

Excavations at Warebeth (Stromness Cemetery) Broch, Orkney

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with contributions by Timothy Sellar and Sally Foster

SUMMARY

Midden material recovered from the broch well included a rare find of mineralized human coprolites. Fragments of barley grain and linseed were identified from the relatively sparse plant remains. The barley is degraded, probably from long cooking in broth to accompany the meat meals. Also present were rather poorly preserved hairs, including deer and sheep or goat.

Associated with the coprolites were bones of sheep, ox, red deer and pig, with cod and limpets present also. The association of bones and coprolites gives direct evidence of human diet in the Orkney Iron Age and is notable in reflecting mainly animal-based foodstuffs. The absence of human parasite eggs is exceptional.

Two ornate bronze and gold pieces found last century at the site are described. The small finds assemblage from the midden is unremarkable and has many parallels throughout Orkney.

The contemporaneity of the broch with its surrounding village was established. Cattle bone gave a radiocarbon date of 1740–1530 BP Cal (GU 2385). This accords with the site's stratigraphy and with the typology of potsherds recovered from the midden. The site's physical setting is described and the results of previous investigations summarized.

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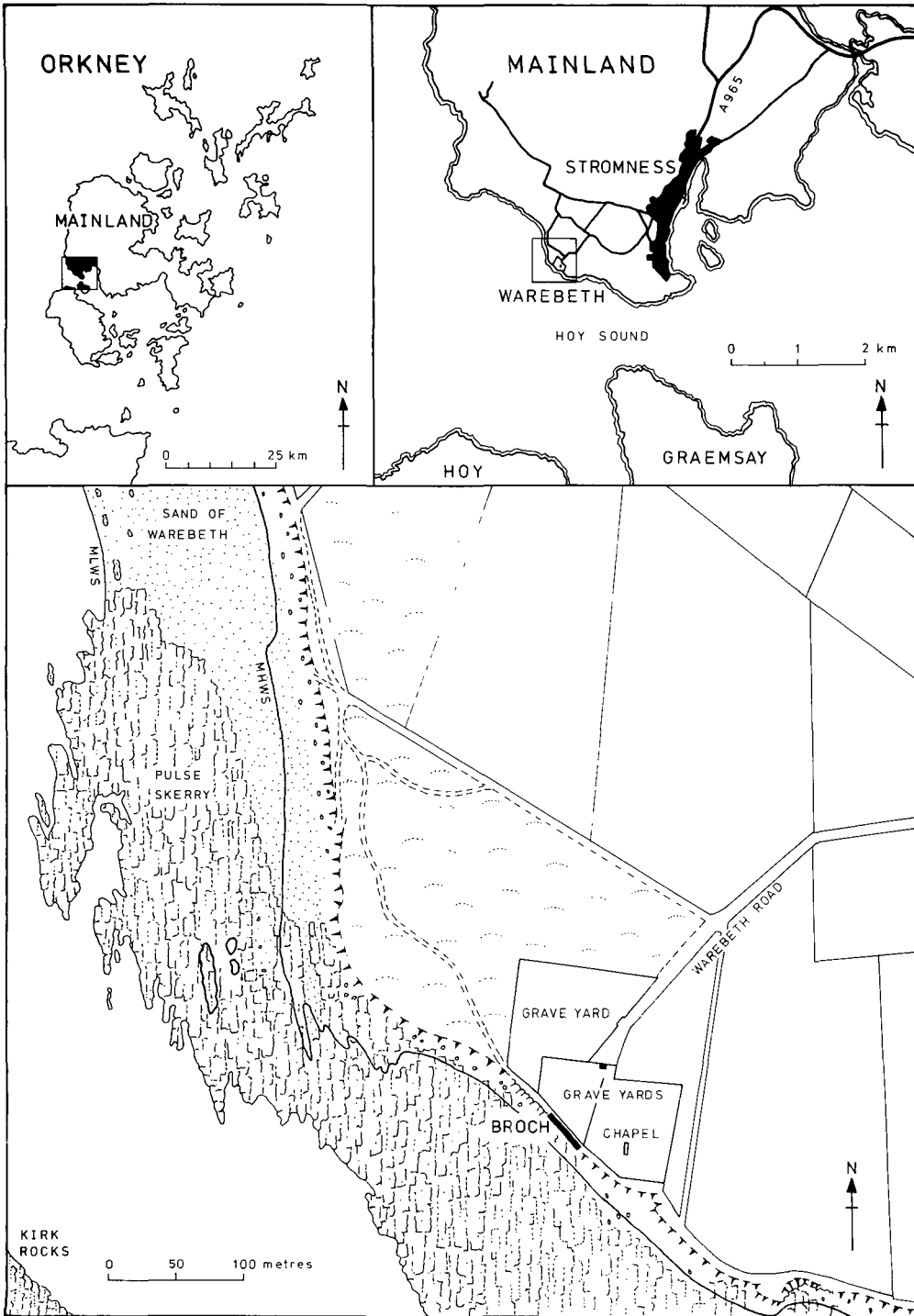
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INTRODUCTION (illus 1–2)

The 1980 excavation at Warebeth (NGR HY 2374 0821), which was initially an exercise in recording the broch well, was funded by the Scottish Development Department (Ancient Monuments) and carried out by North of Scotland Archaeological Services. Warebeth lies on the extreme south-western corner of the west mainland of Orkney, on a low eroding cliff overlooking Hoy Sound and a little over a mile [c 2 km] from the town of Stromness. The site (illus 1) is overlain by Stromness Cemetery, which is still in use and by which name the broch is also sometimes known. The broch was visible only in the section of the cliff face; now its ruins and those of its surrounding settlement are hidden completely by substantial cladding, erected in 1985 to prevent the sea from undercutting the cemetery. In common with many another broch site, more than one phase attaches to Warebeth. Long tradition sees a monastic settlement as having been sited here: this was centred on the area known variously as Monkerhouse, Monkerhouse Green, Monkhouse Green (or similar name), formerly immediately adjacent to the east graveyard (the oldest) and now enclosed by the two subsequent extensions to the cemetery. In the east yard stands the gable end of what was once the parish church of Stromness, the building itself almost certainly dating from before the Reformation. After the removal of the church to a more convenient site within the town the gable was preserved as a long-established landmark for vessels entering Hoy Sound and the rest of the stone most probably used in building the enclosing wall of the cemetery, which continued to serve the local community. An ecclesiastical horizon, whether comparatively recent or from the more distant past, is not an uncommon feature of Orkney broch sites but none of this damaged the well chamber or interfered with its contents.

Of the various names given to this site, the ‘Monkerhouse’ series is self-explanatory; ‘Monkerhouse’ is a straight rendering of Old Norse *monkerhus*. The author was inclined to derive the first element of Warebeth (or Wharebeth, as it is signposted locally) from ON *vardha*, a cairn or beacon, signifying here a navigational aid on an extremely hazardous coast. Mr G Lamb (1987 and personal communication), however, sees the name as made up of ‘Whareb/Wharb’ and ‘eth’, the latter representing the definite article of neuter words and the former signifying ‘bending’ and here applied to the curve of the bay, further to the west along the coast.

The 1980 excavation was prompted by the discovery of a new feature, revealed in the section by further wasting of the cliff. This was the covering of the broch well, exposed on a naturally formed ledge on the cliff face on the same old ground surface level on which the broch was built. Below this cover, steep, almost vertical steps led down behind the section to a very finely constructed well chamber. In the water at the bottom and banked against the steps (down which it had been thrown) was a mass of midden material, the source of the coprolites and bones which form the main interest of the present report. The small finds from the midden are overshadowed by the two ornate bronze and gold pieces found many years previously in the ‘Monker Green’ part of the site (see Finds Catalogue), but the pottery was considered sufficiently diagnostic to suggest that the deposit slightly post-dated the period when brochs traditionally were seen to have been fully developed, ie probably to the second century AD. The pottery evidence was supported by the well’s stratigraphic context and its



ILLUS 1 Warebeth broch: location maps

concealment (until exposed by vertical erosion) under the rubble infill of the broch tower. The radiocarbon date from cattle bone of 1720 ± 50 bp (GU-2385) has been calibrated to give a 95% level of confidence to a date between AD 210 and AD 430 for the midden. The author would be inclined to put the date close to the start of this period.

In calculating how much of the broch had been washed away by the sea, Laing (1868, 60) estimated that about half had disappeared; this is probably a slight over-estimate. A reliable local opinion (from Professor R Miller of Stromness) estimates that the coast here has retreated about 1 m in the last 50 years. Further along the coast at Breckness, nearer the full surge of the Atlantic, about three-quarters at least of a broch has disappeared (cf plan in Hedges 1987, 3, 90). Almost certainly, the pace of erosion would increase once the broch had been undercut and breached. Erosion, which seems to have cut obliquely across the broch walls, would be assisted by the softness or rottenness of much of the underlying bedrock at Warebeth (illus 2).

The historical and physical geography of the area is basically a sand-dune/machair system on boulder clay with many hummocks, some of which are related to quarrying for sand. A probable post-glacial picture would see the Kirk rocks linked to the mainland and a sand bar running from them to enclose a small freshwater lagoon; peat from this has been found on the beach below the present high-water mark. There is little indication as to whether this lagoon existed in broch times or had already gone; at any rate, the whole system now floods easily and often. The hinterland of the broch is nowadays farmland, much of it pasture.

Below the broch and between the foot of the cliff and a series of rocky outcrops, the beach is made up of stone and large pebbles (cf illus 2), representing an inexhaustible source of raw material for tool manufacture and making up most of the stone artefact collection from the site. This is a predominant theme in stone tool assemblages from Orkney brochs. The dangerous waters of Hoy



ILLUS 2 General view of broch interior, showing entrance passage on left. The well is located behind the fissure in the rock face

Sound flow between the rocky outcrops and the island of Hoy (ON high island), more often seen in silhouette against the sky than in prominent relief. These waters are particularly treacherous at ebb tide as the current streams out to the Atlantic; there are a number of melancholy memorials to shipwreck tragedies in the cemetery and local memory recalls the tradition of burying drowned bodies at the point where they were washed ashore. The scraps of metal shown in *illus 2* are from a foundered fishing vessel; presumably Hoy Sound was equally hazardous for the Iron-Age inhabitants of Warebeth.

HISTORY OF EXCAVATION AND INTERPRETATION

No plans or sketches have survived from Laing and Petrie's investigation of the site in 1866, but both were convinced that here were the ruins of a broch (Laing 1868, 60–61; Petrie 1890, 94 no 41). RCAMS, who visited the site in 1929, and Ordnance Survey's Archaeology Division, in 1964, are agreed that no trace of a broch remained; neither authority, however, seems to have paid much attention to the remains exposed in the cliff section.

It was the section remains which first caught Laing's eye and prompted him to suggest in a personal letter to Petrie that the two of them might make a day of exploring this 'very promising site, with the help of 3 or 4 men' (Laing 1866). Laing highlighted a shell midden at the west end of which he thought there was exposed a row of cists and he had heard of 'a number of skulls of peculiar shape having been found'. The cliff has retreated since Laing's time and although a number of upright slabs was noted in the section to the west of the broch entrance by the present writer, the spacing and height of these indicated the partition slabs of a building forming part of the broch village. There were small deposits of shell visible to the east of the broch but nothing that could be interpreted as a cist.

