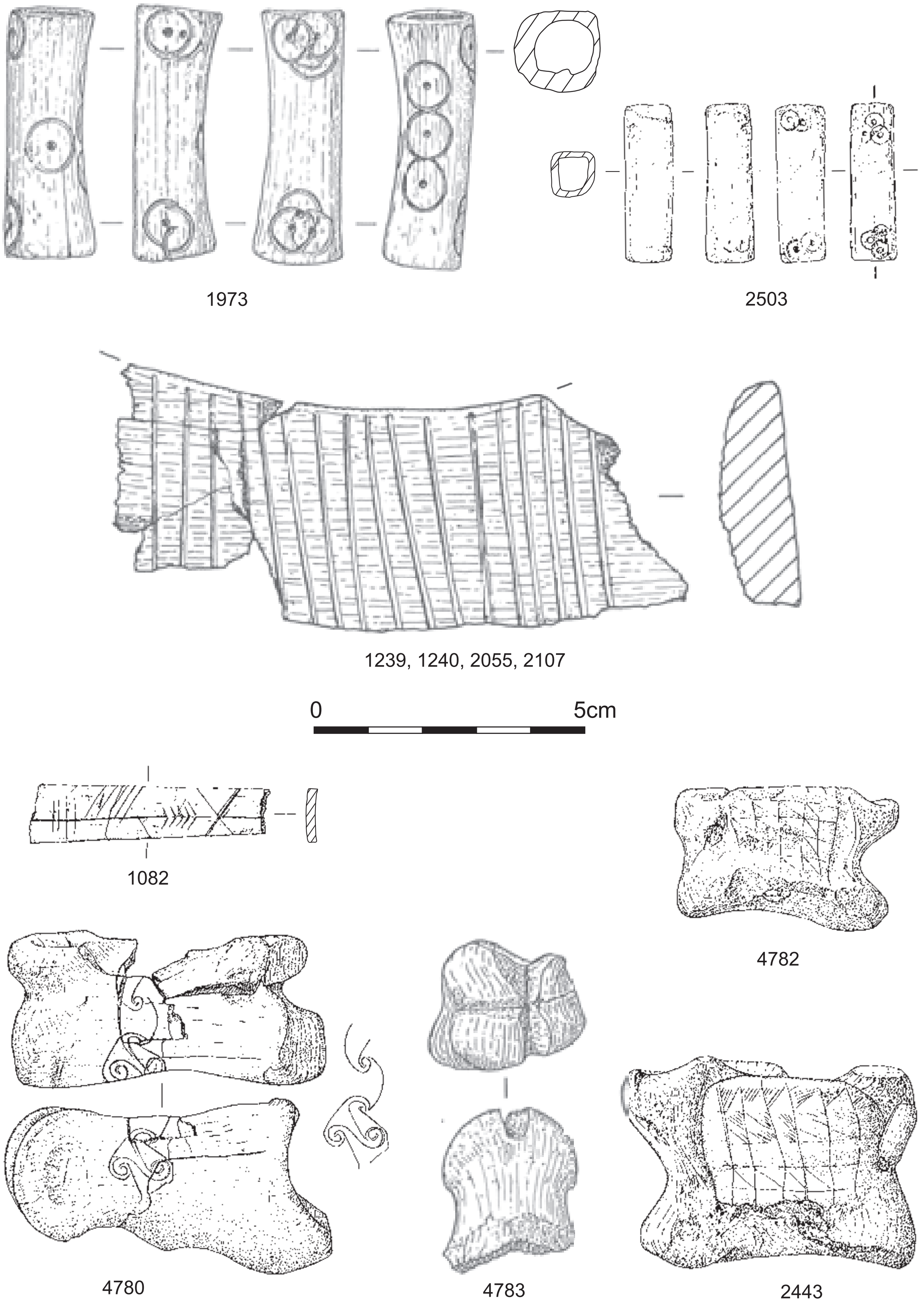


Figure 171. A variety of decorated bones: dice (1973, 2503), grooved whale bone (2055/1239/1240/2107), ogham-inscribed plaque (1082), phalanges (4780, 4783), astragali (2443, 4782)

Figure 172. The decorated astragali (2443 and 4782) and parallelopiped bone dice (1973 and 2503)

groups of three ring and dot motifs; on one of these groups an error has been made in the location of a ring and dot motif and it has been re-inscribed to increase clarity. The number 4 comprises two groups of two ring and dot motifs; one of the groups is well executed but the second group appears less well done, to modern eyes, with two semi-circular arcs based on very close centre points and a third short stretch of arc which extends beyond the edge of the bone. This arrangement of numbers 1-4-6-3 is not found on any of the other Scottish dice and all of the well-preserved examples catalogued by Clarke were numbered 3-4-5-6, though the sequence varies. Unfortunately the number on one side of the smaller die (2503) has been completely worn away so all we are left with is 5-4-6 and, though the missing number looks like a 1 or 2, it may be that this had the more conventional sequence.

The parallelopiped dice from Scotland have been catalogued by Clarke (1970) who identified 21 examples and six related pieces from Dun Cuier. Since this catalogue was published an important assemblage of five pieces was recovered from Scalloway (Smith and Wilson 1998), an isolated example has been recovered from Pool (Smith in Hunter 2007) and a related piece from Dun Vulan (Parker Pearson and Sharples 1999, fig. 6.31). The dice from the broch at Scalloway had up until now been the only well-stratified and datable examples, and were divided into two shape categories (Smith and Wilson 1998, 174). A large short type was present (similar to 1973) and a long thin type (similar to 2503); the long thin types appeared to be slightly earlier, dating to the end of the primary occupation of the broch, with the larger types occurring in the final occupation of the broch. The Scalloway radiocarbon dates supported a late Middle Iron Age date for the beginning of the use of parallelopiped dice and the Bornais dates now clearly indicate that they continue into the Late Iron Age.

The use of these pieces is debatable. Clarke (1970, 220–6) explores the possibility that they were from a type of domino game, a guessing game or that they were rolled as dice, but none of these seems suitable. Instead he suggests a gaming parallel from North America which entailed tossing sets of dice into the air and keeping a score. The latter explanation was particularly favoured because it explained the presence of sets (such as at Dun Cuier and now Scalloway) and it would reduce the problems that would be created by rolling the dice. Many of the parallelopiped dice are very uneven and 1973 has a curve that should significantly favour certain recurring numbers. It was noted, however, that one of the Scalloway dice had been deliberately loaded by the insertion of an iron pin, which suggests they were rolled. The close relationship between the dice and the astragali at Bornais does favour a tossing interpretation as it would be difficult to roll an astragalus. In a recent consideration of games in early historic Scotland, Hall (2007, 22) has discussed the possible shamanistic role of gaming and the context of the Bornais pieces makes this an attractive interpretation. He also argues that the close association between gaming

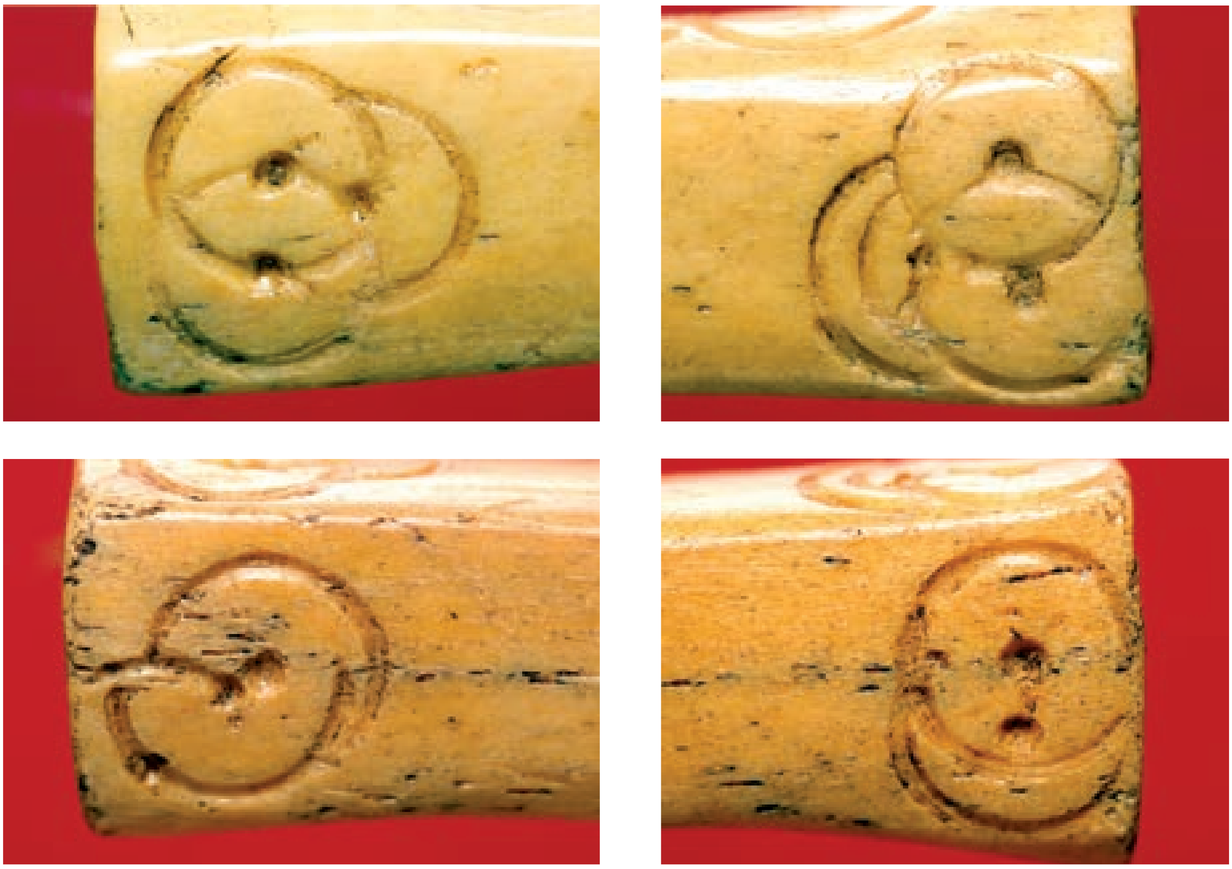


Figure 173. A detail of selected numbers on the parallelopiped dice (1973)

and the elite is problematic and should be considered in relation to the absence of any prestige metalwork from mound 1.

Discs – gaming counters

The site has produced eight ceramic and five shell discs (Figure 174) which appear to have been deliberately shaped. The ceramic discs range from relatively well formed examples with ground edges (2024; CB) to very roughly flaked examples with little evidence for use (1866; CB). The shape and size of these objects is very variable: most are oval rather than circular, some are distinctly square (4790; CB) and, though there seems to be a preference for a length of just under 40 mm, a very small example exists. The most carefully made example (2024) has been ground all over to form straight sides and faces that are slightly skewed in cross-section. One face in particular appears to be very smooth. Many of the other examples are very rough and 1866 is not very different from a broken sherd.

It seems likely that most are unfinished and/or unused and this raises the possibility that they are blanks for the production of ceramic spindle whorls, and there is a possibility stone spindle whorls were produced on site (see above 254). However, the oval shape of the pieces, including the most finished example, undermines this interpretation and it is possible that these are gaming pieces. All but one (8521; CE) were found in Late Iron Age deposits.

The assemblage also includes four pieces of scallop (*Pecten maximus* L.) shell and one fragment of common whelk (*Buccinum undatum*) shell, which may have been discs. Two of the scallop shells (1450; CC and 8516; CB) are complete and well-formed discs 34–37 mm and 54–58 mm in diameter with neatly trimmed edges. The other discs are less well made and may be unfinished; two have perforations (8514; CB and 1917; CB). These objects are comparable in size and shape to the clay discs and the similarity extends to the crude and relatively unfinished appearance of most of the pieces. Three pieces came from the house floors (CB), one from the infill layers (CC) and one from the midden (CG).

Another potential gaming piece is an oval cone of travertine (8520). This is smaller and thicker than the discs but it has a clear base and the surface has a polish that must have come from regular handling. This came from the charcoal-rich infill layers (CC).

Ogham-inscribed plaque – K Forsyth

The ogham-inscribed bone plaque (1082; Figure 175) is a unique object unfortunately found lying on the surface of the mound immediately to the west of the trench excavated

Figure 174. The ceramic and scallop shell discs. Note that 8515 is not catalogued as no deliberate modification could be demonstrated

Figure 175. A bone plaque inscribed with an ogham inscription (1082)

in 1996. The extant section of text comprises five complete letters and the first stroke of a sixth. Although the lettering is clear there are major obstacles to its interpretation. These are: the uncertainty concerning the object's correct orientation, the orthographic uncertainty concerning three of the characters, and the brevity of the surviving section. Given these problems the text cannot be interpreted nor even its language identified with confidence. Reading left-to-right, beginning at the narrow end, gives: [.]EQBIX Inverting the object and reading left-to-right, beginning at the wide end, gives: XIHNE[.] The text might have continued at either or both ends. The value of H in Scottish ogham orthography is not known. From context it appears to be, perhaps, a spirant. The value of the X-character in Ireland varied over time from /k/ and /χ/ to *é* /ɛ:/ and the later diphthong *éo*. Its value in Scotland is not known. The damaged letter could be any one of the 15 consonants. The range of possible readings therefore includes, amongst others: [.]*eqbik*, [.]*eqbié*, *kiχne*[.], *éiχne*[.] The first of these could be interpreted as a Gaelic male personal name (MEQ BIK for manuscript spelling *meic Bicc*, '(of) son of Becc'), but other conflicting readings are equally plausible. The possibility that the text incorporates a Pictish or Norse name should be borne in mind.

The script of the Bornais ogham is distinctively Scottish. It is similar to a number of later Scottish oghams, thought to date from the eighth century and later (Forsyth 1996). Similar forms of script appear on cross slabs and other monuments dated as late as the ninth and tenth centuries AD, including the cross slab from Bressay, Shetland and the cross slab fragment from Whiteness, Shetland, both of which could be tenth century, *i.e.* within the period of Norse control of the Northern Isles (Forsyth 1996 for details). The form of script used at Bornais is different from, and typologically later than, that of the ogham-inscribed knife handle from Bac Mhic Connain, North Uist (Forsyth 1996). This implies that ogham literacy had some history in the Outer Isles.

The lack of wear on the object suggests it was not inlaid in some everyday object, such as a comb or box.

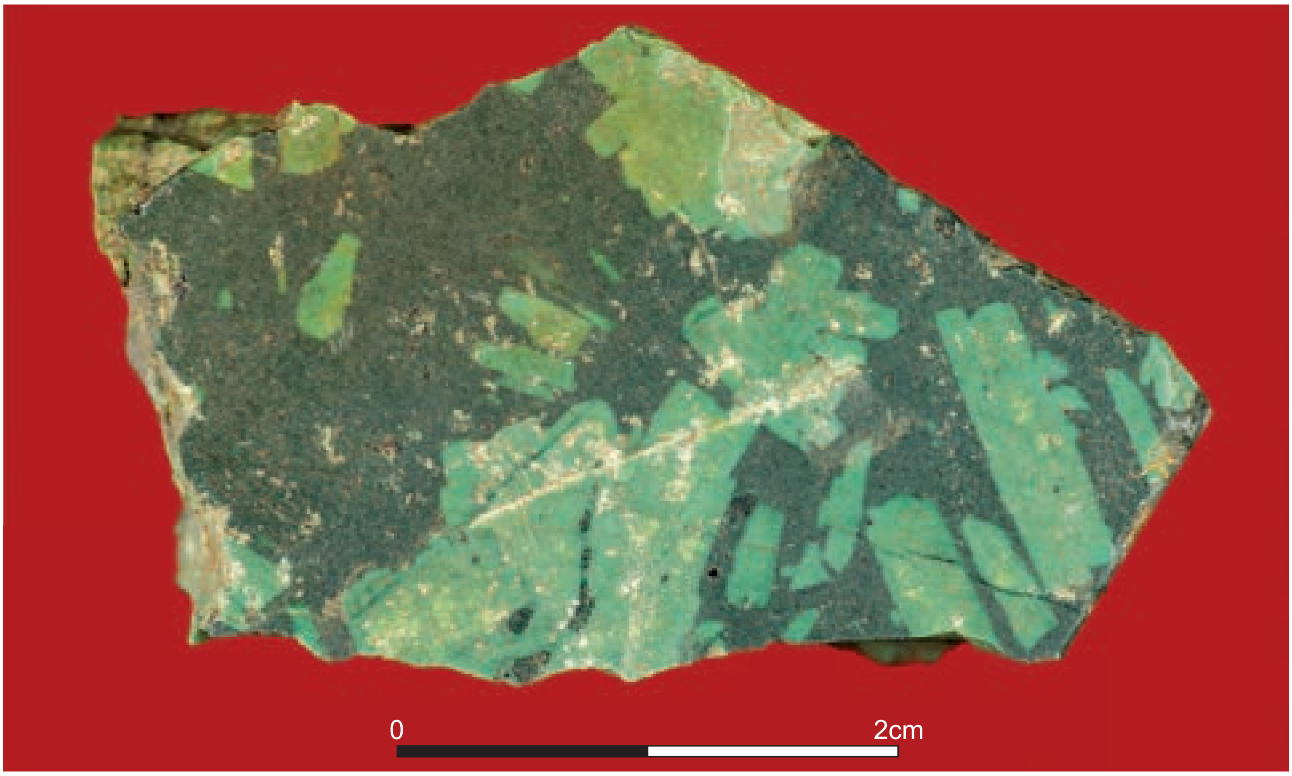


Figure 176. A fragment of green porphyry (1083)

If the plaque was cut specially to bear the text then it would be a unique physical example of the specially cut ogham rods referred to in medieval Irish literary texts. In the texts these are always of wood, usually yew, but in an environment in which wood was scarce, bone might have been an acceptable alternative. Ogham rods in the sagas bear a variety of texts, including cryptic and non-cryptic messages to be conveyed to others, personal aides-memoire, records of poetic composition, and divination. It is unclear, however, whether such references may be taken as records of actual practice or merely constitute imaginative back-projection of literacy into the pre-Christian period in which the stories are set (McManus 1991, 156–63). More certain are early medieval references to the use of lots in contemporary legal procedures (Kelly 1988, 208–9; McManus 1991, 162). The script used in lot-casting is nowhere specified.

The tapering shape of the plaque requires explanation. It brings to mind the wooden merchants' labels excavated from medieval Bergen in Norway. These rune-inscribed plaques are of similar scale to the Bornais plaque, often taper, and/or come to a point. They bore the name of the merchant and were meant to be tied to or inserted into goods bought (Page 1987, 7). A more detailed discussion of the piece is provided in Forsyth (2007).

Porphyry

A fragment of a small slab or tile of green porphyry (1083; Figure 176) was recovered from one of the upper layers in the Norse midden (CF). Both faces have been ground and polished to a thickness of 14 mm. Traces of grinding on two edges indicate that this was the corner of a tile. The source and significance of green porphyry have been known for a number of years (Lynn 1984; Cormack 1989; Owen and Lowe 1999) and Lowe has recently discussed the significance of the 12 pieces, including that from Bornais, from Scotland (Lowe pers. comm.). Like the other Scottish examples, the Bornais piece is a fragment of a tile. The stone was probably quarried from a source in southern Laconia in Greece which was used to provide large quantities of decorative stone for the monumental buildings of the Greek, Hellenistic and Roman periods. The buildings were subsequently extensively quarried in the early medieval period and this distinctive stone appears to have acquired significance to people in the Atlantic Fringe, particularly Ireland, possibly because of its association with the early church (Lynn 1984). At least eight of the examples Lowe lists have ecclesiastical associations whilst one is from the medieval midden at Kebister, Shetland (Owen and Lowe 1999). The fragment from Brough of Birsay was found with workshop debris, an association that was also noted for some of the porphyry found in Viking Dublin (Lowe pers. comm.). The piece from Bornais is the first to be found in the Western Isles and its location in the Norse middens (CF) may indicate a secular use of this material. A further find of green porphyry was made at Bornais in 2004 and came from the floor of House 2 on mound 2.

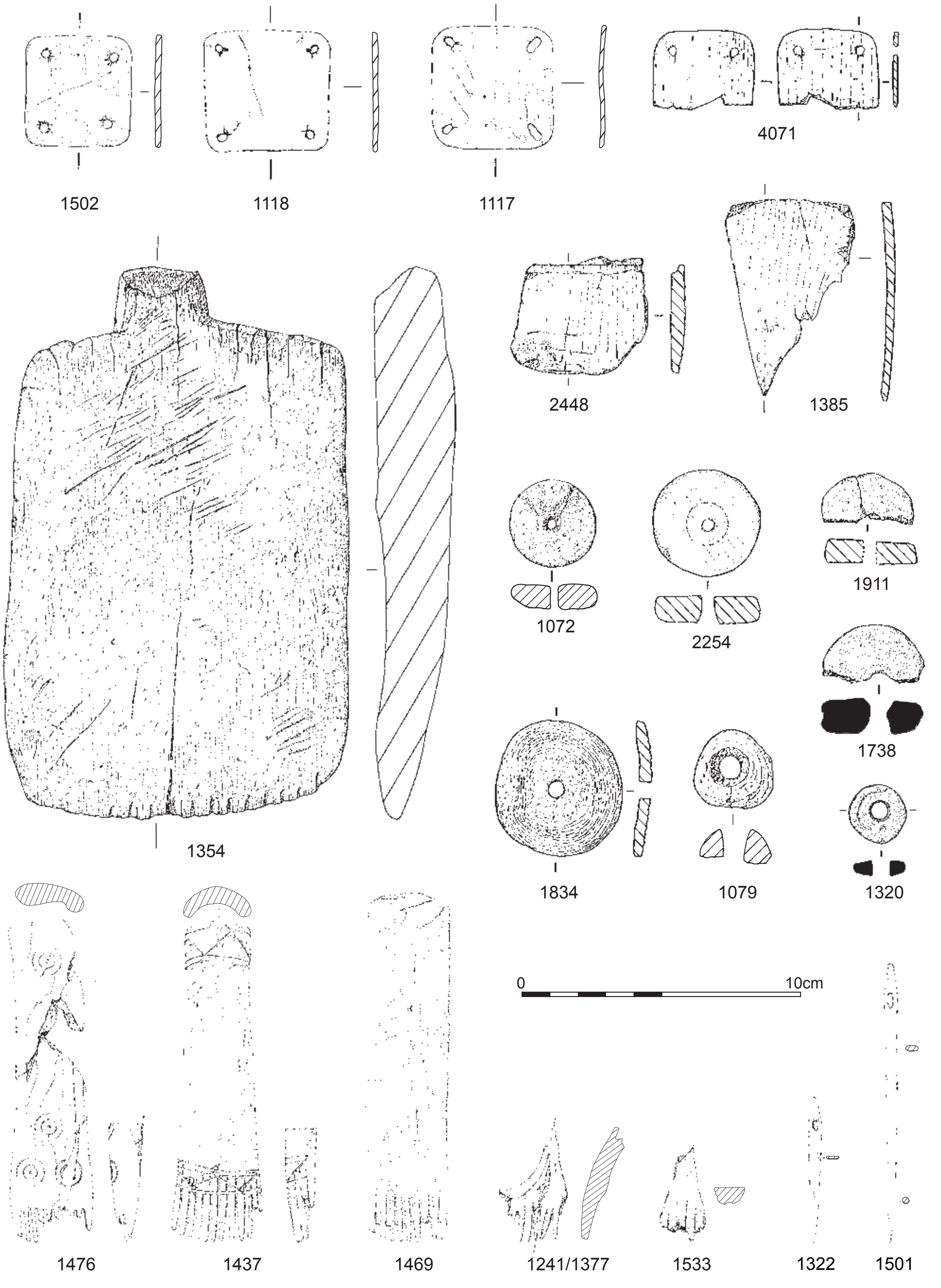


Figure 177. Tools associated with textile production. All bone/antler except 1072, 1911, which are ceramic, 2254 and 1738, which are stone and 1320, which is lead

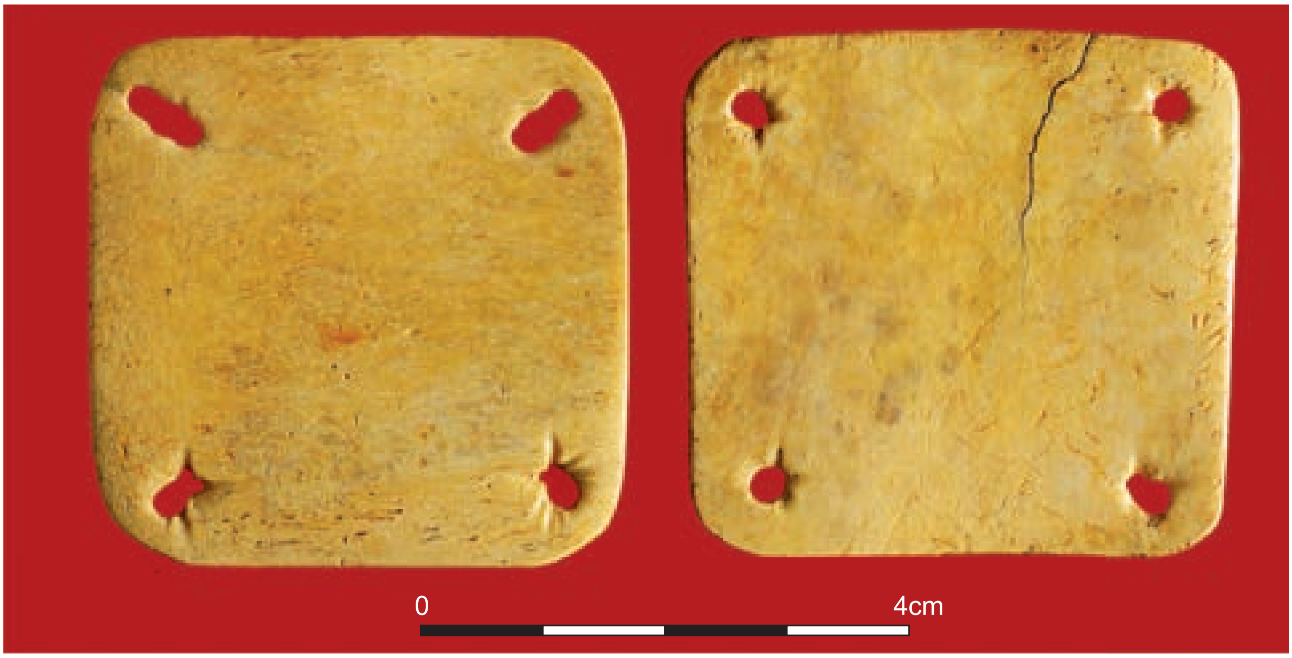


Figure 178. A pair of weaving tablets (1117, 1118) from context 314, block CC

Tools for textile production

The site produced a large assemblage of tools that can be associated with textile production (Figure 177). These were particularly common in the Late Iron Age infill layers where several weaving combs and weaving tablets were found but isolated examples were also present in other contexts of both Late Iron Age and Norse date.

Spinning

Spindle whorls were mounted on to the shorter end of a spindle usually made out of wood. As symbols of female work they appear in many medieval and latter depictions of everyday life (Margeson 1993, fig. 135; Walton Rogers 1997, 1745, fig. 811; Egan 1998, 255–6). Unspun wool was held on a distaff and the yarn was twisted from the wool by hand and attached to the spindle, which dangled and so tautened the increasing length of yarn. During this process the spindle was rotated, a process facilitated by the whorl. The weight and shape of spindle whorls have an influence on the thickness of the yarn produced: lighter whorls spin faster than heavier examples and conical whorls spin more quickly than discoidal whorls (Margeson 1993, 184). The weight of the spindle whorl helps to straighten coarse fibres and produce a firmer yarn. Heavy whorls are useful for plying threads, whilst lighter whorls allow short fibres and fine yarns to be spun (Walton Rogers 1997, 1745).

A total of six spindle whorls were found; one of bone (1079; CF), two of stone (1738; CE and 2254; CB), two of ceramic (1072; unstratified and 1911; CG) and one of lead (1320; CF). The bone whorl has been fashioned from an unfused long bone epiphysis (1079) with a large splayed perforation. A perforated disc made from a centrally perforated cetacean vertebral epiphysis (1834; CG) may be a spindle whorl but is not classed as such in the catalogue. The stone spindle whorls (2254, 1738) are both made from sandstone. The faces have been ground flat and the edge rounded. On one whorl (2254) an incised line has been worked concentrically 5 mm from the perforation on both faces. Both stone whorls are of similar dimensions but the perforation in 1738 is twice as large as that on the decorated piece. All of these whorls are relatively common types found on numerous sites of various dates.

The lead spindle whorl (1320) is a small piece with a plano-convex section and off-centre perforation and is a relatively crude casting. The size and off-centre perforation might indicate that it is not a spindle whorl but a small weight. Lead whorls are known from both early medieval and medieval sites and several more carefully produced triangular-sectioned spindle whorls have been found in Norse contexts on mounds 2 and 2A. Three closely comparable lead spindle whorls were recovered from the late ninth to mid tenth century AD middle Norse horizon at the Brough of Birsay (Curle 1982, 79, illus. 53, nos 504–506). Thirteen lead spindle whorls were recovered from Anglo-Scandinavian contexts at Coppergate, York (Walton Rogers 1997, 1743, fig. 809; Mainman and Rogers 2000, 2530, fig. 1233). No lead spindle whorls were recovered from contexts post-dating the last quarter of the tenth century AD at Coppergate; the significance of this absence is uncertain (Mainman and Rogers 2000, 2530). The Bornais example is notably smaller than those from both the Brough of Birsay and Coppergate, although it does fall within the lighter end of the range of spindle whorl weights recorded by Walton Rogers (1997, 1743). Crudely cast, discoidal perforated weights might have served a number of alternative purposes, such as weighing

Figure 179. The three complete weaving combs (1476, 1437, 1469)

down nets or hangings (*cf.* Margeson 1993, 139, fig. 103, nos 937–938).

Tablet weaving

There are four weaving tablets and two possible tablet roughouts (Figure 177), and all, with the exception of one unstratified tablet (4071), are from Late Iron Age contexts; tablet 1502, 1117 and 1118 (Figure 178) and roughout 1385 are from the infill layers (CC), and roughout 2448 is from the midden (CG). Tablet weaving is a method of weaving that can produce narrow strips or braids, or that can be used to produce integral starting and closing borders on larger textiles woven on a warp-weighted loom (MacGregor 1985, 191–2). The textiles themselves and the tablets used to produce them are known from the Roman period onwards; highly decorative and brocaded bands can be produced using anything up to 52 tablets for one band. Borders for larger textiles could use over 100 tablets. The tablets can be square, as at mound 1, but round, triangular and hexagonal examples are known. Square is the most common shape, with a hole at each corner, often with worn grooves from the threads. Tablet weaving involves passing a warp thread through one of the holes on the tablet; the tablets are arranged in parallel and form the shed through which the weft thread can pass. The shed is changed by rotating the tablets, either in unison in more simple designs, or differentially to produce complex patterns and effects. The tablets from mound 1 have extensive wear on the perforations (Figure 178) and show every sign of having been used for some considerable time. Other sites in Scotland that have produced weaving tablets include Jarlshof, which produced one square tablet among late wheelhouse finds (Hamilton 1956, fig. 39, no. 4) and two circular tablets from early excavations (MacGregor 1985, 192), two circular tablets from Burrian (MacGregor 1974, fig. 10, 147, 148), and one square tablet from the lower Norse horizon at the Brough of Birsay (Curle 1982, illus. 38, 243). The Museum of Scotland displays square examples from Keill and Tain and a roughout tablet from Keiss. The tablets from mound 1 form the first group from the Scottish Iron Age which have good contextual information and can be accurately dated.

Weaving combs

The five single-piece combs from mound 1 (Figure 177) have been included under the heading of textile production equipment, as there is no strong evidence to contradict the traditional identification of these artefacts, and there is some circumstantial evidence (they are found in the same block as the weaving tablets) to support it. Only two examples (Figure 179, left and centre) have any wear marks; 1476 is more heavily worn, showing very fine transverse grooves on the sides and reverse of the teeth (assuming that the decorated side is the front); 1437 shows similar fine transverse grooves but on only two of the nine extant teeth. The wear is slightly different to that found on composite hair combs, which is usually the same on both faces of the comb; the differential wear on 1476 indicates that it was always used with the decorated side upwards. The wear does not rule out use as a thread-beater; the narrow long-handled combs might have been better suited to this use for narrow tablet-woven bands than to use on larger pieces of textile. Tuohy's study of long-handled combs in Britain and north-west Europe supports the identification of smaller, finer combs being used in braid making, although she supposes that the combs were used instead of weaving tablets rather than in conjunction with them (Tuohy 1999, 92–3, 97).

The four most complete long-handled combs are from the infill layers (CC) and only two tooth fragments come from the Norse activity area (CE). Two combs are made of antler and two are made of whale bone, and both include decorated and undecorated types. Suggestions have been made that both material and the presence and type of decoration might have chronological significance but the evidence from mound 1 does not bear this out. Comb 1437 is very similar in shape and decoration to one from Foshigarry, North Uist (Hallén 1994, illus. 14, 6) for which no date is suggested. At the Howe, long-handled combs were found from phase 4 to phase 9 with the majority occurring in phase 7 (Ballin Smith 1994, 178). These combs are also found at non-broch sites such as Pool (Smith in Hunter 2007), where they cannot be earlier than the fourth century AD**,** and at Skaill (Buteux 1997, 111). Long-handled combs did not occur at the Brough of Birsay and it may be that their chronological distribution, like parallelopiped dice, is limited to the Middle Iron Age and the Late Iron Age I period, and they do not occur at sites which only cover the Late Iron Age II/Early Norse horizons.

Since the paper by Hodder and Hedges (1977), only Tuohy (1999) has studied these combs in any depth, and she upholds the perceived differences between the southern British and the Scottish combs. She concludes that the Scottish combs are a distinct and later group, but with one very interesting exception to the pattern. This is a group of combs with ring and dot decoration from the Western Isles which are most closely paralleled by combs from Hadrian's Wall and Newstead (Tuohy 1999, 95).

The Bornais combs are unusual in their careful finish and the elaborate decoration of two examples, 1476 and 1437. The ring and dot decoration of comb 1476 is particularly unusual in an Atlantic Iron Age context. These decorated combs and a couple of combs from Foshigarry and Garry Iochdrach in North Uist are similar to the combs present in England (Tuohy1999). It has been argued that these decorated combs provide a link between the two comb-using regions but this link is undermined by the Late Iron Age dates for the Bornais assemblage. These indicate that the decorated examples from Bornais are later than the simpler combs found at Dun Bharabhat (Harding and Dixon 2000) and Cnip (Armit 2006) and much later than the comparable combs in England.

Flax processing

One whale bone object (1354; Figure 177) from the Norse activity area (CE) can be identified as a flax processing tool. The processing of flax requires a number of discrete stages: *retting* is where the outer bark is rotted to allow access to the inner fibres, and can be done either by leaving the flax stems out in the field and allowing dew and rain to soak them, or by placing the flax stems in running or standing water. Once the outer bark has broken down the next step is *rippling* (drawing the flax through coarse combs to remove seeds), then *breaking*. This involves crushing the outer hull without damaging the inner fibres, either by beating with wooden mallets or using a special frame. *Scutching* then follows, which is the separation of the broken outer stems from the inner fibres; in the historical period this was carried out by laying the stems flat on a board and scraping the fibres clean of debris with a large dentated wooden knife. *Hackling* is the last process prior to spinning and involves the removal of all smaller pieces of debris and short fibres (*tow*), and helps prepare the fibres for spinning by bringing them all parallel to each other, by drawing the fibres through a set of three or four hackles of varying grades, coarsest first.

Hackles from the historical period usually have long iron teeth set into a wooden board or batten. These processes and their associated tools have been named and refined in the historical/industrial period. The tool from mound 1 could have been used both for breaking and scutching, or in a combined process. The ridges cut into the edge would have acted like short teeth and, given the object's solidity and weight, could have acted to both crush and scrape the fibres. A very similar wooden object from Buiston crannog (W591) has been identified as a heckle (Crone 2000, fig. 100, 102–1), but has very short teeth and might also have been a tool more suited to scraping and crushing the fibres than combing them.

An elaborately decorated composite iron and antler comb (1904; Figures 180, 181) may be an example of a heckle. This tool was created by inserting an iron strip with six surviving teeth into a slot at the base of a very flat plaque of antler; there is room for about 12–14 teeth in the original comb. The front of the comb is flat and is

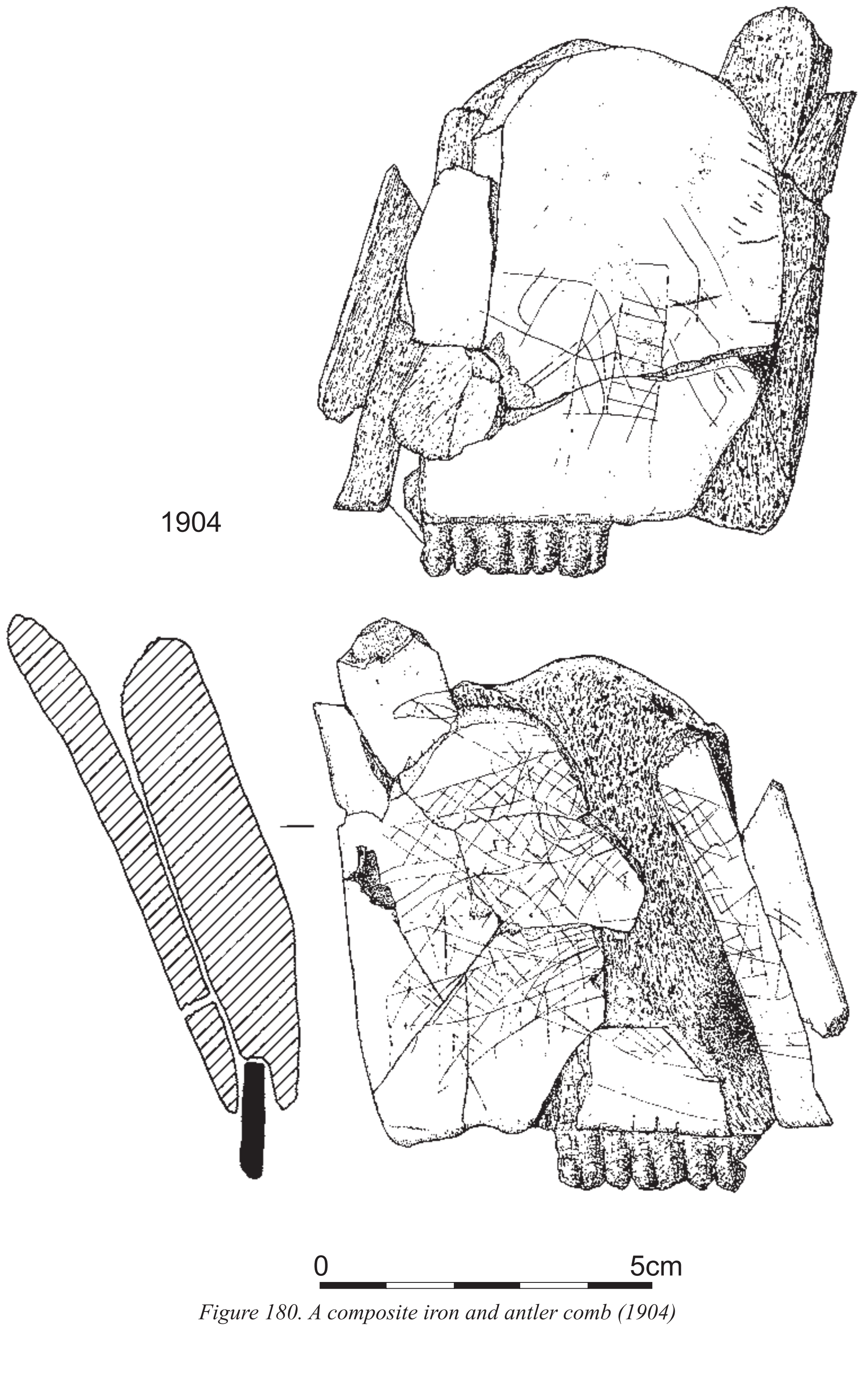


Figure 180. A composite iron and antler comb (1904)

almost completely covered in incised lines which appear to be arranged in bands, though these are over-inscribed by incised swirls. The back of the comb has a slight curve and a more limited area of decoration. It was found at the north-west edge of the Late Iron Age house floor layers (CB) and is burnt and heavily fragmented.

Other tools

Knives

Knives are difficult artefacts to typologically classify and date, even when recovered complete, because of the inevitable changes to their original form caused by

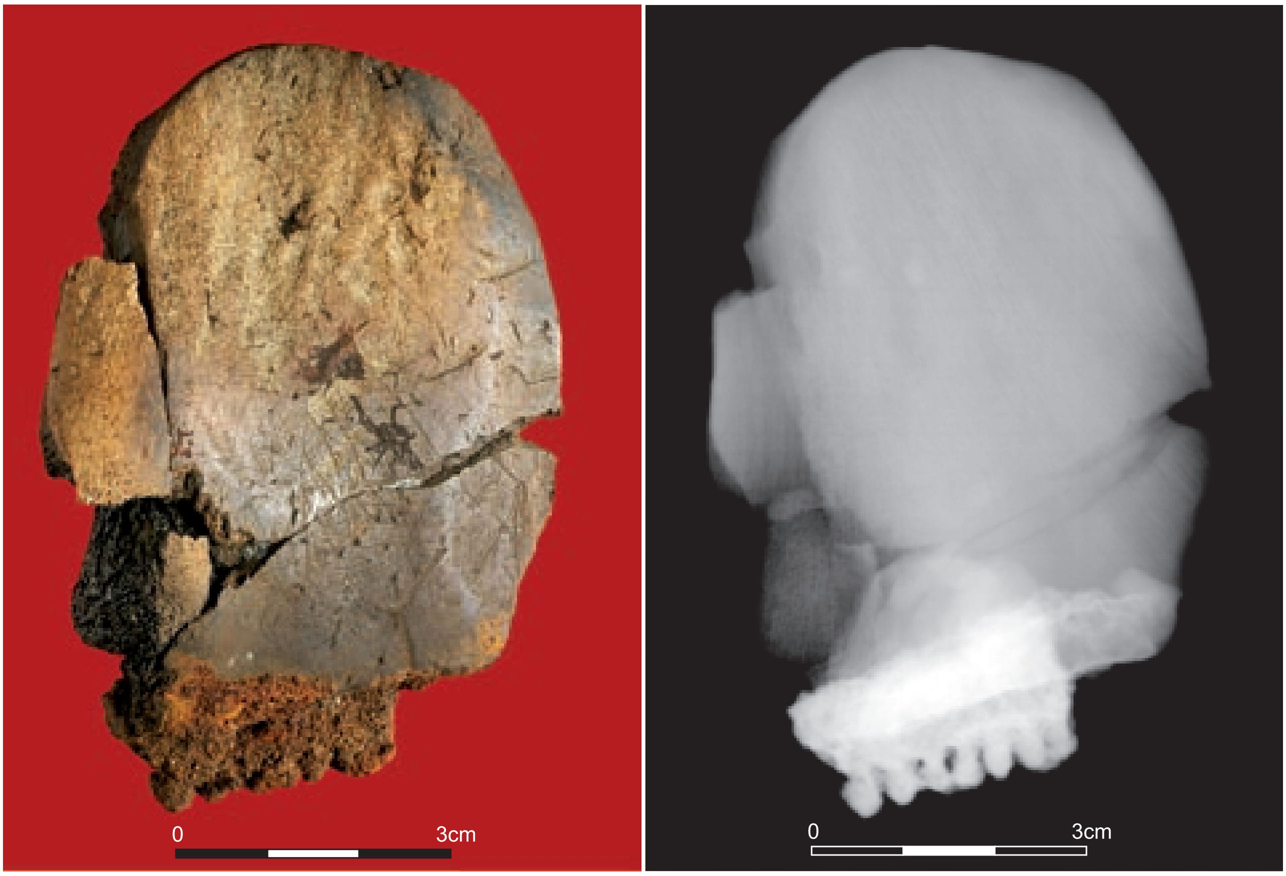


Figure 181. An X-ray and photograph of the composite iron and antler comb (1904)

sharpening and wear. Consequently it is not possible to closely date the examples from mound 1 on the strength of the parallels cited below. Knife 1096 (Figure 182), from the Norse midden (CF) is an example of Ottaway's Group D (1992, 559), similar in form to an Anglo-Scandinavian example from Coppergate (Ottaway 1992, 573, fig. 235, no. 2963). Knife 1539 (Figure 182) is probably a small example of Ottaway's Group D knife (1992, 572); however, it is possibly the blade from a small pair of shears. Given the relative thinness of the tang it is possible that it forms part of a scale tang rather than a whittle tang. There is also a possible fragment (1110) from a narrow, tapering blade. Both the latter two pieces were unstratified.

Points

Sixteen bone points of various forms have been identified (Figure 182). These come from all of the main blocks, both Late Iron Age and Norse. The majority are made from sheep-sized long bones; they include examples that retain an articular end and can thus be identified as tibias or metapodials and others where all trace of the diagnostic features have been removed. The size of these objects ranges from fine bone points (*e.g.* 4788; CG) to relatively broad spatulate implements (*e.g.* 4784; CG). Objects comparable to these are common on Atlantic Iron Age settlements and they could have had a range of functions. Some of the Bornais examples are relatively unused (*e.g.* 4785; CB), others are heavily worn and polished through use (*e.g.* 4784).

Three unusual objects have been included as points though they could be reclassified as pins or pegged playing pieces. 1880 (Figure 182) from the House 2 floor (397) is a short cylindrical section of antler in which an iron pin has been inserted. This is a relatively crudely shaped piece of antler and it seems too simple to be a decorative pinhead. If the iron point survives to its original length then this could be a small awl. 2244 and 2400 are both made from hollowed sections of sheep long bones into which a sliver of bone has been laterally inserted (the point of 2400 is broken off). Both are from the Late Iron Age house (CB). Campbell (1991, 158, illus. 21) has interpreted comparable objects from Sollas as gaming pegs rather than pinheads.

Perforated metapodials

Three sheep metapodials (1171, 2017, 2548; Figure 187) were found with lateral perforations through the centre of the shaft. These objects are normally interpreted as bobbins (Ballin Smith 1994, 171) but Hallén (1994, 216) has also provided alternative interpretations as toggles

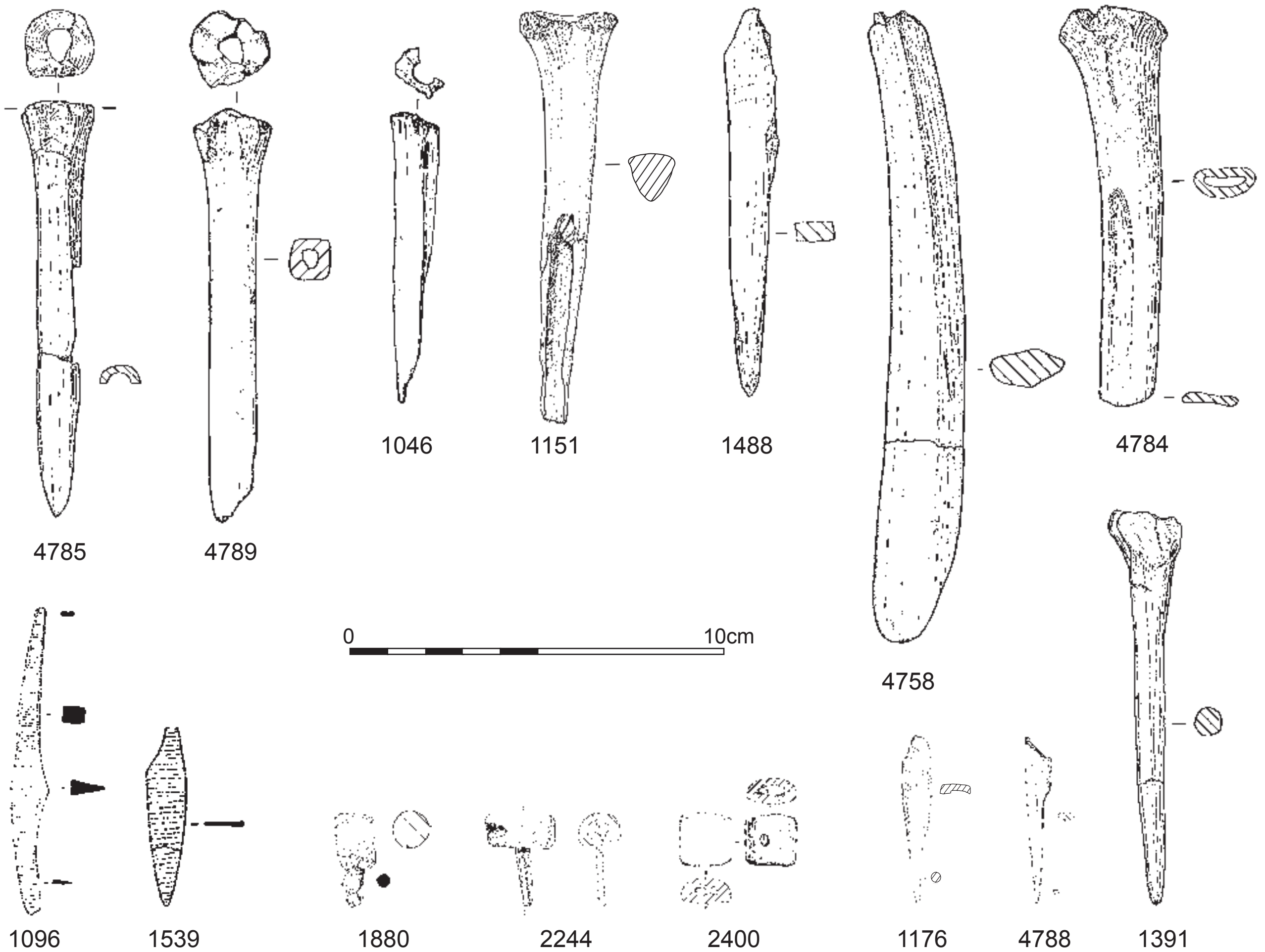


Figure 182. Bone points, a composite antler and iron point (1880), bone pin heads (2244, 2400) and iron knives (1096 and 1539)

for fastening clothes and as children's toys. Examples are found throughout Atlantic Scotland from Jarlshof, Shetland (Hamilton 1956, fig. 37.6) to Bac Mhic Connain, North Uist (Hallén 1994, 216). The Bornais examples are all Late Iron Age in date and two came from the house (CB).

Grooved long bones

Five grooved long bones (1891, 4772, 4774, 1512, 1387) and one comparable grooved antler tine (1508) were found (Figures 183, 187). The grooves indicate rotary motion around the centre of the long bone that must be related to their function. Several of the examples are very heavily worn and all are broken. These objects are quite different to the large turned fragments of antler found at Dun Vulan (Parker Pearson and Sharples 1999, 217) and Sollas (Campbell 1991, 158) which are sensibly interpreted as quern handles. The Bornais examples are much too fine to be quern handles and, furthermore, the wear appears to be centrally located on the long bone. A possible interpretation is that they are thong stretchers or bow drills (MacGregor 1974, 76; Hallén 1994, 217). On one example (1512; Figure 183) individual grooves are quite clear and suggest a twine 1.5 mm wide was being pulled. All but one of the objects came from Late Iron Age contexts; the exception came from the Norse activity area (CE) and could be residual.

Miscellaneous whale bone objects

There are a group of distinctive whale bone tools, most of which were associated with the use of the Late Iron Age house (CB) (Figure 184). The one Norse piece (scutcher 1354) has been discussed above with the textile equipment. The pieces include a bar or adze (2091), a triangular plate (1918), a spoon (1491/1472), two unfused vertebral epiphysis discs (1812, 1495) and a rib fragment (1771) possibly used as a door pivot. The first three objects were burnt black during the destruction of House 1 (CB), the pivot came from the sand layer covering the hearth (CC) and the spoon and the discs came from the infill layers (CC). None of them has a particularly clear function. The position of the adze lodged in the roof timbers suggests it may be associated with the construction of the roof and Sharples would like it to be a tool used to trim turves used in the roof. It is similar to the large wedge found at Sollas

Figure 183. Grooved long bones (1512 and 1387)

(Campbell 1991, illus. 20) though it does not have the extensive polish through use found on the Sollas example. The two whalebone discs could be pot lids. The bone spoon (1491/1472) is unfortunately broken but the identification seems secure. It has a flat bowl and is therefore unlikely to have held any fluids which makes it comparable to the examples known from Scalloway (Smith in Sharples 1998b, 153) and Buckquoy (Brundle *et al.* 2003, 98). Both of these examples, however, are quite fine objects made from animal bones. The Bornais spoon has also been decorated with crudely incised lines on the handle which are not present on the other examples.

Miscellaneous antler tools

Two antler picks or hooks were found in the infill deposits (CC, Figure 185). Both have been made from shed antler but the smaller example (1758) has had the burr trimmed away and the surface is heavily worn, particularly around the perforation through the beam. In contrast the large example (1141) is relatively unworn. The second tine is broken rather than cut as is the top of the antler. Only the heavy wear around the relatively square tip of the brow tine indicates use. Antler picks are known from Iron Age contexts in Atlantic Scotland but they are not common. Several examples were recorded at the Howe (Ballin Smith 1994, 179, illus. 102) and several examples have been found at the earlier Late Bronze Age/Early Iron Age settlement at Cladh Hallan (Parker Pearson *et al.* 2000). It is unclear what these tools would have been used for in the Hebrides. They are too fragile to have been used on the hard metamorphic rocks of the underlying geology and there is little evidence for chipping or flaking of the tines. Digging in the sand might explain the smoothed worn surface of the tines but their shape does not seem particularly suited for this task.

4787 (Figure 185) is a fragment of a rectangular cut section of antler beam with a large lateral perforation that has weakened the object and caused it to break. Several similar objects were found at Foshigarry (Hallén 1994, illus. 8, 1, 6 and 7) where they are interpreted as hafted implements or mounts. The Bornais object comes from the Norse activity area (CE).

Miscellaneous bone tools

A couple of bone objects were found which are difficult to classify. 4786 (CE; Figure 186) is a fragment of a large mandible, which has been trimmed and ground to create a straight shovel-like edge. Other objects include two idiosyncratically perforated bones (1185; CC and 1251; CF) and a small polished fragment of flat bone (1197; CC; Figure 187) with odd striations along one edge which suggest it might have been used as a scraper.

Handles and socketed antler

There are a variety of different object types that appear to have been used as handles (Figure 187). Nine of these are cylinders, solid and hollowed, made largely from antler (4776, 4779, 2011, 2175, 1902, 1423 and 1123) but including two made from bone (1966, 1471). These all come from Late Iron Age contexts in the house floor deposits (CB) or the infill layers (CC) and they are mostly burnt and fragmentary. The ends have been either cut straight across or rounded and several have smooth glossy

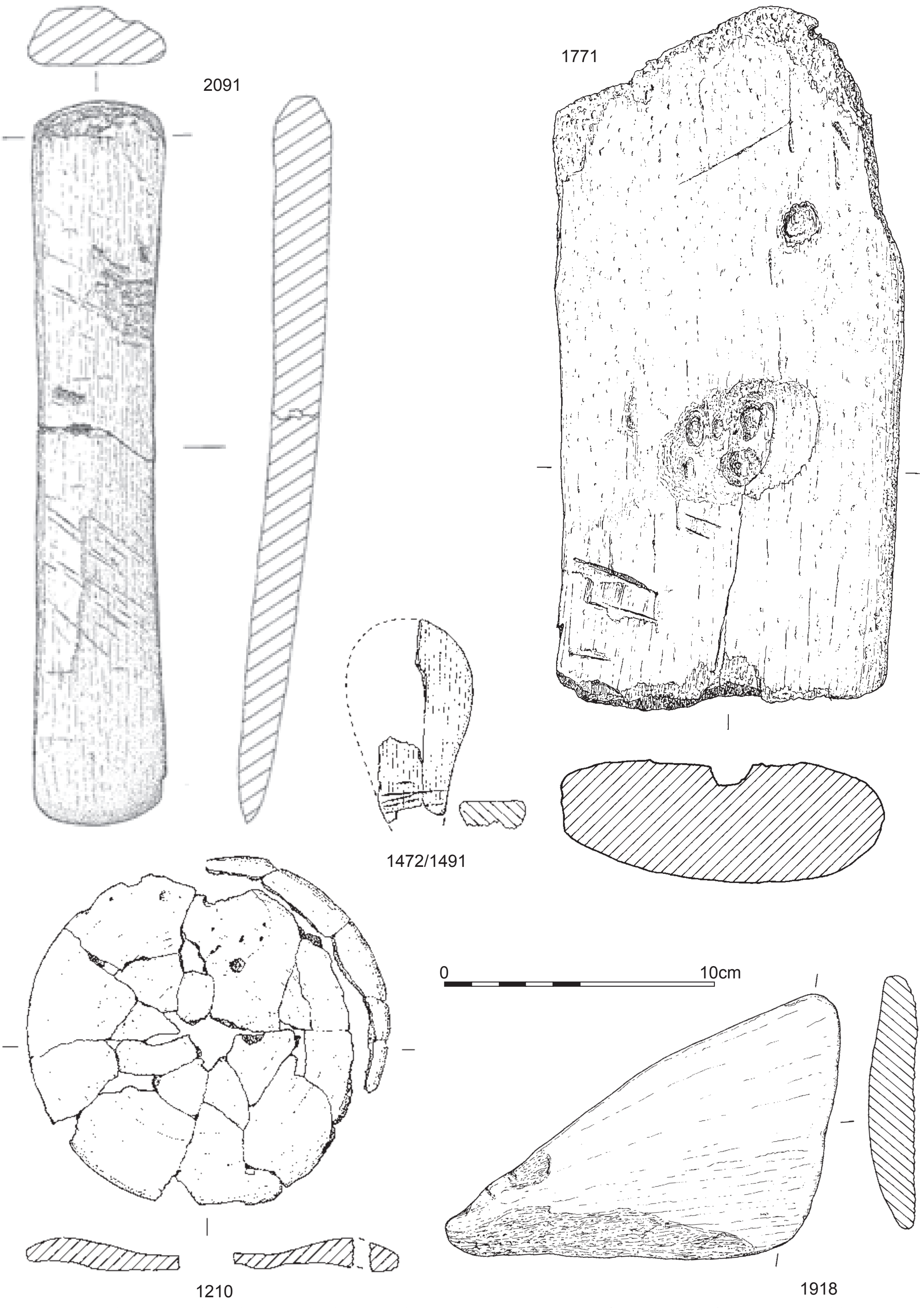


Figure 184. Miscellaneous whale bone tools: bar or adze (2091), a spoon (1472/1491), a rib fragment possibly a door pivot (1771), an epiphyseal plate (1210) and a triangular plate (1918)

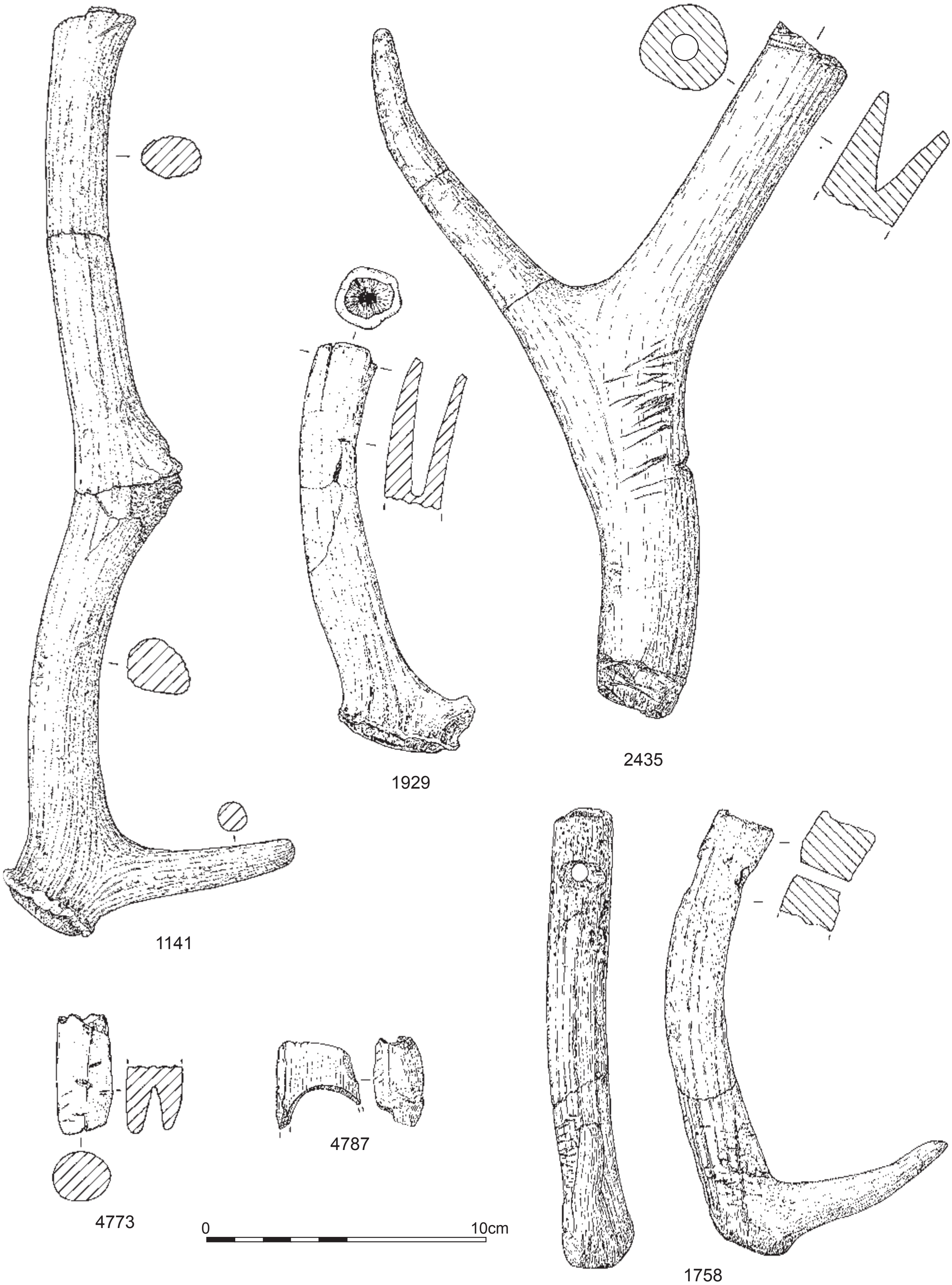


Figure 185. Miscellaneous antler objects: pick (1141), socketed handles (1929, 2435 and 4773), mount (4787) and hook (1758)

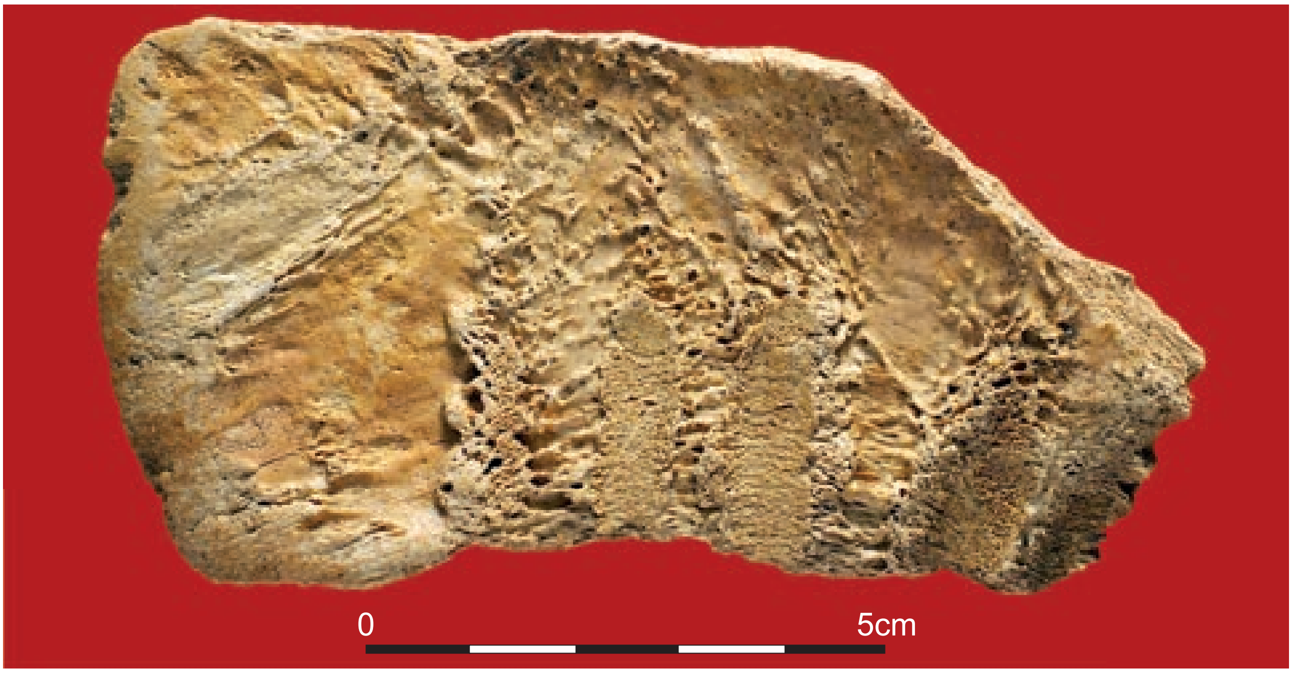


Figure 186. A fragment of a cattle mandible used as a blade (4786)

surfaces indicating heavy use. Objects similar to these have been found at Bac Mhic Connain (*i.e.* Ballin Smith 1994, illus. 97; Hallén 1994, illus. 12, 3 and 6)

A very different group of material is comprised of the five relatively unmodified pieces of antler beam which have been chopped and had an end hollowed out to create a V-shaped socket (4773, 1929, 1760, 1406, 2435). These are very roughly modified pieces that were originally categorised as antler waste. They have cut marks across the surface and there is little evidence for polish through use. There are some large pieces with attached tines (2435; Figure 185) and burr (1923; Figure 185) and there are some small broken pieces (4773; Figure 185). They are all from Late Iron Age contexts. It is difficult to know what these pieces were for, or how they could have acted as handles for any significant tool, given the shallow depth of the socket and the absence of any rivets or metal stains.

