7

THE ENVIRONMENTAL EVIDENCE

This chapter presents the environmental data from the site in seven sections, beginning with an introduction (7.1) and followed by the specialist reports (7.2–7.7). Analysis of the data in the specialist reports has been made by phase, with limited data deriving from Phases 1–4, some useful information from Phases 5/6 but the major part of the evidence offering detailed discussion is limited to the Middle and Later Iron Age, Phases 7 and 8, perhaps covering a timespan from the 1st to the 8th century cal AD.

This represents the first comprehensive collection of information on the Iron Age environment from an excavation in the Northern Isles. The temporal distribution of the data from the site means that Howe cannot be easily compared with the adjacent Early Iron Age settlement of Bu (Hedges 1987a) or the immediately pre-Norse Iron Age sites in Birsay (Ritchie 1977; Morris 1983, 1989; Hedges 1983b), which only just coincide with the end of Phase 8. The closest comparable published site is Crosskirk in Caithness (Fairhurst 1984), although Pool on the island of Sanday, will soon be available (Hunter forthcoming).

7.1 • INTRODUCTION

During the excavations at Howe no off-site environmental data were collected and therefore the available information concerns the human exploitation of the immediate area rather than the wider environmental context. As a result, the data must be interpreted in terms of changes in demand, accessibility and methods of exploitation rather than the simple presence of a resource. It is clear that the nature of the settlement changed between Phases 7 and 8, from a defended, planned village, to a single farmstead. This must have involved a reduction in population and a change in social structure, leading to changes in demand for, and access to, resources.

Without detailed information on the contemporary settlement distribution in the West Mainland of Orkney, and on society's system of land exploitation and ownership, it is difficult to know what land and sea area supplied the materials found at Howe. The presence of substantial numbers of seabird bones from species like, gannet, shag, cormorant, and the auks, indicate access to the cliffs on which they nest (7.4 Bird Remains). The closest suitable cliffs to Howe are 6km away on the west coast and, with the exception of clearly exotic (traded?) materials, for example steatite, this could be the most distant area of resource that was exploited. All other plant and animal resources could have been obtained locally, on land or from the sea.

PHASE 7 • BROCH TOWER AND SETTLEMENT

Previously published information on the past environment of Orkney is usefully summarized by Davidson & Jones in Chapter 2 of 'The Prehistory of Orkney' (Renfrew 1985). They conclude that by about 1300 cal BC, the climate, soil types and vegetation were very like those of the present day, although agricultural land use will have changed significantly. Over the last hundred years, agricultural land has been altered by extensive draining, a decline in arable cultivation, and the extensive use of artificial fertilizers. For the Iron Age, Davidson & Jones note the pollen evidence from the West Mainland for heathland mixed with arable and pastoral farmland on the lower ground, and blanket peat on the hills.

The plant remains from Howe (7.2 Plant Remains below; 7.2.1mf 1:C1–D2), confirm these conclusions, with only one identified species not forming part of the present day flora. The semi-natural vegetation represented in the plant remains includes a heath community which was brought to the settlement as peaty turves for fuel. Peat was also exploited as a fuel, although identifiable plant remains were rarely present to distinguish between upland blanket peat and valley mires. Both were available within a few miles of Howe during the Iron Age. Semi-natural woodland was represented by charcoal from native tree species. The abundance of willow (*Salix*) over birch (*Betula*), rowan (*Sorbus*) and hazel (*Corylus*) charcoal indicates that

the source of wood was willow carrs on the low lying marshes, rather than the more diverse birch woodlands, represented on Orkney today only by a fragment in Berriedale, Hoy. The picture of semi-natural vegetation is completed by the rare presence of brackish and freshwater plants and marine algae.

Of the man-made plant communities, arable fields were well represented from samples of barley straw and other crop-processing debris. The only crop identified from Phase 7, was naked six-row barley. This was grown in fields that were, using the evidence of weed seeds, fertilized, carefully weeded and rather wet in places. The existence of pastures cannot be directly demonstrated from the plant remains, nor is there clear evidence of hay production. However, the domestic livestock must have been grazed somewhere away from the arable fields.

The detailed geographical distribution of these communities is unknown, although it may reasonably be assumed that the main differences between this period and the present day distribution would be the greater extent of heathland and poorly drained areas of lowland. Cultivated land was probably restricted to the better drained slopes, such as those around Howe itself.

The vertebrate fauna of the islands was well represented in the archaeological record, with large samples of fish, birds, mammals and amphibians (7.3–6 below; 7.3.1–6.1mf 1:D3–G14). The fish bone assemblages have been interpreted by Locker as the product of an opportunistic fishery using small boats inshore, or simply fishing from the shoreline. Therefore the assemblages are a fair reflection of the range of species present in inshore waters at the time. The presence of significant quantities of corkwing wrasse bones is interpreted as evidence of warmer sea temperatures than at present. In view of the widespread evidence for a decline in air temperatures prior to the Iron Age (Davidson & Jones, 1985, 32), the possible persistence of warmer seas until a later date is an important factor in the changing Orkney environment. The poor representation of salmonid bones in the assemblage is interesting in view of the present day abundance of brown and sea trout in the Loch of Stenness only 0.5km from Howe. Sea trout are easily netted in the shallow water entering the loch from the sea. The lack of evidence for exploitation of what is now an obvious resource could imply its absence in the Iron Age.

Birds are represented in Phase 7 contexts by the bones of 91 taxa. The close agreement with the present day species list for Orkney is again striking, and a full range of breeding habitats is represented, from sea cliffs to heathland, farmland and freshwater locations. The breeding status and abundance of these species in Phase 7 is hard to establish, as over half the sample are represented by one or two bones only. However changes have clearly occurred in some species, for example, the small scale exploitation of gannets is evidence of local colonies on the Mainland of Orkney at that time. These colonies are now extinct, presumably due to over exploitation, and this was the fate of the great auk. Other than the great auk, the species of sea birds appear to have remained the same, with even the recently expanding fulmar present in Phase 7. The apparent abundance of red grouse in Phase 7 may indicate a greater extent of unimproved heathland, as it is restricted to that habitat, and is not now abundant on Orkney. Red grouse was one of the most abundant species of bird recovered from the Early Iron Age roundhouse at Bu, close to Howe (Bramwell 1987). The turnstone which apparently bred locally in Phase 7 does not breed in Britain at present, but whether this is the result of loss of habitat or some larger scale shift in distribution, is not known. The closest breeding birds are currently in W Norway. Bird species recorded from the much smaller Phase 5/6 assemblages are predominantly those common in the Phase 7 assemblage.

The bones of at least 14 species of mammal were identified from the Phase 7 assemblages (Table 12 below), of which six are domesticates (cattle, sheep, pig, horse, cat, dog), and four are certain human introductions (red deer, Orkney vole, field mouse, brown rat). Only the otter, seals and cetaceans are definitely native, whilst the status of fox is uncertain.

The bones of seals and cetaceans did not allow species identification, so that no comparison can be made with the present day distributions. The low frequency of cetacean bone is thought to result from carcasses being processed on the shore, with the bones only reaching the settlement for the manufacture of artefacts. The fate of seal carcasses is less certain; seal bones are also very rare (23 out of 12,102 identified from Phase 7), but unlike those of cetaceans, they are not found as artefacts. This suggests that some carcasses, or joints at least, were reaching the settlement. It is unclear whether this represents most of a small total, or a tiny proportion of an important wild animal resource largely disposed of on the shore. Where information exists

during the last hundred years, seal populations have been strongly influenced by hunting (Vaughan 1975), and this may well have been true in the Iron Age. The enclosed waters of the Bay of Ireland, which Howe overlooks, currently supports only common seals. Grey seals prefer uninhabited islands and inaccessible beaches on which to haul out, or breed. It is possible that seals were locally scarce in the Iron Age, due to over-hunting near Howe, as all the breeding and haul-out sites were easily accessible to hunters.

Foxes are not part of the modern fauna of Orkney, and the only published archaeological evidence is from the Neolithic chambered cairn at Quanterness (Renfrew 1979). Here, the bones were thought to represent the use of the tomb as a fox den some time after its final use for burial (ie after 2430±90 cal BC), and the bones were subsequently C14 dated to the Iron Age (Hedges *et al* 1987, 300–301). Clutton-Brock (1979, 113), suggests that the fox could have been present in Orkney prior to its post-glacial separation from Scotland. There is no evidence for this, and an intentional human introduction of the fox is equally possible. This must have happened before *c* 400 cal BC as fox bones were identified from the Phase 5/6 deposits at Howe. The presence of skeletons with knife cuts illustrates the disposal of skinned carcasses. The presence in Orkney of wild carnivorous mammals (other than the largely aquatic otter), during or even preceding the Iron Age, must have had a major impact on small mammals, ground nesting birds and red deer calves, as well as on domestic livestock.

Red deer were apparently introduced to Orkney in the Neolithic period (Clutton-Brock 1979), and were present at least in the Mainland and on Westray (Clarke & Sharples 1985). They were therefore a well established component of the Orkney environment by the Iron Age, and were presumably the main grazing animal away from areas used by domestic livestock. Red deer must have played a significant role in the permanent suppression of tree growth over most of the islands.

Three species of small mammal were present in the Phase 7 deposits. The history of the Orkney vole has been extensively discussed in the literature (Berry 1985, 125–7), and is probably a Neolithic introduction. It is the only abundant small mammal at Howe, although many of the bones could represent post Iron Age intrusions. The field mouse (*Apodemus sylvaticus*) was only represented by 16 bones in Phase 7, but occasional bones were present from sediments as early as Phase 3. It was also found in the Quanterness chambered cairn (Corbett 1979), so a Neolithic introduction is possible, unless they were also intrusive there. Berry (1985, 131), considers that the field mouse was introduced to Shetland and the Hebrides from Scandinavia, following Viking colonization. The presence of the brown rat (two bones only), is a remarkably early record for the North of Scotland, and the possibility of intrusion cannot be ruled out.

The considerable numbers of frog/toad bones are important because they confirm the status of one or both of these amphibians as being native, or at least successfully naturalized in Iron Age Orkney. At present the common frog is maintained only by repeated introductions, and the status of the common toad is in doubt (Berry 1985, 122).

The invertebrate fauna is inevitably less well represented in the archaeological record, as few groups leave any fossil remains. The marine invertebrates from Phase 7 are unremarkable, being species still common on shores and in shallow water today. The terrestrial molluscs reflect the man-made habitat in which they lived and reveal nothing about the wider environment outside the settlement.

SUMMARY

In conclusion, analysis of the plant and animal remains has shown that the Phase 7 settlement practiced a mixed arable and pastoral agriculture, growing naked six-row barley and keeping cattle, sheep and some pigs. This was supported by the hunting of wild animals, birds and fish, and by the gathering of wild plants and marine shellfish. There is no reason to believe that this was simply a consumer settlement, as there was evidence for cereal crop processing, the primary butchering of animal carcasses, and animal dung.

