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EXCAVATIONS AT WAREBETH (STROMNESS CEMETERY) BROCH, ORKNEY

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CONTENTS

Notes on plant identification

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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 x400 magnifications.

Cf. *Brassica rapa* ssp. *sylvestris* (cf Wild Turnip) illus 11f

Four golden brown testa fragments range from 0.6 x 0.45 to 0.9 x 0.6mm across. The cells are angular, thick walled, isodiametric and 12-22µm across and each has a round or oval lumen. These palisade cells are of unequal height, forming a large reticulum 70-120µm across at a higher focus. The testa can be distinguished from that of *B. napus* and *B. oleracea* by the presence of the large reticulum. Seeds of *B. nigra* have smaller isodiametric cells 4-10µm, or elongate to 20µm, the walls of the reticulum are thicker, forming conspicuous dark meshes in surface view (Winton 1916). The testas of *Raphanus* spp. have isodiametric and elongate palisade cells, mostly 8-18µm diameter. The seeds of *B. rapa* ssp. *rapa* (cultivated turnip) are on average larger than those of ssp. *sylvestris* (wild turnip), the testa cells are isodiametric to elongate and mainly larger than those of the fossils and the reticulum is less clearly defined or else absent. The cultivated turnip is not thought to have been introduced to Scotland until the 17th century.

Galeopsis sp. (Hemp-nettle) illus 11b

Two nutlet fragments measure 0.5 x 0.35 and 0.6 x 0.4mm. They have rounded palisade cells 20-32µm across, each with a small dark brown irregularly shaped lumen. One of the fragments has retained the crystals in the top of these cells. The crystals have been described by Helback (1950) as tetragonal prismatic and are seen in the pericarp cells of *G. tetrahit* s.l. and *G. speciosa*; cells and crystals of *G. angustifolia* differ.

Hordeum group (Barley and wild grass) pollen

Large grass grains, 34µm upwards in diameter, were noted in each of the three pollen analysed coprolites. The samples had been decalcified using 30% HCL followed by cold HF, acetolysed and mounted in silicone oil. A further coprolite was prepared specifically for measurement of large grass pollen as above but omitting acetolysis. Nine or ten grains of 34µm or more were measured from each sample noting both the annulus diameter and mean diameter of each grain as described by Andersen (1979). Some of the grains in each sample were crumpled, although some were very well preserved, and so the grain diameters are minimum ones. The acetolysed grains measure: annulus, 9-13µm, mean diameter 34-57µm; nonacetolysed grains: annulus 9-10µm, mean diameter 34-38µmm (acetolysis is known to swell grains). The surface sculpturing, observed with phase contrast at x1250, is most clearly defined on the acetolysed grains and consists of separate spinules (punctae), some of which are grouped in short, often curved, lines forming a scabrate surface.

Pollen of cereals and wild grasses have been described by several authors and some of the literature is summarised by C.A. Dickson (1987, 9),

Pollen of the size described for the nonacetolysed grains is found in *Hordeum vulgare* (hulled six-row barley), *Triticum monococcum* (eincorn) and seven wild grasses (Andersen 1979). *T. monococcum* virtually can be discounted as can *Hordeum murinum* (wall barley), a wild grass, on geographical grounds. However, three maritime grasses, with *Glyceria* spp. (sweet-grass) and *Elymus repens* (couch-grass), all have pollen of a similar type to that described here and all occur in Orkney at the present time.

It is notable that occasional fragments of *Hordeum* grain testa, two definitely, others tentatively identified, were recovered from two of the pollen anlysed coprolites (described below). Pollen has been shown to adhere to hulled barley, trapped between the grain and glumes (Robinson and Hubbard 1977). The author has ground hulled six-row barley in a rotary quern, made it into bread and also pearled the grain in a mortar as for broth in the traditional Orkney manner (Fenton 1978, 396). Both had cereal pollen present after cooking; pollen from the bread was crumpled whereas that from pearled grain cooked in water was often well preserved. As is described below, it seems probable that barley was consumed after cooking in broth and it is likely, therefore, that the large grass pollen is indeed barley and derived, in part at least, from broth. Cereal pollen has been reported, in very high frequencies, from the gut contents of Lindow man, an Iron Age bog body from Cheshire, England (Scaife 1986).

***Hordeum* sp. (Barley)** Illus IOa, d

One grain fragment shows the characteristic tiny apical point and apparent double layer of testa cells characteristic of barley (C.A. Dickson 1987 a, Fig. 14 e); these are subrectangular, becoming long and narrow near the hilum.

Cf. *Hordeum* sp. (cf Barley) illus JOb, e

Cf. *Hordeum* grains are represented by dark brown hilar fragments 0.4-1.7mm long. The hilums are 60-80µm wide and most have a little adherent tissue up to 600µm wide on one or both sides of the hilum. The best preserved show remnants of long testa cells 50-80 x 10-20µm, chiefly diagonal to the hilum. These have usually lost their cell walls and are represented by degrading cytoplasm. They can be distinguished from degraded testa cells of *Triticum/Secale* (wheat/rye) which have two cell layers orientated more or less at right angles to each other (C.A. Dickson 1987 a). The testa cells of *Avena* (oats) are colourless, 70-200µm long, and frequently form a modified herring-bone pattern. To determine the cooking process which might have resulted in the degraded testa cells, hulled grains of *Hordeum vulgare* (hulled six-row barley) were ground in a rotary quern, winnowed, sieved, made into bread and cooked on a griddle (= Scots girdle) for about 10 minutes, as is traditional for barley bannocks. The diagnostic bran (testa, pericarp) layers were separated by heating the crumb briefly with water to soften it, then heating with 5% hydrochloric acid for a few minutes to aid removal of the starch and protein (C.A. Dickson 1987 a). When examined at x400 magnifications the testa cells showed varying degrees of disintegration and the pericarp had frequently disappeared. The presence of glume fragments was noted. Barley grain was also pearled, as was traditional for broth, using a pestle and mortar and gently rubbing the grains in water (Fenton 1978, 396); the husks were floated off. The hilums with attached bran layers in the grooves remained but most of the bran was rubbed away. The pearled grain was cooked in water from 1-4 hours to simulate cooking for broth and the grains heated with dilute acid as before. Grain cooked for an hour or two

produced slight disintegration but prolonged cooking for 3-4 hours produced further cell degradation, resulting in a featureless membrane in some instances. Similar hilar fragments with diaphanous tissue were found in all the coprolites, albeit in small numbers, and have been tabulated as cf. cereal. It seems probable that all the hilar fragments recovered are from pearled grain and that the different degrees of disintegration result from different cooking times.