There were also one complete (1793; unstratified; Figure 187) and one fragment of perforated antler plate (1233; CC). The broken pegs are still present in the two peg holes of 1793. These are probably side plates for socketed handles and again are relatively well known in Atlantic Scotland with examples from Foshigarry (Hallén 1994, 221) and Gurness (Hedges 1987, figs 2.17–2.19).

Axially pierced metapodials

One of the most enigmatic artefact types from Bornais are the axially perforated sheep metapodials. Seven of these bones were found (1947, 4778, 4781, 1548, 5810, 5812, 2614; Figure 187). Three of these were found in the destruction layer (457) and their blackened condition makes it clear that they were in the wheelhouse when it burnt down. Two others came from the infill layers (CC) and the midden (CG) and confirm that these objects date to the Late Iron Age activity. The bones have been carefully drilled through the epiphysis, one of the hardest parts of the bone, and it seems very unlikely that this was related to the extraction of marrow which is routinely extracted by fracturing the bone in the mid-shaft area. It would also not explain the polish found on 1947 and 4781 which appears to be the result of repeated handling. The proximal surface of 1947 is also heavily worn around the hole and the articular facets have completely disappeared. O'Connor (2000, 47) notes an account by Arge of the contemporary Faroese tradition of piercing the metapodials in order to blow the bone marrow straight into a mouth of a child but this is probably not an explanation for these pieces as the one complete example has no evidence for a perforation at the distal end. Perforated cattle metapodials are recorded from Norse contexts at York (MacGregor *et al.* 1999, 1990, fig. 946) but these have the shafts shaped into rough points and seem to be quite different. The best explanation may be that these perforated bones are some form of handle; this would explain the polish that appears on the shaft.

Cobble tools

Cobble tools are the most common stone artefacts at Bornais and six separate tool types have been identified (see Table 99). Faceted cobbles and pounder/grinders differ from each other in terms of size of cobble and extent of wear traces. The pounder/grinders tend to be the largest cobble tools (>100 mm long and 50 mm wide) and are ovoid in shape though one elongated tool is pestle-like in shape and has ground rounded ends (1412; Figure 188).

Cobble tools	CB	CC	CG	CD	CE	CF	US
Faceted cobble	15	11	-	-	2	-	6
Pounder/grinder	12	5	-	-	1	-	2
Smoother	10	9	-	1	1	-	1
Polisher	5	4	-	-	-	-	1
Plain hammerstone	4	2	3	-	-	1	-
Flaked hammerstone	1	1	-	-	-	-	-
Total	47	32	3	1	4	1	10
Unused cobbles	17	3	2	-	1	2	3

Table 99. Composition of the cobble tool groups from the house floor

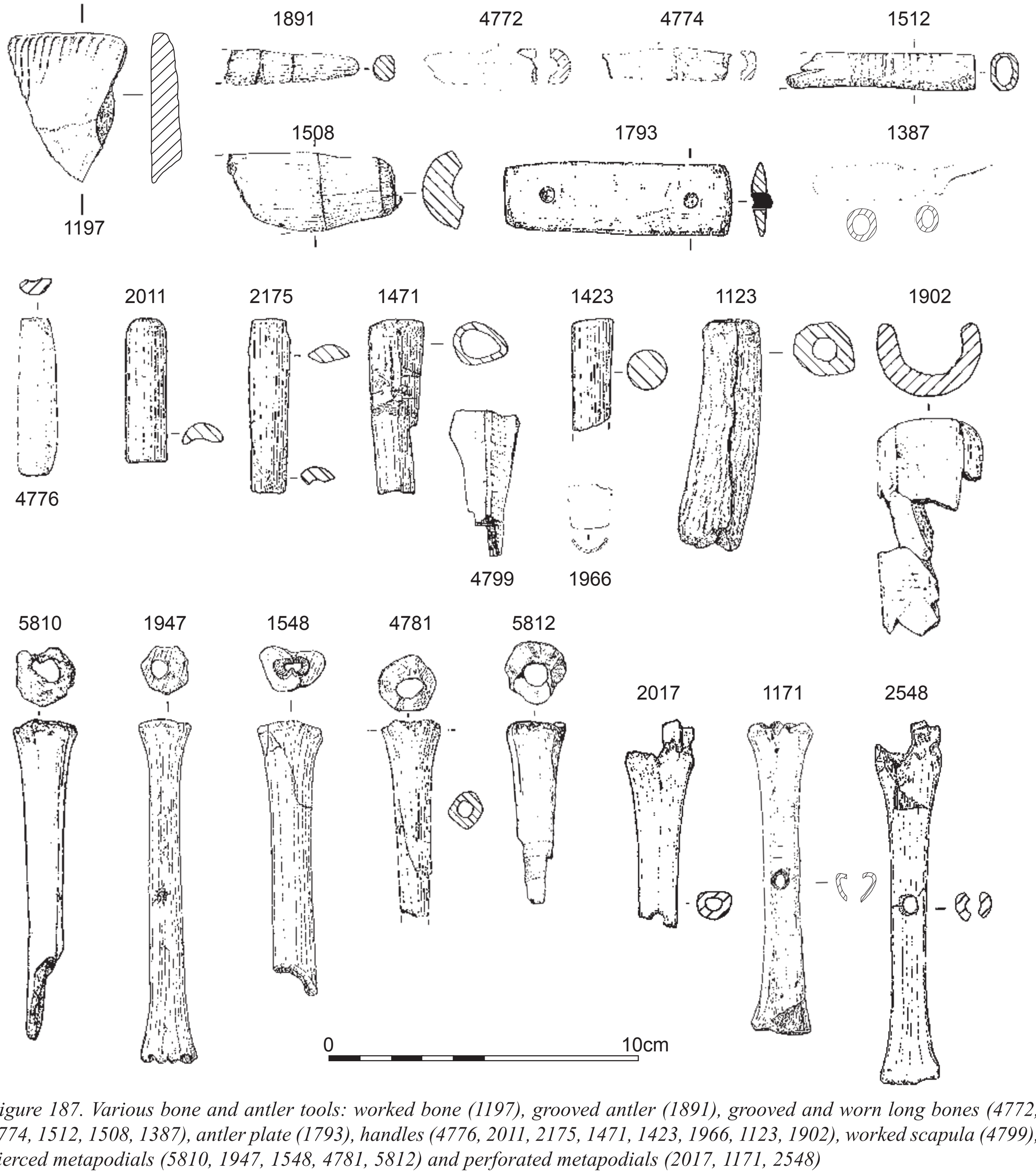


Figure 187. Various bone and antler tools: worked bone (1197), grooved antler (1891), grooved and worn long bones (4772, 4774, 1512, 1508, 1387), antler plate (1793), handles (4776, 2011, 2175, 1471, 1423, 1966, 1123, 1902), worked scapula (4799), pierced metapodials (5810, 1947, 1548, 4781, 5812) and perforated metapodials (2017, 1171, 2548)

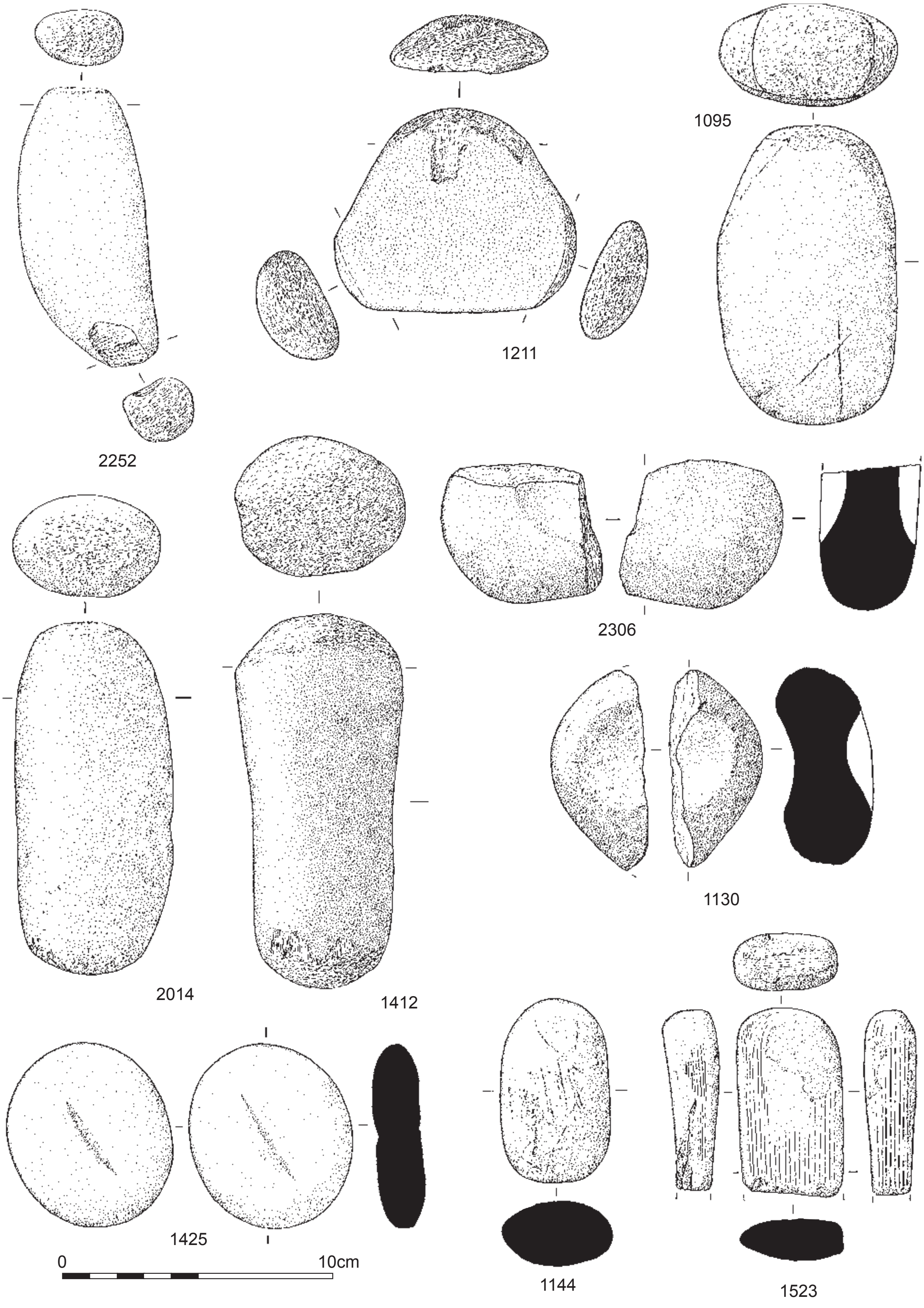


Figure 188. Stone tools: faceted cobbles (2252, 1211, 1095), pounder/grinders (2014, 1412), counter-sunk hollowed stones (2306, 1130), strike-a-lights (1425, 1144) and whetstone (1523)

The faceted cobbles are usually shorter and narrower than the pounder/grinders. The wear patterns on the ends of the pounder/grinders vary in the combination of rough and smooth facets but there is no single combination that occurs most frequently as the pounder/grinders divide almost equally between those with rough facets on either end (*e.g.* 2014; Figure 188), smooth facets on both ends (*e.g.* 1374), or those cobbles with one rough and one smooth end. The faceted cobbles tend to have smaller and smoother facets than the pounder/grinders (2252, 1211; Figure 188).

Another feature of both of these tool types is the worn face that is present on most of the complete, unweathered cobbles. Here the face is worn smooth, sometimes with a remnant polish or gloss residue and occasionally striations are visible on this worn face. One particular faceted cobble has ground facets that continue part way down either side (1095; Figure 188). The symmetry of this grinding suggests that it is deliberate shaping, perhaps for hafting – the opposite end is heavily pecked. A similar stone tool was found at Minehowe, Orkney, though that object is slightly longer and thinner with the opposite end more heavily damaged by bifacial flaking.

Another tool type, the smoother, is characterised by a cobble with a worn face, similar to that occurring on the pounder/grinders and faceted cobbles but more often the original face of the cobble has been altered through use to a flat cross-section. Finally, the polishers are amongst the smallest in size of the cobble tools and usually bear a highly polished face or faces.

The plain hammerstones are simple forms, usually with just random flaking or pecking over the surface of the cobble. The variety of wear traces included in this group does not conform to the more standardised patterns noted above; this may be because the plain hammerstones have just been used in passing for no specific job or else they may have been only lightly used and are undeveloped forms of the above types. Many of these are cobbles of gneiss that are in a state of decay sufficient to obliterate any potential wear traces. Given the close spatial association of these decayed cobbles with other cobble tools (see above 85) it is likely that they were indeed used as a tool but the wear patterns have since been removed by weathering.

Strike-a-lights

The six strike-a-lights are flat, rounded pebbles of quartz. On four pebbles simple brown streaks are present on the surface, most likely rusty iron residue from casual use of the pebble to strike sparks (1144; Figure 188). One strike-a-light is heavily worn (1425; Figure 188) with a single V-shaped groove worked in the centre of each face. Four came from the Late Iron Age house (CB), one from the infill layers (CC) and one from the Norse activity area (CE).

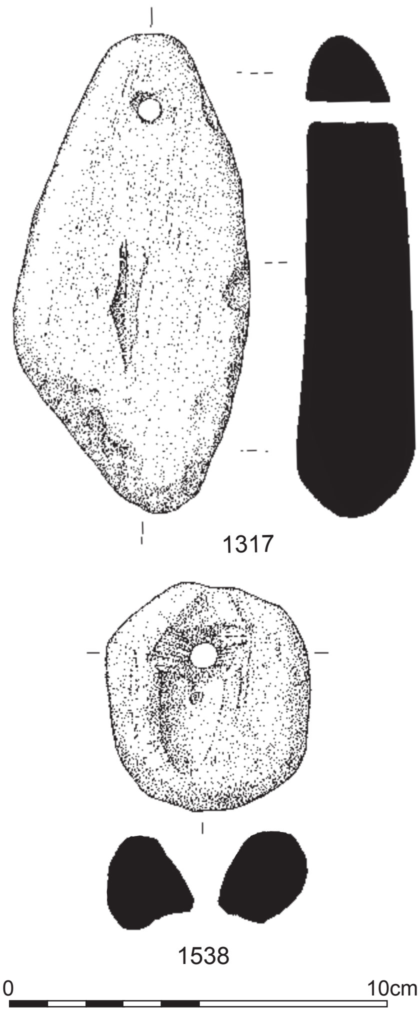


Figure 189. Steatite weights (1317 and 1538)

Anvils

The two anvils are of similar shape and dimensions. They are sub-pyramidal cobbles of gneiss presenting five flat faces. Though not heavily worn, some of the faces have traces of pecking on them (1439) and one face (1388) has been worn to a smooth concave finish. These are both likely to be associated with the Norse activity area (CE).

Counter-sunk hollowed stones

Both of these stones (1130, 2306; Figure 188) are fragments and in each case breakage has truncated two single, smooth hollows that have been pecked on opposite faces. The function of these worked stones is unknown but both were found in Late Iron Age contexts (CC and CG).

Whetstones

The whetstone is a simple form made on a sandstone cobble (1523; CC; Figure 188). It has been worn to a

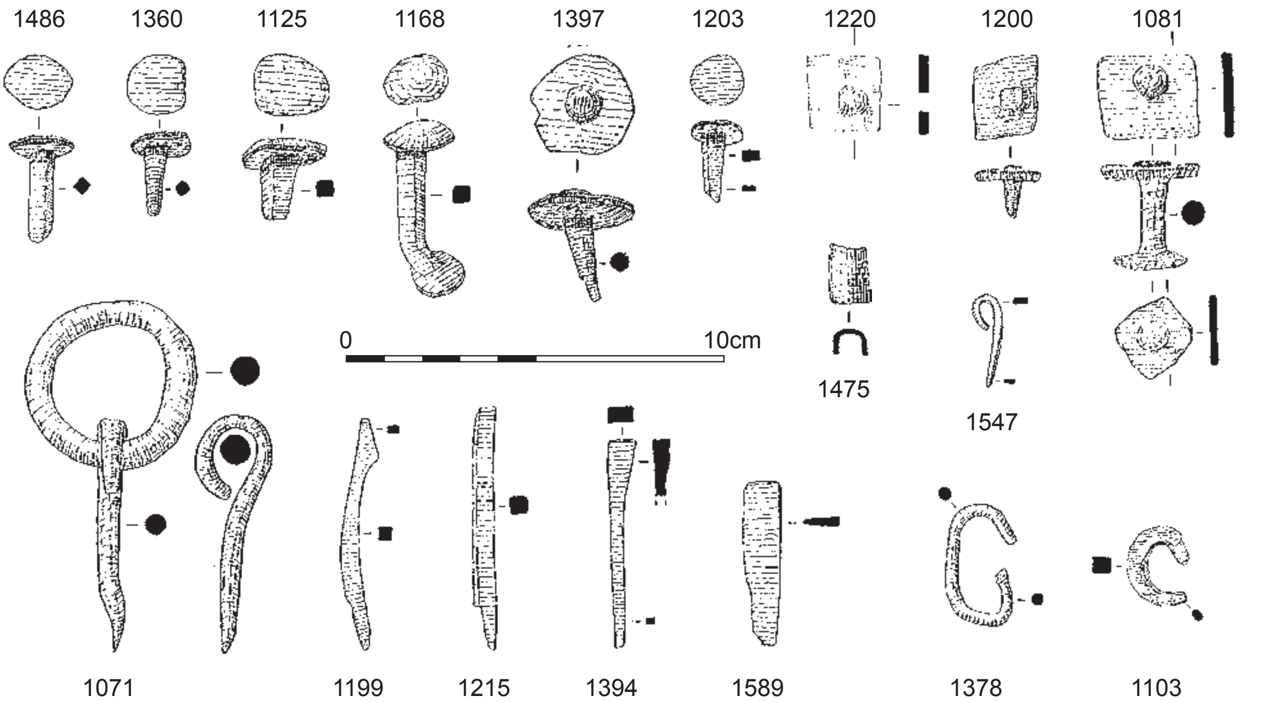


Figure 190. Iron nails (1486, 1360, 1125, 1168, 1397, 1203), roves (1200, 1220), holdfast (1081), snaffle bit (1071), strips (1199, 1215, 1589, 1475), horseshoe nail (1394), buckle (1378), buckle tongue (1547) and ring (1103)

sub-rectangular cross-section with skewed faces and an all-over polish.

Weights

A perforated steatite cobble (1317; unstratified; Figure 189) is either a perforated whetstone or else a weight re-used as a whetstone. It is sub-rectangular in shape and bears a narrow, bored perforation at one end. One face has been worn to a concave cross-section with longitudinal striations and a deep V-shaped groove worn in the centre. Given that Norse whetstones are usually light, narrow, rectangular forms, for example those from Skaill and Brough of Birsay (Buteux 1997, Curle 1982), it is likely that at Bornais a perforated weight was re-used as a whetstone rather than deliberately fashioning a whetstone from this larger cobble. Another instance of re-use is an unstratified steatite mould that has been re-worked as a weight (1538; Figure 189). Here the steatite is quite crystalline and may not be from the same source as the steatite vessels. It is a squared block which was a mould for a U-shaped bar. It was subsequently perforated at one end by gouging with a metal implement from both faces.

Structural fittings

The assemblage contains 14 definitely identified nails, two probable nails and 11 strips which are possible nail stems (Figure 190). Where identifiable all are of a flat-headed or roughly flat-headed form. Flat-headed nails are a common type; for example, they formed the vast majority of the nails recovered from the Coppergate excavations, York (Ottaway 1992, 607). None of the nails are complete; their surviving lengths vary from 11 mm (2570) to 53 mm (1669**)** and their poor preservation and small number prevent any sophisticated statistical analysis. Where complete, the shape of most of the nail heads ranges from sub-rectangular to rectangular; there is one with a diamond-shaped head **(**1486). The stems are all rectangular in cross-section and their thickness varies from 5 mm (1360) to 9 mm (1125). Where identifiable, six of the nails' stems are set centrally on the heads (1486, 1080, 1125, 1397, 1490 and 1187) and two are slightly off-centre (1168 and 1203). Flat-headed nails were used mainly in furniture, such as boxes and chests, but also served as architectural fittings (Ottaway 1992, 613). It is possible that several of the nails were originally used with roves to form holdfasts.

The assemblage contains one holdfast (1081), six definite roves (1091, 1124, 1200, 1207, 1220, 8622) and one possible rove (1101). Holdfasts, or clench bolts, are fittings consisting of a nail and a perforated plate (rove) which are used to join two timbers. The nail is hammered through the timbers, the rove is then placed over the protruding end of the nail, the surplus length of which is cut off before it is hammered over. This arrangement prevents the nail from pulling back through the wood. Although several diamond-shaped roves were recovered during the excavation of mound 2, both the holdfast and the six definite roves from mound 1 are all rectangular in shape. If correctly identified, the possible rove (1101) is probably diamond-shaped.

Holdfasts are known from a variety of Romano-British

(Manning 1985, 132–134), early medieval (*e.g.* Ottaway 1992, 617–18) and medieval (*e.g.* Goodall 1993, 146–7, fig. 108; Scully 1997, 474, fig. 15:14.11; Ottaway and Rogers 2002, 2830, fig. 1408) sites. Although commonly associated with shipbuilding, holdfasts are also known from a range of timber objects and features such as doors, partitions, hatches and carts (Ottaway 1992, 618; Lyne 1996, 149). The holdfast and all of the roves were recovered from contexts associated with the Norse middens (CF). Consequently, it is uncertain whether the Bornais holdfasts represent evidence for shipbuilding at the site, the reuse of wood from ships either as fuel or as timber, or the use of holdfasts as non-maritime fittings.

Miscellaneous metal objects

The remaining two pieces of copper alloy consisted of a finely cast, rectangular-sectioned tapering rivet with a burred end (2779; CB) and a small triangular-shaped fragment of cast plate, which terminates in a raised moulding (1121; CC). The rivet is comparable to rivets from Iron Age contexts including those used to fix stop-studs on several of the rein-rings from Llyn Cerrig Bach, Anglesey (Fox 1946, nos. 50–53, 129; Macdonald 2007, nos 10–11, 15–16, 20).

The miscellaneous iron fragments include a ring (1103; unstratified; Figure 190), a perforated rectangular-shaped plate fragment, which is probably a binding strip (4700; CC), three bar fragments, seven plate fragments, one of which may be a decorative mount or fitting (4690; CB), six strips and five amorphous fragments (two of which have been mislaid).

The slag – T Young

The deposits of mound 1 are rich in material that might be termed 'slag', some of it occurring in large pieces of over 100 mm. None of this material, however, appears to be derived from metallurgical processes but is rather the product of reactions between iron-bearing peat ash, the calcareous sands of the machair and, in some instances, fragments of rock, within hearths and ovens. The term 'fuel ash slag' is commonly applied to materials of this general origin, although the actual contribution from the inorganic ash component of the fuel may be only a minor, if important, component of the slag. Such materials have not been described in detail in existing literature.

Microscopic and fine-grained slag materials were previously described from mound 3 (Young 2005), where they occurred in association with a domestic hearth and with a corn-drying kiln. Rather similar microscopic materials occur widely on mound 1 but were seen particularly in the Late Iron Age house (CB) where they were associated with a large hearth. In contrast, material from Norse horizons on mound 1 is characterised by slag occurring in larger blocks, most comprising rather friable, sintered material, but also including some denser material, which has a higher proportion of melt. It is suggested that these larger slag pieces were produced through similar reactions to those producing the microscopic residues, but on a larger scale, and with high temperatures being maintained for a longer period of time. The maintenance of high temperatures over extended periods allowed for slags to be generated through sintering of the sand into which the hearths were cut, as well as through reaction of sand contained within the peat fuel, which was likely to have been a major source of the silicates in the slags in the previously-described microscopic assemblages from mound 3.

Distribution

Slag was recovered from most of the sieved residues deriving from floated samples taken on mound 1, occurring in 71% of 204 samples from Iron Age horizons and in 19 samples from Norse contexts. Slag fragments in the sieved samples only rarely exceed 3g and much of the assemblage is represented by collections with an average slag particle of 0.04g.

The distribution of slag particles in the sieved residues from the closely sampled Late Iron Age house deposits on mound 1 (CB) shows a strong control by the position of a large hearth. This is illustrated in Figure 191 for contexts 397 and 482 (397 is the floor for the second Iron Age house, CB, with 482 the pit dug for the hearth construction). The overall bulk quantity of slag and the weight of slag per litre of sediment both show elevation close to the hearth. A similar distribution can be seen in equivalent measures of charcoal and burnt organic matter distribution (Figures 48, 49). Unlike the mound 3 granary floors, the surfaces around the hearth did not yield a slag component greater than 10mm on sieving.

In contrast, the deposits associated with the Norse activity area (CE) include a significant proportion of coarse-grained slag material (ranging up to >100 mm). The first significant appearance of a coarse fraction is in a light brown sand (372, 400; total 1.7 kg) overlying the Iron Age features, but grouped with the Norse features which cut it. The main concentrations of coarse material occur in pit 389 (373; 0.4 kg), pit 355 (379, 390, 403, 416; total 12 kg) and a sand deposit lying over the pit (371, 374, 382; total 4.9 kg). The occurrence of slag in these features is interpreted as linked to the hearth pits. A small amount of coarse slag also occurs in the Norse midden deposits (*e.g.* 395).

Description

Macroscopic slags: general description

The macroscopic slags from mound 1 mainly comprise friable, sintered sand, with occasional fragments of gneiss, mixed with varying proportions of flowed melt. The melted

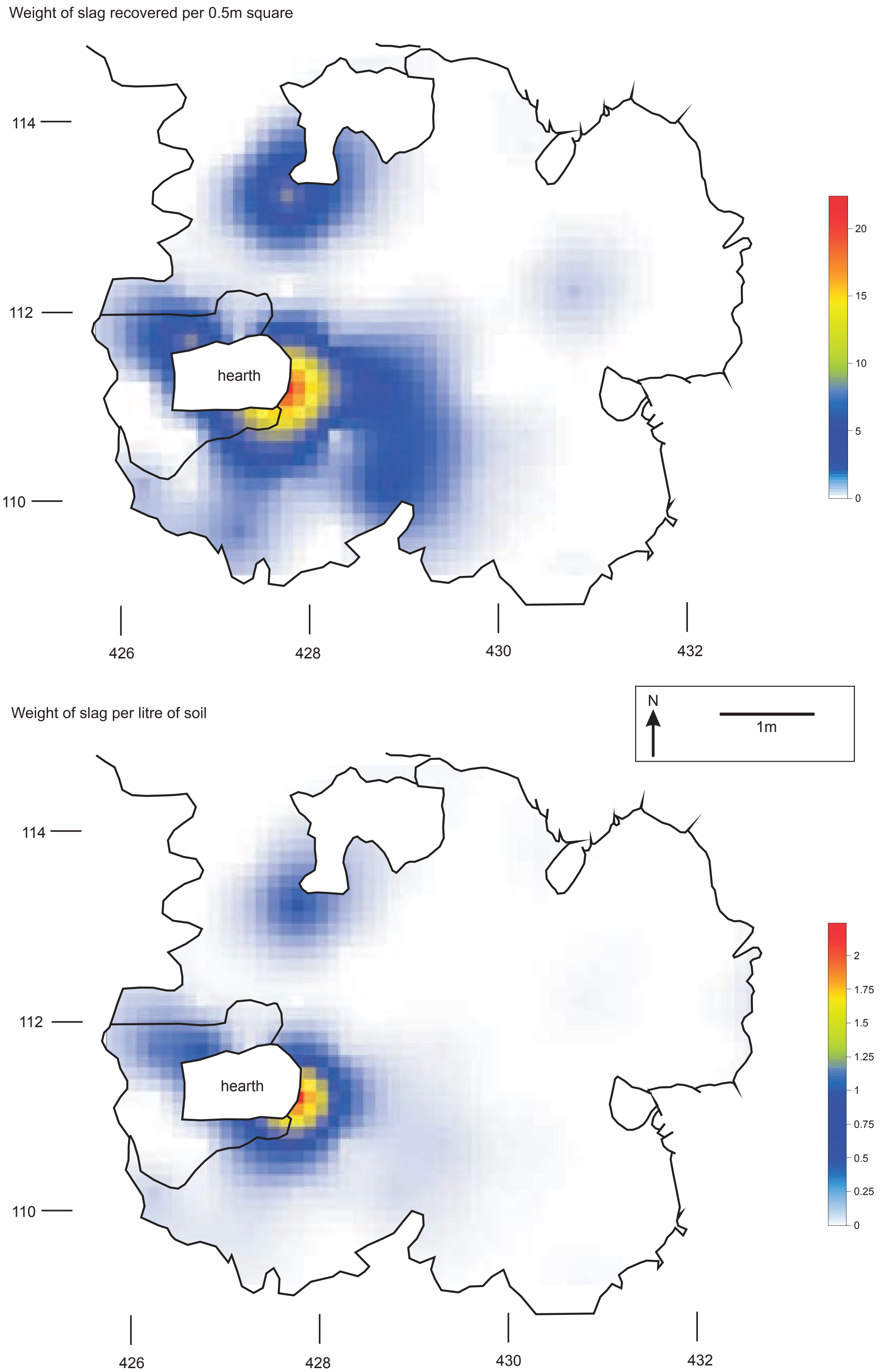


Figure 191. The distribution of slag in the house 2 floor

material is dominantly pale, frequently pale greyish in colour, although there is variation from almost white to almost black. The smaller fragments typically show little distinct overall form but the larger pieces suggest that much of this material originated from the breaking-up of sheets of slag that were locally up to 40 mm thick. These sheets typically have a base dominated by sintered sand and an upper part bearing more melted material, often with a glassy upper surface. Several pieces show that the sheets often had raised or thickened margins, often showing incorporation of much larger (up to 6 mm) crystalline grains than the sand on the base of the sheets.

The form of the slag sheets is interpreted as indicating their formation on the base of hearths floored with sand. The silicate melt appears to be partially derived from above (leading to a blebby and glassy upper surface) but with much of the material derived from the margins of the hearth, leading to the thickened and/or upturned edges to the slag sheets in some instances, often also with a higher proportion of coarse material derived from degradation of the stones lining the hearth edges. The base of the sheets is typically almost planar, with blebs and lobes of melt descending from above and incorporating or sintering the sand on the cooler hearth base.

A small proportion of the slags are denser and show evidence for having been more significantly molten. These slags may be vesicular and are green in colour. Even these slags show evidence for survival of incompletely melted inclusions; they frequently contain small rock fragments. None of the examples of this class of slag showed textural evidence for its position of origin within the hearth.

Macroscopic slags: details

Samples of the slag, together with samples of possible precursor materials, were examined using backscattered scanning electron microscopy (BSEM) with microanalysis by energy dispersive spectroscopy (EDS) and chemical analyses were made using X-Ray fluorescence (XRF; for major elements) and induction coupled-plasma mass spectrometry (ICP-MS; for trace elements).

Within the dominant sintered material, the solidified melt is mainly glassy but locally shows crystallites of plagioclase (andesine) and clinopyroxene (salite), reflecting the calcic nature of the melt. Localised areas with elevated iron content contain iron oxides associated with olivine (Fa12 to Fa58) overgrown by clinopyroxenes (diopside and augite). The chemical composition of the sinters shows a low iron content (4.5% calculated as Fe_2O_3) but, compared with a sample of local sand (9355), they have slightly elevated Fe, Mg and Ti (Table 100). They have a silica content of 62% and CaO of 8–9%. They also show enrichment of several elements associated with the fuel (K, P, Mo, As, U) compared with the iron-rich melts.

Specimens of the denser slags are relatively iron-rich (sample 9359 has 16.5% calculated as Fe_2O_3 and sample 9360 17.7%). They have a low silica content of approximately 54% but high CaO (12.6 and 7.9% respectively). Samples 9361 and 9362 apparently showed a larger contribution from gneiss: large feldspar crystals were visible in hand specimen and microscopy showed relict textures with quartz-plagioclase-hornblende compositions in some examples and relicts of biotite in others. The melt phase bears crystallites of plagioclase (bytownite) and amphiboles (gedrite and hornblende) as well as rare examples of olivine. Sample 9363 is very closely related to the sinters described above but has a slightly higher proportion of the melt phase, bearing plagioclase (labradorite and andesine; some of which may have been relict rather than neomorphic) and clinopyroxene (salite).

The relative abundance of the rare earth elements (REEs) may provide an indicator of the partial melting likely to have played a role in the development of these slags. The REE characteristics of the various materials are particularly well shown on a diagram of total REE *vs.* La_N/Yb_N (where X_N is the chondrite-normalised elemental abundance; Figure 194). Samples from the local sand (9355), peat (9357 and 9358) and sintered sand (9364a–c) differ markedly in their total REE content (with REE ranging from 33.7 ppm for the sand sample to 108.7 ppm for one of the sinters), but show rather similar REE profiles with La_N/Yb_N in the range 9–11 (*cf.* Figures 192 and 193). The magnetic spheroids from mound 3 also plot with this cluster, lying particularly close to the peat sample and the upper layer of the sintered slag (sample 9364c). These similarities may suggest that the main REE-bearing phases are related across these materials; they probably all contain a major component of blown sand.

In detail, the slags dominated by sintered sand (sample 9364a–c) show REE profiles and contents ranging between that of the blown sand and that of the peat sample, suggesting that both types of material might have contributed to slag formation (Figures 192, 193, 194). The basal layers of the sheet of sinter are closest to the REE pattern of the blown sand and the uppermost layer closest to that of the peat, suggesting that the relative input of those two components into the slag is structured. The upward enrichment of the REE in the sheets of sinter is accompanied by a similar upwards enrichment in several other trace elements (Ti, V, Cr, Y, Zr, Th and U; all are elements which occur enriched in the peat ash with respect to the sand).

The REE profiles of the iron-rich slags (samples 9359 and 9360; Figure 193) are very similar to those of the sinters (Figure 193; samples 9364a–c). The iron-rich slags show a slightly more fractionated profile, however, being particularly steeper at the extreme light end (La_N/Yb_N was 13.3 and 13.5 for two samples of dense slags, but 9.4, 9.5 and 9.9 for three samples of sinter). This LREE enrichment gives the iron-rich slags a slightly higher REE than for the sinters (Figure 194). The iron-rich slags have a much less aluminous bulk composition than the other materials (SiO_2/

oxide	SiO_2	Al_2O_3	FeO	MnO	MgO	CaO	Na_2O	K_2O	TiO_2	P_2O_5	Volatiles	*total*
Sand												
9355	62.46	9.84	1.54	0.04	0.8	11.07	2.32	0.86	0.14	0.21	8.87	*98.16*
Gneiss												
9365a	63.35	14.29	3.85	0.07	2.04	4.39	3.2	1.06	0.43	0.12	0.44	*93.23*
9365b	63.47	12.85	8.55	0.14	5.08	5.67	1.6	2.05	0.84	0.72	1.31	*102.29*
Fe-rich melts												
9359	53.95	8.85	16.51	0.1	4.16	12.6	1.96	0.98	0.34	1.91	1.11	*102.47*
9360	55.08	7.89	17.66	0.15	2.68	7.92	1.62	0.77	0.35	1.39	1.6	*97.09*
Fe-poor sinter												
9364a	61.85	10.57	3.92	0.04	3.13	8.28	2.57	1.43	0.43	1.97	1.07	*95.25*
9364b	60.72	11.83	4.22	0.04	3.75	9.6	2.72	1.55	0.54	2.76	1.12	*98.85*
9364c	62.98	11.96	4.04	0.04	3.06	7.74	2.53	1.4	0.59	2.2	1.37	*97.91*
M3 spheroids												
5967/5991	[64.78]*	9.14	6.33	0.17	4.28	8.7	1.88	2.07	0.75	1.9		*[100]*
Peat												
9356	7.41	4.56	14.56	0.03	16.01	13.83	1.26	3.48	0.2	1.21		*64.16*
9357	3.33	2.96	7.75	0.03	25.51	19.97	0	1.67	0.15	0.74		*62.97*
9358	22.78	7.26	23.17	0.36	7.41	10.78	0.19	1.46	0.46	0.75		*77.2*
Peat (normalised)												
9356	11.55	7.107	22.69	0.044	24.95	21.55	1.964	5.417	0.31	1.887		*100*
9357	5.288	4.701	12.3	0.043	40.51	31.71	0	2.657	0.238	1.174		*100*
9358	29.51	9.404	30.01	0.468	9.599	13.96	0.246	1.894	0.589	0.973		*100*

Total iron expressed as Fe(II) oxide. SiO_2 value for the M3 spheroids is an estimate on the basis of the analysis totalling 100%

Table 100. Major elements (expressed as wt% oxides) determined by XRF, except for the M3 spheroids which is by ICP-OES. Peat values also shown normalised to 100%

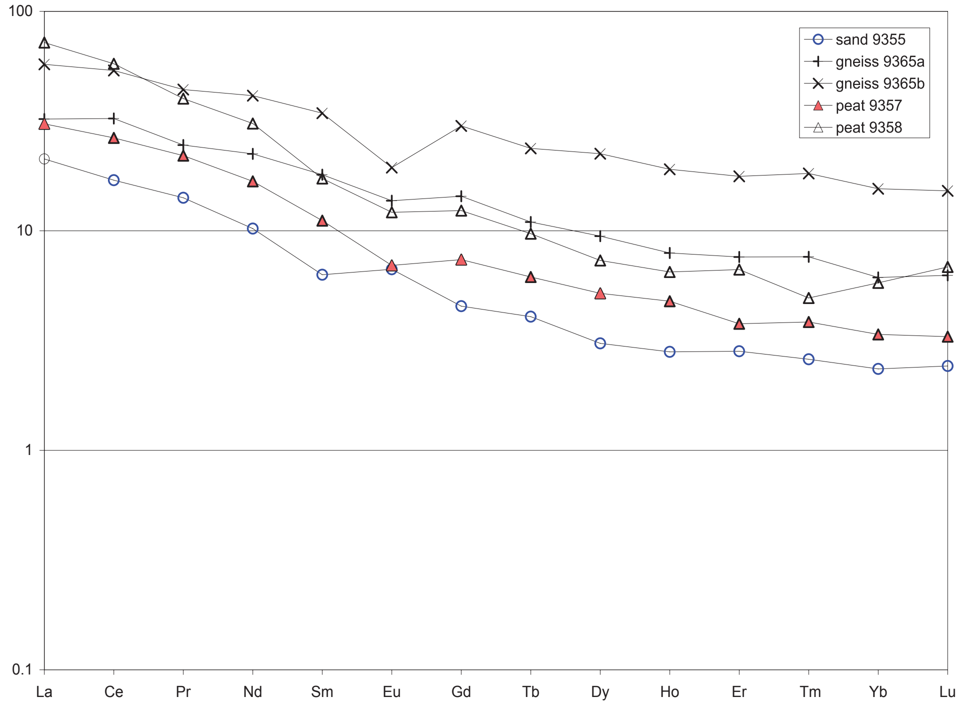


Figure 192. REE profiles, chondrite normalised, for the possible precursor materials

Al_2O_3 of 6–7). One possible explanation of these samples is that they represent flowed iron-rich melt; the production of such a melt would tend towards the composition of olivine and might be expected to show a more fractionated composition, including a steeper REE profile, than its parent material. These samples may be modelled as approximate mixtures of 30–60% sand and 70–40% peat ash, with some added iron, but simple mixing models cannot adequately explain all features of the chemical composition, since they have the most fractionated REE profiles. It would appear that a considerable degree of fractionation has been involved in the generation of these melts and that the melts have moved within the hearth away from their parent materials.

Two samples of gneiss (sample 9365a and b) are characterised by a low gradient to the REE profile, with La_N/Yb_N of 3.7 and 5.3 (Figures 192, 194). These REE profiles are so markedly distinct from those of the slags that the bulk composition of the slag cannot have been influenced by the gneiss to any great extent. The microstructures of some iron-rich slags show some evidence, however, for input from the gneiss with, for instance, slag sample 9361 having derived much of its iron from inherited hornblende, rather than from an iron-rich peat ash.

Microscopic slags

The microscopic slags from mound 1 are broadly similar to those from mound 3 (Young 2005). Typical samples from Iron Age and Norse contexts were examined and, although the materials present are broadly similar, there are some differences.

A sample from the Norse activity area (5661, context 382) contained approximately 50% magnetic materials and showed particle sizes of up to 10 mm. The particles have similar textures to those observed in the mound 3 material, with much of the magnetic material being in the form of blebs and drops. The spheroidal blebs are mainly in the range of 1–2 mm in diameter but they grade up into much less spherical blebs of up to 8 mm maximum diameter. Many of the blebs are conjoined, meaning there appear to be fewer individual spheroids present. Most of the magnetic material is in the form of irregular blebs and short runs of dark glass, sometimes with a reddish bloom on the surface, with abundant included quartzo-feldspathic grains. The non-magnetic fraction also includes glassy materials and blebs but these glasses are dominantly pale, ranging from almost colourless, through creamy white and grey, to a pale green. Most show included grains.

In contrast, a sample from the Iron Age house (8392, context 397; the most slag-rich sample from the surface mapped in detail, see above) was very fine-grained and more similar to the mound 3 examples. The magnetic component comprises around 15% of the sample, and is dominated by material that is dark or black. Some of the dark magnetic material has pale sand grains adhering to the surface; some larger pieces have included grains. The spheroids are clustered between 800 and 1200µm, with most being close to perfect spheres. The spheroids form less than 10% of the magnetic assemblage, most of which comprises more amorphous blebs of dark glass but with a similar size range to the spheroids. In some cases the dark magnetic material can be seen to form thin sheets, and to bind sand particles together to form clumps up to 8mm

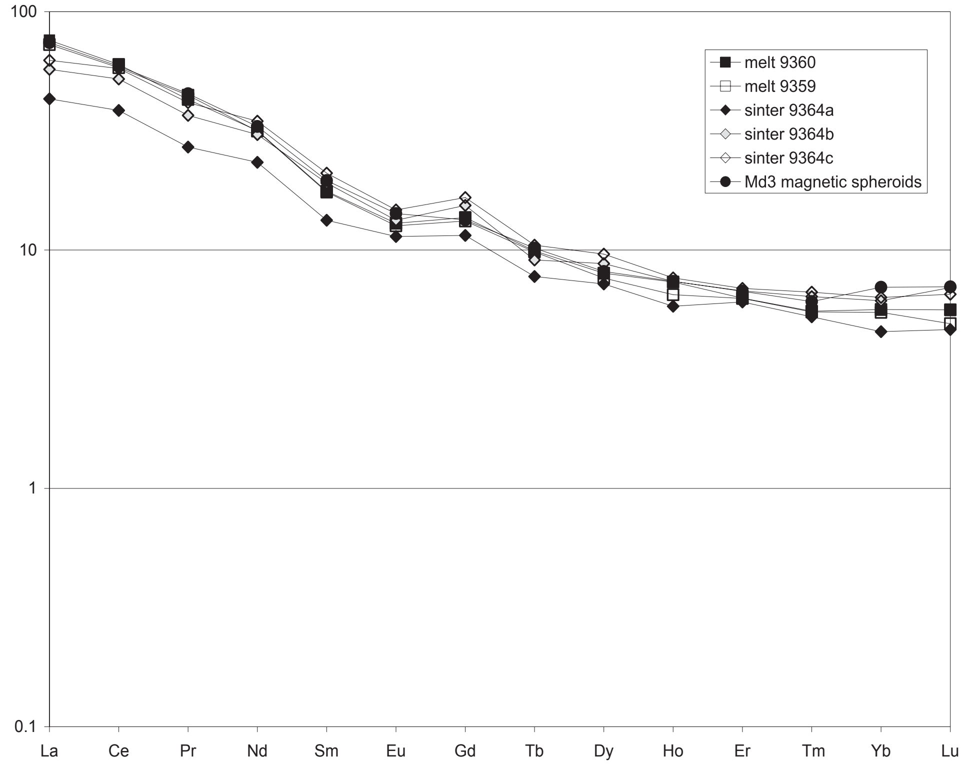


Figure 193. REE profiles, chondrite normalised, for the slags

across. The non-magnetic fraction is very pale, ranging from white through to a translucent grey glass, including many quartzo-feldspathic grains with grain size in the range 100–200µm. Sub-spherical blebs of the pale glass also occur and range up to about 2 mm, significantly larger than the magnetic spheroids.

The differentiation of the Bornais microspherules from those produced in iron working (*e.g.* Allen 1986; Starley 1995) have been discussed with respect to material from mound 3 (Young 2005) and those observations apply equally to the microresidues from mound 1.

Conclusions

Despite the difficulties in identifying precise mixing and fractionation processes capable of producing the observed slags, there is good petrographic and chemical evidence that they are derived from the parent materials: sand, gneiss and peat ash. Simple mass balance calculations cannot completely explain the slag compositions (even for those examples where the gneiss input is believed to be very small). It is likely, therefore, that the sintered slags were not generated through incorporation of the ash in its entirety; rather, the fluxing action on the silicate substrate generated a melt that incorporated some elements preferentially. The high iron content of some of the peat, and also of the more mafic gneiss, has permitted the generation of a more mobile melt in some samples, further complicating the interpretation of bulk compositions. There is no evidence to suggest any metallurgical process was involved in slag generation.

Slags formed from sintered sands are most common and have textures with relict grains bound by a glass phase bearing some crystalline materials, including salite and plagioclase. These phases suggest a high temperature of formation (probably significantly in excess of 1000°C) but experimental studies would be desirable to clarify this. Although the peat ash might have had a contributing fluxing effect, the biogenic calcite in the machair sand probably made the sintering of the sand largely self-fluxing. The high calcium content of the slags (largely derived from the biogenic calcite of the machair sand) not only allows for melt formation at relatively low temperature but also produces a slag which scavenges many trace elements (including P, Mo, U and V) from the fuel ash. Gneiss also contributed to the slags as a minor component, probably mainly through spalling from the blocks surrounding the hearths. Mass balance calculations suggest that the sand contributed approximately 95% of the mass of the sintered sheet.

The microscopic slags from Late Iron Age house floors (CB) in mound 1 show distributions controlled by the position of domestic hearths. These slags, too, can confidently be assigned a non-metallurgical origin. The microscopic slags show a similar range of composition to the macroscopic examples, with both iron-rich and iron-poor particles. The iron-poor particles are often sintered grains and/or pale glassy materials. The iron-rich materials include spiky-appearing sintered masses and spheroidal particles. Both types are readily separated from the sieved residues by a magnet and, as with the assemblages previously described from mound 3, show subtle but

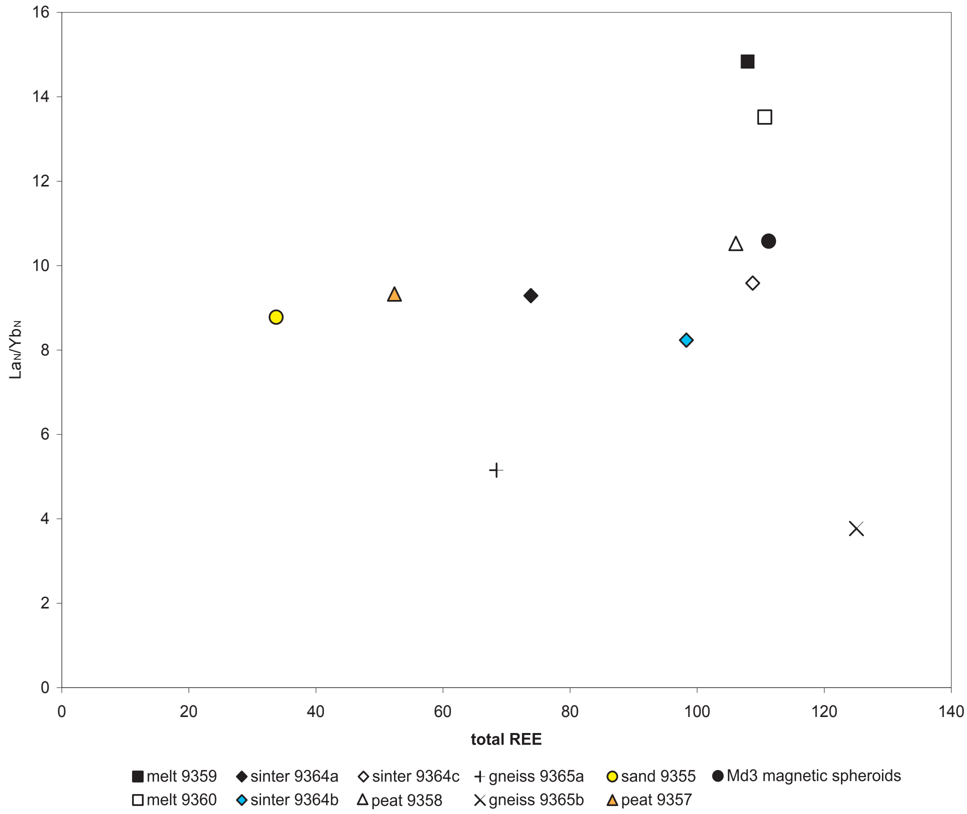


Figure 194. Plot of La_N/Yb_N (chondrite normalised) v. the total REE (ppm) for the slags and possible precursor materials

significant differences from magnetic microresidues from iron-working.

Slags generated in the Norse activity area (CE) are differentiated from those from the domestic floors and granary on mound 3 by a higher proportion of melted material. In the activity area the melt phase is sufficiently abundant to bind together slabs of material up to at least 100mm wide (possibly much more; all the large fragments are broken sheets) and up to 40 mm thick. The most likely explanation for the difference in scale of the slags formed would be the length of time the hearths were maintained in use: those in the activity area (CE) developed larger bodies of slag through the maintenance of high temperatures for longer periods of time.

The behaviour of calcium-rich systems of this type is not well described in the literature but it is likely that the reactivity of the system was driven by reactions between calcite and the silicate minerals during thermal breakdown of the calcite at temperatures from as low as 600°C, although high degrees of partial melting must have occurred at significantly higher temperatures. Although such reactions may be particularly likely to occur in situations where there is a high level of calcium in the mineral phases, they also occur where the principal source of calcium is the fuel ash. The production of fuel ash slags in an early medieval cereal kiln in south-west Wales has recently been documented (Young 2010) and the slag compositions were modelled to demonstrate a reaction between calcic wood ash and the siliceous substrate. The generation of sintered slags has been recorded from other archaeological sites where hearths are on calcite-rich substrates. A site, for instance, at Gloucester Business Park (Young and Bowstead Stallybrass 2003), lying on limestone gravels in the Severn valley, produced assemblages of apparently non-metallurgical slag, which also showed evidence for phosphorus scavenging and which had a glassy matrix bearing crystals of salite. Other occurrences of non-metallurgical fuel ash slags, particularly perhaps those from the southern British Iron Age informally known as ‘Iron Age Grey Slag’ (Cowgill *et al.* 2001), might have had similar origin and be interpretable in terms of sinters produced during relatively low-temperature partial melting. ‘Slag’ recovered from the earlier Iron Age rampart at Malmesbury (Young 2011) showed considerable morphological similarity to the Bornais mound 1 material, occurring in low density sintered sheets of up to 150mm in thickness.

The movement, distribution and disposal of plant materials – J Summers and J Bond

The types of plant remains represented in the assemblages recovered from the different contexts resulting from occupation and activities on Mound 1 at Bornais in many respects show a great deal of similarity. For example, the overwhelming dominance of barley within the cereal assemblages is universal and the fairly limited range of wild plant taxa does not show a substantial amount of variation. However, this is in itself an important point to consider since it indicates that the plant remains recovered result from a fairly common set of activities. It would suggest that there were few rather than a range of diverse locales in which plant materials became carbonised. It also indicates that the types of materials entering the hearth(s) did not vary significantly, although the effect of mixing, both in the hearth and post-deposition, will inevitably blur any view of diversity within the assemblages.

The daily use of cereals, including the final stages of processing (fine sieving) and food preparation will have accounted for a significant proportion of the diagnostic material incorporated into the fire (cereals and arable weeds). The minimal amount of chaff in the assemblages most likely points to the bulk of crop processing having taken place away from the dwellings, perhaps in buildings elsewhere in the vicinity or in an external working area. The drying of cereals could have taken place in the dwelling, perhaps similar to the pot drying or the use of heated stones documented by Fenton (1978: 375). The other major source of carbonised plant material will have been the fuel used. This was most likely peat or turves, or a combination of the two, and the seeds of associated plants are likely to have been incorporated into them, as has been hypothesised for a proportion of the sedges. Other plant matter could derive from flooring or bedding materials, which could also account for some of the sedges and grasses identified.

Ash from domestic hearths will have been present in substantial quantities, being disposed of in midden deposits and incorporated into floors, through raking out of hearths and trampling (*e.g.* Milek *et al.* 2005). The correspondence between hearths and ash deposits within domestic structures has been demonstrated using magnetic susceptibility measurements and archaeobotanical analysis at a number of sites in the Northern and Western Isles (Church and Peters 2004).

It is also of great interest that the charcoal layer (457) also shares many similarities with other deposits. Although this context is interpreted as a conflagration layer (Sharples 1999), the densities of carbonised plant remains (other than charcoal) are little different from those occurring in other floor surface deposits. This is not to deviate from the archaeological interpretation but may give some insights into how the wheelhouse was used. The fact that there is no increased density of cereal remains in charcoal layer 457 suggests that there were little or no stored crops (either food or seed resources) within the building at the time of the fire. This is a stark contrast to the Middle Iron Age conflagration deposit at Scalloway broch, Shetland, where large amounts of carbonised grain were interpreted as the charred remains of cereals that had been stored in the upper stories of the structure (Holden 1998). Carbonised grains in a destruction layer at Dun Bharabhat, Lewis, have been interpreted in conjunction with large amounts of barley straw as representing the remains of burnt thatch from the collapsed roof (Church 2002a). If one subscribes to this interpretation, the evidence from Dun Bharabhat can also be taken to show that there was no stored crop present when the structure burned.

A number of scenarios may account for this absence of carbonised grain. The first explanation is taphonomic, considering the grains and seeds to have been totally consumed by fire in the intensity of the blaze, leaving little evidence in the archaeological deposits. However, the good preservation of a number of timbers suggests that this was not the case, although cereal grains were less well preserved in this context compared to those from the secondary floor deposit, pit fills and hearth. The evidence from the deposits at Dun Bharabhat (Church 2002a: 71) and Scalloway (Holden 1998), which can be expected to have resulted from similar conditions, and from experimental work at the Historical-Archaeological Experimental Centre in Lejre, Denmark (Christensen *et al.* 2007), where conditions in collapsed roof materials seem to have provided good preservation conditions, might also contradict such an argument. It must, however, be remembered that not all fires behave in the same way and a fierce, well aerated fire could have easily destroyed a large proportion of the plant materials within the building.

Based on the above evidence, it is possible to conclude that stored crops were not present in any great concentrations when the fire occurred. The removal of any stored products prior to the fire starting could account for such a situation. This would, however, suggest a deliberate fire lit under planned conditions, a scenario not supported by the archaeological evidence (*cf*. Parker Pearson *et al.* 2004a: 112–13). Equally, the house could have been burnt at a time when stored supplies were at their lowest, perhaps in the early autumn prior to harvest when the seed has been sown and stored reserves are at their lowest. This is possible but one might expect that, in all but the worst years, there would still be some food in store that would have elevated the quantities incorporated into the charred archaeobotanical assemblages. This was simply not the case, with densities of *H. sativum* grains per litre being about two (42.47%) less than is seen in the secondary floor layer (397). There is also the potential that the building was no longer occupied when it was destroyed by an accidental fire, under which conditions one might also expect no stored grain to have remained within the structure.

The final possibility is that grain was not stored within the structure at all. In the Middle Iron Age, it is thought that many agricultural products were stored within the domestic structures of the region (*e.g.* Dockrill 2002: 160; Holden 1998). Limited household-based storage during the Late Iron Age would be interesting since it would require other structures to have been built for the purpose. The problem with this interpretation is that designated Late Iron Age storage structures are not well documented in the literature. A possible example can be found in Structure 19 during Phase 6.1 at the settlement of Pool, Sanday, which has been interpreted as a storage structure (Hunter 2007: 86), although evidence of what it stored is limited. It is, however, entirely possible to store grain without a specialised building, as demonstrated by the straw-rope *corn byke* granaries used in Caithness and Orkney in the nineteenth and twentieth centuries (Fenton 1978: 370–3), which would be all but invisible in the archaeological record.

Charcoal – R Gale

The quantities and quality of the timber available to the inhabitants of South Uist in the Iron Age are unclear and, whilst a range of species have been identified in the charcoal recovered from mound 1, the very infrequent occurrence of these species suggests these were not available in large numbers on the island nor is there any evidence that the wood derives from large trees suitable for major structural works.

The construction of the wheelhouse would have required a large number of substantial roof timbers. Assuming that the wheelhouse had a corbelled peripheral area (see 49 for discussion of the structure) then the central space must have been covered by a pitched roof that was either thatched or turfed. This area to be spanned was up to 3.8 m in diameter and, assuming a pitch of 45°, this would indicate timbers 2.7 m in length would be required. The longest timber visible in the burnt layer appears to be 1.2 m in length (assuming finds 2085 and 2088 are a single timber) and most of the timbers appear to be about 0.1 m wide. All of these structural timbers appear to be spruce/larch. The frequent use of spruce/larch (*Picea*/*Larix*) suggests that driftwood was strong enough to be used as a structural timber despite many of the timbers being weakened by marine borers.

Although anatomically similar, the properties of larch and spruce timber differ. Larch is more fire-resistant and provides stronger timber for construction work, whereas spruce, has neither the strength nor durability of larch (Meiggs 1982). The resinous nature of these timbers probably afforded good protection from the seawater (in antiquity, spruce resin was particularly valued for waterproofing and sealants; Meiggs 1982). It also makes this timber easy to burn, however, and when seasoned and installed in the roof of the Bornais house, the abundant resin might well have created a fire hazard.

Fish preparation and consumption – C Ingrem

There is some evidence to suggest that during the Late Iron Age young saithe were processed for storage and later consumption. Bones from both the head and tail regions of the body are present in the midden deposits (CG) so it would seem that whole fish were originally brought to the site. However, the relatively high frequency of the opercular, a bone not generally considered particularly robust, suggests that the gills of some fish might have been removed and disposed of in the midden with the body being taken elsewhere. As well as being eaten fresh, young saithe are known to have been dried in the sun, over a fire or salted, in historical times. At the Bay of Firth, Orkney, Fenton (1978) noted that sillock catching was a community affair and when the carts returned laden with fish everyone helped to clean them. Guts and gills were discarded and the fish left in salt and water overnight. The drying process continued with spits thrust through the mouth, or the fish strung in pairs by their tail, and hung on thin straw ropes above a fire until the fish were so dry that they snapped between the fingers (Fenton 1978). The absence of cranial bones in the assemblage recovered from the Iron Age house might result from the removal of fish heads prior to cooking and consumption.

It is of interest that documentary records from the eighteenth century provide evidence that young saithe were not only a valuable source of food in the Western Isles but were also valued for their liver oil, used in lamps (Cutting 1956: 171). Although not visible in the archaeological record the likelihood of such a valuable resource being utilised during the Late Iron Age should not be overlooked.