Given that the six units around the broch have all been seen as having a primarily domestic function, from their surviving layout and furnishings, the external yard adjacent to each of the six houses may have housed livestock, although the numbers involved must have been small, and also been used for the storage of crops. Domestic fowl were kept and it is possible that pigs strayed about the settlement rather than being put out to forage. Camilla Dickson has identified burnt dung, probably from milk fed calves; however, only one sample

of dung was found in a place where it could have been burnt *in situ*, (on the final floor in the ***SW*** house, during the major fire which destroyed the building). This does indicate that young animals at least were kept somewhere within the settlement.

PHASE 8 • THE LATER IRON AGE FARMSTEAD AND SETTLEMENT

The quality and range of the environmental data for Phase 8 is similar to Phase 7, and the picture they present is not radically different. However, changes were occurring in the subsistence economy of the settlement.

The main change noted in the exploitation of plant resources is the decline in the use of wood as a fuel (7.2 Plant Remains; 7.2.1mf 1:C1–D2). Local supplies of wood must have been a valuable resource since the Neolithic period when the natural woodland was largely destroyed. Therefore any trees must, by the Iron Age, have been a carefully managed resource and simple over-exploitation is an unlikely explanation for the Phase 8 decline. Loss of access to trees is a more likely cause of this change. The substitution of heathy turves as a fuel instead of wood must have had a serious impact on the heathlands that were being stripped for fuel and implies an insufficient supply of peat to the Phase 8 farmstead. Again, as with wood, access to supplies could have been a problem. Diversification in arable agriculture is indicated by the presence of hulled six-row barley, flax and possibly cultivated oats.

Late Phase 7 does have the earliest record of hulled six-row barley on the site, but it is otherwise confined to Phase 8 contexts. Even in Phase 8, naked barley remains the dominant cereal, mixed occasionally with hulled barley, suggesting that it was a minor contaminant in the naked barley crop. Flax is first recorded from Phase 8 stages 3–4, presumably as a crop, either for its fibres, or the edible seeds. The increasing numbers of oat grains in Late Phase 8, probably around the 7th century cal AD, although not specifically identified, may indicate intentional cultivation of that cereal.

In the faunal remains from Phase 8, the main changes are seen in the large mammal bone, with a decline in red deer from 18% of the identified animal bone in Phase 7, to 4% in Phase 8. This is balanced by an increase in domestic animals (sheep and pig). The proportion of red deer bone had in fact declined from 35% in Phases 5/6. It is tempting to view this as evidence for the gradual decline of the red deer population, leading ultimately to extinction, perhaps sometime after the Viking colonization. The evidence of a congenital abnormality in the red deer presented by Smith (7.3 Animal Bone Report below; 7.3.1mf 1:D3–G7) supports the idea of a small isolated population, but this was present from at least as early as Phase 3/4, implying that this small population was apparently successfully managed and maintained for at least 1000 years. If the deer population was declining, then it was probably because its position in the subsistence economy was changing.

Sheep and deer would have competed for grazing, so that any increase in domestic sheep flocks could have displaced the wild deer. Smith draws attention to the changes in sheep mortality, with a greater proportion living longer in Phase 8 than in Phase 7, indicating either that there was improved husbandry or that there was a change in farming practice. Did an increased emphasis of sheep lead to the decline in deer hunting, or did a declining deer population force increases in domestic livestock numbers. Alternatively, the Phase 8 farmstead may have lost access to the deer herd available during Phase 7, or that hunting was no longer a viable proposition for a small family group on their own. Data from other contemporary West Mainland sites would help to resolve this issue.

Two species of mammal are recorded for the first time in Phase 8, rabbit and pigmy shrew. The rabbit is intrusive and recent burrows were noted during the excavation. The pygmy shrew is represented by a single bone, and it is impossible to say whether it was present in the Iron Age or introduced at a later date.

SUMMARY

The farmstead of Phase 8 presents new additions to the crop range of the Phase 7 settlement such as flax and hulled six-row barley; in addition, there are further economic changes such as the appearance of rabbits, the increase in domestic animals at the same time as the decline in deer and the use of heathy turves for fuel compensating for the decline in the use of wood.

The diversification of arable crops and apparent reduction in hunting leads to an economy that resembles 7th- to 8th-century settlements in Orkney, for example Pool, Sanday (Hunter, pers comm), and Buckquoy, Birsay (Ritchie 1977; Morris 1983, 1989). However, it was still a way of life, with mixed arable and pastoral agriculture, combined with hunting and gathering, that would have been familiar to the inhabitants of the Phase 7 village, 800 years earlier.

7.2 • PLANT REMAINS

Camilla Dickson

Howe is one of the very few prehistoric sites in Scotland where plant remains have enabled the study of a continuous record of occupation throughout the Iron Age. In the past, barley grains were recorded from broch excavations but the floor and midden samples were largely discarded. In recent years improved sampling has shown that environmental evidence has been preserved. At Howe the careful sampling of numerous contexts has produced more than eighty taxa of flowering plants and mosses, thus enabling a detailed picture of the use of plant resources over perhaps a thousand years of prehistory.

Pollen analyses show that the local scrub woodland was largely cleared and pastoral farming established before the chambered tomb was built. Barley was recorded from the earliest settlement; certain evidence for naked six-row barley dates from the roundhouse occupation and continues through to the end of the Phase 8 settlement. The ears of naked barley were probably plucked, dried and hand-rubbed. Whole ears were recovered from the Early Phase 7 fire in the broch tower where grain was dried and parched; some grain was cooked whole in broth or as gruel. From Later Phase 7 hulled barley partly replaced naked barley. Wild oats were found in Phase 7 contexts and oats may have been cultivated by Later Phase 8. Linseed/flax seeds were recorded from Early Phase 8 onwards. Fruits of crowberry and whortleberry or cowberry were collected in Later Phase 8. Plants found having ancient medicinal uses are lesser celandine, juniper, cf common skull-cap and cf dead-nettle.

The main roofing timbers were probably of conifer driftwood, larch and probably spruce are indicated; it is suggested that turf was used for gable ends and straw thatch was probably used wholly or in part. Willow was used for smaller roofing wood and for furnace fuel. Birch, ash and alder may have been used in building and part of an alder container was recovered. The striking decrease in wood after Phase 7 is tentatively linked with its exploitation for industrial use. A heather basket was found and heather was commonly used. Brackish water and sea-shore plants were collected, perhaps for animal bedding and fodder. Water supplies from Phase 7 onwards were probably from a loch or pond. Burnt dung indicates that milk-fed animals were housed in the ***SW*** and ***S*** buildings during part of Early Phase 7; the ***SE*** building was domestic.

METHODOLOGY

Nearly 500 samples were examined in total; most were of carbonized material floated and sieved from the site. 36 wet samples were sieved in the laboratory and at least one sample from each context was prepared for pollen analysis; however, only two samples contained countable pollen. Each sample was examined using a stereo-microscope at x4 magnifications to extract identifiable remains. Fruits, seeds and charcoal were compared with those from a modern reference collection. Detailed notes on identification are available in microfiche (1:C1–C4). The complete list of macroscopic plant remains from each sample is available in the archive and a summary by phase is set out in Table 2. The nomenclature is according to Clapham *et al* (1981) and Smith (1978) for the wild plants. The detailed results from contexts which are particularly informative from Phases 4 to 8 are set out in Tables 3–7mf (1:C7–C14).

DETAILED DISTRIBUTION OF PLANT REMAINS BY PHASE

NEOLITHIC

PHASES 1/2

Charcoal only, was recovered from Phase 1/2 contexts. From the pre- Neolithic surface, alder (*Alnus*), birch (*Betula*) and rowan type (*Sorbus*) were present, and from the area adjacent to a hearth spruce (*Picea*) was identified. The status of trees in Orkney is later discussed.

PHASE 2

Two of the samples from contexts at the base of the chambered tomb mound were productive in both pollen and larger plant remains. One sample (SF 7299) had fragments of decayed turf *c* 3mm thick consisting of poorly preserved epidermal fragments, together with fruits or seeds of cf tufted hair-grass (cf *Deschampsia caespitosa*), cf rough-stalked meadow grass (*Poa* cf *trivialis*), conglomerate/soft rush (*Juncus conglomeratus/effusus*) and stinging nettle (*Urtica dioica*). These remains suggest damp grassland or pasture, probably disturbed ground.

The second sample of silts (SF 7302) contained seeds of wood bitter-cress (*Cardamine flexuosa*), hairy bitter-cress (*C. hirsuta*), conglomerate/soft rush (*Juncus conglomeratus/effusus*), blinks (*Montia fontana*), marsh yellow cress (*Rorippa islandica* ssp *islandica*) and procumbent pearlwort (*Sagina procumbens*). These could all have grown on damp ground with some bare mud near to water. Tufts of mosses consisted of *Hylocomium splendens*, *Hypnum cupressiforme* and *Rhytidiadelphus squarrosus* all widespread in suitable grass and woodland habitats with bog moss (*Sphagnum palustre*), found in marshes and wet woods, and *S.*sect *cuspidata*, some species of which can grow in similar habitats.

Pollen Analysis (Table 1mf 1:C4)

From their appearance then, context SF 7299 represents a turf line, and SF 7302 a tuft of moss with seeds, both denoting the original ground surface. They are therefore the equivalent of surface samples, and so local pollen will be over-represented and regional pollen under-represented. Further more, there are very high numbers of poorly preserved unidentified grains, in SF 7299, 72% and in SF 7303, 89%, probably mainly of the grass family (*Gramineae*) with some birch (*Betula*) and hazel/bog myrtle (*Coryloid*) pollen. However clear inferences can be made in spite of these problems.

The most striking features are the low tree and shrub values, only *c* 16% of the total, which must represent a very open landscape. Grasses form the most important group, over 50% of the pollen; the grassy nature of the immediate area is shown by the grass fruits in SF 7299. Appropriately, this sample contains the highest values for plantain (*Plantago*) species especially ribwort (*P. lanceolata*) at 7%, usually an indicator of pastoral farming; pollen of the buttercup family (*Ranunculaceae*), frequently a pastoral indicator, is also present. Other herb values are low and there is virtually no indication of arable farming; heather (*Calluna*) values are also low. The presence of ferns, up to 14% in SF 7302, from a damp mossy habitat, together with honey-suckle (*Lonicera*) pollen, may suggest the former existence of scrub woodland. In spite of the limitations, already mentioned, of the two samples, it seems reasonably certain that by the time the chambered tomb was built woodland was largely cleared and some pastoral activity established in the area.

Comparisons can be made with pollen analyses showing a more regional pollen picture in the late Neolithic. Analyses through deposits in the Loch of Skaill, *c* 8km NW of Howe, Glimms Moss, *c* 12km to the NNE (Keating & Dickson 1979), and Lesliedale Moss, *c* 12km E of Howe (Jones 1979) all depict a largely treeless landscape with mainly pastoral farming. Local arable as well as pastoral activity is shown from ditch deposits at the Stones of Stenness 3.5km to the NE (Caseldine & Whittington, 1978) and from Maeshowe nearly 5km also to the NE (Jones 1979).

From the same context, wood of Scots pine (*Pinus sylvestris*) was recovered; the status of pine in Orkney is later discussed.