The results of Laing and Petrie's investigation are included in Laing's 1868 paper. In sum, this consisted of tracing part of the broch wall and noting its emergence in the cliff section; excavation of a cist or 'vault' set into the top of the broch mound adjacent to the west wall of the east graveyard (then the extent of the cemetery); and the recording of a group of cists found on the outskirts of a midden in the east yard by gravediggers. As regards the latter, Laing was unable to examine them himself since they were by then overlain by more recent graves. They are described as

'. . . 5 feet 6 inches [1.65–1.8 m] in length, formed of a head and foot stone, and generally three stones on each side, consisting of rude unhewn sandstone flags set on edge, roofed over with similar flags, but never paved, and containing extended skeletons.'

The bones were noted as seeming very old and the skulls very thick. No grave goods had been recorded but no search had ever been made.

The solitary cist (or 'vault') was set at a higher level in the broch mound itself, in what is now the middle yard of the cemetery. This was of different construction ('. . . not of flags set on edge, but built rudely of squared stone') and did not contain any skeleton. Laing attributed this structure to the medieval monastery and saw it as a 'secondary interment' on the ruined broch but this is all surmise; there is nothing to prove that it ever was a grave and really it could belong to any time subsequent to the ruin of the broch. Any monastic or other remains have now vanished or else are overlain completely by the westward expansion of the cemetery. As to whether the other cists form part of a broch-age cemetery, one has to face immediately the problem of a total lack of securely stratified contexts from other sites. Laing could be right, since the cists seem to have been sited deliberately beyond the midden and apparently did not cut into it, which might be expected if insertions were made at a later date. This, however, may be entirely by chance; there is no full record of what was found, and there is, moreover, no way of plotting accurately how far back the broch village extended from the coast line. Where there are securely stratified human remains from Orkney broch sites they

appear to be either obviously secondary or else seem to indicate an extraordinarily casual attitude to death, such as the two skeletons, one found in a shallow drain and the other under rubble, at the Howe broch village (author's observation). The Warebeth cists could date from any time in the first millennium and could be Christian or non-Christian. The author's inclination is to see them as later than the main period of the broch; a case might well be made for putting them in the same (Norse) horizon as the two bronze and gold pieces (see p 127).

The only finds surviving from Laing and Petrie's excavation are a long-handled bone comb and some fragments of Iron-Age pottery. These are included in the Finds Catalogue (fiche 1: E5-F13).

A final and important source of information at Warebeth is the oral evidence supplied by gravediggers. To Ordnance Survey's account from Mr Sutherland (a gravedigger who died some years before the present enquiry) of drystone walling, midden heaps and 'carefully built passages, into some of which he penetrated for a considerable distance' may be added, for the sake of preserving the record, the following accounts (amassed by Mr A Skene of Stromness at the behest of the author):

Mr O Tait (Burgh Surveyor) – stone structures found in the old (east) and middle yard, not in the new (west) yard, but no proper record or plan exists; Mr J Wilson (former gravestone maker) – stone structures, passages, upright flags found all over the area of the middle yard; some flags were so big that two men could barely move them in preparing a grave.

Various elderly citizens confirmed this general account but gave no further detail. In the old and middle yards, particularly on the seaward side, there is a definite unevenness to the surface. Many of the graves have sunk slightly, which may be accounted for partly by the sides of the trench collapsing or collapse of coffins, but probably more by soil shifting between large stones underneath after the grave had been filled in.

The sum of all this is that it can be stated with confidence that there existed here a sizeable settlement before the site's later use as a cemetery. Its prehistoric character is indicated by the general tenor of the descriptions, with references to shell middens, quantities of bones and teeth, large upright flagstones and stone structures; all the very essence of Orkney prehistory.

THE 1980 EXCAVATION

The 1980 excavation at Warebeth was prompted by the discovery of the newly revealed well of the broch and was concerned mostly with the investigation of this feature. In its approach as a weekend exercise, perhaps it echoed Laing's suggestion to Petrie of 'explore it in a day with 3 or 4 men'. In technique there might be a similarity too, though of necessity methods of recovery were rudimentary; these are described below at the appropriate point. Some attention also was paid to noting features revealed in the cliff-face section: it was not practicable, though, with the time and resources available to make a detailed section drawing. Archaeological remains seemed to be spread along c 80 m of the section; a great deal was turfed over and some masked by cemetery spoil, giving an intermittent view of the whole. The photographic record and such drawings as were made are deposited with the rest of the site records in the National Monuments Record, Edinburgh; the drawings would add nothing to this report and therefore are not reproduced.

SURFACE FEATURES

Given the number of broch sites at which substantial defensive earthworks can be recognized, for instance Burrian, North Ronaldsay (MacGregor 1974, pl 3c), Gurness, Mid Howe and others (cf plans in Hedges 1987), air photos of the site were examined. This proved unsatisfactory as there had been too much ground disturbance at the cemetery. There was, however, a suggestion of a ditch on

the east side, though this was obscured by turf. The broch does, of course, have an obvious line of defence in the cliff and, given the rocky outcrops, would not easily be approached directly from the sea. Hence it would not be unreasonable to expect that the defences were completed by an arced ditch system, terminating in the cliff section, on the same principle as at those sites already referred to.

The mound mentioned by Laing (1868, 60), though not observed by RCAMS and OS, may still be discerned, particularly between the edge of the cliff and the wall of the middle yard. Here the picture is complicated, though, by a fairly pronounced natural rise as one approaches the site from the west. Within the yards the surface does seem to rise towards the south-west corner of the east yard and to acquire a distinct unevenness, such as one might expect from underlying large stone rubble. This rise in ground level may just be reflected in the adjacent middle yard, though here it is considerably less clear. No precise measurement of the mound is possible and, in any case, the underlying settlement may have continued out beyond its edge; such was the case at The Howe (author's observation).

SECTION FEATURES

Of the remains exposed in the section, apart from the broch the most clearly visible were to the west. Here are exposed the remains of what was interpreted as a large outbuilding, the wall on the seaward side of which had disappeared exposing a number of large orthostats, still in their original upright setting and showing the internal partitioned structure of the building. A paved passage (c 1 m wide) probably separated this building from the broch tower. The length of this building could not be established accurately but appeared slightly to exceed 5 m; in its western half c 2 m of walling surviving to c 0.7 m in height was seen and associated with a large upright (c 1.20 m high, c 0.80 m wide). If the building had a hearth this was not exposed in section. Beyond this building to the west (or north-west, following the coastline) archaeological remains appeared in the section for at least another 15 m and possibly c 20 m still further; this would mean that part of the site underlay the most recent extension to the cemetery, the large yard built to the north and west. At present there are fewer graves here, or more accurately fewer marked by memorials, which, together with the more vestigial remains visible in this part of the section, may account for the Burgh Surveyor's opinion that this area was beyond that of the prehistoric settlement. Though some bits of walling and much general rubble were noted, a great deal of the section was obscured and no coherent outline of structures could be established. All of this material, however, appeared to be on the same ground surface as the broch.

In the cliff to the east or south-east of the broch, the archaeological remains extended about 30 m in section, with a very vague indication of a ditch beyond this. Here the same problem of turf cover obscuring the section was complicated further by c 10 m of modern revetment walling, roughly midway in the section. This covered the whole of the cliff face and obviously was designed to prevent erosion of the east yard. To the east of this modern wall the archaeological section continued with c 5 m of earth and small stones. This butted and partly overlay c 1.5 m of large horizontal rubble, perhaps walling, which in turn overlay a lens (c 0.2 m thick) of shell midden. General rubble lay for c 4 m between the horizontal rubble and another small piece of walling surviving to four courses c 0.5 m high. This was the last feature visible in the section. However, below the general rubble, a pit (c 1 m deep, 1.2 m wide at the top, 0.5 m wide at the bottom) appeared to have been cut into the old ground surface and to contain a fair quantity of shell.

Between the modern revetment and the east wall of the broch was a general mixture of rubble and turf. As with the rest of the section, all the remains rested on the same original ground surface and varied in thickness between 0.5 and 1.5 m.

THE BROCH (illus 3)

The broch was entered from the south-west, incidentally the quarter most exposed to the wind. Apart from the well chamber, the single best preserved feature was part of the north-west side of the entrance passage (illus 3, also shown in illus 2). Obviously the outermost stones had disappeared at the time of the photograph but in the remaining section there can clearly be seen the door jamb and adjacent bolt- or bar-hole for the door. The walling containing the bar-hole does not represent the end of the entrance passage, ie the inner wall of the broch. Further east (right of photograph) was a similar corner piece of walling, which unfortunately collapsed before it could be photographed. The space between is perhaps best interpreted as a guard cell, on account of its general loose fill and the original continuation of the entrance passage. Unusually, unless there was a mirror image on the opposite side of the entrance, the guard cell was on the left as one entered, generally considered a disadvantage for a defender in hand-to-hand fighting, which would of course then be the state of the battle.

The thickness of the broch wall was definitely 5 m and probably more; an exact measurement was difficult since erosion appeared to have cut the broch tower obliquely, thereby expanding and distorting the wall's apparent thickness. On the east side of the broch there seemed to be the remains of an intra-mural cell or ground gallery; this area had seen a fair amount of slump and spread. Possible secondary use of the tower was indicated by a piece of walling near the east inner face but no real stratigraphic sequence of reuse of the tower could be determined. Flat stones may indicate paving or else be fortuitous. What was noticeable was the absence of pitched, large masonry rubble, except near the floor, such as might be expected in a collapsed tower. Much of the fill consisted of earth and small flat rubble; one might infer dismantling of the walls and stone robbing. Apart from the well, the only noteworthy feature of the broch floor was the remains of a hearth represented by a spread of what appeared to be peat ash and burnt stone. The broch's internal diameter was c7 m.



ILLUS 3 Broch entrance passage showing door jamb and bar hole

THE WELL (illus 4–6)

The construction of this feature was a magnificent achievement, as is obvious from the photographs (illus 4, 5). Bedrock was dug into and then faced with high quality drystone walling. The roof was corbelled and this and the pillars carried the stress and weight away to the sides (illus 6). The stones used all seemed to have been dressed with a great deal of care. Entered from above, the steep, almost vertical, stair consisted of flags set into bedrock. In technique, this feature is very reminiscent of the earth houses in Orkney, for example, Rennibister, Saverock and Grainbank (RCAMS 1946, 2, figs 147–8, 231, 232, nos 325, 408 and 409).

The midden material was banked against the stair, with much of it waterlogged at the bottom. A rough division into three layers was made:

- Well Fill 1, a sticky brown/green layer with much cess masking the other, inner layers;
- Well Fill 2, a small lens of similar, but less dense, material as Well Fill 3;
- Well Fill 3, bone, shell, pot sherds, stone and cess, almost pure midden.

Well Fill (WF) 3 was completely waterlogged, as was the lower part of Well Fill 1. In the hindsight of post-excavation the stratigraphic distinction appeared somewhat arbitrary, particularly WF2. Well Fill 1, first seen as a cess layer, yielded a fair amount of bone and the same sort of pottery, save one sherd (pottery no 21). No doubt all this material took some time to amass and the inclination is to treat it all as the same sample. For the sake of the record, the original contexts are given in the catalogue.