A different pattern is apparent for the herring recovered from the Norse middens; here bones from the head are few and suggest that, unlike saithe, these fish may have arrived in a decapitated form. Herring are oily fish and consequently do not keep easily. There are numerous references to whole fish being cured (pickled) with the aid of salt in the documentary literature (Cutting 1956; Hodgson 1957; Martin 1995) but none are known that mention prior decapitation. This pattern is, however, seen at other Norse sites in the region and it has been suggested (Ingrem forthcoming) that it may signify the existence of a local tradition of preserving herring, involving wind-drying, whereby the fish are decapitated and split open to increase the surface area and expedite the curing process. This method does not require the large quantity of salt usually required for preserving herring. If indeed it existed, this type of processing would not produce hard-cured fish but might have been aimed at winter provisioning or local exchange.

In many respects the assemblage of cod and hake from the Norse midden is suggestive of processing (drying and salting) waste. Historical evidence indicates that, with regard to large gadoid fish, the curing process generally involved decapitation and sometimes removal of part of the spine nearest to the head (Fenton 1978). Consequently, an abundance of skull elements at midden sites is often interpreted as processing waste (Barrett 1997) and a relative abundance of abdominal vertebrae would be consistent with this hypothesis. In contrast, appendicular elements were sometimes left in the cured fillets to aid rigidity (Fenton

1978), as were most caudal vertebrae. The assemblage of gadoid fish from the Norse deposits on mound 1 is not large compared with those recovered from some contemporary sites such as Robert's Haven, Caithness (Barrett 1997) so probably reflects small-scale fish processing, aimed at providing cured cod and hake for consumption or exchange during the leaner months of the year.

Despite the temporal change in the types of fish exploited, there is no evidence to suggest that fish became more important in the diet with time. Offshore fishing is a dangerous business involving considerable expenditure in technology and capital; consequently, it is unlikely to be practised unless the returns outweighed the costs. This implies that the catch was expected to provide a surplus of fish above that required for immediate consumption and it is possible that cod and hake, to some extent, fulfilled this role. A question remains concerning the whereabouts of the missing herring heads and raises the possibility that these were removed at the landing site or at sea.

The consumption of birds – J Cartledge and D Serjeantson

With the possible exception of the songbirds, the bird bones appear to be anthropogenic in origin, as they were mostly disarticulated and were found with other food and household remains. The percentage with butchery marks is small, approximately 5 per cent of identified bones, but this is typical for bird bones. Butchery marks, more knife than chop marks, were identified on 17 bones from at least eight species including the crane, two bones of great auk, cormorant, shag, gulls, guillemot or razorbill, and goose. Scorching was noted on seven bones, from layers (314), (337), (396), (456), (457) and (485). Two bones only, from (314) and (319), showed indications of carnivore gnawing. Two from layers (485) and (412) had possible indications of rodent gnawing.

All the birds present are edible but some might not have been eaten. The peregrine falcon is more likely to have been caught for its feathers than for the meat. Remains of ravens are often found in prehistoric and early historic settlements, sometimes as whole skeletons. These have a ritual significance and are not eaten (Serjeantson 1991). However, the single bone here (from the Norse layer, 312) comes from a young bird; when corvids are eaten, it is usually as young birds (Gidney 2007). The few small passerines also might not have been eaten but there are many historical records of their being used as food and indeed there are parts of Europe where they are still netted.

Otherwise, in historical times, the islanders have been recorded as eating all the seabirds whose remains have been found at the site. The fulmar has white flesh that is considered to be tasty. Young gannet meat (guga) can be boiled or pickled in salt and has 'the texture of good steak and the taste of kipper' (Beatty 1992, 99). The people of North Uist held the meat of the shag in great esteem and would make a soup of it which 'if properly made it is very like the best hare soup' (Beatty 1992, 40). Wherever puffins occur in large colonies, man has harvested them. In the Faroe Islands, a forked pole slung with a netting bag was used to capture them. The breast is the only part of a puffin that produces much meat; it was boiled or roasted, and, once cooked, loses its fishy taste (Boag and Alexander 1986). Breakfast for a St Kildan often consisted of milk and porridge with a puffin boiled in the oats (Beatty 1992). People harvested the chicks of Manx shearwaters for food at the same time as puffins without distinguishing between them, as they both nest in burrows and the chicks look and taste similar (Boag and Alexander 1986). In the sixteenth century sailors are recorded as valuing the great auk as a food source, as it was rich in proteins and highly nutritious fats and oils.

Most of the seabirds could be preserved. Puffins and Manx shearwaters were stored in barrels, preserved in their own fat, in ash or in brine and great auks were preserved with salt. These techniques would have been within the capability of Late Iron Age technology and it is possible that some of the seabirds from the site had been preserved.

Large quantities of eggshell have also been recovered from the flotation residues. In historical times the inhabitants of Uist are recorded as having taken the eggs of razorbills, oystercatchers and eider ducks and they no doubt took those of gulls and other species in the past. Gulls' eggs were eaten until the last century in the Netherlands and northern Europe (Hull 2001, 183–6).

As well as supplying fat in the diet, the fat and oil in the carcasses of seabirds were valued for heating, light and as a liniment. The fulmar and the Manx shearwater are among the oiliest of the seabirds. In the nineteenth century, the fulmar was much prized by the St Kildans who also used the oil for their lamps (Beatty 1992). But it was not the oiliest birds which were targeted here – gulls are not especially fatty. It does not seem likely that the oil, even if it was used, took priority over the food value of the birds. It may be that the sea mammals were a more important source of oil at Bornais.

The feathers as well as the meat would have been used (Heinzel *et al.* 1974). The small body feathers and the down provide insulation and they would have been used for bedding and warmth. Bird skins have been used for clothing in some northern cultures (Nelson 1969), and might have been here, though the butchery traces cannot prove or disprove this here. Wing and tail feathers will have been used for decoration and some of the minor species could have been caught with the specific aim of using the feathers for decoration. The crane particularly has always been prized for its long elegant tail and wing feathers (Bartosiewicz 2005). The peregrine falcon might also have been caught for its feathers, as these are sought after by bird hunters for their association with this swift and accurate predator of other birds.

Block	Butchery									
	Chopped	Cut	Chop & Cut	Sawn	Total Butchered	Gnawed	Burnt	Total bone	% Butcherd	% Gnawed	% Burnt
CA		1			1	8	1	24	4	33	4
CB	9	38		1	48	46	308	617	8	7	50
CC	63	42	1	10	116	150	211	1124	10	13	19
CG	65	115			180	166	69	1771	10	9	4
Total	137	196	1	11	345	370	589	3536	10	10	17

Table 101. Taphonomic characteristics of the Late Iron Age bone (%)

Block	Butchery										
	Chopped	Cut	Chop & Cut	Sawn	Total	Gnawed	Burnt	Total bone	% Butcherd	% Gnawed	% Burnt
CD	0	1		0	1	0	0	8	13	0	0
CE	32	15		3	50	69	24	436	11	16	6
CF	27	17		1	45	104	26	633	7	16	4
Total	59	33	0	4	96	173	50	1077	9	16	5

Table 102. Taphonomic characteristics of the Norse bone

In contrast to the abundant consumption and use of seabirds and other wild birds, there are few signs that domestic birds were kept. The only remains are from a young chicken and a possible domestic goose from the Norse midden (CF).

Animal bone taphonomy – J Mulville and A Powell

The taphonomic characteristics of the Late Iron Age and Norse material are shown in Tables 101 and 102. The observed incidence of bone exhibiting gnawing averages 10% in the Late Iron Age assemblage, a level lower than that seen at the other South Uist sites: Bornais mound 3 (16%), Dun Vulan (14%) and Cille Pheadair (21%) (Mulville in Sharples 2005b, 177; Mulville 1999, 237; Mulville forthcoming). There is some variation in frequency between areas, with gnaw-marked bone least common in the house floors (CB 7%), slightly more common in the midden (CG 9%) and with a peak at 13% in the infill (CC). The number of canid remains at mound 1 is very small with only four dog bones recovered, and just a single bone was recovered from the Iron Age deposits. The canid remains in both phases might each have derived from a single animal, although it is extremely unlikely that the dog bone found represents the entire dog population. From the gnawing evidence we know that living animals were present and yet only a single bone was recovered from Iron Age contexts. There is little evidence for dog consumption or other post-mortem exploitation and the characteristics of the deposits associated with mound 1 suggest food or bone-working debris. It therefore seems likely that the dog remains were deposited elsewhere.

In the Norse period (Table 102) gnawed bone was more common, consistent across the blocks and similar in incidence to Bornais mound 3 and Cille Pheadair (Mulville in Sharples 2005b; Mulville forthcoming). Both occupation deposits and infill showed a higher degree of gnawing at 16%. The majority of gnawing was canid, but a few examples of digested bone were recorded. Bone exhibiting rodent gnaw marks was rare overall but occurred in both the Late Iron Age house (CB), and midden (CG) and the Norse activity area (CE).

Gnawed bone can be a guide to disposal patterns. Assuming the number of canids remained relatively constant, damaged bone indicates that dogs had access to material. This must indicate that the newly butchered bones were left exposed for some time before deposition. In the Late Iron Age the low level of gnawing (7%) in the floor deposits (CB) suggests that this material was swiftly removed from areas accessible to dogs, whilst material placed in the midden (CG 9%) and infill layers (CC 13%) was exposed to canid activity for slightly longer periods before becoming buried. The higher levels of gnawing in the Norse blocks (16%) suggest less efficient management of waste.

Burnt bone is three times as abundant in the Late Iron Age assemblage as in the Norse, 17% compared to 5%. There is variation between the different areas and this is particularly marked in the Iron Age; half of the identifiable bone from the house floors (CB) is burnt, whilst 19% of the bone from infill (CC) is burnt and only 4% in the midden (CG). The spatial variation between the Norse areas is much less marked, with around 6% and 4% respectively of bone burnt in the activity area (CE) and midden layers (CF).

The high level of burning in the mound 1 assemblage is in marked contrast to the *c*.2% recorded at the other Hebridean sites: Dun Vulan, Bornais mound 3 and Cille Pheadair (Mulville 1999; Mulville in Sharples 2005b; Mulville forthcoming). The exceptionally high level of burning in the floor layers is a result of the conflagration associated with the incineration and collapse of the roof. The majority of material was burnt black/brown, indicating a temperature of around 200 to 300°C (Walker *et al.* 2008).

It is also possible to identify which species' bones are more often burnt. Table 103 demonstrates that, of the main food animals, sheep/goat remains show the most exposure to fire and red deer the least. The information available for the minor species is biased by sample size but it is worth noting the high percentage of burning of cetacean bone. This figure was calculated only for bone identified to element. Table 104 presents information regarding all the burnt whale bone fragments recovered. At 61% the percentage of burning in identifiable cetacean elements is slightly higher than that for all fragments identified as cetacea (53%). The high level of burning is a result of the oil content within marine mammal bone in general. Cetacean bone could have been used as fuel (Mulville 1999, 2002) but it is also probable that cetacean material exposed to accidental fire would have been more likely to burn. The presence of a number of burnt whale bone artefacts in the house floor layers suggests a degree of accidental damage, as in general worked bone is rarely destroyed by burning (see below).

The presence of whale bone on site, particularly from large animals, is indicative of the value placed on the bone itself. It is possible to fully butcher a whale without needing to remove the large and heavy bones to the settlement (Mulville 2002). Cetacean bone has highly desirable properties of strength and resilience that are often exploited in artefact production (Hallén 1994). The high level of burning, noted above, can be related to the use of whale bone as fuel (Mulville 2002). At other Hebridean sites the authors have observed that burning is generally found on bone showing no evidence of fine working. This was not the case at mound 1, where a high proportion of worked material was burnt; this material was derived from contexts containing much burnt material in CC. Whilst this material might have burnt well as a result of its high oil content, the deliberate use of worked items as fuel is unlikely.

Species	LIA	Norse	Total
Cattle	17%	3%	13%
Sheep/Goat	18%	5%	15%
Pig	13%	2%	10%
Red deer	9%	2%	8%
Horse	-	-	0%
Dog	100%	-	25%
Cat	67%	-	33%
Roe deer	50%	-	25%
Otter	6%	-	5%
Seal	-	-	0%
Cetacean	44%	68%	61%
Cattle/red	50%	-	13%
Cattle-sized	10%	5%	9%
Sheep-sized	7%	-	4%
Hare/fox sixe	-	-	0%

Table 103. Incidence (%) of burning by species

Butchery

Butchery marks are not particularly frequent at Bornais, in spite of the good preservation; there is a similar incidence, 10% and 9% overall in both phases. In the Norse period chop marks are more common than knife cuts whereas in the Late Iron Age knife cuts are more common. There is little variation in the distribution between blocks in the Late Iron Age (8–10%), but in the Norse period the activity area (CE) has much more butchered bone (11%) than the midden (CF, 7%).

Butchery marks are more frequent, as a proportion of the identified bone for that species, on sheep/goat than on any other major taxon in both periods (Tables 105 and 106). However, chop marks are far more common on cattle (and red deer) than on sheep/goat and pig in the Late Iron Age and more common on sheep in the Norse phases, though not by so great a margin.

There are some noteworthy butchery specimens. Three cattle and three sheep/goat hyoids from the Late Iron Age have knife or chop marks that probably indicate the removal of the tongue. Two Late Iron Age cattle mandibles have cut marks on the vertical ramus, one internally, that may indicate the removal of the tongue, but the external marks probably indicate filleting of the cheek muscle.

Phase	Block	total nisp	Mandible	Rib	Vertebra	Unid	% Burnt
Late Iron Age	CA	25					
	CB	617		1		63	91%
	CC	1094	1		2	385	53%
	CG	1768				20	65%
	All areas	3504	1	1	2	468	57%
Norse				Rib	Vertebra	Unid	% Burnt
	CD	8		1			20%
	CE	436			1	31	51%
	CF	663		13		5	20%
	All areas	1107		14	1	36	32%

Table 104. The cetacean bone: NISP and taphonomy

Taxon	Chop	Cut	Chop & cut	Sawn	N	% of ID bone
Sheep	8	29			37	11.1
Sheep/Goat	38	89	1	2	130	11.0
Cattle	34	39		4	77	6.7
Pig	2	11			13	6.9
Red deer	29	18		1	48	10.3
Horse	1				1	50.0
Otter		1			1	4.2
Whale	1				1	16.7
Cattle-sized	19	9		3	31	25.2
Sheep-sized	5			1	6	10.3
Total	137	196	1	11	345	9.8

Table 105. Distribution and type of butchery mark by species, Late Iron Age

Taxon	Chop	Cut	Sawn	N	% of ID bone
Sheep	16	6		22	14.8
Sheep/Goat	11	8		19	6.6
Cattle	19	10	1	30	7.6
Pig	1		1	2	3.6
Red deer	5	3	1	9	12.5
Roe deer		1		1	50.0
Seal	1			1	50.0
Whale		1		1	4.5
Cattle-sized	2	4	1	7	33.3
Sheep-sized	4			4	8.5
Total	59	33	4	96	8.9

Table 106. Distribution and type of butchery mark by species, Norse

	Cattle		Sheep		Pig		Red Deer	
	Unfused	Neonates	Unfused	Neonates	Unfused	Neonates	Unfused	Neonates
CB	33	9	36	0	78	0	11	0
CC	50	13	47	3	69	6	35	0
CG	44	37	38	2	78	0	44	2
CE	49	16	54	8	100	38	11	0
CF	54	16	53	9	100	33	47	7

Table 107. Fusing ageing summary for major species (%)

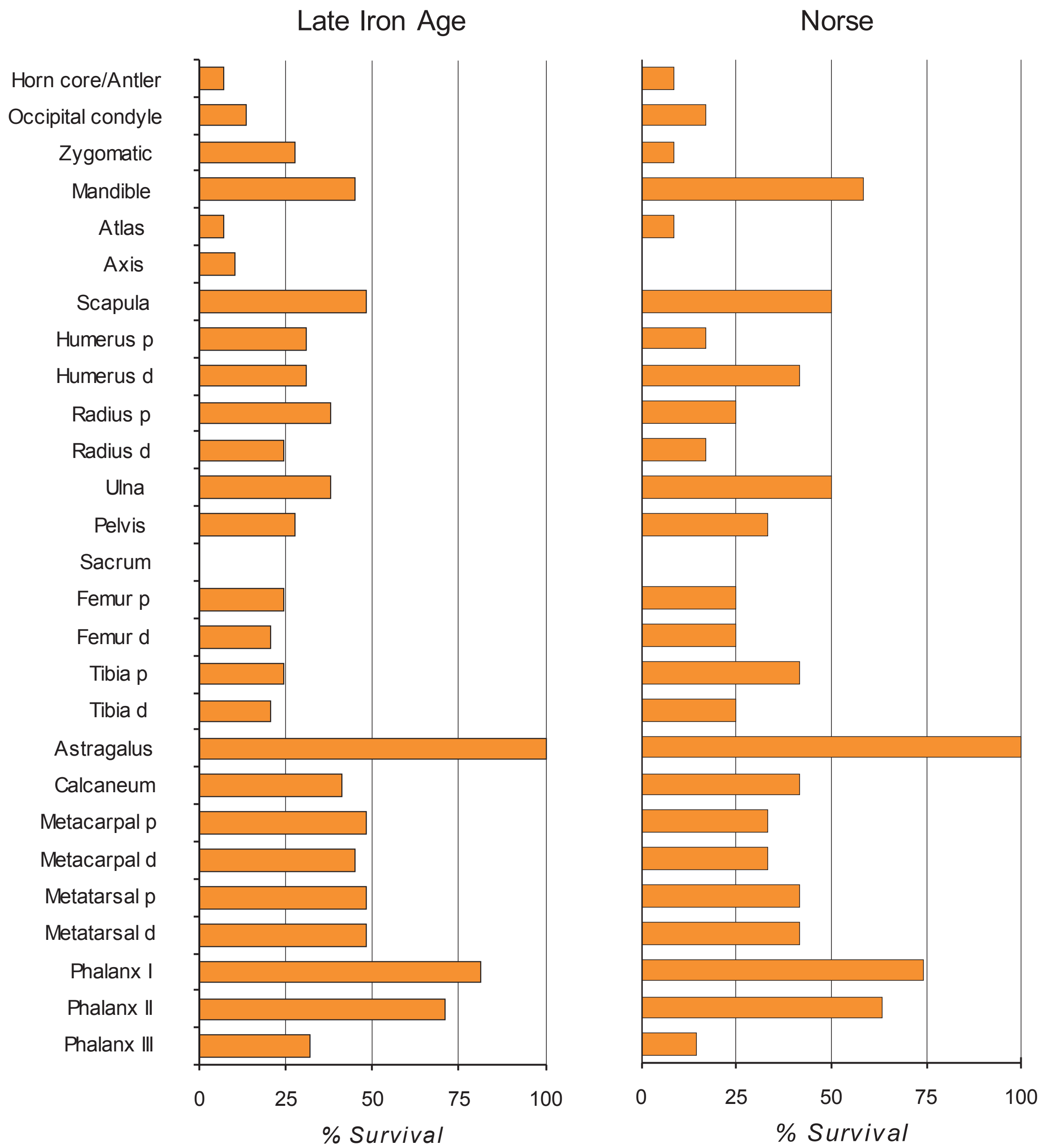


Figure 195. Comparison of body part representation for cattle in the Late Iron Age and Norse phases

Anatomical representation of major terrestrial species

The survival of bone is affected by its physical properties (density, shape *etc.*) and the intensity of processing and damage it is subject to will determine how fragmented the material becomes. It is possible to manipulate the data to overcome some of the 'biases' inherent in the bone assemblage (see discussion of zone data below) but the combined factors of retrieval and preservation will still affect the patterns imposed by human action and must be considered during analyses.

By looking at which parts of the skeleton are present for each animal it is possible to investigate spatial and temporal variation in the processing of carcasses. Once animals are slaughtered, their carcasses are divided, with particular elements providing different quantities of oils, fat, marrow, meat or the raw materials for sinew, hide and leather working. The amount of any resource available from an animal will also depend on the age, sex and condition of the individual.

We can consider the anatomical data for the two main food species, sheep and cattle, in detail by period to assess the effects of taphonomic biases. The most striking pattern in the distribution of cattle elements (Figure 195) is the predominance of astragali in both periods, and to a lesser extent the large number of phalanges. In the Iron Age other lower limb elements are relatively abundant, with fewer mandibles, scapula and lesser amounts of other limb bones present. The Norse distribution is broadly similar, although metapodials are slightly less abundant

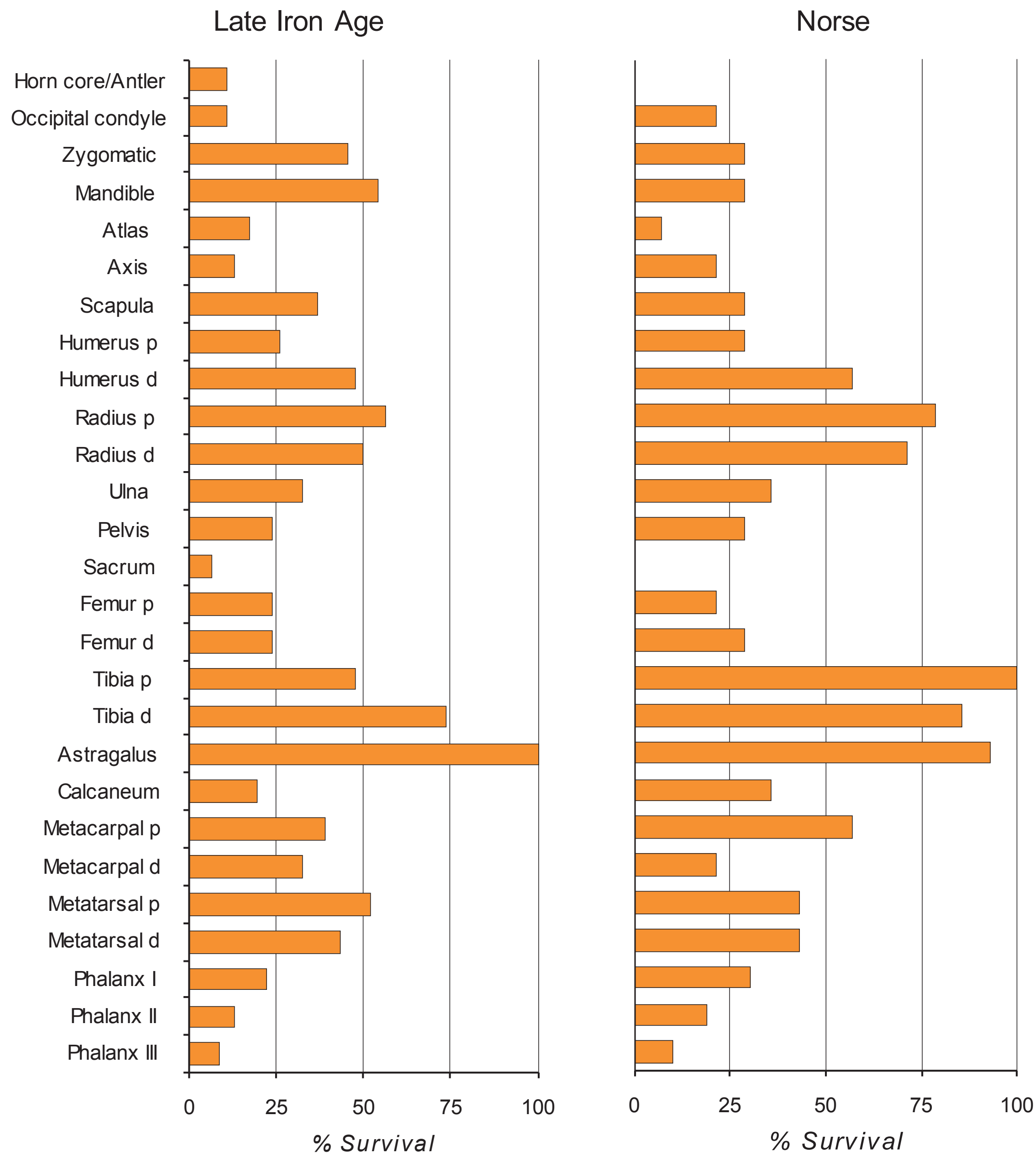


Figure 196. Comparison of body part representation for sheep/goat in the Late Iron Age and Norse phases

and mandibles and some fore limb elements are found in higher numbers.

This pattern is not solely a product of preservation. The high numbers of cattle astragali, particularly in comparison to the relatively robust associated elements of calcaneum, distal tibia and proximal metatarsal is striking. The majority of the other elements are present at between 20 and 50% of the expected quantity of material. The presence of only minor differences between the phases suggests similar preservation/deposition patterns occurred. If the patterns at Bornais mound 1 are compared with those at Dun Vulan and Bornais mound 3 (Mulville 1999; Mulville in Sharples 2005b) – sites with similar preservation and recovery methods – the predominance of astragali at mound 1 is remarkable. The large assemblage from Dun Vulan (NISP *c.*6000) also had a high number of astragali but this was accompanied by a similar abundance of lower hind limb elements and fore limb elements. At Bornais mound 3, a smaller assemblage (NISP *c.*750), cattle astragali, distal tibia and metapodials were all equally abundant.

The pattern in sheep is slightly different than that noted for cattle; there is less emphasis on lower limbs and larger quantities of upper fore and hind limb bones are present (Figure 196). In the Late Iron Age the elbow (humerus/radius/ulna) and hock joint (tibia/astragalus) predominate, and in the Norse period the relative importance of the limb bones increases with more upper limb elements present. Fewer elements of the extremities are recorded; phalanges in particular are low in numbers. There is a possible bias seen in the distribution of sheep phalanges, with the larger

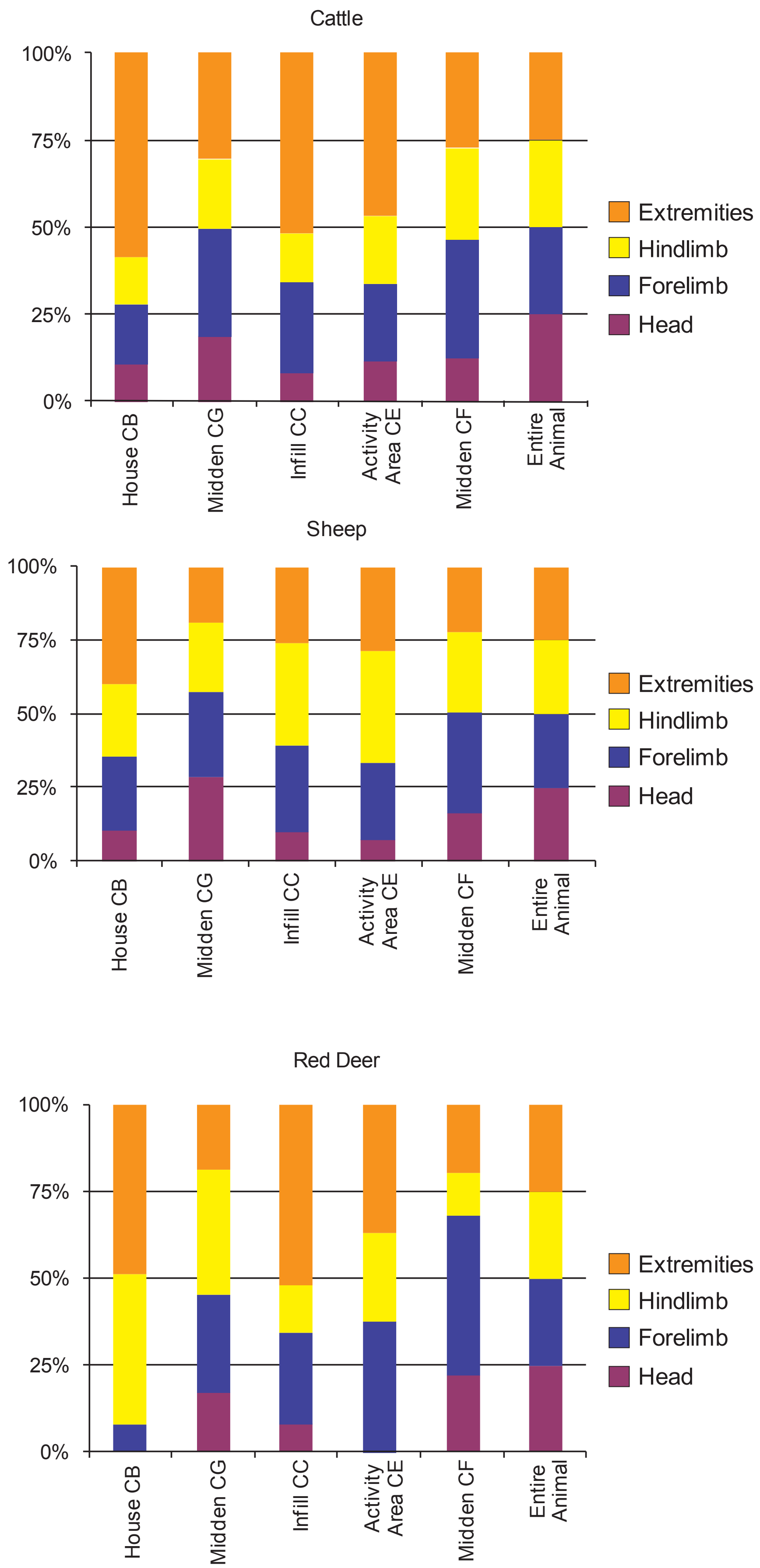


Figure 197. A comparison of body part abundance by block for cattle, sheep and red deer

sheep first phalanx present whilst the smaller second phalanx is mostly absent, probably because the latter passed through the 1cm^2 mesh used for sieving.

The distribution of body parts in sheep is less uneven than for cattle and reflects the combined factors of retrieval and preservation. The elements that are more frequent are those which are relatively robust early fusing bones (proximal radius, distal tibia, astragalus and metapodial; see Metcalfe and Jones 1988) but the abundance of other elements such as distal humerus and radius cannot be accounted for by earlier fusion times. At the comparative sites of Dun Vulan and Bornais mound 3, as at mound 1, distal tibiae are predominant but they are not accompanied by a similarly high number of astragali. A similar disparity in the number of sheep versus cattle phalanges overall was noted at Dun Vulan, with cattle phalanges present at 60% of the number expected relative to the MNI and sheep phalanges making up only 14%. At Bornais mound 3 cattle and sheep toes were recovered in similar small quantities yet whilst all three cattle phalanges were present in similar quantities, sheep toes demonstrated a size bias with the abundance falling from first to second to third phalanx (Mulville in Sharples 2005b, fig. 90).

Similar figures are not presented for pig because of the small number of individuals present in both phases. All areas of the carcass are represented in both phases, however, and, as with sheep/goat, there is no marked discrepancy between fore limb and hind limb element frequencies.

Stratigraphic block differences

The route of animal material from a freshly slaughtered carcass to eventual disposal can be tracked by analysis of the material represented in the different blocks. To simplify the data it has been grouped in carcass units comprising the head, fore limb, hind limb and extremities (from the astragalus down). To compensate for fragmentation and the differing frequencies of elements, the data were standardised. The most abundant zone (left or right) for each element was calculated, *i.e.* the MNE. This figure was divided by the number of left or right elements present in a carcass. In the case of unsided elements such as phalanges the count is divided by the number of elements present in a single animal. This number was summed for each carcass unit and then divided by the number of elements in that group (*e.g.* for the hind limb by three: pelvis, femur and tibia). Thus if entire carcasses were present on site, each of the four categories would account for one-quarter of the total (Figure 197).

The data can then be examined to provide information on how animal carcasses were moved through the settlement. In the Late Iron Age the cattle distributions suggest that few body parts were disposed of at the slaughter stage, with a range of elements taken into the house for processing, and particular body parts being preferentially retained. Such a pattern is not unexpected in a community that fully exploits their stock. The presence in the house (CB) of an abundance of extremities – bones that bear little meat but are useful for marrow/fat extraction and bone working – is of interest (Figure 197). There is a predominance of astragali and phalanges amongst the extremities and, whilst this may relate to their robusticity and/or to their perceived low food value, the associated metapodials might have had an architectural usage. It should be noted that the intriguing arrangement of cattle metapodials surrounding the central hearth of the secondary floor (397) is not included in the analysis of the main bone assemblage.

The later infilling of the house (CC) contains more limb bones than the floor (Figure 197), indicating the deposition of more food waste, but at least 50% of the material is still from the extremities. This material is derived from slightly younger animals, with 13% neonates and 50% of material unfused (Table 107).

The Late Iron Age midden has a very different distribution, with a larger proportion of limb bones than in the floors and infill layers, and a more even distribution of waste bones, with similar numbers of metapodials and astragali present (Figure 197). This pattern resembles that produced if entire animals were being deposited and can be interpreted as a reflection of the midden as the eventual location for the disposal of the majority of bone waste. The age profile of the animals in the midden is also different to the floor and infill contexts; most of this material is from very young animals with 37% neonates and 44% bone unfused (Table 107). This may point to the preferential processing of young animals as food or, perhaps more likely, the selection and retention of mature bone for working.

In the Norse period the activity area (CE) is dominated by cattle extremities, and shows similarities to the Late Iron Age floor (CB) and infill layers (CC). The age profile of the activity area is most similar to the infill layers (CC), with both neonates and younger animals present (16% neonates, 49% unfused; Table 107), in contrast to the Late Iron Age floor levels (CB). As in the Late Iron Age midden (CG), the Norse midden deposits (CF) contain fewer bones from the extremities and more upper limb bones. Once again the midden deposits are the focus for limb bone elements and therefore food waste but, unlike the Late Iron Age, the age profile is not made up of neonates and younger animals.

It could be argued that these patterns are due to post-depositional differences, with the fragile neonatal cattle bone preferentially destroyed in some contexts, yet sheep show a very different age pattern with very few neonates present. Very little neonatal material was recovered in any area (<9% neonates) and with unfused bone at 36% to 54% (Table 107).

Overall the patterns are more even for sheep but, as for cattle, there are differences in which body parts predominate (Figure 197; Table 107). In the Late Iron Age, the middens (CG) again show the body part representation most indicative of entire animals being deposited. Unfused bone is equally prevalent in the floors (CB; 36%) and the midden (CG; 38%) with the greatest proportion of unfused bone (47%) in the infill layers (CC). Neonates are virtually absent in the Late Iron Age blocks, with only 2–3% identified.

In the Norse period there is a greater emphasis on prime meat-bearing bones in the activity area (CE) and in the midden (CF), with slightly more sheep than cattle limb bones present. As mentioned previously, the deposition of limb bones is more suggestive of food waste rather than other types of carcass processing. There is very little difference between blocks CE and CF in the age of death for Norse sheep, 8–9% neonates and 53–54% unfused, so the animals are therefore dying slightly younger in the Norse period than in the Late Iron Age (Table 107).

The small number of sheep neonates is similar to Bornais mound 3 and few Hebridean settlements produce newborn lamb carcasses (*e.g.* Mulville in Sharples 2005b; Mulville 1999). The more even age distribution across the site suggests that sheep were possibly less important in bone/hide working, though some artefacts are made of sheep bone.

Red deer

The anatomical distribution for red deer is shown in Figure 198 but it must be noted that the sample sizes are small. Overall the Late Iron Age figures for red deer are similar to those for cattle, with few elements other than the astragalus well represented. The main difference is that metapodials and phalanges are far less frequent than for either cattle or sheep. A range of elements from the head, represented by the zygomatic and mandible, down to the toes is present indicating that some whole carcasses were brought to the site. As hunted animals, slaughtered away from the settlement, some of the red deer might have been returned without the extremities or the hides, with attached lower limbs, could have been processed elsewhere.

The major limb bones, as with sheep and in contrast to cattle, do not show a discrepancy in representation between fore and hind limb elements.

The Norse sample is smaller, with most elements having an MNE of one and only the proximal humerus and radius having an MNE of two. The most abundant element is the astragalus, with an MNE of six. As for the Late Iron Age very few phalanges are recorded but relatively more metapodials are present.

If we compare the red deer body units by block the differences across the site become visible (Figure 197). There is an absence of head elements on the Late Iron Age house floors (CB) and this small assemblage is dominated by the few hind limbs and extremities present; the latter are predominantly made up of astragali, mirroring the situation in cattle. The infill layers (CC) follow the pattern seen for cattle with a majority of extremities, whilst the midden (CG) follows the pattern in both cattle and sheep, with an even distribution of body parts, The Norse activity area (CE) is more similar to the sheep with a predominance of limb bones, whilst the midden (CF) pattern is comparable to that seen for the other major food animals with a more even spread of elements; there is, however, a slight emphasis on fore limbs in this area.

The age of the deer material changes across the block (Table 107). There are few neonates in the Late Iron Age; a maximum of 2% in the midden (CG) suggests that, as for sheep, few young were returned to the settlement. The number of unfused bones is extremely low in the floor layers (CB), increases in the infill layers (CC) and reaches a maximum of 44% in the midden (CG). This pattern is mirrored in the Norse period where the activity area (CE) contains no neonates and only 11% unfused bone, whereas in the Norse midden (CF) a small number of neonates and nearly half of all bone are unfused. This suggests that the bones of the older animals were being preferentially deposited in houses whereas the bones of younger animals were placed in middens.

Discussion of body part distribution

Overall we can characterise the Late Iron Age house floors (CB), and to a lesser extent the infill layers (CC), as being dominated by bones of the extremities. Thus material of little meat value is entering the house, possibly for bone/hide working, along with a small quantity of prime meat-bearing bones. It may be that little food consumption was occurring in the house, or that food waste, possibly after cooking, was preferentially cleared whilst bone working waste (astragali, toes and metapodials) was allowed to accumulate. Bone working is further demonstrated by the predominance of mature cattle bone and metapodials, and the number of bone artefacts recovered (as a result of the fire).

The midden (CG) contains a spread of all elements and received all body parts in similar quantities, suggesting it functioned as the focus for bone disposal. What is of interest is that the large quantities of bone from the extremities in the house floor (CB) are not mirrored by an absence from the midden. The material in the midden therefore probably came from a number of sources and, whilst some bones were selected for working, not all were suitable. For cattle the majority of carcasses found in the midden (CG) derived from young animals, whose porous and unfused bones would not have provided suitable bones for working and/or their smaller hides were processed in a different manner. A similar pattern for sheep suggests that they too provided material for working on the house floors (CB), but provided more food debris in the infill layers (CC) with entire animals being deposited in the midden (CG).

The missing adult upper limb bones from the cattle and sheep carcasses were either being placed on another part of the site, or they were more highly processed, fragmented and destroyed as a result of food preparation, cooking and consumption.

The Norse activity area (CE) was similar to the Late

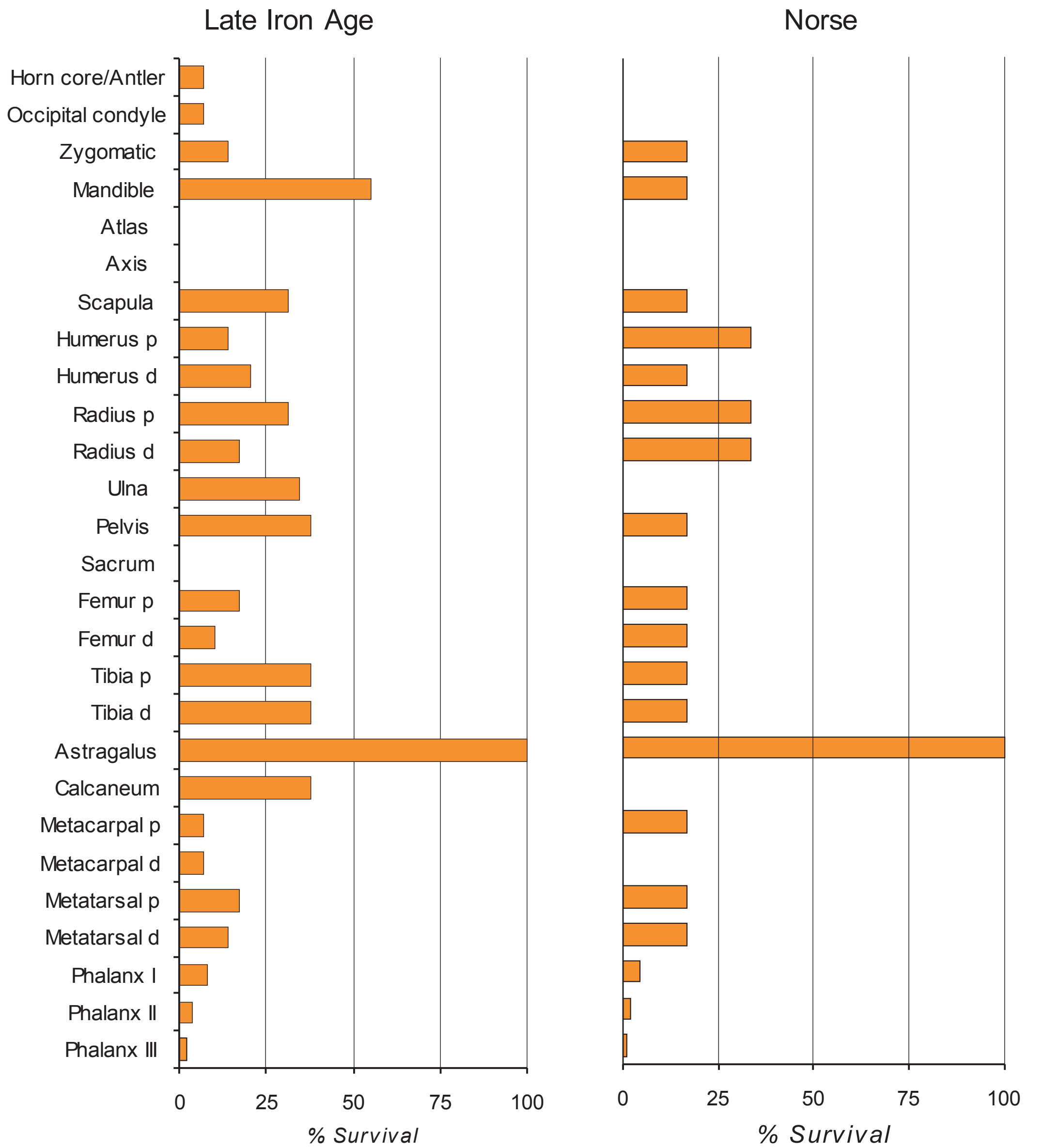


Figure 198. Comparison of body part representation for red deer in the Late Iron Age and Norse phases

Iron Age floor layers (CB) in the abundance of cattle extremities, with this area still providing a focus for cattle hide processing or bone working. The Norse age profile for cattle here was only slightly different to that seen in the Late Iron Age, containing a much greater proportion of neonates (16%) and with half the bone present unfused. There was a greater emphasis on sheep consumption in both the Norse activity area (CE) and midden layers (CF) with many prime meat bones were present. Sheep show little spatial distinction in age groupings in each phase. Deposition was unrelated to the productivity of different age animals or to the properties of the bone itself; only chronological changes in husbandry strategies are visible.

The percentage of unfused bone for red deer is similar to that seen for older cattle and suggests that deer were being treated in a similar way.

Conclusion – N Sharples

The excavations on mound 1 recovered a large amount of material that provides a considerable amount of information on the nature of the activities on mound 1 in the fifth and sixth centuries AD and to a lesser extent the Norse period. Most of the objects in the assemblages have parallels with objects in other assemblages from the Hebrides and further afield but there are several objects, including the ogham inscription, the decorated phalanges and astragali, and the antler and iron comb, that are unique and make this an assemblage of considerable importance to the understanding of early historic society in the Atlantic fringe of Britain.

The assemblage includes a considerable amount of waste material that represents either the debris from manufacturing activity or raw materials awaiting transformation into tools. A large amount of the unworked animal bone assemblage found in the Late Iron Age house (CB) appears to have been carefully selected as a raw material as it comprises mainly phalanges and astragali. These were stored with a very large assemblage of stone cobble tools in bags hanging from the walls of the house prior to its destruction. Many of these cobble tools could have been used to roughly shape the original bones but others were apparently unused and again represent the presence of a resource awaiting future use. The importance of manufacturing activities in the Late Iron Age is also indicated by the large collection of cut antler in both the infill deposits (CC) and the midden (CG). The bulk of this material is concerned with the transformation of local resources, mostly bone and antler, using simple tools, flint and pumice, but cut marks on this material indicate the use of iron objects such as saws and knives that are not present in Late Iron Age contexts at Bornais and rarely elsewhere.

No major transformative industries occurred in the vicinity of the areas excavated and, though one piece of fired clay was present, it is not sufficient to indicate local pottery production. The presence of large quantities of slag was initially thought to indicate a specialist high-temperature activity, such as metalworking, but detailed analysis indicates this is not the case; the slag derives from the fusion of sand, peat and stone in simple hearths. The size and complexity of some of the slags reflect the high temperatures of some of the hearths but again these do not necessarily indicate specialist activity but instead the use of outdoor hearths in the Norse period as the constant wind increased the temperature of these hearths.

The presence of external hearths in the Norse period is an interesting development and may reflect some changes in the nature of food production and consumption. These hearths could have had a specialist function; the most obvious might be to dry fish such as herring, which are a distinctively new feature in the Norse food assemblage of the Hebrides. However, the absence of any unusual concentrations associated with the hearths suggests that this is not a particularly convincing argument. Perhaps these hearths were simply for cooking food and they represent a more communal approach to food preparation and consumption. The radiocarbon dates associated with the activity area (CE) containing the hearths indicate very early Norse activity in this area, though there is also later activity, and similar open hearths appear to be present in Early Norse contexts on mound 2A (Sharples *et al.* forthcoming). Perhaps these hearths indicate the presence of large groups of people in temporary residence at the settlement – this is the period of the Viking raids when large groups are known to have been moving around the Atlantic seaways.

In the Late Iron Age food preparation is indicated by the presence of many vessels covered in sooty residues, which have clearly been placed on a hearth. The large size of many of the vessels used in this period does, however, suggest a storage function is important and it is also notable that the range in vessel forms is relatively restricted, particularly when compared to the later Norse assemblages, which include flat baking plates and small cup-like vessels as well as the more ubiquitous cooking wares.

The inhabitants seem to have had a varied diet that consisted of a range of wild resources including birds (which also provided feathers, oil and eggs), fish (saithe and salmonids in the Late Iron Age and herring, hake and cod in the Norse period), shellfish (mostly winkles and limpets), whale and red deer. In the Late Iron Age the saithe seem to have been processed on site but in the Norse period processing occurred elsewhere and the material deposited on site consists of consumption debris from the eating of waste products from cod and hake processing or the prime meat from herring processing. Red deer also seem to have been brought to the site largely unprocessed though some of the extremities might have been removed elsewhere.

There is currently no way to assess the relative importance of different animal species and plants but it is clear that in the Norse period the quantities of fish, shellfish and crops increase and generally there is a much wider range of species being exploited. Herring become important, having been an insignificant species in the Late Iron Age, and oats, rye and flax become a major part of the domestic economy (Sharples 2005b). It is difficult to know whether this coincides with a relative decline in the importance of domestic animals but there seems no reason to make this assumption. Instead it would seem more likely that the Norse colonisation represents a maximisation of the exploitation of the natural environment and intensification in the production of the domestic environment. This appears to be sudden and dramatic but it is more likely that it is the culmination of a process that was underway throughout the first millennium AD. There is clear evidence that fish were becoming a more important part of the diet in the Late Iron Age I occupation than they were in the Middle Iron Age and new crops such as oats were of increasing importance in Late Iron Age II deposits (see Sharples and Smith 2009).

These developments are also visible in the increasing range of material culture available to the occupants which again seems to change dramatically between the Late Iron Age I and the Norse periods in mound 1. As has been mentioned, the overwhelming bulk of the artefacts found on the site are made from locally available materials and the inhabitants clearly had a wide range of simple tools. Unfortunately identifying a restricted function for most of these objects is difficult; the range of points and handles is directly comparable to many other assemblages from sites in the Western Isles (Hallén 1994; Hunter in Armit 2006) and these will be discussed in greater detail below 327. The most distinctive group of objects is that associated with textile production and these are almost exclusively associated with the abandonment and infilling of the wheelhouse. Weaving combs are a relatively common discovery in Atlantic Scotland but weaving tablets are relatively rare. The Bornais assemblage of tablets is the first group of stratified examples from the region. These clearly indicate an interest in dress and suggest the creation of fine textiles was possible in the region.

The importance of identity focused on the decoration of the body is also indicated by the wide selection of ornamental objects present. In the Late Iron Age these are mostly simple objects comprising bone pins, beads and toggles but there is also an interesting antler finger ring which appears to copy the form of a Roman ring and suggests the inhabitants were aware of developments in southern Britain. In the Norse period this became even more important and the fragmentary remains of a wide range of combs and pins were found on mound 1, including an important example of a copper alloy stick pin. Objects comparable to all of these were found in very large quantities on mounds 2 and 2A and such finds will be discussed in greater depth when this assemblage is published.

The importance of gaming in the Late Iron Age is indicated by the presence of a number of ceramic and shell discs, a pair of parallelopiped dice with associated decorated astragali and a few other pieces such as the decorated phalanx and the bone pegs which might be gaming pieces. It is interesting to note that no Norse gaming pieces were found on mound 1 though they are known from the other mounds. These pieces again indicate that the inhabitants of the settlement were well connected with areas outside the Atlantic region – parallelopiped dice are found throughout Britain and Ireland and clearly indicate the development of a culture of gaming amongst the Roman and post Roman elite. It has been argued, however, that these objects are, in this case, associated with acts of divination and they therefore might indicate the presence of someone with special knowledge and magical powers.

In the Norse period there are two objects that have a similarly ambiguous role, the ogham inscription and the fragment of green porphyry. The latter is arguably a specifically religious item imported from the Mediterranean because of its association with the important religious centre of Rome. These objects clearly circulate as fragments and are a clear demonstration of the important symbolism of even the most innocuous piece of material culture. The ogham is more difficult to interpret; it could possibly indicate some form of simple book-keeping but it is more likely to have had a more specialised function and again a role in divination or lot casting is possible.

Notes

1 The dating of the Middle Iron Age wares at Dun Vulan as late as the fifth and sixth centuries is not convincing (Parker Pearson and Sharples 1999, 210).

2 It is not clear which of the important assemblage of diagnostic bone artefacts should be associated with this phase or the subsequent Plain style pottery (Young 1956, 315–27).

8 Discussion

Introduction – N Sharples

The excavation of mound 1 has provided a valuable contribution to our understanding of the Iron Age in the first millennium AD. As we discovered at the beginning of this report, some periods of the Iron Age of Atlantic Scotland are well documented. A relatively large number of excavations have taken place and these include work in the last two decades which employed good recovery techniques and which can be directly compared to the excavations at Bornais. It is also possible to place these sites in a landscape of settlement as the monumental nature of the architecture and the tradition of elaborately decorating the ceramics allows unexcavated sites to be located and dated.

In this discussion I will explore

- The nature of wheelhouse architecture and the use of wheelhouses;
- The abandonment and destruction of the Bornais wheelhouse;
- The use of material culture and the social importance of artefacts;
- Power relations in the first millennium AD;
- The agricultural economy of the period.

This is followed by a brief analysis and summary of the nature of the Norse settlement on this mound but this is a relatively limited discussion.

The wheelhouse – N Sharples

Two recent surveys of wheelhouses exist. Armit (1992a, 51–72) has provided a detailed account of the evidence from the Western Isles, identifying 17 definite wheelhouse sites and nine possible sites on the islands. Crawford (2002) has examined the wheelhouse evidence throughout Scotland and identified 62 structures (note some of Armit's sites include several of Crawford's structures). Neither survey can be used uncritically as Armit does not clearly differentiate between definite and possible examples and Crawford excludes some fairly well documented examples (such as Bruach Ban and Bruthach a Tuath on Benbecula; Armit 1992a, 59), conflates separate sites (Sligeanach and Cill Donnain III on South Uist; Sharples 1998a and Zvelebil 1991) and includes structures that would not routinely be thought to be wheelhouses (*e.g.* all the sites recorded on Orkney). I have tried to clarify this situation by providing an updated and corrected list of sites in the Western Isles (Table 108) using Crawford's definition that the structures had to have evidence for '…a curve of drystone walling showing at least two radial piers' (Crawford 2002, 111). The distribution of these wheelhouses is shown in Figure 199 and some characteristic examples are shown in Figure 200. It is likely that this distribution indicates only the sporadic activities of archaeologists in the Western Isles and not the nature of Iron Age settlement.

Crawford (2002) claims that almost 60% of the original distribution of wheelhouses has been identified and excavated but I would regard this as an absurd suggestion. Every Middle Iron Age settlement identified in the South Uist survey (Parker Pearson 1996b; 2012) is likely to produce at least one and probably up to three structures that would be classified as a wheelhouse by Crawford. Parker Pearson's survey of the South Uist machair is not likely to have been 100% successful in identifying all Middle Iron Age settlement and it suggests that only a small percentage of the wheelhouses have been excavated.

The wheelhouse population would also be increased by the recent work on the moorlands of Barra and South Uist. The site at Allt Chrisal T17, Barra (Foster and Pouncett 2000) survived as a formless stony mound and was originally interpreted by Armit as an Atlantic Roundhouse (Armit 2005, fig. 36) yet excavation revealed a relatively well preserved wheelhouse.[1] Branigan subsequently identified a further 15 field monuments on the uplands of Barra and Vatersay that could be wheelhouses (Branigan and Foster 2000, 337). On South Uist a particularly well preserved group of wheelhouses survives on the east coast of the island at Usinish (Thomas 1870) and there are other possible candidates in the moorlands. A souterrain at Bealach a'Chaolais is almost certainly attached to a wheelhouse and the author is also convinced that the robbing of the cairn in front of the chamber of the Neolithic tomb at Loch a'Bharp indicates the presence of a wheelhouse (Cummings *et al.* 2005, 51; 2012). Many more upland wheelhouses may be disguised by the construction of more recent shieling settlements. It would seem likely therefore that large numbers of wheelhouses await discovery by future excavators.

The excavations at Allt Chrisal were also important in identifying an earlier structure that preceded the wheelhouse (Foster and Pouncett 2000, 150–2). This was not well preserved but a simple roundhouse with an external diameter of 10.9 m appears to be present.

Number	Name	Island	Site number	Diameter	Number of piers	Date excavated	Publication
LEW1	Cnip	Lewis	1	6.7	8	1987-8	Armit 2006
LEW2	Cnip	Lewis	2	6.7	3, est 7	1987-8	Armit 2006
LEW3	Traigh na Berie, Bhaltos	Lewis	12	7 to 8			Armit 1991
USTN1	Udal South	Uist, North	A	10.8	11		Crawford 2002
USTN2	Udal South	Uist, North	B	10.8	11		Crawford 2002
USTN3	Udal South	Uist, North	C	7.6	8		Crawford 2002
USTN4	Udal North	Uist, North	XV				Crawford 2002
USTN5	Sollas, Machair Leathann	Uist, North		10.9	13	1957	Campbell 1991
USTN6	Eilean Maleit	Uist, North		7.6	7, est 9	1995	Beveridge 1911; Armit 1998
USTN7	Cnoc a'Comhdalach	Uist, North		7	7	1905-07	Beveridge 1911
USTN8	Garry Iochdrach	Uist, North		7.8	7	1912-3	Beveridge and Callander 1932
USTN9	Clettraval	Uist, North		7.4	8	1946-48	Scott 1948
USTN10	Bac Mhic Connain	Uist, North	D	8.7	8	1919	Beveridge and Callander 1932
USTN11	Bac Mhic Connain	Uist, North	A	5.7	2	1919	Beveridge and Callander 1932
USTN12	Foshigarry	Uist, North	A	11		1911-12	Beveridge and Callander 1931
USTN13	Foshigarry	Uist, North	B	11.9	3, est 13	1912-13?	Beveridge and Callander 1931
USTN14	Foshigarry	Uist, North	C	10	4, est 12	1912-13?	Beveridge and Callander 1931
USTN15	Sloc Sabhaidh, Baleshare	Uist, North	tr 1			2005-9	Rennell and McHardy 2009
USTN16	Sloc Sabhaidh, Baleshare	Uist, North	tr 2			2005-9	Rennell and McHardy 2009
BEN1	Bruthach a Tuath	Benbecula		8.8	7 est 10	1956	Armit 1992
BEN2	Bruach Ban	Benbecula		10		1956	Armit 1992
GRM1	Grimsay, Bagh nam Fheadaig	Grimsay		8.5	8	1994-97	Hothersall and Tye 2000
USTS1	Hornish	Uist, South		8	5, est 10	1984	Barber 2003
USTS2	A'Cheardach Mhor, West Geirinish	Uist, South		9.6	9, est 11	1956	Young and Richardson 1960
USTS3	A'Cheardach Bheag, Drimore	Uist, South	I	10.8	12	1956	Fairhurst 1971
USTS4	A'Cheardach Bheag, Drimore	Uist, South	II	4.9	3, est 8	1956	Fairhurst 1971
USTS5	Cill Donnain	Uist, South		5	6	1989-1991	Zvelebil 1991
USTS6	Kilpheder	Uist, South		8.8	11	1951-52	Lethbridge 1952
USTS7	Sligeanach	Uist, South		?		1998	Sharples 1998a, 2012
USTS8	Bornais	Uist, South			2, est 6	1996-99	Sharples 1999
USTS9	Uamh Ghrantraich (Scalavat)	Uist, South		8.2	5, est 10		Crawford 2002
USTS10	Uamh Iosal (Usinish)	Uist, South		8	4, est 9		Thomas 1870
BAR1	Allasdale, Tigh Talamhanta	Barra		8.2	7, est 9	1950-53	Young 1952
BAR2	Allasdale Dunes	Barra		12.1		2008	Wessex Archaeology 2008
BAR3	Allt Chrisal	Barra		6.3	7	1996-99	Branigan and Foster 2000

Table 108. A list of wheelhouses in the Western Isles

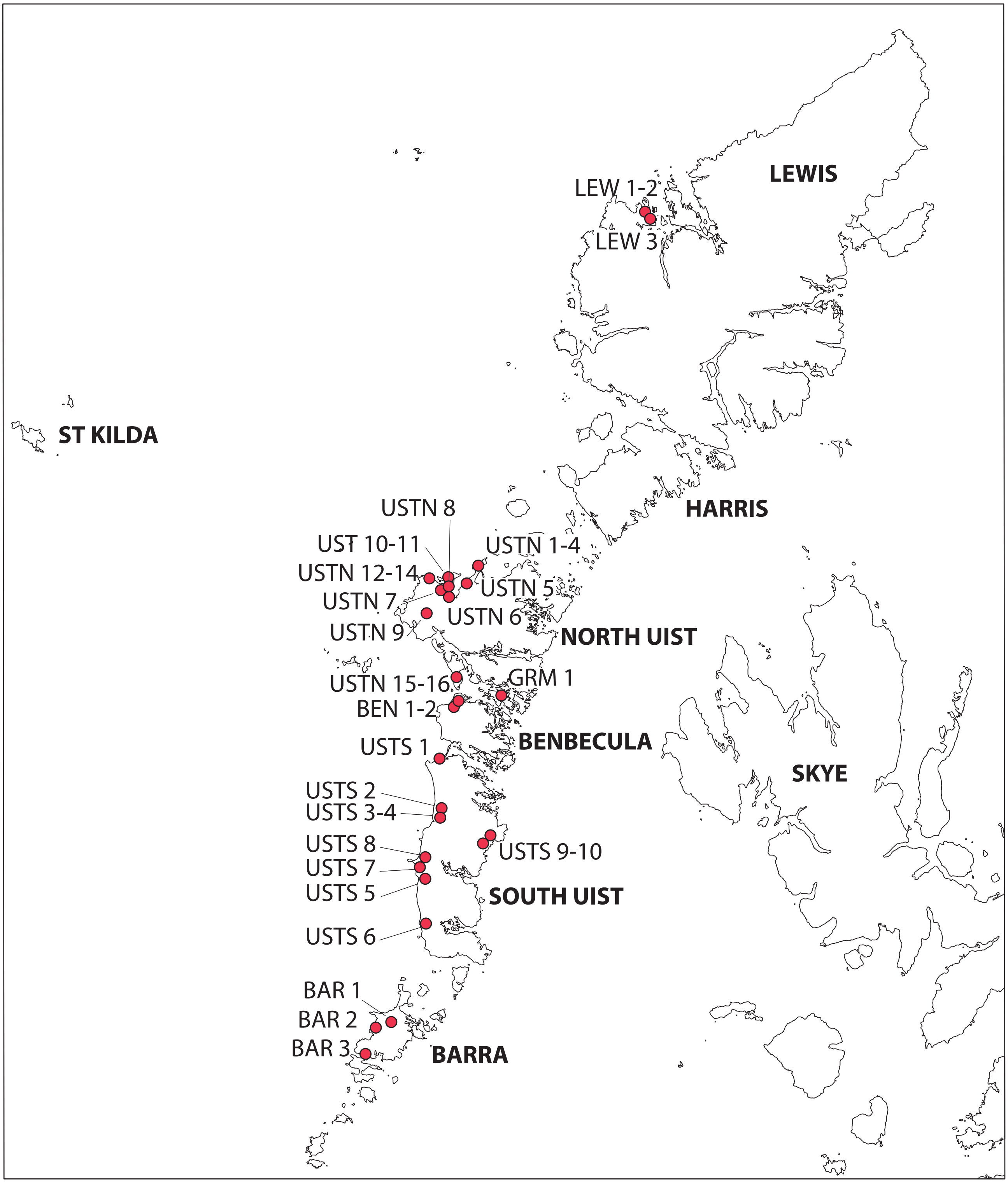


Figure 199. The distribution of confirmed wheelhouses in the Western Isles

This simple roundhouse can be compared to 65 other roundhouses found during the survey of Barra and Vatersay which were split into possibly chronologically significant categories on the basis of size. Excavation in the Borve valley revealed a badly-preserved example of one of these houses which has been dated to the Early Iron Age on the basis of the pottery (Cumberpatch in Branigan and Foster 2000, 223), and a simple roundhouse has also recently been identified and partially excavated in the Allasdale Dunes on Barra, producing a radiocarbon date of 750–400 cal BC (Wessex Archaeology 2008). The evidence from Barra therefore suggests the presence of a group of Early Iron Age roundhouses that appear to lack the architectural sophistication of wheelhouses.