PHASE 2/3

The discovery of peat fragments from this early period is of particular interest. In Orkney blanket bog did not begin to form until *c* 3500 bp as shown by Keating and Dickson (1979), who also note that valley bogs require drainage for ease of cutting. It seems unlikely, therefore, that this sample dates from the Neolithic, but is more likely to be from the earliest settlement. It is noteworthy that peat was not recorded again until Early Phase 7 contexts.

IRON AGE

PHASE 3

The silts overlying the Neolithic ditch, containing midden and other occupational debris from the earliest Iron Age settlement, yielded a few plant remains and these are listed in the main table, Table 2. The earliest evidence of barley growing at Howe is of one barley rachis fragment only. Birch, cf rowan, spruce, willow and heather were used.

PHASE 4–6

The plant material and associated finds from the most informative samples from Phase 4 onwards are listed in Tables 3 to 7mf (1:C7–C14). The plants comprising weeds are discussed later in the report, as is the burnt material resembling dung.

Wheat of emmer type (*Triticum* cf *dicoccum*) is represented by one grain from a Phase 4/5 context. Emmer has been found in Orkney from Neolithic to Iron Age contexts, invariably as rare grains and usually with barley. Naked six-row barley (*Hordeum vulgare* var *nudum*) is tentatively identified from Phases 5 and 6 and with certainty from several Phase 5/6 contexts. Three samples, each containing hundreds of adherent grains, purely of naked barley, came from ditch fills; those from 1837 and 1835 had a little adherent carbonized material similar to either burnt flesh or dung. The barley seems to have burnt whilst cooking and is described later in the report. From Phase 5/6, below the late revetment, were found one grain of cf naked barley, rare straw fragments and a quantity of weed seeds including over a hundred fruits of stinging nettle (*Urtica dioica*); however a single nettle plant can produce hundreds of small fruits, so the large number is probably not significant. As all these remains from the ditch fills were carbonized, it is unlikely that any of the plants were growing in the ditch but probably represent straw with accompanying weeds cleared out from occupation deposits. Willow was the commonest wood used and found in thirty of the forty-one samples. Ash (*Fraxinus*), birch, cf spruce and willow were found on the earth floor of the roundhouse/Broch 1 and the presence of post-holes suggests that some of the wood at least was structural. Heather was found in the broch and four other samples.

Unburnt plant material from the Howe occupation was rare, but a little was incorporated in the chocolate-brown silt within the E well, Phase 4–6. The very small plant fragments included one seed and a stem/leaf fragment of rush, two stinging nettle fruits and rare moss leaves including three species of bog moss (*Sphagnum*); bog mosses have a number of uses due to their absorbent properties. Burnt plant fragments consisted of a few heather stems and leaves, a barley grain and a sedge nutlet.

Small fragments of material resembling burnt dung with adherent straw were tentatively identified from the earth floor of the roundhouse/Broch 1. There is insufficient evidence to decide whether the presumed dung was inadvertently brought in with the straw or possible evidence of animals housed within the broch at this time.

PHASE 7 – EARLY SETTLEMENT

A cupboard in the broch tower contained, together with a barley grain and a little charcoal, the sole occurrences of single nutlets of three noteworthy plants. Sheep's sorrel (*Rumex acetosella*) was perhaps gathered for medicinal use although in common with other sour docks or sorrels it has been used as a pot-herb (Grieve 1931). Another plant, cf common skull-cap (cf *Scutellaria galericulata*), is now rare on Orkney being restricted to storm beaches in the northern islands (Bullard 1972). Cf dead-nettle (cf *Lamium* sp.) (tentatively identified since the nutlet is smaller than reference nutlets) is also represented; both genera have medicinal uses.

A layer of burning within the interior passage of the broch tower consisted of willow charcoal and peat. The floor of the blocked W intramural cell, *c* 1.6m above the broch floor, yielded a few barley grains, birch, spruce, willow and heather charcoal; weeds and straw with adherent small fragments, to 6mm diameter, which are probably of dung. Also found were occasional tubers of cf lesser celandine (cf *Ranunculus ficaria*), and an achene, these suggest medicinal use of the plant and are discussed below. Although there

is so little occupational evidence preserved, these sparse remains suggest that peat was burnt and heather used; wood may have been structural or used for fuel.

Occupation evidence from the early part of the Phase 7 settlement is mainly from the two buildings damaged by fire, that is the ***SW*** and ***S*** buildings. The yard leading to the ***SW*** building had an ash and charcoal floor which formed before and during the life of that building. The floor sample consisted of straw (probably barley) and willow charcoal with rare barley and wild/cultivated oat grains, weed seeds, heather charcoal, and, tentatively identified, burnt dung, with adherent straw and peat. A deposit from the entrance paving contained seventy barley grains but was otherwise very similar to the previous sample with the addition of possible tubers of lesser celandine. Inside the building, silting in the corner of a tank contained one oat grain and 16 uncarbonised oospores of stoneworts (*Chara* spp.). Stoneworts are found in calcareous fresh and brackish waters of lochs and ponds and therefore strongly suggest that the tank had contained water. From context 1498, one sample consisted mainly of straw containing 16 barley and 12 oat grains, two of which are certainly of wild oats, and weed seeds; these included capsules of chickweed seeds which suggest that the straw, including the weeds, had not been disturbed after gathering. This implies that the ears had already been collected separately for threshing. Four samples from this context, which covered most of the floor of the building, had dung-like material adhering to straw and willow charcoal. From ash overlying this context a 10cm thick layer of burnt straw was preserved on top of silts resting on a stone. rare fragments of heather were found in it but no burnt dung; this could be one of the rare instances of roofing thatch being preserved. Worked willow wood from the same context was of at least 35mm diameter and may have been used as a roofing support. Samples from context 1394 consisting of rubble, earth and the underlying deposits were of particular interest. Several fragments of larch (*Larix*) charcoal show very narrow annual rings; they are probably from the outer wood of a large piece of timber. This may well be the first prehistoric find in Scotland and must have arrived as driftwood from North America. Larch together with willow charcoal, which now measures 30 × 35mm across, are presumed to be part of the roof; this use is discussed later. Also recovered was plant material similar to that from the partly underlying context 1498 with the addition of a little peat, and a discrete lump and characteristically shaped fragments of dung (illus 78 and notes on the identification in microfiche, 1:C1–C4). Since some of the dung has adherent straw it seems more likely to be from milk-fed calves than from infants.

As has been shown from the archaeological account, there is no other line of evidence to suggest that animals were housed in any of the buildings at Howe. It is important therefore to consider whether dung would have been brought in to store and used as fuel. All the dung recognised at Howe must have been carbonized when fresh; dried dung from suckling animals, including humans, does not appear to form vesicles when burnt. Such fresh dung would not readily dry out in the humid atmosphere of an enclosed building on Orkney. We have no burnt dung from any of the hearth samples. In an Iron Age farmhouse in the Netherlands, dung of only sheep or goats, which is of lower water content, was found in the hearth although cattle dung was readily available (Therkorn *et al* 1984). Another possibility is that dung was deliberately intermixed with straw and used as roofing material. This, however, would have the disadvantage that dung would wash through the straw when ever it rained. The importance of animal manure as fertilizer was certainly recognized by the Iron Age inhabitants of Britain and it seems unlikely that such a valuable product would have been used other than for arable crops. The most plausible explanation is that at this stage the building was used as a byre.

From the occupation debris of the ***S*** building, an oat grain, straw, weeds, heather and willow were recovered and each of three samples contained burnt dung with adherent straw, wood and stems. It seems likely that this building was also used for animal housing at the time of the fire and the partly dung-covered wood in both buildings could represent fallen roof supports. The presence of straw and adherent dung covering the living areas and the virtual restriction of cereal grains to the straw are good evidence that the two buildings were used exclusively for animal housing at this period. A single rowan seed may date from the use of the ***S*** building as a dwelling house.

Intriguing finds from the ***SW*** and ***S*** buildings are rare fruits of spiral tasselweed (*Ruppia cirrhosa*); a fruit was also found in the ***E*** building yard of the later settlement. Spiral tasselweed is confined to brackish water and consists of thread-like stems and leaves; these drift up in autumn in masses in the nearby Loch of Stenness (ER Bullard pers comm). Similar stems are produced by horned pondweed (*Zannichellia palustris*) and these were formerly used in Shetland to stuff mattresses (Fenton 1978). Since the Ruppia fruits were found in the same contexts as animal dung, and from a Later Phase 7 settlement yard, it seems more likely that the stems were collected for fodder or possibly to supplement straw for animal bedding.

The double cupboard in the ***E*** building contained eight barley grains, two of them definitely of naked barley, heather and willow charcoal. The oven contained a little heather, peat, and possibly dung, presumably from fuel. Stake-holes near the S wall of the building held decayed uncarbonised wood, tentatively identified as alder. There is archaeological evidence for possible domestic iron smelting from this building.

Ash deposited from the hearth in the ***SE*** building produced over a hundred barley grains many of them possibly naked barley, weed seeds were also noted. From a paved area just N of the hearth nine barley grains, one oat grain fragment and small fragments of heather and willow charcoal were recovered. This building seems to have been solely domestic; it is probable that only naked barley was grown at this period. There were no recognizable remains of fuel in the ash dump which suggests that peat may have been used in the hearth. The absence of straw and dung suggest that animals were not quartered in either building.

PHASE 7 – LATER SETTLEMENT

Within the broch tower willow and spruce charcoal were found in the S part of the inner circle of floor 1 and the N collapsed part of the outer circle of the second floor occupation deposits; wood of 25mm diameter or more is indicated. It is not known whether this represents fuel or roof supports.