The recovery of this material, by hastily-filled buckets hoisted to the surface, and the planning and photographing of the chamber, was a very hazardous undertaking, particularly when one considers that the weight resting on the pillars was, with the ruin of the broch interior, very much greater than the builders had catered for. Strict instructions on the safety of employees were issued by the Inspector of Ancient Monuments responsible, Mr P J Ashmore, and given the hazardous nature of the interior, it was not possible to plot the bottom of the well accurately. Such probing as was done, however, seemed to indicate a V-profile rather than a squared-off base.

The central question is, of course, why should such a finely constructed feature and vital part of the broch be put to such an astonishing purpose. It seems reasonable to rule out the first inhabitants of the broch as they would be most unlikely to pollute the water supply in their place of refuge. It seems self-evident that another source of fresh water was supplying the later inhabitants. Perhaps the well, or even the tower itself, was considered to be in a dangerous state; it would have been a far greater risk to bring water up than it would have been to simply empty rubbish down the stair. There is also perhaps the consideration that it was deliberately polluted to deny its use as a well to subsequent occupants, perhaps attacking foes; this is rather more doubtful, however, since the deposit is obviously not a one-off act of revengeful malice.

The ingenious suggestion (made by J H Dickson) that this might originally have been not a well but an earth house (such a feature did exist under the broch floor at The Howe) seems to be ruled out by the probable floor section and by the water table, seen in the layer of rotten bedrock into which the well is cut. This can be seen in illus 2; here the well is directly behind the fissure in the bedrock. The fissure, along a line of particular weakness in the rock with little resistance from the well chamber, would when breached have caused a major collapse at the site, probably involving the cemetery itself; hence the massive revetment wall which now completely masks the cliff face. A hairline crack was beginning to appear in the fissure at the time of the excavation.

SMALL FINDS

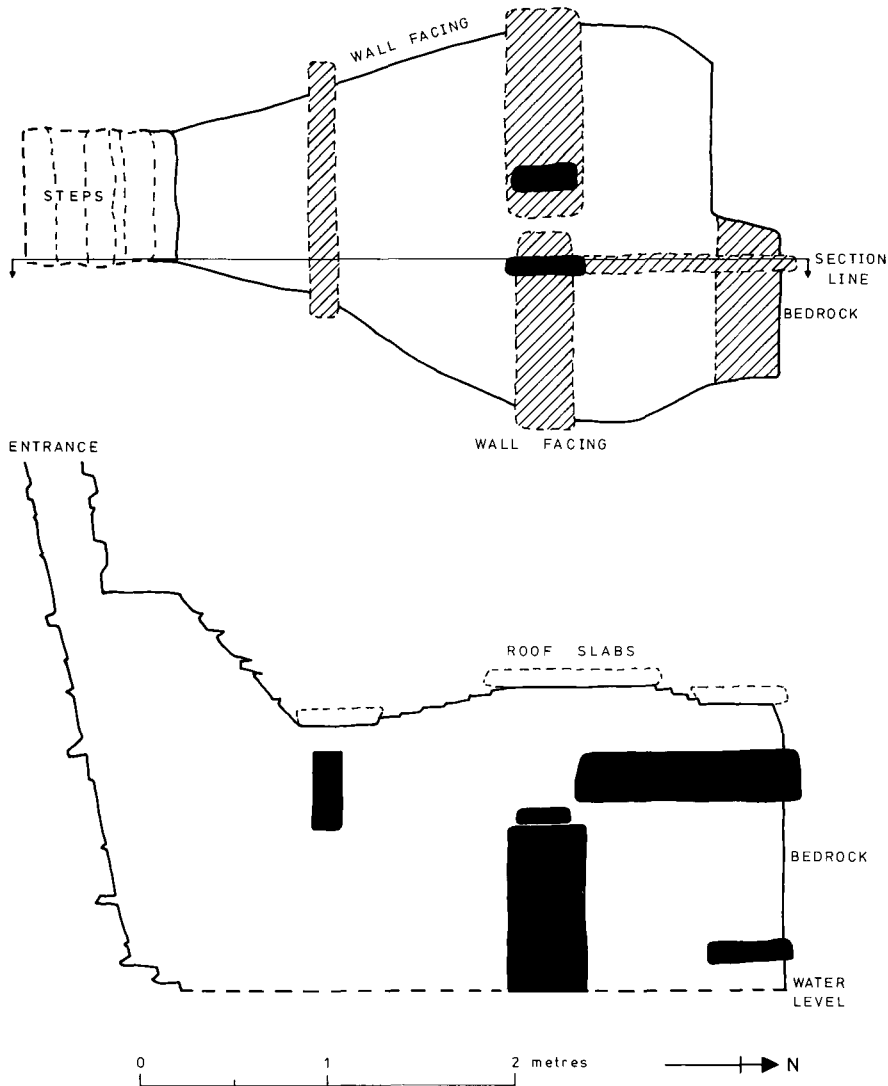
Apart from Laing's long-handled comb (Laing 1969, 60) and a few potsherds from Petrie (NMA 1892, 229) in the Royal Museum of Scotland, no finds survive from their exploration of the



ILLUS 4 View of the well



ILLUS 5 View of the well

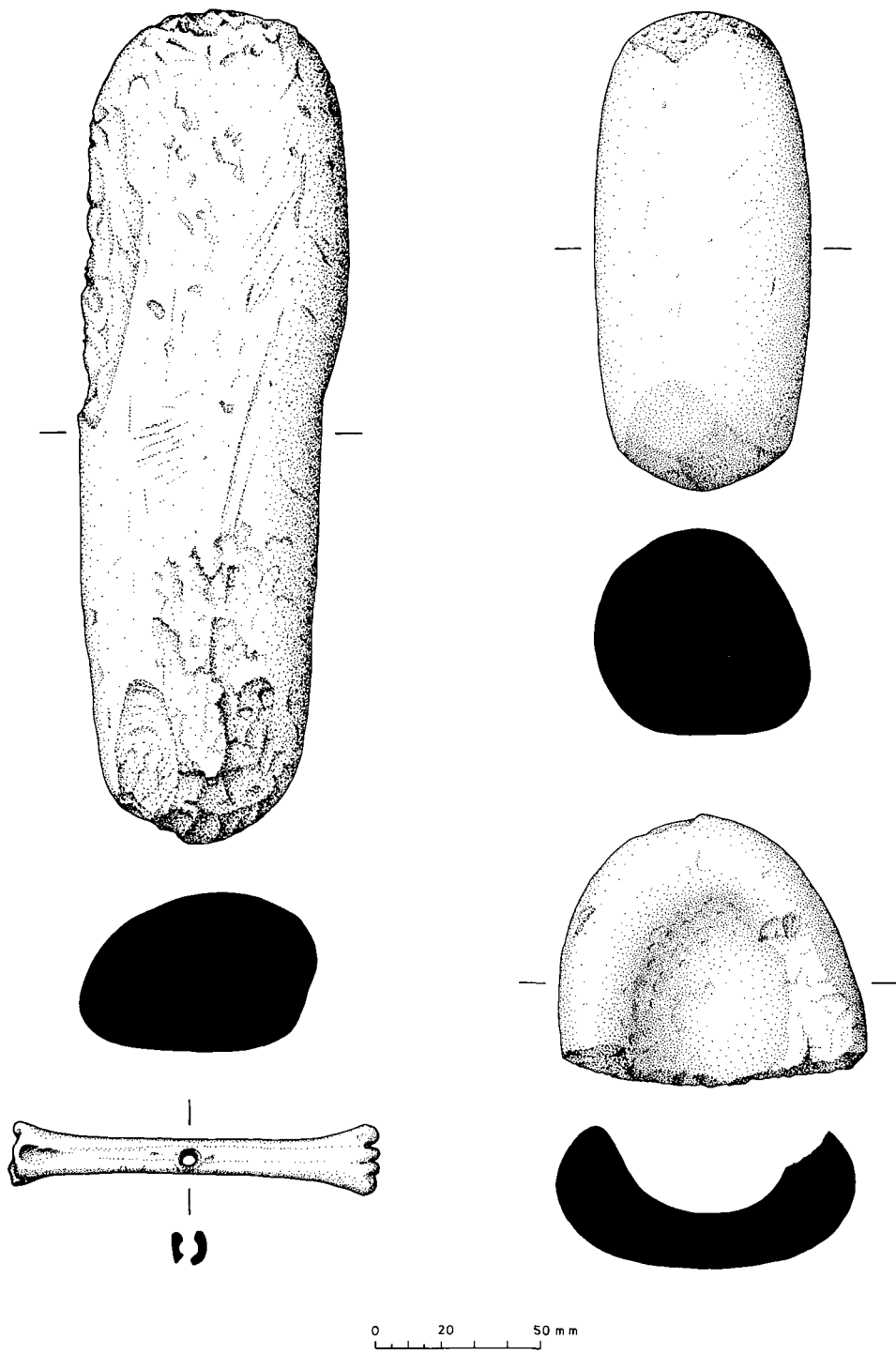


ILLUS 6 Warebeth: plan and section of the well

site. Laing's letter to Petrie (Laing 1866) discloses that he 'poked out with his stick 2 or 3 stone implements of the exact type found at Keiss'. What those were and whether they were all the same is not known but it is unlikely that they are of vital significance.

The two ornate bronze pieces found last century and the environmental remains do, of course, overshadow everything else; they are discussed by Ms Foster on p 127. As for the rest of the small finds assemblage, including the simple bronze pin, it is all in no way out of the ordinary and can be paralleled readily at other broch sites. The full catalogue is on fiche 1: E5-F13.

Undoubtedly, the beach provided the raw material for the stone articles (illus 7). These consist mainly of pebbles of a size able to be held comfortably in one hand (with one large exception, no 7) and generally abraded or chipped at one or both ends. Their use would seem to be as pounders,



ILLUS 7 Warebeth: stone and bone objects

grinders or hammerstones. Most Orkney broch sites yield such implements in quantity. The rest of the stone assemblage comprises: a potlid or plate, chipped to shape from a piece of flagstone; a wedge-shaped beach pebble used as a whetstone; a fragment of a hollowed stone vessel, probably a lamp, and fashioned from a selected coarser-grained stone (possibly Hoy sandstone); some fragments of burnt and cracked stones, interpreted as pot boilers; and two sandstone flakes, probably originally mistaken for potsherds.