Linum **cf. *usitatissimum*** (cf. Linseed, Flax) illus 10j

One seed fragment, measuring 0.9 x 0.8mm, consists of part of the beak and back of a seed. Two cell layers are preserved: the "round cells" which measure 30-50µm across and the underlying fibres measure 110-135 x 5-10µm, the fibres have retained their thickened pitted walls. These layers are characteristic of *Linum* seeds; of the species present in Britain, seeds of *L. bienne* and *L. catharticum* are both smaller and those of *L. perenne* are less clearly beaked. The shape and cell pattern compare well with reference seeds of *L. usitatissimum* but the small size of the fragment precludes certain identification. *L. perenne* is not known as a food plant and its most northern native site is in southern Scotland.

Linum **sp.** illus 10h, i

Three fragments of *Linum* capsules were recovered; measuring up to 3.5 x 2.5 mm. Parts of three valves can be seen on one of the fragments. They were identified by the presence of crystal cells , although the crystals have gone, together with the long narrow cells of the endocarp. These have pitted walls which have lost much of their thickening, they are arranged in groups and are sometimes crossed by the

remaining shorter cells of the hypoderm. These layers are highly characteristic of *Linum* capsules (Vinton 1916). The width of the capsules excludes all the small ones of *L. catharticum*.

***Rumex* cf *crispus* (cf Curled Dock)** Illus 10a, e

Two nutlet fragments measure 0.9 x 0.7mm and 2.0 x 1.5mm. One has a pale border where originally attached to another side, the other is part of a pointed nutlet. The cells are strongly sinuous, 50-70 x 30-45µm, and each cell has 6-10 rounded spurs. They overlie thin-walled longitudonally elongated cells 6-10µm wide. Similar cell layers are found in *R. crispus*. Nutlets of *R. acetosa* and *R. acetosella*, the former especially used for food, have rather different cells.

***Stellaria media* (Chickweed)** Illus 11a

One complete seed and three fragments were identified. The fragments range from 0.7 x 0.7mm to 1.0 x 1.2mm. The cells are thick-walled 250-320µm across; some cells bear a low rounded tubercle. The testa is distinguished from that of other members of the Caryophyllaceae by the presence of conspicuous warts up to 8µm across. Seeds of *S. neglecta* have sparser, smaller warts.

Cf *Viola* sp. (cf Violet or Wild Pansy) Illus 11c

A single fragment, maximum size 0.8 x 0.4mm consists of two cell layers. Polygonal epidermal cells, c20µm in diameter, each contain a square or polygonal crystal. This overlies a sclerenchymatous layer of very long thick-walled fibres, each 8-10µm across, with small rounded pits. Similar cell layers are found in seeds of *Viola* spp. Rhombic crystals in the subepidermal cells are a feature of some species.

TABLE 1

Contents of Human Coprolites

			whole or partial				collapsed	numerous fragments
			A	B	C	D	E	F	
CROP PLANTS									
Cereal undiff	testa	F	o	o	r	r	o	r	+
Hordeum (Barley)	testa	F	r	-	-	-	-	-	+
Cf. *Hordeum* (cf. Barley)	testa	F	r	-	-	-	-	-	+
Linum cf. *usitatissimum* (cf. Linseed, Flax)	seed	F	r	-	-	-	-	-	+
Linum sp.	capsule	F	r	-	-	-	r	-	-
ARABLE WEEDS									
Cf. *Brassica rapa* ssp. *sylvestris* (cf. Wild Turnip)	seed	F	-	-	-	r	r	r	+
Capsella bursa-pastoris (Shepherd's Purse)	seed		-	-	1	-	-	-	-
Galeopsis sp. (Hemp-nettle)	nutlet	F	-	-	-	-	r	-	+
Poa annua (Annual Meadow-grass)	grain		-	-	-	-	-	r	-
Polygonum cf. *aviculare* s. l. (cf. Knotgrass)	nutlet/perianth		-	-	-	-	-	-	+
Rumex cf. *crispus* (cf. Curled Dock)	nutlet	F	-	-	-	-	-	-	+
Stellaria media (Chickweed)	seed	F	-	-	-	-	r	r	+
HEATH, BOG AND GRASSLAND									
Calluna vulgaris (Heather)	leaf		*c	*o	*c	*-	*o	*r	*+
Empetrum nigrum (Crowberry)	fruitstone		-	-	-	-	-	-	*+
E. nigrum	leaf		r	-	-	-	-	-	+
Erica tetralix (Cross-leaved Heath)	leaf		r	-	-	r	-	-	+
Eriophorum vaginatum (Cotton-grass)	leaf spindle		*o	-	r	r	*r	r	+
Hylocomium splendens (Moss)	leaf		r	-	o	-	r	r	+

TABLE 1 cont.

HEATH, BOG AND GRASSLAND cont.		A	B	C	D	E	F	frags
Hypnum cupressiforme (Moss)	leaf	-	r	-	-	-	-	+
Juncus acutiflorus/articulatus (Sharp-flowered/Jointed Rush)	seed	r	-	-	-	-	-	-
Juncus bufonius (Toad Rush)	seed	r	-	-	-	-	-	+
Juncus sp. (Rush)	leaf or stem	-	-	*r	-	-	-	-
Rhius hornum (Moss)	leaf	-	-	-	-	r	-	-
Potentilla cf. *erecta* (cf. Common Tormentil)	achene	-	-	-	-	-	-	+
Pteridium aquilinum (Bracken)	frond F	*r	-	r	*r	*r	-	+
Rhytidiadelphus cf. *squarrosus* (Moss)	leaf	-	-	r	-	r	-	+
R. triquetrus (Moss)	leaf	-	-	r	-	-	-	-
Selaginella selaginoides (Lesser Clubmoss)	megaspore	-	r	-	-	-	-	-
Sphagnum sp. or spp. (Bog Moss)	leaf	c	c	c	r	r	r	+
AQUATIC								
Chara sp. (Stonewort)	oospore	r	-	r	-	r	-	-
MISCELLANEOUS								
Cf. *Betula* or *Alnus* (cf. Birch or Alder)	wood	r	-	-	-	-	-	+
Cf. *Cerastium* (cf. Mouse-ear Chickweed)	seed	-	-	-	-	r	-	+
Coniferae (Conifer)	wood	*r	-	-	-	r	-	+
Dicranum sp. (Moss)	leaf	r	-	-	-	-	-	+
Fissidens sp. (Moss)	leaf	-	-	-	-	-	-	+
Rhacomitrium sp. (Moss)	leaf	r	-	-	-	-	-	-
Rumex sp. (Dock)	nut, perianth	-	-	-	-	-	-	*+
Viola sp. (Violet, Wild Pansy)	seed F	-	-	-	-	-	-	+
Unidentified	seed	-	-	-	-	r	-	+