A sample from the clay floor contained 17 barley grains with a little burnt chaff and straw and a few weed seeds. On top of this floor, ears of naked six-row barley (illus 79) were laid out to dry in front of the kilns, covering the whole inner circle of the broch tower. Some at least of the barley lay directly on the clay floor and the imprint of the grains remained where they had been trampled into the ground after accidental burning. Associated with the barley was a layer of straw a few millimetres thick containing chaff and weed seeds. A fragment of probable dung with adherent straw may have been brought in with the crop or possibly relates to an earlier use of the tower. From the same context large pieces of willow were identified which are thought to be from fallen roofing. One piece was shaped with two adjacent flat faces, each 30mm across, cut at a slightly obtuse angle; part of these faces and the other two faces had burnt away. Fragments from a long piece of alder had been roughly shaped; they measure 34 × 17mm and 42 × 19mm, and were perhaps part of a slat-like piece. Also from the barley context part of a staved container of alder was found near the barley ears; this and a woven heather basket are described below. Contemporary with the barley fire were the contents of a kiln which contained one oat grain and eight barley grains with weed seeds, presumably all introduced with straw for kindling. Also present were the remains of plants associated with heathy turf and also presumably used for fuel; this was the earliest certain occurrence of turf-forming plants from Howe and they are described below. Post-dating the barley fire, a second kiln had been used for drying barley and 238 grains were found in the ash fill of the lower part of it which also contained rare heather and willow fragments: these were presumably the remains of fuel. We

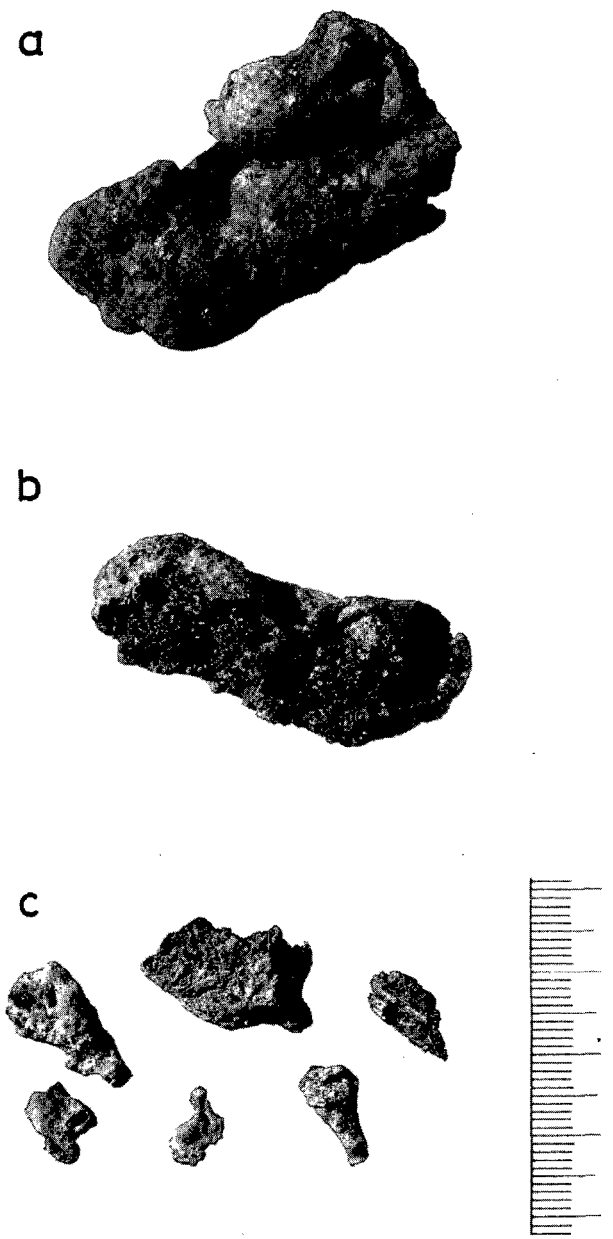
Table 2: Summary of plant remains

	Type of remains	Phase 1	2	2/3	3	3/4	4	4/5	5	4–6	5/6	6	5–7	5/7	7	7/8	8
Woodland																	
Alnus (alder	c			1							2				3		2
cf *Alnus* (alder)	w														1		
Betula (birch)	c	1			1						1				4		
Coniferae (conifer family)	c								1						2		1
Corylus (hazel)	n																1
Fraxinus (ash)	c										1						1
Larix (larch)	c														1		
Picea (spruce)	c	1			2						4				9		2
cf *Picea* (cf spruce)	c										2				5		
Pinus sylvestris (Scots pine)	w	1															
Prunus avium/padus (gean/bird-cherry)	c																1
Salix (willow or sallow)	c		1		3	1	7		5		12	2	1	3	104	7	78
Sorbus aucuparia (rowan)	s														1		
Sorbus (rowan type)	c		1		1										1		
Cultivated plants																	
Hordeum vulgare var *nudum* (naked six-row barley)	g									1	4				8		18
H. vulgare cf var *nudum* (cf naked six-row barley)	g								1		1	1			12		8
H. vulgare var *vulgare* (hulled six-row barley)	g														1		2
H. vulgare cf var *vulgare* (cf hulled six-row barley)	g																4
H. vulgare sl (six-row barley)	g												1		12		32
Hordeum sp (barley)	g														7		11
Hordeum sp (barley)	rac ba				1										5		4
Linum usitatissimum (flax/linseed)	s																5
Triticum cf *dicoccum* (emmer wheat)	g							1									
Arable and waste ground																	
cf *Anthemis cotula* (stinking mayweed)	cy														2		
Avena fatua (wild oats)	g, fl ba														3		
Avena sp or spp (wild or cultivated oats)	g												1		8		21
Brassica rapa cf ssp *sylvestris* (wild turnip)	s		1												3		
cf *Elymus (Agropyron) repens* (couch-grass)	car														1		
Galeopsis tetrahit agg (hemp nettle)	n										1		1		4		5
Galium aparine (goosegrass)	fr										1				2		2
Odontites verna (red bartsia)	s																1
cf *Poa annua* (annual poa)	car											1			1		1
P. trivialis (rough-stalked meadow-grass)	gl+car														1		
P. cf *pratensis/trivialis* (smooth/rough-stalked meadow-grass)	car	1											1		14		1
Polygonum aviculare agg (knotgrass)	n										1				4		13
Rumex crispus (curled dock)	n																2
R. cf *crispus* (cf curled dock)	n				1												6
R. obtusifolius (broad-leaved dock)	n																20
R. cf *obtusifolius* (cf broad-leaved dock)	n				1										2		6
R. cf *obtusifolius* x *crispus*	n																1
Spergula arvensis (corn spurrey)	s														1		9
Stellaria media (chickweed)	s				1			1			1		1		21		32
Tripleurospermum inodorum (scentless mayweed)	cy												1				1
Urtica dioica (stinging nettle)	a		1							1	1		1		4		1
Grassland, heaths and mires																	
Achillea cf *ptarmica* (sneezewort)	cy														2		
Alopecurus cf *geniculatus* (marsh foxtail)	car														2		1
Arctostaphylos alpina (black bearberry)	fst																1
Calluna vulgaris (heather)	c				1			1	5	2			1		58	2	185
C. vulgaris (heather)	l														2		
Cardamine flexuosa (wood bitter-cress)	s		1														
C. hirsuta (hairy bitter-cress)	s		1														
Carex binervis (ribbed sedge)	n									1	1				7		36
C. dioica (dioecious sedge)	n																1
C. flacca (glaucous sedge)	n																3
C. hostiana (tawny sedge)	n																14
C. nigra (common sedge)	n														2		20
C. panicea (carnation sedge)	n														2		4
C. pilulifera (pill-headed sedge)	n														3		6
C. pulicaris (flea-sedge)	n														2		8
C. serotina (small-fruited yellow sedge)	n																3
Danthonia (Sieglingia) *decumbens* (heath grass)	car																8
cf *Deschampsia caespitosa* (tufted hair-grass)	car		1														
Eleocharis palustris (common spike-rush)	n														2		
Empetrum nigrum (crowberry)	fst														1		24
Erica cinerea (bell-heather)	l, s														2		
Eriophorum vaginatum (cotton-grass)	sp														1		
Hylocomium splendens (moss)	l sh		1							1							
Hypnum cupressiforme (moss)	l sh		1														
Juncus articulatus type (rush)	s		1														
J. conglomeratus/effusus (conglomerate/soft rush)	s		2							1							

	Type of remains	Phase 1	2	2/3	3	3/4	4	4/5	5	4–6	5/6	6	5–7	5/7	7	7/8	8
J. squarrosus (heath rush)	s														2		14
Juncus sp or spp (rush)	l/st									1						1	2
Juncus sp or spp (rush)	s														3		3
Juniperus communis (juniper)	fst																2
Lotus sp (birdsfoot – trefoil)	s																1
Luzula sp (woodrush)	s																7
Montia fontana (blinks)	s		1					1							3		9
Pedicularis sylvatica (lousewort)	s														2		3
Plantago lanceolata (ribwort)	s														1		12
Polygala cf *serpyllifolia* (Thyme-leaved milkwort)	s																3
P. cf *vulgaris* (common milkwort)	s																2
Polygala sp (milkwort)	s																1
Potentilla erecta (tormentil)	a														1		13
P. palustris (marsh cinquefoil)	a																2
Ranunculus acris (meadow buttercup)	a																1
R. ficaria (lesser celandine)	t																1
cf *R. ficaria*	t														1		1
cf *R. ficaria*	a														1		
R. flammula (lesser spearwort)	a														2		7
Rhytidiadelphus squarrosus (moss)	l sh		1														
Rumex acetosella agg (sheep's sorrel)	n														1		
Sagina procumbens (procumbent pearlwort)	s		1														
cf *Scilla verna* (spring squill)	s																1
Selaginella selaginoides (lesser clubmoss)	m														1		4
Sphagnum sect *cuspidata* (bog moss)	l		1							1							
S. sect *sphagnum*	l		1							1							
Sphagnum sp or spp	l									1							
Vacciniumm auliginosum/vitis-idaea (bog whortleberry/ cowberry)	s																2
Vaccinium sp or spp	s																2
Viola cf *palustris* (marsh violet)	s																1
Aquatic and waterside																	
Chara sp or spp (stoneworts)	oo														1		1
Rorippa islandica spp *islandica* (marsh yellow-cress)	s		1														
cf *Scutellaria galericulata* (common scullcap)	n														1		
Brackish and maritime																	
Carex cf *maritima* (curved sedge)	n																2
Fucoid alga (seaweed)	th														1		2
Puccinellia sp (salt-marsh-grass)	car																3
Ruppia cirrhosa (spiral tassel pondweed)	f														3		
Miscellaneous																	
Bromus sp (brome or log-grass)	car														1		
Bryophyta (moss)	1 sh										1						1
Carex sp or spp (sedges)	n														7		36
Galium sp (bedstraw)	f				1												2
Gramineae (grass family)	car				1						1				12		27
cf *Lamium* sp (cf dead-nettle)	n														1		
Potentilla sp (cinquefoil or tormentil)	a														1		2
Ranunculus sp (buttercup)	a																1
Rumex sp or spp (dock or sorrel)	n				1			1							8		21
Viola spp (pansy or violet)	s																1
unidentified	ro														1		1
	l																1
	f																2
	rh														1		10
	s									1					5		12
Calluna-Eriophorum peat (heather-cottongrass peat)																	1
Calluna peat																	1
Peat				1						2					20		5
cf peat																	10
Burnt plant material		1		2				2	3	1					16		22
Total no of samples		3	5	1	9	1	7	1	2	4	23	3	4	1	167	7	235

Key to plant tables

ab	abundant	fi	fibre	n	nut or nutlet	sp	spindle from leaf base
a	achene	fl	floret	oc	occasional	ste	stem
adh	adherent	fr	fragment	oo	oospore	str	straw
ba	base	fq	frequent	pe	perianth	th	thallus
bs	budscale	fst	fruit-stone	pl	plant	t	tuber
car	*caryopsis*	g	*grain*	*rac*	*rachis segment*	*unc*	*uncarbonized*
carb	carbonized	gl	glume	r	rare	unident	unidentiified
ch	chaff	h	hulled six-row barley	rh	rhizome	w	wood
c	charcoal	l	leaf or leafy	ro	root	+	present
cy	cypsela	m	megaspore	s	seed	++	barley, more than 50 grains
f	fruit	na	naked six-row barley	sh	shoot	++	straw, more than 1/3 of sample