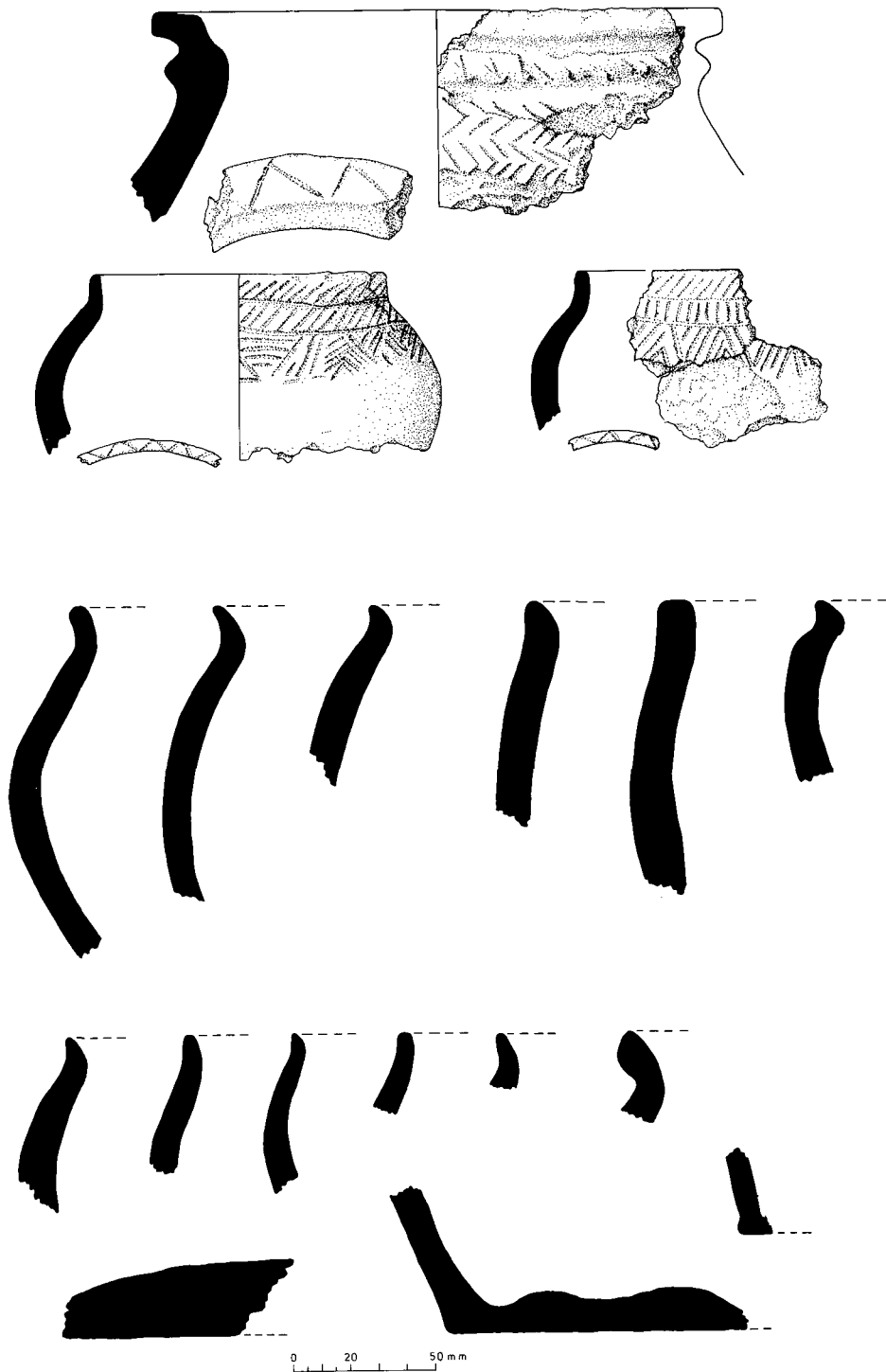
Articles of bone are fewer but of more individual interest. Although the comb (no 2) was found in another part of the site, it and the bobbin (no 1, illus 7) may each be seen as part of the textile-making process. It seems likely that combs with a flat end section were used in weaving (a rounded end section, often seen on antler combs, would not draw the weft uniformly). An alternative use for the bobbin as a reel seems unlikely, unless for storage: the bone would be inclined to snap. The rest of the bone pieces include a cut fragment of no clear purpose and a section of whalebone, used probably as a rubber, perhaps in dressing skins. A highly polished antler tine completes this part of the assemblage, none of which cannot be paralleled at other brochs in Orkney or the Scottish mainland.

The pottery makes up the bulk of the small finds (illus 8). Generally it may be described as coarse although some pots were of much better quality than others. Perhaps these were used for liquids, the coarser pots being for dry goods. Burnishing, which would have helped the pot retain its liquid content, is seen only infrequently. All the pottery appears hand-made; where discernible, the technique seems to have been to build the pot from coils. Rims mostly were everted, though flat-rimmed situlate vessels were noted occasionally. As a matter of course, the side or wall of the pot narrowed as the rim was drawn out and fashioned. One sherd (no 21) is exceptional in the thickening of the rim and in its fabric. The profile of the pots was generally bulbous or shouldered. Their height generally could not be established, save for some of the smaller bowls: these latter, particularly if decorated, may have served also as drinking vessels. A common feature of the pot bases is the raised interior often with finger-tip impressions. All the pots were flat-based and commonly thickened at the basal corner, a natural point of weakness.

All the decorated pieces, such as they are, are illustrated together with a representative selection of profiles (illus 8). The decorative motifs, all simple linear motifs such as zigzags, roughly incised triangles filled with short incised lines, are paralleled principally at broch sites on the southern side of the Orkney Mainland (eg Lingro, Ayre, The Howe): the 'fern' motif and interior combing are absent here but the sample is small; without doubt, though, the decorated wares from these sites are all in the same tradition.

Small as this assemblage is, one may extrapolate from it (and from the environmental remains) certain other tool types and activities. Whetstones indicate the most useful of all tools, the knife. Pot boilers imply a second method of cooking, perhaps for broth, in addition to the use of peat embers, suggested by Dickson (see following section). A lamp implies oil, from seabird or marine mammal. Whalebone, most likely obtained from beached animals, presumably had some blubber or meat attached to it. Deer bones naturally imply hunting, though virtually nothing in the small finds from brochs can with certainty be associated with weaponry, either for warfare or hunting. Slings would not necessarily leave any trace in the archaeological record; it might be noted also that 'potlids', if such they be, are remarkably lethal weapons when launched horizontally. The spread of the brochs themselves is *a priori* evidence for boats, yet though these must have existed, nothing of them remains. Nor is there much that can be linked directly to fishing, though large cod bones obviously do indicate an interest in the sea.

The general inference from broch finds is of life directed overwhelmingly towards subsistence. Nothing survives to give an insight into religious beliefs or practices, either in structures or artefacts. Environmental remains, however, can add a little more detail to the picture of day to day life.



ILLUS 8 Warebeth: pottery

Analysis of the coprolites and bone remains will be found on the pages following. As regards these, it must first be emphasized that there is no way of knowing how large a percentage of the total remains of this particular community is represented. Bones, shells and general rubbish turn up in every part of a broch site and, at Warebeth, much was probably simply thrown over the cliff.

HUMAN COPROLITES

Camilla Dickson

INTRODUCTION

Human coprolites, preserved by desiccation, commonly have been found on the American continent and reference to the literature for these is given by Hillman (1986). Jones (1982) gives reference to coprolites and faecal material from Europe. Coprolites preserved by mineralization have not commonly been recorded or extensively analysed. Bronze-Age mineralized coprolites from the Netherlands were pollen-analysed and occasional plant remains noted by Paap (1976). Jones (1983) has described parasite eggs and noted the presence of cereal bran, probably *Triticum* (wheat), in a mineralized coprolite of Anglo-Scandinavian age from York, England.

It is more usual for human faeces to be found dispersed in cess deposits from the Roman occupation onwards, eg Knights *et al* (1983). The Warebeth coprolites afforded a rare opportunity to examine food remains uncontaminated by the extraneous material which accumulates in cess pits. They should therefore be comparable to the gut contents of the Iron-Age bog bodies from Britain and Europe.

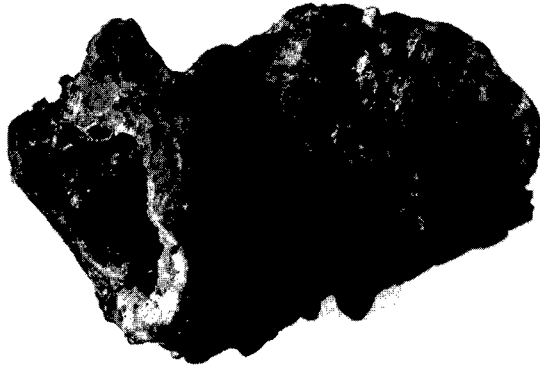
DESCRIPTION OF COPROLITES (illus 9)

The mineralized coprolites consisted of several cylindrical and sub-cylindrical pieces and many collapsed fragments. These were dark brown when wet but became buff-coloured on drying. The surface was often knobbly and some of the larger coprolites were partly or completely hollow (illus 9) with a wall thickness of 3 to 15 mm. They varied greatly in size from 17 mm long by 14 mm maximum diameter up to 105 by 55 mm and their volumes ranged from 1 to 100 cc. One coprolite, dark brown when dry, measuring 50 by 20 mm, was probably from dog or cat to judge from the parasite egg content. The largest of the collapsed fragments measured 95 by 55 mm and the average thickness was 10 mm; they were flattened with one smooth knobbly surface, the other was rough. They resembled disintegrating faeces dispersed in liquid as can be seen in present day cess pits.

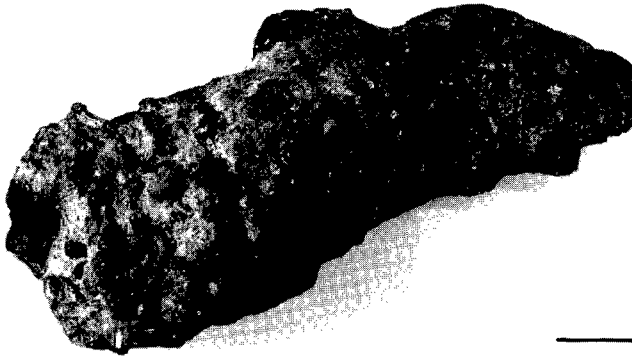
The stools had been penetrated by hollow stems, perhaps bracken, now mineralized, which had allowed sand and silt to infiltrate. Occasional fragments of *Pteridium* (bracken) fronds and *Calluna* (heather) leaves were adherent and *Diptera* pupae were also noted adhering to two coprolites and were recovered from the sievings of two others; presumably the larvae had penetrated the stools. The faeces were probably voided on to bracken and heather and were subsequently moved into the well. Calcareous water then impregnated and preserved them by mineralization. Those faeces which were only partially impregnated became hollow as the organic core disintegrated.

The cylindrical coprolites were very hard but the collapsed fragments broke readily. The outer surface was shiny and generally intact before drying out except where sand and small stones were embedded and stems had penetrated. Carbonized fragments, up to 2 mm diameter, were noted dispersed throughout and a cancellus bone fragment of 7 by 3 mm was seen. Irregularly shaped cavities were noted below the surface. Broken surfaces revealed crumbly light brown amorphous areas and shiny harder parts which probably derived from animal foodstuffs.

The coprolites were decalcified using either 30% hydrochloric acid or 15% phosphoric acid;



a



b

ILLUS 9 Human coprolites: a (upper), outer part mineralized, inner part decayed away; b (lower), completely mineralized. Scale bar: 1 cm

there seemed little difference between the effect of the two acids on the plant material. No unpleasant odour was produced. The dispersed coprolites were sieved using 80 meshes to the inch and both fractions were examined using a stereo microscope up to $\times 25$ magnifications. The proportion of plant and animal material which was visually recognizable was small in relation to the volume. Animal hairs were identified by H M Appleyard (table 1 and appendix 1, fiche 1: F14) and insect remains by R M Dobson (appendix 2, fiche 1: G1). In addition, rare burnt and unburnt cancellous bone fragments, mainly up to 3 mm long, and two fragments of collagen tissue, one with an attached hair base, were recognized. Rare down and feather fragments, up to 1 mm in length, were noted in one of the coprolite fragments. The plant identifications together with those of the animal hairs are set out in

table 1. The nomenclature for the flowering plants follows Clapham *et al* (1987) and for mosses, Smith (1978). Those seeds represented by fragments are described. Fragments of plant epidermis and seed testa were noted which lack distinguishing cell patterns or are preserved as rare fragments, usually less than 1 mm across. Carbonized plant material was present in all coprolites in approximately similar proportions to that which was unburnt. Some of these were examined with direct illumination at $\times 200$ magnifications. They consist of wood charcoal, plant epidermis and humified peat. The vesicular shiny carbon which results from burning meat was not seen.