TABLE 1 cont.

ANIMAL			A	B	C	D	E	F	frags.
Bone	cancellus	F	+	-	-	-	+	*+	+
Cf. *Cervus* (cf. Red Deer)	hair	F	+	+	+	+	+	+	+
Cf. *Ovis* or *Capra* (cf. Sheep or Goat)	hair	F	-	+	-	+	-	-	+
Cf. *Mustelida* (cf. Weasel family)	hair	F	-	-	-	-	-	+	+
Cf. *Vulpes* (cf. Fox)	hair	F	-	-	-	-	+	-	-
Aves (Bird)	feather	F	-	-	-	-	-	-	+

Key to Table 1

r: rare, 1-3 o: occasional, 4-10 c: common, 11+

F: fragment *: some carbonised +: denotes presence

TABLE 2

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

	B	C	F
Betula (Birch)	0.5	0.7	1.2
Pinus (Pine)	0.2	0.2	1.2
Quercus (Oak)	+	-	0.6
Alnus (Alder)	0.9	0.5	1.6
Tilia (Lime)	-	-	+
Fagus (Beech)	-	+	+
Coryloid (Hazel/Bog Myrtle)	0.9	1.2	2.2
Salix (Willow)	0.2	0.2	-
Gramineae (Grass family)	15.2	22.3	6.5
Hordeum group (Barley and wild grasses)	3.3	5.6	1.1
Cyperaceae (Sedge family)	4.2	-	2.0
Calluna (Heather)	38.3	34.5	46.1
Empetrum nigrum (Crowberry)	0.9	1.5	26.5
Calluna/E. nigrum (Heather/Crowberry)	3.7	5.1	5.8
Ericaceae (Heath family)	-	0.2	+
Artemisia (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	+
Filipendula (Meadowsweet)	1.9	1.2	0.6
Linum catharticum (Purging Flax)	+	-	-

Table 2 cont.

	B	C	F
Lotus (Birdsfoot-trefoil)	-	+	-
Plantago lanceolata (Ribwort)	3.3	7.6	2.0
P. maritima (Sea Plantain)	2.1	1.2	+
Plantago sp. or spp. (Plantain)	3.0	-	0.2
Polygonum aviculare (Knotgrass)	1.2	0.7	-
Potentilla type (Cinquefoil/Tormentil type)	1.9	2.4	0.5
Ranunculaceae (Buttercup family)	1.2	1.5	0.3
Rubiaceae (Bedstraw family)	0.2	-	-
Rumex (Dock/Sorrel)	0.2	0.5	-
Stellaria holostea (Greater Stitchwort)	-	-	+
Succisa (Scabious)	0.2	0.7	-
Trifolium repens (White Clover)	-	0.2	-
Umbelliferae (Umbellifer family)	0.5	-	-
Botrychium (Moonwort)	+	-	-
Polypodium (Polypody)	0.7	+	-
Pteridium (Bracken)	-	-	+
Filicales (Fern)	0.5	1.2	0.2
Selaginella (Lesser Clubmoss)	-	0.2	-
Sphagnum (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

The bones

T J Sellar

BONE REPORT

T. J. Sellar

Introduction

Post-excavation analysis saw little justification for maintaining the original division of the excavated material into 3 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 and thus the impact of material in the other layers on the total sample would have been minimal. For the sake of the record percentages and totals for each layer are preserved in Tables 3 and 4.

In all, 2496 bones and bone fagments were examined, of which some 86.7% (2164) were identified (Table 3). Many of the bones, and particularly the long bones, were broken into small pieces. This restricted the information that could be obtained, particularly on possible pathology and other aspects such as means of slaughter. On the other hand, some bones contain marrow which is highly nutritious and their destruction is to be expected.

Methods

Each bone or fragment of bone was examined and identified as far as possible. This was done by reference to skeletal material available either within the Biology Department at Imperial College or at the British Museum (Natural History). 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) from the dressed carcass weights given in Chaplin (1971). However, it should be noted that the weights are

estimates only and represent between one quarter and one third those expected from modern breeds.

In Tables 5 and 6, 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. The reference skeletons were disarticulated specimens of Chillingham ox and Soay sheep, owned by the British Museum (Natural History). This analysis assumed that: a) larger, heavier bones break into more pieces; and b) variations in bone density and degree of fragmentation are not significant. These major assumptions were necessary because it was not practicable to weigh the bone fragments of the sample by type. The aim of this analysis was simply to give an indication of which bone types were under-represented in the sample. Such bones would have been removed from the carcass and perhaps used elsewhere, for instance, in the manufacture of tools. This information is indicative only and should be treated as such.

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. Rabbits were a Norman introduction to Britain and therefore post-date considerably the era of the brochs. Nowadays rabbits are regarded as an agricultural pest in Orkney (sometimes as a plague!) but the chances of rabbits having contaminated the well fill are negligible and can be ignored. The "rabbit" bones are more likely to be those of a small hare and this identification is used in the

present text. As regards the second uncertain species, *Rattus rattus* seems to have been introduced to Britain by the Romans (C. Dickson, personal communication). It is not known when rats first appeared in Orkney; at the present time they thrive in the farming-based economy of the islands and certainly there is no animal more adept at finding its way into and through the rubble of a derelict site. A cemetery overlying an ancient, fairly extensive stone-built settlement on the coast and at the edge of reasonably productive farmland could well provide a refuge for rats. It is not impossible that a rat should have made its way into the well chamber, though no signs of animal disturbance were noted by the excavator. Suggested alternative identifications might be stoat or weasel (both absent from present-day Orkney), tentative identification of their fur having been made from the coprolites (Dickson q.v. above).