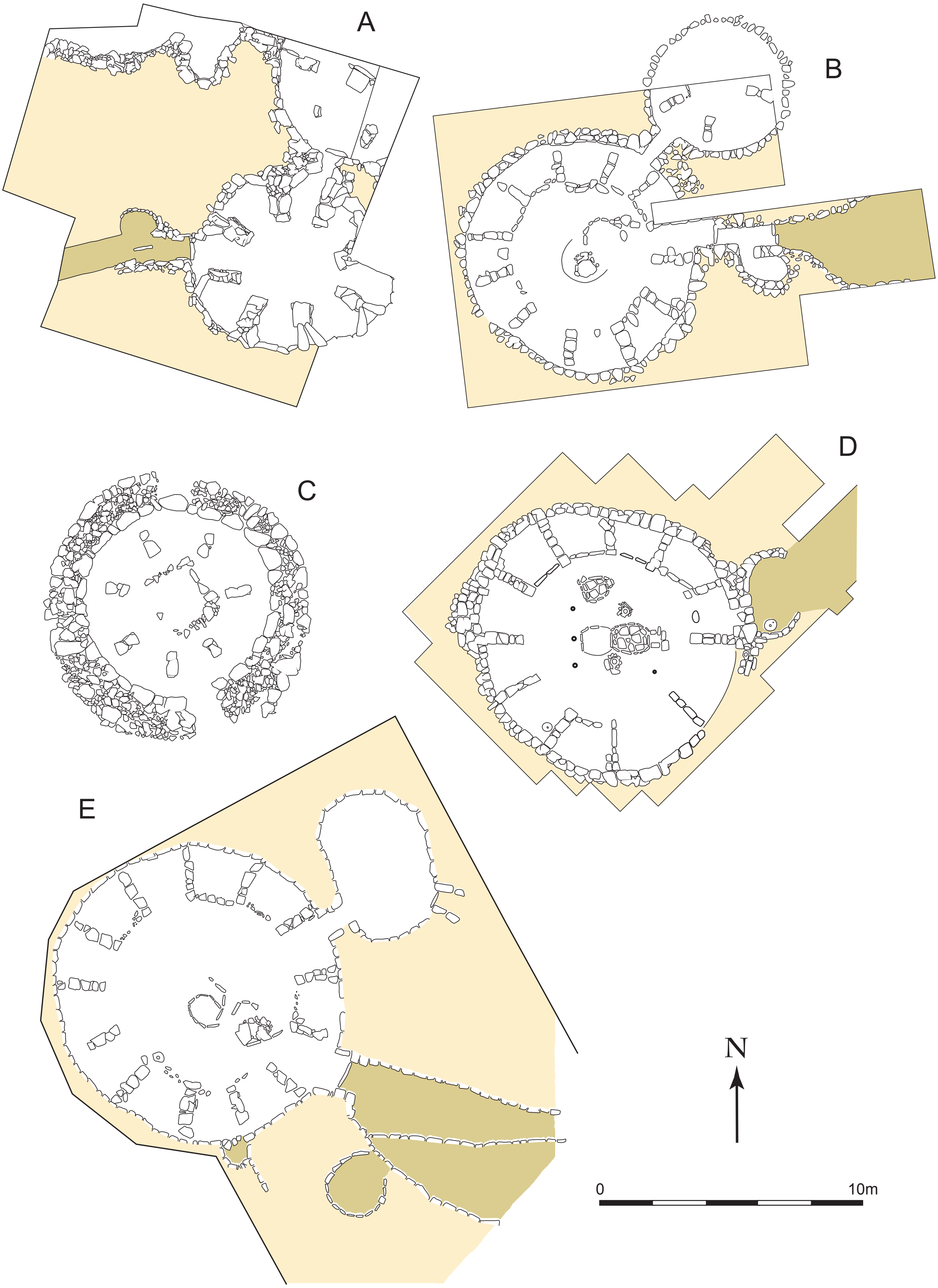


Figure 200. The plans of selected wheelhouses from the Hebrides. A) Cnip, B) A'Cheardach Bheag, C) Allt Chrisal, D) A'Cheardach Mhor, E) Sollas

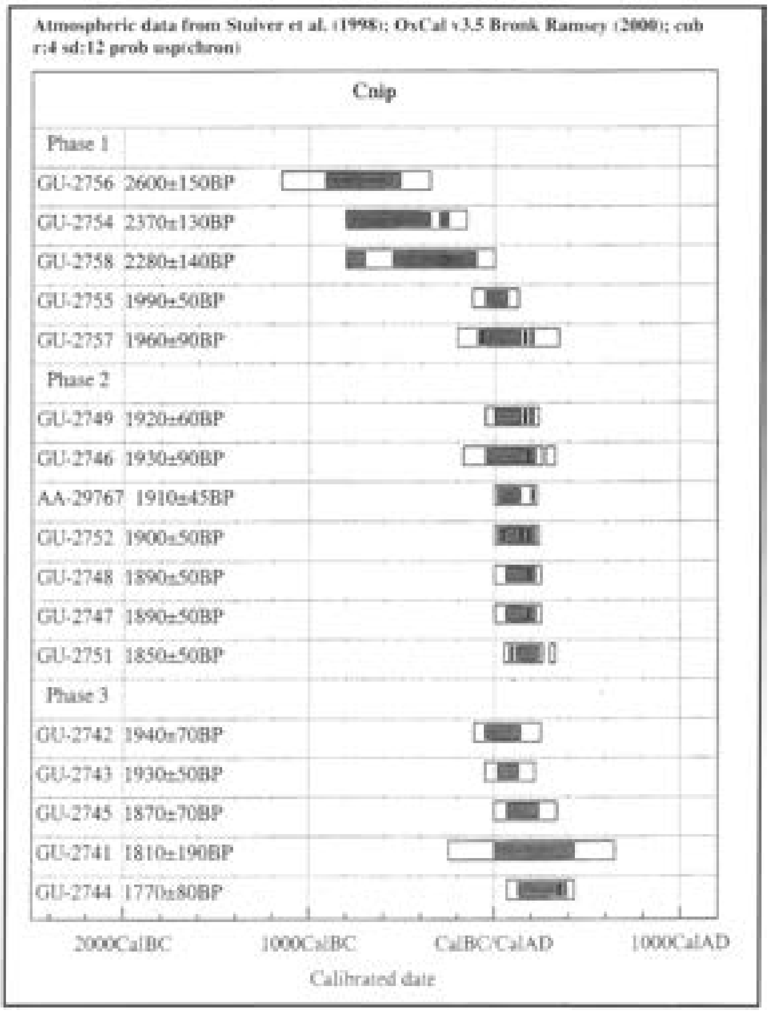


Figure 201. A simplified diagram of the radiocarbon dates from Cnip, Lewis (Sharples 2005a, fig 21)

On South Uist excavations at Cladh Hallan (Parker Pearson *et al.* 2000; 2004a) have revealed a Late Bronze Age settlement that includes three simple circular or sub-circular houses arranged in a row facing east. The central house had a porch elaborating the entrance and there was a sequence of seven surviving floors which indicate the house had a long life that included frequent refurbishment of the living area. The other houses had much simpler life cycles. Large quantities of occupation material were recovered from the house and the distribution of this material in the roundhouse was distinctive, marking out working areas in the south half of the house.

Understanding the chronology of wheelhouses is impeded by the lack of sites with sequences that have produced multiple radiocarbon dates. The only well-dated examples before the excavations at Bornais were Sollas (Campbell 1991) and Cnip (Armit 2006). In his conclusion to the analysis of the radiocarbon dates from the wheelhouse at Cnip, Armit suggests 'wheelhouses were constructed and occupied in the later centuries BC, possibly prior to 200BC .... with clear antecedents perhaps as early as 400–500 BC' and that 'there appears to be no evidence as yet for the construction of any Hebridean wheelhouse after the first century AD' (Armit 2006, 222–3). The sequence of dates from Cnip (Figure 201) demonstrates that the later phases, 2 and 3, of the site securely belong to the first century AD and the second to mid third centuries AD. The first phase is more problematic as curated material has clearly been brought to the site during the construction process and provides a disparate set of radiocarbon dates that spans much of the first millennium BC. It seems most likely that the first phase belongs to the first century BC but it is impossible to prove this.

Armit's argument for the earlier origins of the wheelhouse is based on the presence of saddle querns at Foshigarry (Beveridge and Callander 1931) and the dating of structure 5 at Hornish Point (Barber 2003). Neither is particularly satisfactory. The radiocarbon dates from Hornish Point are mostly marine shell, which provides unacceptably early dates, and the only two dates from charcoal come from mixed assemblages of carbonised grain originating from several contexts and are thus not ideal samples. However, the latter two dates do suggest activity in the fourth to first centuries BC. The recent excavations at Eilean Olabhat in North Uist (Armit *et al.* 2008) provide much better evidence for the origins of wheelhouses. The earliest activity on this site occurred in the fourth to third centuries BC (Armit *et al.* 2008, 97) and consisted of a roughly circular building which was modified by the addition of at least three substantial stone piers. The structure is small and lacks the sophistication of a classic Middle Iron Age wheelhouse but clearly indicates the introduction of the essential elements of the architecture in the latter half of the first millennium BC.

Armit's suggestion that wheelhouse construction comes to an end before the second century AD was based on the argument that the wheelhouse at Cnip was losing its monumental character by the end of the first century AD and that the first to third century AD dates from the wheelhouse at Sollas (Campbell 1991) are for its use rather than its construction. Both observations can be accepted as essentially correct. However, the decline in the structural integrity of the Cnip wheelhouse may simply reflect the problems of maintaining the building rather than a general decline in architectural competence. Similarly the significance of the Sollas dates is that they indicate the use of a monumental wheelhouse in the first to third centuries AD and I can see no reason why new wheelhouses similar to this structure could not be constructed in this time period.

The dates from Bornais suggest that the structure on mound 1 was most likely built in the first half of the fifth century cal AD (see above 219) and, whilst this building is too badly preserved to prove that it is definitely a wheelhouse, this seems the most likely interpretation. It seems therefore that wheelhouses have a much longer currency than people have realised. The defining characteristics, the piers, were being developed in the fourth to third century BC and continued to be visible into the early fifth century AD. The relatively late date for the creation of wheelhouses should not come as a total surprise as the excavations at Scalloway on Shetland indicated that a wheelhouse was constructed inside a broch in the late fifth to sixth centuries AD (Sharples 1998b). Furthermore, recent work at the broch of Scatness on Shetland (Dockrill *et al.* 2010) conclusively demonstrates that wheelhouses were being constructed around the outside of the broch in the fifth to sixth centuries AD and were used through to the middle of the ninth century AD. Furthermore, the Scatness sequence also demonstrates an architectural development from aisled wheelhouses, to wheelhouses with infilled but still long thin rectangular piers, to wheelhouses with integrated triangular piers as is also seen at Jarlshof. There seems no reason to refuse to accept the dates from Bornais particularly as so few wheelhouses have been adequately dated.

The Bornais excavations provide little information on the construction of the wheelhouse as most of the evidence for this activity was destroyed. The author would generally accept the sequence of construction outlined by Armit (1992a, 66–8) and believes that the Bornais wheelhouse would have been constructed in a pit, the internal wall of the house essentially acting as a revetment to the surrounding sand. The piers that are the defining features of these structures project into the interior and create a series of peripheral rooms as well as providing support for the corbelled vaults that roofed these rooms. The peripheral rooms surround an open central space and the roofing of this is slightly more debatable. The most widely accepted interpretation of how this space was roofed is depicted in a reconstruction drawing by Braby (Figure 202; Armit 1992a, illus. 6.13) and this suggests a seamless transition from corbelled vault to pitched thatch roof supported by timber rafters. This interpretation has been challenged by Crawford (2002, 123) who, on the basis of a drip gully and paving found in the Udal wheelhouses, has argued that the central area was never roofed. The author finds this suggestion implausible. The presence of hearths in the majority of wheelhouses suggests they were meant to be roofed. The drip gullies are more likely to reflect a drainage problem where the thatched roof of the central area met the corbelled roof of the peripheral rooms. It is precisely such junctions that are always the source of leaks in new and old houses. The evidence from Bornais demonstrates the presence of a wooden roof covering the central area of this wheelhouse and I would assume that all wheelhouses were constructed with a central timber roof. The recent reconstructions at Old Scatness on Shetland have demonstrated the ease with which such structures can be built (Malcolmson *et al.* 2004).

An alternative interpretation of the timbers found at Bornais is that they represent the remains of a raised floor, attic or loft. Whilst the author would be happy to accept the presence of internal flooring in roundhouses (and scarcement ledges in the aisled roundhouses at Old Scatness and Jarlshof clearly indicate they were present in some houses), the bulk of wheelhouses seem designed specifically to create a sense of monumentality which is enhanced by the very high roof space of the central area (Armit 1997). There is no obvious evidence for internal access to this putative upper floor, though a removable ladder would be adequate. It is also worth noting that the hearth needs an area of roof in which smoke can collect and the space between an upper floor and the roof would be very restricted. I would therefore argue that the timbers represent the roof.

The presence of a roof and central hearth supports the argument that wheelhouses are essentially domestic dwellings which, though monumental pieces of architecture, are not fundamentally different in function to other roundhouses found throughout Britain in the first millennium BC (Harding 2009). The suggestion (most recently made by Crawford 2002) that wheelhouses are temples with a specialist religious function, is essentially a misunderstanding of the significance of the unusual deposits found in the houses at Sollas and Hornish Point (Campbell 1991; Barber *et al.* 1989). These deposits indicate the inseparable nature of domestic life and ritual activity rather than the specialist function of these houses.

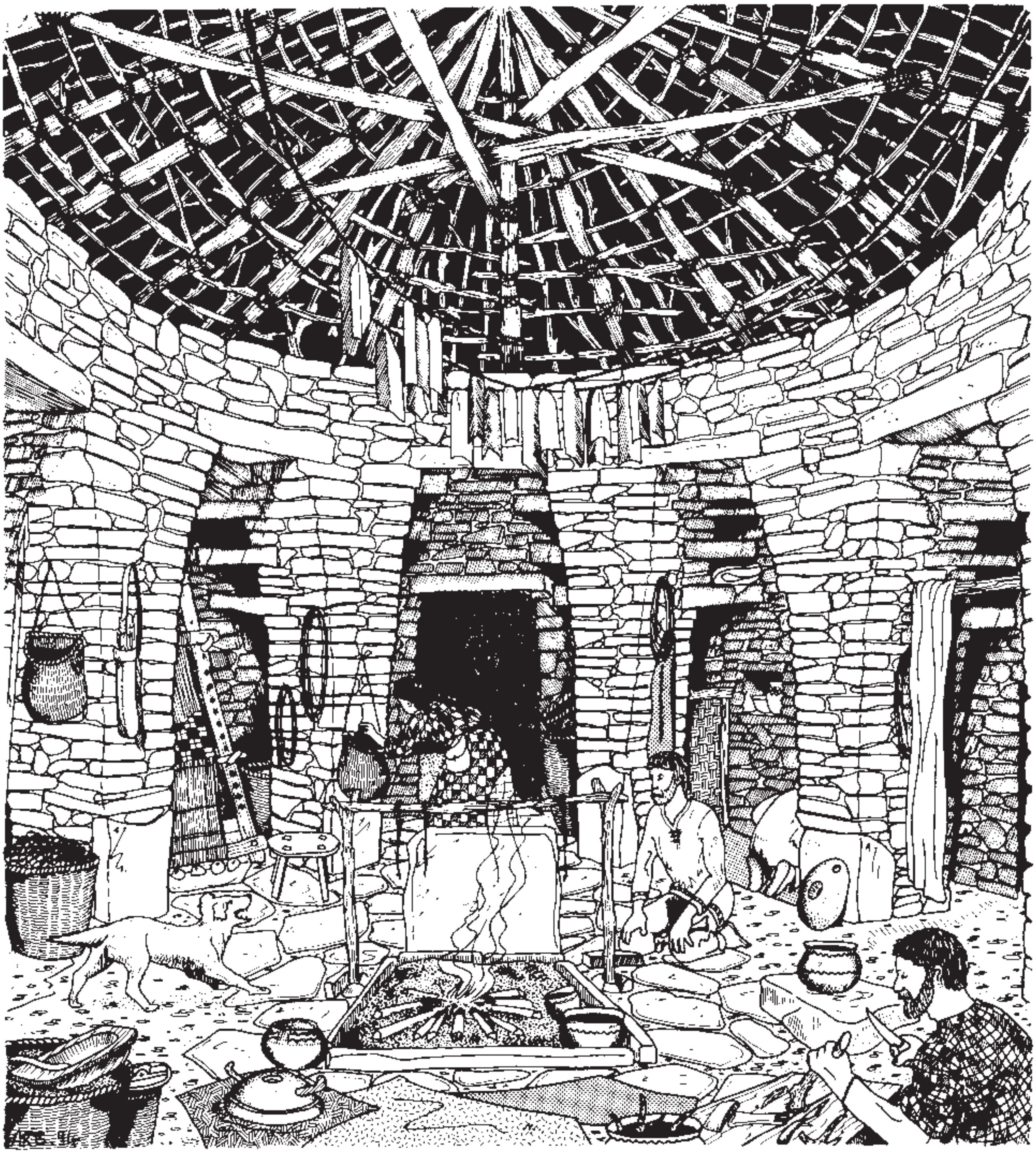


Figure 202. A reconstruction of a wheelhouse interior by Alan Braby

Houses have always been a focus for ritual activity and this is well documented in other areas of Europe in prehistory (Gerritsen 2003; Webley 2008) and in many non-western societies (Waterston 1997). It would be more surprising if there was no evidence for ritual activity.

The substantial nature of these structures and their distinctive features can be attributed, in two different ways, to the increasing monumentalisation of the domestic sphere that is such an important characteristic of the end of the first millennium BC in Atlantic Scotland (Armit 1997). In one sense the wheelhouse appears to be providing an alternative discourse to that provided by brochs. Brochs are conspicuous and designed to dominate the landscape and create a feeling of awe. The wheelhouse in contrast presents a hidden monumentality; the houses are concealed within the landscape and are only understandable to those allowed to penetrate the interior. It could be suggested that these structures present a subversive monumentality designed to undermine the overt power structures inherent in the creation of the broch. However, the precise structural characteristics of the wheelhouse may have a more prosaic origin.

There are no obvious precursors for the wheelhouse form in the Western Isles. Settlements such as Cladh Hallan (Parker Pearson *et al*. 2001) demonstrate the existence of simple roundhouses in the Late Bronze Age and Early Iron Age that had timber and thatch roofs covering a floor area of approximately 60 sq. m. The large area of these houses suggests the presence of long timbers that could be used as rafters and supports for the roof. The principal effect of the introduction of the wheelhouse form is the increased emphasis on a distinction between the central area and the peripheral cells and the reduction of the area that needs to be covered by a timber and thatch roof. This would place much less demand on good quality (long and straight) timbers. The development of the wheelhouse might also have encouraged the tendency to build subterranean dwellings in the machair as this would have reduced the amount of stone required to support the corbelled vaults.

There could be a number of reasons for this change but it seems to indicate that good timbers were no longer available for the construction of the smaller houses. Access to timber has always been a problem on the islands of Atlantic Scotland (Fojut 2005) as most of the pollen studies done on the islands suggest the disappearance of native woodland in the Bronze Age. Small relic woodlands may survive in isolated valleys but these are unlikely to be capable of producing long straight timbers. It has been argued that timbers were being imported to Shetland from the Scottish mainland (Fojut 2005) but there is very little evidence for this and the evidence for complex long-distance exchange networks in the Middle Iron Age is minimal (Sharples 2003b). The most likely source of timber is spruce driftwood ultimately derived from North America but found on the beaches of all the islands and this is the principal material used for the timbers at Bornais.

Fojut has questioned the idea that driftwood is really a very suitable raw material for use as a structural timber but his dismissal is based on hearsay and there really needs to be some experimental work to find out how suitable this material is for building houses. Access to driftwood is likely to have been tightly controlled by the community, with rights to material washed ashore on specific beaches likely to have been the subject of detailed negotiations within each locally-defined community (Sharples 2005b, 161). It is also clear that these are precisely the type of resources that could have been appropriated by local leaders. It is possible that a reduction in the availability of good driftwood timbers might have been caused by some external factor affecting the erosion of virgin forests in North America, or a change in the currents that brought the material to the shores of South Uist, but it seems more likely that it represents the appropriation of this resource by a section of the community that was not living in the simple roundhouses of the coastal plain.

It is therefore significant that brochs not only used a large amount of stone (which in the Hebrides is, relatively speaking, an unproblematic resource) but they also required large quantities of good quality timber. It has been commonly acknowledged in most of the recent broch reconstruction drawings (Parker Pearson and Sharples 1999, fig 1.5) that not only do these structures have to have been completely roofed but that there were substantial internal floors and dividing walls, all of which would have needed good quality timber. The construction of the brochs could well have absorbed all of the sizeable timbers in any territory and would have made the development of an architecture which minimised timber requirements very attractive.

Another possible source of timber is the roof timbers used by the other members of the community. Roof timbers could well have been of considerable age and there are documented cases of timbers being removed from houses that are being abandoned for use in the new house. Such re-use could have happened repeatedly in an environment where timber was in short supply. If one accepts the interpretation that brochs were constructed as part of a deliberate attempt to manipulate power relationships then the appropriation of timber resources could be seen as a deliberate attempt to link households with the new constructions. Ancestral timbers within the broch might well be clearly visible and recognisable to different families. The appropriation of these timbers would make it increasingly difficult to roof normal roundhouses and again would encourage the inhabitants to reduce the area requiring a timber roof.

It is possible that the occupants of the Western Isles looked to other regions for a solution to this problem. The absence of trees seems to have been a particularly acute problem on Shetland where driftwood was already being used to provide major structural supports in the large Late Neolithic/Early Bronze Age structure at Stanydale (Calder 1952). It may be significant that the roundhouse does not appear to have been adopted in Shetland in the Later Bronze Age as it was elsewhere in Scotland and Britain. Instead a distinctive cellular architecture appears to have evolved which included the use of piers projecting into the interior of the house, though these are not comparable in their regularity to wheelhouses (Downes and Lamb 2000). The roundhouse first appears at the beginning of the Iron Age at Jarlshof (Hamilton 1956) where several examples were constructed on top of a group of Late Bronze Age cellular houses. The wheelhouse may represent the fusion of the symbolically significant form of roundhouse architecture with the locally distinctive tradition of cellular architecture. The earliest dates for the wheelhouses at Old Scatness suggest they were constructed in the first century BC (Outram and Batt 2010) but these may not be the first wheelhouses ever constructed. There are no dates for the wheelhouses at Jarlshof.

Wheelhouse use – N Sharples

If we accept the fundamentally domestic nature of the wheelhouse it should not obscure the fact that the house always has a purpose or role that is greater than simply providing shelter from the elements. The house is the heart of the domestic world, the architectural feature that defines the primary social unit, the household, and separates it from other households. A considerable amount of work has been done on the significance of houses in the Iron Age of Britain; this has largely been focused on the orientation of the entrances and the patterning of deposition in the interior and how this can be used to discuss the organisation of day to day activities within the house (Fitzpatrick 1994; Giles and Parker Pearson 1999; Hingley 1990; Oswald 1997; Parker Pearson 1996a, 1999; Parker Pearson and Richards 1994). A developing area of interest is the temporal sequence of house construction, use and abandonment which can be related to the social life of the households contained by these structures (Brück 1999; Barber and Crone 2001; Cowley 2003; Gerritsen 2003; Sharples 2005a).

The evidence from Bornais provides valuable information on both the spatial and temporal understanding of roundhouses and needs to be put into the broader context of studies in these two areas. It is clear from a large number of analyses that Iron Age roundhouses are generally oriented towards the east or south-east (Oswald 1997; Parker Pearson *et al*. 1996). This predominant pattern should not obscure the significance of houses that are oriented in other directions; indeed, it emphasises the significance of these houses.

It is very noticeable that a detailed examination of the orientation of brochs (Parker Pearson *et al*. 1996) revealed a large number of these structures to be oriented to the west. It has been suggested that the status of the occupants of the brochs might have allowed them to deliberately subvert the normal orientation; forcing people to approach from an inauspicious direction emphasised the special nature of these structures. This can be linked to the suggestion that the location of brochs is specifically chosen to suggest a controlling relationship over nature (Sharples and Parker Pearson 1997). It is also important, however, to note that the relationship between access and orientation is complicated by the three-dimensional nature of these structures. The principal domestic room in a broch might not have been on the ground floor but instead on the raised floor indicated by the presence of a scarcement ledge in many brochs (Sharples 1998b). In most brochs to reach the first floor it is necessary, on entering the broch, to turn to the left and enter a passage in the wall which leads through a chamber to a staircase. This runs up through the wall in a clockwise or sunwise direction to the entrance that leads you into the first-floor residential space. Access into this room is normally 180° opposite the entrance into the broch.[2]

Unfortunately, it is not always possible to reconstruct this path as most brochs survive as field monuments with many of the principal architectural features obscured by rubble. It may be that the architecture and the pathways it created emphasised the orientational differences of brochs or they could have been used to reduce them. The broch at Dun Vulan (Parker Pearson and Sharples 1999) is a very good example of the pathway emphasising difference: a visitor entered through the east entrance, the entrance to the staircase lay in the south sector of the enclosing wall and this led up in a sunwise direction to allow access to the second floor from the west.

It is also clear that an unusually large number of wheelhouses have west-facing entrances. In a recent study of wheelhouse orientations, Armit (2006, 250) identified 18 orientations in the Western Isles. These exhibit the general trend towards the east and south-east but include five wheelhouses with west-facing entrances. Three of these – Allasdale, Clettraval and Allt Chrisal – are located in moorland locations but two, Bornais and Cnip, are in the more characteristic machair environment. Parker Pearson and Sharples (1999, 17) suggest that the reversal of orientation may be associated with a specialist function for the occupants and metalworking was thought to be significant but, as Armit (2006, 250) notes, the evidence for metalworking from Cnip is not closely associated with the wheelhouse. The other west-facing wheelhouses produced only limited evidence for metalworking which is no different in scale or character to that from east-facing wheelhouses. There is no metalworking evidence from Bornais. There is nothing to suggest any chronological division and, though the west-facing wheelhouses are all small, there are other smaller wheelhouses that face east.

At a more general level it may not be sensible to look at individual explanations for this ability to subvert the accepted cosmological structure; perhaps the explanation lies in the late date for wheelhouse construction. Roundhouses were no longer the universal structure for domestic dwelling in Britain as the Romans had introduced a completely different form of house in southern Britain (Hingley 1990); even in northern Britain these circular structures were soon to be replaced by buildings with a completely different form and social significance (Sharples 2003b). It is possible that by the time wheelhouses were being constructed their role in providing cosmological structure had already been transformed. It is certainly true that the appearance of subsidiary cells or rooms at sites such as Cnip (Armit 2006) prefigures the spatial arrangements of the subsequent cellular structures.

It is also clear from a detailed analysis of the architecture and the deposits found in the interior of the wheelhouses that the use of these structures cannot simply be explained as a dichotomy between north and south, right and left. These binary oppositions have been shown to be of considerable significance in structuring deposits in southern sites such as Longbridge Deveril Cow Down, Dunstan Park and Maiden Castle (Fitzpatrick 1994; Parker Pearson 1996a; Sharples 2010) and they also played a very important role in the internal organisation of the Late Bronze Age houses at Cladh Hallan, South Uist (Parker Pearson *et al.* 2000). However, the principal architectural characteristic of the wheelhouse, and the broch, is a division between the

Figure 203. The cattle metapodials arranged around the hearth of the secondary house

peripheral cells and the open area at the centre and this is often marked by a low kerb of small upright stones, which is present at Bornais. The centre/periphery division is emphasised by the presence of a substantial central hearth that is often provided with a stone kerb. Core/periphery distinctions were highlighted as one of the key structuring roles of roundhouses by Hingley (1990) but his ideas have been rather overshadowed by the recent emphasis on entrance orientation.

The hearth is clearly the focal point in this model and its prominence in the houses of Atlantic Scotland supports the idea that core/periphery distinctions are very important.[3] The rectangular, or trapezoidal, form identified at Bornais is unusual and is only visible in phase 2 at Cnip (Armit 2006, 42, fig 2.15), Allasdale (Young 1952) and phase 1 at Allt Chrisal (Foster and Pouncett 2000). There were three hearths in phase 2 at Cnip. The original hearth was square, defined by edge-set stones and with a paved interior. This hearth was replaced by a slightly larger hearth defined by a rectangular arrangement of edge-set slabs and small beach pebbles, and with paving covering the interior. The final hearth was defined by a very rough oval arrangement of stones. The first two hearths are similar to the primary hearth at Bornais, though square instead of trapezoidal. Two phases of hearth were recorded at Allasdale. The first hearth is recorded as being an oval setting of flat slabs. The second hearth was 'a square-paved hearth edged on three sides with chamfered stones' (Young 1952, 87). The open side faced the west-facing entrance. The primary hearth at Allt Chrisal was also rectangular but a very rough kerb of large boulders defined an area 2.2 m by 2.3 m which is very different to the other hearths. The ash spread appears to have been allowed to accumulate in the interior of this house or even deliberately encouraged to accumulate, which is again quite different to the situation at Bornais. Eventually a more conventional hearth with a clay base and a circular kerb of small rounded beach pebbles was created (Foster and Pouncett 2000, 161).

The other wheelhouses tend to have circular or oval hearths. Many of these had well-defined kerbs of small upright pebbles and they can be oriented by the presence of a slab feature, such as was found at Clettraval (Scott 1948) and A'Cheardach Mhor (Young and Richardson 1960), which points roughly towards the doorway. In both structures only the second-phase hearth appears to have had these features. At Kilpheder (Lethbridge 1952) and A'Cheardach Bheag (Fairhurst 1971) the orientation was created by leaving the area facing the entrance unkerbed. The hearth at A'Cheardach Bheag is particularly interesting as it was surrounded by a kerb of deer jaw bones. There is some evidence for at least two periods of hearth but the excavator is not particularly clear on the sequence. It is likely that the primary hearth was the roughly circular setting of slabs just to the south of the centre of the house which was surrounded by the deer jaws. These were placed in a semi circle[4] '…. with the

Figure 204. Excavation of the hearth at Dun Bharabhat; the line of white speckles between the hearth and the trowel are the decayed remains of the line of disarticulated teeth (with thanks to Professor D.W. Harding)

ascending ramus thrust into the ground, teeth downwards, and each overlapping at least one and normally two of the adjacent bones' (Fairhurst 1971, 80).

Clearly there are similarities between the use of bones at this hearth and the bones around the hearth at Bornais, but there are also crucial differences (Figure 203). The bones used are different, jaws from the head as opposed to metapodials from the feet, but both are extremities, bones normally grouped together as waste. The species present are also different: deer are wild animals, whereas cattle are domesticates, but again both are probably of considerable social significance and probably only ever consumed on special occasions. Perhaps the most striking difference is the positioning of the bones: the Bornais metapodials were prominent, protruding out from the floor layer and with their most distinctive features highly visible, perhaps symbolising spatial divisions within the house whereas, in contrast, the jaw bones from A'Cheardach Mhor were placed teeth downwards and might even have appeared to be rounded beach pebbles to those who did not look closely. This might have been a hidden sign known only to the household.

Other instances of animal bones being used to demarcate space are known in the region. In bay 5 of the wheelhouse at A'Cheardach Mhor, directly opposite the entrance '... longbones and jaws of a sheep … were thrust vertically through the occupation level into the sand' (Young and Richardson 1960, 141). At Dun Bharabhat in Lewis two phases of hearth were exposed; the lowest was made of clay and only partially defined whilst the upper had a distinctive 'crook-shaped setting of kerbstones' (Harding and Dixon 2000, 16) which surrounded paving set into clay. Around the north-west side of the hearth '… a double line of disarticulated animal teeth had been embedded in the occupation surface' (Figure 204; Harding and Dixon 2000, 17). It is possible that these bones were originally arranged in patterns similar to the Bornais metapodials but were later disturbed by domestic activity.

It is clear that the hearth was an important feature of the houses in Atlantic Scotland, much more so than it was in southern England where it is quite common to find that hearths are little more than undefined spreads of burnt stone or clay (Sharples 2010). The hearth thus provided a focus for emphasising a quite different set of social relations than those present in southern England. The regular replacement of the hearths in houses that are otherwise unaltered is also a noticeable feature of the archaeological record. It may suggest that the hearth was closely associated with the principal occupant and that when they died the hearth had to be renewed as a signal of the presence of a new family. The close association of hearth and occupant is certainly demonstrated by the deliberate preservation of the final hearth in the Bornais structure.

The area around the hearth was conceived of as quite different to the peripheral area adjacent to the house wall. The most obvious difference is that the peripheral area is partitioned whereas the centre is open. This suggests a difference between a communal social space around the fire and a more private space separated into rooms around the periphery. The distinction between these two different spaces is particularly clearly defined in the wheelhouse at Sollas (Campbell 1991). This site was characterised by a complex sequence of pre-floor pits and scoops which may indicate ritual activity during the construction of the wheelhouse (but see Armit 2006, 222–6). The pits clearly distinguish the central area from the surrounding cells; no pits cut across this division even though in this wheelhouse only a few cells were separated from the interior by a stone kerb. The central area was distinguished by an arc of large pits that ringed the hearth, leaving a gap towards the entrance. These are clearly reminiscent of the partial kerbs around hearths and the arrangement of metapodials around the later Bornais hearth. All provided an opening towards the entrance. The Sollas pits suggest the placing of seating spaces for people arranged around the hearth and it seems likely that in this situation the most important individual in the house was located in a welcoming position opposite the doorway and that visitor and kin would be arranged on either side in locations that emphasised their social position.

Bornais is one of the few wheelhouses in the Western Isles where it has been possible to completely remove the floor layers and examine the pre-floor deposits. Unfortunately these proved to be a relatively mundane scatter of small features, several of which were probably dug after the destruction of the first wheelhouse and immediately prior to its rebuilding (Figure 23). The few primary features identified appear to be post holes or robbed-out stone holes and had none of the special deposits present in the features at Sollas (Campbell 1991) and Hornish Point (Barber 2003). The floor deposits were also thoroughly explored, but again in the primary phase these proved to be relatively elusive deposits. The only contexts identified below the charcoal layer created by the destruction of the house were a thin brown sand layer covering the southern half of the centre of the house and a layer of compressed coprolite adjacent to pier 4. However, soil micromorphological analysis (see above 54) did identify a layer of mineral sand, at the base of the charcoal layer (457), which cannot be a natural deposition and suggests the deliberate introduction of sterile sand to create a floor for the house.

The absence of a significant floor layer is unusual. At A'Cheardach Mhor the central area had a floor described as '… a level, trodden crust, greasy in places, with impacted peat-ash in varying depths' (Young and Richardson 1960, 141) and at A'Cheardach Bheag the central floor layer is described as '… a compact layer of blackened earth, presumably consolidated with silt from outside and well mixed with ash' (Fairhurst 1971, 80). For neither site is it clear how thick the floor layer was. The situation at Sollas is slightly clearer; Atkinson recorded three occupation layers separated by clean sand and the cells also appear to have had multiple floor levels (Campbell 1991, 132–3). The clean sand might have been deposited deliberately during a cleaning/refurbishment phase but it may also represent natural deposition resulting from abandonment or the repair of the roof. The former is more likely as the layers appear to be relatively thin and even.

At Allt Chrisal (Foster and Pouncett 2000) it is argued that the wheelhouse was originally kept clean, with occupation material regularly swept out to be deposited on a midden in front of the house. However, this cleanliness soon stopped and thick occupation deposits were found to cover the floor of the structure. Ash layers accumulated above the hearth and were also deposited in several peripheral cells before being sealed by a thick organic layer. There was then a significant structural modification of the wheelhouse which included the creation of a new hearth and the masonry infilling of the aisles between the piers and the walls. This secondary occupation was associated with another occupation layer which is thought to represent 'the continuous build up of occupational debris over a prolonged period of time' (Foster and Pouncett 2000, 61).

The absence of a substantial primary floor layer at Bornais may be due to a number of different factors:

- The house was not occupied for any length of time;
- The house was an ancillary building not much used;
- The floor was routinely and thoroughly cleaned;
- The floor was covered by skins or textiles that were kept clean.

Before we reflect on these alternatives it is important to consider the material recovered from inside the house. This can be divided between the burnt material probably associated with the destruction of the primary wheelhouse, unburnt material probably associated with its reoccupation and material dumped into the abandoned and robbed-out remains of this structure.

Analysis of the radiocarbon dates suggests that both the primary and secondary occupation of the house were relatively short periods of occupation (see Marshall *et al.*, chapter 5). House 1 was probably in use for 40–110 years and House 2 for 55–115 years. This is not dissimilar to the chronological evidence from Cnip which suggests that wheelhouses could be relatively short-lived structures and it may be that we can envisage these structures being essentially occupied by a couple of generations of the same family.

The primary occupation of the wheelhouse was remarkably clean, with only the thinnest layer of brown sand surviving under the charcoal layer. The material associated with this phase of activity consists therefore of an assemblage of burnt objects found in a charcoal layer (457). The ultimate source of this material is probably

Figure 205. The whale bone axe wedged in the roof timbers

complex though the original location of some of the material is fairly easy to interpret. The whale bone axe (2091) was found wedged between two of the carbonised timbers (Figure 205). This object was clearly deliberately placed in this position and I would argue that given the potential height of the roof above floor level it was placed between the timbers during the construction of the roof, or possibly when the roof was being refurbished.

The distribution of the cobble tools, in concentrations of particular types of tool adjacent to the walls, suggests the presence of bags hanging from the roof and walls of the building which fell to the floor during the fire. Most of the bags were located in cell E where there were four concentrations, but cells C and D both had a single bag hanging next to a pier. There was also at least one concentration in the interior that may represent a bag and a dispersed spread of cobble tools across the northern half of the house (Figure 58).

The range of tools recovered from the interior of the house was quite limited; most of the stone and bone tools could be described as cobble tools, points and handles or sockets of some form. The most distinctive objects are the whale bone axe (2091) and the antler and iron comb (1904).[5] There are noticeably few personal items and this contrasts with the assemblage from the secondary floor layer that seals these primary deposits.

The limited nature of the assemblage and the presence of bags of cobble tools suggest that the primary structure was a relatively infrequently occupied building where tools were stored rather than used. This would explain the relative absence of a distinct ash-rich floor deposit and it would also make it easier to explain the coprolite layer. This probably derives from a dog restrained adjacent to pier 4 in cell D. Though it is generally acknowledged that attitudes to cleanliness are culturally conditioned, it would seem surprising if people were living, sleeping, eating and cooking so close to a heap of dog shit. It would make more sense if this were a storage space linked to a more substantial wheelhouse that acted as the primary living area.[6]

Excavations indicate that most of the machair wheelhouses exist in complexes comprising several wheelhouses and other clearly subsidiary spaces (Crawford 2002). This is most clearly demonstrated at the Udal South where large and small wheelhouses exist side by side and adjacent to another unusual U-shaped structure. A short distance away to the south is another isolated wheelhouse. Similar relationships can be observed at almost every other machair complex and A'Cheardach Mhor seems to be exceptional in having only a single isolated structure, though excavation of the surrounding machair has been limited. In contrast the three excavated upland wheelhouses do not appear to have any associated circular buildings but instead have adjacent rectangular structures. There is much debate about the chronology of the rectangular buildings (Harding 2009, 189). The original excavators argued they were Iron Age but subsequent interpretations have tended to assume they are much later in date. If one accepts that they are later structures then these wheelhouses are unusually isolated structures.

At Bornais the presence of redeposited Iron Age ceramics in deposits infilling the Norse structure (CF) and the observation that this house seems to be cut through a charcoal-rich deposit suggests that another burnt-down structure exists in the area immediately to the north of the excavated house. The presence of burnt deposits leading in this direction from the excavated area suggests these two structures were originally connected.

The presence of the coprolite layer opens up the question of why a dog would be kept in the house. Was it ill, was it needed for security or does it indicate a household pet rather than a working dog? If it was kept for security then it suggests that theft (or the fear of theft) was a significant problem for the occupants of these settlements. The location of the dog inside rather than outside the house may also indicate that this was a problem occurring within the community rather than a threat from outside.

The principal spatial divisions within the house appear to be between the periphery and the central area. The periphery is where the material was stored, whereas the centre appears to have more dispersed evidence for activity. Analysis of the residues suggests activity focused on the area to the north of the hearth where there were increased frequencies of pottery, shells, eggshell and bone. However, the floor layer was restricted to the south half of the house and the hearth is situated within the south half, rather than at the centre, and it was clearly designed to be used by someone occupying the southern part of the house.

There are very few sites with which one can make any comparisons but, on the basis of the limited evidence that exists from A'Cheardach Bheag and A'Cheardach Mhor, it seems clear that at these sites most of the substantial finds came from the peripheral cells. Large finds are seldom recorded in the central area unless they are part of the structure of the house, such as the whale bone post sockets at A'Cheardach Mhor.

The secondary reoccupation of the house seems to indicate a change of function and there is much better evidence for sustained activity in the floor deposits overlying the charcoal layer. The elaborate hearth at the centre of the house suggests this was a more important space. The finds evidence indicates a limited amount of artefact production and tool use was taking place and that the inhabitants had lost some small personal ornaments, including an antler finger ring. The most interesting and substantial group of material, however, appears to be 'special deposits' placed probably in relation to the reoccupation of the structure after it was burnt down. I have argued (above 84) that the parallelopiped die and, by association, the decorated astragalus were deliberately pushed into the burnt layer from above and speculate that this may indicate an act of divination that relates to the reoccupation of the building. Similarly the bulk of the ceramic assemblage comes from pits cut through the charcoal layer and must again indicate deliberate deposition prior to the reoccupation of the house. Both these deposits are reminiscent of the foundation deposits found under the floors of the wheelhouses at Sollas and Hornish Point and it may be that their presence or absence reflects the significance of the overlying occupation. If the house is destined to be a focus for settlement activity then dedications have to be made, whereas if it is intended to be storage space then no special preparations have to be made.

The distribution of finds from the floor of the secondary structure does not provide any clear evidence for activity areas inside the house. The small finds were mostly concentrated in the centre of the house to the east of the hearth (Figure 60) and this is where the die and astragalus were found, though they were over a metre apart. Also from the central area are a couple of bone pins, a bead and the antler finger ring. Bone points, handles and waste were found in more peripheral positions. This might indicate a continuation of the distinction between public and private space that seems to be a defining characteristic of the architecture of wheelhouses but there are too few objects to regard this as an emphatic division.

The distribution of the materials recovered from the residue sorting again does not show any strong patterning (Figures 45 to 50); there seems to be a focus on the hearth area with elevated densities of bone, eggshell, slag, B.O.M. and, to a lesser extent, pottery in its vicinity. This is what one would expect if the hearth were used for cooking. The distribution of carbonised plant remains (Figures 61, 62) is much more even, with only two isolated concentrations worthy of note – a concentration of barley seeds on the south side and *Carex* seeds beside the hearth. There was also a low-level presence of oats and rye around the hearth, which is distinctive given how rare these crops were in the Iron Age.

This analysis of the occupation of the house at Bornais has shown that significant patterns exist. The most obvious patterns are either an accidental result of the destruction of the house, such as the cobble stone clusters, or deliberate 'special depositions'; evidence for the nature of routine domestic activities is elusive yet it is possible to suggest the original house was more of a store room than a domestic residence. There is more evidence for activity in the reoccupied house: the hearth seems to have been used for normal domestic activities and the distribution of small finds highlights the importance of the central area at the head of the hearth opposite the door. The elaborate arrangement of animal bones around the hearth also suggests this provided an important structuring metaphor for the occupation of this building.

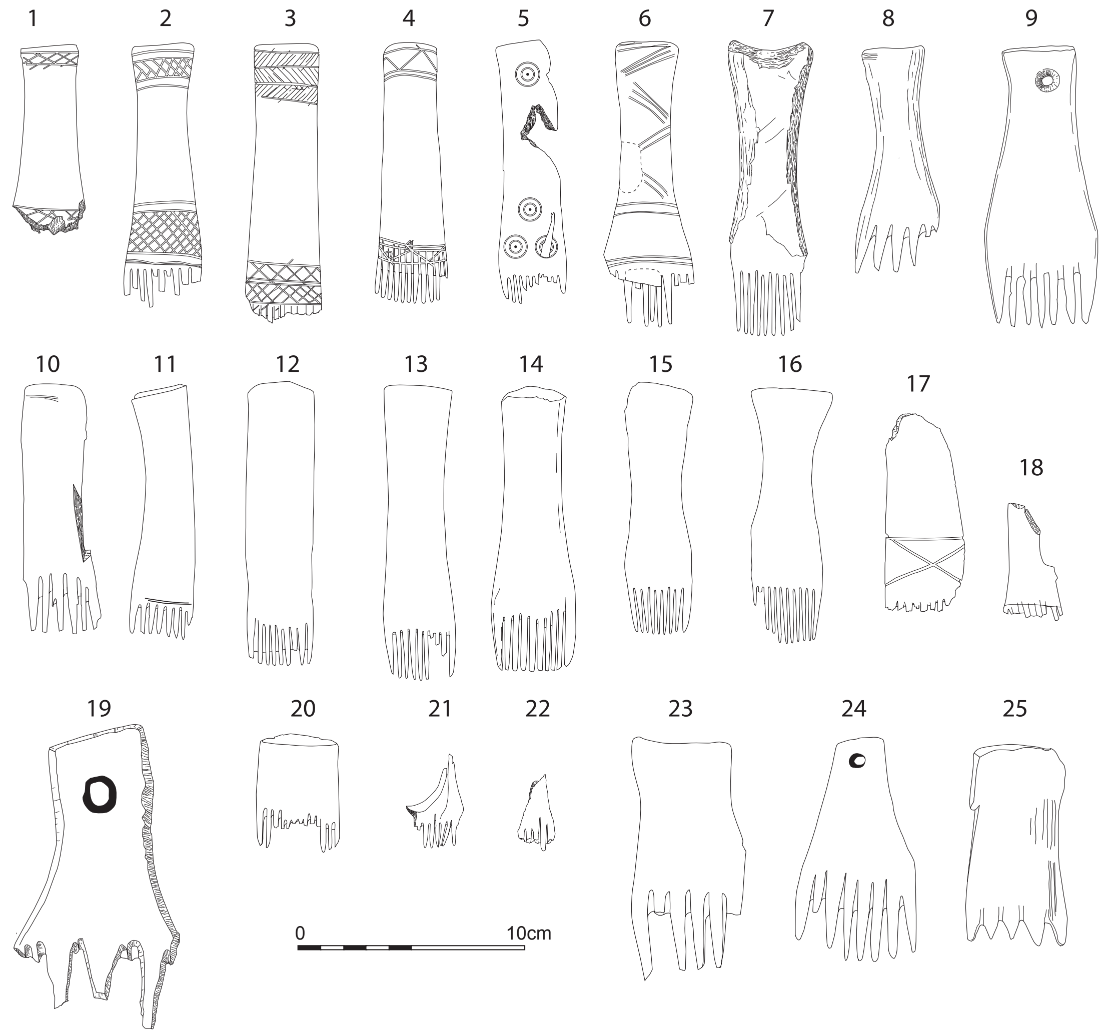


Figure 206. The weaving combs recovered from excavations in the Hebrides. 1 Foshigarry, 2 Garry Iochdrach, 3 Foshigarry, 4–5 Bornais, 6 Bragar, 7 Cnip, 8 Uig, 9 Foshigarry, 10 Galston, 11 Bac Mhic Connain, 12 Bornais, 13–14 Bac Mhic Connain, 15–16 Sloc Sabhaidh, 17 Bac Mhic Chonnain, 18 Bachda Mhor, 19 Dun Bharabhat, 20 Uig, 21–22 Bornais, 23 Tota Dunaig, 24 South Uist, 25 Foshigarry. See Tuohy 1999 for details of 1–3, 6, 8–11, 13–14, 17–18, 20, 23–25, Armit 2006 for 7, Harding and Dixon 2000 for 19 and thanks to Tom Dawson for permission to publish sketches of 15 and 16

The abandonment and destruction of the wheelhouse – N Sharples

The abandonment and destruction of the wheelhouse was also a carefully structured series of activities that included the deposition of important items of material culture. The first act was to cover the hearth and its associated bones with a discrete layer of relatively sterile sand and this seems to have been designed to protect these fragile remains from disturbance during the dismantling of the house walls. The almost total removal of the stone walls of this structure must have been a very messy activity and it is difficult to imagine the hearth would have survived if it had been exposed.

Dismantling the structure probably began with the deliberate collapse of the corbelled vaults over the peripheral cells and most of the stone from the roofs and the walls must have been removed from the interior of the house. The removal of the walls would have almost immediately resulted in the collapse of the abutting sand and this probably covered the primary courses of the wall. This might have encouraged the work crew to leave the lower courses of the wall but at Bornais the walls were almost completely removed, with only a short stretch of the basal course surviving around the east side of the house. The presence of this stretch may be fortuitous or reflect the fact that the surrounding sand on this side of the house was deeper and more inconvenient to move, but it may have a greater significance. It is clear that certain parts of the house had to be left *in situ*; the hearth is the most obvious element, but the stones of the entrance thresholds for both phases also survived when the walls had been completely removed on either side. This might suggest that the surviving elements

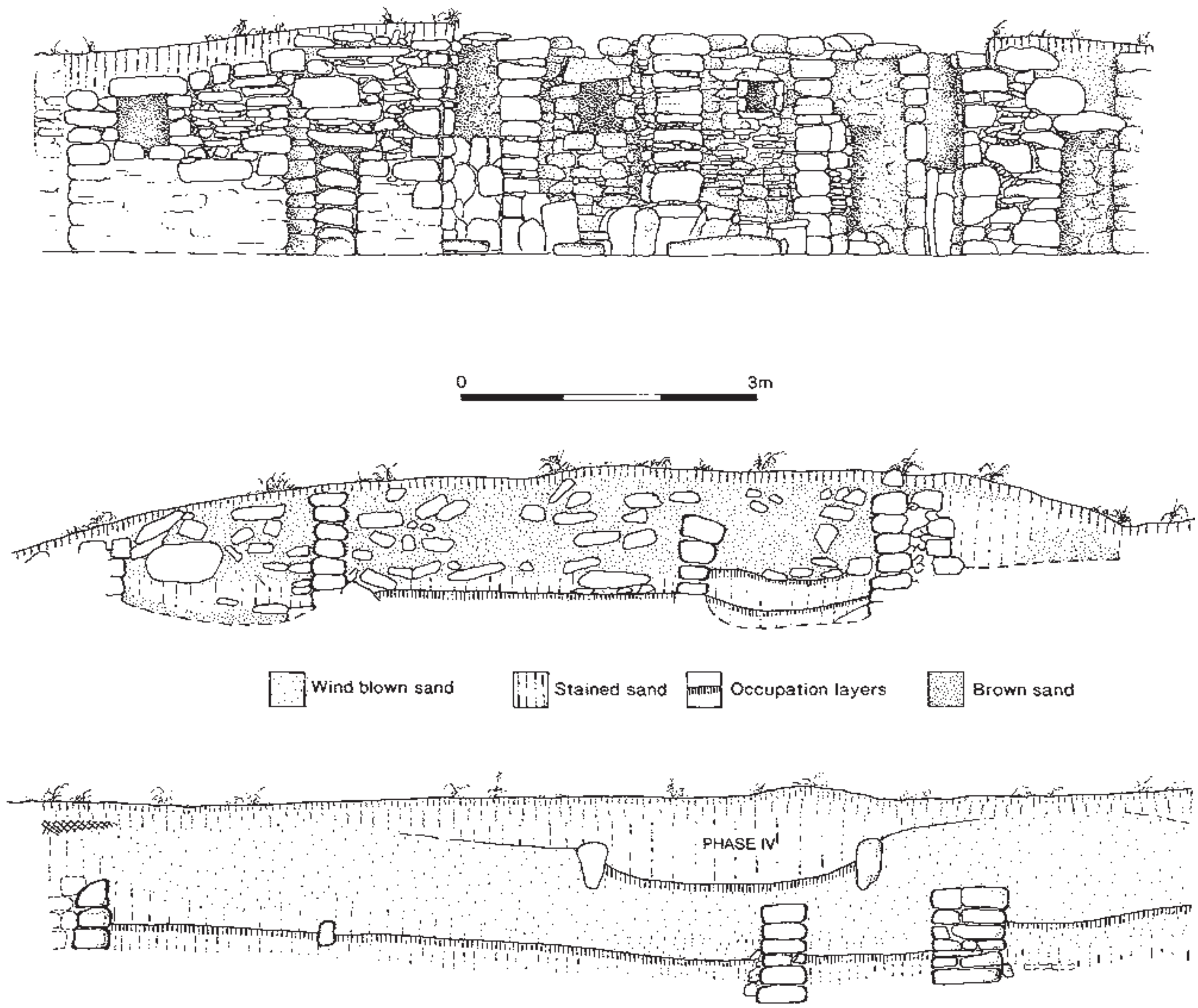


Figure 207. An elevation drawing of the wheelhouse at Kilpheder and sections through the deposits infilling the wheelhouses of A'Cheardach Bheag and A'Cheardach Mhor (from Lethbridge 1952; Fairhurst 1971 and Young and Richardson 1960 respectively)

of the wall had some significance that made them special; perhaps it is related to this being the east side of the house, the normal position of the door.

The removal of the wall stones had practical and probably symbolic significance; it emphasised emphatically that this house was no longer in use and yet it enabled a connection to be made between the house(s) that were being built using the recycled material and the ancestral source of this material. Perhaps the hearth and the threshold stones embodied the original house and its occupants, whereas the walls could be envisaged as offspring that had moved on to a new life.

The abandoned house would have been a large unstable hole in the old settlement mound that would quickly have filled both with sand collapsing from the exposed sides and with wind-blown sand. The presence of charcoal-rich and artefact-rich layers just above the house floor suggests deposition was taking place immediately after the house was dismantled. The pottery assemblage in these layers is generally similar to that recovered from the use of the house and there is a range of working debris, simple tools and a few personal items. However, these layers also produced an exceptional collection of weaving tools.

Three complete and one fragmentary weaving combs were found, as well as three weaving tablets and a complete bone needle. Weaving combs, though iconic Atlantic Iron Age objects, are not very common discoveries in the Western Isles (Figure 206); there are examples from Cnip (Hunter in Armit 2006), Dun Bharabhat (Harding and Dixon 2000), Foshigarry and Bac Mhic Connain (Hallén 1994) and two were recently recovered from Sloc Sabhaidh, Baleshare (Tom Dawson pers. comm.) but no examples were recovered from A'Cheardach Mhor, A 'Cheardach Bheag, Kilpheder, Allt Chrisal or Dun Vulan. Weaving tablets are even less frequent discoveries and very few of these objects are known from Atlantic Iron

Age sites (MacGregor 1985, 192). The complete nature of most of the objects from Bornais and their discovery in the same contextual group suggest their deposition was a deliberate act designed in part to mark the end of the house – part of the act of closure. The function of these objects is clearly related to textile working and it raises the question of why this function was associated with this house. Was the family connected to the house known for their textile production? There is very little evidence for textile production during the use of the house but this is not conclusive. There is no certainty that material culture related to the use of a house would survive in a house that was abandoned and destroyed because it came to the end of its life. Furthermore, if the act of commemoration, signalled by the deposition of these objects, commemorated the occupants then there is no need to assume the textile production was undertaken in the house.

I have previously reviewed the evidence for wheelhouse abandonment in an article in the volume *Tall Stories* (Sharples 2005a) but it is important to reconsider the material as it is directly relevant to how we interpret the sequence at Bornais mound 1 and the relationship with mound 2. The excavation of three wheelhouses during the construction of the rocket range in the 1950s provides well-documented evidence for the end of wheelhouse use, and for A'Cheardach Mhor and A'Cheardach Bheag good sections were published of the deposits infilling the structures (Figure 207).

At A'Cheardach Mhor the fill of the wheelhouse is curiously devoid of stones or of any evidence for the natural decay of the building. If one accepts the evidence from the well-preserved wheelhouses at Cnip and Jarlshof, then the walls of this structure should be several metres taller and the peripheral compartments should have corbelled vaults. Not only do these structural features not survive but there is no evidence that they were ever present. It suggests that the building was deliberately dismantled and then allowed to fill with sand. The systematic nature of this removal suggests this was a specific event that marked the abandonment of the house and was not a long drawn-out process of opportunistic robbing.

At A'Cheardach Bheag the section is quite different: a homogeneous brown sand infills the structure and contains a large quantity of slabs. However, according to the drawn sections many of these stones are lying flat, and this could not have occurred through the natural decay of the structure. If the walls and corbelling collapsed naturally then the stones would be pitched at an angle and leaning against the walls and piers. It seems likely, therefore, that the structure was deliberately dismantled and deliberately infilled.

At Sollas the evidence suggests a sequence very similar to A'Cheardach Mhor: the wheelhouse was systematically but only partially dismantled and allowed to fill with wind-blown sand and a similar situation was also noted by the author during the excavations at Allasdale Dunes in Barra (Wessex Archaeology 2008). One of the few structures that does not appear to have been dismantled is the wheelhouse at Kilpheder. The walls of this structure survived to a height of over 2 m and showed clear evidence for the lower levels of the corbelled vaults. The structure was infilled with blown sand and showed no signs of any secondary occupation. Even at this site, however, there was no evidence in the fill for the upper levels of corbelling and these stones must have been deliberately removed.

Despite the evidence for demolition, subsequent modification or alteration of a wheelhouse to create a new building is not as common as one might expect. A clear example is the phase 3 activity at Cnip where there is a drastic alteration of the wheelhouse. The structure created was a rectangular building with an internal area 3.5 m long and 2.2 m wide. The dimensions suggest this was not a residential building that replaced the original wheelhouse. Instead it seems to have been an ancillary building, perhaps occupied when other larger structures were still in use elsewhere on the site.

After the abandonment of A'Cheardach Mhor there were four significant periods of reoccupation. The first reoccupation of the wheelhouse (phase II) was very ephemeral and was regarded as little more than temporary activity. The succeeding phase III activity was also very scrappy and was restricted to the area above the entrance. Both these 'occupations' may represent ritual acts of remembrance rather than occupation. Only the phase IV occupation could be regarded as representing a significant domestic settlement and even this was not particularly well preserved. Finds from this occupation can be dated to the seventh or eighth centuries AD and the occupation must be three to four hundred years after the original abandonment of the structure. The site was subsequently reoccupied in the Norse period (phase V). A number of wheelhouses appear to be in locations that were left completely unused from their abandonment through to their discovery; these include Sollas, Kilpheder and probably A'Cheardach Bheag.

The evidence from the machair wheelhouses of the Uists does seem to be consistent and we can suggest the following life cycle for these structures:

- A primary use which is fairly short; the evidence from Bornais suggests that the original structure was occupied for between 40 and 115 years before it was burnt down and though the dates from Cnip are more difficult to interpret, they could be comparable with this pattern.
- At Bornais the structure was rebuilt after the fire and was occupied for a similar period between 55 and 115 years. At Cnip the phase 2 structure was similarly occupied for about a century. Similar life spans could be suggested for most of the other machair wheelhouses.
- There is very little evidence for the substantial modification of the principal wheelhouse, though infilling of aisled piers and replacement of the hearth is a common feature. Many of the subsidiary buildings attached to a main wheelhouse undergo substantial modification that may involve complete abandonment or infilling.

Within one or two hundred years of their construction many of these wheelhouses had been systematically dismantled and abandoned. This can be clearly documented at Bornais and many other sites and contrasts with the sequences of houses built one on top of another which is found in the Norse phases at both Bornais and Cille Pheadair (Sharples and Smith 2009). The only occasion when this happens to a wheelhouse is at Cnip when an ancillary structure is built inside the ruined wheelhouse. The avoidance of the abandoned wheelhouses is surprising as the survey of the Uist machair clearly demonstrates that settlement remains focused on certain specific locales on the machair plain throughout the first millennia BC and AD (see Parker Pearson 1996b; 2012).

Clearly these decisions represent cultural choices that were of considerable importance to the inhabitants of the Bornais wheelhouse. It suggests that when the building was constructed it was expected to have only a prescribed and relatively short life. Structural death occurred once the link between the original family and their descendents became tenuous and possibly spread between several descendants. The stones used were then taken, probably to be incorporated into another building, or buildings, and perhaps providing an ancestral link between generations. Sufficient structural remains were left, however, to identify the original house and possibly to provide a focus for remembrance. The hearth in particular seems to have been too closely associated with the original occupants to be disturbed.

The use of material culture – N Sharples

The material culture of the Hebrides has been a topic of considerable discussion in the archaeological literature for most of the twentieth century as a result of Beveridge's excavations on North Uist (Beveridge 1911) and in particular the publication of the large assemblages of finds from Foshigarry, Garry Iochdrach and Bac Mhic Connain (Beveridge and Callander 1931; 1932). The quality of the artefactual material present in the islands became well known in British and European archaeology (Childe 1940, 247) and the display of this material, and of comparable finds from sites in Orkney, in the National Museum of Antiquities of Scotland was an important inspiration to any visitor to Edinburgh. The material has encouraged various interpretive approaches but two approaches have dominated: the idea of a relationship between the islands of Atlantic Scotland and other regions in the north, including the arctic regions of Canada and Greenland, and the importance of cultural contact with the south of Britain.

The relationship with the northern 'circumpolar' region was used to argue for the importance of a functional response to the environment. For example whale bone artefacts, such as the large blades recovered from Foshigarry (Beveridge and Callander 1931, fig. 1) reflected two issues, the absence of good quality timber for the production of simple agricultural implements such as spades, and the presence of a ready supply of an alternative raw material, whale bone obtained from strandings on the coastline. Some scholars argued for the presence of contact between these northern societies but others were ambivalent on this point, suggesting environmental pressures were sufficient to establish comparable responses.

The importance of cultural contact with the south was looked at in quite a different manner. The presence of objects with parallels from southern Britain was one of the primary factors in applying a diffusionist perspective to the societies in this region. All of the objects present in Atlantic Scotland were assumed to represent the importation of a way of life, a cultural system, introduced to the indigenous occupants of the region by incomers from the south. This approach was most consistently and systematically argued by MacKie (1965; 1971) in the latter half of the twentieth century and has been closely associated with his belief that the "crucial step by which the older, cruder semi-brochs were converted to formidable, freestanding tower-refuges was probably the responsibility of immigrants from southern England" (MacKie 1971, 66). These ideas about broch origins have been attacked since the 1970s and now have very little support; even MacKie has accepted the possibility of a northern origin for the brochs (MacKie 2007). The importance of the material culture has, however, taken a less central position in the debate in recent years, as the focus has been on identifying early examples of 'complex roundhouses'. This is surprising as the original critique of MacKie's ideas focused on the significance of the material culture and several papers written as a response to MacKie focused on the broader significance of material culture in Atlantic Scotland (Clarke 1970; 1971; Lane 1987).