To help determine whether the plant and animal remains were faecal or had become incorporated with the percolation of hard water, a 250 cc sample of the well silt was sieved. The remains consisted of one poorly preserved carbonized cereal grain, 16 mineralized *Calluna* leaves and one of *Erica tetralix* (cross-leaved heath), a carbonized fruit of *Polygonum aviculare* (knotgrass), a megaspore of *Selaginella* (lesser clubmoss) and occasional fragments of burnt leaves or stems, probably of monocots. Occasional partly burnt lumps of highly humified peat, up to 20 by 15 by 15 mm, were also noted in the silt. All could have become incorporated in the silt from earlier habitation, although the heaths may have been adhering to the coprolites. Apart from the peat, the plant and animal remains which characterize the contents of the coprolites were not seen.

POLLEN ANALYSIS

Three samples were pollen-analysed, two from cylindrical coprolites and the third, F, from a collapsed one. The surfaces were scraped before sampling. The analyses are given in table 2. They show strikingly low values for trees and shrubs, only 3 to 5% of total pollen, indicating an almost treeless landscape. Traces of *Tilia* (lime) and *Fagus* (beech) must represent long-distance transport of pollen since these trees are not native to Scotland. Gramineae (grasses), from 6 to 22%, with *Calluna* (heather) and *Empetrum nigrum* (crowberry) together contributing from 42 to 79%, comprise the largest proportion of the pollen and suggest that grassy heathland communities predominated. The small values of *Artemisia* (mugwort), Chenopodiaceae (goosefoot family) and *Polygonum aviculare* (knotgrass), all usually associated with arable fields and waste places, suggest that there was little arable farming in the immediate vicinity. Pollen of *Hordeum* group (barley and wild grasses) ranges from 1 to 5.6%; the problem of distinguishing barley pollen from that of certain wild grasses is discussed later. Nevertheless, since cereal grain fragments, probably of barley, were also present in the coprolites, it is reasonable to suppose that the *Hordeum* group pollen is indeed barley. The barley pollen probably came from broth, as is discussed in the notes on identifications. Herbs associated with pasture, especially *Plantago lanceolata* (ribwort) and Compositae (daisy family), together with Ranunculaceae (buttercup family), indicate some pastoral activity. No immature pollen was seen, such as would be expected if young flower buds were eaten, eg as leafy potherbs.

The pollen spectra compare well with those from two surface samples from Orkney heathland analysed by Keatinge and J H Dickson (1978, fig 11). A mainly treeless landscape had been shown to exist over much of Orkney Mainland from the Neolithic onwards (eg Moar 1969; Davidson *et al* 1976; Keatinge & J H Dickson 1978). The analyses vary chiefly in the relative values of grasses and heaths, the latter predominating where grazing pressure lessens.

We may conclude that the coprolite pollen derived from drinking water, consumed partly as broth, and that the water came from a predominantly heathy area.

INTERNAL PARASITE EGGS

Eggs of parasitic nematodes particularly were searched for on the pollen slides. No parasite eggs, such as those of *Trichuris* and *Ascaris* which commonly used to affect man, were seen. This is somewhat surprising since such eggs have usually been found in the gut content of Iron-Age bog

bodies (eg Jones 1986) as well as in cess from Roman times onwards. It is of interest, therefore, that Dunn (1968) states that generally in open country, temperate latitude hunter-collector groups are either wholly or relatively free of parasitic infections.

However, a single egg of the type found in the presumed dog or cat coprolite, which was identified tentatively by A K G Jones as *Capillaria aerophila*, was found in coprolite C and a further one in a non-acetolysed coprolite. The eggs measured 54 by 36 μm and 58 by 33 μm respectively. The rare occurrence of the eggs suggests either aerial dispersal from dried animal droppings or very slight contamination of food or water from animal faeces.

ANIMAL COPROLITE

As previously stated a single animal coprolite was found; before it was recognized as such a sample was prepared for pollen analysis. Parasite eggs, all of cf *Capillaria aerophila*, were abundant. The sparse pollen included that of *Hordeum* type; perhaps the animal had consumed some barley broth! The slide also contained much degraded hair of fur type; no bone fragments were seen.

MACROSCOPIC PLANT REMAINS (illus 10–11)

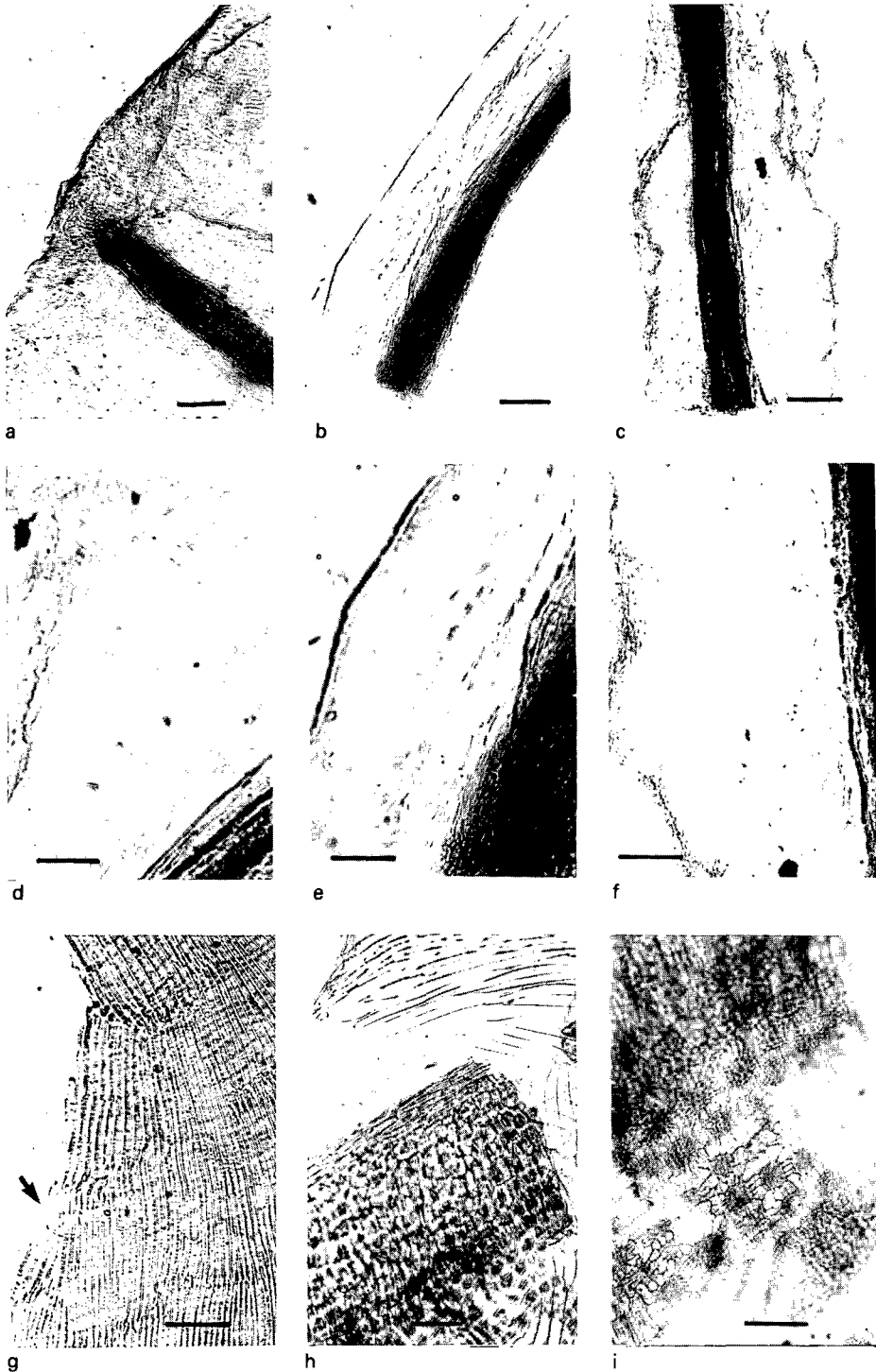
The plant remains from the coprolites are listed in table 1. The volume of those lettered A to D was between 50 and 100 cc, E was only 6 cc. The last column notes presence only in small fragments of coprolites: cylindrical, total volume c 8 cc: collapsed, total volume c 180 cc. There seem to be no clear differences between cylindrical and collapsed pieces and all are considered here together.

It is probable that all the cereal grain fragments are of *Hordeum* (barley). The identification, on surface sculpturing, of all the large grass pollen as belonging to the *Hordeum* group strengthens this supposition. The grain fragments' generally much degraded appearance is interpreted as the result of prolonged cooking as for broth (see notes on the identifications, fiche 1: C3). One seed fragment was identified tentatively as *Linum usitatissimum* (cf linseed) and two capsule fragments are probably also of linseed. Although linseed was usually taken as a laxative, this effect can be removed by soaking or boiling the seeds and throwing away the water (Helbaek 1950). The seeds contain 30–40% fat (Renfrew 1973). This seems to be the earliest record for Orkney, although it has been recorded from the early Pictish period onwards.

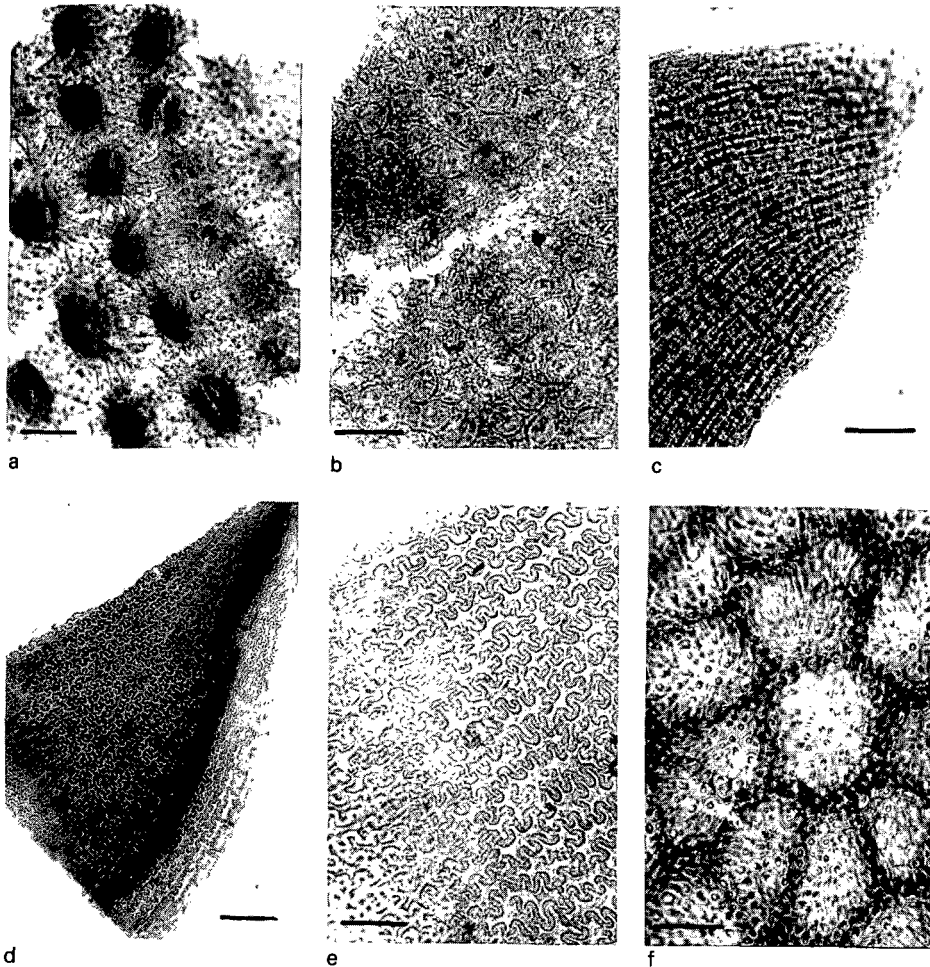
Arable weeds include cf *Brassica rapa* ssp *sylvestris* (cf wild turnip), *Capsella bursa-pastoris* (shepherd's purse), *Galeopsis* sp (hemp nettle), *Rumex* cf *crispus* (cf curled dock) and *Stellaria media* (chickweed). All except *Capsella* (one seed) are present as rare fragments and may have been collected and processed with the grain inadvertently or included deliberately. Wild turnip seeds contain 36% oil and have been used as a rather bitter substitute for mustard seed (Gerard 1633). They have been recorded from other Orkney brochs (C A Dickson 1987b) and in quantity from numerous other prehistoric sites, especially in Europe from the Neolithic onwards. The nutlets of *Galeopsis* sp (hemp-nettle) and *Rumex* cf *crispus* (cf curled dock) have astringent properties. Although the leaves of *B rapa*, *Capsella* and *S media* are edible, identifiable leaf epidermis was not seen.