Three other points should be remembered when reading the report. Firstly, no attempt was made to separate sheep and goats. Thus the bones referred to below as sheep could have been from either animal, or a mixture of both. Secondly, for various reasons, 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 possibility of sexing 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 morrhua*

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), 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, nor is there much indication that the meat was cooked. Only two fragments in the entire sample showed evidence of having been subjected to any significant heat.

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). These were dominated by sheep bones which were the equivalent of 52.9% of the total identified (Table 4); 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. Conclusions drawn from the data on other species would have to be much more tentative.

Compared with the reference animals, most bone types were well represented (Tables 5 and 6). The only notable exceptions were ox pelvic girdle and sheep skull and ankle bones (Table 7). The pelvic girdles could have been used for the manufacture of larger objects such as combs, while the skulls perhaps were used as ornaments; this is, of course, purely speculative. The ankle bones, being rather small, probably had limited use and may even have been lost before deposition of the sample; alternatively,

some of the smaller bones may have been used for making dice or other gaming pieces (cf. MacGregor 1974, 86-88 and 89 fig. 16). In both cattle and sheep, the most numerous bones were rib and these accounted for around one third of the total for each species. n the sheep, the next most abundant were leg bones. Generally these were much less fragmented than those of ox. The ulnae, humeri, femurs and tibiae seem to have been broken on the shaft, presumably for the removal of the nutritious marrow. Generally, radii and fibulae were whole. The sheep scapulae also were mainly unbroken. This is a little surprising as they easily could have been worked into, or used as, useful articles such as shovels; however, the bone may have been considered too small or too fragile to be useful.

One of the larger ox skull fragments had a horn core that was broken and seems to have healed partially before death. The break was not close to the skull and other fragments had the core intact. Therefore, it is not probable that dehorning, common in modern husbandry, was attempted. It seems more likely to be the result of an accident and the animal lived for some time afterwards. One pig bone was of interest, having a femur with iron deposits. This suggested it spent some time in very wet conditions.

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, especialy during the winter. The rat, if such is a correct identification, is a scavenger that probably fell into the well and could not escape; on the other hand, if these are stoat or weasel bones, then one naturally must return to the idea of hunting or trapping, though for the pelt rather than the meat.

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). They show quite wide variations between the possible minimum and maximum numbers for each of the domesticated species (Table 8). 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. In terms of husbandry this would seem logical if the pigs were maintained only to relieve the monotony of the diet and provide for periods of animal feed shortage, particularly in winter. Somewhere in the region of 60% of the meat yield came from the cattle, about one quarter from sheep and around 15% from pigs (Table 8).

These figures ignore the contribution of the red deer. The numbers of this animal 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, McCowan and Nicholson (1976). These varied between 98-143 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. 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). This makes the information 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). 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 7 records of ages betwen 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). 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 (and these included a mandible from a very young lamb), 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). 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. As in the lambs, this was supported by other bone evidence. In one case the specimen was so small that it may have come from a foetus, perhaps still born or from a pregnant sow. Few animals between one and two years were killed. If not taken early on, the pigs were allowed to mature to full size before being eaten.

Conclusions

The overall picture of the community which deposited the bone material is complex. They seem to have developed a well organised 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 was 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. Pigs would also provide excellent variety to the diet.

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.

It is possible that the relatively large representation of lambs in the sample indicates the severity of the conditions at lambing time; certainly many were very small at death. Alternatively, it may indicate lambing success beyond the support of the available pasture land and consequent culling; this would seem less likely, however. A second period when lambs would have been killed deliberately was in their first autumn. This culled the flock and reduced it to levels that could be maintained through the winter. It probably included a more general reduction in sheep numbers of all ages. However, there does seem to have been a tendency to allow some sheep to lamb once (when about 2 years old), then kill them. 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 (again perhaps part of a culling programme) or allowed to mature and produce piglets. This herd would have given a very helpful degree of flexibility to the husbandry practised. They could have provided good quality meat when the cattle and sheep were suffering from food shortages. 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: firstly, 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 requirements 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.

Table 3

Numbers of fragments in each layer of the sample

Layer	No of fragments	Identified		% of total
		No.	%	sample
1	224	193	86.2	8.9
2	234	182	77.8	8.4
3	2038	1789	87.6	82.7
Totals	2496	2164	86.7	100.0

Table 4

The percentage abundance of fragments from each species and in each layer and the number and percentage for the whole sample.

	Layers			Totals	
Animal	1	2	3	No.	%
Ox	46.1	25.3	19.9	476	22.0
Sheep	31.7	54.4	55.1	1147	52.9
Pig	9.8	14.3	3.6	109	5.0
Red deer	11.4	6.0	18.7	366	16.9
"Hare"	-	-	0.5	8	0.4
"Rat"	-	-	0.3	6	0.3
Cod	0.5	-	2.6	48	2.2
Limpet	0.5	-	0.3	7	0.3
Totals	100.0	100.0	100.0	2164	100.0

Table 5

Table of cattle bone types.

For Chillingham ox, weights are expressed as percentages of the total skeletal weight.

For the Well Fill, numbers of fragments are given as percentages of the total.

	Chillingham	Well Fill	
Bone type	ox %	No.	%
Skull	16.2	76	16.0
Mandible	4.8	26	5.5
Vertebra	20.3	65	13.65
Rib	11.5	152	31.9
Scapula	4.4	14	2.9
Pelvis	5.6	5	1.05
Long bone	23.7	75	15.75
Carpus, tarsus	4.3	15	3.15
Canon bone	5.4	19	4.0
Phalanges	2.8	29	6.1
Totals	100.0	476	100.0

Table 6

Table of sheep bones types, calculated in the same way as Table 5

	Soay sheep	Well Fill	
Bone type	%	No.	%
Skull	33.2	125	10.9
Mandible	4.7	79	6.9
Vertebra	16.4	106	9.2
Rib	9.4	441	38.4
Scapula	3.1	59	5.1
Pelvis	3.5	41	3.6
Long bone	19.5	218	19.0
Carpus, tarsus	2.7	15	1.3
Canon bone	5.9	43	3.7
Phalanges	1.6	20	1.7
Totals	100.0	1147	100.0

Table 7

Data from Tables 5 and 6 showing bone types notably less well represented than expected from the reference animals.