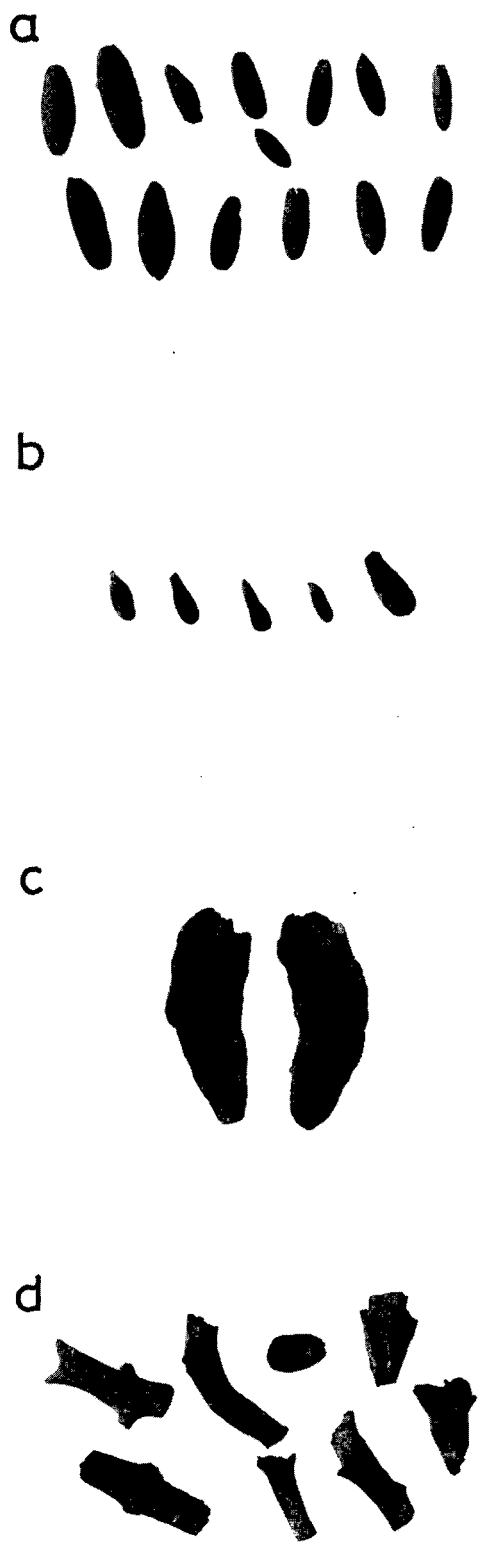
Illus 78
a) Carbonized dung of calf from the ***SW*** building, Early Phase 7 (context 1394); 42mm long; b) as above, fragment showing vesicles and cavities, 19.7mm long; c) as above, fragments, some with club-shaped ends, 10–22mm long; mm scale.

may conclude therefore that during part of the Later Phase 7 period of occupation, the broch tower was used for cereal processing. Barley ears were dried there and grain parched in a kiln. A quern, SF 2453, gives evidence that some of the grain was processed further.

From the path linking the broch to the settlement, three ground surfaces overlying one another, gave evidence of transporting barley, heathy turf, heather, willow and possibly peat.

The settlement buildings contained traces of mostly naked barley, heathy turf, heather, willow, spruce and peat. It seems probable that both turf and peat were used for fuel, although turf was also used for roofing in Orkney.

Illus 79
a) Burnt ears of naked six-row barley (*Hordeum vulgare* var *nudum*) on floor 2 of broch tower, Later Phase 7 (context 861); scale – 40mm; b) adherent clusters of naked six-row barley, ditch fill, Phase 5/6 (context 1857).



Illus 80
a) Pure sample of oat grains, wild or cultivated (*Avena* sp), from unphased rectangular building (context 892); grains 3,2–7.0mm long; b) lesser celandine (*Ranunculus ficaria*) tubers, Later Phase 8 settlement (context 644); tubers 2.9–3.7mm long; c) root, split lengthwise, ***E*** building, Later Phase 7 (context 1356), 29mm long; d) *Fucoid alga* (seaweed), thallus fragments, E cell of ***NE*** building, Early Phase 8 (context 1353); fragments 3.0–9.0mm long.

On the earth floor of the ***S*** building were found five small pieces of willow roundwood of 10–15cm diameter, 10–13 years old, one piece had been cut obliquely and could represent wattle or kindling.

From the floor round the hearth in the ***E*** building, two halves of a root cut lengthwise were found, each measured 29 × 10mm (illus 80c). Starchy roots have been used for food in the past in times of scarcity, sometimes ground and used as meal, and medicinal uses are recorded for some species. The earth floor of the yard produced another fruit of tasselweed previously found in Early Phase 7.

A cell of the ***NE*** building yielded over 100 barley grains of both naked and hulled six-row barley; this is the earliest occurrence of hulled barley from Howe. The furnace dump in the yard contained heather, willow, cf spruce and peat.

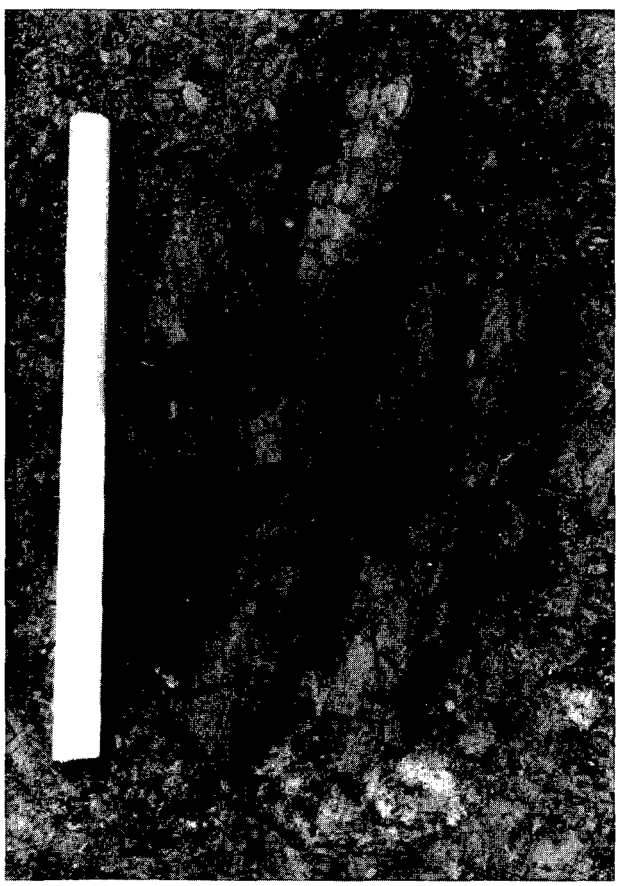
PHASE 7/8

From the third and later floor of the broch tower about a sixth of the total contents of a furnace were examined (illus 81). All the charcoal identified, over 1000g, was of willow (*Salix*); a little was of roundwood, twenty pieces of which measure 14–24mm diameter and range from 6–23 years growth. A few fragments of rush leaves/stems and other stems were noted.

From the fourth floor. a sample contained two fragments of willow roundwood each 12mm diameter, one of which had been cut obliquely, together with fragments of larger diameter willow.

PHASE 8 – EARLY SETTLEMENT STAGES 1–4

In the ***stalled*** building a single seed of flax/linseed (*Linum usitatissimum*) came from floor levelling below the paving, as did



Illus 81
Pieces of willow (*Salix*) charcoal from floor 3 of the broch tower, Phase 7/8; scale – 20cm.

two thallus fragments of a fucoid seaweed and a small fragment of alder. This is the earliest flax seed found on the site; the plant's possible use at Howe is later discussed. A few grains of tentatively identified hulled and naked barley and rare grains of wild or cultivated oats were found in hearth deposits; naked barley and less well-preserved barley grains came from other contexts. The soakaway contained 60 oospores of stoneworts, aquatic plants from fresh or brackish waters as previously found in an Early Phase 7 tank at Howe. Willow charcoal of over 40mm diameter was noted from below the paving. Pieces of worked alder wood were found in the hearth; the carbonized wood had two adjacent incomplete flat faces, 35 and 45mm wide, cut at a slightly obtuse angle, the other two sides were burnt away. It seems probable that alder and willow were both used, perhaps as roofing supports. Heathy turf and possibly peat, found in hearth deposits, were presumably used as fuel, but the use of turf also for roofing cannot be excluded. Rare fragments of tentatively identified burnt dung together with tiny straw fragments, were also found.

The plant remains from the ***NE*** building, its S annex and the yard show similar signs of domestic occupation. Barley grains, rare except for the 27 found in the hearth of the yard, were poorly preserved but naked barley was present. Willow, heathy turf and peat were found in hearth and floor samples. Well preserved heather-cottongrass (*Calluna-Eriophorum*) peat was found in the main building. From the separate cell to the E, 50 small thallus fragments of a fucoid seaweed (illus 80d) were found with willow and heather charcoal on the earth floor. Seaweed has only been noted from two other contexts at Howe, one small fragment from a shelly deposit in Phase 7 and two from the Phase 8 ***stalled*** building. Similar fucoid seaweeds have been used medicinally (Grieve 1931), they were also used to supplement cattle food in winter (Fenton 1978) and for fuel. Seaweed is still used as manure.

Willow charcoal was recovered from the charcoal spread derived from destruction deposits which partly covered the hearth in the ***W*** building, an iron-working shed.

From the hearth in the reused ***E*** building were found over 80 barley grains, some definitely referable to the naked variety. From the same context, gean or bird cherry (*Prunus avium* or *padus*) charcoal was identified; no *Prunus* species are native to Orkney and this is the only find from Howe. From the same hearth a single fruit-stone of juniper (*Juniperus communis*) was identified; this is of particular interest since the fruit has a long history of medicinal use and is still so used. Its culinary use with meat is of more recent origin. Although the fruit could have been introduced with kindling none of its charcoal was found.

PHASE 8 – LATER SETTLEMENT STAGES 5–10

As shown in Table 7 (1:C13–C14), hulled as well as naked barley was recovered from stages 5 and 6 of the Phase 8 settlement. Wild/cultivated oats were found, usually as one or two grains with barley. From context 378, 36 grains of naked barley and 13 grains of oats were recovered; as with all the oat grains from Phase 8 there were no glumes left to enable specific identification, so it is not known whether this represents a very weedy crop or the earliest instance of cultivated oats from Howe. Seven seeds of flax/linseed (*Linum usitatissimum*) were recovered from stage 5 floor samples and two single seeds from stage 9, from silt and levelling under the floor.