Heath and bog plants are well represented; *Calluna*, both burnt and unburnt, was found in all coprolites as were leaves of *Sphagnum* (bog moss); *Eriophorum vaginatum* (cotton-grass), some burnt, was identified from most coprolites. These are common components of peat and tiny burnt fragments of peat were also present. Some frond fragments of *Pteridium* are also burnt. The most likely origin for all these plants is from a peat fire in which bracken had been used for kindling. The wood fragments (miscellaneous category) may also have come from fuel. The ingestion of this fuel is accounted for if meat was cooked in peat embers; from the presence of animal hair and bone this seems highly likely.

Plants of grassland and wetter heaths consist mainly of seeds of *Juncus* spp (rushes) and mosses,



ILLUS 10 a, d, *Hordeum*, top of grain with testa cells and part of hilum, a, scale bar: 100 μ m; d, scale bar: 50 μ m. b, e, cf *Hordeum*, hilar fragment with degraded testa cells; b, scale bar: 100 μ m; e, scale bar: 50 μ m. c, f, cf cereal, hilar fragment with much degraded testa cells; c, scale bar: 100 μ m; f, scale bar: 50 μ m. g, *Linum* cf *usitatissimum*, seed fragment with long fibres and round cell (arrowed), scale bar: 50 μ m. h, i, *Linum* capsule fragment, h, crystal, hypoderm and endoderm cells, scale bar: 100 μ m; i, crystal cells, scale bar: 50 μ m



ILLUS 11 a, *Stellaria media*, seed fragment, scale bar: 100 μm . b, *Galeopsis* sp, nutlet fragment, scale bar: 50 μm . c, cf *Viola* sp, seed fragment, scale bar: 50 μm . d, e, *Rumex* cf *crispus*, nutlet fragment; d, scale bar: 100 μm ; e, scale bar: 50 μm . f, cf *Brassica rapa* spp *sylvestris*, seed fragment, scale bar: 50 μm

mostly of the robust weft-forming species. However, none of the substantial leafy stems which typify mosses used for toilet purposes were seen, only individual leaves. The tiny rush seeds and moss leaves simply may have been blown or washed into the source of the drinking water. *Chara* (stonewort) oospores, from a genus which grows in calcareous water, probably derive from drinking water.

ANIMAL HAIRS

The small fragments of degraded mammalian hair identified by H M Appleyard were found in all the coprolites. Virtually all contained deer hair and several sheep or goat hair, all tentatively identified (table 1).

The coprolites came from layers 1 and 3 of the well fill, as did most of the bones. As shown in T Sellar's bone report (*infra*), bones of *Cervus elephas* (red deer) and *Ovis/Capra* (sheep/goat) were present. The deer hair, therefore, has been tabulated as of cf *Cervus*, although not readily distinguish-

able from that of other genera of deer. It is not often that butchered bones can be so closely linked to the end product! Ox and pig were represented by bones but hair was not recorded although some coarse fragments of comparable diameters were too degraded to identify. Occasional fur fibres were found in two of the coprolites. One type is possibly stoat or weasel, another is more like fox hair. These may be contaminants from the food of domestic animals; similar hairs were noted in abundance in the dog/cat coprolite.

DISCUSSION AND COMPARISONS

There can be little doubt that the plant remains represent a mixture of sources: barley and linseed which were eaten deliberately; arable weed seeds intentionally or accidentally consumed; peat from fuel used in cooking; and small seeds, moss leaves and oospores which probably came from the drinking water, as did most of the pollen. The small proportion of cereal bran, not more than 10 grains, were represented by hilar fragments in each coprolite, and indeed the small numbers of seeds generally and small quantity of other plant tissue possibly derived from food suggest that the meals represented by these ancient stools were largely of meat. Four of the smallest diameter stools, ranging from 14 to 24 mm (=E) across, which on size criteria could be from child or adult, all contained animal hairs and bone fragments. A diet which includes wholemeal bread of whatever cereal produces faeces containing thousands of bran fragments derived from the indigestible grain wall. Despite cooking, digesting and 2000 years or more as mineralized faeces or cess, the cereal testa is usually well preserved. Only two fragments of well-preserved barley grain were found in the several hundred cc of coprolites which were examined. One must conclude that although querns for grinding grain are a common feature of Orkney broch sites, bread was probably absent from these particular meals.

This virtual absence of well-preserved bran contrasts with the contents of Iron-Age bog bodies from England and Denmark where cereal fragments were preserved in large quantity. Preliminary ESR spectroscopy on chaff from the Lindow man bog body gave results which suggested that it was from bread cooked or griddled briefly over an open fire (Robins *et al* 1986). The very occasional fragments of weed seeds found in the Orkney coprolites are typical of weeds of crops and waste places and common contaminants of cereal grain in areas of traditional agriculture at the present time (Hillman 1986). In contrast, Tollund and Grauballe man, the Danish bog bodies, contained many hundreds of weed seeds, both whole and fragmentary, in addition to cereal fragments (Helbaek 1958). Hillman (1986) suggests that these represent the fine cleanings of the grain processing, perhaps used to bulk out the grain.

No definite evidence for meat consumption was found in the gut of Lindow man; although a number of small animal hairs were recovered, bone or sinew fragments were absent (Holden 1986). Bone and hair fragments were found in small quantity in Grauballe man (Helbaek 1958). It seems probable then that meat provided only a small proportion, if that, of the bog victims' diet. The three victims undoubtedly met a violent death and may have received poor food as criminals. It has also been suggested that they were sacrificial victims and that their last meals may have consisted of ritual food. Whatever the explanation, it may well be that the meals were not necessarily typical of Iron-Age food.

A further distinction lies in the cereal composition. Chaff of *Triticum dicoccum* (emmer wheat) and *T. spelta* (spelt wheat), the two primitive wheats most commonly found in the Iron Age, was present in both Grauballe and Lindow man but no wheat remains were identified from the Orkney coprolites. The testa of these wheats is not noticeably degraded after prolonged simmering in water as for broth (author's observation, unpublished) even if the pericarp characters have decayed away. It seems more likely that wheat was absent. Only very occasional wheat grains have been recorded in Orkney prehistory and the present climate is unsuited to its cultivation. *Avena fatua* (wild oat) seems

to be the only oat species present in the Orkney Iron Age and was usually only a minor contaminant of the barley, of which both hulled and naked types were grown. Barley was the staple cereal throughout Orkney prehistory and querns for grinding date from the earliest habitations. Flat unleavened bread (bannocks) and other barley products would have been consumed and have been recorded up to recent times (Fenton 1978). It may be that the predominantly meat meals indicated by the coprolites were not typical. The small number of coprolites could represent meals eaten over a short period, perhaps from a time when cereal stocks were low.

CONCLUSIONS

The meals represented by these coprolites appear to have been mainly of meat from red deer, sheep/goat and other animals, including birds, together with barley broth, linseed and a small admixture of arable weed seeds. The meat may have been cooked in the embers of a peat fire. The other plant remains could have come from the drinking water, as could most of the pollen. Pollen analyses from three of the coprolites indicate an almost treeless landscape dominated by grassy heath with some pasture.

NOTES ON PLANT IDENTIFICATION

As shown in table 1, some plant remains are represented solely by fragments and the criteria used are not necessarily those used in identifying intact fruits and seeds. Cell patterns of some seeds are diagnostic for the species. All fragments have been examined at $\times 400$ magnifications. The details are on fiche 1: C3–14.

BONE REPORT

T J Sellar

INTRODUCTION

(The full report is on fiche 1: D1–F2.)

Post-excavation analysis saw little justification for maintaining the original division of the excavated material into three layers (Well Fill 1, 2 and 3) and for this report the material is considered as one sample. In any case by far the largest part of the remains (82.7%) was ascribed to Well Fill 3. In all, 2496 bones and bone fragments were examined, of which some 86.7% (2164) were identified (table 3, fiche 1: D12). Many of the bones, and particularly the long bones, were broken into small pieces.

METHODS

Whenever possible the animal's age at death was determined using data from Silver (1969). Estimates of animal numbers were used to calculate food values (table 8, fiche 1: E2) from the dressed carcass weights given in Chaplin (1971). In tables 5 and 6 (fiche 1: D13–14), the abundance of each bone type of ox and sheep was calculated as a percentage of the total for each animal. These were compared with the weights of each bone type of the reference animals, expressed as percentages of total skeletal weights.

All bone fragments identified were ascribed to an animal type. Each was assumed to represent only one species. In most cases these species were identified unequivocally. Doubt, however, attaches to two identifications, described on first examination as 'rabbit' and 'rat'; none of the bones could be ascribed with certainty to these species and the name was used to indicate only the size of the animal.