Bone type	Ox	Sheep
Skull		x
Mandible		
Vertabra		
Rib		
Scapula		
Pelvis	x	
Long bone		
Carpus, tarsus		x
Canon bone		
Phalanges		

Table 8

Estimates of maximum and minimum numbers (from all sources) and their estimated relative food values calculated from dressed carcass weights ECW).

		No.	ECW	max %	min %
ox	max	15	4500	63.2	
	min	5	1500		58.3
sheep	max	67	1675	23.5	
	min	25	625		24.3
pig	max	19	950	13.3	
	min	9	450		17.5

Table 8A

Data from Table 8 with estimates for red deer incorporated

		No.	ECW	max %	min %
ox	max	15	4500	53.3	
	min	5	1500		47.2
sheep	max	67	1675	19.8	
	min	25	625		19.7
pig	max	19	950	11.2	
	min	9	450		14.2
red deer	max	11	1320	15.6	
	min	5	600		18.9

Table 9

A Age at death of the cattle, data pooled from all sources.

B Main use of cattle: > 3½ milk and draught, < 3½ meat fattened.

	Age yr.	Ox No	Ox %
A	< ∞	46	100.0
	< 3½	7	15.2
	< 2½	3	6.5
	< 1½	0	0
	3½ - ∞	39	84.8
	2½ - 3½	4	8.7
	1½ - 2½	3	6.5
	0 - 1½	0	0
B	> 3½	39	84.8
	< 3½	7	15.2

Table 10

A Age at death of sheep, data pooled from all sources.

B Main uses of sheep: > 3 wool and milk, < 3 meat fattened

	Age yr.	Sheep No	%
A	< ∞	178	100.0
	< 3	77	43.3
	< 2	39	21.9
	< 1	4	2.2
	3 - ∞	101	56.7
	2 - 3	38	21.3
	1 - 2	35	19.7
	0 - 1	4	2.3
B	> 3	101	56.7
	< 3	77	43.3

Table 11

Age at death of pigs, data pooled from all sources.

Age yr.	Pig No.	%
< ∞	21	100.0
< 2	11	52.4
< 1	9	42.9
2 - ∞	10	47.6
1 - 2	2	9.5
0 - 1	9	42.9

Finds catalogue

B Bell & S Foster

CATALOGUE OF FINDS

Note

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.

The following abbreviations for museum accessions are used throughout this catalogue.

HM	Hunterian Museum, University of Glasgow.
NMAS	National Museum of Antiquities of Scotland (now renamed Royal Museum of Scotland).
RMS	Royal Museum of Scotland, Queen Street, Edinburgh.
SM	Stromness Museum, Stromness, Orkney.
THM	Tankerness House Museum, Broad Street, Kirkwall, Orkney.

Other abbreviations:

WC	Warebeth Churchyard (= excavation site code)
WF	Well Fill (plus layer no.)

STONE

1 Long, axe-shaped beach pebble, abraded and chipped at each end. Approximately half of flat underside abraded and heavily chipped along half of one edge. Some chipping and striations (natural) on top side. WF Unstratified.
Length c250mm, maximum width c80mm, maximum thickness c48mm
Illustrated
Accession no. THM 1987.137 WC 1

2 Pounder/grinder. Beach pebble, one end abraded, other end faceted. WF 2
Length c140mm, maximum width c65mm, maximum thickness c60mm.
Illustrated
Accession no. THM 1987.137 WC 2

3 Sub-circular beach pebble, abraded one end and on one side. Surface cracking, perhaps from fire. WF 3
Length 135mm, maximum width 130mm, maximum thickness c70mm
Not illustrated
Accession no. THM 1987.137 WC 3

4 Circular beach pebble, abraded and cracked around circumference. One side broken. Perhaps used also as a pot boiler. WF 3
Length c115mm, width 106mm, maximum thickness c55mm
Not illustrated
Accession no. THM 1987.137 WC 4

5 Triangular stone, comfortably hand held, abraded around edges. Several score marks, possibly natural. Perhaps intended for use as ard or axe but no real wear marks. WF 3

Length c185mm, width 87mm, thickness 35mm

Not illustrated

Accession no. THM 1987.137 WC 5

6 Beach pebble, broken at either end but still showing signs of abrasion. Probably a grinder. WF 3

Length c141mm, width c77mm, thickness c43mm

Not illustrated

Accession no. THM 1987.137 WC 6

7 Very large and heavy beach pebble, chipped and broken at one end, abraded by grinding at other. Two handed implement. Triangular cross-section. WF 3

Length 266mm, width 102mm, thickness 84mm

Not illustrated

Accession no. THM 1987.137 WC 7

8 Beach pebble, slightly abraded at one end, broken obliquely at the other, where there is also some blackening. WF3

Surviving length 166mm, maximum width 80mm, thickness c70mm

Not illustrated

Accession no. THM 1987.137 WC 8

9 Beach pebble; abraded, chipped and broken at one end, broken obliquely at the other. Pockmarked surface. WF 3

Surviving length 165mm, maximum width c87mm, thickness 73mm

Not illustrated

Accession no. THM 1987.137 WC 9

10 Beach pebble, almost complete example, probably used as a pot boiler. WF 3

Length 138mm, width 104mm, thickness 65mm

Not illustrated

Accession no. THM 1987.137 WC 10

11 Cracked and broken fragments of beach pebbles, probably used as pot boilers. Unstratified.

Not illustrated

Accession no. THM 1987.137 WC 11

12 Pot lid, subcircular, fashioned from a piece of flagstone. Chipped around the edges and with a small piece broken off on one side. WF 3