David Clarke published an important discussion paper (Clarke 1971) on the significance of the 'small finds' of Atlantic Scotland which tried to redirect the study of the material culture of the region away from the cultural role created by Childe and adopted by MacKie, towards a more functional approach to understanding material culture. He based his critique on the work of the Oxford anthropologist Radcliffe Brown and suggested that approaches to material culture could be divided into problems of morphology, physiology and development:

- Problems of morphology relate to social structure and in terms of material culture relate to concerns with cultural definition and delineation;
- Problems of physiology relate to issues of function and relate to concerns with technology and the economy;
- Problems of development relate to the changes in social structure and relate to concerns with chronology.

Essentially the paper argued that the problems of cultural and chronological definition had become the sole points of interest in the study of Atlantic Scotland and the significance of the function and purpose of objects had been ignored. The problems of adequate definition were highlighted by a study of finger rings and projecting ring-headed pins and by a study of parallelopiped dice (Clarke 1970). In considering the function of an object Clarke suggested that artefacts have four attributes – 'ecological, technological, societal and stylistic' – but that people have focused too much on the 'stylistic' criterion because of a belief that this relates to concerns with culture and chronology. He suggested that archaeologists should be much more interested in the function of objects and that because of the distinctive ecology of the islands this is one of the major defining attributes of the material culture of the region. This consideration of functionality encouraged Clarke to examine the role of ethnographic parallels as a means of ascribing function. However, the accompanying analysis ultimately demonstrates how problematic this approach is: objects have multiple functions and many objects that have significant morphological differences can have similar functions; though Clarke tries to dismiss this problem, it is nonetheless real.

A more important problem with this paper is that it conflates the social with a concern for cultural definition. There are many social roles that material culture can display and it is clear that the paper is based on the conservative approach to material culture adopted by processual archaeologists. It was written some years before the widespread adoption of a symbolic interpretation of material culture (Hodder 1982), which highlighted the potential importance of the social interpretation of objects.

Since Clarke wrote his paper interest in the general significance of the material culture of Atlantic Scotland has declined. Lane (1987; 1990) and Harding (2005) have refined some of the chronological problems of the objects and provided more detailed critiques of the diffusionist view but they have not really developed a theoretical understanding of the material present. The publication of several substantive articles and monographs on Iron Age sites in recent years, notably Scalloway, Shetland (Sharples 1998b), Cnip, Lewis (Armit 2006) and Pool, Orkney (Hunter 2007), should have resulted in a reconsideration of the role of material culture but the authors have generally avoided this issue. In most cases the large assemblages of material have been separated into different material classes and analysed, categorised and classified in isolation; comparisons are made with other assemblages that contribute to an understanding of the chronology of the site and the typological development of the material (this is particularly the case with ceramics); the presence of exotic imports is often used to discuss the connections of the site and, in certain cases, the functional significance of the material is examined and used to discuss the presence of activity areas and the differentiation of lived space. Very little attention has been paid to the general significance of the distinctive material culture in Atlantic Scotland and how this provides the basis for social life in the region.

The importance of the ceramic assemblages from the islands is particularly significant and demonstrates some of the limitations of current approaches. All the settlements in Atlantic Scotland produce large assemblages of ceramics[7] and these include elaborately decorated vessels made to the finest quality (see Campbell 1991, illus. 17, 232; Armit 2006, illus. 3.1, h). Most of the debate on the significance of these vessels has revolved around the chronological validity of sequence (Armit 1991; Campbell 2002; Lane 2007); though the importance of the ceramics in dating settlements is undoubtedly very useful, it is not the only significance of this material. As Clarke (1971) has outlined, the material has a function that includes the storage, cooking and serving of food and a cultural significance that has seldom been considered. Recent advances in the study of pottery include the analysis of lipid residues (Campbell 2000; Campbell *et al*. 2004) and these provide the potential for a detailed analysis of function and a greater understanding of the role of ceramics.[8]

The cultural significance of pottery in the Atlantic Iron Age is emphasised by the very restricted use of pottery in mainland Scotland. For instance, as one moves from the Hebrides through Skye to the mainland, the quantity, quality and decorative elaboration of the pottery present on roughly contemporary settlements decline dramatically. Clearly the creation and use of pottery is a cultural choice made by the natives of the Hebrides. Furthermore, it is not synonymous with the occupation of brochs; the few mainland brochs to be excavated (*e.g.* Dun Telve and Dun Troddan) have not produced large ceramic assemblages (MacKie 2007, 847). Likewise there is a significant difference in the ceramics present in the Hebrides and those found in Orkney (Ross in Ballin Smith 1994) and Shetland (MacSween in Sharples 1998b). These differences clearly indicate that there is cultural variability in the Atlantic region which is subsumed by the overall distribution of monumentally defined domestic structures. The region can be split into sub-regions by the predominance of brochs and duns (essentially a distinction between circular and more irregular and rectangular house forms), related architectural structures (timber houses, isolated wheelhouses, Orcadian village houses, wheelhouse villages) and variations in material culture.[9] These variations in material culture do not represent territorial distinctions in a Childean sense where material culture is chosen specifically to signify difference, but instead reflect real social distinctions between the societies of the different regions.

Recent work on material culture has argued that the nature of the symbolism is seldom arbitrary but is rather closely related to environmental stimulus, cultural contacts, biological and anatomical metaphors and the cultural context of use (Boivin 2008). This work provides a theoretical context for an interpretation of the material culture of Atlantic Scotland. The complexity of the material culture is meaningful but the understanding of this complexity may be difficult to grasp and not necessarily straightforward. The ceramics are clearly an example worth exploring. Why are ceramics so important in the islands and unimportant elsewhere? Why do the complexity of decoration and the quality of the vessels change through time? These are questions that seem to be of some importance to understanding these societies.

A simple environmentally-based interpretation favoured by some archaeologists (Cavers 2008, 22) is that pottery on the islands is replaced by organic containers on the mainland. The importance of pottery reflects the absence of trees on the Atlantic islands and the severely restricted role of wood in this region. Wood is much more readily available in mainland Scotland and it seems likely that woodland and forests were a characteristic feature of this landscape in the Iron Age and early historic periods. Furthermore, woodland would probably have had a social as well as an economic significance. Wood was clearly used on the mainland for a wide variety of purposes and one of these was the making of vessels. These are found, for example, at the crannog in Loch Glashan, mid Argyll (Crone and Campbell 2005) and several vessels have been found in bogs throughout the highlands and islands (Earwood 1993). Nevertheless, the use of wooden vessels does not totally explain the limited distribution of ceramics as wooden vessels are known from the islands; there is a fine wooden trough from Stornoway (Earwood 1993, 51) and the excavations at Dun Bharabhat (Harding and Dixon 2000) resulted in the recovery of many wooden artefacts including several simple vessels. There were clearly enough trees on the islands to be used to make vessels.

Furthermore, the conscious rejection of pottery in mainland Scotland has to be emphasised. Good quality ceramics are a feature of this region throughout the Neolithic and Early Bronze Age; it is only with the decline in ceramic use at the end of the Early Bronze Age that we begin to see the development of different approaches on the mainland and the islands. In the Middle Bronze Age pottery becomes relatively poorly fired and no longer elaborately decorated. In mainland Scotland, and northern England, this decline in quality and complexity coincides with a decline in quantity until eventually in the Late Bronze Age and Early Iron Age pottery is extremely rare, though seldom completely absent. In contrast, the decline in the quantity of these assemblages does not seem to be so significant in the islands. The large assemblage of crude undecorated ceramics from the settlement at Cladh Hallan (Parker Pearson *et al.* 2000) is generally comparable in form to pottery found in mainland Scotland, but the size of the assemblage is much larger.[10] The key to understanding the importance of pottery in Iron Age Atlantic Scotland therefore lies in the changes that took place around the transition from the early to later Bronze Age.

It has to be acknowledged that this issue is not a priority for this publication; nevertheless, it seems likely that the difference relates to the importance placed on the household and the activities and social relationships that occur within the household. In the Early Bronze Age pottery is closely associated with death and regularly deposited with burials, whereas in later prehistory pottery is closely associated with food preparation and consumption. It is therefore possible that the importance of pottery in the islands is related to the relative permanence of settlement and the importance of arable agriculture throughout prehistory. Neolithic and Early Bronze Age settlements are well known (Sharples 2009) and pottery seems to be closely associated with the domestic occupation of the latter structures. As we move into the later Bronze Age domestic settlements seem to become much more substantial and much longer lived than comparable settlements on the mainland. The repeated reconstruction of a house at Cladh Hallan is difficult to parallel and suggests the settlement was permanently occupied for several hundred years (Parker Pearson *et al*. 2004a). It also quite possibly includes several households as five houses have been excavated and more seem to be present. It is possible that ceramics are adopted as a significant part of the material assemblage in areas where the house and the household became the focal point for mediating social relationships. This is not a particularly convincing argument at the moment as it is difficult to reconstruct the agricultural economies of settlements in the mainland areas of Scotland as the taphonomic conditions in these areas are not conducive to the preservation of animal bones. It is noticeable, however, that the development of an increasingly visible and symbolically important Late Bronze Age ceramic tradition in southern England is closely associated with the development of the distinctive middens such as Potterne, East Chisenbury and All Cannings Cross (Waddington 2009), which are comparable to sites such as Cladh Hallan with their emphasis on organic fertility.

Another contrast which might be significant in understanding the importance of pottery in certain areas is the symbolic contrast between an artefact made from the soil and an artefact made from an organic living thing, a tree. Clearly the symbolism of trees and soil will be quite different and therefore the metaphorical difference between a pot, made from mixing soil (clay) and rock and subjecting them to heat, and a vessel carved out of a living entity is likely to be of considerable importance. The contrast would be very apparent for people living in buildings that were gradually being submerged by their surrounding middens and who eventually come to live in underground houses. On the mainland, society was more concerned with life cycles and the presence of fodder and shelter. This sounds rather like the dichotomy between Celtic cowboys roaming the impoverished wastelands of northern Britain and the settled farmers of southern England promulgated by scholars of the 1950s and 1960s (such as Piggott 1958) and this should be a warning that the model is far too simplistic. Nevertheless, these are the kinds of juxtapositions that are worth exploring when we finally assemble a reasonable understanding of Late Bronze Age culture, society and economy in northern Britain.

Figure 208. Wavy cordons on the pottery from Bornais

Once the tradition of pottery production is established in the domestic sphere in the Western Isles then the changes undergone by that pottery become important indications of social change. These have been fully documented by several authors starting with Young (1966) and they are outlined in detail by Lane elsewhere in this volume (20). For my purposes, most of the discussions have not entirely come to grips with the importance of the ceramic repertoire (with the exception of Campbell 1991) because they have not really tried to explain what the changes in pottery indicate. It is clear that these changes have very little to do with functional improvements as the fabrics remain the same for millennia and there is actually very little change in the overall shape of the vessels; they are nearly all buckets and jars; some are larger, some smaller; some are more open mouthed, some more close mouthed. The principal variation comes in the degree and complexity of the decoration and in the precise shape of the rim, neither of which significantly affects the function (see Figure 12). The complexity and variability of both the decoration and the rims are greatest in the Middle Iron Age, from roughly 200 BC to AD 400. This coincides, as far as we can see, with construction of the most complex forms of domestic architecture, the broch and the wheelhouse, and to my mind this is not a coincidence.

The significance, or purpose, of form and decoration on any object is problematic (Garrow *et al.* 2008) but I have argued (Sharples 2008) that in a general sense it is best interpreted as an attempt to convey social messages – 'these elements represent a form of symbolic visual communication which is only partly accessible to us' (Megaw and Megaw 2001, 19). The complexity of the decoration on the pots, therefore, in some sense reflects the complexity of the messages being conveyed and the nature of the society using the pottery. The context in which the decorated object is used is also important and one can contrast the nature of the messages conveyed by elaborate decoration on a sword scabbard, used in a much more formal, highly charged, symbolic environment of ritual combat (Giles 2008), with that of pottery which is used in a household context. In the Hebrides pottery was produced and consumed by households and there is no evidence for specialist production or exchange. The primary social event where pottery would be observed would be during cooking and food consumption. If one assumes that the presence, absence and nature of the elaborate decoration were an attempt to convey coded social messages, then these messages were primarily viewed and understood by members of the household. The architecture therefore provided an arena for the theatre of household interaction and both are central to the nature of Middle Iron Age society in Atlantic Scotland.

It may be possible to explore the specific meanings of some of this decoration (or art) if one assumes that decoration, as a semiotic code, will refer to certain features of the cultural and natural environment in a metaphorical fashion (Boivin 2008). Perhaps the most obvious decorative feature in Atlantic Scotland is the wavy cordon (Figure 208). This is an almost ubiquitous feature of decorated pottery in the Hebrides and it is also of importance in the Northern Isles. The cordon is extremely distinctive and there are no close parallels outside Atlantic Scotland. It is normally located at the belly of the pot, effectively separating the top third of the pot from the bottom two-thirds. The top third and the rim is then the focus for almost all the additional decoration. It emerges sometime in the first millennium BC, probably between 400 and 200 BC, and its appearance coincides with the decision to decorate the pottery (Armit *et al*. 2008, 73). Its execution varies considerably and variants include the pleated cordon and the stabbed cordon, and sometimes a physical cordon is replaced by a line of slashes. The most prominent form, however, is a sinuous wavy line (Campbell 1991, fiche table 7; MacSween in Armit 2006, 93) and in this form it survives the decline of decoration in the Middle Iron Age to become the sole decorative feature in the Late Iron Age assemblages from Bornais. Eventually the cordon disappears and, in Late Iron Age II, pottery is completely undecorated.

The symbolism of the line seems clear in an island context where the sea is the dominant feature of the view from any elevated location and the description of this decorative element as a 'wavy cordon' seems particularly appropriate as it can be interpreted as an accurate representation of waves. Campbell (1991, 155) in his publication of the Sollas pottery considered the importance of structuralist analysis of pottery decoration (Hodder in Hodder 1982) but his attention was focused on the radial symmetry of the elaborate decoration on the shoulder of the Middle Iron Age vessels, which is such an important feature of the Sollas assemblage. He felt that this was reminiscent of the radial symmetry of wheelhouse architecture and that the use of arcades and triangular motifs to decorate the upper half of these vessels was a direct allusion to the corbelled roofs of these structures. His consideration of the cordon was less literal though he did suggest it provided a structuralist distinction between above ground domestic activity and below ground ritual activity. If you follow my analogy that the cordon represents the sea then the decoration in the upper body can be looked at more as a representation of islands rising out of the sea, or more broadly as the terrestrial world. This need not necessarily contradict Campbell's interpretation, as the houses and the world could be seen as again having a metaphorical relationship. The turf-covered roofs emerging from the machair resembled the mountains that dominate the centre of the island of South Uist. Other specific decorative features in the Hebridean repertoire that may have specific readings are the stamped circular impressions caused by ring-headed pins. These may be representations of the sun (or the moon) and there are some supporting analogies as the elaborately decorated pin heads of the Late Bronze Age/Early Iron Age transition are often interpreted as symbols of the sun.[11]

Of particular interest to this report is the decline in decoration that occurs between the Middle Iron Age and Late Iron Age I. The chronology of this is now fairly clear: the ceramic assemblage from Cnip contains elaborately decorated ceramics, the Bornais mound 1 assemblage has no decoration other than the double wavy cordon. As Campbell (1991) observed, this decline in decoration may be related to the decline in the use of monumental domestic architecture. It is very unlikely that any brochs were constructed after about AD 400 and even a wheelhouse such as was excavated at Bornais is a relatively small structure that appears to lose some of its characteristic features after it is burnt down. The Late Iron Age structures that subsequently emerged are much smaller and they place much less emphasis on a central circular space around the hearth where people can be fed and entertained. Instead separate smaller rooms are attached, to produce cellular structures which are known as 'figure of eight' or 'jelly baby' structures.[12]

The reduced symbolism of the Late Iron Age I pottery coincides with the reduction in the significance of the monumental house and the importance of the household as a sphere of important social interactions. In essence feasting and entertaining around the hearth is no longer of great importance in defining hierarchies and structuring family relationships, consequently the vessels used in this activity carry less complex information and are not so symbolically important.

This theory may explain the general decline in the importance of decoration but why does the wavy cordon retain its significance and also why are the pots of this period distinguished by having two cordons, normally spaced about 30–50 mm apart (Figure 209)? There are also examples where the wavy line goes for a wander, forming loops or horseshoes, and it is difficult to know what to make of these variations. A possible reason for the increasing importance of the wavy cordon may be the increasing importance of sea travel. The Middle Iron Age was a period of relative isolation, with little evidence for the existence of long-distance networks of exchange bringing together different island groups. There was also only limited exploitation of the sea's resources; most of the exploitation of these resources came from beachcombing for shellfish and driftwood, and the limited quantities of fish present on sites such as Dun Vulan seem to have been largely caught from the shore (Cerón-Carrasco 1999).

In the Late Iron Age contact with other regions is indicated by an increasingly varied material culture and fishing appears to become more important. The salmon/trout and saithe deposits in the midden on mound 1 at Bornais are distinctive and suggest specialist fishing strategies, possibly for a feasting event, though this still probably does not involve extensive off-shore fishing. However, the relationship between the increased importance of the sea and the use of a wavy cordon breaks down in the Late Iron Age II. In this period contact with mainland Scotland continued to increase and would suggest fairly routine sea travel for at least part of this society and yet the wavy cordon decoration disappears. These changes may ultimately reflect the decline in the importance of ceramics as a forum for symbolic communication.

The social importance of artefacts – N Sharples, A Clarke and A Smith

An initial examination of the importance of the Bornais mound 1 finds assemblage was published in the volume *Sea Change* (Sharples 2003b). In this paper Sharples examined the significance of material culture in the Atlantic zone by comparing the assemblages recovered from three sites,

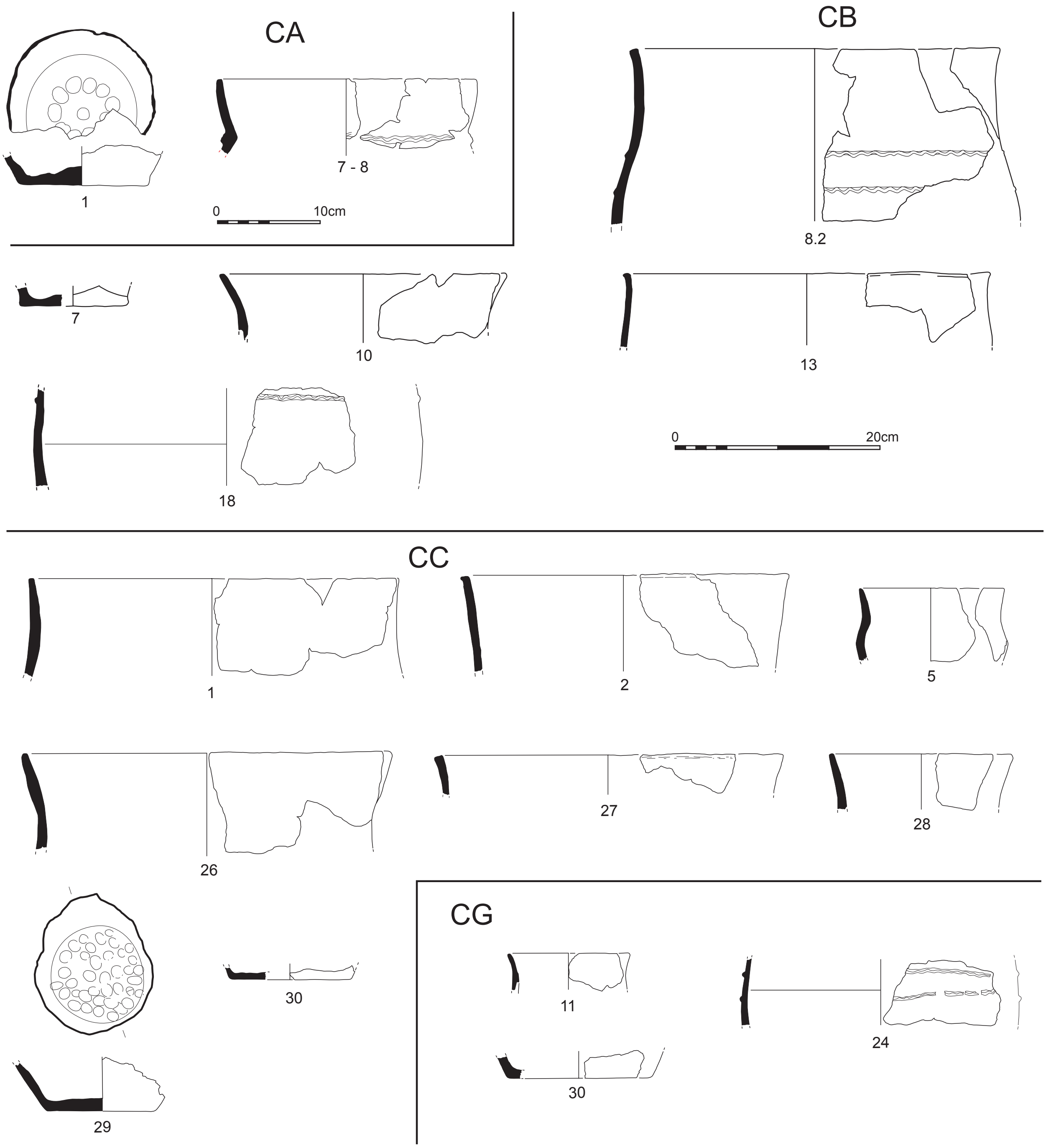


Figure 209. A selection of the best preserved vessels from Bornais

Dun Vulan (Sharples and Parker Pearson 1999), Bornais mound 1 and Scalloway, Shetland (Sharples 1998b). The article argued that there was a clear development in the use of material culture in the first millennium AD that reflected a shift from a society based around the household, where social competition and expression was focused on architecture, towards a society, at the end of the Late Iron Age, which was concentrated on the individual, who was the focus for a complex network of social relationships.

Since the publication of that paper a number of new sites and assemblages have become available from the Hebrides, notably Cnip (Armit 2006), Bostadh (Tim Neighbour pers. comm.) and Eilean Olabhat (Armit *et al.* 2008) and these make it possible to reconsider the significance of change in material culture in the first millennium AD. Cnip and Bostadh are good comparisons with Bornais as both sites appear to be quite similar small farmsteads and they have been subject to excavations that are comparable in size. They are both on the machair which means the preservation conditions are very similar. Both sites have

category	object type	material	Cnip	Bornais*	Bostadh
working debris	waste	antler/bone	36	28	94
	spillage	copper alloy		1	
	unused cobble	stone		9	
		flint	1	32	
		pumice	3	12	1
	lump	baked clay	1		
	mould	baked clay	4		
tools	spade/reaping hook	iron	1		1
	knife	iron			1
	point	bone/iron/antler	6	15	2
	scraper/shovel	bone		1	
	perf metapodial	bone		3	
	handle	bone/antler	5	13	2
	tubes	bird bone			2
	grooved	antler/bone		5	
	pick/hook/haft/pronged	antler	1	2	4
	comb/adze/spoon/perforated	whale bone/antler/iron	1	3	1
	triple-pronged tools	iron			2
	needle	bone	1	1	1
	weaving tablet	bone		3	
	weaving comb	antler/whale bone	1	4	
	perf disc	whale bone		2	
	spindle whorl	stone/bone/lead/ceramic	9	2	
	quern rotary	stone	5		5
	quern saddle	stone			2
	strike-a-light	stone		5	
	whetstone	stone		1	1
	counter-sunk hollow	stone		2	
	perforated disc	stone	1		
	cobble tool	stone	2	82	86
	? cobble tool	stone		11	
personal objects	decorated	bone/whale bone		4	
	toggle	bone		1	
	bead/pendant	antler/stone/glass		4	2
	perforated	shell		5	
	ring	bone/copper alloy	1	1	
	comb	antler			16
	pin	bone/iron/antler/copper alloy	9	13	22
	buckle	iron			
gaming	playing piece	ceramic/stone/bone	1	8	1
	disc	shell		5	
	die	bone		2	
	musical	bone	1		
	minature sword	bone	1		
structural fittings	nail/tacks/spike	iron			12
	mount	copper alloy	1		
	holdfasts/mounts	iron			3
	door pivot	whale bone		1	2
	link	antler			1
miscellaneous	binding	iron		1	
	bar/rod/wire	iron		2	1

	strip/plate	iron	1	4	
	fragment	iron		2	4
	sheet/fragment	copper alloy/lead		3	10
	rivet	copper alloy		1	1
	perf/cut scapula	bone		1	
	worked	whale bone	11	3	9
	perf strip	antler		1	
	pierced metapodial	bone		4	
			104	303	289

* Excludes steatite vessels and anvil which are clearly intrusive

Table 109. A detailed analysis of the artefacts from Cnip, Bornais mound 1 and Bostadh

chronologically distinct phases of activity: Cnip is Middle Iron Age and Bostadh is Late Iron Age II; together with Bornais they provide a sequence that gives some indication of chronological development in the first millennium AD. Eilean Olabhat is located on the acidic moorlands and so no bone survives and it also has two quite separate periods of activity; no general comparisons are therefore possible.

The assemblage of finds recovered by the excavations at Cnip in west Lewis is important because it is securely dated by a suite of radiocarbon dates from the first century BC to the middle of the third century AD. There is no evidence for any significant overlap with the Bornais assemblage (though two ‘flaring vessels’ were found in late contexts; MacSween in Armit 2006, 101–2). The small finds assemblage comprises 104 objects (Table 109), mostly of worked bone and stone. Using functional criteria the assemblage can be split into fittings, manufacturing debris, items of personal adornment, leisure objects and tools (including several specifically associated with textile production). Much of the assemblage comprises the waste from the production of bone and antler objects, though there is also a substantial collection of tools that consists of simple bone and antler points and handles, a whale bone weaving comb and the iron blade of a spade, which is an important and unusual discovery. The quantities of stone tools are surprisingly low; there is a reasonable collection of five querns but only two cobble tools were found; Clarke (in Armit 2006, 151) suggests this may be because the excavation focused on the interior of the houses but this was where most of the Bornais cobble tools were found. The items of personal adornment largely consist of simple bone pins and there was very little evidence for elaboration of the pin heads, or any form of decoration. Despite the presence of six moulds[13] for the production of copper alloy pins, only one small fragment of the tip of a copper alloy pin was found. Decoration is limited to a couple of grooves on one of the bone handles and contrasts dramatically with the elaborately decorated pottery assemblage.

This assemblage is comparable to the Middle Iron Age assemblage from Dun Vulan and to the four other assemblages from wheelhouses on the machair excavated and published in the second half of the twentieth century: A’Cheardach Mhor (Young and Richardson 1960), A’Cheardach Bheag (Fairhurst 1971), Kilpheder (Lethbridge 1952) and Sollas (Campbell 1991). All of these were well excavated and had good preservation of most categories of material culture. All the sites produced a significant number of bone artefacts, largely points and handles of simple form. The only bone object that demonstrates evidence for wider contact with the outside world is a distinctive bone pommel from A’Cheardach Bheag (Fairhurst 1971, fig. 10.1). The only substantial metal object is the iron ploughshare from A’Cheardach Bheag which is comparable to the spade from Cnip. A small number of Roman artefacts were found in these wheelhouses: an elaborate fibula from Kilpheder, an iron ring from Sollas and a bronze ring from A’Cheardach Mhor. Glass beads were found at A’Cheardach Mhor and Sollas and an intriguing find from Sollas was a small cone of ‘Egyptian Blue’, a pigment ultimately of Mediterranean origin which is probably related to contact with Roman Britain.

The small finds assemblage from Bornais mound 1 comprises 303[14] items from the stratified Late Iron Age contexts (CA, CB, CC, CG; Table 109). It is dominated by pieces made from bone and stone but there is a small collection of metal pieces and an unusual collection of shell. Functionally, the assemblage is dominated by tools and this is due to the recovery of 82 definite, and 11 probable, cobble stone tools, strike-a-lights, whetstones and other types. This is a similar range of stone tool types to those present at A’Cheardach Mhor in the Middle Iron Age and Bostadh in Late Iron Age II and it seems that these simple forms remain relatively unchanged through the Iron Age. In the Northern Isles during this period stone was used for a greater variety of artefacts (Table 110) that includes bowls and lamps, stone balls, discs and handled pieces such as blades and choppers. In general the quantities of stone artefacts in the Northern Isles are much greater than from sites in the Western Isles. It is likely that the ease of working the stone from the Northern

Atlantic Iron Age settlements	Cobble tools	Spindle whorls	Whetstones	Strike-a-lights	Stone disc	Rotary querns	Saddle querns	Stone weight counter sunk stones	Pumice	Steatite
Bornais mound 1 LIA	82 (20)	2	1	5	-	-	-	2	12	2
Dun Cuier (Young 1956)	X	2	X	X	-	6	-	-	X	-
Foshigarry (Beveridge and Callander 1931	100	3	3	7	20	5	1	-	46	-
Garry Iochdrach (Beveridge and Callander 1932)	51	8	5	2	7	X	-	-	16	-
Bac Mhic Connain (Beveridge and Callander 1932)	15	-	-	12	-	3	1	-	11	-
Cnip (Clarke 2006)	2	-	-	-	1	5	-	-	-	-
Bostadh (Clarke forthcoming a)	105		3			5	3		4	
Allasdale (Young 1952)	X	-	-	-	-	-	-	-	X	-
A' Cheardach Mhor (Young and Richardson 1960)	67	-	7	-	-	6	1	-	28	2
Dun Bharabhat (Harding and Dixon 2000)	X	X	-	-	-	X	-	-	-	-
Galson (Edwards 1924)	4	-	-	1	-	1	2	1	X	1
Scalloway broch (Clarke 1998)	30	0	1	1	14	-	-	1	145	?
Scalloway post broch (Clarke 1998)	103	8	16	3	36	9	1	1	225	?
Howe broch (Ballin Smith 1994)	243	19	2	-	50	16	39	4	12	-
Howe post broch (Ballin Smith 1994)	57	11	-	3	31	2	10	-	7	X
Pool (Clarke 2007)	10	8	4	-	17	3	-	-	?	?
Bayanne (Clarke forthcoming b)	30	-	-	-	2	2	1	-	36	?

x = present but no numbers available. ? = uncertain presence, no numbers available

Table 110. Stone assemblages from Western Isles and Northern Isles Iron Age

Isles, mainly sandstones and schists, has contributed to the large assemblages of coarse stone tools from Orkney and Shetland sites. In contrast, the stone from the Western Isles is less able to be split, flaked and ground and it is likely that other raw materials such as bone and ceramics were in use. The absence of any querns at Bornais is surprising as they are found on Middle Iron Age settlements, such as Cnip. The most likely interpretation is that the excavations provide only a limited view of the range of materials present on the settlement.

Bornais mound 1 has produced a varied selection of bone and antler tools that includes a reasonable assemblage of points and handles and a collection of perforated and grooved long bones of ambiguous function. The most important group of tools is associated with textile production and includes a collection of weaving combs, weaving tablets and a needle from the infill of the house that seems to be a specific deposit marking the abandonment of the house.

After tools, the next largest group of material comprises the working debris and includes a large collection of cut antler and bone, a small assemblage of flint and pumice and some unworked stone cobbles which can be identified because of their context. A small piece of copper alloy spillage is likely to be an accidental product of the destruction of the house. The evidence for bone, antler and stone working is directly comparable to the material from Cnip and Bostadh and indicates simple craft working was situated in the household. There is little evidence for craft specialisation at this site but in the recent excavations at Eilean Olabhat (Armit *et al.* 2008) good evidence for metalworking was found which includes an assemblage of moulds for the production of decorative discs, pins and hoops. The presence of Dun Cuier ware vessels and the radiocarbon dates suggest that this site is contemporary with the occupation at Bornais. Similar debris has also been recovered from the secondary occupation of the broch at Beirgh on Lewis (Harding and Gilmour 2000). Whilst Eilean Olabhat is apparently a simple settlement, it may be significant that it is not a machair settlement and it is located on an island in a loch. Both of these features suggest it is relatively peripheral to the main settlement landscape and these might have made the island an appropriate location for metalworking. This situation contrasts with the presence of metalworking at Cnip, but it should be noted that the moulds at Cnip were not associated with any other metalworking debris and might have been brought from elsewhere.

The assemblage of decorative items from Bornais consists of 28 objects; 13 pins, including two iron pins and a fragment of a copper alloy pin, and an interesting selection of beads or toggles. Most of the pins are simple and similar in character to the Cnip pins but there is one distinctive nail-headed pin (4644) which clearly indicates an attempt to control the form of the pin. The iron pins are unusual and difficult to parallel. The antler finger ring suggests knowledge of Roman fashions and is comparable to the earlier Middle Iron Age fashion for Roman brooches. The presence of a number of perforated shells, best interpreted as ornaments, is also an unusual discovery. However, there are isolated examples from Kilpheder and from Bostadh which suggest these may be more widely distributed than at first appears; they would be very easy to lose if shells were regularly discarded during the excavation process.

The substantial collection of gaming pieces contrasts quite significantly with the isolated and ambiguous piece from Cnip. The size of the Bornais assemblage depends on the inclusion of a large collection of ceramic and shell discs, which could be interpreted as blanks for the production of spindle whorls rather than counters, but there are also several points (2244, 2400, 1880) that could be interpreted as playing pieces. The dice are very distinctive objects and are closely paralleled by other dice found throughout Atlantic Scotland, Britain and Ireland and by related pieces on the continent (Clarke 1970). The relationship between the dice from Atlantic Scotland and those from southern England is problematic as parallelopiped dice appear to stop being used in the south early in the Roman period, whereas the dice from Bornais, Pool and Scalloway come from fifth century AD contexts. Nevertheless, as with the weaving combs, the dice clearly indicate the inhabitants of the Bornais Late Iron Age settlement are connected to much wider social networks and their concern with games, and possibly with divination, points towards the development of status distinctions within this society.

The assemblage recovered by the excavations at Bostadh in west Lewis is another very important addition to our understanding of developments in the Hebrides.[15] The radiocarbon dates clearly demonstrate this was a Late Iron Age II settlement dating to the seventh to eighth centuries AD that has very little evidence for any contamination from earlier Iron Age deposits though it is partially covered by a later Viking settlement. The small finds assemblage from the Late Iron Age comprises 289 objects (Table 109), mostly of worked bone and stone though there is a much more significant collection of metalwork that includes both iron and copper alloy. The assemblage is divided in the same fashion as that from Cnip but in this case the assemblage is dominated by tools; this is largely due to the substantial assemblage of cobble tools (86 objects) which is comparable to the assemblage from Bornais. The rest of the assemblage consists of bone and antler points and handles, querns and a small collection of iron objects that includes a knife. The assemblage of manufacturing waste is again substantial, with large quantities of antler waste in particular. The assemblage of fittings is much larger than was found on the Middle Iron Age settlements and this is due to the presence of large numbers of small pieces of iron and copper alloy which were attached to larger objects. Perhaps the most distinctive feature of the assemblage is the material associated with personal decoration. This includes 16 combs, 22 pins, a glass bead and pendant. The combs have all been decorated and several of the pins have been carefully shaped and decorated.

Parallels for this Late Iron Age II assemblage are not easy to make in the Western Isles and this was one reason why I chose to use the Scalloway assemblage to discuss later changes in the original paper (Sharples 2003b). The material from Dun Cuier on Barra (Young 1956) clearly comprises a mixed assemblage, including three composite bone combs, that was deposited over a long period spanning the fifth to eighth centuries AD so it is contemporary with both Bornais mound 1 assemblage and Bostadh. Similar mixed assemblages come from some of the sites excavated by Beveridge in North Uist and composite combs of Late Iron Age II date are known from Foshigarry and Garry Iochdrach (Hallén 1994, 222). There is also a composite comb from an imperfectly understood reoccupation of A'Cheardach Mhor (Young and Richardson 1960, 157). An important assemblage of artefacts was recovered from the excavations at the Udal and, though this has never been published, it is clear that several composite bone combs are present (Selkirk 1996). There is also good evidence for a substantial settlement of this date on Bornais mound 2 and the limited excavation of these early deposits did result in the discovery of two diagnostic hipped pins and a composite bone comb (Sharples 2003b).

The best evidence for settlements from this period is, however, in the Northern Isles where large mixed assemblages were recovered on Orkney from the early excavations at the Brough of Birsay (Curle 1982), the Broch of Burrian (MacGregor 1974), the single-period site at Buckquoy (Ritchie 1977) and the multi-period settlement at Pool (Hunter 2007). On Shetland the most important published assemblages are from Scalloway (Sharples 1998b) and Jarlshof (Hamilton 1956) though this appears to be the least important period in the occupation at Jarlshof. However, our understanding has recently been transformed by the publication of the large assemblage of material from Scatness (Dockrill *et al.* 2010).

All of these assemblages clearly demonstrate the importance of ornamentation and the much wider connections of the occupants of the Atlantic province at the end of the first millennium AD. The elaborate combs are an important and recurrent feature of assemblages of this date and are widely distributed throughout the region, occurring on most of the sites that have been excavated. These not only demonstrate an interest in personal grooming by the owner but the presence of perforations may indicate that the combs were worn by the owner. It would certainly explain the elaborate decoration of these combs if they were a dress accessory that was clearly meant to be viewed. Pins are also relatively commonplace and they contrast with the earlier pins in having a distinctive hipped form and often very carefully made decorative heads. These were again clearly made to be worn and viewed by anyone in close contact with the wearer.

Metalwork had become a much more significant feature of the assemblages and there is good evidence that fairly elaborate decorative objects were circulating in the region. Unfortunately most of this evidence comes from the Northern Isles. The Scalloway excavations recovered an interesting pair of metal pins but the largest assemblage comes from Brough of Birsay which produced a spectacular collection of debris for the production of ornaments that included penannular brooches and pins (Curle 1982). Nothing like this assemblage has so far been discovered in the Western Isles but a similarly rich assemblage was recovered from the historic centre of the Scots at Dunadd, Argyll (Lane and Campbell 2000). The rarity of elaborate metal ornaments from any of the recently excavated settlements in the Hebrides is interesting, particularly when compared to the increasing quantity of metalworking debris coming from the fifth to sixth-century sites (Heald 2011). This may be simply a reflection of the small number of excavated settlements of seventh to eighth-century date and it may well be that the most important sites are covered by substantial Norse settlements, such as mound 2 at Bornais. The other possibility, however, is that metalworking in this period is more controlled and restricted and that only one or two sites comparable to Dunadd and the Brough of Birsay exist and these have yet to be found.[16]

Power relations in the Iron Age – N Sharples

The evidence from the recently excavated settlements of Atlantic Scotland appears to demonstrate an inverse relationship between monumental architecture and the richness and variability of material culture, excluding pottery. In the Atlantic Iron Age there is an early period when the architecture of brochs and wheelhouses forms the focus for social display and major monuments are constructed which dominate the archaeological record. The material culture associated with these structures is generally impoverished, consisting of a variety of prosaic functional tools, largely undecorated and seldom deriving from outside the locality. As one moves through the millennium the construction and then the use of these monumental buildings declines and they are replaced by cellular structures which are less impressive and contain smaller, less theatrical spaces. This coincides with the increasing importance of portable material culture, which includes material influenced by external styles that is often elaborately decorated and worn on the body to indicate the significance of the individual.

Similar relationships can be demonstrated in the first millennium BC in southern England and appear to represent a shift from a Late Bronze Age society where power is invested in the individual to an Iron Age society where power lay with the community and finally back, in the Late Iron Age, to one where the individual is pre-eminent (Sharples 2010). In Atlantic Scotland the changes in the first millennium AD indicate a shift from a society where power relationships are structured around specific households to a society where power is controlled by individuals.

In the Middle Iron Age the broch encircles a family unit and creates a network of boundaries that incorporate not only architecture but also a landscape that has a complex historical significance (Sharples and Parker Pearson 1997). For a wheelhouse dweller to visit a broch would have entailed a journey across a series of vegetational, topographic and aquatic boundaries and through a series of architectural spaces, doorways, chambers and passages that play with metaphors of wild and domesticated. This journey not only emphasised the separation of the inhabitants of the broch from the bulk of the population, but would have accentuated the privileged position of the members of the community allowed to enter the interior to take part in meetings around the central hearth. The size and form of the architecture viewed either from the outside or from the inside emphasised the importance of the occupants to the local community and to external visitors.

The physicality of the broch indicates in a very practical way the social relationships that supported this household. A considerable expenditure of resources was required to construct a broch. The construction process would have involved the acquisition and consumption of scarce resources. The stone chosen had to be the best available in the locality. The community had to acquire the stone, transport it to the desired location and then erect the structure. Perhaps of greater significance was the timber required to outfit the interior. Large quantities of long timbers were needed to create the internal floors and to roof the structure and these must have been very difficult to acquire in Atlantic Scotland. It is possible that driftwood and scarce local timber were carefully conserved and that these ancient resources were consumed by the construction of brochs. It has been argued (above 317) that the appropriation of good timber for the construction of brochs led to the development of wheelhouse architecture as this would have minimised the use of timber.

All of this effort represents a communal investment in the broch and indicates that though the structure might have defined and enclosed a household, in some respect that household must have represented and symbolised the community. These societies were relatively self sufficient and the acquisition of artefacts from other areas was not only unnecessary but had the potential to undermine the relationship between the broch household and the local community.

The organisation of power in the second half of the first millennium AD (Late Iron Age II) is manifestly different to the Middle Iron Age. Households occupied structures that could not easily be used to differentiate the status or identity of the occupants and whose construction utilised fewer critical resources. Brochs remained the dominant architectural form in the landscape, but these were dilapidated unstable structures. The Howe in Orkney was occupied in the Late Iron Age but the structure was in a state of dangerous instability and several well-documented collapses had occurred (Ballin Smith 1994). In contrast, the artefacts carried or worn on the body would easily have identified status and power relationships in these Late Iron Age societies.

The size, shape and decoration of pins and brooches acted to differentiate individuals and could probably be used to characterise a wide range of personal differences such as age, gender and cultural/political affiliations, as well as status (Nieke and Duncan 1988, 14–15; Nieke 1993, 129; Youngs 2008). They indicate a society where the precise classification of the individual was of considerable importance. These items of personal adornment broke down the homogeneity of the household and instead placed individuals into categories that were widely dispersed in the landscape. They also enabled the individual to choose the category they belonged to. What you wore and when you chose to wear it emphasised one set of affiliations as opposed to another.

For example an individual in the Western Isles who chose to wear a 'hand pin' such as that found on Dunan Ruadh, Pabbay (Branigan and Foster 2000, 269–70) might be deliberately indicating their affiliation with a local group who supported closer connections with mainland Scotland. In contrast, an individual wearing or carrying the decorated combs found at Bostadh might be emphasising their sexuality and status as a married or unmarried individual. The decision to choose one or other of these items depended on what your intentions were for that day.

It is important to emphasise that these ornaments were not simply club badges that could be bought to indicate membership. They had a much more active role in creating associations. Most of the artefacts present on the islands are likely to have been exchanged not as commodities, which had a price and which could be alienated, but as gifts (Mauss 1990). The difference between the gift and the commodity is that the gift is exchanged primarily to symbolise the relationship created between two individuals, the gift giver and the gift receiver (Godelier 1999; Gregory 1982). The giving of the gift is part of a process of enchainment.

The exchange of material culture creates relationships between individuals that can be called upon if warfare erupts, crops fail or leadership beckons. Power to compete rests on an individual's skill in building up and manipulating a complex network of relationships. An individual in Late Iron Age Orkney wearing an artefact such as the Westness brooch is demonstrating his relationships with a large network of people and the implication is that, if you interfered with this individual, he could call upon this network of people to support him in any resulting conflict. Elaborate objects such as the Westness brooch, or swords, might have acquired long histories that encompassed numerous individuals of considerable significance. These histories might have been recited on special occasions and, again, positioned the owner in a chain of relationships that emphasised their significance and participation in history. An important feature of power relationships built up through the gift exchange of artefacts was that they were personal. It was an individual's ability to support and establish gift relationships that dictated his/her position in the social hierarchy.

The changes between the Middle Iron Age and the Late Iron Age marked an abrupt transformation in the social relationships of Atlantic Scotland and these changes are sometimes thought to be the result of external contact with the Roman Empire. Large quantities of Roman material culture were circulating in southern England from the first century BC (Hunter 2001). This material was certainly available to the occupants of Atlantic Scotland from the second century AD and Roman artefacts have been found on brochs and wheelhouses (see above and Robertson 1970; Hunter 2001). The introduction of such artefacts could have had a significantly destabilising affect, as it allowed individuals, tied into local communities, to break out of these dependent relationships and to create new relationships based on the exchange of exotic Roman objects. However, the quantity of Roman goods circulating in Atlantic Scotland was small and contrasts with the range and variety of material in southern Scotland, where several sites have produced substantial assemblages containing a range of materials (Hunter 2001). The limited amount of material present also contrasts with the vast amounts of material present inside the Roman province and also the vast amounts of material found outside the empire in other areas of Europe (Parker Pearson 1989). The evidence suggests that the communities of Atlantic Scotland were able to control the introduction of Roman material culture but it may also indicate that Rome was not particularly interested in this region.

The principal change in the region was more closely connected with the creation of a coordinated opposition to Rome in the fourth and fifth centuries AD. The development of large political units in eastern Scotland, which ultimately led to the appearance of the Kingdom of the Picts, is closely associated with the development of a range of distinctive artefact types (Foster 1996). These are likely to be have been used as gifts and to have played a formative role in developing long-distance regional networks of power, which ultimately incorporated even the insular communities of the Atlantic fringe. The increasing importance of mainland Scotland in the period after the abandonment of the settlement on Bornais mound 1 suggests that the Western Isles might well have become politically linked to the Kingdom of the Picts.[17] Perhaps the disruption noted in the settlement record in the middle of the first millennium is actually connected with this change.

The agricultural economy of a late wheelhouse

Crops – J Summers and J Bond

During the Late Iron Age occupation of mound 1, the arable economy relied heavily on the cultivation of hulled, six-row barley. This owes much to the long-running pattern of cultivation that had existed within the islands and other parts of Atlantic Scotland from at least the Bronze Age. The Late Iron Age lies at a point of complex economic and social change (Sharples 2003b) and a number of these factors are represented in the palaeobotanical evidence from mound 1 at Bornais. New crops were beginning to be introduced in the form of oats and flax, which would have had a significant impact on the way that land was managed, with a wider range of cultivation practices being employed. By this point it is possible to see that both a more intensively manured infield and a less fertile outfield were both being exploited for cultivation (Bond *et al.* 2004). It is perhaps even possible to see the adoption of oats and flax running in parallel, with oats taking up the slack and being grown on previously uncultivated land, filling a gap in the food economy caused by flax growing on the improved infield soils.

The weed taxa represent both the calcareous shell sand of the machair and the enrichment of cultivated soils. Although weeds of specific crops are difficult to differentiate in the assemblages, it is possible to see that cultivation was taking place on the machair, most likely in the close vicinity of the settlement. The frequency with which cereal grains occur in the assemblages also indicates that these crops, predominantly in the form of barley, constituted a significant proportion of the diet of the site's inhabitants during the Late Iron Age. The strategy of mixed agriculture incorporating the cultivation of barley is one that is common in the later prehistory of the region (Smith and Mulville 2004; Bond 2003) and the evidence from Bornais fits well into the general view of a predominantly household-level subsistence economy.

Through comparison with the already published results from mound 3, it can be seen that, even in this much later period, the weed flora show a considerable degree of similarity between periods separated politically and culturally. Although new crops were introduced and the economic goals of the arable economy were modified, it would seem that these were instigated within long-standing, well-established land management strategies. These deposits from a small settlement area are of great value for understanding the developments made in agricultural practices and the economy of South Uist. Based on current evidence, it appears that areas beyond the machair were not heavily utilised for food resources. It is, however, likely that the blacklands were exploited both for peat fuel and wild plants, such as heather and sedges, for a range of purposes. It is, however, difficult to examine the use of these environments in any detail based on the carbonised archaeobotanical assemblages from Bornais.

The destruction event represented by the charcoal layer suggests that, unlike in earlier periods, the bulk storage of grain within domestic structures was less common at this time. Whether this is a product of the circumstances surrounding the fire or the result of other storage facilities being utilised remains to be fully understood. Other occupation evidence is mainly representative of general domestic household activities, with plant remains from a range of sources becoming carbonised in the domestic hearth and subsequently being deposited in the occupation layers and midden deposits excavated.

Mammals – J Mulville

The relative abundance of the major species from sites dating to the Middle Iron Age, Late Iron Age and Norse periods on the Uists, Lewis and Harris is summarised in

Uists/Barra	Sheep	Cattle	Pig	Horse	Deer	Total NISP	Reference
Iron Age							
Udal XI-XIII	58	38	2	1	0	6797	Serjeantson in prep
Baleshare	59	34	6	0	1	2040	Halstead 2003
Sollas Site A	67	28	4	0	1	558	Finlay 1984
Sollas Site B	38	54	5	1	2	257	Finlay 1984
Hornish Point	59	28	12	0	1	440	Halstead in Barber 2003
A'Cheardach Mhor	59	36	3	0	2	223	Finlay 1984
A'Cheardach Bheag	43	41	3	0	13	68	Finlay 1984
Cill Donnain	42	46	10	0	2	4665	Vickers in prep
Dun Vulan Midden	48	28	22	0	3	569	Mulville 1999
Dun Vulan Platform	39	47	14	0	1	2313	Mulville 1999
Bornais M1 LIA	46	34	6	<1%	14	3309	
Pabbay	83	15	1	0	0	2278	Mulville in Branigan and Foster 2000
Mingulay	39	60	0	0	0	415	Mulville in Branigan and Foster 2000
Sandray	60	37	3	0	0	144	Mulville in Branigan and Foster 2000
Norse							
Udal IXc-X	26	69	3	2	0	2497	Serjeantson n.d
Bornais M3	55	35	7	0	3	710	Mulville in Sharples 2005b
Cille Phaedair	54	33	9	1	3	7185	Mulville forthcoming
Bornais M1	46	41	6	0	8	941	
Lewis/Harris							
Iron Age							
Beirgh LIA	17	48	2	<1%	32	1880	Thoms 2004
Cnip	30	40	5	0	25	1489	McCormick in Armit 2006
Bostadh Phase 1 LIA	46	40	0	2	11	254	Thoms 2004
Norse							
Bostadh	33	38	1	5	23	1585	Thoms 2004

Table 111. The percentage relative abundance of the main species (NISP) from Hebridean excavations

Table 111. The Late Iron Age material from mound 1 is comparable to several assemblages recovered from the Hebrides. The most relevant assemblages are those from Dun Vulan (Mulville in Parker Pearson and Sharples 1999) dating from first to sixth centuries AD, the Udal (Serjeantson in prep.) where the phase XI–XIII assemblage should date to the Late Iron Age, Bostadh (Thoms 2004), and Beirgh (Thoms 2004). If assemblages with smaller samples are excluded from broader comparisons (*i.e.* NISP less than 300; Hambleton 1999) the Late Iron Age assemblages in general are dominated by sheep and cattle, with smaller amounts of pig and red deer present and are similar to the preceding Bronze Age and the succeeding Norse assemblages.

Cattle make up around a third of the Late Iron Age domestic assemblage in the Uists although there are a number of exceptions, at Cill Donnain (46%), Dun Vulan (platform; 47%) and on the small islands of Pabbay (15%) and Mingulay (60%). The proportion of sheep is generally higher, with percentages ranging from 38% to 83%, whilst pigs are always present in small proportions accounting for between 3% and 14% of domestic food animals on South Uist. The largely Middle Iron Age deposits at Dun Vulan (midden) have an unusually high proportion of pig, 22%, and this has been linked to the status of the broch inhabitants (Mulville 1999, 272, 274). Bornais mound 1 lies towards the centre of the range for all three major domestic species. Comparison with the Late Iron Age assemblages from Lewis reveals distinct differences, most notably in the higher proportions of deer and cattle at Beirgh and Cnip (Thoms 2004; McCormick in Armit 2006). It has been suggested that these differences are a product of the environment surrounding these sites (McCormick in Armit 2006).

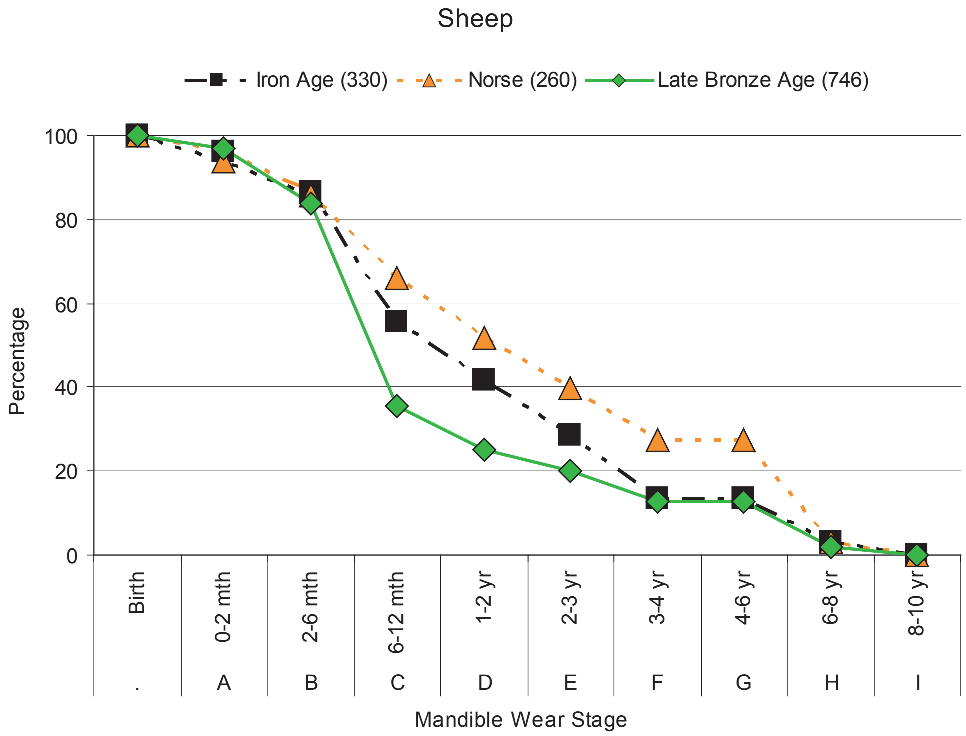


Figure 210. The mortality curves for Hebridean sheep

In terms of the age of animals exploited there are general trends visible in the Iron Age data for the Uists (Figure 210). In the Bronze Age, represented by the large assemblage from Cladh Hallan, sheep were killed at a young age with two-thirds dead by 12 months (Mulville and Powell forthcoming) but in the Iron Age the age of slaughter rises and this is noticeable at Bornais mound 1. The increase in the age of slaughter over time suggests less intensive exploitation of the sheep herd, with some of the focus shifting away from meat production possibly towards secondary products such as wool. For cattle there is little change in the exploitation patterns. The Iron Age sites have a similar mortality pattern to Cladh Hallan, with about 70% of cattle dead by six months (Figure 211). At Bornais mound 1 there is an initial high level of early mortality, identical to the grouped Iron Age data, but the large number of animals dying between 1 and 8 months is unusual (Figure 146). The extremely high level of neonatal mortality for Bornais mound 1 is comparable to only one other site, on the small island of Mingulay (Mulville in Branigan and Foster 2000, 301). In this small assemblage, five of the six cattle mandibles were from neonates and there was also a high proportion of sheep neonatal deaths, which is not the case at Bornais. It was pointed out (Mulville in Branigan and Foster 2000, 304) that if these animals were representative of the pattern for the Mingulay herds, this high level of slaughter would soon result in a diminishing population and this observation also holds true for Bornais. It may be that in both cases these assemblages are a biased sample of the culled population and that the larger older animals were deposited elsewhere (Mulville in Branigan and Foster 2000, 304).

At all sites and in all periods pigs die relatively young; their primary use as meat animals results in few animals surviving to old age. There is no evidence for wild boar on the Western Isles suggesting that they were neither imported to the islands nor established a breeding population.

There is now unequivocal evidence for a viable red deer population on the Uists from the Bronze Age onwards (Table 111). They make up 7% of the main assemblage at Late Bronze Age Cladh Hallan and this includes a number of neonatal individuals (25% of mandibles). Late Iron Age Bornais mound 1, with 14%, has the highest proportion of red deer of all Uist sites. The only other site with such a preponderance of deer is A'Cheardach Bheag (Fairhurst 1971) but at this site a large deposit of red deer mandibles surrounding a hearth boosts the contribution that red deer make to the assemblage. The situation is very different on the islands of Lewis and Harris where, as noted above, the proportion of red deer is much higher at Beirgh (32%), Cnip (25%) and Bostadh (11% in phase 1) (Thoms 2004; McCormick in Armit 2006). The age profile for the slaughter of these animals is also different: 'few' very young or fully mature animals were killed at Cnip, with 60% slaughtered between 1 and 2½ years old. At Beirgh fusion evidence suggests that both older and younger animals were preferred, with little evidence for the targeting of individuals between 2 and 4 years; 20% of early fusing bone (2 years) remains unfused and 60% of bone is fused in the late fusing group.

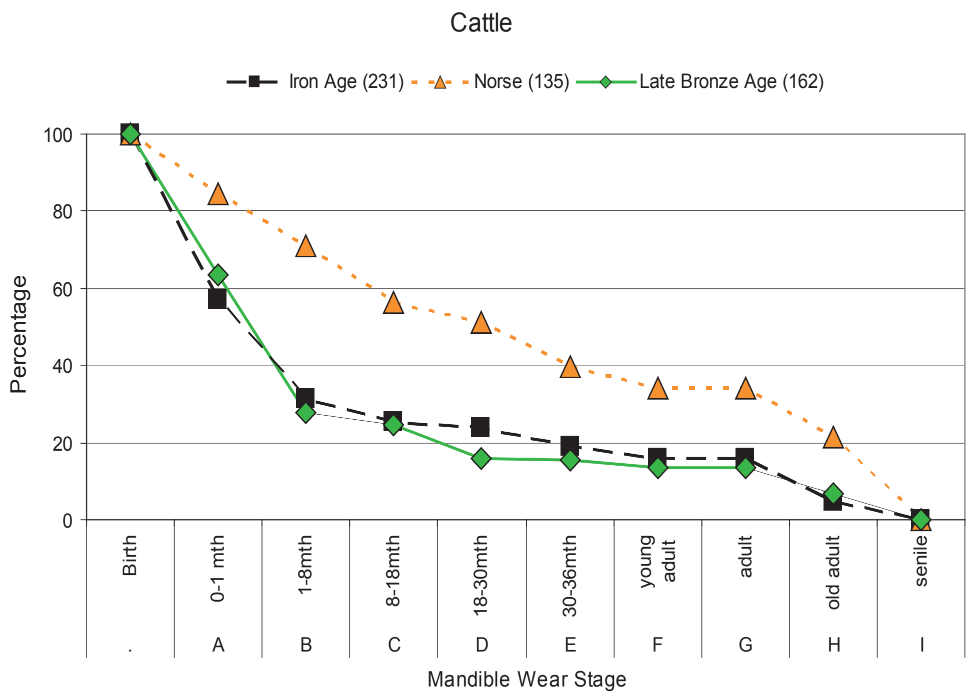


Figure 211. The mortality curves for Hebridean cattle

Dental ageing information from Bostadh indicates that deer ranging from neonates to 9 year olds were hunted; however, there is little information from the Late Iron Age contexts to identify a selective strategy in this period.

At Bornais red deer exploitation focuses on just weaned red deer calves. This is unusual in the context of the Hebrides, unknown on mainland Britain (Mulville 2010), and does not fit with proposed models for a managed population when young and prime animals are the expected targets. For example, in present-day culling strategies, the average age of the hind cull is between 4 and 5 years and that of stags between 6 and 7 years (C. Smith in Ballin Smith 1994, 145). The Bornais pattern is, however, consistent with the results from the Howe (C. Smith in Ballin Smith 1994) where dental evidence indicates that 47% of the deer were killed in the first year, a similar figure to Bornais (Table 96) although there is a greater emphasis on older deer. This is interpreted as evidence for a selective culling pattern at the Howe, whilst the presence of foetal deer at Quanterness (Clutton-Brock 1979) is presented as evidence of herd management. The neonatal and very young deer noted at the Howe (C. Smith in Ballin Smith 1994) had burning marks on their bones which suggest they might have been roasted whole over a fire.

Roe deer is present in small amounts at Late Iron Age Bornais mound 1, and is present on four other Uist Iron Age sites. At less than 1% roe deer make up only a small proportion of any assemblage and it remains unclear whether the quantities present in the Iron Age or later in the Norse period suggest an indigenous population on Uist.

Small amounts of dog and cat are found at most sites of all periods. Dogs make up 2% of the identified species at Bornais mound 3 (Mulville in Sharples 2005b) but make up less than 0.5% on mound 1 and are similarly rare at Norse Cille Pheadair. Cat remains are always rare on the islands, and only a few bones were recovered from Bornais mounds 1 and 3 and Norse Cille Pheadair.

Horse is present on a range of Iron Age sites in small quantities, with the exception of the Udal where a larger number of horses are present (Table 111). A single bone was recovered from Late Iron Age Bornais mound 1. There is evidence of possible horse consumption at Late Iron Age Beirgh (Thoms pers. comm.).

The use of pinnipeds (seals) and cetacea (dolphin and whales) in small quantities is found at all sites (Mulville 2002) and Iron Age Bornais fits into this pattern with occasional exploitation represented by a few bones.

The birds – D Serjeantson

Birds make up more than 14 per cent of the identified mammals plus birds in the Late Iron Age midden (CG). This is an exceptionally high figure, as more typically bird bones make up 2 to 5 per cent of identified bones. There is a similarly high percentage of wild mammals in the midden so it is clear that consumption of wild foods was increased in the phase, or activity, which led to the deposition of the midden. In the other Late Iron Age deposits (CB, CC) the percentage is smaller.

Most of the birds eaten are seabirds. Other than the great auk, the same species continued to be caught for food in the north and west of Scotland into historical times (Baldwin 2005). Capture was specialised on a few species at Bornais. Almost two-thirds of the remains are from gulls and one-quarter from shag and cormorant. The contrasts with Dun Vulan are interesting as the great auk, guillemots, razorbills and also gannets were favoured over the gulls and cormorants there. A larger proportion of the birds eaten at the broch are from places that could be reached only by sea. This might suggest that the Bornais community had fewer links with the outside world than did the broch inhabitants. At many sites the exploitation of gulls is of lesser importance than that of some other seabirds. At the Udal North at this time the larger gulls were the third most frequent species after the gannet and the Manx shearwater (Serjeantson 1988). It is likely that there were gull nesting colonies in the machair dunes or the headland not far from the site at Bornais, which made these birds readily available. Shags and cormorants are the most frequent seabirds at several other sites of the period around the coast of Scotland. They were the most frequent species in the Late Iron Age (phases 6 and 7) at Pool, Sanday, Orkney (Serjeantson in Hunter 2007, 279–84) and also in the Iron Age deposits at Crosskirk in Caithness (Macartney in Fairhurst 1984, 135–6). As we saw earlier, these species would have been present on the rockier parts of the coast all year round so could have been captured at any time. Historically these birds were caught in winter and early spring (Fenton 1978). In the farming calendar this was the lean time of year when barley and dairy food were scarce, so the meat, and especially the fat, provided by seabirds made an important contribution to the food supply. No other species provided more than two per cent of the total in the Iron Age, so other birds were minor or incidental food species. The selection of species suggests that a desire for feathers and oil was a secondary consideration.