Three other points should be remembered when reading the report. First, no attempt was made

TABLE 1
 Contents of Human Coprolites

			Whole or partial					Collapsed F	Numerous fragments
			A	B	C	D	E		
CROP PLANTS									
Cereal undiff	testa	F	o	o	r	r	o	r	+
<i>Hordeum</i> (Barley)	testa	F	r	-	-	-	-	-	+
Cf <i>Hordeum</i> (cf Barley)	testa	F	r	-	-	-	-	-	+
<i>Linum cf usitatissimum</i> (cf Linseed, Flax)	seed	F	r	-	-	-	-	-	+
<i>Linum</i> sp	capsule	F	r	-	-	-	r	-	-
ARABLE WEEDS									
Cf <i>Brassica rapa</i> ssp, <i>sylvestris</i> (cf Wild Turnip)	seed	F	-	-	-	r	r	r	+
<i>Capsella bursa-pastoris</i> (Shepherd's Purse)	seed	-	-	1	-	-	-	-	-
<i>Galeopsis</i> sp (Hemp-nettle)	nutlet	F	-	-	-	-	r	-	+
<i>Poa annua</i> (Annual Meadow-grass)	grain	-	-	-	-	-	r	-	-
<i>Polygonum cf aviculare</i> s.l. (cf Knotgrass)	nutlet/perianth	-	-	-	-	-	-	-	+
<i>Rumex cf crispus</i> (cf Curled Dock)	nutlet	F	-	-	-	-	-	-	+
<i>Stellaria media</i> (Chickweed)	seed	F	-	-	-	-	r	r	+
HEATH, BOG AND GRASSLAND									
<i>Calluna vulgaris</i> (Heather)	leaf	*c	*o	*c	*r	*o	*r		*+
<i>Empetrum nigrum</i> (Crowberry)	fruitstone	-	-	-	-	-	-	-	*+
<i>E nigrum</i>	leaf	r	-	-	-	-	-	-	+
<i>Erica tetralix</i> (Cross-leaved Heath)	leaf	r	-	-	r	-	-	-	+
<i>Eriophorum vaginatum</i> (Cotton-grass)	leaf spindle	*o	-	r	r	*r	r	-	+
<i>Hylocomium splendens</i> (Moss)	leaf	r	-	o	-	r	r	-	+
<i>Hypnum cupressiforme</i> (Moss)	leaf	-	r	-	-	-	-	-	+
<i>Juncus acutiflorus/articulatus</i> (Sharp-flowered/Jointed Rush)	seed	r	-	-	-	-	-	-	-
<i>Juncus bufonius</i> (Toad Rush)	seed	r	-	-	-	-	-	-	+
<i>Juncus</i> sp (Rush)	leaf or stem	-	-	*r	-	-	-	-	-
<i>Mnium hornum</i> (Moss)	leaf	-	-	-	-	r	-	-	-
<i>Potentilla cf erecta</i> (cf Common Tormentil)	achene	-	-	-	-	-	-	-	+
<i>Pteridium aquilinum</i> (Bracken)	frond	F	*r	-	r	*r	*r	-	+
<i>Rhytiadelphus cf squarrosus</i> (Moss)	leaf	-	-	r	-	r	-	-	+
<i>R triquetrus</i> (Moss)	leaf	-	-	r	-	-	-	-	-
<i>Selaginella selaginoides</i> (Lesser Clubmoss)	megaspore	-	r	-	-	-	-	-	-
<i>Sphagnum</i> sp or spp (Bog Moss)	leaf	c	c	o	r	r	r	-	+
AQUATIC									
<i>Chara</i> sp (Stonewort)	oospore	r	-	r	-	r	-	-	-
MISCELLANEOUS									
Cf <i>Betula</i> or <i>Alnus</i> (cf Birch or Alder)	wood	r	-	-	-	-	-	-	+
Cf <i>Cerastium</i> (cf Mouse-ear Chickweed)	seed	-	-	-	-	r	-	-	+
Coniferae (Conifer)	wood	*r	-	-	-	r	-	-	+
<i>Dicranum</i> sp (Moss)	leaf	r	-	-	-	-	-	-	+
<i>Fissidens</i> sp (Moss)	leaf	-	-	-	-	-	-	-	+
<i>Rhacomitrium</i> sp (Moss)	leaf	r	-	-	-	-	-	-	-
<i>Rumex</i> sp (Dock)	nut, perianth	-	-	-	-	-	-	-	*+
<i>Viola</i> sp (Violet, Wild Pansy)	seed	F	-	-	-	-	-	-	+
Unidentified	seed	-	-	-	-	r	-	-	+
ANIMAL									
Bone	cancellus	F	+	-	-	-	+	*+	+
Cf <i>Cervus</i> (cf Red Deer)	hair	F	+	+	+	+	+	+	+
Cf <i>Ovis</i> or <i>Capra</i> (cf Sheep or Goat)	hair	F	-	+	-	+	-	-	+
Cf <i>Mustelida</i> (cf Weasel family)	hair	F	-	-	-	-	-	+	+
Cf <i>Vulpes</i> (cf Fox)	hair	F	-	-	-	-	+	-	-
<i>Avies</i> (Bird)	feather	F	-	-	-	-	-	-	+

Key

r: rare, 1-3; o: occasional, 4-10; c: common, 11+; F: fragment; *: some carbonized; +: denotes presence

TABLE 2

Pollen analysis of coprolites, expressed as a percentage of the total pollen including spores

	B	C	F
<i>Betula</i> (Birch)	0.5	0.7	1.2
<i>Pinus</i> (Pine)	0.2	0.2	1.2
<i>Quercus</i> (Oak)	+	—	0.6
<i>Alnus</i> (Alder)	0.9	0.5	1.6
<i>Tilia</i> (Lime)	—	—	+
<i>Fagus</i> (Beech)	—	+	+
<i>Coryloid</i> (Hazel/Bog Myrtle)	0.9	1.2	2.2
<i>Salix</i> (Willow)	0.2	0.2	—
Gramineae (Grass family)	15.2	22.3	6.5
<i>Hordeum</i> group (Barley and wild grasses)	3.3	5.6	1.1
Cyperaceae (Sedge family)	4.2	—	2.0
<i>Calluna</i> (Heather)	38.3	34.5	46.1
<i>Empetrum nigrum</i> (Crowberry)	0.9	1.5	26.5
<i>Calluna/E nigrum</i> (Heather/Crowberry)	3.7	5.1	5.8
Ericaceae (Heath family)	—	0.2	+
<i>Artemisia</i> (Mugwort)	0.2	0.2	+
Caryophyllaceae (Pink family)	0.7	+	0.2
Chenopodiaceae (Goosefoot family)	+	0.2	+
Compositae, Liguliflorae (Dandelion type)	4.7	3.1	0.2
Compositae, Tubuliflorae (Daisy type)	2.8	4.6	0.5
Cruciferae (Cabbage family)	0.9	0.5	+
<i>Filipendula</i> (Meadowsweet)	1.9	1.2	0.6
<i>Linum catharticum</i> (Purging Flax)	+	—	—
<i>Lotus</i> (Birdsfoot-trefoil)	—	+	—
<i>Plantago lanceolata</i> (Ribwort)	3.3	7.6	2.0
<i>P. maritima</i> (Sea Plantain)	2.1	1.2	+
<i>Plantago</i> sp or spp (Plantain)	3.0	—	0.2
<i>Polygonum aviculare</i> (Knotgrass)	1.2	0.7	—
<i>Potentilla</i> type (Cinquefoil/Tormentil type)	1.9	2.4	0.5
Ranunculaceae (Buttercup family)	1.2	1.5	0.3
Rubiaceae (Bedstraw family)	0.2	—	—
<i>Rumex</i> (Dock/Sorrel)	0.2	0.5	—
<i>Siellaria holostea</i> (Greater Stitchwort)	—	—	+
<i>Succisa</i> (Scabious)	0.2	0.7	—
<i>Trifolium repens</i> (White Clover)	—	0.2	—
Umbelliferae (Umbellifer family)	0.5	—	—
<i>Botrychium</i> (Moonwort)	+	—	—
<i>Polypodium</i> (Polypody)	0.7	+	—
<i>Pteridium</i> (Bracken)	—	—	+
<i>Filicales</i> (Fern)	0.5	1.2	0.2
<i>Selaginella</i> (Lesser Clubmoss)	—	0.2	—
<i>Sphagnum</i> (Bog Moss)	5.4	0.2	0.5
Unidentified (crumpled or degraded)	34.6	36.5	11.8
Total pollen including spores	428	408	642

to separate sheep and goats. Second, the number of post-cranial pig bones identified may be an underestimate; however, the general trend of markedly fewer pig bones than other domesticated food animals is reliable. Finally, the nature of the material, with most bones broken into small pieces, prevented any sexing of the specimens.

RESULTS

The species identified in the bone sample were:

- (a) Mammalia: ox *Bos taurus*, sheep *Ovis aries*, pig *Sus domestica*, red deer *Cervus elephus*;
- (b) Teleostei: cod *Gadus morrhus*;
- (c) Mollusca: common limpet *Patella vulgata*.

Additionally there were remains from small mammals of two distinct sizes; these were the uncertain species mentioned above (hare and rat).

The indications are that slaughtering took place close to the site of the bones' recovery. The sample contains the distal leg elements, metacarpals, metatarsals and phalanges (tables 5 and 6, fiche 1: D13–14), which generally were removed soon after slaughtering and would not be transported far with the carcass; unfortunately, there is no evidence of possible methods of slaughter.

Complete well fill sample

The complete sample of identified bone material consisted of some 2164 fragments, representing 86.7% of the total recovered (table 3, fiche 1: D12). These were dominated by sheep bones which were the equivalent of 52.9% of the total identified (table 4, fiche 1: D12); ox bones were 22% and deer 16.9%, the other five species making up only 8.2%. The most reliable information therefore is likely to come from the sheep and cattle bones. Compared with the reference animals, most bone types were well represented (tables 5 and 6, fiche 1: D13–14). The only notable exceptions were ox pelvic girdle and sheep skull and ankle bones (table 7, fiche 1: E1).

The red deer and hare naturally suggest hunting. The latter probably represented a chance capture, rather than systematic trapping. On the other hand, the numbers of red deer fragments approached those of ox and far exceeded the pig. Therefore, this animal probably constituted an important part of the diet, especially during the winter.

Limpets are a very common shore animal and could have been collected throughout the year, probably some of the time at least for bait. Quite reasonable numbers of cod bones were found (no other fish species was identified); they were mainly from large individuals and their size and probable numbers suggest that they were caught offshore from boats.

Numbers

The numbers of individuals were estimated for each layer separately, using all the sources available; these data were then pooled (table 8, fiche 1: E2). They show quite wide variations between the possible minimum and maximum numbers for each of the domesticated species. However, the proportions of each are similar; so are the relative meat yields. As would be expected, the largest group were sheep, which accounted for about two thirds of the total numbers of livestock kept. Cattle and pigs occurred in similar numbers.

The numbers of red deer are difficult to estimate but between 5 and 11 individuals seem very likely, and possibly this is an underestimate. The numbers would have added significantly to the meat supply of the community and would alter the picture given by the meat yield data in table 8. Data on dressed carcass weight of red deer were given by Mitchell *et al* (1976). These varied between 98 and 143 lb (44.5–65 kg) according to the season and a median value of 120 lb (54.5 kg) was used in the calculations. The effect these had on the meat yield data is shown in table 8A (fiche 1: F2). Red deer provided between one fifth and one sixth of the total weight of meat eaten. This reduced the importance of cattle and sheep and, to a lesser extent, the pigs. Also it is indicative that some effort had to be expended on hunting to maintain food supplies. It is possible that quite large numbers of red deer inhabited the area since dense island populations have been reported in modern times, although red deer are not found in Orkney at present.

Age data

By amalgamating the data from teeth and fusion of epiphyses a reasonably large number of ageings were obtained, particularly from ox and sheep (see tables 9, 10 and 11, fiche 1: E3–4). The information is therefore quite reliable and gives a good indication of the husbandry practised; it was

supplemented by observations on other bones. The evidence is that all the cattle were kept for at least 18 months (table 9, fiche 1: E3). No indication of earlier death was found, although some might be expected through natural causes. Either calf rearing was highly successful, or they were not eaten. Few individuals were killed during their next two years of life; there are only seven records of ages between 1½ and 3½ years. This means it was unlikely that many (if any) calves were castrated, to be fattened quickly for early meat production. Most were raised to provide milk or to be used as draught animals.