Maximum surviving diameter 167mm x 154mm, thickness varies c12mm-6mm

Not illustrated

Accession no. THM 1987.137 WC 12

13 Hammerstone, broken in two. Long, flat beach pebble, used at either end. WF 3

Length 206mm, width 58mm, maximum thickness c12mm

Not illustrated

Access no. THM 1987.137 WC 13

14 Whetstone, naturally triangular or wedge-shaped beach pebble. WF 3

Length 157mm, width 38mm top tapering to 20mm at rounded tip, thickness 33mm

Not illustrated

Accession no. THM 1987.137 WC 14

15 Fragment of hollowed stone vessel, representing about half of an original oval piece. Coarse grained (possibly Hoy Sandstone). Probably a lamp. WF 2

External dimensions: surviving long axis length 84mm (originally c170mm), present width 91mm, thickness 45mm

Cavity: thickness of sides c22mm, base c18mm

long axis c60mm, width c45mm, maximum depth c27mm

Illustrated

Accession no. THM 1987.137 WC 15

16 Two sandstone flakes from the broch midden. Probably thought originally to be potsherds. Unstratified.

Not illustrated

Listed as being in RMS (formerly NMAS) but not traced.

Source: OS HY 20 NW 12

BONE

1 Bobbin made from sheep's leg bone with central, circular perforation. Slight grooving around perforation and some polishing.

WF 2

Length 109mm

Illustrated

Accession no. THM 1987.137 WC 16

2 Long handled comb made from a piece of whalebone and comprising originally seven teeth, of which four survive intact, one is broken and two are missing. Almost flat in section across teeth. Comb has been fashioned to resemble human hand, though broken in one corner. No incised decoration.

"Found in debris from the Stromness Churchyard, formerly Monkers Green." (Stromness Museum display legend). This is probably the "rude hand comb" found by Laing (1868, 60)

Original maximum length (including teeth) 110mm, maximum width 40mm, maximum thickness 4mm

Maximum length of teeth 23mm

Not illustrated

Accession no. SM A.124

3 Bone fragment cut to a sharp edge on either side, perhaps originally used or intended as a point. Unstratified.

Maximum length 85mm, maximum width c35mm

Not illustrated

Accession no. THM 1979.258

4 Horn, with small part of skull attached. Probably sheep or goat. Unworked. Unstratified.

Length 80mm

Accession no. THM 1979.14

5 Whalebone implement, probably a rubber as cancellated surface has been worn down to a chisel end, indicating that implement was held obliquely. There are some small incised marks, but not in any coherent pattern. Flat, roughly axe shaped. Unstratified.

Length 166mm, width 54mm (worked end) 32mm (other),

Maximum thickness 13mm

Not illustrated

Accession no. THM 1979.13

ANTLER

1 Tine, blackened and highly polished at tip. Clear signs of cutting at base.

Length 110mm

Not illustrated

Accession no. THM 1979.257

BRONZE

1 Pin, undecorated

Length 51mm

Not illustrated

Accession no. THM 1987.137 WC 50

DECORATED BRONZE AND GOLD PIECES

Sally Foster

1 Bronze and gold mount with Celtic pattern

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, although one edge has a clean cut, achieved by several blows from a sharp implement. The design consists of two major elements: a raised, decorated border (9mm 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, inbetween 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 celticised 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 (ECMS 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, c14mm 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.

Length 46mm; width 28mm;
maximum depth of border 6mm; depth of main plate 2mm.
Illustrated eg. Grieg (1940), fig. 95 (plate)
PSAS 26 (1891-92) 86 (woodcut)
Accession no. RMS FA 44

2 Circular decorated bronze and gold mount

In 1887 a decorated mount was reported as having been found some time ago at Stromness (Curwitr 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 5mm), 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 (Curwitar 1887, 344, fig 5: Hunterian Museum acc no B.1914.364; Grieg 1940, 200, fig 96).

This Hiberno-Saxon mount, probably contemporary with the other mount from Monker Green, has variously been described as the circular terminal portion of a penannular brooch (Curwitar 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 inserts 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.

Maximum diameter 29mm, maximum depth 5mm

Illustrated eg. Grieg (1940) fig. 96 (plate)
Curwitar (1887, 346) fig. 6 (woodcut)

Accession nos. HM B.1914.863 (original)
RMS FC 160 (facsimile)

POTTERY

1 Collection of nine small coarse bodysherds, all unstratified.

Not illustrated

Accession no. THM 1987.137 WC 17

2 Collection of five bodysherds, including one originally adjacent to the base. Better fired than normal, though still with some surface cracking of slip. Some burnishing. WF unstratified.

Not illustrated

Accession no. THM 1987.137 WC 18

3 Three adjacent sherds from the side of a well made globular pot. Burnished, well fired. WF 2

Thickness c10mm

Not illustrated

Accession no. THM 1987.137 WC 19

4 Collection of sherds comprising:

a) Very thick and very coarse base sherd, no walling attached. Surface cracking. Maximum thickness 23mm

b) Coarse bodysherd originally adjacent to base. Heavily abraded.

c) Coarse bodysherd, heavily abraded, possibly originally adjacent to base.

d) Three very coarse bodysherds.

e) Abraded rim sherd.

f) Eight assorted small coarse bodysherds.

g) Hard bodysherd, partially blackened. Fairly well fired.

cont.

4 cont.

b) Very well made hard fired bodysherd, much better than average but not unique (cf. e.g. Lingro). Coil built. Thickness c9mm.