The absence of evidence for domestic birds on a site of the first millennium AD would be very unusual in the Scottish lowlands and in England but it is not unexpected in the Scottish islands. At the Udal domestic chickens were also absent, or rare, before the Norse period (Serjeantson in prep.) and in the Late Iron Age at Pool only one bone was present out of a sample of 108 identified bones.

The fish – C Ingrem

In some respects the fish remains from both Late Iron Age and Norse deposits at Bornais mound 1 conform to the pattern seen at contemporary sites in the Northern and Western Isles of Scotland. In the Northern Isles, where numerous sites have been excavated and the results published, a recurring pattern is evident: a change from the exploitation of inshore taxa, particularly small gadids, to the deliberate targeting of larger cod-family fish that inhabit offshore waters is apparent (Wheeler 1976; Barrett 1997; Sellar 1982). At many sites there is evidence for an increased reliance upon fish in the diet during the Norse period, although, as we have seen, this is not the case at Bornais mound 1. The large number of bones and the element representation in the assemblage recovered from Norse deposits at Robert's Haven led Barrett (1997) to suggest that large cod-family fish were being processed for storage and possibly trade.

Several sites from the Western Isles have been excavated in recent years although the results of some are as yet unpublished. The Iron Age broch site of Dun Vulan (Parker Pearson and Sharples 1999), located on the coast not far from Bornais, is well suited as a comparison given the use of a similar recovery strategy. As at Sollas (Finlay 1991), Hornish Point and Baleshare, North Uist (Cerón-Carrasco 1999) and for the Iron Age deposits at Bornais mound 1, immature saithe were the main species exploited at Dun Vulan (Cerón-Carrasco 1999). Interestingly, the predominance of vertebrae and lack of head bones at Dun Vulan led to the suggestion that most of the fish were gutted and beheaded elsewhere, a pattern hinted at by the house deposits from mound 1. Iron Age sites on the islands of Pabbay, Sandray and Mingulay were similarly dominated by inshore species including saithe, despite the absence of sieved samples (Ingrem 2000).

The Norse occupation of mound 1 – N Sharples

The Norse occupation of mound 1 was not the central focus of the excavations and consequently our understanding of the occupation of the mound in this period is fragmentary. Nevertheless, the material does make a significant contribution to our understanding of the nature of the Norse settlement at Bornais which is worth drawing together at this point.

The first point is that there is a significant Norse occupation present. Furthermore, the radiocarbon dates suggest that the occupation began in the tenth century and there is no reason not to assume that it didn't continue up to the fourteenth century, even though we have a relatively limited examination of the latest deposits and have no conclusive evidence for the date of the abandonment of this mound. The settlement evidence for the early occupation is unfortunately rather incoherent, comprising a group of two to three hearths, which do not appear to be inside a building. These hearths were associated with large quantities of slag which probably indicate the high temperatures achieved by an open hearth in this windy environment. The occupation is associated with only a small quantity of objects and unfortunately the most important items – the ogham-inscribed plaque, the coin of Olaf Kyrre and the copper alloy stick pin – were all surface finds (this was a badly eroded deposit). Nevertheless, these finds indicate that this was a significant area of the settlement. The stratified assemblage includes fragments from a steatite vessel and a large whale bone 'bat' that may well be associated with flax processing. The latter object might suggest this area was set aside for particular specialist activities of which we have only a glimpse.

The other main discovery was a large and well-preserved house which appears to date to sometime before the twelfth century. This house is quite similar to house 500 at Cille Pheadair (Brennand *et al*. 1998): it is sunk just under a metre into the existing mound and, more importantly, had a small room at one end accessed by a passage from the main room, though the limited area excavated at Bornais makes this only a tentative interpretation. A comparable structure was also identified at the Udal (Crawford 1974a) though this is not yet published. All of these houses could date to the eleventh to twelfth century and would be contemporary with the large bow-shaped hall (house 2) on mound 2 (Sharples and Smith 2009). However, they are clearly smaller structures than house 2 and have much cruder stone walling, suggesting a significant status difference.

Examination of the geophysical survey (Figure 6) suggests that this house could be one of four houses arranged in a rough square around the centre of the mound, with an extra house on the south side. This pattern is not one that is recognisable on the other Bornais settlement mounds where a single principal house appears to occupy the centre of the mound with other subsidiary buildings scattered around it. It may indicate that the settlement on mound 1 has a slightly different significance. It is important to emphasise that mound 1 is set apart from the main area of settlement, whilst mounds 2, 2A and 3 are all close together and form an almost continuous settlement. It may also be important that the Norse settlers of mound 1 built on top of an ancient settlement. The main house on mound 2 was built on the immediately preceding settlement of the indigenous inhabitants but the other mounds appear to have no native predecessors, though only mound 2A has seen anything like a systematic exploration of the early deposits. It is possible, therefore, that the status of the inhabitants of mound 1 was slightly different from that of the occupants of mounds 2A and 3. A relatively independent household related but not subservient to the occupants of the principal house on mound 2 might be an appropriate interpretation of the mound 1 settlement.

The occupation of the Norse house on mound 1 was not examined but a large assemblage of material was recovered from the middens that were dumped inside the structure and the information recovered from this material is summarised below.

Pottery – A Lane

The pottery from the Norse contexts confirms our view of a typical Viking period and later Hebridean assemblage (Lane 2005b) while giving some useful indications of chronological variation. The assemblage from the Norse activity area (CE) is a mixture of Norse and Late Iron Age material. The Norse material includes platter and some thin cups and there is not much evidence for the larger bowl forms seen in the midden (CF). This raises some problems of interpretation (see above 175); it is possible the Late Iron Age and Norse styles could have been in contemporary use but the most likely interpretation is that this represents the mixture of at least two chronologically separate phases. It is hoped that analysis of the Bornais mound 2 materials will allow the characterisation of an early Viking pottery assemblage.

The assemblage from the Norse middens (CF) is the largest on mound 1 and is dominated by Norse material. A small number of cordoned sherds indicate a residual presence of Late Iron Age 1 material. The midden (CF) has a typical Norse assemblage with open bowls, cups and platter, sagging and flat bases, grassmarking and crazed basal surfaces. The assemblage is dominated by large Viking bowls and platter sherds. These are found from the earliest to the latest deposits although the quantity of platter may be dropping off in the upper layers.

There are no decorated Norse sherds or everted rims, which suggests that the assemblage is earlier than that from the house on mound 3 where everted rims do occur (Lane 2005a, 194–5). The radiocarbon dates for the midden (CF) suggest occupation around AD 1200 while the mound 3 house is dated to the thirteenth to fifteenth century AD (Sharples 2005b, 155). A very similar assemblage of platter and bowls without any decoration or everted rims is known from the excavations at Cill Pheadair (Parker Pearson *et al.* forthcoming) where it is dated *c*. AD 1020–1220 (Parker Pearson in litt.).

The metal – P Macdonald

The metal assemblage from the Norse deposits is relatively small and therefore potentially statistically unrepresentative. Excluding demonstrably modern items, it consists of 36 pieces of ironwork, six pieces of copper alloy and one lead spindle whorl. The forms of ancient and medieval iron artefacts are remarkably conservative and it is frequently not possible to date individual finds on the basis of their form alone. Consequently, the possibility that Late Iron Age metalwork has been residually deposited in later contexts cannot be dismissed. The only demonstrably non-Iron Age artefact in the assemblage of copper alloy pieces is the probable lace-tag.

Given the small size of the iron assemblage it is not possible to draw any firm conclusions from the study of its composition. Over half of the iron assemblage consists of structural fittings, such as nails and holdfasts, and approximately a third consists of unidentified miscellaneous fragments such as bars, rods, strips and plate fragments. It is notable that the assemblage does not include domestic equipment, craft tools (with the possible exception of possible awl 1078; see chapter 7) or weapons; however, given the small size of the assemblage these absences are not necessarily significant. Unlike the mound 3 assemblage, the ironwork from mound 1 does include a few items of harness equipment.

Although the small size of the assemblage reduces the confidence that can be placed in generalising about its character, it is broadly comparable in composition with ironwork assemblages recovered from a range of urban and rural early medieval and medieval settlement sites such as Coppergate, York (Ottaway 1992), Late Viking Age and medieval Waterford, Co. Waterford (Scully 1997), the early medieval manor at Goltho, Lincolnshire (Goodall 1987), Hen Domen, Montgomery (Goodall and Goodall 2000; Higham and Rouillard 2000) and Norwich, Norfolk (Margeson 1993). There is no evidence, such as partially-manufactured items, unused bar iron or blanks, to suggest that items of ironwork were being produced on mound 1 at Bornais. The miscellaneous examples of bar, rod, strip and plate fragments could justifiably be identified as scrap, that is the broken pieces of other objects which would be suitable for recycling. However, that these miscellaneous fragments were fairly evenly distributed across the various context groups rather than recovered in associated concentrations suggests that they were casually lost or discarded rather than collected together for recycling.

The stone and bone tools – A Clarke, N Sharples and A Smith

The relatively small assemblages of stone and bone artefacts from the Norse deposits include a range of simple tools that could be recovered from any period or area of Atlantic Scotland. There are a few diagnostic objects, however, which clearly relate the assemblage to a much wider north Atlantic region that was incorporated into the Norse sphere of influence. The pins and combs can be paralleled at many sites, most notably York (MacGregor *et al*. 1999), Freswick (Batey 1987) and Jarlshof (Hamilton 1956), and are directly comparable to the fragmentary assemblage recovered from mound 3 (Sharples 2005b). These will be explored in much greater detail when the substantial assemblage from mounds 2 and 2A is published. More unusual finds are the ogham-inscribed plaque and the fragment of green porphyry. The former was unfortunately unstratified but there are reasons for suggesting that it dates to the early period of the Norse occupation and indicates the continued influence of the Celtic language and the importance of literacy to a probably small section of the population. The porphyry provides clear evidence for the networks of exchange that relate the site to the wider world. It probably came from Ireland where relatively large quantities of this material appear to have been brought to demonstrate the Christian connections between Rome and the Irish church. It is difficult to be certain of the importance of these Christian allusions to the Norse inhabitants of Bornais but it seems more than likely that they existed and that the fragments had some form of religious significance.

Mammals – J Mulville

As Table 111 demonstrates there are few Norse period assemblages for comparison and at only three of these is it possible to compare Iron Age assemblages with subsequent Norse occupation – Bornais, the Udal and Bostadh. At all of these sites the proportion of pigs remains relatively constant between the Late Iron Age and Norse periods, with Cille Pheadair having the greatest proportion of pig. There is no increase in the proportion of sheep at Bornais mound 1 although the Norse assemblages from Bornais mound 3 (Mulville in Sharples 2005b) and Cille Pheadair (Mulville forthcoming) both have a greater proportion of sheep than is seen at mound 1. The most unusual pattern is seen at the Udal with sheep dramatically reducing in importance between the Iron Age and the Norse periods and a rise in cattle. Broader comparisons with the material on Lewis, as mentioned above, are complicated by the importance of deer as a resource and this is apparent at Bostadh with an increased reliance on deer between the Iron Age and Norse periods.

There are no general trends distinguishable in domestic species abundance across the islands that can be attributed to the arrival of the Norse on the island yet there are changes in the age at which animals, particularly cattle, are being slaughtered (Figure 211). Overall there is an increase in the age of slaughter at the Norse sites, with a larger number of animals surviving to the later age groups; the only exception is the Udal which has a higher level of early mortality (Serjeantson in prep.). As noted previously the difference in the age of animal slaughter affects the contribution that individual species make, thus whilst in general the proportion of cattle within the Norse Uist assemblages does not increase over time, the contribution of beef to the diet does as a result of the larger carcass size of the older animals.

The sharp fall in neonatal cattle mortality in the Norse period indicates a distinct break with previous practice. This could indicate a transformation of cattle management and food production strategies but the decline in neonatal mortality may result from other changes. There could have been an improvement in husbandry methods. It has been suggested that the high proportion of earlier calf deaths are linked to poor fodder provision (McCormick 1998), particularly over winter. Thus if the Norse improved fodder provision more calves would have survived until adulthood. However, this vision of the Norse inhabitants as more capable farmers is not supported at all sites across the islands. At the Udal we can see that neonatal mortality remains high in the Norse period and in the Northern Isles the rate of calf death increases in the Norse period and has been linked to an intensification of dairy production (Mulville *et al.* 2005). There is no evidence for better husbandry in stock size changes (see above 241). This switch to an older age for slaughter would seem to be a deliberate strategy. At Cille Pheadair the much greater age of death for cattle has been linked to herd conservation (Mulville forthcoming) yet this is not the case for the Bornais Norse mounds 1 or 3 where a steady rate of a slaughter continues until about 18 months, leaving only around one-third of animals as breeding stock.

Goat appears in the southern Hebrides for the first time in the Norse period in small quantities at Cille Pheadair, Bornais mound 1 and mound 3 and has also been identified in Late Iron Age and Norse phases at Bostadh on Lewis (four bones in total). The appearance of goat in Late Iron Age contexts at Bostadh is surprising, and the author notes that the identification (a distal radius epiphysis) needs to be checked (Thoms 2004).

These goats might have been imported for milk production or for their ability to use browse for fodder, being more able to metabolize twigs and leaves than sheep. Their presence could suggest an attempt to exploit the heath and meagre woodland resources on the islands. In Landnám-era Iceland and Greenland, goats were common. In Iceland goat numbers did not decline until the early thirteenth century AD (McGovern *et al*. 2001) and in Greenland goats remained nearly as common as sheep in many assemblages until the end of the colony in the fourteenth to fifteenth centuries AD (*cf*. McGovern 1992; McGovern *et al*. 1983; Enghoff 2003).

It is only with the arrival of the Norse that horse is present in greater numbers. The proportion of horse is only 1% or less of the hand-collected assemblage at Cille Pheadair and Bornais mounds 1 and 3. Although the numbers are small this marks the first time on South Uist that horses play a significant role. At the Udal a larger number of equid bones were recovered and horse accounts for 2% of the identified species. At Norse Bostadh, whilst the number of bones does not increase, the small sample size means that they increase in relative abundance to 5%.

The presence of very young foals at Cille Pheadair, the Udal and Bornais indicates a breeding population on Uist. There is evidence of possible horse consumption at Norse Cille Pheadair where two bones from phase 6 are chopped, a tibia and a metatarsal (Mulville forthcoming). Both are from the same context and body side, so the butchery may derive from a single event. It is unclear if this butchery is associated with human consumption. Horse butchery is also recorded at the Udal, although the period to which the remains belong is uncertain. Once Christianity was adopted the use of horses as food (or in religious symbolism) was forbidden. The butchered horse at Cille Pheadair post-dates Pope Gregory III's AD 732 edict forbidding the consumption of horseflesh. Could horse consumption have continued on the islands, even during a phase when two pendant crucifixes (Parker Pearson *et al.* 2004a: 141–2) were deposited on this site?

Horses were considered of ritual significance in pagan Norse culture and many Scandinavian sites display evidence of butchery marks on horse bones, for example Aker, Norway (Perdikaris 1993). There is a Norse horse burial on Vatersay, demonstrating the ritual importance of this animal to the islanders at this time (Sikora 2004).

If we include wild species the picture of exploitation becomes more complex. The most abundant wild species in the archaeological record for the Norse period across the Western Isles is red deer, which is present in small quantities on most sites. The proportion of red deer from the Norse assemblages at Bornais mound 1 is relatively high at 7% compared to the other Norse sites; mound 3 and Cille Pheadair have only 3% and deer is rare at the Udal (0.5%). In contrast the Norse phases at Bostadh on Lewis show a great reliance on red deer, with 23% present in phases 2–4 (Thoms 2004).

Analysis of the red deer body parts from Bornais mounds 1 and 3 and Cille Pheadair demonstrates a range of elements is present, suggesting that whole animals were sometimes returned to the site. At both sites there is a small amount of red deer antler recorded, and much of this is worked. There is some slight evidence for a disparity between fore and hind limb bones in favour of fore limbs in the Norse period. This may reflect the larger body size of the older animals exploited in the later phases, and the need for more carcass processing before transport.

The age of exploitation increases at mound 1 in the Norse period relative to the Late Iron Age and this pattern is also seen at mound 3 with mainly adults procured and only single sub-adult and neonate specimens present. At Cille Pheadair the small number of deer present includes both neonatal and adult animals. At Bostadh fusion evidence for the Norse phases also suggests the preferential procurement of adult animals, with only 20% of bone unfused in the early and mid-fusing age groups (up to 4 years of age) and only 25% of bone unfused in the 4–6 year age group. These patterns both suggest a strategy more representative of one designed to maximise meat procurement.

Roe deer is absent from the Norse period deposits at both mounds 1 and 3 at Bornais, and from the Udal and Bostadh, but is recorded at Cille Pheadair. There are no definite records from the Norse Uist sites of non-native wild species, such as badger and pine marten (although two fragments of small murid are recorded from Norse Bornais) and these remain as only occasional finds on other Iron Age sites, but not at Bornais. A single pine marten bone was recorded from the latest Norse phase at Bostadh. Hare and otter are present but only in small numbers.

It is interesting to note that for the Iron Age both wild and domestic animals are exploited at a younger age than they are in the Norse period; this suggests a very real cultural difference in what was considered appropriate food by the two groups. The Iron Age diet of veal, lamb and young venison supplemented by milk was replaced, in the Norse period, by one of beef, mutton and venison, although in both periods pigs were only consumed as adults.

An analysis of the species of cetacea on sites indicates a change between prehistory and the Norse period with a broader range of species found later (Mulville 2002). Although there are problems in quantifying whale bone, there also appears to be a greater proportion of whale bone and a larger range of artefacts recovered from Norse settlements. This could suggest a larger number of stranded animals, the more active procurement of whale, a greater length of occupation at these sites or a larger settlement size. This is particularly interesting when contrasted with the Greenland Norse who made little use of the available cetaceans. They adopted some of the native Inuit patterns of species exploitation in hunting seals but in general they seemed reluctant to use the marine mammals to the same degree (Tom McGovern pers. comm.). When the cetacean bone identified only to size class is included, it becomes obvious that large whales dominate the Norse whale bone assemblage (Mulville 2002).

The fish – C Ingrem

Norse fish remains have been analysed from two other sites on South Uist – mound 3 at Bornais (Ingrem 2005) and a farmstead at Cille Pheadair (Ingrem forthcoming) – and both produced large quantities of fish bone, recovered using a similar strategy to that at mound 1. The quantities of fish bone excavated suggest an increasing dependence on fish as a source of protein. Both assemblages were similarly dominated by herring vertebrae leading to the suggestion that herring were decapitated, possibly to facilitate wind-drying. The possibility that surplus gadoid fish were being exported from the locality has also been considered and, at both sites, cod and hake decapitation appears to have included the appendicular region (Ingrem 2005). Another Norse site in the region that has produced fish bone is the Udal (Serjeantson in prep.) where, despite a lack of routine sieving, herring was also common.

Prior to analysis of the Bornais and Cille Pheadair assemblages, little was known of Norse fishing practices in the Western Isles. Given the similarities that are seen to exist with the Northern Isles during the Iron Age, it would not have been surprising if this had continued into the Norse period. It is now apparent, however, that this is not the case in respect of taxa representation: the results from the farmstead at Cille Pheadair, Bornais mound 3 and now Bornais mound 1 leave little doubt that herring were the main target of fisher people living in the Western Isles during the Norse period.

In other respects, the fish remains conform well to the pattern seen at contemporary sites from both the Northern and Western Isles of Scotland, with a change in emphasis from inshore fishing during the Late Iron Age to the exploitation of offshore waters during the Norse period being apparent. This indicates a move to more intensive practices although it does not appear that fish became more important in the diet of the occupants of mound 1, in contrast with the other sites. This may be the result of dietary preference or simply reflect excavation bias. Overall, the evidence from South Uist indicates that during the Norse period fishing activities in the region were focused on herring and it has been suggested that it may have been practised at the community level. Taken together, the Norse evidence from the island suggests that herring arrived at settlement sites in a decapitated form, which raises the possibility that herring were landed in considerable numbers and to aid wind-drying had their heads removed, perhaps close to the landing site.

The birds – D Serjeantson

The assemblage from the Norse activity area (CE) may include some residual material, but the range of species is similar to other Norse phase deposits, so the material can be regarded as mostly Norse. In the middens (CF), bird bones are 8 per cent of all mammals and birds, again a fairly high percentage, with the range of species similar to mound 3. As in the Iron Age, most of the birds will have been caught for food, even if the feathers were also used. The larger gulls continue to be the most frequent species, but they are a smaller percentage of the total than in the Late Iron Age and bird capture and consumption seems to have been less focused on a few species. The remains of gannet and guillemot or razorbill are more frequent than in earlier periods. It is characteristic of Norse sites that the gannet is a frequent species. As suggested in chapter 7, some of the seabirds must have been captured at a distance from the site; it is possible that they were obtained as tribute or by trade or exchange (Serjeantson 2001).

Skill was required for capture of gulls, cormorants and great auks, as they were easily disturbed, but the task was not necessarily dangerous. However, the accounts of seabird fowling on St Kilda and elsewhere make it clear that it required much more skill and daring to capture the cliff-nesting birds such as the auks and the gannet, both of which become more frequent in the Norse period. To catch these it was necessary to make a visit by boat to an outlying island and to climb dangerous sea cliffs; it was an activity that brought the young men great prestige (Beatty 1992; Baldwin 2005).

At this time there is some evidence for domestic fowl (one bone) and one bone of goose was similar to domestic goose. Mound 3 also has domestic fowl and goose at this time. On the islands, domestic chickens were, and are, difficult to keep because they are caught and killed by the greater black-backed gulls and white-tailed eagles.

The seabirds contributed to the food supply as well as to other needs such as warmth and light in both the Late Iron Age and the Norse period. It is likely that birds were captured at all seasons of the year, and the cormorants and shags might have been particularly important as a source of food in winter.

Conclusion – N Sharples

The excavations on mound 1 provide some important information on the nature of the settlement at Bornais. The excavations demonstrated that this was the earliest area of settlement so far explored and revealed the remains of an important fifth to sixth century AD occupation. The absence of evidence for a significant amount of residual Middle Iron Age material culture was important in enabling the examination of an unmixed Late Iron Age I assemblage which contrasts with the mixed assemblage from this period at Dun Vulan (Parker Pearson and Sharples 1999). Despite the absence of evidence it is clear that the occupation of mound 1 started considerably earlier than the deposits examined and it seems likely that a substantial Middle Iron Age settlement exists elsewhere on the mound.

The Late Iron Age settlement consists of the remains of a house which was burnt down, rebuilt and then abandoned and completely dismantled. Apart from a short stretch of the first course of the inner revetment wall none of the structure of the house survived the deliberate demolition that marked the end of the occupation. However, not only were the floor and associated hearth of the rebuilt house preserved intact, this floor had been laid on top of the burnt roof timbers of the original structure which had in turn collapsed on and preserved the primary floor. These deposits contained an assemblage of objects that provide invaluable information on the occupation and reoccupation of the house. The original house appears to have been largely used for storage whereas the secondary use had a more domestic character. Some of the more unusual objects appear to have been deliberately placed as part of ceremonies associated with the reoccupation of the structure. The systematic dismantling of the house was also associated with a distinct assemblage of artefacts which appear deliberately placed as part of the process of abandonment. Contemporary with the occupation of the house was a midden which lay on the edge of the settlement mound to northwest of the house and this was examined by a single trench.

The settlement provided an assemblage of ceramics characterised by the double-cordoned flaring rim vessels known as Dun Cuier ware and the appearance of this style is now firmly dated by a suite of radiocarbon dates. It was associated with a large and varied collection of bone and stone objects that includesa range of simple tools and evidence for manufacture at the site. There were also a number of classic objects including parallelopiped dice, weaving combs and weaving tablets and several more unusual objects including a decorated phalanx and an elaborately decorated composite iron and antler comb. These objects are well dated and provide an important insight into the role of material culture in the mid first millennium AD.

The quantities of animal bone and crop remains from the site were also substantial and provide a detailed picture of the economy of a settlement in the middle of the first millennium AD. The economy was dominated by the cultivation of barley and the herding of cattle and sheep. There is some evidence for the increasing diversity of crops, with oats and flax both being present in small but significant quantities. The bone assemblage also includes a small assemblage of pig and a small but nevertheless important assemblage of red deer. Very young animals appear to have been a particular target for the inhabitants and this unusual strategy may indicate a desire to obtain the distinctive coats of immature deer. There is also good evidence for fishing, with discrete deposits of saithe and salmonid bones occurring in the settlement midden.

The abandonment of the house appears to mark the end of the occupation of this mound and the settlement appears to have then shifted some 100 metres north to a new location on mound 2. This movement is comparable to the shift in settlement at the Udal[18] and field survey suggests that this shift in the middle of the first millennium AD is a consistent pattern for settlement on the Uist machair and indicates a significant disruption in the middle of the first millennium AD.

Mound 1 was reoccupied in the tenth century when the island was colonised by Norse incomers but the principal focus for this settlement was mound 2. This volume does not contain any substantive analysis of the nature of the colonisation as this will be discussed when mounds 2 and 2A are published (see also Sharples *et al.* forthcoming). However, the settlement does provide important evidence for Norse activity which can be compared with the other mounds and the finds recovered include a very rare example of a portable ogham inscription on a bone plaque and a fragment of green porphyry from Laconia in Greece, imported probably via Rome and Ireland.

A significant eleventh-century house was discovered and partially excavated and this can be compared with houses on other mounds at Bornais and Cille Pheadair. The structure was infilled with midden which contained a substantial assemblage of animal bone and ceramics that provides important comparisons with assemblages from the other mounds.

The mound was clearly an important part of the Norse settlement at Bornais even though it was relatively detached from the main settlement area. It considerably expands the extent of the settlement and the intriguing nature of some of the finds emphasises the importance of this settlement and suggests it played an important role in the politics of the western sea routes.

Notes

1 Armit (1992a) has argued that wheelhouses are not included in the class of Atlantic roundhouses.

2 These generalisations are based on a study of the architectural features of brochs undertaken by Angus Graham (1947) which is not as helpful as it could be as it does not relate the different features nor pay any attention to cardinal orientations.

3 In many houses it is the only architectural feature that shows evidence for reconstruction.

4 It is possible this was originally a full circle that was then damaged by the reconfiguration of the hearth.

5 This was located in an exposed area outside the charcoal layer but it is included here because the level of burning is comparable to that of the other objects from the charcoal layer.

6 The presence of a dog is also suggested by the presence of coprolite in the ancillary building of Norse date on mound 3 though this was not so well defined or substantial a deposit.

7 Dun Vulan produced 19065 sherds (Parker Pearson and Sharples 1999); Cnip produced 6370 sherds (Armit 2006); Allt Chrisal produced 5670 sherds (Foster and Pouncett 2000).

8 A selection of ceramics from Bornais mound 1 are in the process of being analysed for lipids and other residues but this is part of a larger programme investigating change through time that will be published in later volumes.

9 Mostly pottery, but also in other aspects of material culture such as the weaving combs.

10 Similar patterns are visible in Shetland. The assemblage from the later Bronze Age settlement at Sumburgh (Downes and Lamb 2000) is very substantial but in these islands the quality of the pottery is much better and decoration retains its importance.

11 Disc-shaped pin heads do reappear in Late Iron Age II contexts and there is a good example from Scalloway in Shetland (Sharples 1998, fig. 109, 15).

12 These structures were first recognised at the Udal (Crawford 1974a) and this was where the term 'jelly baby' was applied. Excavations in Orkney have uncovered similar structures but some of these, and in particular the structure at Buckquoy (Ritchie 1977), were more monumental and others, such as Red Craig, Birsay (Morris 1989), had a very regular figure of eight shape.

13 Only four appear in Table 109 because two are unstratified.

14 Excluding the steatite vessels and the anvil stone, which are argued to be clearly intrusive objects.

15 Thanks to Tim Neighbour for providing access to the finds report by Fraser Hunter.

16 Campbell and Heald (2007) argue that the evidence for the production of high-status objects in the Western Isles is not as restricted as it is in other areas of western and northern Britain and suggest this might indicate the relative freedom provided by being peripheral to the main political centres of the period and the possible presence of itinerant metalworkers.

17 Some authors (Crawford 1974a; Gilmour 2000; MacKie 2010) have argued for the influence of the Scots from west-central Scotland but the author believes the presence of Pictish symbol stones, square cairns and the stylistic affiliations of the metalwork (Campbell and Heald 2007, 175) suggest Pictish influence was stronger (Parker Pearson *et al.* 2004a, 105–23).

18 The north mound at the Udal has a Late Iron Age II settlement associated with the Plain wares and 'jelly baby' houses, whereas the south mound has wheelhouses though apparently these are not associated with Dun Cuier ware.

Appendix 1: Context List – N Sharples

Context	Mound	Block	Context type	Same as	Fill of	Filled by	Small finds	Sample numbers	Radiocarbon dates
301	1		Turf						
302	1	CC	Yellow sand				1078, 1098, 1136, 1141, 1170, 1171, 1266, 1524, 4719		
303	1	CF	Dark brown sand				1080, 1081, 1083, 1085,		
304	1	CF	Brown sand	347, 350			1079, 1087, 1090, 1091, 1169, 1378, 1379, 1473, 1475, 1488, 1490, 1547, 4711, 4720	5580	SUERC-7634, 810±35
305	1	CF	Orange sand				1096	5654, 5671, 5581	SUERC-7635, 840±35; SUERC-17946, 930±35
306	1	CB	Charcoal sand	397, 492			1216, 1499		
307	1	CF	Light grey sand				1116		
308	1	CC	Charcoal sand	329, 363, 398, 407, 415			1094	5582, 5598	
309	1	CC	Pale brown sand	332, 408, 419			1577	5587	
310	1	CF	Dark brown sand				1172, 1086, 1093, 4710		
311	1	CF	Dark brown sand				1097, 4734		
312	1	CF	Brown sand				1123, 1124, 1125, 1143, 1220, 1274, 1320, 1330, 1331, 1383, 1395, 1396, 1397, 1557, 1568, 4731	5585, 5656, 5664	SUERC-7625, 1435±35
313	1	CF	Red clayey sand						
314	1	CC	Charcoal sand	406, 418, 438			1099, 1100, 1112, 1113, 1117, 1118, 1119, 1121, 1122, 1123, 1128, 1129, 1130, 1131, 1137, 1167, 1230, 1233, 1262, 1263	5583	
315	1	CF	Shell layer					5584	
316	1	CD	House revetment wall	433					
317	1	CD	Secondary revetment wall						
318	1	CF	Light grey sand				1244	5586	
319	1	CF	Red-brown sand				1133	5589	
320	1	CF	Light brown sand						
321	1	CF	Dark brown sand						
322	1	CF	Orange sand					5588	SUERC-18229, 1690±35

323	1	CD	Revetment wall						
324	1	CE	Dark brown sand	378	355				
325	1	CE	Light brown sand				1138, 1144, 1150, 1151, 1152, 5810, 5811	5590, 5592	
326	1	CE	Dark brown sand	379	355			5591	
327	1	CF	Dark brown charcoal flecks				1101		
328	1	CE	Brown sand	373	389				
329	1	CC	Charcoal sand	308, 363, 398, 407, 415				5594	
330	1	CF	White sand						
331	1	CF	Brown sand	343			1163, 1168, 1199, 4743, 8622	5593	SUERC-17947, 1510±35
332	1	CC	Pale orange sand	309, 408, 419			1154	5596	
333	1	CF	Dark brown sand				1176, 1251, 4739	5595	
334	1	CD	Revetment wall, passage				1271		
335	1	CF	Red-brown sand				1232, 4742	5597	
336	1	CF	Brown sand grey mottles						
337	1	CC	Charcoal sand	413, 414, 441			1184, 1185, 1186, 1197, 1198, 1201, 1202, 1204, 1210, 1211, 1212, 1213, 1239, 1240, 1241, 1269, 4800	5571	
338	1	CF	Orange clay charcoal flecks					5572	
339	1	CF	Dark grey sand charcoal flecks				1215	5574	
340	1	CF	Light brown sand						
341	1	CF	Orange-brown sand				1200, 4718,	5599	
342	1	CF	Grey sand						
343	1	CF	Brown sand	331			1217, 1218	5570	
344	1	CD	Secondary revetment wall						
345	1	CF	Orange sand				1205	5575	
346	1	CF	Light grey sand				4707, 5812	5576	
347	1	CF	Brown sand	304, 350					
348	1	CF	Winkle layer						
349	1	CF	Grey sand				1206, 1207		SUERC-17948, 915±35
350	1	CF	Brown sand	304, 347					
351	1	CD	Red brown sand						
352	1	CD	Charcoal-rich sand						
353	1	CF	Dark brown sand						
354	1	CF	Dark brown sand charcoal flecks						

355	1	CE	Pit			324, 326, 362, 371, 378, 379, 390, 391, 416			
356	1	CF	White sand						
357			Cancelled						
358	1	CF	Orange sand						
359	1	CD	Revetment wall						
360	1	CF	Dark brown sand						
361	1	CD	Revetment wall, passage						
362	1	CE	Light brown sand		355				
363	1	CC	Charcoal sand	308, 329, 398, 407, 415					
370	1	CE	Dark brown sand					5650	
371	1	CE	Dark brown sand		355			5651	
372	1	CE	Light brown sand				1316, 1348, 1532, 1533, 1571, 1585, 1593, 1737, 1738, 1956, 2570	5655	
373	1	CE	Brown sand	328	389		1319	5653	SUERC-8170, 1155±40
374	1	CE	Brown sand				1318, 1321, 1322, 1362, 1486, 1506, 1586	5652	
375	1	CE	Orange-black sand	401	376		1327, 1328, 1343	5657	
376	1	CE	Scoop			375, 401, 420			
377	1	CC	Charcoal sand						
378	1	CE	Dark brown sand	324	355			5658	
379	1	CE	Orange sand charcoal-rich	326	355		1355, 1543	5660	
380	1	CC/CE	Brown sand					5659	
381	1	CE	Orange sand charcoal flecks		405		1356	5664	
382	1	CE	Dark brown sand				1367, 1711, 1712	5661	
383	1	CE	Light brown sand		386		1354	5662	
384	1	CE	Dark brown sand				1350, 1359, 1360, 1504, 1511	5663	
385	1		Rabbit disturbance						
386	1	CE	Pit			383			
387	1	CB/CC ?	Charcoal layer					5664	
388	1	CC ?	Light brown sand						
389	1	CE	Pit			373			
390	1	CE	Orange sand		355			5665	SUERC-7637, 1130±35
391	1	CE	Grey-brown sand		355				
392	1	CC	Charcoal sand				1590, 4697	5666	

393	1	CC	Light brown sand				1374, 1550		
394	1	CC	Pale orange sand	309, 332, 409, 419			1385		
395	1	CF	Dark brown sand charcoal flecks					5669	
396	1	CE	Orange sand						
397	1	CB	Orange black sand	306, 492			many	8326-8525	SUERC-7642, 1580±35; SUERC-7643, 1545±35
398	1	CC	Charcoal sand	308, 329, 363, 407, 415			1369, 1372, 1376, 1377, 1491, 1594	5667	SUERC-8171, 1550±35
399	1	CC/CE	Dark brown sand						
400	1	CE	Light brown sand				1375, 1381, 1384, 1387, 1389, 1391, 1392, 1394, 1398, 1410, 1566	5670	
401	1	CE	Light brown sand	375	376		1591	5672	
403	1	CE	Red-brown sand				1565, 4780	5673	
404	1	CC	Yellow/orange sand				1382, 1390, 1424, 1426, 1430, 1432, 1433, 1439, 1440, 1461, 1465, 1508, 1548, 1567	5674	
405	1	CE	Hearth pit			381	1388		
406	1	CC	Charcoal sand	314, 418, 438			1407, 1409, 1415, 1472, 4789	5675	
407	1	CC	Charcoal sand	308, 329, 363, 398, 415			1405, 1406, 1408, 1589, 1736, 1756, 2107, 4698, 4755, 4761	5676	SUERC-7645, 1200±35
408	1	CC	Pale orange sand	309, 332, 419			1412, 1510, 1514	5677	
409	1	CC	Pale orange sand					5678	
410	1	CC	Pale brown sand					5679	
411	1	CE	Hearth pit			412			
412	1	CE	Red sand charcoal mottles		411			5680	
413	1	CC	Charcoal sand	337, 414, 441			1422, 1437, 1476, 1478, 1479	5682	SUERC-7638, 1575±35
414	1	CC	Charcoal sand	337, 413, 441			1419, 1423, 1425, 1512, 1551, 1559, 1764, 1765, 4751	5683	
415	1	CE	Charcoal sand	308, 329, 363, 398, 407					
416	1	CE	Pale brown sand		355				
417	1	CC/CE	Orange white sand	439					

418	1	CC	Charcoal sand	314, 406, 438			1450, 1452, 1453, 1459, 1463, 1469, 1470, 1517, 1518, 1523, 1529, 1556, 1564, 1569, 1570, 1572, 1574, 4700, 4756, 8520	5685	
419	1	CC	Pale orange sand	309, 332, 408				5684	
420	1	CE	Dark brown charcoal-flecked sand		376		8521		
421	1	CC	Charcoal sand				1474		
422	1	CC/CE	Light brown sand						
423	1	CC	Pale orange sand						
424	1	CC	Pale orange sand				1484, 1495, 1496, 1534, 1535, 1536, 1549, 4737, 1495	8300	
425	1	CC	Grey sand				1501, 1502, 1771		
426	1	CB/CC	Dark brown sand				1498		
427	1	CC	Brown sand						
428	1	CC	Dark brown sand				1553		
429	1	CC	pale yellow sand	444					
430	1	CC	Orange-brown sand						
431	1	CB/CC	Dark brown sand	440					
432	1	CB/CC	Charcoal sand						
433	1	CD	House revetment wall	316					
434	1	CG	Dark brown sand, midden				1733, 1734, 1735, 4788	8306	
435	1	CG	Yellow sand	450					
436	1	CG	Light brown sand						
437	1	CC/CE	Red brown sand						
438	1	CC	Charcoal sand	314, 406, 418			1758, 1759, 1760, 1761, 1766, 4760		SUERC-7624, 1470±35
439	1	CC/CE	Orange white sand	417			1757		
440	1	CC	Dark brown sand with orange flecks	431					
441	1	CC	Charcoal sand	337, 413, 414					
442	1	CC	Yellow sand						
443	1	CB/CC	Red-brown sand						
444	1	CC	Pale yellow sand	429					
445	1	CG	Dark brown sand				1788, 1949, 4782	8301	
446	1	CG	Light brown/grey sand						
447	1	CB	Orange sand, charcoal flecks					8302	
448	1	CG	Dark brown sand				1951, 2025, 2219, 2575, 2578, 2588, 2657	8305	

449	1	CG	Orange-brown sand				1776, 1777, 1778, 1779, 1780, 1781, 1948, 1833, 1834, 2003, 2004, 2005, 2658	8304	
450	1	CG	Pale yellow sand	435			1802, 1818	8323	
451	1	CE	Orange/dark brown sand					8307–8320, 8322	SUERC-7652, 1145±35; SUERC-7653, 1130±35
452	1	CG	Orange-brown sand					8324	
453	1	CB	Orange sand		489		2295, 2296, 8519	9099–9106, 9154	OxA-15417, 1481±27; OxA-15418, 1493±27
454	1	CG	Grey-brown sand						
455	1	CG	Dark brown sand				1840, 4687	8527	
456	1	CG	Yellow brown sand				1896, 1897, 1910, 1911, 1915, 2132, 2135, 2178, 2435, 2481, 2560, 2598	8526, 8564	SUERC-7628, 1515±35; OxA-15419, 1547±28
457	1	CB	Charcoal-rich sand				many	see Figure 31	SUERC-7644, 1550±35; SUERC-7646, 1585±35; SUERC-7647, 1505±35; SUERC-7648, 1570±35
458	1		Cancelled						
459	1	CB	Pale yellow sand				1855, 2069		
460	1	CB	Yellow sand patch					8528	
461	1	CG	Orange sand						
462	1	CB	Orange black sand				1902, 1904, 2045, 2046, 2057, 2561, 4690	8531–8563	
463	1	CG	Pale orange sand				1907, 2576, 2586, 2061, 2063, 4783, 8518	9058	SUERC-7632, 1490±35
464	1	CG	Pale yellow sand						
465	1	CB	Orange coprolite-rich sand					9059, 9157	SUERC-7636, 1565±35
466	1	CB	Dark brown sand					9061	
467	1	CB	Light brown sand					9062	
468	1	CG	Orange brown sand						
469	1	CB	Cut			470			
470	1	CB	Orange sand arc		469			9063	
471	1	CB	Dark brown sand				2474	9060	
472	1	CG	Dark brown sand	490			2247, 2250, 2253, 2503, 8512		
473	1	CG	Orange-brown sand				2691, 4792	9143	
474	1	CB	Orange sand					9097	

475	1		Cancelled						
476	1	CB	Dark brown sand			489		9108–9114	
477	1	CB	Yellow sand black flecks			489		9115–9121	
478	1	CB	Orange sand grey mottles		837		1988		
479	1	CB	Dark brown charcoal-rich sand		480			9098	
480	1	CB	Pit/post hole			479	1998		
481	1	CB	Red-brown sand				2254	9145	
482	1	CB	Brown sand				metapodials; 4775	9123–9142	OxA-15416, 1530±28
483	1	CG	Grey sand					9165	
484	1	CB	Pale yellow sand					9144	
485	1	CG	Brown sand				2273, 2274, 2275, 2307, 2308, 2309, 2310, 2343, 2585, 4763, 8513	9147	SUERC-7626, 1500±35; SUERC-7633, 1530±35
486	1	CB	Yellow sand					9146	
487	1	CB	Red brown layer			489		9148, 9151	
488	1	CB	Dark brown charcoal-rich sand						
489	1	CB	Hearth		453, 476, 477, 487, 494, 496, 497, 498		2161, 2163		
490	1	CG	Dark brown sand	472			2202, 2306, 2344, 2345, 2351, 2448, 2614A, 4793, 4794, 8517	9162	
491	1	CB	Hearth metapodials						
492	1	CB	Orange sand charcoal flecks	306, 397			2158, 2197	9163	
493	1	CG	Brown-grey sand				2294, 4764, 4784	9164	SUERC-7627, 1450±36
494	1	CB	Pink/orange sand			489		9172, 9174	
495	1	CG	Pale yellow sand				8522		OxA-15421, 1542±28; OxA-15452, 1606±26
496	1	CB	Dark brown sand			489		9171	
497	1	CB	Dark brown sand			489		9173, 9175	
498	1	CB	Orange yellow sand			489		9176	
499	1	CA	Pale yellow sand				2312, 2327, 2375, 2376, 2392, 2393, 2420, 2687, 4758		
800	1	CB	Dark brown sand charcoal flecks		801		4470	9177	
801	1	CB	Pit			800			
802	1	CB	Dark brown sand charcoal flecks		803			9179	
803	1	CB	Pit			802			

804	1	CB	Feature ??			805			
805	1	CB	Light brown sand		804				
806	1	CB	Post hole			807			
807	1	CB	Dark brown sand charcoal flecks		806		2507	9180	
808	1	CB	Feature ??			809			
809	1	CB	Dark brown sand		808				
810	1	CB	Feature ??			811			
811	1	CB	Light brown sand		810				
812	1	CB	Dark brown sand		813		2647	9181	
813	1	CB	Pit			812			
814	1	CB	Post hole			815	4747	9182	
815	1	CB	Dark brown sand		814				
816	1	CB	Stone hole			817			
817	1	CB	Light brown sand		816			9184	
818	1	CB	Stone hole			819			
819	1	CB	Light brown sand		818				
820	1	CB	Post hole ?			821			
821	1	CB	Dark brown sand		820				
822	1	CB	Post hole ?			823			
823	1	CB	Brown sand		822				
824	1	CB	Stone hole			825			
825	1	CB	Dark brown sand		824				
826	1	CB	Stone hole			827			
827	1	CB	Dark brown sand		826				
828	1	CB	Post hole ?			829			
829	1	CB	Dark brown sand		828			9183	
830	1	CB	Dark brown sand		831		2400		
831	1	CB	Pit			830			
832	1	CA	Dark brown sand charcoal flecks						
833	1	CB	Feature fill		834				
834	1	CB	Shallow gully			833			
835	1	CB	Stone hole			836			
836	1	CB	Light grey sand		835		2528		
837	1	CB	Pit			478, 838			
838	1	CB	Grey sand charcoal flecks		837			9186	
839	1	CB	Dark brown sand		840				
840	1	CB	Pit			839			
841	1	CB	Brown sand						
842	1	CB	Dark brown sand						
843	1	CB	Red brown sand						
844	1	CB	Post hole			845			
845	1	CB	Dark brown sand		844				
846	1	CB	Feature			847			
847	1	CB	Dark brown sand		846				
848	1	CB	Brown sand						
849	1	CB	Brown sand						

Appendix 2: Artefact Catalogue –A Clarke, P Macdonald, N Sharples and A Smith

Within the function and object type groups, the entries are arranged as stratigraphic blocks (Late Iron Age blocks followed by Norse blocks, followed by unstratified material), and then sorted by small find number.

The catalogue entries follow the format as below:
Find no. Context no. Stratigraphic block Sample no. Coordinates
Object type and material.
Written description. Condition assumed to be good unless otherwise indicated.
Measurements in millimetres. Abbreviations used: L length, W width, Th thickness, H height, ML maximum length *etc*.

WORKED BONE AND ANTLER

Dress and ornament

Combs

Late Iron Age blocks

1577 309 CC
Tooth plate offcut or waste piece (?). Bone (?)
Thin, regular plate of bone with three regular cut sides and one curving side. May be tooth plate offcut or waste piece from manufacture of comb tooth plates. Blackened from burning.
16 by 19mm Th 2–3mm

Norse blocks

1343 375 CE 430.20 109.15
Tooth plate from single-sided comb. Antler/bone (?)
Tooth plate fragment from single-sided comb with tapering upper edge. Rivet hole stained with iron on one side. All teeth broken off. (Figures 89, 162)
W 16mm, H 22mm Tooth spacing not recoverable

1327 375 CE 429.85 109.35
Single loose tooth. Does not fit any surviving tooth plates. (Figure 89)
L 16mm

1169 304 CF
Side plate fragment from single-sided comb. Antler.
Small side plate fragment, triangular section, decorated with single incised longitudinal lines along upper and lower edges, and pair of incised lines along mid-rib. Additional knife-cut chevrons are placed on either side of the mid-rib. One rivet hole present on edge, with iron staining indicating use of iron rivets. Nicks from cutting of teeth are present along lower edge, confined within the lower incised line. (Figures 102, 162)
W 26mm, H 13mm Tooth spacing 6 per cm

1232 335 CF
Side plate fragment from composite comb. Antler.
Unusually shaped side plate fragment with semi-circular section. Decorated with two parallel diagonal lines. Rivet holes on each broken side, nicks from cutting of teeth on lower surface. (Figures 102, 162)
W 33mm, H 7.5mm Tooth spacing 7 per cm

1244 318 CF
Side plate fragment from single-sided comb. Antler.
Side plate fragment, trapezoidal section, decorated with single incised longitudinal lines along upper and lower edges, and pair of incised lines along mid-rib. Nicks from cutting of teeth are present along lower edge, cutting through the lower incised line. (Figures 102, 162)
W 28mm, H 12mm Tooth spacing 6 per cm

1473 304 CF 434.80 119.20
Tooth plate from single-sided comb. Antler.
Tooth plate fragment from single-sided comb, all but two teeth lost. (Figures 102, 162)
W 22mm Tooth spacing not recoverable.

1500 US
Side plate fragment from composite comb. Antler.
Side plate fragment with flat, wide cross section. Could be from single- or double-sided comb, as only part of one edge survives. Decorated with three rows of ring and dot. Rivet holes on each broken side. LIA type comb. (Figures 105, 162)
W 25mm, H 15mm (incomplete) Tooth spacing not recoverable. Total H 14mm, side plate H estimated at 6mm. Tooth spacing 8 per cm.

1730 US
Tooth plate from single-sided comb. Bone.
Small tooth plate fragment with very fine short teeth. Rivet hole on one side but no staining to indicate material of rivets. (Figures 105, 162)
W 19.5mm

Pins

Generally it is not possible to distinguish the material of pins unless particular diagnostic features are present (*i.e.* patterns of cancellous material, traces of epiphyses *etc.*). Material has been suggested only where such features are present.

Complete pins and pins with head intact: Late Iron Age blocks

2174 457 CB 9005 430.40 111.70
Pin. Bone.
Very fine slender pin, in three pieces. There is no trace of any expansion for a hip or a head. There are some diagonal scratches at the head end but no other traces of working or wear. (Figures 56, 163)
L 81mm, max. dia. 3.1mm

2547 457 CB 9044
Pin head and shank fragment. Bone.
Head very slightly expanded. Black stained/burnt, with very high gloss polish. (Figures 56, 163)
L 25mm (incomplete), max. dia. 5mm (head), 4mm (shank)

4644 397 CB 8463
Nail-headed pin. Bone.
In two pieces. The pin is small and finely worked, with medium glossing on the shank and partially burnt/stained black. The shank tapers markedly from below the head to the point but there is no trace of a hip. (Figures 56, 163)
L 42mm, head dia. 6mm shank dia. 4mm

1510 408 CC
Pin (?), probably bone.
Very small sliver of bone, one end pointed, other end slightly tapered and snapped across. May be small pin, or working waste. (Figures 72, 163)
L 33mm, max. dia. 2 by 2.5mm

4764 493 CG
Point. Shag radius.
Proximal end has epiphysis still intact. Probably used as pin. Some knife trimming of shaft and transverse cuts near point. High gloss polish. (Figures 80, 163)
L 112mm Head 7 by 7mm

Norse blocks
1138 325 CE 429.40 110.70
Thistle-headed pin.
Very finely worked and smooth surface. (Figures 89, 163)
L 77.5mm Head dia. 5.5mm

1319 373 CE
Pin. Pig fibula.
Fairly roughly worked, some knife cuts on shank and transverse cuts used to roughly mark head. (Figure 163)
L 62mm Head 7 by 4mm

1384 400 CE 426.76 110.90
Pin and shank fragment. Bone.
Slightly expanded flat-topped head. Medium gloss polish with some root damage. (Figures 89, 163)
L 23mm (incomplete) Head dia. 5mm

1093 310 CF
Pin head and shank fragment. Bone.
Flattened, slightly splayed head with slight peak. Some cancellous tissue on one side of head. Medium gloss polish. (Figures 102, 163)
L 33mm (incomplete) Head 8 by 4mm, shank dia. 5mm

1172 310 CF
Pin head and shank fragment. Bone.
Asymmetric sloping head, fairly thick shank. (Figures 102, 163)
L 41mm (incomplete), head 5 by 7mm, shank dia. 5mm

1383 312 CF
Pin and shank fragment. Antler.
Large, elaborately shaped head with five lobes, two on each side and one on top, decorated with incised dots. There is also a series of seven longitudinal incised lines around the shank. A deep V-section groove has been cut on the back of the head. Faceting on shank and profile of dots show that the pin has been carved and decorated using a knife. (Figures 102, 163)
L 46mm (incomplete), head 12 by 16mm, shank dia. 4.5mm

Pin heads of bone and antler: Late Iron Age blocks
1131 314 CC 429.80 112.40
Fragment of pin head or bead. Bone/tooth large mammal.
Burnt white and splitting. Broken across middle, with traces of iron staining in centre, possibly from iron pin shaft. (Figures 72, 164)
H 15mm dia. 11mm

1230 314 CC
Fragment of pin head or large bead. Bone.
Cattle-size long bone, broken in half across major longitudinal perforation. A second perforation comes through one side transversely, and has iron staining, possibly for a small pin/tack to secure head to pin. (Figures 72, 164)
H 18mm, dia. 16mm, main perf. dia. 5–6mm, lateral perf. dia. 4mm

Pin shank and point fragments: Late Iron Age blocks
1906 397 CB 8421 428.40 112.20
Point. Shank has flattened oval section. (Figures 56, 163)
L 38mm max. dia. 3mm

4777 397 CB 8467
Shank, burnt black.
L 14mm max. dia. 3.5mm

1129 314 CC 429.45 114.00
Bone. Flattened triangular section, stained/burnt black. (Figures 72, 163)
L 38mm max. dia. 3 by 5mm

Norse blocks
1375 400 CE 426.30 109.90
L 24mm max. dia. 3mm

1712 382B CE 429.05 110.05
Slightly curving lengthwise. Probably antler.
L 69mm max. dia. 4mm

1163 331 CF
Very fine but roughly shaped with cut marks clearly visible. Bone. (Figures 102, 163)
L 35mm max. dia. 3 by 2.5mm

1767 US
Curving, slightly flattened section. Bone.
L 61mm max. dia. 5 by 3.7mm

1164 US
Point. Shank has circular cross section. (Figures 105, 163)
L 27mm max. dia. 4mm

Pin roughout: Norse blocks
1532 372 CE
Split piece of cattle-sized long bone, with some rough faceting down length and transverse chops where head possibly intended to be. (Figure 89)
L 48mm Head 9 by 8mm

Beads
Late Iron Age blocks
2498 397 CB 8405
Bead. Possibly made from animal tooth.
Roughly oval shape with longitudinal perforation. Some faceting well worn and smoothed. (Figures 56, 165)
L 16mm W 10mm Perf. dia. 4mm

1382 404 CC
Bead fragment. Bone.
Disc, broken across perforation. Surface not in good condition, pitted and eroded. (Figures 72, 165)
dia. 18mm Th 3mm perf. dia. 4mm

2691 473 CG
Bead or pendant. Antler tine tip.
Hole close to one end, cut transversely through deep cuts across surface. Base flattened and smoothed, top left fairly rough. (Figures 80, 165)
H 24mm, dia. at base 14 by 15mm, at top 12 by 13mm, perf. dia. 2–3mm

Ring
Late Iron Age blocks
2182 397 CB 8403 429.20 111.60
Ring. Antler.
Made from antler beam section hollowed out, and carved to look like a ring with a large squared bezel and stepped shoulders. Style appears to be an imitation of late Roman 'Brancaster' type rings, which have a square bezel, often with carved or stamped intaglio, and shaped shoulders. (Figures 56, 165)
Dia. external 28mm, internal 19mm W 14mm

Toggle
Late Iron Age blocks
1119 314 CC
Toggle. Bone.
Sheep distal tibia segment with one end trimmed and large oval perforation through shaft. Object is broken across perforation and other end missing. Burnt blue/grey colour. Perforation knife-cut, no other working or wear marks visible. (Figures 72, 165)
L 19mm dia. 12 by 9mm Perf. up to 6mm across

Dice
Late Iron Age blocks
1973 457 CB 9027
Parallelopiped die. Bone, probably made from section of sheep metapodial.
High gloss polish from extensive handling. Numbers formed from large overlapping ring-and-dot motifs. Numbers 1, 3 and 6 are clear, but the fourth number could be either 4 or 5. The 6 has an additional dot, but this relates to a very faint circle and is probably a false start or error. Effort has been made not to overlap the rings where they cross so the sequence of drawing can be deduced. The radius of the ring-and-dot motifs varies slightly (within less than 1mm tolerance) which could be caused by the curving bone, so they all could have been drawn with the same fixed tool. (Figures 56, 171, 172, 173)
L 47mm W 15 by 16mm

2503 472 CG
Parallelopiped die. Bone, probably made from proximal shaft end of a sheep metapodial.
Very worn, with some gloss polish. Numbers formed by overlapping ring-and-dot, very similar to 1973, but smaller. Numbers are very worn making is hard to make some of them out. The 4, 5 and 6 are reasonably clear, but the remaining number may be a 2 or a 1. Ring-and-dot appear to have been incised using same tool with diameter of 3.2mm. (Figures 80, 171)
L 30mm W 8 by 9mm

Inscribed bones
Late Iron Age blocks
2443 457 CB 9008
Cattle astragalus.
Incised grid of lines on one surface. Some 'boxes' of the grid appear to have been filled in with fine incised diagonal lines. No other traces of working, although the bone appears to have undergone heavy wear and pathological changes during the animal's life. (Figures 56, 171, 172)
L 58mm W 38mm

4782 445 CG
Red deer astragalus
Incised grid of lines on one surface. As with 2443 above, some of the boxes have been filled in, this time with short pecked stabs, cutting diagonally across each box and filling in half. The surface is damaged and the full extent of the working cannot be seen. There are no other signs of working or use on the bone. (Figures 80, 171, 172)
L 41mm W 26mm

4783 463 CG
Unfused cattle second phalanx.
Deep cut marks over distal surface form cross-shape. (Figures 80, 171)
H/L 30mm W 23 by 26mm

Norse blocks
4780 403 CE
Cattle first phalanx.
Burnt and fragmented, with running spiral and pelta motif incised around two sides. Motif has been incised using the sharp point of a knife. No other working or use marks visible. (Figures 89, 168, 169)
L 60mm

1082 US
Ogham inscription. Bone.
Segment of cattle-size rib bone with ogham inscription. Burnt to pale grey colour. Both ends broken. Cancellous tissue on reverse is smoothed and worn down, although inscription itself is crisp, indicating bone may have been around for some time before

inscription put on it. (Figures 105, 171, 175)
L 44mm, W max. 11mm tapering to 8.5mm, Th 2.5mm

Tools

Weaving tablets

Late Iron Age blocks

1117 314 CC 429.91 111555
Weaving tablet. Bone.
Rounded corners, hole at each corner. Holes very heavily worn, into ovals/8 shapes. Two holes markedly more thread-line worn than others. Very thin and well-handled, smooth. (Figures 72, 177, 178)
44mm by 45mm Th 0.7–1.5mm

1118 314 CC 429.91 111551
Weaving tablet. Bone.
Rounded corners, crack runs from close to one corner to mid point. Four holes, one at each corner, with heavy wear from threads, again heaviest. wear on internal edges. Very smooth, well used and handled. (Figures 72, 177, 178)
43mm by 45mm Th 1.5–1.9mm

1502 425 CC
Weaving tablet. Bone, possibly scapula
Rounded corners, with hole at each corner. Heavy wear around holes from thread, heaviest. wear at internal edges of holes. (Figures 72, 177)
40mm by 38 mm Th 3mm

4071 US
Weaving tablet fragment. Bone.
Rounded corners, has broken across one pair of holes. Surviving two holes heavily worn with thread lines, again on internal edges. (Figures 105, 177)
36mm (complete W) by 29 mm (incomplete W) Th 1.5mm

Weaving tablet roughouts/waste (?)

Late Iron Age blocks

1385 394 CC 429.55 107.40
Cattle-size scapula blade.
Fragment of thin bone plate, trimmed along two sides. Possibly from scapula shovel, although no damage from use, or possibly for manufacture of weaving tablets, Again, similar material to 1502 and proportions correct. (Figures 72, 157, 177)
Triangular shape, max. dimensions 70mm by 46mm Th 4mm

2448 490 CG
Left cattle mandible fragment, from below $M_{3.}$
Deep, thick saw cut down one side. Material similar to that used in weaving tablets, and shape only slightly larger – suitable for trimming down. (Figures 80, 157, 177)
44mm by 49mm

Single-piece combs

Late Iron Age blocks

1904 462 CB 8549 427.50 114.51
Comb. Antler and iron
Heavily burnt and fragmented flat plaque of antler, one surface very smooth and fine-grained, other surface slightly rougher. An iron strip with six surviving teeth has been inserted into a slot at the base; there is room for about 12–14 teeth in the original comb. Front of comb is flat and almost completely covered in finely incised lines. These appear to comprise two or possibly three bands of cross hatched lines which are over-inscribed by incised swirls. Back has a slight curve and a more limited area of decoration which comprises a rectangular block split in half with one covered with diagonal hatching and the other with parallel horizontal lines, isolated lines run out from this and across it. (Figures 57, 180, 181)
L 78mm W 74mm

1241 & 1377 337 & 398 CC
Single-piece comb fragments. Possibly whale bone.
Two joining fragments, heavily burnt and distorted. Part of end with teeth; seven teeth present. No decoration visible on body of comb, but badly cracked and distorted. (Figures 72, 177)
L 41mm

1437 413 CC 430.26 110.30
Single-piece comb. Antler.
Virtually complete. Decorated with transverse and diagonal cuts at either end. Cuts for teeth taken well down body of comb, and crossed over by decoration. Eight of 12 teeth survive intact, with some very fine striations on two (not adjoining) teeth, but otherwise no wear visible. Surface pitted and abraded. (Figures 72, 177, 179)
L 117mm W max. 30mm, min. 24mm

1469 418 CC 425.45 109.85
Single-piece comb. Whale bone.
Complete, rectangular in shape, undecorated. One side smooth the other side cratered. Teeth weathered and surface root damaged. Nine teeth present, one missing, all very short. (Figures 72, 177, 179)
L 126mm W 29mm

1476 413 CC 429.50 111.30
Single-piece comb fragments. Antler
Heavily burnt and fragmented, with some pieces missing. Slightly curved body, swelling towards teeth and less so towards butt, smooth on one side, cancellous on the other. Smooth side decorated with four surviving large double ring-and-dot motifs. Only four teeth still intact out of 10. Teeth worn, particularly heavy wear on underside, many fine transverse striations across side and back of teeth (assuming held with decoration facing user). (Figures 72, 177, 179)
L 118mm W max. 29mm, min. 22mm

1328 375 CE 429.25 109.25
Two loose teeth, quite thick and stumpy so presumed to be from single-piece comb.
L 15mm and 17mm

1533 372 CE
Single-piece comb fragment. Whale bone.
Mostly cancellous tissue apart from thin skin on surface. (Figures 89, 177)
L 34mm W 16mm

Whorls/discs

Late Iron Age blocks

1834 449 CG
Whorl (or vessel lid?). Whale bone, unfused vertebral epiphysis from small cetacean.
Central perforation. Some slight glossing. (Figures 80, 177)
Dia. 46 by 49mm perf. dia. 6mm Th 4mm

8522 495 CG
Whorl (or vessel lid?) fragment. Whale bone, unfused vertebral epiphysis from cetacean.
Edge worn, possible central perforation.
Est. dia. 100–120mm

Norse blocks

1079 304 CF 433.63 116.95
Spindle whorl (?). Unfused cattle-size femur.
Proximal epiphysis with widely splayed perforation. Poor condition, blackened on one side. (Figures 102, 177)
Dia. 27 by 29mm, perf. dia. 13 by 15mm, min. 8mm

Needles

Late Iron Age blocks

1501 425 CC
Large needle. Bone.
Eye irregular and knife-cut, traces of wear from pulling of thread. Entire needle smoothed and worn with glossy polish. (Figures 72, 177)
L 101mm W 5 by 2mm Eye 5 by 1.5mm

Norse blocks

1322 374 CE 432.90 109.81
Needle. Bone,
Made from very thin strip of bone, probably from rib, as cancellous tissue down one side. Eye irregular and knife-cut with traces of wear from pulling of thread. Point fine and sharp. Needle smooth and worn with glossy polish. (Figures 89, 177)
L 52mm W 5 by 1.5mm

Points

Late Iron Age blocks

1880 397 CB 8467 429.60 113.94
Pin head and shank fragment. Antler and iron.
Cylindrical antler pin head, with part of iron pin shank still attached. Antler burnt and stained dark brown/black, but faceting and cut marks visible on lower edge and on top. (Figures 56, 182)
L of entire object 25mm Antler pin head L15mm, dia. 10mm

2244 397 CB 8355 427.70 109.75
Pin and head (?). Sheep metacarpal.
Strange object comprising section of hollowed sheep metacarpal with sliver of bone set into it at right angles. Ends of metapodial are fairly roughly trimmed and bone sliver is also irregular. If a pin, the shank is very short, as it appears unbroken and to be at its original length. (Figures 56, 182)
Metapodial section L 19mm, W 12 by 9mm, bone sliver L 25mm

2400 830 CB 428.89 110.18
Pin head. Sheep radius.
Cut section of sheep radius, polished all over, particularly at cut ends. Hole through posterior side in which the base of bone point is embedded. Another fragment of bone is embedded in the medullary cavity, presumably to hold pin in place. (Figures 56, 182)
L 14mm W 13mm Th 7mm Hole 3mm dia.