The picture of the sheep flock is rather different (table 10, fiche 1: E4). They do seem to have been cropped at all ages, although the tendency was to allow most one year of growth at least. A few lambs were eaten, since in addition to the remains that could be aged positively many of the bones indicated small individuals. The numbers killed during the second and third years of life indicated that part of the flock, perhaps as much as one third, was kept specifically for meat production. They could have been castrated, or kept to produce one (replacement) lamb, before slaughter. Most sheep were kept for at least three years. These would have been used to provide wool, perhaps milk (especially if some were goats) and a replacement supply of lambs.

Finally, the pigs seem to have been killed either as piglets, or when old after reproduction (table 11, fiche 1: E4). Here the lack of information on sex is particularly unfortunate, as from basic husbandry techniques a preponderance of male piglets in the sample would be expected. Some of the piglets were very young indeed.

CONCLUSIONS

The overall picture of the community which deposited the bone material is complex. They seem to have developed a well-organized system of meat production within the constraints of their environment. This almost certainly meant winter shortages for the people, as well as for the animals. Under these circumstances, a herd of pigs would have been a very useful supplement to cattle and sheep. They are omniverous and would not require the large amounts of fodder that would be essential to the other species; they can survive on a wide variety of foods.

The most numerous animals were the sheep and goats. These provided relatively little meat, but could crop the grass much closer than cattle, therefore making full use of available pasture. The cattle and pigs were in approximately equal numbers. It seems highly likely that the herd of cattle provided more than half of the meat requirement of the community. However, they were too useful to be maintained just for meat production. Mostly they seem to have been used for draught and to provide milk and calves, before slaughter. Most of the sheep were kept for more than three years and provided much needed wool as well as meat.

The pigs seem to have been taken either very early on or allowed to mature and produce piglets. This herd would have given a very helpful degree of flexibility to the husbandry practised. Finally the red deer, which had to be hunted, probably contributed very significantly to the food supply, particularly at certain times of the year. In weight terms, they provided around one sixth of the total meat supply. Red deer are large, dangerous animals that are not easily caught. Thus the need for them, perhaps coupled with the idea of the hunt, must have been sufficient to compel the necessary organization and effort required for the hunting.

Turning now to the highly speculative, it is possible that the community in question was quite large, either absolutely or relatively to the available resources. A number of lines of evidence point in that direction: first, the hunting of red deer, already discussed; secondly the lack of many of the smaller possible food animals which were most likely available; these included hare, present in the sample to a minor extent, and other species such as various types of birds, though feather fragments were noticed in the coprolites. The general absence of these could indicate that the meat require-

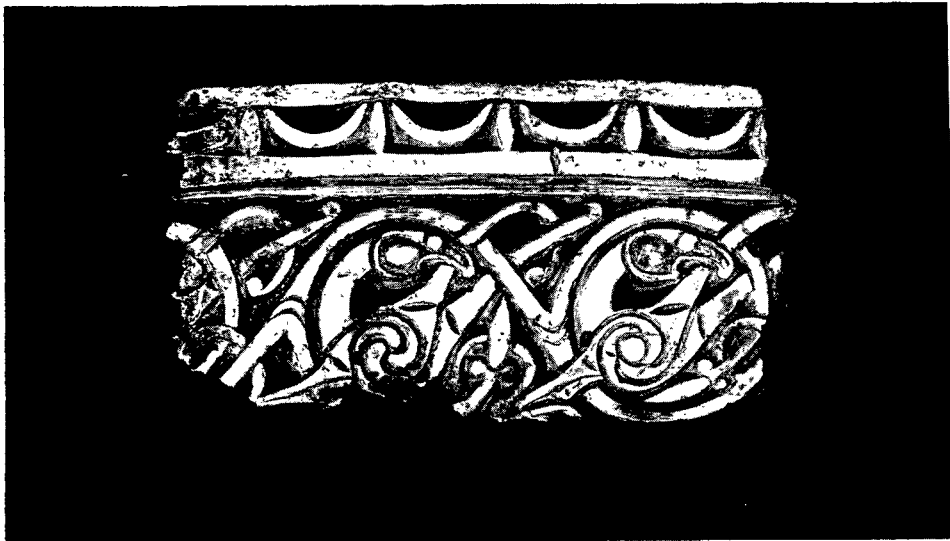
ments were sufficiently large to make the trapping of smaller animals inadequately productive. Finally, the only marine species caught was cod. Many other potential sources were available, both on shore and in the waters around the coast. The people seem to have concentrated on a large species (most of the cod bones indicated large specimens) which would have provided good, high-quality protein. Other, smaller species of fish and shellfish, especially those found on the shore, seem to have been ignored, or else are missing from the remains. A large community in the harsh conditions of Orkney might have needed to concentrate its efforts on obtaining the maximum food yield for the time spent in its production. Certainly, at all times they would have had to make the best of their total resources to survive.

CATALOGUE OF FINDS

Note

(The full catalogue is on fiche 1: E5–F13.)

All of the finds from the 1980 excavation are deposited in Tankerness House Museum. This catalogue lists also some other material, viz the two sandstone flakes mentioned by Ordnance Survey (stone no 16); the long handled bone comb (bone no 2), probably the find made by Laing (Laing 1868, 60); bone nos 3–5 and antler, surface finds made by Mr B Wilson, Curator, Tankerness House; the two ornate bronze pieces (see individual entries); and the small collection of sherds donated by G Petrie to the National Museum of Antiquities sometime prior to 1892.



ILLUS 12 Bronze and gold mount from Monker Green, Stromness (RMS FA 44)

DECORATED BRONZE AND GOLD PIECES

Sally Foster

1 Bronze and gold mount with Celtic pattern (illus 12)

About 1889 a cast bronze mounting with a Celtic pattern, covered with gold on the upper surface, was discovered at Monker Green, Stromness (RMS acc no FA 44; Donations 1892; Grieg 1940, 200, fig 95). The fragment has been crudely truncated on three sides. The design consists of two major elements: a raised, decorated border (9 mm wide) which decreases in depth towards the centre of the plaque where it steps down diagonally to a thinner area of inhabited continuous vine scroll.

The edge is outlined on each of its long sides by plain borders, in between which runs an egg-and-dart

derived motif (Wamers 1987, 97). The lower field contains the vestiges of three elements of an inhabited single continuous vine scroll, each similar, but differing in minor detail. A contorted forward-facing bird-like animal inhabits each scroll, craning its long neck forward to bite one of its outstretched hind-limbs, which both embrace the plant scroll and finally entwine around themselves and terminate in a small lobe. The beast has a long hooked, hatched beak, and a beady circular eye and pouched cheeks. Only three limbs are indicated, each extending from an elaborate triskele-form hip at the base of the slender neck. One triskele is simple, its three swirling lines emanating from a central point. The other is more elaborate, evolving from a central circle, further enhanced by three small oblique nicks. The single jointed foreleg extends backwards as if to support the weight of the animal. It has a longitudinal linear division, and terminates in long claws. A long thin spur emanates from the back of the heel and curls around the spear-shaped leaf at the end of each scroll. Where each scroll bifurcates there are two parallel V-shaped lines.

This object has been discussed by Bakka (1963, 60–1, fig 63) and Bruce-Mitford (1960, 254, fig 64). Both authorities agree it was manufactured by an eighth-century Northumbrian craftsman, Bruce-Mitford preferring the second half of or the late eighth century on the basis of analogies with the Croft-Ormside-Kells group. The Stromness example, and bronze-bound pails from Birka and Hopperstad (Bakka 1963, fig 23–7) which bear bird-inhabited vine scrolls, may be derived from the Mediterranean art group independently of the birds and bird-friezes of the Lindisfarne manuscript group because of their associated vines (*ibid.* 60; *contra* Bruce-Mitford 1960, 254). The vine-scroll was a popular Pictish motif, a celticized version of the Northumbrian vine-scroll, undoubtedly spread through the influence of the Roman church in Scotland (Henderson 1983). There is no reason to attribute this object to the Picts.

The egg-and-dart derived motif may be related to the ‘crescent and almond-shaped prominences’ on two bronze mountings from Crieff where each section of shaped border is filled by a single egg and two darts (Allen & Anderson 1903).

An Hiberno-Saxon object such as this may originally have been part of a highly ornate book mount or box, and the top edge has the remains of two, possibly three shallow, impressed indentations by which it would have been attached with clasps, c 14 mm apart.

The exact context of this and the following mount are unknown, but Bakka (1963, 61) makes the interesting suggestion that they might have come from Norse graves in view of the surprisingly large number of contemporary late Saxon and Hiberno-Saxon/Northumbrian objects which have been found in Norwegian graves.

2 Circular decorated bronze and gold mount

In 1887 a decorated mount was reported as having been found some time ago at Stromness (Cursitor 1887, 346). The original is now in the Hunterian Museum, Glasgow, but there is a facsimile in the Royal Museum of Scotland, Edinburgh. It consists of a cast circular bronze plate with a thin raised vertical edge (height 5 mm), the upper surface of which has been covered with gold. A fine cable runs around the upper edge, although the edges of the mount are somewhat corroded. From a central setting which has lost its boss swing three arms of an ornate triskele, the two wide arms of which are filled with fine linear decoration. The third arm tapers smoothly to a constant width and then swings around to encircle the edge of the disc. Its final part is destroyed, but appears to taper to a point once its circuit is complete. A similar triskele can be seen on a panel at the top of the foot of the Ardagh chalice (Rynne 1987, pl 1 B) which dates to c 700 AD (Wilson 1984, 120), or the contemporary Lindisfarne Gospels (f. 139r; Bruce-Mitford 1960, fig 46). Both these works are representative of Hiberno-Saxon art of this period (Bruce-Mitford even sees the Ardagh chalice as possibly Northumbrian: *ibid.* 251). The three intermediate fields are decorated with various forms of fine chip-carved interlace in a moderate relief. In technique this piece is very similar to a brooch from Harray (Cursitor 1887, 344, fig 5: Hunterian Museum acc no B.1914.864; Grieg 1940, 200, fig 96).

This Hiberno-Saxon mount, probably with the other mount from Monker Green, has variously been described as the circular terminal portion of a penannular brooch (Cursitor 1887, 346) and the remains of the central portion of the same (Grieg 1940, 200). The edges are very corroded and it is difficult to see whether it has either been cut from a brooch or cast individually. If the latter is the case its form as an individual mount for a penannular brooch is most unusual; finer panels of filigree etc, or glass/amber insets are more typical. Note for example the blue glass and other coloured glass used in circular settings on certain of the penannular brooches in the St Ninian’s hoard (Wilson 1973, 98). On the reverse are two small protruberances which may have been connected with attachment. Alternatively it could possibly have been incorporated in an object such as a book cover, chalice or paten.

APPENDIX 1

ANIMAL FIBRES

This report, which is based on information supplied by H M Appleyard is on fiche 1: F14.

APPENDIX 2

INSECT IDENTIFICATION

R M Dobson

See fiche 1: G1-2.

LOCATION OF ARTEFACTS AND ARCHIVE

The objects from the 1980 excavation have been deposited in Tankerness House Museum, Kirkwall, Orkney and the excavation archive has been placed in the National Monuments Record in Edinburgh.

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