The remains of various berried fruits are of particular interest; 18 fruit-stones of crowberry (*Empetrum nigrum*) with three seeds of bog whortleberry or cowberry (*Vaccinium uliginosum* or *vitis-idaea*) were found in a stage 6 hearth deposit. From a later stage of the same building six crowberry stones and two seeds of bog whortleberry or cowberry with nine poorly preserved seeds of *Vaccinium* type together with a single fruit-stone of black bearberry (*Arctostaphylos alpina*) were recognised, also from a hearth deposit. Crowberry fruits are eaten by Inuits and used to be eaten by highlanders; they are quite palatable, although not very flavoursome. Fruit of *Vaccinium* spp are particularly sought after in northern countries, all are useful sources of vitamin C and *Vaccinium* spp have medicinal uses also (Launert, 1981). The black bearberry is an uncommon plant usually of montane vegetation but Bullard and Goode (1975) point out that such vegetation is found in exposed parts of the Orkney Islands, and the plant still grows on three of them (Bullard 1972). The juicy berries are 6–10mm across, the fruit-stone seems particularly resistant to decay as this one was not carbonized. The same context produced another juniper fruit-stone and with 45 nutlets of broad-leaved dock (*Rumex obtusifolius*) imply deliberate collection, both plants have medicinal properties which are later discussed.

A few fragments of a hazel (*Corylus*) nut shell were found in a stage 10 hearth; hazel is now almost extinct in Orkney and this is the only find of hazel from Howe.

Nine tubers of lesser celandine (*Ranunculus ficaria*), five shown in illustration 80b, were found in an ash dump just below a hearth, context 640. The tubers, which are formed just below the ground, must have been deliberately collected; they have been used medicinally, certainly since classical times. The properties of the plant are discussed later; the young leaves have been used as a salad (Launert 1981).

Ash (*Fraxinus*) wood, as previously stated, was presumably brought to Orkney, it was found in a yard S of the N room. From the same context were found a single nutlet of curved sedge (*Carex* cf *maritima*) and two fruits of a species of saltmarsh-grass (*Puccinellia*). They must have come from the sea shore, (the nearest is 0.5km away where *Puccinellia* still grows), perhaps from vegetation gathered from the strand line for hay. It is possible of course that detached fruiting pieces were adhering to the spruce driftwood which was found in the same context. A single fruit of saltmarsh grass was noted in another Phase 8 context and both species were present in a stage 5 context.

Heather (*Calluna*) peat was definitely identified from stage 6 and peat was probably used throughout stages 5 to 9, although very small fragments were only tentatively identified from stage 9. In 16 of 19 stage 10 hearth contexts only heather twigs were found. Remains of heathy turf plants were found with peat in some hearths, but there was no good evidence for turf in stage 10. Willow was noted from some of the hearths. Part of a root 25mm long by 10mm across was recovered from a wall core from stage 10; this is only the second root fragment from Howe, the other was from Later Phase 7.

LATE – RECENT AND UNPHASED

A sample from an apparently rectilinear structure SW of the settlement yielded 40 oat grains (illus 80a). 14 of these measure 5.0 (3.2–7.0) × 1.8 (1.2–2.4) × 1.6 (1.2 × 2.5)mm. Although they fall within the size range of both wild and cultivated oats it seems unlikely that a pure sample of wild oats would be found within a building, and so they are more likely to be black oat (*Avena strigosa*) or common or white oat (*A.sativa*); black oat was the species traditionally grown on Orkney. Fragments of willow wood were also recovered.

WOOD AND CHARCOAL

ORKNEY WOODLAND

Woodland cover has always been light on Orkney and on mainland Orkney at present the only native small trees and shrubs remaining are those of aspen, juniper and willows. Pollen analyses have shown that birch-hazel scrub, light even before the Neolithic, became largely replaced by pasture certainly under the influence of man and his grazing animals and also perhaps through climatic change (Keating & Dickson 1979). However, sheltered valleys would still have sustained woodland as is shown by remains of wood in peat and post-Neolithic pollen analyses. The only native woodland still remaining is on the island of Hoy where, in a

sheltered valley, aspen, birch, hazel, rowan and willow still grow, accompanied by tall herb communities such as still exist in other Orkney dales. In earlier times therefore we may assume that, in places sheltered from the very strong, salt-laden winds which inhibit tree growth at the present time, woodland vegetation would provide leaves of trees and shrubs and herbage which would supplement grasses as food for the larger herbivores such as red deer. However, if the grazing pressure intensified and tree seedlings were eaten preventing regeneration, trees would only remain in places inaccessible to animals, for example aspens on cliff sides such as survive at present. Similarly over-exploitation by man could equally well remove the remaining woodland.

ORIGINS OF THE WOOD USED AT HOWE

Only birch, hazel and willow are certainly known to have grown on mainland Orkney, evidenced by wood and, in the case of hazel, nuts preserved in peat; additionally, there is evidence of juniper from locally distributed fossil pollen. It is almost certain that rowan also once grew in mainland Orkney where rowan seeds have also been identified from two other archaeological sites. Alder and pine wood have been found on Orkney from the Neolithic and later archaeological contexts but their native status has never been definitely established. However, since their pollen has been found in relatively high values, especially before the Neolithic in the case of pine, it seems possible that due to exploitation by man they became extinct on Orkney. As already stated, ash and gean or bird-cherry are not native Orkney trees and must have come from the Scottish mainland.

Larch has never been a native British tree and spruce ceased to be a native many tens of thousands of years ago. Graham (1952) suggests that spruce driftwood probably originated from North America, where spruces, the American larch and other conifers still extend along the NE coasts, remnants of the great forests which existed before the 17th-century colonization began. Many of the fallen conifers would have been swept out to sea and floated eastwards on the prevailing currents. Fenton (1978, 111) quotes from the captain of a sailing ship who kept meeting 'Great Firre trees', on a voyage from Orkney to Iceland in 1577. No doubt the driftwood logs which are still occasionally found on Orkney beaches would have been much more plentiful in the past and it is notable that spruce wood had been found at numerous coastal archaeological sites in the N and W isles of Scotland, some containing holes bored by marine organisms.

THE USES OF WOOD AT HOWE

The charcoal most commonly found was that of willow, present in 135 Phase 7 contexts and 78 Phase 8 ones. Willows would be common on the undrained often impervious soils; they are particularly fast growing and so the removal of branches would give a renewable resource over many years if browsing were prevented. Willow seems to have been used for roofing supports, although the small size of present day willows on Orkney suggests that long timbers would be very difficult to find. The position of willow charcoal after the fire in the Early Phase 7 SW building suggests fallen roofing, and shaped wood from the Later Phase 7 broch tower may have had a similar origin. Wood of at least 30 × 30mm across was used. Willow wood was used exclusively for the Phase 7/8 furnace in the broch tower and included roundwood. Willow was found in one of the five Phase 7 hearths and in 18 out of 98 Phase 8 hearth deposits.

Alder charcoal was present in eight contexts from the Neolithic and Iron Age periods. Decayed alder wood was tentatively identified from stake holes in the clay floor of the ***E*** building of Early Phase 7 date; its uses could be connected with domestic iron smelting in that building. From the Early Phase 8 ***stalled*** building, worked wood, partly burnt away, was found in the hearth; it was at least 45 × 35mm across and could have been structural in origin.

The only certain wooden artefact from Howe consisted of carbonized fragments of an alder wood container from the Later Phase 7 burnt grain floor of the broch tower. The wood is all cut tangentially, the two faces parallel to the tangential plane are usually slightly curved. The growth rings suggest that wood ranging from *c* 60–500mm in diameter was used (the measurements are based on the degree of curvature of the growth rings and assume equal growth all round the tree). The sides are now *c* 15mm in thickness with a rounded unthickened rim. Each of the better preserved pieces has a flat face shaped along one longitudinal side at between 110° and 120° to the inner face. The only piece with a complete cross section has the other longitudinal side at 90o. Narrow grooves on the two small fragments suggest that the pieces may have been held together with bands of fibre or metal. Vessels and other artefacts of alder have occasionally been found in archaeological contexts (Coles *et al* 1978).

Birch charcoal was recovered form seven samples at Howe from Neolithic and Iron Age contexts. Birch is a harder wood than willow and may have been used structurally since it was found on the earth floor of the Phase 5/6 roundhouse/Broch 1 earth floor with ash, willow and cf spruce all in the same context as six post-holes used as roof supports. A fragment of a possible birch artefact was found in an Early Phase 7 wall context. It has been cut tangentially from mature wood and appears to have been rounded at one end and broken transversely. The length is now 50 × 43mm broad and 10mm thick. It could be part of a spatula; the even grain and relative hardness of birch makes it a suitable wood for small objects.

Ash wood may have been used structurally in the roundhouse/Broch 1 as previously described; a fragment was also found in the yard of a Late Phase 8 house. Ash is a hard, heavy wood and so unlikely to have arrived as driftwood; it may have been reused wood. Its flexibility makes it ideally suited to boat building.

Gean or bird-cherry was represented by a single fragment from the hearth of the ***E*** building in the Early Phase 8 settlement; the hard fruit woods have been previously used in prehistory for handles and ferrules (Coles *et al* 1978).

Three finds of rowan type charcoal were recorded from Neolithic and Iron Age contexts and they do not relate directly to buildings.

A single piece of pine wood was preserved in the waterlogged silts of the chambered tomb mound.

A single find of larch came from the Early Phase 7 ***SW*** building. Larch heartwood is naturally durable and stronger than any other common softwoods. Larch is used for beams and joists and would last longer than any other available wood for roof timber which could well have been its use at Howe.

Although spruce was recovered from all periods at Howe, as 18 certain and seven tentative identifications, it is not clear whether it was used for building although doubtless, as with larch, long straight trunks would be washed up on the shore. In common with other resinous wood, larch and spruce have a high calorific value making them particularly useful as fuel.

DISCUSSION

The evidence for the use of wood in building derives mainly from buildings damaged by fire. From the Early Phase 7 settlement, pieces of willow charcoal were found in three contexts within the ***SW*** building and from their position they appear to be from fallen roofing. The largest remaining pieces were of 35 × 35mm and 35 × 30mm minimum diameters. Wind-shaped willows growing on Orkney at the present time are much branched and only attain a height of about 2m and therefore do not produce substantial timber but could be used for smaller roofing wood. The absence of post-holes in most of the settlement buildings suggests that there were usually no central posts to support the roofs.

Wood for rafters and tie-beams would need to be of timber up to 4m or more in length. It is unlikely that any wind-trimmed native

tree could produce such long straight lengths. However, as already noted, conifer driftwood would meet this need and the timber could be cleft until it was a suitable width. Some of the larch fragments from the ***SW*** building have broad, curved growth rings from near the centre of the tree and other fragments have very narrow rings of only 5mm in twenty-two years denoting the very slow growth of a large tree; this suggests that substantial timber was employed. If straw thatch were used, a pitch of not less than 40o would be needed; this would involve the building of substantial gable ends to the required height. For ease of construction, turf or peat could be used for this purpose on top of the stone walls. There is, not surprisingly, no evidence for gable ends at Howe. Turf, if used, would, on re-roofing, be renewed and the old turf used for fuel or spread on the arable fields. There is evidence for the use of turf for composite walls in Norse and pre-Norse dwellings in the Northern Isles (Fenton 1978, 112) and gable ends of turf have been recorded on old buildings in Shetland, one such resting on a wooden lintel forms part of a byre (*ibid*, fig 59). If the form of construction were similar to that traditionally used in Orkney and Shetland, employing tie-beams (*ibid*, fig 64) the purlins could be of smaller wood such as narrow, short lengths of willow. Driftwood, roughly shaped, was traditionally used as roofing timber in Orkney and Shetland. It was covered with thatch, turves and flagstones used separately or in combination and secured with ropes of heather or straw.