Long bone points

Late Iron Age blocks

2312 499 CA
Tip of point.
Black, burnt and very glossy. General softening of surfaces but no other signs of wear or working.
L 28mm max. W 11 by 6mm

4771 457 CB 9028
Point fragment or possible pin roughout. Long bone.
One edge shaped, but has sharp transverse cuts across at upper end.
L 39mm max. W 6mm

4785 397 CB 8340
Point. Sheep right metatarsal.
With perforation through proximal epiphysis. Shaft is splintered and broken, but has clearly been cut and roughly shaped to form point. Surface of point root damaged – no wear marks visible. (Figures 56, 182)
L 113mm

1766 438 CC 428.95 110.00
Tip of point. Sheep-size long bone.
Slight softening on very tip but no other marks of wear or working.
L 37mm max. W 11 by 4mm

4789 406 CC
Point. Sheep right metatarsal
With perforation through proximal epiphysis. Shaft is fractured to create point but there is only a little use wear. The perforation is triangular, 7mm by 7mm. (Figures 72, 182)
L 110mm

4800 337 CC
Point. Sheep left tibia.
Distal shaft is fractured and roughly flaked to create a blunt point that shows signs of wear.
L 102mm

4793 490 CG
Point. Splinter of sheep-size long bone.
Surface pitted and flaking, so no wear marks visible.
L 72mm max. W 10 by 4mm

Norse blocks

1151 325 CE
Point. Sheep tibia
Unfused epiphysis retained at proximal end, but hollowed out, and shaft trimmed for lower half. Very tip broken and missing. Longitudinal striations visible on lower third of shaft, possibly from wear. (Figures 89, 182)
L 110mm

1391 400 CE 426.95 111.80
Point or crude pin. Left cattle metatarsal.
Part of proximal epiphysis left on one end. Shaft has been more carefully shaped, rounded and cut to a point. Knife faceting visible on shaft and below head. (Figures 89, 182)
L 107mm shaft dia. 9mm

5811 325 CE
Point.
Crudely shaped. Some diagonal striations around worn point.
L 45mm

1488 304 CF
Point. Splinter of cattle-size long bone.
Some chips and scratches around point. (Figures 102, 182)
L 103mm max. W 14 by 5mm

1046 312 CF
Point. Sheep left metacarpal.
Hole in proximal surface which has broken in half. Distal shaft fractured to create a fine point with minimal wear.
L 78mm max W 13mm

2533 US
Point fragment. Sheep distal tibia.
High gloss polish, with some fine transverse scratches on surface.
L 53mm max. W 6 by 4mm

Fine points
Late Iron Age blocks
4788 434 CG
Point fragment. Sheep-size long bone.
Very fine, sharp point. Surface very smooth and glossed. (Figures 80, 182)
L 45mm max. W 7mm

Norse blocks
1176 333 CF 429.70 121.33
Point and shank fragment. Sheep-size long bone.
Fine point with glossy polish and some longitudinal striations. (Figures 102, 182)
L 46mm max. W 7 by 4mm

Spatulate points
Late Iron Age blocks
4758 499 CA
Spatulate point. Cattle-size rib.
Epiphyseal end missing, rounded end heavily worn on one side from rubbing action (Figures 21, 182).
L 170mm W 22mm Th 9mm

4784 493 CG
Spatulate point. Left sheep radius.
Distal end cut off squarely. Some light diagonal scratching on surface near point, and considerable smoothing and wear of whole tool. (Figures 80, 182)
L 107mm Point W 16mm

4794 490 CG
Point fragment. Sheep-size rib.
End of rib shaped, not possible to tell whether cut or worn. No other wear or working marks visible.
L 43mm max. W 11 by 3mm

Whale bone points
Late Iron Age blocks
1551 414 CC
2919 397 CB
Point or peg fragments. Whale bone.
Two fragments of a cancellous whale bone. They do not join but are almost certainly from the same object. Three surfaces have rough knife-cut facets, one surface is smoothed. Burnt and blackened. (Figure 56)
L 145mm W 15–21mm Th 14–16mm

Grooved antler tine and long bones
Late Iron Age blocks
1891 397 CB 8454 428.70 113.10
Antler tine tip fragment.
Burnt black, with worn grooves in two main areas. Wear very similar to that on long bones below. (Figures 56, 187)
L 44mm max. W 12 by 5mm

4772 397 CB 8439
Sheep metatarsal fragment.
Two areas of grooving. The bone has broken across each end, and longitudinally, but wear continues over broken long edges, indicating that it remained in use after the lengthways split occurred. (Figures 56, 187)
L 37mm W 9.5–11mm

4774 457 CB 9018
Sheep metatarsal fragment.
Burnt and blackened with series of fine transverse grooves across width. One end has also been chipped, possibly deliberately. (Figures 56, 187)
L 42mm W 11mm

1508 404 CC
Cattle-size long bone fragment.
Grooved and worn across width for one-third of length. Substantial wear has taken place, removing about 5mm of material. Surface slightly eroded with chalky texture. (Figures 72, 187)
L 56mm W max. 25mm, min. 20mm

1512 414 CC
Sheep distal tibia.
Trimmed at one end, other end broken. Series of fine transverse grooves worn across width. Individual grooves visible approx 1.5mm wide. Object burnt/stained black. (Figures 72, 183, 187)
L 62mm dia. 10 by 12mm

Norse blocks
1387 400 CE 426.28 112.15
Sheep distal tibia.
Shaft with both ends broken, heavily worn down over 20mm area by transverse grooving. Up to 4mm of material has been worn away. One broken end is more worn and softened – object may have continued in use after first break. (Figures 89, 183, 187)
L 59mm max. dia. 10 by 12mm, min. dia. 8 by 8 mm

Perforated sheep metapodials

Late Iron Age blocks

2017 457 CB 9000

Sheep distal metacarpal fragment

Broken across central perforation. Burnt and blackened. (Figures 56, 187)

L 68mm perf. dia. 4mm

2548 457 CB 9048

Sheep left metacarpal

Broken across central perforation. Burnt and blackened. (Figure 187)

L 118mm perf. dia. 4–5mm

1171 302 CC

Sheep right metacarpal.

Central perforation. Surface root damaged. (Figures 72, 187)

L 100mm perf. dia. 4–5mm

Antler plate and pegs

Late Iron Age blocks

1233 314 CC

Plate fragment. Antler.

Two perforations. Burnt and blackened.

L 28mm W 15mm Th 3mm Perfs dia. 4mm

1793 US

Plate. Antler.

Complete antler plate with two peg stumps *in situ*. Plate fairly roughly cut and finished with cut marks on one end and marks from surface paring visible. (Figures 105, 187)

L 74mm W 20–23mm

Whale bone objects

Late Iron Age blocks

1918 457 CB 9024

Plate. Large rib.

Triangular. Two edges are broken; one appears to have been deliberately trimmed but obscured by heavy wear and polish from use. (Figures 57, 184)

160mm by 90mm Th 14mm

2091 457 CB 429.50 111.00

Bar-shaped object. Whale bone.

Slender object, partially burnt and blackened; one end slightly blunter shaped, other end slightly expanded in width but tapering in thickness. No clear wear or working marks. Possible functions may be agricultural tool, hoe or slim mattock, or door-check bar? Perhaps not robust enough for door check. No indications of any hafting or mounting. (Figures 57, 184)

L 270mm blunt end W 50mm, expanded end 52mm

1210 337 CC

Unfused vertebral epiphysis of medium-sized whale.

Trimmed and worn around the circumference. Fractured into many small fragments and it is unclear if it was ever perforated. Burnt black. (Figures 73, 184)

Dia. 130 mm

1495 424 CC

Unfused vertebral epiphysis of large whale.

Fragment of a large disk with an off-centre perforation 60mm from the edge.

Dia. est. 260mm perforation dia. 11mm

1472 406 CC 430.40 109.70

1491 398 CC

Two conjoining fragments. Probably mandible.

Dense whale bone, shaped into an elongated flat oval with a handle decorated with four or five incised lines. The edge is worn smooth and polished. Burnt black. Possible spoon. (Figures 72, 184)

L 72mm est. bowl W 48mm, neck W 23mm

1771 425 CC 426.5 110.5

Large fragment. Large rib.

Both surfaces survive. Several chop marks truncate one edge; the other is worn smooth. Several chop marks are visible on the surface and there is a circular hollow, 63mm by 42mm, pecked and ground into the surface. Possible base for door pivot. (Figures 73, 184)

265mm by 130mm Th 42mm

Norse blocks

1321 374 CE 429.4 110.26

Vertebra from a small cetacean with surviving but eroded transverse and spinous processes.

Unfused surface of centrum worked, cranial surface cut vertically and horizontally, caudal surface has roughly hacked hollow and vertical cut marks.

L 120mm W 135mm Th 110mm (centrum)

1354 383 CE 430.30 107.96

Paddle or spade-shaped object. Mandible.

Made from dense Balaenopteran mandible bone. Blade end has odd series of indentations carried over the edge onto the other side – possibly deliberately cut rather than worn. Stump of handle, broken off. Possible flax scutching tool. A bat-shaped tool was sometimes used to scrape the flax to remove any boon (woody part of stem) left behind after the hackling process. (Figures 89, 177)

L 200mm W 116mm Th 31–22mm Handle dia. 31mm

Antler hook

Late Iron Age blocks

1758 438 CC 428.85 109.85

Large (fishing?) hook. Antler.

With perforation for attachment/suspension. Made from shed antler using length of beam and brow tine. Edges of burr have been trimmed off and the upper surface of the brow tine is smoothed and worn. The tip of the tine is slightly rounded and chipped, but not to the extent that would be expected for use as an antler pick. There are numerous transverse cuts on one side of the beam/tine junction – the origin and purpose of these is not clear. The antler is rather small and must have come from a young deer or a population under great stress. (Figures 73, 185)

L overall 158mm, tine L 80mm burr dia. 22 by 26mm

beam dia. 21 by 22mm

Antler pick?

Late Iron Age blocks

1141 302 CC 428.82 113.16

Pick (?). Antler.

Section of shed antler, comprising burr, brow tine and beam in three pieces. Relatively thin beam and small antler. End of brow

tine is squared off and heavily worn – more so than is usual from wear during deer's lifetime. There is a break where the second tine has come away, but this is broken, not cut, so not clear whether intentionally removed. Surface is dry and chalky, with no working or wear marks visible other than on the end of the brow tine. (Figure 73)
L overall 330mm, tine L 75mm burr dia. 32mm by 39mm
beam dia. 20mm by 25mm

Handles
Late Iron Age blocks
1902 462 CB 8549 426.00 114.52
Handle fragment. Antler.
Cylindrical cut and hollowed section of antler beam, one end trimmed and smoothed, other end broken. Burnt grey/black. (Figures 56, 187)
L 30mm dia. 30mm

1966 457 CB 8578
Handle (?) fragment. Sheep-size long bone.
Heavily polished bone fragment, one end trimmed. Burnt/stained black. (Figures 56, 187)
L 14mm dia. 13mm

2011 457 CB 9024 430.60 112.90
Handle fragment. Antler.
Cylindrical, made from trimmed tine; one end carefully rounded, other end cut across straight. Split longitudinally and burnt/stained black. Very smooth glossy surface. (Figures 56, 187)
L 47mm W 14mm

2175 457 CB 9005 430.30 111.60
Handle fragment. Antler.
Cylindrical, both ends cut straight across and smoothed; one end hollowed out and splayed. Burnt/stained dark brown. (Figures 56, 187)
L 56mm W 12mm

4776 397 CB 8432
Handle fragment. Antler.
Cylindrical, with both ends trimmed and rounded. Surface smoothed with medium gloss from handling/wear and some very fine transverse scratches at one end. Split longitudinally. (Figures 56, 187)
L 52mm W 13mm

4779 397 CB 8454
Handle (?) fragments. Antler.
Four burnt and blackened fragments of worked antler object, probably cylindrical solid object similar to handle 8432 above.
L 11 by 18mm, 13 by 17mm, 9 by 6mm, 16 by 10mm

1123 314 CC 428.93 114.50
Handle (?) fragment. Antler.
Section of hollowed and trimmed antler (large tine or small beam). Ridged external surface still remaining and ends fairly roughly trimmed. Burnt along one side and split along length. (Figures 73, 187)
L 74mm dia. max. 19 by 23mm, min. 17 by 19mm

1423 414 CC
Handle fragment. Antler.
Solid handle fragment, one end trimmed and smoothed flat, other end broken. No hollowing out. Burnt and blackened in patches. (Figures 72, 187)
L 35mm dia. 14mm

1471 398 CC 429.50 110.00
Handle (?) fragment. Bone, sheep right tibia.
One proximal end trimmed across, other end broken and splintered. Some longitudinal trimming and transverse chopping. Burnt and blackened. (Figures 72, 187)
L 56mm dia. 18mm by 15mm

Socketed antler
Late Iron Age blocks
1929 457 CB 8572
Shed antler burr and beam section. Brow tine has been removed, partly cut and partly broken off. Beam end is hollowed out. No other signs of working or wear. Burnt/stained dark brown/black. (Figures 57, 185)
L overall 103mm burr dia. 33mm by 46mm beam dia. 21mm

4773 397 CB 8390
Section of cut antler, possibly large tine, one end chopped and partially hollowed out, other end broken. One side burnt and blackened. (Figures 57, 185)
L 43mm max. dia. 19mm

1406 407 CC 428.80 109.33
Length of small beam or large tine, hollowed out. Both ends cut and surface might have been pared, but surface badly eroded and pitted, so no working marks visible.
L 94mm dia. max. 22mm by 25mm, min. 19mm by 20mm

1760 438 CC 428.85 109.87
Antler length, either small beam or large tine, probably too straight for tine. One end cut and slightly hollowed out, other end broken, also hollowed out over 10mm+. Surface has suffered great erosion and pitting, with deep hole in one area.
L 119mm max. dia. 17mm by 18mm

2435 456 CG
Large section of antler beam and tine from large mature antler set, possibly same as brow tine 2202, context 490. Lower end of beam has many chop marks, hacked off fairly roughly. Upper end has many smaller cuts and is partly hollowed out. Tine still attached (broken in two pieces). Area of transverse cuts on one surface near tine junction. (Figures 80, 185)
L overall *c.*270mm, tine L 120mm max. beam dia. 32mm by 34mm

Bone and antler objects of unknown function

Whale bone
Late Iron Age blocks
2055 397 CB 8354
1239 337 CC
1240 337 CC
2107 407 CC
Large fragment of dense whale bone, probably mandible, originally found as four separate pieces. The surface is traversed by 17 roughly parallel incised lines. The one surviving edge is heavily worn and polished through use. Burnt black. (Figure 72)
103mm by 40mm Th 10mm

Shovel-like (?) object

Norse blocks

4786 382B CE

Fragment of cattle mandible, one surface only, which has been trimmed and worn in similar way to scapula shovel tools. (Figure 186)

L 106mm max. W (at worn end) 54mm, min. W 33mm

Hafted (?) implement

Norse blocks

4787 382B CE

Fragment of antler object, rectangular in cross-section, with large perforation, providing point of weakness across which object has broken. Several similar objects come from Foshigarry (Hallén 1994, illus. 8, 1, 6, 7) and are interpreted as hafted implements or mounts. (Figures 89, 185)

L 32mm W 29mm Th 18mm perf. dia. 22mm

Pierced sheep metapodials

Late Iron Age blocks

1947 457 CB 8571

Sheep right metatarsal.

Complete. Distally unfused, with single hole cut through proximal epiphysis, possibly for marrow extraction. Use wear on shaft and proximal surface articular facets worn away. Burnt and blackened. (Figures 56, 187)

Hole dia. 5mm

4778 457 CB 9022

Sheep right metatarsal.

Epiphysis perforated by single irregular hole, shaft broken and splintered. Burnt and blackened. (Figure 56)

Hole dia. 5mm by 7mm

4781 457 CB 9033

Sheep left metatarsal.

Proximal epiphysis perforated by single irregular hole, shaft broken and splintered. Use wear on shaft. Burnt and blackened. (Figures 56, 187)

Hole dia. 9mm by 5mm

1548 404 CC

Sheep left metacarpal fragment.

Figure of eight hole pierced through proximal epiphysis, possibly for marrow extraction. No other signs of working, shaft broken, not cut for point. (Figures 72, 187)

Hole max. dia. 10.5mm

2614 490 CG

Sheep metatarsal fragment.

Hole pierced through proximal epiphysis, possibly for marrow extraction.

Hole dia. 7mm

Norse blocks

5810 325 CE

Sheep left metatarsal.

Proximal epiphysis perforated by a hole possibly resulting from three perforations. The shaft has been fractured and use wear is visible on the fractured edges. (Figures 89, 187)

Hole dia. 10mm by 5mm

5812 346 CF

Sheep left metatarsal.

Proximal epiphysis perforated by a single large hole. The shaft is fractured and transverse grooves over the fracture surface indicate this break occurred before the bone was used. (Figures 102, 187)

Hole dia. 7mm

Other odd holes and markings

Late Iron Age blocks

1185 337 CC 429.91 111.72

Cattle-size scapula fragment.

Large hole pierced through blade, and small pit beside hole. Not where hole would be expected for hanging joint. Function unknown.

83mm by 56mm hole 8mm by 9mm

1197 337 CC

Small fragment of cattle-size long bone.

Odd striations along one edge. Function/origin unknown. (Figures 72, 187)

19mm by 23mm Th 5mm

Norse blocks

1251 333 CF

Juvenile cattle left metacarpal.

Neat hole (dia. 4mm) cut in one side – too small for marrow extraction, too regular for gnawing. Both ends of the bone are missing and appear damaged and pitted, probably from animal gnawing.

4799 335 CF

Sheep right scapula.

A broken fragment with the spine trimmed and worn. (Figures 102, 187)

45mm by 23mm Th 6mm

Raw materials and manufacturing debris

Antler raw material

Late Iron Age blocks

4775 482 CB 9127

Very small shed antler burr, upper end heavily cut and chopped.

dia. 23 by 25mm Th 18mm

1765 414 CC 428.40 109.40

Length of antler beam, lower end cut and sawn around width then snapped across cancellous tissue. Upper end has two chop marks on one side, but then has been broken off. (Figure 155)

L 74mm max. dia. 18 by 20mm

1818 450 CG 411.51 112.74

Length of unshed antler pedicle and beam. Pedicle end damaged, but definitely from a butchered animal rather than shed. Surface highly guttered and knobbly; brow tine absent – may be from young stag or roe deer. Beam has deep cut across one side part way up, as if being divided into segments. Upper end cut and sawn around, then snapped across cancellous tissue. (Figures 80, 155)

L overall 146 mm dia. at pedicle/beam junction 26 by 30mm, dia. at upper end 16mm by 19mm

Norse blocks
1206 349 CF 443.16 124.70
Length of small beam or large tine. Cut and chopped at lower end, broken off at upper end. Slightly guttered surface, no other working marks. (Figure 155)
L 109mm max. dia. 16mm by 19mm, min. 14mm by 15mm

8523 US
Antler pedicle, shed. Beam has numerous cut marks, brow tine eroded but also appears to have been cut off.
L overall 65mm dia. at base of pedicle 36mm by 40 mm

Antler tine discards
Late Iron Age blocks
2015 457 CB 8591 429.10 111.45
Antler tine tip, base broken not cut. Two rows of transverse indentations along one side are unusual – not teeth marks as not opposed. (Figure 155)
L 47mm

2131 457 CB 9067 427.58 114.04
Antler tine, base cut and snapped. Tip slightly smoothed and scratched, but normal natural wear. (Figure 155)
L 100mm max. dia. 18 by 19mm

1170 302 CC
Tine junction fragment from antler crown. Two circular dents in one side do not look recent – look like tooth marks but not opposed. Some possible other gnawing marks on other side but don't match. All ends broken, surface smooth. (Figure 155)
L overall 81mm max. W 34mm

1198 337 CC
Antler tine fragment, burnt. Base heavily chopped and hacked, tip broken off. Surface very knobbly towards base, smoother towards tip. Normal natural wear. (Figure 155)
L 50mm max. dia. 14mm by 15mm

1202 337 CC 429.45 112.00
Antler tine tip, heavily chopped along one side. Base chopped across. Burnt and blackened. (Figure 155)
L 60mm max. dia. 13mm

1204 337 CC 427.80 113.85
Antler tine tip fragment, smooth shiny surface. Base broken not cut. Burnt and blackened. (Figure 155)
L 29mm dia. 10–11mm

1369 398 CC
Antler tine tip, slightly twisted. Surface all smooth, no other marks. Base broken not cut. Burnt and blackened. (Figure 155)
L 54mm dia. 12–13mm

1452 418 CC
Antler tine tip, smooth with some transverse striations. Base splintered and broken, not cut. (Figure 155)
L 94mm dia. 13mm by 15mm

1474 421 CC 425.17 110.70
Antler tine, tip smoothed with some minor striations, but normal natural wear. Base broken not cut. (Figure 155)
L 135mm max. dia. 20mm by 25mm

1549 424 CC
Antler tine tip, series of transverse scratches down on side. Base broken not cut. Burnt and blackened. (Figure 155)
L 21mm max. dia. 9mm

1550 393 CC
Antler tine tip, completely smooth and end rounded, but normal natural wear. Base broken not cut. (Figure 155)
L 41mm dia. 10mm by 11mm

1759 438 CC
Large antler tine, surface covered with facets from knife trimming. This has not removed workable quantities of solid material, just removed nubbly surface in places. Base broken not cut. (Figure 155)
L 150mm max. dia. 19mm by 21mm

1840 455 CG 413.64 112.46
Antler tine, tip broken. Base broken, not cut. Surface chalky and eroded. (Figure 155)
L 145mm max. dia. 16mm by 24mm

2202 490 CG 415.32 112.00
Very large tine, probably brow tine. Base cut, no marks visible on tip. (Figure 155)
L overall 250mm max. dia. 41mm by 22mm

Norse blocks
1152 325 CE
Tine tip fragment, smooth. Burnt and blackened. Base broken not cut. (Figure 155)
L 32mm dia. 10mm

1350 384 CE 434.50 110.20
Antler tine, end smoothed but normal natural wear. Base broken not cut. (Figure 155)
L 100mm max. dia. 21mm by 18mm

1097 311 CF 443.29 126.05
Very small tine tip fragment. Burnt and blackened. (Figures 102, 155)
L 10mm

1122 312 CF
Antler tine, tip worn heavily with longitudinal striations and transverse chop marks. Base heavily chopped with repeated cuts from heavy blade. Some areas smoothed and polished. Might have been utilised.
L 94mm max. dia. 18mm by 19mm

1330 312 CF 432.95 117.70
Large tine, tip smoothed and worn, probably natural wear. Base broken not cut. Some striations on tip but no other marks visible. (Figure 155)
L 140mm dia. max. 18mm by 23mm

1235 US

Antler tine, tip eroded possibly gnawed, base chopped. (Figure 155)
L 110mm max. dia. 16mm by 17mm

1306 US
Antler tine, tip smoothed, natural wear, base cut and snapped across cancellous tissue. (Figure 155)
L 113mm max. dia. 16mm by 18mm

2026 US 411558 106.93
Antler tine, tip damaged. Base cut and snapped across cancellous tissue. Surface chalky and eroded. (Figure 155)
L 76mm max. dia. 17 by 19mm

Cut sections of antler

Late Iron Age blocks

2429 397 CB 8473
Fragment of trimmed and pared antler beam. Beam has been hollowed out, split in half and external surface pared down. Similar size and scale of beam to 2435 (context 456). (Figure 57)
L 29mm W 32mm Th 13mm

2253 472 CG
Cut section of antler, one end roughly chopped, other end broken. Burnt and blackened.
L 28mm dia. 16mm

2345 490 CG
Cut section of antler, one end sawn around width, other end more roughly chopped. (Figure 80)
L 24mm dia. 19mm by 20mm

Norse blocks

1511 384 CE
Small cut section of antler tine, cut both ends. Surface very knobbly, but also fairly abraded.
L 17mm dia. 14mm by 16mm

Cut sections of long bone

Late Iron Age blocks

2028 397 CB 8369
Cut mid-shaft section of cattle right metatarsal. Both ends sawn around most of way through. Cuts softened and worn and whole object slightly glossed – utilised for something? (Figure 57, 156)
L 23mm dia. 22 by 23mm

1415 406 CC
Cut section of cattle right metacarpal. Each end sawn partly through then snapped. (Figure 72, 156)
L 30mm dia. 29mm by 22mm

1422 413 CC
Cut section of cattle-size left metacarpal. Each end cut all way across, perhaps trimmed or sanded after sawing as fairly smooth, with some diagonal striations. Could be same bone as 1415 (context 406). (Figure 72, 156)
L 23mm dia. 29mm by 22mm

1478 413 CC 430.40 109.70
Cut section of cattle metacarpal, each end cut part way through then snapped. Very good condition, pale solid bone. (see Figure 156)
L 26mm dia. 25mm by 36mm

1756 407 CC 429.5 110.70
Fragment of cattle-size long bone, one end cut and snapped, possibly fragment of cut section. Burnt and blackened. (see Figure 156)
L 20mm dia. 15mm by 20mm

1735 434 CG
Cut section of cattle left metatarsal, longer than most sections. One end cut flat right across (or sawn and trimmed), other end cut partially through and snapped. Broken longitudinally and blackened at one end. (see Figure 156)
L 50mm dia. 21mm by 23mm

SHELL

Late Iron Age blocks

8514 397 CB 8421
Perforated disc (?). Scallop shell (*Pecten maximus*).
Triangular fragment with the remains of a small perforation, 6–7 mm dia., on one edge. The outer edge appears roughly flaked as if to shape it into a disc. (see Figure 174)

8516 457 CB 9067
Disc. Scallop shell (*Pecten maximus*).
Flat disc made from the flat side of a large scallop shell. Smooth and pearly on one side rough and corrugated on the other. The edge is rough and irregular. (see Figure 174)
ML 58mm MW 54mm Th 2mm

1917 397 CB 8424 426.62 112.52
Perforated disc. Common whelk (*Buccinum undatum*).
Roughly oval-shaped disc with a perforation 5–6 mm dia. A large fragment of the disc is missing and, with the exception of one small smoothed area, most of the edge is crudely broken and rough. The perforation in contrast is abraded and polished. (Figure 166)
ML *c.*50mm MW *c.*45mm Th 5mm

8519 453 CB 9100/1
Perforated land snail shell.
Two small perforations for suspension in the last whorl.
MH 13mm dia. 15mm

1450 418 CC
Disc. Scallop shell (*Pecten maximus*).
Flat disc made from the flat side of a large scallop shell. Smooth and pearly on one side rough and corrugated on the other. The edge is smooth and carefully cut. (Figure 174)
ML 37mm MW 34mm Th 2mm

8512 472 CG
Disc. Scallop shell (*Pecten maximus*).
Slightly over 50% of a circular disc made from the flat side of a large scallop shell. Smooth and pearly on one side rough and corrugated on the other. The edge is rough and irregular. (Figure 174)
ML 53mm MW ? Th 3mm

8513 485 CG
Perforated fragment. Common whelk (*Buccinum undatum*).
Only the last two whorls survive and the ventral surface has been removed to expose the columella. The edges are largely worn smooth in places. A perforation 6–7 mm dia. is asymmetrically located near the posterior end of the last whorl (Figure 166)
ML 58mm MW 36mm

8517 490 CG
Perforated top shell.
Two facing holes on the last whorl. One of the holes is relatively worn. (Figure 166)
MH 20 mm dia. 25mm

8518 463 CG
Pair of perforated top shells.
Similar in size and shape, both with identical breaks on the last whorl. (Figure 166)
MH 23mm dia. 28mm

CERAMIC OBJECTS

Spindle whorls

Late Iron Age blocks
1911 456 CG 419.1 110.2
Spindle whorl. Ceramic.
Half of a flat disc made from body sherd. Upper surface orange, interior and lower surface dark brown. Edge extremely rough and central drilled hole does not appear to go all the way through. Unfinished; broken in production. (Figure 80; 177)
dia. 32mm Th 7–10mm

1072 US
Spindle whorl. Ceramic.
Flat disc made from body sherd. Abraded remains of pale surface visible on top and bottom, dark inner fabric. Upper surface relatively uneven, edge rounded and smooth. Narrow 3mm central hole. (Figures 105, 177)
dia. 32mm Th 10mm

Discs

Late Iron Age blocks
1866 397 CB 8418 429.55 112.1
Disc. Ceramic.
Crudely shaped circular disc made from body sherd. Upper outer surface buff coloured and over half missing; grades through to black inner surface which is well preserved. Edge very rough. Unfinished. (Figure 56, 174)
ML 49mm MW 48mm MTh 13mm

2024 397 CB 8364 429.25 110.08
Disc. Ceramic.
Oval piece of fine-grained micaceous ceramic. Upper surface worn very smooth to a skewed profile with visible longitudinal striations. Edge ground smooth. (Figure 56, 174)
ML 34mm MW 29mm MTh 12mm

4790 457 CB 8579
Disc. Ceramic.
Roughly square disc with curving sides made from orange body sherd. Very uneven thickness. Edge partially ground. (Figure 56, 174)
ML 39mm MW 39mm Th 7–11mm

4791 457 CB 9004
Disc. Ceramic.
Small oval disc made from an orange body sherd. Both surfaces well preserved. Edges roughly shaped. (Figure 56, 174)
ML 23mm MW 20mm MTh 8mm

1484 424 CC 426.68 111.20
Disc. Ceramic.
Oval disc made from body sherd. Outer surface smooth, slightly domed and charcoal-stained; inner surface rough. Edge ground but still fairly rough. (Figure 72, 174)
ML 37mm MW 32mm MTh 11mm

1497 413 CC
Disc. Ceramic.
Pear-shaped disc made from body sherd. Smooth upper surface, mid brown/black fabric and rough orange lower surface. Edge ground smooth. (Figure 72, 174)
ML 37mm MW 34mm MTh 11mm

4792 473 CG
Disc. Ceramic.
Oval disc made from body sherd. Outer black surface smooth with longitudinal striations. Inner orange surface rough. Edge ground but still fairly rough. (Figure 80, 174)
ML 34mm MW 31mm MTh 11mm

Norse blocks
8521 420 CE
Disc. Ceramic.
Oval disc made from body sherd. Outer surface pale orange, inner surface grey, sherd thickening on one side. Edge varies from rough to relatively smooth (Figure 174).
ML 39mm MW 33mm MTh 14mm

COARSE STONE TOOLS

Cobble tools

Late Iron Age blocks
1923 457 CB 9011
Cobble tool(?)
Rounded cobble of gneiss. Crumbling. Cannot identify any wear traces.
ML 53mm MW 51mm MTh 46mm

1924 457 CB 9002
Cobble tool(?)
Large oval cobble of gneiss. Very crumbly, destroyed much of one face. Cannot identify any wear traces.
ML 170mm MW 94mm MTh 57mm

1928 457 CB 8572
Cobble tool(?)
Large cobble of gneiss. Very crumbly. Cannot identify any wear traces.
[no measurements]

1932 457 CB 8572
Cobble tool(?)
Rounded cobble of gneiss. Very crumbly. Cannot identify any wear traces.
ML 74mm MW 66mm MTh 41mm

1936 457 CB 8572
Cobble tool(?)
Burnt fragment of gneiss. Cannot identify any wear traces.
[no measurements]

1946 457 CB 8571
Cobble tool(?)
Small rounded cobble of gneiss. Very crumbly. Cannot identify any wear traces.
ML 47mm MW 46mm MTh 29mm

1967 457 CB 9043 430E 113.5N
Cobble tool(?)
Fragment of a cobble of gneiss. Very crumbly. Cannot identify any wear traces.
[no measurements]

1985 457 CB 9017 430.75E 112N
Cobble tool(?)
Rounded cobble of sandstone. Abraded. Cannot identify any wear traces.
ML 64mm MW 61mm MTh 35mm

2064 397 CB 8467
Cobble tool(?)
Fragment of a cobble of gneiss. Very crumbly. Cannot identify any wear traces.
[no measurements]

2073 397 CB 9002
Cobble tool(?)
Flat cobble of gneiss. Very crumbly. Cannot identify any wear traces.
ML 133mm MW 77mm MTh 45mm

2158 492 CB
Cobble tool(?)
Irregular cobble of gneiss. Crumbling. Cannot identify any wear traces.
ML 145mm MW 100mm MTh 72mm

Cobble tools, faceted

Late Iron Age blocks

1216 306 CB 429.19E 111.24N
Cobble, faceted.
Oval cobble of fine-grained sandstone. Two facets ground on one end form ridge. One face worn smooth with traces of polish/gloss residue.
ML 101mm MW 69mm MTh 44mm

1876 457 CB 431.1E 112.78N
Cobble, faceted.
Sub-oval cobble of fine-grained sandstone. One smooth rounded facet ground on narrow end.
ML 102mm MW 73mm MTh 42mm

1890 397 CB 8354 428.3E 109.85N
Cobble, faceted.
Flat oval cobble of fine-grained micaceous sandstone. Two narrow ground facets form ridge at either end. One face worn flat and smooth with some polish.
ML 120mm MW 70mm MTh 44mm

1922 457 CB 9002
Cobble, faceted.
Small oval cobble of fine-grained metamorphic rock. One smooth facet pecked on narrow end. One face possibly worn smooth with gloss/polish.
ML 76mm MW 52mm MTh 29mm

1931 457 CB 8572
Cobble, faceted.
Oval cobble of fine-grained micaceous rock. Small facet pecked on one end.
ML 87mm MW 73mm MTh 52mm

1935 457 CB 8572
Cobble, faceted.
Flat oval cobble of fine-grained micaceous sandstone. Narrow end with two ground facets forming ridge. Opposite end has a single ground facet. One face has been worn flat and smooth with traces of polish.
ML 90mm MW 54mm MTh 24mm

1982 457 CB 9043 430.1E 113.7N
Cobble, faceted.
Flat cobble of fine-grained sandstone. Single facet on one end has been roughly pecked and flaked. One face worn flat and smooth with possible dark staining from substance being worked.
ML 120mm MW 80mm MTh 47mm

1983 457 CB 9043 430.2E 113.6N
Cobble, faceted.
Flat oval cobble of amphibolite (?). Single facet pecked on narrower end. A very light facet on other end. One face worn smooth with traces of polish.
ML 99mm MW 59mm MTh 33mm

1986 457 CB 9027 430.9E 112.9N
Cobble, faceted.
Volcanic (?) rock – with white inclusions. Burnt, removing one end. Roughly pecked facet on surviving end. One face worn to a smooth, concave profile.
ML 126mm MW 50mm MTh 39mm

2000 457 CB 9018 428.7E 112.3N
Cobble, faceted.
Rectangular cobble of fine-grained micaceous rock. Single facet ground on one end and some pecking on opposite end. One face worn flat and smooth with some visible striations and traces of polish.
ML 109mm MW 50mm MTh 28mm

2063 457 CB 8572
Cobble, faceted.
Irregular oval cobble of fine-grained micaceous rock. Single small facet ground on one end. One face worn flat and smooth.

ML 111mm MW 83mm MTh 47mm

2068 457 CB 8572
Cobble, faceted.
Elongated oval cobble of vesicular igneous (?) rock. Single light facet on one end. One face possibly worn smooth.
ML 100mm MW 53mm MTh 35mm

2106 397 CB 8440
Cobble, faceted.
Flat oval cobble of micaceous sandstone. Two narrow ground facets on one end form ridge. Narrow ground facet on opposite end.
ML 90mm MW 66mm MTh 27mm

2252 457 CB 9083 427.5E 111.95N
Cobble, faceted.
Narrow oval cobble of black gneiss. Single, pecked, lightly flaked facet on either end. (Figures 57, 188)
ML 108mm MW 47mm MTh 29mm

2338 457 CB 8585 431.4E 110.9N
Cobble, faceted.
Oval cobble of black gneiss. Smooth facets on one end form ridge. Opposite end more roughly pecked. One face worn flat and smooth.
ML 102mm MW 61mm MTh 44mm

1113 314 CC 428.64E 115.16N
Cobble, faceted.
Sub-triangular cobble of fine-grained stone. Rounded facet ground on narrow end.
ML 100mm MW 70mm MTh 55mm

1128 314 CC
Cobble, faceted.
Fragment of a quartz cobble. Broad facet pecked on surviving end.
[no measurements]

1211 337 CC 427.3E 113.6N
Cobble, faceted.
Flat triangular cobble of micaceous sandstone. Apex has broad, pecked facet with some flaking. Ridged facets ground on corners of base. One face worn smooth. (Figures 74, 188)
ML 75mm MW 92mm MTh 28mm

1213 337 CC 427.34E 113.58N
Cobble, faceted.
Small cobble of fine-grained metamorphic rock. Narrow band of faceting ground on one end.
ML 70mm MW 63mm MTh 31mm

1262 314 CC
Cobble, faceted.
Single facets lightly pecked on either end. One face worn smooth with traces of polish.
ML 106mm MW 44mm MTh 39mm

1269 337 CC
Cobble, faceted.
Fragment of an oval cobble. Surviving end has small, lightly pecked facet.
[no measurements]

1426 404 CC
Cobble, faceted.
Elongated oval cobble of fine-grained sandstone. On narrow end there are five ground facets which form ridges. One face possibly worn smooth.
ML 145mm MW 82mm MTh 48mm

1465 404 CC
Cobble, faceted.
Flat oval cobble of fine-grained micaceous rock. Broken across width. Rounded facet pecked on surviving end.
ML - MW 77mm MTh 40mm

1518 418 CC
Cobble, faceted.
Flat oval cobble of gneiss. Small, rough facets worn on either end.
ML 88mm MW 49mm MTh 25mm

1424 404 CC
Cobble, faceted.
Sub-oval cobble of fine-grained sandstone. Small facet worked on narrow end.
ML 55mm MW 70mm MTh 45mm

1430 404 CC
Cobble, faceted.
Small, oval cobble of gneiss. Rounded facet roughly pecked at either end.
ML 85mm MW 48mm MTh 41mm

Norse blocks

1389 400 CE 425.83E 112.2N
Cobble, faceted.
Elongated oval cobble of fine-grained rock, with iron inclusions. One small facet pecked on narrow end.
ML 108mm MW 48mm MTh 28mm

1398 400 CE 426.61E 112.5N
Cobble, faceted.
Large cobble of fine-grained micaceous sandstone. Opposite face appears to have been worn very smooth with visible striations. Small pecked facets on protruding ends.
ML 170mm MW 145mm MTh 78mm

1095 US
Cobble, faceted.
Flat oval cobble of micaceous sandstone. Broad pecked facet on one end with regular ground facets partway down sides, almost like deliberate shaping. Opposite end has a small pecked facet with areas of polishing around both faces. (Figures 105, 188)
ML 114mm MW 66mm MTh 39mm

1300 US
Cobble, faceted.
Finger-like pebble of sandstone, broken across width. Small facet pecked on surviving end.
ML - MW 35mm MTh 25mm

1399 US
Cobble, faceted.
Irregular cobble of fine-grained metamorphic rock. Rough facet pecked on broad end. Some pecking and flaking on opposite end.
ML 112mm MW 56mm MTh 49mm

1420 US
Cobble, faceted.
Small oval cobble of fine-grained metamorphic rock. Single pecked, rounded facet on either end. One face worn smooth with traces of polish/gloss residue.
ML 97mm MW 63mm MTh 41mm

1519 US
Cobble, faceted.
Sub-oval cobble of gneiss. Some rough pecking on one end forming a facet.
ML 87mm MW 73mm MTh 47mm

2549 US
Cobble, faceted.
Oval cobble of gneiss. Abraded. Small facet pecked on narrower end.
ML 93mm MW 57mm MTh 38mm

Unused cobbles
Late Iron Age blocks
1920 457 CB 9002
Cobble, unused.
Rectangular cobble of gneiss. No sign of wear.
ML 120mm MW 54mm MTh 35mm

1976 457 CB 9043 430.3E 113.1N
Cobble, unused.
Flat cobble of gneiss. Crumbling. No sign of wear.
ML 64mm MW 59mm MTh 17mm

1993 457 CB 8582 429.5E 110N
Cobble, unused.
Flat cobble of gneiss. No sign of wear.
ML 83mm MW 79mm MTh 35mm

2102 457 CB 429.7E 110.6N
Cobble, unused.
Elongated cobble of metamorphic rock. No sign of wear.
ML 114mm MW 50mm MTh 48mm

2161 489 CB
Cobble, unused.
Large oval cobble of gneiss. Crumbling. No sign of wear.
ML 170mm MW 102mm MTh 88mm

4759 397 CB
Cobble, unused.
Rounded cobble of white gneiss. No sign of wear.
ML 58mm MW 54mm MTh 52mm

1186 337 CC 429.7E 111.85N
Cobble, unused.
Oval cobble of gneiss. No sign of wear.
ML 125mm MW 65mm MTh 45mm

1407 406 CC 431.15E 110.92N
Cobble, unused.
Irregular cobble of sedimentary rock with numerous natural cavities. No sign of wear.
ML 120mm MW 83mm MTh 39mm

1440 404 CC 432.7E 112.1N
Cobble, unused.
Irregular cobble of gneiss. No sign of wear.
ML 76mm MW 36mm MW 26mm

Norse blocks
1410 400 CE 426.69E 112.8N
Cobble, unused.
Irregular cobble of gneiss. No sign of wear.
ML 108mm MW 70mm MTh 34mm

1274 312 CF
Cobble, unused.
Flat circular cobble of gneiss. No sign of wear.
ML 89mm MW 82mm MTh 19mm

1396 312 CF 435.2E 114.6N
Cobble, unused.
Irregular cobble of coarse-grained rock. No sign of wear.
ML 105mm MW 78mm MTh 44mm

1267 US
Cobble, unused.
Fragment of a cobble of sandstone. No sign of wear.
[no measurements]

1516 US
Cobble, unused.
Rectangular cobble of gneiss. No sign of wear.
ML 93mm MW 67mm MTh 35mm

Hammerstones
Late Iron Age blocks
1921 457 CB 9049
Hammerstone, faceted.
Oval cobble of quartzite. Single rough facet on one end truncated by flaking. Pecking on opposite end.
ML 112mm MW 70mm MTh 58mm

1992 457 CB 8582 429.3E 110.35N
Hammerstone, plain.
Flat oval cobble of gneiss. Some light pecking on either end.
ML 111mm MW 78mm MTh 40mm

2067 397 CB 8371
Hammerstone, plain.
Rounded cobble of gneiss. Spread of rough pecking over part of surface.
ML 69mm MW 66mm MTh 42mm

2103 457 CB 8588
Hammerstone, plain.
Oval cobble of metamorphic rock. Some rough pecking over surface.
ML 102mm MW 68mm MTh 49mm

2249 457 CB 9083 427.54E 111.8N
Hammerstone, plain.
Oval cobble of fine-grained grey micaceous sandstone. Broken down length. Some light pecking on either end.
ML 94mm MW - MTh 25mm

1432 404 CC 431.84E 112.95N
Hammerstone, flaked.
Flat oval cobble of fine-grained sandstone (?). Rough bifacial flaking on either end. Some rough pecking down sides too.
ML 125mm MW 82mm MTh 45mm

1574 418 CC
Hammerstone, plain.
Elongated irregular cobble of micaceous sandstone. Some pecking and flaking on one end.
ML 208mm MW 63mm MTh 57mm

1594 398 CC
Hammerstone flake.
From cobble of black micaceous sandstone.
ML 54mm MW 27mm MTh 8mm

1733 434 CG
Hammerstone, plain.
Rounded cobble of gneiss. Spread of rough pecking over part of surface.
ML 82mm MW 80mm MTh 64mm

1910 456 CG 419.19E 110.19N
Hammerstone, plain.
Flat finger-like pebble of sandstone. Abraded. Possible pecking and flaking on one end.
ML 69mm MW 25mm MTh 12mm

2250 472 CG 414.6E 110.63N
Hammerstone, plain.
Sub-oval cobble of quartz. Some light pecking on either end.
ML 87mm MW 64mm MTh 47mm

Norse blocks
1331 312 CF 433.6E 117.8N
Hammerstone, plain.
Oval cobble of gneiss, crumbling. Some rough pecking on either end.
ML 138mm MW 78mm MTh 57mm

Polishers
Late Iron Age blocks
1969 457 CB 8585
Polisher.
Small pebble of gneiss. Possibly used as polisher on one face.
ML 47mm MW 45mm MTh 30mm

1970 457 CB 8585
Polisher.
Small pebble of hard fine-grained metamorphic rock. Possibly used as a polisher on one face.
ML 39mm MW 38mm MTh 23mm

1855 459 CB 431.4E 112.38N
Polisher.
Finger-like pebble of sandstone. Some gloss/polish on one face from use as polisher or whetstone.
ML 88mm MW 30mm MTh 22mm

2234 457 CB
Polisher(?)
Small cobble of quartzite. Some gloss residue/polish on one face.
ML 61mm MW 37mm MTh 27mm

4470 800 CB 9177
Polisher.
Flat oval pebble of fine-grained rock. Polish/gloss residue on both faces.
ML 73mm MW 33mm MTh 17mm

1201 337 CC 429.8E 112.15N
Polisher.
Flat circular pebble of metamorphic rock. One face worn smooth with traces of polish.
ML 58mm MW 55mm MTh 18mm

1266 302 CC
Polisher.
Finger-like pebble of fine-grained rock. One face worn smooth with traces of polish.
ML 90mm MW 38mm MTh 21mm

1529 418 CC
Polisher.
Small flat cobble of fine-grained metamorphic (?) rock. One face is worn smooth with traces of polish.
ML 67mm MW 51mm MTh 24mm

1536 424 CC
Polisher.
Flat finger-like pebble of brown micaceous sandstone. Possibly worn on one face leaving traces of polish.
ML 72mm MW 29mm MTh 13mm

1301 US
Polisher.
Oval cobble of fine-grained rock. One face worn smooth with traces of polish.
ML 82mm MW 46mm MTh 26mm

Pounders/Grinders
Late Iron Age blocks
1462 397 CB
Pounder/grinder.
Oval cobble of fine-grained micaceous sandstone (?). Single, rounded smooth facet on either end. One face worn flat and smooth.
ML 106mm MW 82mm MTh 68mm

1499 306 CB
Pounder/grinder.
Oval cobble of very fine-grained metamorphic (?) rock. Three ground facets on one end form ridges with some flaking. Opposite end roughly pecked. One face worn smooth with polish and visible striations.
ML 108mm MW 57mm MW 52mm

1920 457 CB 9002
Pounder/grinder.
Large oval cobble of gneiss. Single roughly pecked facets on either end, one with additional flaking. One face worn flat and smooth.
ML 147mm MW 91mm MTh 65mm

1930 457 CB 8572
Pounder/grinder.
Sub-oval cobble of fine-grained micaceous sandstone. Rounded, roughly pecked facet on narrow end. On broader end single facet ground smooth. One concave face worn very smooth with some polish.
ML 145mm MW 84mm MTh 53mm

1940 457 CB 8567 430.4E 109.15N
Pounder/grinder.
Flat oval cobble of gneiss. Two small facets ground on one end. Single small facet pecked on opposite end.
ML 125mm MW 81mm MTh 50mm

1963 457 CB 8567 430.42E 109.1N
Pounder/grinder.
Flat oval cobble of fine-grained micaceous rock. Two ground facets form ridge on either end. One face worn smooth.
ML 126mm MW 82mm MTh 48mm

1971 457 CB 8567
Pounder/grinder.
Irregular-shaped cobble of gneiss. Rounded facet pecked on one end. Opposite end more roughly pecked.
ML 165mm MW 82mm MTh 73mm

1977 457 CB 9043 430.3E 113.6N
Pounder/grinder.
Oval cobble of gneiss. Single facet pecked on one end with some flaking. Opposite end heavily flaked. One face worn flat and smooth.
ML 114mm MW 68mm MTh 57mm

2014 457 CB 8595 430.09E 111.05N
Pounder/grinder.
Elongated oval cobble of micaceous sandstone. Single roughly pecked facets on either end. One face worn flat and smooth with visible striations. Heavy pecking on one side forms notch just off-centre. (Figure 188)
ML 126mm MW 60mm MTh 40mm

2070 397 CB 8340
Pounder/grinder.
Elongated oval cobble of amphibolite. Single rounded facet pecked on narrow end. Rougher facet on opposite end. One face worn smooth with traces of polish.
ML 118mnm MW 63mm MTh 50mm

2071 397 CB 8340
Pounder/grinder.
Oval cobble of micaceous sandstone. Two facets ground on one end form ridge. Opposite end has a more roughly pecked rounded facet. One face worn flat and smooth.
ML 84mm MW 60mm MTh 43mm

2163 489 CB
Pounder/grinder.
Narrow oval cobble of quartzite. Single, roughly pecked facets on either end. Reused in hearth.
ML 148mm MW 77mm MTh 52mm

1374 393 CC 428.7E 107.57N
Pounder/grinder.
Rectangular cobble of gneiss. On broader end three ground facets form ridge. On opposite end there is a pecked, rounded facet. One face worn flat and smooth with traces of polish. (Figure 74)
ML 107mm MW 65mm MTh 41mm

1412 408 CC 431.7E 110.5N
Pounder/grinder.
Pestle-like. Cylindrical cobble of gneiss. Rounded, pecked facets on either end. Very nice tool. (Figures 74, 188)
ML 140mm MW 65mm MTh 51mm

1405 407 CC 428.74E 104.38N
Pounder/grinder.
Sub-oval cobble of micaceous sandstone. Single pecked facet on narrow end. Some pecking on opposite end. One face worn flat and smooth.
ML 117mm MW 87mm MTh 60mm

1433 404 CC
Pounder/grinder.
Oval cobble of banded gneiss. Single, roughly pecked facets on either end.
ML 116mm MW 90mm MTh 77mm

1553 428 CC
Pounder/grinder.
Flat oval cobble of fine-grained metamorphic rock. One end heavily flaked over rough facet. On opposite end smoothly ground facets form ridge. One face worn flat and smooth with some visible unidirectional striations.
ML 102mm MW 76mm MTh 37mm

Norse blocks
1381 400 CE 426.75E 110.3N
Pounder/grinder.
Oval cobble of coarse-grained gneiss. Single roughly pecked facets on either end. One face worn smooth.
ML 132mm MW 93mm MTh 51mm

1302 US
Pounder/grinder.
Cylindrical cobble of metamorphic rock. One end with flat facet pecked and ground. Opposite end has flaking over rough facet. One face worn flat and smooth.
ML 160mm MW 55mm MTh 53mm

1520 US
Pounder/grinder.
Fragment of a cobble of fine-grained micaceous sandstone. Surviving end has been heavily flaked over rounded pecked facet.
ML – MW 59mm MTh -

Pumice
Late Iron Age blocks
1852 397 CB 430.53E 113.4N
Pumice.
Angular piece of pumice with at least two faces used for rubbing.
ML 53mm MW 46mm MTh 35mm

2140 397 CB 8415
Pumice.
Irregular lump of pumice with large vesicles. No sign of wear.
ML 65mm MW 43mm MTh 32mm

2688 457 CB 8572
Pumice.
Roughly cube shaped fragment of pumice with one worn flat surface.
ML 44mm MW 36mm MTh 37mm

4762 397 CB 8340
Pumice.
Fragment of pumice with very large vesicles. No sign of wear.
ML 48mm MW 47mm MTh 37mm

1099 314 CC 429.05E 113N
Pumice.
Sub-rectangular lump of pumice. One face possibly worn from rubbing.
ML 67mm MW 57mm MTh 47mm

1761 438 CC
Pumice.
Large rounded lump with two adjacent faces worn flat from rubbing. Some visible striations and very light grooves visible.
ML 65mm MW 50mm MTh 47mm

4751 414 CC
Pumice.
Fragment of pumice with very large vesicles. No sign of wear.
[no measurements]

4755 407 CC
Pumice.
Fragment of pumice with very large vesicles. No sign of wear.
[no measurements]

4756 418 CC
Pumice.
Fragment of pumice with very large vesicles. No sign of wear.
ML 35mm MW 32mm MTh 19mm

4760 438 CC
Pumice.
Rounded lump of pumice. Some light faceting is most probably use wear.
ML 41mm MW 28mm MTh 19mm

4761 407 CC
Pumice.
Fragment of a rounded lump with flat base possibly worn smooth.
ML - MW - MTh 42mm

4763 485 CG
Pumice.
Flattened rounded lump. Does not appear to have been used.
ML 44mm MW 40mm MTh 15mm

4469 US
Pumice.
Rounded lump of pumice.
ML 56mm MW 27mm MTh 21mm

4752 US
Pumice.
Fragment of pumice with very large vesicles. No sign of wear.
ML 54mm MW 42mm MTh 32mm

4754 US
Pumice.
Fragment of pumice with very large vesicles. No sign of wear.
[no measurements]

Smoothers
Late Iron Age blocks
1914 397 CB 8458
Smoother.
Small flat oval cobble of gneiss. One face possibly worn flat and smooth.
ML 84mm MW 52mm MTh 20mm

1919 397 CB 8442 426.6E 113.1N
Smoother.
Elongated oval cobble of fine-grained metamorphic rock. One face worn smooth with some light striations visible.
ML 100mm MW 47mm MTh 26mm

1963 457 CB 8567
Smoother.
Flat round cobble of gneiss. Fragment. Burnt. One concave face worn very smooth.
ML 81mm MW 65mm MTh 31mm

1968 457 CB 8585
Smoother.
Large rounded cobble of fine-grained metamorphic rock. One face worn flat and smooth. Some localised pecking on either end.
ML 120mm MW 90mm MTh 70mm

2045 462 CB 8534 427.4E 115.8N
Smoother.
Oval cobble of fine-grained sandstone. One face worn flat and smooth with visible longitudinal striations.
ML 96mm MW 80mm MTh 49mm

2065 397 CB 8467
Smoother.
Small oval cobble of fine-grained micaceous sandstone. Possibly used as a smoother on one face though not heavily worn.
ML 72mm MW 61mm MTh 34mm

2066 397 CB 8371
Smoother.
Flat oval cobble of gneiss. One face has been worn flat and

smooth with traces of polish and dark staining (?).
ML 70mm MW 48mm MTh 16mm

2072 397 CB 8340
Smoother.
Irregular cobble of metamorphic rock. One flat face has been worn smooth with traces of polish.
ML 70mm MW 66mm MTh 43mm

2104 397 CB 427.4E 112.3N
Smoother.
Flat oval cobble of fine-grained micaceous rock. The lower face has been worn flat and smooth and there are traces of pecking in the centre of the face and a polish over the surface.
ML 87mm MW 60mm MTh 29mm

2170 457 CB
Smoother.
Rounded cobble of gneiss (?). One face worn flatter and smooth with some darker staining.
ML 87mm MW 80mm MTh 53mm

1098 302 CC 429.72E 114.55N
Smoother.
Narrow, elongated cobble of rock with white inclusions. One face worn smooth with traces of polish/gloss residue. Another face with visible longitudinal striations. Both ends pecked and faceted.
ML 135mm MW 37mm MTh 30mm

1137 314 CC 429.44E 113.7N
Smoother.
Irregular cobble of fine-grained metamorphic rock. Parts of the surface have been worn smooth with traces of polish/gloss residue.
ML 103mm MW 70mm MTh 65mm

1408 407 CC 428.96E 109.48N
Smoother.
Flat oval cobble of fine-grained sandstone. One face worn flat and smooth. Some light pecking on either end.
ML 105mm MW 83mm MTh 36mm

1453 418 CC 426.24E 109.62N
Smoother.
Elongated cobble of vesicular volcanic (?) rock. Triangular cross-section. Two faces worn flat and smooth. Small pecked facet on either end.
ML 126mm MW 41mm MTh 30mm

1459 418 CC 425.42E 110.4N
Smoother.
Irregular cobble of fine-grained metamorphic rock. One flat face has been worn smooth with traces of polish.
ML 126mm MW 86mm MW 61mm

1461 404 CC
Smoother.
Flat oval cobble of gneiss. One face worn flat and smooth. Rough facet pecked on either end.
ML 175mm MW 103mm MTh 47mm

1524 302 CC
Smoother.
Small flat pebble of metamorphic rock. Abraded on one face. Opposite face has possibly been worn flat and smooth.
ML 77mm MW 37mm MTh 14mm

1534 424 CC
Smoother.
Flat round cobble of fine-grained rock. One face appears to have been worn smooth with some gloss/polish.
ML 81mm MW 63mm MTh 34mm

1535 424 CC
Smoother.
Elongated oval cobble of fine-grained sandstone. The base has been worn very flat and smooth and bears a light polish. Some light pecking on either end.
ML 117mm MW 50mm MTh 34mm

Norse blocks
1271 334 CD
Smoother.
Small, flat, oval cobble of fine-grained rock. One face worn flat and smooth.
ML 60mm MW 45mm MTh 18mm

1318 374 CE
Smoother.
Sub-oval cobble of vesicular volcanic (?) rock. One face worn smooth.
ML 86mm MW 67mm MTh 48mm

1214 US
Smoother.
Flat circular cobble of sandstone. One face worn smooth.
ML 73mm MW 68mm MTh 29mm

Spindle whorls
Late Iron Age blocks
2254 481 CB 427.78E 111.13N
Spindle whorl. Stone.
Sedimentary (?) rock with crystal inclusions. Shaped from tabular block. Circular in plan with flat faces and rounded perimeter. One face worn to a very smooth finish and is black, possibly from staining or else an original bedding layer. Perforation worked from both faces. Traces of incised line placed 5mm around perforation on both faces. (Figures 56, 177)
Dia. 39mm MTh 10mm Hole dia. 4mm

Norse blocks
1738 372 CE
Spindle whorl. Stone.
Sedimentary (?) rock with crystal inclusions. Shaped from tabular block. Flat faces and rounded perimeter. Perforation worked from both faces and slightly off-centre. (Figures 89, 177)
Dia. 40mm MTh 13mm Hole dia. 8mm

1272 US
Spindle whorl (?). Stone.
Fragment of rock that the spindle whorls are made from. Sandstone with crystal inclusions. Appears to be unused.
ML 71mm MW 31mm MTh 19mm

Strike-a-lights

Late Iron Age blocks

1960 457 CB 8570
Strike-a-light. Quartzite.
Flat rounded pebble of quartzite. On one face there are light brown streaks, most probably from the use of a metal blade on the stone for a spark.
ML 73mm MW 63mm MTh 32mm

1961 457 CB 8570
Strike-a-light. Quartzite.
Flat rounded pebble of quartzite. On either face there are brown lines, most probably from the use of a metal blade on the stone for a spark.
ML 62mm MW 57mm MTh 31mm

1962 457 CB 8570
Strike-a-light. Quartzite.
Flat rounded pebble of quartzite. On either face there are brown streaks, most probably from the use of a metal blade on the stone for a spark.
ML 56mm MW 48mm MTh 28mm

2001 457 CB 9018 429.6E 112.9N
Strike-a-light (?). Quartzite
Flat rounded pebble of quartzite. No apparent sign of wear but very similar to those others described as strike-a-lights.
ML 67mm MW 56mm MTh 37mm

1425 414 CC 428.53E 110.17N
Strike-a-light. Quartzite.
Flat oval cobble of quartzite. Single, deep, V-shaped groove in centre of each face. (Figures 74, 188)
ML 69mm MW 60mm MTh 19mm

Norse blocks

1144 325 CE
Strike-a-light. Quartz.
Small oval pebble of quartz. On one face there are light brown streaks, most probably from the use of a metal blade on the stone for a spark. (Figures 89, 188)
ML 70mm MW 42mm MTh 25mm

Anvils

Late Iron Age blocks

1439 404 CC 435E 112N
Anvil stone.
Irregular, triangular cobble of gneiss presenting five flat faces. Though not heavily worn, some of the faces appear to have traces of pecking on them.
ML 145mm MW 130mm MTh 120mm

Norse blocks

1388 405 CE 433.1E 111.5N
Anvil stone/grinder.
Irregular, triangular cobble of gneiss presenting five flat faces. Some damage from flake removal. One surviving face appears to have been worn to a smooth concave face.
ML 160mm MW 135mm MTh 140mm

Vessels

Late Iron Age blocks

1390 404 CC 439.1E 108.2N
Rim sherd from large vessel. Steatite.
Both interior and exterior are ground to a fine finish. The rim is slightly rounded and the wall thickens from 14mm at rim to 23mm at break. (Figure 159)
MTh 23mm

1537 431 CC
Vessel sherd. Steatite.
Ground smooth on interior. Encrusted with soot on exterior.
MTh 12mm

Norse blocks

1367 382 CE
Rim sherd. Steatite.
Interior and exterior ground to a smooth finish. Rim is slightly rounded. Wall thinner at rim and splays outwards. Exterior encrusted with black soot. (Figure 159)
MTh rim 12mm MTh break 17mm

1593 372 CE
Vessel sherd. Steatite.
Ground to a fine finish on inside and outside. Sooted on exterior.
MTh 28mm

Whetstones

Late Iron Age blocks

1523 418 CC
Whetstone. Sandstone.
Flat, elongated pebble of fine-grained sandstone. Abraded over one face. Worn to a sub-rectangular cross-section. Both faces worn to a skewed profile. Sides, ends and faces all worn with a polish. (Figures 74, 188)
ML 73mm; MW 39mm MTh 21mm

1317 US
Perforated whetstone/weight. Steatite.
Sub-rectangular cobble of steatite. Small perforation bored at one end. One face has been worn to a concave cross-section with visible longitudinal striations. A deep V-shaped gouge has been scored in the centre of the face. Possibly a reused weight or else a perforated whetstone. (Figures 105, 189)
ML 132mm MW 62mm MTh 32mm dia. perf. 7mm

Miscellaneous stone artefacts

Late Iron Age blocks

2105 397 CB 427.2E 113.7N
Bead (?), perforated. Sandstone.
Medium-grained sandstone. Ground all over. Oval in plan with flat faces and a rounded edge. Perforation made off-centre along length of the oval. (Figures 56, 165)
ML 27mm MW 26mm MTh 14mm dia. perf. 6mm

1130 314 CC 429.96E 112.94N
Counter-sunk hollowed stone.
Fragment of oval cobble of gneiss/sandstone. Breakage truncates single smooth hollows made on opposite faces in centre of stone. See 2306. (Figures 74, 188)
MTh 33mm

8520 418 CC
Counter/gaming piece. Travertine.
Oval, flattened cone of travertine. Dark grey with light brown top surface, polished all over
Dia. 26–27mm MH 20mm

2306 490 CG 415.54E 113.49N
Weight or hollowed stone, counter-sunk.
Fragment of oval cobble of gneiss. Breakage truncates single smooth hollows made on opposite faces in centre of stone. See 1130. (Figures 80, 188)
ML - MW - MTh 39mm

Norse blocks
1271 334 CD
Counter (?).
Natural rounded pebble of gneiss.
ML 28mm MW 27mm MTh 23mm

1083 303 CF
Polished slab of porphyry, fragment. Exotic.
Both faces have been ground flat and then polished. There are traces of grinding and polishing on two edges which may suggesting that this is a fragment from the corner of a tile. A single scratch on one face. See Owen and Lowe 1999, 223. (Figures 102, 176)
Broken dimensions 44mm by 30mm MTh 14mm

1538 US
Weight and reused mould. Steatite (?)
Small block of steatite (?), crystalline. Originally shaped as mould for a deep U-shaped bar. Subsequently perforated at one end of the mould by gouging with metal implement from both sides. (Figures 105, 189)
ML 61mm MW 57mm MTh 34mm
Mould 48mm long, 15mm wide, 10mm deep, dia. perf. 7mm

METAL ARTEFACTS

Transport Harness

Norse blocks
1394 400 CE
Modern horseshoe nail (?). Iron.
Flat, rectangular-sectioned tapering stem which expands, on one side only, through a distinct neck into a bevelled, rectangular-sectioned head. The tip is missing. (Figures 89, 190)
L 59mm, max. dimensions of stem 5mm by 3mm, max. dimensions of head 8mm by 5mm

1378 304 CF
D-shaped buckle frame (?). Iron.
Distorted and broken, sub-rectangular-sectioned fitting. The artefact is now open but traces of a probable scarf joint, which are visible across the broken part of the fitting, suggest. that it was originally closed to form a sub-rectangular loop. Probably a crude D-shaped buckle frame (*cf*. Ottaway 1992, 683, fig. 294; Ottaway and Rogers 2002, 2891, fig. 1468) or possibly a chain link (*cf*. Ottaway 1992, 648, fig. 273; Ottaway and Rogers 2002, 2851–2853, fig. 1429). (Figures 102, 190)
Dimensions 34.5mm by 18mm, Th 4.5mm

1547 304 CF
Buckle tongue. Iron.
Simple buckle pin with a rounded blunt tip and a slightly elongated loop. The rectangular-sectioned shaft slightly tapers towards the tip. There is no evidence of applied decorative ridges or flanges on the shaft. (Figures 102, 190)
L 25mm, max. W shaft 4mm, max. Th shaft 2mm, external dia. of loop 7–9mm, internal dia. of loop 4–6mm

1071 US
Snaffle-bit (?). Iron.
Ring, roughly circular in cross-section, and shank, also roughly circular in cross-section, which expands slightly towards the middle. The eyes are in planes at right angles to each other, one is partly broken. Probably, but not certainly, from a two-link snaffle-bit. (Figures 105, 167, 190)
Ring external dia. 47mm, internal dia. 28mm; shank L 68mm

Dress and ornament

Late Iron Age blocks
1078 302 CC
Pin (?). Iron.
Circular-sectioned stem, one end is broken and the other is flattened into a waisted, or notched, head. Probably, but not certainly, a pin fragment. (Figures 72, 163)
L 49mm

1184 337 CC
Pin (?). Iron.
Incomplete and curved, sub-rectangular sectioned (max. Th 2mm) tapering shank. Broken at both ends. Possibly, but not certainly, part of a pin or needle. (Figures 72, 163)
L 41mm

4687 455 CG
Pin (?). Copper alloy.
Circular-sectioned rod fragment, which tapers to a rounded point at one end and is broken at the other. Probably the tip of a pin. (Figures 80, 163)
Surviving L 16mm, dia. 2mm

Norse blocks
1116 307 CF
Lace-tag (?). Copper alloy.
Narrow, slightly tapering cylinder formed from a rolled copper alloy sheet, with an overlapping straight seam. One end is broken, whilst the other has been apparently crimped flat from one side with a round nosed pinching tool. Probably a long lace-tag. (Figures 102, 165)
L 60mm, dia. 7.5–5.5mm

1177 US
Stick pin. Copper alloy.
The rectangular-sectioned head of the pin narrows and tapers and has been worked into a neatly-turned, closed, crozier-shaped loop. There is no expansion of the circular-sectioned shank which tapers from the pin’s neck (max. dia. 4mm) to a short, rounded point. The pin is plain and there is no evidence to suggest that its surface was originally tinned. (Figures 105, 163)
L 120mm

Craft activity

Late Iron Age blocks
4688 397 CB
Spillage/casting waste (?). Copper alloy.
Fragment of spillage or casting waste, plano-convex in section with a globular surface.
10mm by 6mm, H 3.5mm

Norse blocks
1320 312 CF
Spindle whorl (?). Lead.
Crudely-cast perforated weight, plano-convex in cross-section. The tapering perforation is slightly off-centre. Probably a spindle whorl, although possibly some other form of perforated weight. (Figures 102, 177)
Dia. perf. 6.5–7.5mm, external dia. 19.5–21mm, H 6mm, weight 14g

Tools

Knives
Norse blocks
1096 305 CF
Knife. Iron.
The back of the blade is slightly convex, the edge of the blade is missing. The broken, rectangular-sectioned tang is set slightly below the line of the back of the blade. (Figures 102, 182)
L 82mm

1539 US
Knife (?). Iron.
The back of the blade is slightly convex and curves downwards from the shoulder to the tip. The cutting edge has an elongated S-shape, presumably as a result of wear and sharpening. Only part of the notably thin, tapering, rectangular-sectioned tang survives. (Figures 105, 182)
L 48mm

1110 US
Blade (?). Iron.
Possible fragment of a narrow, tapering blade. The back of the blade is curved and the fragment is broken at both ends.
L 22mm, max. W 11mm max. Th 6mm

Structural Fittings

Nails
Norse blocks
1359 384 CE
Nail (?). Iron.
Rectangular-sectioned tapering strip fragment. Broken at both ends and bent through a right angle halfway along its length. Probably the stem of a nail.
Surviving L 26mm

1360 384 CE
Nail. Iron.
Incomplete flat-headed nail with a rectangular-sectioned stem. (Figures 89, 190)
Surviving L 26mm

1486 374 CE
Nail. Iron.
Diamond-shaped flat-headed nail with a rectangular-sectioned stem. Although incomplete, the end of the stem is bent through a right angle, suggesting the nail was possibly part of a holdfast. (Figures 89, 190)
Surviving L 30mm

2570 372 CE
Nail. Iron.
Incomplete flat-headed nail with a rectangular-sectioned stem, broken just below the head.
Surviving L 11mm

1080 303 CF
Nail. Iron.
Incomplete flat-headed nail with a rectangular-sectioned stem.
Surviving L 41mm

1087 304 CF
Nail. Iron.
Incomplete flat-headed nail with a rectangular-sectioned stem.
Surviving L 37mm

1125 312 CF
Nail. Iron.
Roughly flat-headed nail with an incomplete stem of undetermined, but probably rectangular, cross-section. (Figures 102, 190)
Surviving L 26mm

1133 319 CF
Nail (?). Iron.
Not available for study.