All the above from WF 2

Not illustrated

Accession nos. THM 1987.137 WC 20 a-h

5 Rim sherd from deep, very slightly shouldered, coarse heavy situlate vessel. Flat rim. Undecorated. WF 2

Maximum thickness c13mm, diameter of rim 300+mm

Illustrated (profile) fig. 8 middle, second from right

Accession no. THM 1987.137 WC 21

6 Rim sherd, everted, with pronounced shoulder. Coarse ware, abraded and cracked surface. Possibly from a relatively shallow bowl. WF 2

Thickness c10mm, diameter of rim c190mm

Illustrated (profile) fig. 8 middle, extreme right

Accession no. THM 1987.137 WC 22

7 Complete base sherd with walling attached to approximately one third of its circumference. Fairly well made flat based vessel. Internal surface of base raised, as is usually the case, with broad channel or groove between raised portion and wall. Uneven surface, probably from finger tip impressions. No burnishing or combing. WF 2

Maximum external diameter of base c125mm (surviving diameter 103mm)

Internal diameter of base c95mm; Thickness of wall c8mm

Illustrated (profile) fig. 8 bottom, right

Accession no. THM 1987.137 WC 23

8 Very coarse base sherd, greatly thickened towards the middle of the base. No finger tip impressions. Very coarse ware, surface cracked. Flat based. WF 2

Maximum thickness of base c23mm, minimum thickness 12mm

Diameter of base c130mm

Illustrated (profile) fig. 6 bottom, left

Accession no. THM 1987.137 WC 24

9 Rim sherd, reconstructed, probably from a large high-shouldered storage vessel. Everted, with a flat rim-top carrying simple zigzag motif and with internal bevel. Below the rim on the outside is an applied cordon with oblique incised marks, giving a roped effect. Below this are two horizontal lines of incised herring-bone. All motifs very probably were continuous around the vessel and probably applied mostly by fingernail.

The interior is undecorated, but the original coil construction (smoothed before firing) can still be seen. Fabric is coarse and unburnished but still reasonably well-made. Profile, technique, motifs and their execution indistinguishable from wares found at Lingro. WF Unstratified.

Thickness (shoulder) c12mm, diameter of rim c170mm

Illustrated fig. 6 top

Accession no. THM 1987.137 WC 25

10 Large piece of reconstructed rim and side, probably from a deep bowl. Undecorated. Hard fired and reasonable well made, though some unevenness on inside where finger-tip pressure was applied to smooth out the coils before firing. Some blackening and staining on exterior. WF 3

Thickness c8mm, diameter of rim c160mm

Illustrated (profile) fig. 4 middle, extreme left

Accession no. THM 1987.137 WC 26

11 Piece of rim and side from a large, deep pot. Undecorated and with everted rim, abraded but well made showing the usual thinning of the fabric as the rim was fashioned. Coil built. WF 3

Thickness c8mm, diameter of rim c140mm

Illustrated (profile) fig. 4 middle, second from left

Accession no. THM 1987.137 WC 27

12 Rim sherd from a markedly globular pot or bowl. No "neck" between small everted rim and body. Reconstructed. Blackened outside. Generally rather coarse. WF 3

Thickness c10mm, diameter of rim c190mm

Illustrated (profile) fig. 4 middle, centre left

Accession no. THM 1987.137 WC 28

13 Rim sherd, blackened, probably from tall storage vessel. Coarse, undecorated. Partially flaked on outside. Reconstructed. WF 3

Maximum thickness c11mm, diameter of rim c190mm

Illustrated (profile) fig. 4 centre right

Accession no. THM 1987.137 WC 29

14 Large piece of rim and shoulder of well-made decorated pot, probably a bowl. Hard-fired, relatively thin walled and representing a finer ware that the general assemblage. Decorative motifs (all incised and all doubtless continuous around original) consist of:

rim: zigzag;

on neck and upper shoulder: two roughly parallel horizontal lines were incised first and the space between these and the rim itself then filled with oblique incisions;

on shoulder immediately below second line is a series of triangles, with these and the space between filled with simple incisions. This motif becomes lost in a general series of incisions further round the shoulder (cf. illustration).

The interior is plain and neither surface is burnished. Reconstructed section from 3 sherds, together with 2 other rim pieces. WF 2

Maximum thickness c7mm, diameter of rim c90mm

Illustrated fig. 8 second row from top, left

Accession no. THM 1987.137 WC 30

15 Rim sherd from ware identical to 14 above. Decorative motifs identical except that second row of oblique marks is replaced by vertical strokes, but at the same spacing as before. Slightly sharper profile. WF 2

Maximum thickness c7mm, diameter of rim c80mm

Illustrated fig. 8 second row from top, right

Accession no. THM 1987.137 WC 31

16 Everted rim sherd showing pronounced thinning at the rim as this was pinched out and fashioned. Coarse, unburnished and undecorated. WF 3
Maximum thickness 11mm, diameter of rim c170mm
Illustrated (profile) fig. 6 second row from bottom, extreme left
Accession no. THM 1987.137 WC 32

17 Everted rim sherd, abraded at rim and blackened on exterior. Coarse, unburnished and undecorated. WF 3
Maximum thickness 8mm, diameter of rim c110mm
Illustrated (profile) fig. 6 second row from bottom, second from left
Accession no. THM 1987.137 WC 33

18 Everted rim sherd, probably from a globular pot or bowl, showing pronounced thinning of the fabric to form a very narrow ("knife-edge") rim. Relatively thin walled and therefore probably not a very deep vessel. Unburnished and undecorated. WF 3
Maximum thickness c6mm, diameter of rim c130mm
Illustrated (profile) fig. 6 second row from bottom, third from left
Accession no. THM 1987.137 WC 34

19 Small rim sherd, lacking the normal everted profile. Unburnished and undecorated. WF 3
Maximum thickness c7mm, diameter of rim c180mm
Illustrated (profile) fig. 6 fourth from left
Accession no. THM 1987.137 WC 35

20 Small everted rim sherd, abraded but still showing the common thinning of the fabric as the rim or lip was formed. WF 3
Maximum thickness c8mm, diameter of rim c180mm
Illustrated (profile) fig. 8 second row from bottom, second from right
Accesion no. THM 1987.137 WC 36

21 Rim sherd of markedly different fabric and profile. In contrast to the other sherds, the rim or lip is thickened, which accentuates the angle between it and the body of the pot. The provenance is noteworthy, WF 1. Undecorated, reddish fabric, unusual thickness.
Maximum thickness c12mm, diameter of rim 250mm
Illustrated (profile) fig. 8 second row from bottom, extreme right
Accession no. THM 1987.137 WC 37

22 Basal corner sherd from a thin walled, (probably) small flat based pot. The corner itself forms a near right angle. WF 3
Maximum thickness c6mm
thickness and diameter of base impossible to determine
Illustrated (profile) fig. 8 botton corner right, upper sherd
Accession no. THM 1987.137 WC 38