Spruce seems to have been the conifer most often used by the prehistoric populations of the N and W isles. Spruce timber has been found in a Bronze Age context at Stanydale, Shetland where it was used for 10 inch wide posts and perhaps rafters, lengths of 20 feet upwards would have been employed (Calder 1951). The use of driftwood in building construction continued certainly into the late seventeenth century in Orkney (Fenton 1978, 111) and to as late as the nineteenth (BBS pers comm), although whether this resulted from shipwrecks is not known.

DECLINE IN WOOD USE

As shown in the main table (Table 2), wood was used throughout the history of Howe. Although little evidence remains from the Neolithic period, the presence of alder, birch, pine, rowan type, spruce and willow shows the variety of woods available. The long Iron Age occupation used the same woods with the exception of pine but with the addition of ash. The Phase 8 occupation lacks birch, pine and wood of rowan type. As shown in Table 2, the number of Phase 7 and Phase 8 samples is very similar and so a comparison may be made between them in the use of wood. Only about half as many Phase 8 as Phase 7 samples contained wood and this reduction affects all the trees. This contrasts with heather which is present in more than twice as many Phase 8 as Phase 7 samples. Of the Phase 8 samples, 98 are from hearths but only six of the Phase 7 samples are from hearths; Phase 8 hearths account for 83 of the 185 heather samples, but even excluding these hearth samples, the use of heather increased considerably and that of wood decreased substantially during the Phase 8 occupation.

The industrial development in the Later Iron Age at Howe would increase the demand for fuel. Iron working in Later Phase 7 used willow, cf spruce and peat, and willow was used in the Phase 7/8 furnace. Willow charcoal found in the Early Phase 8 iron-working shed was probably used in a furnace there. An ash and slag dump from Later Phase 8 produced willow, peat and heather although no industrial hearths were found after Early Phase 8.

It may be that increased use of wood caused demand to outstrip the supply and that for domestic use, heather and heathy turf were increasingly used. Peat was only certainly found in two Phase 8 hearth deposits but present in several floor samples; since peat burns more readily to ash, leaving no coarse debris, its use may be underestimated when examining floated and sieved samples.

CROP PLANTS

As shown in the tables (1:C7–C14), naked six-row barley was the cereal most commonly grown at Howe from the time of the earliest Iron Age settlement right through to the latest Phase 8 occupation. Naked barley is known from Orkney from the earliest Neolithic occupation onwards.

Several thousand adherent grains of pure naked barley were recovered from Phase 5/6 ditch fills. The grains are depressed where they press against adjacent grains (illus 79b; this is probably caused by the grains being picked at a milk-ripe or nearly dough-ripe stage. Ripe grains and dried unripe grains do not readily become depressed on cooking. Ripe grains do not adhere to each other unless cooked in a medium such as a gelatinous stock or in milk; in these, the carbonized media glue the grains together. No such substance was seen on the Howe grains. The use of milk-ripe pearl barley for soups is recorded by Pliny (AD 23–79). Perhaps these grains represent a thick barley broth; if so, it is one of the very few records of prehistoric soup. A 'porridge' of hulled and naked barley cooked in some unidentified medium was found in a Late Iron Age house in Finland (Aalto 1982). Some of the burnt deposits found on pot sherds at Howe were of cereal-type cells and barley was tentatively identified on one of them, as described elsewhere; these were preserved on sherds from all phases from 3 to 8. It seems most probable that thick broths and gruels were cooked, although we have no good evidence for any milk-based products.

Some of the stages of cereal processing are indicated from the Late Phase 7 floor in the broch tower where a fire had preserved individual ears of naked barley laid out to dry by the warmth of kilns or ovens. Three of the six rows of barley in each ear can still be seen (illus 79a), the other three rows would lie underneath; they appear to be of the nodding lax-ear variety although this could not be confirmed from the rachis segments since they and most of the chaff had burnt away. It is not known definitely whether the ears and straw were harvested separately. However it was noted that samples of straw, whilst including weed seeds, did not include rachis fragments and in one instance appeared to have been undisturbed since gathering, in fact rachis fragments were only rarely recovered from any Howe sample. As Hillman (1981, 152) points out, rachis remains are very prominent in charred remains of threshed straw that has been reaped together with the free-threshing ears. Ears of corn were plucked by hand in historic times in Orkney if the corn was short stalked, as longer lengths of straw were required for thatching (Fenton 1978, 337). The presence of the low growing chickweed (*Stellaria media*) in with the straw, suggests that the straw was gathered low on the stalk. One possible example of straw thatch was found as a 10cm thick layer overlying some of the other deposits in the burnt ***SW*** house from Early Phase 7.

One of the traditional methods of separating naked cereal grains is by hand-rubbing followed by light winnowing (Hillman 1981, fig 6). This leaves pure grain free of chaff and weed seeds; such grain was found in the kiln from the same floor in the broch, presumably being parched there before use or storage. Pure grain had been previously described from the earlier ditch fills. It seems likely that grain was sometimes toasted before grinding and mixing with milk for 'burstin', a traditional cereal dish described by Fenton (1978, 375, 395). Parched grain could be ground for barley-meal bread or bannocks, and a quern, SF 2453, suggests that this was also carried out in the broch. From Iron Age bread found at Glastonbury, Somerset, Helbaek (1952, 212), distinguished fragments of wheat and hulled barley. Barley was also malted for ale making in Iron Age Britain and farm kilns survived into this century in Orkney largely for drying malt; however none of the barley showed the sprouts which would indicate that grain was being used for this purpose.

From Late Phase 7 onwards, hulled six-row barley, also known as bere barley, was often found in the same samples as naked barley grain. Although it would first need hummeling to remove the long

awns (Fenton 1978, 373), bere could be ground without dehusking and bere bannocks became one of the traditional foods in Scotland and are still made in Orkney. However, for broth and gruel, naked barley would be preferable since hulled grain would first have to be dehusked using a knocking stone and pounder (*ibid* 390). It is noteworthy that knocking stones were not found in context at Howe, so it seems probable that naked barley continued to be grown for broth and gruel for children. Naked barley continued in cultivation at least during the Norse period in parts of the N Isles; presumably some factor such as greater susceptibility to disease, poorer yields or weaker straw led to its complete replacement with bere barley which continued to be the main barley crop grown until earlier this century in Orkney.

There is no indication that farming standards changed during the long occupation; as described elsewhere, the barley grains were of similar size throughout. Barley grains were often associated with seeds of chickweed, a plant of rich soils, a good indication that barley fields were regularly manured.

Oat grains were generally present as rare grains with the barley, although it does not seem possible to specifically identify glumeless grain on carbonized material. Grain from Phase 7 seems to be all or mainly of wild oat (*Avena fatua*). Later Phase 8 samples have a higher proportion of oat grains, which may imply weedier fields or deliberate cultivation. It is worth noting that wild oats used to be roasted for burstin. A single pure sample of 40 oat grains from a late or unphased building must surely indicate deliberate collection. Grains of black oat (*Avena strigosa*) have been recovered from an undated deposit in Gurness Broch, Evie, Orkney (Dickson 1987b), and cultivated oat (*Avena sativa*) was identified (Donaldson *et al* 1981) from Norse deposits at the Bay of Birsay, Orkney.

Of particular interest are the seeds of flax/linseed (*Linum usitatissimum*) from Early and Later Phase 8 buildings. Previous pre-Norse records of the plant from northern Scotland have been of a single seed from a broch in Caithness (Dickson & Dickson 1984), and rare seed and capsule fragments tentatively identified from human coprolites at Warebeth broch, Orkney (Bell & Dickson 1989). The Warebeth find shows that the plant had been grown for consumption as linseed. Bond and Hunter (1987) list Norse and later finds from Orkney and Ireland. They also discuss the complex processing needed to prepare the flax fibres for weaving which seems unlikely to have been carried out by subsistence economies. The interpretation of flax/linseed (*Linum usitatissimum*) grown as a fibre plant is dependent on finds of linen processing implements as pointed out by Bond and Hunter. A weaving comb related to Early Phase 8 could have been used for wool or linen weaving, but there is no unequivocal evidence for linen manufacture at Howe.

ARABLE WEEDS

The weed seeds were usually found with barley grains, sometimes with straw and chaff also present but the latter readily burns away. It seems likely that most of the weed seeds originated with the barley crop and were discarded together with the straw and the chaff during the processing. Weed seeds were not usually present in large numbers and there is no suggestion that any of them were collected for food. Where present in dwelling houses, there seems to be no difference in their distribution between the floor and the hearth. It is not certain whether they represent the refuse from cereal processing in the houses or came from straw brought in for kindling; collapsed straw roofing is another possible source.

Relatively small numbers of weed seeds were found in the larger straw samples which suggest that the crops were carefully weeded.

Chickweed (*Stellaria media*) was the most commonly occurring weed represented; although hand weeding of the young corn would remove most arable weeds, chickweed can grow and seed in five to seven weeks, its presence denotes richer soil. Other frequently occurring arable weeds were hemp-nettle (*Galeopsis tetrahit*), meadow grasses (*Poa* cf *pratensis* or *trivialis*), knot-grass (*Polygonum aviculare* agg), broad-leaved dock (*Rumex obtusifolius*) and corn spurrey (*Spergula arvensis*). Plants of wet places occurring with the straw and chaff were marsh foxtail (*Alopecurus* cf *geniculatus*), common spike-rush (*Eleocharis palustris*) and lesser spearwort (*Ranunculus flammula*), all probably growing in wet hollows in the corn field.

EDIBLE FRUITS AND NUTS

Fruit which had been deliberately collected was only found in the Later Phase 8 houses. Fruit-stones of black bearberry (*Arctostaphylos alpina*) and crowberry (*Empetrum nigrum*) and seeds of whortleberry or cowberry (*Vaccinium uliginosum* or *vitis-idaea*) were found in hearth deposits of the second and third stages of use of the same building. Although crowberry stones occurred as isolated finds in 24 Phase 8 samples, they were always accompanied by heather and sometimes also by plants of heathy turf; it is probable that in most instances therefore they came in turf. Cowberry and black bearberry are now only locally distributed and usually found near the summits of hills in Orkney (Bullard & Goode 1975). It is doubtful whether suitable habitats ever existed close to the low lying Howe area. Perhaps they were brought back to dry for winter use or, as has been already suggested, the Vaccinium species could have been collected for medicinal use. The discovery of these autumn fruiting species in the hearth debris of the last fires of Phase 8 suggests that the dwellings were rebuilt or reroofed in the autumn perhaps to take advantage of the new season's straw and heather for thatching. Fruit must have been scarce on Orkney: neither raspberry (*Rubus idaeus*) nor blackberry (*R.fruticosus*) for instance are native there, although bilberry (*Vaccinium myrtillus*) would be frequent in dales and heathland. Berries were evidently sought after but were no doubt normally eaten where collected and so finds such as these are unusual.