1168 331 CF
Nail. Iron.
Incomplete flat-headed nail with a rectangular-sectioned stem. (Figures 102, 190)
Surviving L 47mm

1218 343 CF
Nail. Iron.
Incomplete flat-headed nail with a rectangular-sectioned stem.
Surviving L 33mm

1379 304 CF
Nail. Iron.
Incomplete probable flat-headed nail with a rectangular-sectioned stem, broken just below the head.
Surviving L 15mm

1397 312 CF
Nail. Iron.
Incomplete roughly flat-headed nail with a relatively thick, rectangular-sectioned stem. (Figures 102, 190)
Surviving L 34mm

1490 304 CF
Nail. Iron.
Incomplete roughly flat-headed nail with a bent rectangular-sectioned stem.
Surviving L 18mm

1187 US
Nail. Iron.
Incomplete flat-headed nail with a rectangular-sectioned stem.
Surviving L 19mm

1203 US
Nail. Iron.
Incomplete flat-headed nail with a rectangular-sectioned stem. (Figure 190)
Surviving L 23mm

1669 US
Nail. Iron.
Incomplete flat-headed nail with a tapering rectangular-sectioned stem and missing tip.
Surviving L 53mm

Possible nails
Norse blocks
1504 384 CE
Strip (possible nail stem). Iron.
Rectangular-sectioned tapering strip, broken at both ends and bent through a right angle at one end. Possibly a nail stem.
L 37mm

1506 374 CE
Strip (possible nail stem). Iron.
Rectangular-sectioned tapering strip, broken at both ends. Possibly a nail stem.
L 23mm

1199 331 CF
Strip (possible nail stem). Iron.
Slightly curved, rectangular-sectioned tapering strip, broken at both ends. Possibly a nail stem. (Figures 102, 190)
L 62mm

1215 339 CF
Strip (possible nail stem). Iron.
Rectangular-sectioned tapering strip, broken at both ends. Possibly a nail stem. (Figures 102, 190)
L 65mm

1110 US
Strip (possible nail stem). Iron.
Rectangular-sectioned tapering strip, broken at both ends. Possibly a nail stem.
L 24mm

1190 US
Strip (possible nail stem). Iron.
Rectangular-sectioned tapering strip, broken at both ends. Possibly a nail stem.
L 33mm

1192 US
Strip (possible nail stem). Iron.
Rectangular-sectioned tapering strip, broken at both ends. Possibly a nail stem.
L 56mm

1335 US
Strip (possible nail stem). Iron.
Rectangular-sectioned tapering strip, broken at both ends. Possibly a nail stem.
L 19mm

1358 US
Strip (possible nail stem). Iron.
Rectangular-sectioned tapering strip, broken at both ends. Possibly a nail stem.
L 24mm

2517 US
Strip (possible nail stem). Iron.
Rectangular-sectioned tapering strip, broken at both ends. Possibly a nail stem.
L 26mm

4072 US
Strip (possible nail stem). Iron.
Rectangular-sectioned tapering strip, broken at both ends. Possibly a nail stem.
L 22mm

Holdfasts
Norse blocks
1081 303 CF
Holdfast. Iron.
Rectangular-sectioned stem, the head is incomplete and of uncertain form, while the other end has been hammered over a rectangular-shaped rove. The stem of the holdfast is set at a right angle to its head and rove and its overall length is 32mm, the distance between its inner face and head is 17mm and this indicates the thickness of the two pieces of timber it joined. (Figures 102, 190)
L 32mm, rove dimensions 21mm by 23mm

1091 304 CF
Rove. Iron.
Rectangular-shaped rove with a central rectangular perforation (dimensions 2mm by 3mm).
16mm by 15mm

1101 327 CF
Rove (?). Iron.
Trapezoidal-shaped plate fragment partly pierced by a circular hole. Possibly part of a diamond-shaped rove.
24mm by 20mm

1124 312 CF
Rove. Iron.
Rectangular-shaped rove with a slightly off-centre, circular perforation (dia. 5mm).
23mm by 22mm

1200 341 CF
Rove. Iron.
Roughly rectangular-shaped rove with part of a sub-rectangular sectioned nail piercing the rove at an oblique angle. (Figures 102, 190)
22mm by 17mm

1207 349 CF
Rove. Iron.
Rectangular-shaped rove with a slightly off-centre, circular perforation (dia. 6mm). (Figure 102)
23mm by 19mm

1220 312 CF
Rove. Iron.
Rectangular-shaped rove with a slightly off-centre, sub-circular perforation (dia. 5–6mm). (Figures 102, 190)
19mm by 18mm

8622 331 CF
Rove. Iron.
Rectangular-shaped rove with a slightly off-centre, sub-circular perforation (dia. 5mm) around which the edges have been pushed up.
21mm by 20mm

Miscellaneous iron artefacts

Rings
1103 US
Ring (?). Iron.
Probable small ring, broken and distorted, rectangular in cross-section (Th 5mm). Small rings are not uncommon finds and probably had a wide variety of functions. (Figures 105, 190)
External dia. approximately 20mm

Bindings
Late Iron Age blocks
4700 418 CC
Binding (?). Iron.
Perforated rectangular-shaped plate fragment, broken at one end and along one side. Part of a rivet hole (dia. 4mm) is extant 9mm from the intact end of the fragment. Possible binding strip.
L 34.5mm, W 15mm, Th 2.5mm

Rods
Late Iron Age blocks
4630 457 CB
Rod. Iron.
Circular-sectioned rod fragment.
L 15m, max. dia. 8mm

Bar fragments
Following Ottaway, bars are defined as having a maximum width to maximum thickness ratio of less than 4:1 and being markedly wider and thicker than strips (Ottaway 1992, 493).

Late Iron Age blocks
1517 418 CC
Bar. Iron.
Slightly twisted rectangular-sectioned bar fragment.
Surviving L 29mm, W 6–7mm, Th 5–6mm

Norse blocks
1586 374 CE
Bar. Iron.
Sub-triangular-sectioned bar fragment.
Surviving L 18mm, max. surviving W 4mm, max. surviving Th 4mm

1546 US
Bar. Iron.
Tapering rectangular-sectioned bar fragment, broken at its widest. end. Possibly part of a tang.
Surviving L 48mm, W 6–9mm Th 4mm

Plate fragments
Following Ottaway, plates are defined as usually having a thickness of 6mm or less and a maximum width to maximum thickness ratio greater than 4:1 (Ottaway 1992, 501).

Late Iron Age blocks
2564 397 CB
Plate. Iron.
Rectangular-shaped fragment. One edge is partly bent over at a right angle.
L 21mm, W 11mm Th 2mm

2568 397 CB
Plate. Iron.
Rectangular-shaped fragment. Traces of mineralised wood are preserved on one side of the fragment.
L 17mm, W 13mm, Th 2mm

4690 462 CB
Plate. Iron.
Irregular-shaped plate fragment, one edge of which is embellished with two protruding rounded flanges (L 4mm, W 2.5mm, Th 2mm) separated by a gap 0.5mm wide. X-radiographic examination suggests that there was at least one adjacent flange which is now broken. One end of the fragment is bent upwards at a right angle; it is not certain whether this is an original feature or post-depositional damage. Possible traces of mineralised wood or fabric are visible on one side of the fragment.
Dimensions 16mm by 14mm by 2.5mm

Norse blocks
1543 379 CE
Plate. Iron.
Irregular-shaped fragment.
L 23mm, W 16mm, Th 3mm

1395 312 CF
Plate. Iron.
Curved, irregular-shaped fragment. Possibly part of a ferrule or socket.
L 15mm, W 18mm, Th 3mm

1102 301 (topsoil)
Plate. Iron.
Rectangular-shaped fragment, broken on three sides and perforated by a small, irregular-shaped void which is possibly a result of corrosion.
32mm by 18mm, Th 2mm

Strip fragments
Following Ottaway, strips are defined as having a maximum width to maximum thickness ratio of less than 4:1 (Ottaway 1992, 493).

Late Iron Age blocks
1589 407 CC
Strip. Iron.
Tapering strip fragment, rounded at both ends. Traces of mineralised wood are visible on one side of the fragment. (Figures 72, 190)
L 44mm, W 7–11mm, Th 3mm

Norse blocks
1316 372 CE
Strip. Iron.
Rectangular-sectioned tapering fragment, broken at both ends.
L 42mm, W 10–8mm, Th 4mm

1085 303 CF
Strip. Iron.
Irregular fragment, broken at both ends.
L 37mm, max. surviving W 13mm

1475 304 CF
Strip. Iron.
Semi-cylindrical strip fragment. The fragment is not large enough to positively identify, however, it is probably part of a socket, ferrule or collar. (Figures 102, 190)
L 16mm, external dia. 13mm, Th 1–2mm

1188 US
Strip. Iron.
Rectangular-sectioned tapering fragment, broken at one end and embedded in a nodule of slag at the other.
L 34mm, W 5mm

1427 US
Strip. Iron.
Narrow rectangular-sectioned tapering fragment, broken at both ends.
L 18mm, W 5–4mm, Th 2mm

Copper alloy sheet
Late Iron Age blocks
1470 418 CC
Sheet fragment. Copper alloy.
Irregular-shaped sheet fragment.
12mm by 7mm, Th 0.1mm

1590 392 CC
Sheet fragment. Copper alloy.
Rectangular-shaped sheet fragment. One side of the fragment is embellished with two parallel incised lines set approximately 1.5mm apart.
14mm by 7mm, Th 0.8mm

Norse blocks
1585 372 CE
Sheet fragment. Copper alloy.
Roughly rectangular-shaped sheet fragment, folded over on itself twice.
9.5mm by 7.5mm, folded Th 1.2mm

1591 401 CE
Sheet vessel fragment (?). Copper alloy.
Irregular-shaped sheet fragment. Damage to the fragment has been repaired by the application, in antiquity, of two copper alloy so-called paper clip patches, one of which retains part of a copper alloy sheet washer, now of uncertain shape. (Figures 89, 160)
31mm by 25.5mm, Th 0.1mm

1217a 343 CF
Mount (?). Copper alloy.
Rectangular-shaped and heavily creased sheet fragment. The fragment contains distinctive transverse tears at either end. (Figures 102, 160)
35.5mm by 10.0mm, Th 0.1mm

1217b 343 CF
Sheet fragment. Copper alloy.
Irregular-shaped sheet fragment. The edges of the fragment are creased, suggesting that they might have been deliberately cut in antiquity. (Figures 102, 160)
78.5mm by 11.5mm, Th 0.5mm

1191 US
Sheet fragment, Copper alloy.
Tapering sheet fragment, rolled around on itself to form an irregular flattened cylinder. At least five straight incised lines, which apparently form part of a lattice pattern, are visible on the inside of the fragment. It is uncertain whether these are decorative features or keying to facilitate the application of the strip. (Figures 105, 160)
11.5mm by 11.5mm, Th 0.2mm

1120 US
Ferrule. Copper alloy.
Tapering ferrule with folded over, flattened and square-cut end. (Figure 160)
L 49mm, max. dia. 11mm

1149 US
Sheet fragment. Copper alloy.
Irregular-shaped sheet fragment.
23mm by 6mm, Th 0.2mm

1307 US
Sheet fragment. Copper alloy.
Rectangular-shaped sheet fragment with one surviving straight edge.
15mm by 10mm, Th 0.2mm

1313 US
Sheet fragment. Copper alloy.
Irregular-shaped sheet fragment with one surviving straight edge and part of a possible fixing hole (estimated dia. 2m). Possibly part of a binding or mount.
15mm by 8mm, Th 0.2mm

Miscellaneous copper alloy artefacts
Late Iron Age blocks
2779 397 CB
Rivet. Copper alloy.
Finely-cast, rectangular-sectioned tapering rivet. The rivet has no head, although its thickest end is burred indicating that it has been used. (Figures 57, 160)
L 7mm, max. W 1.5mm, max. Th 1.4mm

1121 314 CC
Plate. Copper alloy.
Triangular-shaped cast plate fragment, which terminates at its narrowest. end in a raised moulding. The fragment is slightly curved in section and on its reverse (concave) side its edges have slightly raised borders (W 1mm). (Figure 160)
11.5mm by 11mm, max. Th 4.5mm

Lead sheet
1314 US
Sheet fragment. Lead.
Trapezoidal-shaped, folded lead sheet fragment.
17mm by 14mm, Th 1mm, weight 2g.

Silver coin
1575 US
Penny, Silver
Olaf the Peaceful of Norway (1066–1093)

Unknown and mislaid metal artefacts
1879 397 CB
Unknown. Copper alloy.
Not available for study.

4746 397 CB
Unknown. Iron.
Small amorphous fragment.
13mm by 9mm by 6mm

4747 814 CB
Unknown. Iron.
Small amorphous fragment.
7.5mm by 6.5mm by 3mm

1136 302 CC
Unknown. Iron.
Not available for study.

1086 310 CF
Unknown. Copper alloy.
Not available for study.

1143 312 CF
Unknown.
Not available for study.

4704 US
Unknown. Iron.
Large amorphous fragment. Given the quality of the fragment's preservation, its size and unstratified context, it is not unreasonable to suggest that it is probably modern.
77mm by 42mm by 32mm

Appendix 3: Flint Catalogue – A Pannett

Find No.	Context No.	Block	Material	Colour	Cortex	Blank	Character	Classification	Platform	Termination	State	Size for fragments	Length	Breadth	Thickness	Comments
2494	397	CB	Fresh flint	Dark grey	Tertiary	Flake	Unworked	Broken core – unclassifiable	Not present due to breakage	Feather	Complete but with damaged platforms		27.8	33.4	4.8	
2574	397	CB	Fresh flint	Dark grey	Secondary	Flake	Edge damage	Broken core – unclassifiable	Cortical/outer	Hinge – strong	Complete and unmodified		24.4	20	17.8	
4643	397	CB	Fresh Flint	Grey	Secondary	Flake	Unworked	Flake shatter proximal	Cortical	Feather	Fragment - proximal	20–29				
4640	397	CB	Fresh Flint	Grey	Secondary	Chunk	Edge damage	Chunk	None	None	Fragment indeterminate	20–29				
4642	397	CB	Fresh Flint	Grey	Secondary	Flake	Unworked	Flake	Cortical	Feather	Complete and unmodified		17.7	11.9	15.8	
4638	397	CB	Fresh Flint	Grey	Tertiary	Flake	Unworked	Flake	Not present	Feather	Complete and unmodified		23.7	15.7	2.6	
2296	453	CB	Fresh flint	Light grey/white	Primary (dorsal and platform)	Pebble	Unworked	Flaked pebble	Cortical/outer	Feather	Complete and unmodified		45.4	61.9	32.5	
2528	836	CB	Fresh flint	Dark grey	Tertiary	Bladelet	Unworked	Chunk	None	Not relevant	Not relevant	20–29 mm				
4719	302	CC	Rolled Flint	Light grey/white	Primary	Flake	Unworked	Flake	Cortical	Plunging	Complete and unmodified		30.9	30	7.9	
1263	314	CC			Secondary			Chunk					29	25	15	
4697	392	CC	Fresh Flint	Grey	Primary	Chunk	Unworked	Chunk	None	None	Fragment indeterminate	20–29				
1567	404	CC	Fresh flint	Light grey/white	Secondary	Flake	Retouched piece	Simple retouch – unmodified edge	Not present due to breakage	Hinge – light	Fragment - distal	10–19 mm				
4698	407	CC	Fresh Flint	Grey	Primary	Flake	Unworked	Flake	Cortical	Feather	Complete and unmodified		24.4	35.3	10.1	
1559	414	CC	Burnt flint	Light grey/white	Secondary	Flake	Unworked	Flake	Not present due to breakage	Feather	Fragment - distal	20–29 mm				
1556	418	CC	Fresh flint	Dark grey	Secondary	Bladelet	Edge damage	Strike a light	Cortical/outer	Feather	Complete - but abraded		23.1	16.8	11	
1564	418	CC	Burnt flint	Variable	Secondary	Burnt chunk	Unworked	Burnt chunk	None	Not relevant	Fragment - indeterminate - burnt	20–29 mm				
1569	418	CC	Fresh flint	Mottled grey	Secondary	Bladelet	Retouched piece	End scraper - distal retouch	Cortical/outer	Retouched – indeterminate	Complete and modified		23	11.3	18.8	
4737	424	CC	Fresh Flint	Grey	Primary	Flake	Unworked	Flake	Cortical	Hinge	Complete and unmodified		29.9	38.1	7.3	
1734	434	CG	Fresh flint	Dark grey	Primary (dorsal and platform)	Flake	Unworked	Flaked pebble	Abraded	Hinge – light	Complete but with damaged platforms		22.1	30.2	15.3	
1951	448	CG	Fresh flint	Dark grey	Primary (dorsal only)	Flake	Unworked	Broken core – unclassifiable	Not present due to breakage	Hinge – light	Complete but with damaged platforms		16.5	30	12	
2575	448	CG	Fresh flint	Dark grey	Secondary	Flake	Unworked	Broken core – unclassifiable	Cortical/outer	Hinge – light	Complete and unmodified		13.4	16.5	4.5	
2575	448	CG	Fresh flint	Light grey/white	Secondary	Bladelet	Unworked	Chunk	None	Not relevant	Not relevant	10–19 mm				
2575	448	CG	Fresh flint	Dark grey	Tertiary	Flake	Edge damage	Broken core – unclassifiable	Not present due to breakage	Feather	Complete but with damaged platforms		23.2	30.2	5.1	
2578	448	CG	Fresh flint	Dark grey	Primary (dorsal and platform)	Pebble	Unworked	Flaked pebble	Cortical/outer	Feather	Complete and unmodified		18.8	25.1	1.3	
2588	448	CG	Fresh flint	Dark grey	Secondary	Flake	Unworked	Broken core – unclassifiable	Not present due to breakage	Hinge – strong	Complete but with damaged platforms		13.7	18.2	8.4	
1896	456	CG	Fresh flint	Light grey/white	Tertiary	Flake	Unworked	Broken core – unclassifiable	Planar	Feather	Complete and unmodified		34	18.2	16	
2481	456	CG	Patinated flint	Light grey/white	Primary (dorsal only)	Flake	Unworked	Broken core – unclassifiable	Not present due to breakage	Feather	Complete but with damaged platforms		20.2	31.4	11.8	
2560	456	CG	Fresh flint	Light grey/white	Secondary	Flake	Unworked	Broken core – unclassifiable	Planar	Hinge – light	Complete and unmodified		16.7	17.4	4.7	
2598	456	CG	Fresh flint	Light grey/white	Secondary	Bladelet	Unworked	Chunk	None	Not relevant	Not relevant	20–29 mm				
					Primary (dorsal											

2576	463	CG	Fresh flint	Dark grey	Primary (dorsal and platform)	Pebble	Unworked	Flaked pebble	None	Not relevant	Not relevant	30–39 mm				
2586	463	CG	Burnt flint	Variable	Primary (dorsal only)	Burnt chunk	Unworked	Burnt chunk	None	Not relevant	Not relevant	20–29 mm				
2585	485	CG	Fresh flint	Dark grey	Secondary	Bladelet	Unworked	Rolled/abraded angular shatter/chunk	None	Not relevant	Not relevant	20–29 mm				
1956	372	CE	Fresh flint	Mottled grey	Primary (dorsal only)	Bladelet	Unworked	Chunk	None	Not relevant	Not relevant	10–19 mm				
1566	400	CE	Fresh flint	Dark grey	Secondary	Flake	Unworked	Broken core – unclassifiable	Cortical/outer	Stepped – light	Complete and unmodified		26	35.6	7.6	
1565	403	CE	Fresh flint	Dark grey	Secondary	Flake	Unworked	Broken core – unclassifiable	Not present due to breakage	Feather	Complete but with damaged platforms		19.1	4.3	7.4	
1711	382B	CE	Fresh flint	Dark grey	Primary (dorsal only)	Bladelet	Unworked	Chunk	None	Not relevant	Not relevant	10–19 mm				
4720	304	CF	Burnt Flint	Grey	Secondary	Chunk	Unworked	Chunk	None	None	Fragment indeterminate					
4711	304	CF	Rolled Flint	Grey	Tertiary	Chunk	Unworked	Chunk	None	None	Fragment indeterminate	10–19				
4710	310	CF	Fresh Flint	Grey	Tertiary	Flake	Unworked	Flake	Not present	Feather	Complete and unmodified		14.4	15.9	11.5	Possible core trimming flake struck from base of amorphous core reused for flakelets – but very rough
4734	311	CF	Fresh Flint	Grey	Primary	Flake	Unworked	Flake	Cortical	Feather	Complete and unmodified		15.9	15.3	5.5	
1557	312	CF	Fresh flint	Light grey/white	Tertiary	Flake	Unworked	Flake	Not present due to breakage	Hinge – light	Complete but with damaged platforms		35.1	17	5.2	
1568	312	CF	Fresh flint	Light grey/white	Tertiary	Bladelet	Unworked	Chunk	None	Not relevant	Not relevant	10–19 mm				
4731	312	CF	Fresh Flint	Grey	Secondary	Flake	Unworked	Flake	Planar	Feather	Complete and unmodified		14.9	12.4	6.2	
4743	331	CF	Fresh Flint	Light brown	Secondary	Flake	Unworked	Flake	Not present	Stepped	Complete and unmodified		15	25.6	6.1	
4743	331	CF	Fresh Flint	Light grey/white	Tertiary	Flake	Unworked	Flake	Not present	Hinge	Complete and unmodified		16.5	16.9	2.2	
4743	331	CF	Fresh Flint	Light brown	Secondary	Flake	Retouched	End scraper + 2 sides	Retouched	Retouched	Complete and modified		13.5	15.2	7.7	Cortical flake with abrupt retouch around all sides to form small scraper
4743	331	CF	Fresh Flint	Light grey/white	Tertiary	Flake	Unworked	Flake	Not present	Feather	Complete and unmodified		13.7	10	5.4	
4739	333	CF	Fresh Flint	Grey	Tertiary	Chunk	Unworked	Chunk	None	None	Fragment indeterminate	20–29				
4742	335	CF	Fresh Flint	Grey	Secondary	Flake	Edge damage	Strike a light	Cortical	Not present	Fragment - proximal	20–29				Scars from repeated striking along LHS lateral edge from dorsal surface
4718	341	CF	Burnt Flint	Light grey/white	Tertiary	Chunk	Unworked	Chunk	None	None	Fragment indeterminate	10–19				
4707	346	CF	Fresh Flint	Grey	Secondary	Flake	Unworked	Flake	Planar	Feather	Complete and unmodified		19	19.1	12.8	
1560	unstrat		Patinated flint	Light grey/white	Primary (dorsal only)	Bladelet	Unworked	Flaked pebble	None	Not relevant	Not relevant	20–29 mm				
1560	unstrat		Fresh flint	Light grey/white	Secondary	Blade	Retouched piece	Simple retouch – unmodified edge	Cortical/outer	Plunging	Complete and modified		19.4	10.1	5.6	
1561	unstrat		Patinated flint	Light grey/white	Primary (dorsal and platform)	Flake	Unworked	Flake shatter – distal	Not present due to breakage	Hinge – light	Fragment - distal	10–19 mm				
4728	unstrat		Patinated Flint	Light grey/white	Secondary	Core	Unworked	Amorphous core	N/A	N/A	Complete and unmodified		22.4	18.1	23.1	Last vestiges of flake core
4728	unstrat		Fresh Flint	Grey	Secondary	Flake	Unworked	flake shatter proximal	Planar	Not present	Fragment - proximal	20–29				
4728	unstrat		Burnt Flint	Grey	Secondary	Flake	Unworked	Flake	Not present	Feather	Complete and unmodified		21.5	24.3	11.3	
4728	unstrat		Rolled Flint	Light grey/white	Tertiary	Flake	Unworked	Flake	Planar	Feather	Complete and unmodified		19.8	9.7	8	
4728	unstrat		Fresh Flint	Grey	Secondary	Flake	Unworked	Flake	Cortical	Feather	Complete and unmodified		16.9	19.2	11.8	
4735	unstrat		Fresh Flint	Grey	Secondary	Flake	Unworked	Flake	Not present	Feather	Complete and unmodified		25.9	16.9	6.3	
4733	unstrat		Rolled Flint	Light grey/white	Primary	Flake	Unworked	Flake	Cortical	Feather	Complete and unmodified		25.9	16.1	5.8	

Appendix 4: Catalogue of illustrated pottery – A Lane

Figure 21: Block CA

1. 6 conjoining basal sherds, orange/brown black grey-brown pink, 11–14mm base, 5mm wall, flat base, circle of deep finger impressions on basal interior, sooted interior, T&G, 13cm diameter, 242.9g, SF2420, (499).
2. 1 decorated body sherd, blackened brown, open semicircular applied cordon, possibly a circle or semicircular swag, T&G, 5mm thick, possibly same vessel as 2420, 9.3g, SF2375, (499).
3. 1 decorated body sherd, blackened brown, tooled wave cordon similar to type 10, 5mm, smoothed exterior, relatively fine, possibly earlier type, 18.6g, SF2392, (499).
4. 1 decorated body sherd, blackened black/brown, vessel neck, 10–13mm, heavily sooted, type 5 wave cordon, probably on shoulder with flaring neck, 51.5g, SF2327, (499).
5. 1 decorated body sherd, blackened brown, abraded type 5 wave cordon, on shoulder, 5–10mm, smoothed exterior, 18.7g, SF2376, (499).
6. 1 decorated misc., blackened grey, double horizontal incised line decoration, 8mm, smoothed exterior, Middle Iron Age, 6.5g, SF2393, (499).
7. 3 rim and 5 body sherds, conjoining, orange buff, flaring rim, applied type 5 pinched thumb and finger wave cordon decoration, at neck below rim, T&G construction, 4–8mm, diameter *c.*24cm, 78.5g, SF2687, could be same vessel as SF2420, (499).
8. 1 flaring rim sherd, orange buff, flaring rim, applied type 5 thumb and finger wave cordon, same vessel as above, 4–7mm, 23.5g, SF2687, (499).

Figures 52, 53: Block CB

1. 1 rim, black, flat, 4mm, 3g, SF2671, possibly same vessel as no. 14 (457)
2. 1 rim, black, flat, slight exterior lip, smoothed exterior, 7mm, 13g, could be from vessel 2 but slightly thicker, SF2047, (457)
3. 1 rim, black, slightly flattened, straight, 6mm, 9g, probably vessel 2, SF2134, (397)
4. 1 decorated body sherd, black/grey, flaring neck above slight shoulder, single cordon, 86g, SF1988, possibly part of vessel 1, (478)
5. 1 base, grey-brown, flat, slight foot, 8mm wall, 10mm base, 11cm diameter, 32g, SF1988, (478)
6. 2 rims, conjoined, flattened rim top, flaring, 8–10mm, T&G, 37cm diameter, 152g, vessel 1, SF1988 (478) and SF2214 (397), see also Figure 158
7. 2 rims and 2 body sherds, flattened rim top, flaring, 9mm, smoothed exterior, flaring rim above slight shoulder, double cordon, belly diameter 32cm, 378g, SFs 1987, 2670, 1905, 1988, vessel 1, (457, 397, 478), see also Figure 158
8. 2 body sherds, conjoined, shoulder, double cordon, 9mm, 156g, SF2647, probably vessel 4, (812)
9. 1 body sherd, shoulder, double cordon, smoothed exterior, T&G, 8–10mm, belly diameter 36cm, 207g, SF1988, probably vessel 4, (478)
10. 2 rims, sooted, blackened grey, round, flaring rim, slight shoulder, wiped exterior, 8–10mm, *c.*28cm diameter, 116g, SF2647, very similar to vessel 2 but flares out more; might be same as 8 and 9, and hence vessel 4, (812)
11. 3 decorated body sherds, blackened grey/grey buff, shoulder, double cordon, T&G, 8mm, 121g, SFs 2647 and 2214, may be same vessel as 12 and hence vessel 3, (812 & 397)
12. 2 decorated body sherds and 1 misc. sherd, conjoining, plus 2 body sherds & 1 misc. conjoining, blackened grey/brown, shoulder, double cordon, 7–12mm, 109g, SF1909 & 2136, may be vessel 3 as 11 above, (397)
13. 2 rims and 1 body sherd conjoining, black, slightly flattened top, slight lip, 6mm, flaring, 36cm diameter, 83g, SFs 2214 and 1988, vessel 2, (397 and 478)
14. 1 rim, blackened grey, flat, 4mm, 2.8g, SF2561, *cf* Figure 21, no. 1 (462)
15. 1 decorated body sherd, grey buff, 7mm, applied ‘T cordon’, may be swag or circle, 4.5g, SF1870, possibly residual older sherd, (397)
16. 1 base, flat, 10–13mm, fingermarked interior, possible groove round edge at base of wall, squared sherd, (462)

17. 2 rims, conjoining, blackened brown/black, slightly flattened top, 5–7mm, straight, 17g, SFs 2214 and 1988, (397 and 478)
18. 6 body sherds conjoining, irregular blackened buff soot, cordon-decorated shoulder, type 5 applied cordon, 5–8mm thick, abraded surface, T&G, 38cm belly diameter, 143.5g, SF2474, (471)
19. 1 body sherd, blackened buff, shoulder, smoothed exterior, abraded double cordon, T&G, 9–10mm, 54g, SF1987, (457)
20. 1 decorated body sherd, orange-buff, 7mm, broken at neck or at everted rim, converging incised decoration, possible cord, smoothed exterior, 4.6g, SF2507, Middle Iron Age? (807)

Figures 68, 69, 70: Block CC

1. 4 rims and 2 body sherds, irregular orange/buff grey/buff, flat rim, flaring, conjoining to form very slightly shouldered jar, smoothed exterior, 10mm thick, 35cm diameter, 221.5g, (308)
2. 1 rim and 1 body sherd, blackened grey/brown, flat rim, straight-sided, slight flaring, 8–10mm, wiped exterior surface, 34cm diameter, 114.5g, (314)
3. 2 rims, blackened brown/grey, blackened brown, flaring, flat, 6–9mm, 31.9g, (314)
4. 1 rim, blackened grey/brown, rounded, inturned bowl, 10mm, 56.6g, ?Norse, (314)
5. 2 rims plus 2 rims and 2 body sherds, black, slightly shouldered vessel with flaring rim, 6mm thick, smoothed exterior, T&G, irregular rim top ranging from slightly flattened to round, *c.*14cm diameter, 120.9g, (337)
6. 1 base, flat, orange-buff, 11cm diameter, T&G, 21.7g, (337)
7. 2 body sherds, black, shoulder, zigzag cordon, T&G, conjoined, coarse angular inclusions, 9–10mm, 55g, (337)
8. 2 rims, black, conjoining, 5mm, thin, slightly flattened rim, straight, sooted interior and exterior, 6.7g (398)
9. 1 body sherd, black brown/grey, complex T pattern slashed narrow cordon, 7–11mm, possible T&G, smoothed exterior, 22.1g, (398)
10. 1 body sherd, black, double cordon, shouldered jar broken as rim turns up, T&G, 7–10mm thick, hard, gritty, SF1376, 140.2g, (398)
11. 1 body sherd, neck, buff, smoothed exterior, 9mm, applied cordon, SF1376, 46.5g, (398)
12. 1 platter rim, grey-buff, in-angled flat profile, cracked exterior, fingered interior, 10–15mm thick, 8g, (404)
13. 1 base (?) sherds, fabric E, orange-black/soot, rounded angle, 5mm wall, 7mm base, 5.1g, Norse, (404)
14. 1 rim, buff, fabric E, 5mm, smoothed interior, sooted exterior, shallow rounded incurving profile, possibly a convex cup or bowl, Norse, 5.5g, (404)
15. 1 platter sherd, red buff, fingered interior, cracked exterior, 10–13mm thick, 12.5g, (404)
16. 1 misc., orange buff, 10mm, incised triple line decoration, slightly splayed design, 2.4g, (404)
17. 1 body sherd, sooted buff grey, single applied cordon at everted neck, DV type 22 cordon style, 6–9mm, 28.5g, *cf.* CA (404)
18. 1 body sherd, blackened orange, applied cordon DV type 22, 10mm width, lumpy fingered exterior, T&G, 7–10mm, 33.3g, (404)
19. 1 rim and 1 body sherd, sooted brown, slightly flattened rim, large flaring rim with slight shoulder, 10mm, very sooty exterior, 146.8g, SF1736, (407)
20. 1 rim, sooted brown/grey, flat-shouldered jar, T&G, 8–12mm, sooting and blackening on both surfaces, traces of organics on surface and in fabric, 69.5g, (407)
21. 1 body sherd, buff, burnished exterior surfaces, dot-impressed narrow cordon, 5mm, SF1514, 10.3g, Middle Iron Age, (408)

21a. 1 body sherd, orangey-buff, everted neck, with applied cordon, abraded, 7mm, 12.7g, *cf.* CA rim, (408)

22. 1 body sherd, orange, 5mm, slashed rope cordon, 5mm, soot below cordon, 6.7g, (408)
23. 1 rim, black, 3–4mm, cup form, slightly out-turned, smoothed exterior, 3.3g, (409)
24. 1 rim, blackened brown, 5–6mm thick, sooted, slightly flat-topped, flaring from a slightly shouldered jar, 6.5g, (413)
25. 1 body sherd, blackened buff/grey, broken below neck, with double applied zigzag cordon, roughly parallel. Both narrow and *c.*19mm apart, DV type 5, heavy sooting on shoulder, smoothed exterior gritty interior, T&G, SF1419, 130.5g, (414)
26. 3 rims and 1 body sherd joining 1 rim, orangey-buff, large, flaring, slightly shouldered jar, 5–10mm thick, slightly flat rim, 36cm diameter, 260.3g, SF1570 (418) and SF1496 (424)
27. 5 rims, flat, conjoined, T&G, 9–10mm, 28.8g, uncertain diameter, (418)
28. 1 rim, 6–8mm, brick red, slightly flaring shouldered jar, T&G, 34.7g, (418)
29. 2 base sherds, plus 2 body sherds and 1 misc., forming complete base, pink/buff, 11cm diameter, omphalous, crudely fingered interior, heavily sooted interior wall, base clean, 213g, (418)

30. 1 base sherd, brown, flat-bottomed, steep-walled, 7mm wall and base, 12cm diameter, lightly sooted, 25.1g, (418)
31. 2 body sherds, blackened buff, conjoining body/neck sherds, applied zigzag cordon, double cordon 30mm apart, wiped smooth exterior, gritty interior, finger impressions around cordon from manufacture, blackened sooty exterior, 5–10mm thick, SF1463 and SF1572, 130.4g, (418)
32. 1 misc., black, applied zigzag cordon, T&G, smoothed exterior, 5.2g, (418)
33. 1 misc., black/brown, 6–10mm, combined applied and incised, black hard fabric, shiny smooth exterior, off-white residue interior, incised decoration at an angle of 45° to the narrow, diagonally slashed applied cordon, very worn and abraded. Similar to DV type 14, 4.9g, (418)
34. 1 misc., black/brown, 5–7mm, 2 incised lines at 45° angle to each other, and notching on edge, smoothed interior and exterior, blackened exterior, 3.1g, (418)
35. 2 rims, black, slightly flattened, flaring, 4mm, conjoined, 6.9g, (418)
36. 1 rim, grey brown, slightly flat, 5mm, 9.4g, (418)
37. 1 body sherd, buff/grey buff, applied pressed cordon at neck, 5–8mm, 11g, (419)
38. 1 body sherd, soot orange, large applied zigzag cordon, 8mm, 7.5g, (419)
39. 1 rim, buff, slight inturn, exterior sooting, 8mm, 12.8g, (423)
40. 1 rim, buff, slightly flattened, long and flaring, 7–9mm, exterior sooting, 59.9g, (424)
41. 1 rim, buff, soot, slight inturn and flaring, 5mm, 27.7g, (424)
42. 1 rim, buff, slightly flaring, 4–5mm, 10.9g, (424)

Figures 77, 78: Block CG

1 1 decorated body sherd, blackened brown, T&G, fairly sharply out-turned neck, applied zigzag cordon type 5, 8mm, 19.3g, SF2294 (493)
2. 1 body sherd, brown/grey encrusted, T&G, 10mm, smoothed exterior, 2 gouges post-firing, 47g, (493)
3. 1 base, buff-orange, 10mm, flat, slight foot, 7mm wall and base, T&G, 21g, (485)
4. 1 decorated body sherd, sooted grey/black, applied tooled cordon type 5, 5–7mm thick, smoothed exterior, 7.5g, SF2307 (485)
5. 1 rim, blackened grey, straight, 9mm, slightly flattened lipped rimtop, 24g, (490)
6. 1 rim, blackened grey, T&G, flaring or upright, 5mm, 10.6g, SF2274 (485)
7. 1 decorated misc., orange/black orangey-brown, applied cordon decoration, narrow tooled type, 9mm, 7.9g, (483)
8 3 base sherds, brown/grey brown, conjoining, irregularly fingered basal interior, 10mm, T&G, 60g, (472).
9 1 rim, blackened grey, flat, 7mm, smoothed exterior, 6g, SF2657 (448).
10 1 rim, blackened buff, 5mm, out-turned, 5g SF2657 (448). Possibly same vessel as no. 6 above.
11 2 rims, soot grey-black, conjoined, upright or slightly flaring, slightly shouldered, T&G, very sooty exterior, abraded interior, 12cm diameter, 18.6g, SF2219 (448). Possibly same as nos 6 and 10.
12. 1 decorated body sherd, orange/blackened orange-buff, 7mm, applied cordon, narrow thumb and finger wave decoration similar to type 5, 9.9g, SF2178 (456)
13. 1 rim sherd, orange buff, flat, upright/slightly kinked, 8mm, red inclusions, 12g, (456).
14 1 decorated body sherd, blackened buff/grey buff, shoulder, T&G, double cordon decoration, narrow type 5 thumb and finger wave cordon, 10mm, smoothed/burnished exterior, 8mm, 95g, SF1897 (456)
15. 1 body sherd, orangey-buff, narrow applied cordon similar to type 5, 8mm, 18g, (449)
16. 2 conjoining decorated body sherds, buff, smoothed surfaces, very abraded double cordon decoration, possibly type 9, T&G, 12mm, 74.3g, SF2004 (449)
17. 3 conjoining base sherds, brown buff, T&G, 10mm, 14cm diameter, very rough exterior, probably applied extra layer, 62.2g, SF1777 and SF1780 (449)
18. 1 decorated body sherd, blackened buff, narrow wave cordon similar to type 1, 10mm, possibly curving to shoulder, smoothed/burnished outer surface, 45g, SF1781, (449)
19. 2 conjoined decorated body sherds, blackened orangey-buff, single narrow cordon decoration similar to type 5, T&G construction, shoulder, smoothed exterior, SF2005 (449)
20. 1 rim, orangey-buff, upright or flaring, slightly flattened rimtop, 5mm, 11g, SF2658 (449)
21. 1 decorated body sherd, buff, type D fineware, fine impressed applied cordon, possibly a variant of type 6 or 7, 5mm, 5.4g, Middle Iron Age?, SF1833 (449)
22 1 body sherd, orange/soot buff, double cordon decoration, abraded wave type, top and bottom cordon in opposite directions, smoothed exterior, shoulder broken below rim angle, 40.8g (449)
23. 1 rim, blackened brown, straight-sided, 7mm, 10g, (468)
24. 5 body sherds and 3 misc. conjoining pieces, blackened buff, decorated bulbous body of vessel, thin, 5–6mm,

double wave cordon decoration similar to type 1 and 9, T&G, smoothed exterior, 27cm diameter belly, 68g, SF1907 and SF2063, (463)

25. 1 body sherd, buff, T&G, applied cordon, smoothed exterior, red inclusions, 10mm, 49g, (455)
26. 1 misc., blackened black, applied wave cordon, one T cordon, slashed, 3g, SF1788, (445)
27. 1 body sherd, blackened grey-brown, linear cordon + light slashes, SF1788, 21g, (445)
28. 1 rim, black/grey, flat, straight-sided, slight hint of shoulder, 5–7mm, 9g, (450)
29. 1 base, brown/grey, T&G, flat, 8mm wall and base, 22.6g, SF1802 (450)
30. 2 conjoining base sherds, blackened brown/grey, flat-bottomed, 14cm diameter, probably same vessel as 29, 35g, (450)
31. 1 misc., buff grey, 10mm, smoothed exterior, light comb or tooth marks and a curving incision, possibly accidental grass impression, 5g, (493)

Figure 87: Block CE

1. 1 rim, blackened grey, 10mm, flattened rimtop, T&G, flaring, 38.8g, (325)
2. 1 misc., orange, triple-angled linear incised decoration, 8mm, abraded, 3.8g, SF1348, (372)
3. 1 misc., black, finger-printed running cordon, 5mm, 1.6g, SF1571, (372)
4. 1 rim, fabric E, blackened grey/buff, slightly flattened, inturned, cup, 6mm, 5.6g, (372)
5. 2 rim sherds, conjoined, fabric E, black, 3–5mm, heavily carbonised exterior, cup form, 15cm diameter, irregular surface, angled slab joins, 30.4g, (374)
6. 1 platter rim, orange/buff, flat, upturned edge, 8mm, fingernail marks, rough exterior, some organic inclusions, 17.3g, (381)

7 1 platter rim, brown/orange buff, irregular flat rim, upturned edge, shows sharp edge of circular former on lower surface, 6mm, organic inclusions, 10.4g, (381)

Figures 99, 100: Block CF

1. 1 rim, blackened brown/black brown, straight-sided, slightly flattened rim, 8–9mm thick, open bowl, 34.6g (345)
2. 1 rim, fine, buff, flattened top, 5mm thick, 3g, (345)
3. 3 rims, 1 body sherd, 1 misc., conjoined, blackened grey/brown, flattened rim, slightly bulbous or straight wall, 5–8mm irregular wall, sooted exterior, 30cm diameter, bowl form, 46.9g, (345)
4. 1 basal angle, blackened brown/grey, 8mm wall, 10mm base, possible sagging base, 32.3g, (345)
5. 4 body sherds, blackened brown/grey, 9–10mm thick, broken at basal angle, angled slab joins, heavily carbonised exterior, bowl form, 185.6g, (345)
6. 1 rim, blackened grey/brown, slightly rounded, slab joins, open profile, 19.4g, (341)
7. 1 rim, blackened brown, flattened rim, inturned, 5mm thick, 2.9g (335)
8. 1 platter, buff, 8mm thick, fingernail marks, 6.9g (335)
9. 1 base, blackened grey/brown, wall 8mm, base 14mm, sagging base, fingered basal angle, 42.4g (310)
10. 1 platter, brown/grey, 10mm thick, exterior grassmarking, 2 squared holes, 18.9g (310)
11. 1 rim, sooted brown/grey, flattened rim, slightly inturned, 8mm, 17.3g (319)
12. 1 base, blackened black/brown, rounded angle, flat base, 7mm wall, 8mm base, 13g, (319)
13. 1 platter, blackened orange/grey, 8–11mm thick, ridged fingered interior, 12.1g, (319)
14. 1 rim, E fabric, blackened grey/orange, convex/cup form, rough surface, flat rim, heavily sooted, 4mm, 11.8g, (322)
15. 1 body sherd, orange/buff grey, smoothed surface, T&G, extra clay exterior surface, ?early Late Iron Age, 53g, (322)
16. 1 platter, orange/buff, 10mm, fingered and stabbed, 13.5g, (348)
17. 1 rim, blackened orange, flat top, 5–6mm thick, 3.3g, (331)
18. 1 body sherd, black/buff, 7mm, fine zigzag cordon with notches, 4.7g, Middle Iron Age, (331)
19. 2 platter sherds, 2 conjoining including 1 rim, orange/buff, flattened rim edge, 10–12mm, fingered interior, exterior grassmarked, some organic inclusions, 36.3g (303).
20. 2 rims, 1 misc., 1 base sherd, conjoined give full profile, blackened brown/black, rim rounded and slightly inturned, bulbous wall, upright basal angle, slab joins, wall 4–7mm, base 7–8mm, 23cm diameter, 121.6g (312)
21. 1 rim, black, upright, flattened rim top, hard surface, 7mm thick, 19.5g, (312)
22. 2 platter sherds, conjoining, orange/buff, 9–12mm thick, fingered interior, 3 fine stab marks, 82.5g, (312).
23. 1 platter rim, orange, flat angled rim, 8mm thick, grassmarked, 10.8g, (312)
24. 1 platter sherd, orange/brown, 9mm thick, deep fingernail marks, 24.2g, (312)
25. 1 base sherd, orange/black, flat base, angled wall, T&G; ?Iron Age, 7mm wall, 8mm base, 40.8g, (312)

26. 1 base sherd, blackened grey, flat, steep-sided, 8mm wall and base, notched exterior angle, 14cm diameter, 69.9g, (312).
27. 1 base sherd, blackened orange/grey orange, steep-sided, flat base, 8mm wall, 12mm base, 36.6g (312)
28. 1 base sherd, blackened grey, fabric C, slight foot, rounded base, bulbous wall, wall 9mm, base 5mm, 16cm diameter, 42.7g, *cf.* context 304, no. 35, (312).
29. 1 basal angle, blackened orange, 12mm wall, 10mm base, steep-sided, 20cm diameter, 81.1g, (312)
30. 2 base sherds, conjoined, black/grey, upright wall, flat base, angle slab, 15mm wall, 7mm base, 37cm diameter, 188g, (312)
31. 1 platter sherd, red/buff, 11mm thick, 3 deep stab marks, 20.3g, (312)
32. 1 body sherd, blackened orange/black, 7–8mm thick, applied zigzag cordon with slashed decoration above, 10.1g, (312)
33. 1 base sherd, blackened buff/grey, steep-walled, grassmarked base, 9mm wall, 8mm base, 18.8g, (305)
34. 1 base sherd, blackened grey, steep-walled, angle slab join, burnt organic interior, 8mm wall, 5mm base, 45.1g, (305)
35. 1 base sherd, fabric C, hard fine ware, blackened black, slight foot, rounded base, bowl form, 5mm base, 7mm wall, 16cm diameter; same as base in (312) no. 27, 52.9g (304)
36. 1 basal angle, blackened orange/black, 12mm wall, 8mm base, steep wall, 29.1g, (304)

Appendix 5: Revisions to the mound 3 chronology – P Marshall

Introduction

Following the identification of a problem with the ultrafiltration procedures undertaken as part of bone pre-treatment at Oxford in October 2002 (see Bronk Ramsey *et al.* 2004a) all three of the radiocarbon measurements obtained on animal bone from mound 3 (Marshall 2005) were subsequently withdrawn (OxA-10273,OxA-10274 and OxA-10279). These samples were subsequently re-processed according to the new pre-treatment ultrafiltration stage outlined in Bronk Ramsey *et al.* (2004a) and measured by accelerator mass spectrometry as described by Bronk Ramsey *et al.* (2004b). Details of the new results are given in Appendix 5 Table 1.

Calibration

The calibration of the results, relating the radiocarbon measurements directly to calendar dates, is given in Appendix 5 Table 1 and in Figure 1. The radiocarbon determinations have been calibrated with data from Reimer *et al.* 2009 using OxCal (v4.1) (Bronk Ramsey 1995; 1998; 2001; 2009). The date ranges have been calculated according to the maximum intercept method (Stuiver and Reimer 1986), and are cited at two sigma (95% confidence). They are quoted in the form recommended by Mook (1986), with the end points rounded outwards to 10 years. The probability distributions (Appendix 5 Figures 1 and 2) are derived from the usual probability method (Stuiver and Reimer 1993).

The three new results have also been incorporated into the chronological models previously presented (Marshall 2005) and are shown in Figure 2. The new model (Figure 2) provides an estimate for the earliest recorded activity

Laboratory Number	Sample ref. Number	Material	Radiocarbon Age (BP)	d^{13}C (‰)	δ^{15}N (‰)	C:N ratio	Calibrated date range (95% confidence)	*Posterior density estimate (95% probability)*
OxA-15422[1]	BO99/5854/214	bone, sheep	955±26	-21	5.7	3.3	cal AD 1020–1160	*cal AD 1035–1050 (1%) or 1075–1170 (94%)*
OxA-15453[2]	BO99/589/2156	bone, cattle	965±26	-21.4	8.6	3.3	cal AD 1010–1160	*cal AD 1020–1055 (14%) or 1070–1155 (81%)*
OxA-10275	BO99/5906/604	carbonised seed, *Hordeum* sp.	880±32	-22.5			cal AD 1040–1230	–
OxA-10276	BO99/5964/269	carbonised seed, *Avena* sp.	537±34	-25.8			cal AD 1310–1440	*cal AD 1325–1355 (14%) or 1385–1440 (81%)*
OxA-10277	BO99/5971/269	carbonised seed, *Avena* sp.	521±32	-25.9			cal AD 1320–1450	*cal AD 1325–1350 (8%) or 1390–1445 (87%)*
OxA-10278	BO99/8629/276	carbonised seed, *Avena* sp.	563±33	-25.8			cal AD 1300–1430	*cal AD 1300–1365 (72%) or 1380–1415 (23%)*
OxA-15454[3]	BO99/8707/675	bone, cattle	795±26	-22.5	4.2	3.3	cal AD 1210–1280	*cal AD 1205–1280*
OxA-10291	BO99/5909/604	carbonised seed, *Avena* sp.	580±70	-22.9			cal AD 1270–1450	*cal AD 1320–1440*
OxA-10292	BO99/8045/614	carbonised seed, *Avena* sp.	590±50	-24.8			cal AD 1280–1440	*cal AD 1285–1405*
OxA-10304	BO99/8077/614	carbonised seed, *Avena* sp.	660±50	-26			cal AD 1260–1410	*cal AD 1265–1395*
OxA-10305	BO99/8633/276	carbonised seed, *Avena* sp.	705±50	-24.2			cal AD 1220–1400	*cal AD 1220–1325 (76%) or 1345–1395 (19%)*

Table 1. Bornais mound 3 radiocarbon results

on mound 3 of *cal AD 1050–1140 (63% probability; start_mound 3;* Figure 2*)* or *cal AD 940–1150 (95% probability)*, though it should be noted that this trench was not bottomed.

Activity on mound 3 is estimated to have finished in *cal AD 1410–1475 (68% probability; end_mound 3:* Figure 2*)* or *cal AD 1390–1570 (95% probability)*.

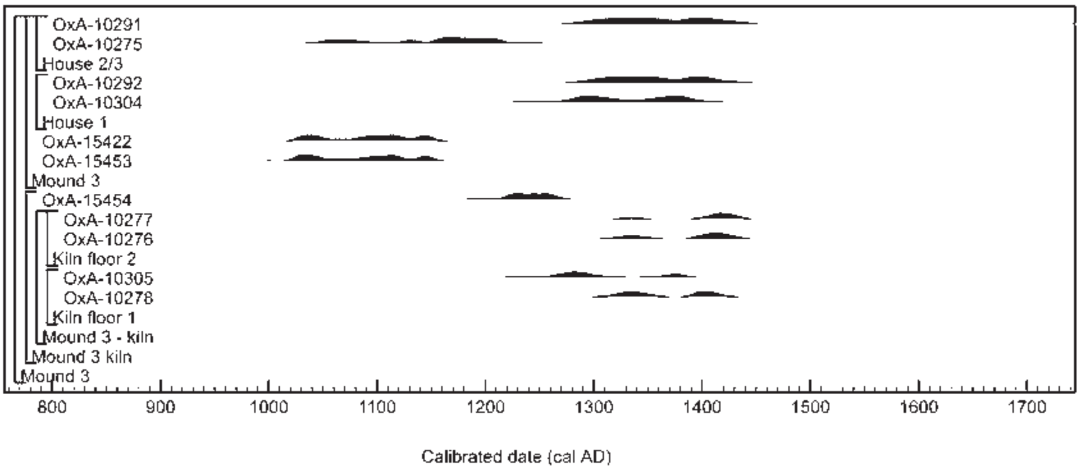


Figure 1. Probability distributions of dates from Bornais mound 3. Each distribution represents the relative probability that an event occurred at a particular time. These distributions are the result of simple radiocarbon calibration (Stuiver and Reimer 1993)

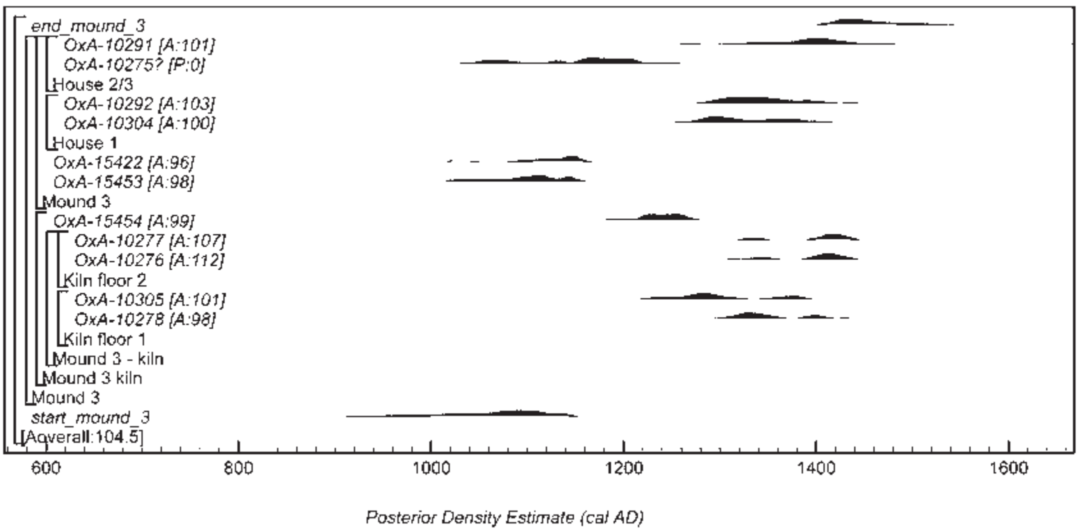


Figure 2. Probability distributions of dates from Bornais mound 3. Each distribution represents the relative probability that an event occurred at a particular time. For each of the radiocarbon dates two distributions have been plotted, one in outline, which is the result of simple radiocarbon calibration, and a solid one, which is based on the chronological model used. A question mark (?) indicates that the result has been excluded from the model. The large square brackets down the left-hand side along with the OxCal keywords define the model exactly

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