23 Collection of four sherds from WF 1 comprising:

a) hard, well fired body sherd. Undecorated. Maximum thickness c7mm

b) basal corner, heavily abraded

c) 2 coarse body sherds

Not illustrated

Accession nos. THM 1987.137 WC 39 a-c

24 Very small bodysherd but of distinct type. Reddish, smooth fabric, possibly related to distinct rim sherd no. 21, above, hence listed separately here. WF 1

Not illustrated

Accession no. THM 1987.137 WC 40

25 Body section of pot, reconstructed from 2 sherds. Reasonably well made (uniform thickness) and fired. Buff exterior, unusual blackened interior. WF 3

Thickness c10mm

Not illustrated

Accession no. THM 1987.137 WC 41

26 Body section of pot, reconstructed from 2 sherds. Considerable flaking on exterior. Typical curved body profile. WF 3

Thickness >8mm

Not illustrated

Accession no. THM 1987.137 WC 42

27 Abraded everted rim sherd from globular pot. Thinner at rim, unburnished, undecorated. WF 3

Maximum thickness c8mm

Not illustrated

Accession no. THM 1987.137 WC 43

28 Heavily abraded small rim sherd, of interest in that it recalls profile of no. 21 (cf. illustration). The fabric here, though, is much coarser and the provenance is WF 3

No realistic measurement possible

Not illustrated

Accession no. THM 1987.137 WC 44

29 Basal sherd, showing common thumb impression in centre. Original pot probably small. Flat based, unusually smooth on underside, in contrast to coarse interior. WF 3

Maximum thickness c8mm, maximum internal diameter c70mm

Not illustrated

Accession no. THM 1987.137 WC 45

30 Collection of basal corner sherds comprising:

a) coarse sherd, greatly thickened immediately above base. Probably from quite a large storage vessel. WF 3

Original thickness of body probably c12mm

cont.

30) cont.

b) 8 sherds of better quality (thinner, harder, better fired) than (a) above. Most show characteristic scar or flaking from immediately above original join of body and base (a natural point of weakness, hence customary thickening) as base sheared off. WF 3

Variable thickness of body, average c8mm

Not illustrated

Accesion no. THM 1987.137 WC 46 a-b

31 Rim sherd, blackened and uneven on exterior. Thin (everted) lip or rim and probably from a globular pot. WF 3

Maximum thickness c8mm, diameter of rim indeterminate

Not illustrated

Accession no. THM 1987.137 WC 47

32 Narrow body sherd but probably showing most of the profile of a small bowl with everted rim. WF 3

Thickness c7mm

Not illustrated

Accession no. THM 1987.137 WC 48

33 General collection of body sherds from WF 3, none exhibiting any features not mentioned in the foregoing.

Variable dimensions. Total of 144 sherds.

Not illustrated

Accession no. THM 1987.137 WC 49

34 5 sherds of undecorated medium-coarseware, representing 2, or more likely 3, pots; GA 132-133 and 136 definitely belong together, 134 might belong with them, 135 is definitely from a different pot. All are unexceptional broch age sherds.

a) Rimsherd. Simple, rounded slightly everted rim, showing traces of finger smoothing. Angular grits of variable size.

GA 132

b) Rimsherd, poorly preserved, from same pot as (a).

GA 136

c) Curving body sherd, from same pot as (a).

GA 133

d) Slightly curving body sherd of same texture as above.

GA 134

e) Slightly curving plain body sherd from large coarse pot. Large grits of blackish stone protruding through exterior. Finger smoothing marks visible on interior.

GA 135

Full accession nos. RMS GA 132-136

Not illustrated

APPENDIX 1

ANIMAL FIBRES

Based on information supplied by H. M. Appleyard, Textile Consultant, 8 Bridle Stile, Shelf, Halifax, HX3 7HW

The fibres (hairs) were sieved from the coprolites after dispersal in dilute acid. Most of the coprolites, including the collapsed fragments, contained fibres, although many are fragmentary. Some fibres were mounted in gum chloral aqueous mountant, others were kept in vials with formalin and later dried and mounted in liquid paraffin by Mr. Appleyard. He observed that they were too small and friable to make casts (0.5 to 5.0mm long), and his comments, which follow, are therefore based on whole mounts.

Coarse fibres with a thin cortex and wide, lattice-type medulla and fine fibres, non-medullated and only sparsely pigmented; resemble outer- and under-coat of deer.

Medium fibres with a continuous medulla, non-pigmented and fine fibres, without medulla or pigment but with slight evidence of scales, resemble the outer and inner coats of sheep or goat. Occasional curling was noted as would happen with some heat treatment; one fibre appears to be carbonised.

Fur fibres resemble one of the mustelids, possibly stoat or weasel. One fragment with a wide medulla is more like fox hair.

APPENDIX 2

INSECT IDENTIFICATION

R. M. Dobson

Note

Coprolite G was analysed for insect remains only and does not occur in the main body of the report.

Coprolite

A Many fragments of insects etc. including:

a) Oribatid mites (2 species); Arachnida, Acarina, Cribatei (Cryptostigmata).

b) Springtail; Insecta, Collembola, Coleoptera.

c) Elytron of Rove beetle; Insecta, Coleoptera, Staphylinidae.

d) Puparia of ? muscoid fly; Insecta, Diptera, Cyclorrhapha, ? Muscidae (similar to specimen in Coprolite D).

e) Larva of fly (Maggot); Insecta, Diptera, Cyclorrhapha, ? Muscidae.

f) Puparium of fly; Diptera, Cyclorrhapa, ? Phoridae (similar to specimens in coprolites B and G).

g) Larvae of fly; Diptera, Nematocera, Scatopsidae (similar to specimens in coprolites C, D and G).

h) Fragments of head and thorax of flies; Diptera.

i) Various unidentifiable scraps of insects

Coprolite

B Puparium of fly, Diptera, Cyclorrhapha, ? Phoridae

C Head capsules of fly larva, Diptera, Nematocera, Scatopsidae

D Fragments of fly puparium; Diptera, Cyclorrhapha, ? Muscidae

Fragments of fly larva; Diptera, Nematocera, Scatopsidae.

G a) Puparium of fly; Diptera, Cyclorrhapha, ? Phoridae

b) Head of capsule of fly larva; Diptera, Nematocera, Scatopsidae.

The material examined could all have come from soils containing decaying organic materials.