A few hazelnut fragments, also from Later Phase 8, were the only evidence of hazel at Howe and it was probably not grown locally. However, hazel charcoal was found in another part of mainland Orkney in Norse or earlier deposits at the Bay of Birsay (Donaldson *et al* 1981).

DOCKS (*Rumex*)

CF CURLED DOCK (*Rumex* cf *crispus*) AND BROAD-LEAVED DOCK (*R.obtusifolius*).

Two samples of pure collections of large numbers of uncarbonised dock nutlets were found in well-stratified deposits. It was noted that some of them germinated after the samples were collected and bagged. It was considered possible that these were still viable ancient seeds and a single nutlet from SF 6369, associated with the germinated ones, was submitted to the Oxford Accelerator for dating. The date proved to be modern and so it must be assumed that the other nutlets from these two samples are also modern. Details are given here of the finds and possible mechanism for their presence since similar collections may well be found at other archaeological sites.

From Early Phase 7 rubble at the rampart face, *c* 2.0–2.5m below the topsoil, at least 100 nutlets were found in damp stony silt, mostly contained within an area 0.2m square. The nutlets were

identified as broad-leaved dock (*Rumex obtusifolius*) by their shape and cell pattern. One nutlet only was still enclosed in the perianth. A further collection consisting of over 450 Rumex nutlets was found scattered between paving slabs in the Early Phase 8 occupation of the ***NE*** building. The sample was *c* 1.50m below the topsoil but not waterlogged. Most were identified as broad-leaved dock (*R.obtusifolius*), and only one nutlet retained the perianth. Three nutlets were tentatively identified as cf curled dock (*R.crispus*) and a number are intermediate in shape and cell pattern between *R.crispus* and *R.obtusifolius* which are known to produce fertile hybrids.

Curled dock (*Rumex crispus*) and broad-leaved dock (*R.obtusifolius*) grow in the vicinity of Howe at the present time. Dock fruits are often produced in large quantities; curled dock can produce over 40,000 fruits and broad-leaved dock over 60,000 per plant in a year (Cavers & Harper 1964). The fruit of both species is mainly wind-dispersed complete with enclosing perianth segments; those of curled dock can also be water-dispersed, and the spines on the perianth of broad-leaved dock also enable the fruits to adhere to animal coats. Viable nutlets of broad-leaved dock have been found in cattle droppings and those of curled dock from the excreta of various birds (Salisbury 1961, 102, 104).

The Howe mound consisted mainly of stone and rubble and was riddled with cavities. Although it is improbable that weeds were blown or moved down by tunnelling operations into discrete areas, it is possible that small rodents could have collected them. To test this hypothesis nutlets were placed where mice were known to feed and up to 500 nutlets of broad-leaved dock (*R.obtusifolius*) (perianth segments removed) were taken overnight but none when the papery perianth was left intact covering each nutlet. A specimen of field or wood mouse (*Apodemus sylvaticus*) was trapped the following night (author's observations). Bones of field mice were commonly found from the excavation at Howe, and it seems probable that field mice were responsible for the collection of uncarbonised nutlets.

A collection of 45 carbonized nutlets of broad-leaved dock (*R.obtusifolius*) were found in a Late Phase 8 hearth deposit along with seeds of berried fruits which must have been deliberately collected. There seems to be no record of the collection of curled (*R.crispus*) or broad-leaved dock nutlets for food in Britain, probably because of their astringency, but it is just possible that they were gathered for medicinal use (Grieve 1931). These docks are commonly found as weeds in waste places and field margins; their nutlets are also present in small numbers in other samples in company with other arable weeds.

MEDICINAL USES OF PLANTS

It is only rarely that plants with claimed medicinal uses have been recorded from prehistoric sites in Britain. We have no definite proof that the medicinal properties were known or even that the plants were gathered for medicinal purposes at Howe. However, such knowledge was widespread in S Europe dating back some four millennia in a more or less continuous tradition. For instance Hippocrates' (b 460 BC) use of medicinal plants was quoted and added to by Pliny (23–79 AD) and others. Fruits or tubers of the following plants (Table 10) which have medicinal uses appear to have been deliberately collected.

Firstly, the evidence for deliberate gathering must be examined. As previously stated, the absence of juniper charcoal suggests that the fruit alone was collected. Cf skull-cap may have been growing by a stream-side or in a fen; no other plant from Phase 7 comes from such a habitat and its presence solely in the broch cupboard also suggests a special purpose. The only occurrences of sheep's sorrel, a plant of heaths, grassland and cultivated land together with that of cf dead-nettle are from the same stone cupboard. The dock nutlets, as already described, have mostly been rubbed free of the enveloping perianth. To obtain the root tubers of the lesser celandine the plant would need to be deliberately uprooted.

PLANTS EMPLOYED FOR MEDICINAL USES

JUNIPER (*Juniperus communis*)

The fruits have the following active ingredients: as aromatic essential oil, flavone, tannin, resin, glycoside, bitter principle and sugar. The effect is strongly diuretic, digestant, antiseptic; causes redness, relieves flatulence and stimulates the menstrual flow (Launert 1981). The species was known to Theophrastus (370–285 BC) and the many medicinal uses given by Dioscorides (fl AD 64) suggest that the antiseptic and emmenagogic properties were known by him. Pliny recognizes the carminative, digestive, diuretic and emmenagogic qualities of the fruit (Book 24, 36). Both authors also recommend juniper for coughs and ruptures. Its use continued through the Renaissance and it is still used in herbal medicine to alleviate rheumatic and similar pains and for dropsy, bladder and kidney disorders (Launert 1981). It is of interest that a preliminary plant list from a late Roman Iron Age site in Finland (Aalto 1982) contained fruit stones and needles of juniper and other useful collected plants.

DEAD-NETTLE (cf *Lamium* sp)

The petals and flowering shoots of various *Lamium* spp are used as an infusion. The active ingredients of *L.album* include mucilage, tannin, tyramine, methylamine, choline, saponin and flavone-glycoside. The effect is astringent and diuretic (Launert 1981). Fuchs (1543), probably quoting from classical sources, recommends the pounded leaves for nose bleeds, boils, goitres, open wounds and ulcers. Culpepper (1652) gives similar uses. In herbal medicine *L.album* is used for kidney and bladder complaints, amenorrhoea, catarrh, burns and septic cuts (Launert 1981).

Table 10: Plants with medicinal uses • types and location

Juniper (*Juniperus communis*)	Early Phase 8 ***E*** building, 1 fruit-stone in hearth deposit. Later Phase 8 stage 7, 1 fruit-stone in hearth deposit.
cf Dead nettle (cf *Lamium* sp)	Early Phase 7 broch tower, 1 nutlet in stone cupboard.
Lesser celandine (*Ranunculus ficaria*)	Early Phase 7 broch tower, cf 1 achene, cf 2 tubers in intra-mural cell, and ***SW*** building, cf 6 tubers on paving. Later Phase 8 stage 5, 9 tubers in ash under hearth.
Sheep's sorrel (*Rumex acetosella* agg)	Early Phase 7 broch tower, 1 nutlet in stone cupboard.
cf Common Skull-cap (cf *Scutellaria galericulata*)	Early Phase 7 broch tower, 1 nutlet in stone cupboard.

LESSER CELANDINE (*Ranunculus ficaria*)

The root tubers and the whole plant are used; the active ingredient is not known but the effect is astringent. Theophrastus records the use of the plant and Dioscorides (Gunther 1934), recommends the juice for the purging of the head and as a gargle. Fuchs (1543) repeats Dioscorides' uses and adds that the juice heals and gets rid of piles. By the 17th century, the main use of the plant was for the relief of piles and it became known as the pilewort (the tubers bear some resemblance to haemorrhoids and this use was ascribed according to the doctrine of signatures). Because of the plant's astringency this use is considered particularly effective and piles are still treated with the plant extracts in herbal and homeopathic medicine. The young leaves have also been used as a treatment for scurvy (Launert 1981). There seems no definite evidence for its use for haemorrhoids prior to the middle ages and its earlier use seems more likely to have been for catarrh and sore throats.

SHEEP'S SORREL (*Rumex acetosella* agg)

The plant in common with other sorrels, contains binoxylate of potash. The whole fresh plant is used. The action is diuretic, refridgerant and diaphoretic and the juice is used in urinary and kidney diseases (Grieve 1931). The leaves are antiscorbutic.

COMMON SKULL-CAP (cf *Scutellaria galericulata*)

The flowering herb yields the active ingredient scutellarine; it is anti-inflammatory and alleviates fever; although it is no longer used for these purposes, an infusion is sometimes given for throat infections (Launert 1981). *S.galericulata* possesses nervine properties similar to the American *S.lateriflora* which also has strong tonic and anti-spasmodic action. Skull-cap is also given as one of the best remedies for insomnia (Grieve 1931). Skull-cap is still used as a herbal preparation.

An intriguing question is whether any of these finds throws light on the health of the inhabitants; since most plants have several properties this cannot readily be ascertained. However, dead-nettles, lesser celandine, juniper and some *Vaccinium* spp (collected as berried fruits) contain tannins giving astringent properties. Astringents cause the contraction of tissues and so diminish discharges, some of the plants have been used for diarrhoea and dysentery. Tannins also have an antibiotic effect by precipitating protein in mucus membranes and so deprive bacteria of nutrition, they are therefore used for slow-healing wounds and suchlike (Launert 1981). Several plants contain vitamin C, sheep's sorrel and lesser celandine in the leaves and *Vaccinium* species and crowberries also in the fruit; scurvy may well have been a problem as it was in historic Scotland. Other plants would have been used as pot-herbs and doubtless roots were also eaten, but these fruits and tubers remain because of their durable nature and are not necessarily representative of the wide range of plants with medicinal uses which would have been available.

HEATHY TURF, HEATHER AND PEAT

Some of the plants found are characteristic of the dwarf shrub heathland which used to cover much of the mainland of Orkney before it was reclaimed for agricultural use. The heaths are often heather dominated with crowberry (*Empetrum nigrum*), bell heather (*Erica cinerea*), cross-leaved heath (*E.tetralix*) and small grasses among the commoner plants. Many of the species listed under grassland, grassy heath and mires are to be found in these heaths especially the species of sedges (*Carex*), heath rush (*Juncus squarrosus*), woodrush (*Luzula*), lousewort (*Pedicularis sylvatica*) and tormentil (*Potentilla erecta*). This heath, when found on thin peaty soils, can be stripped off with the peaty layer and when dried gives a turf some 30–50mm thick. The uses of such turf is known from past centuries: for fuel, also for building composite walls and, until quite recently, to roof farm buildings on Orkney. Naturally the removal of such turf leads to soil erosion and is no longer practised.

Some samples contained seeds of several species of heathy turf plants and it seemed likely that these represented burnt turves. To test this hypothesis, turves from Orkney heaths were collected and samples broken up and sieved in the laboratory. Many heather stems and roots, occasional sedge rhizomes and seeds of heather, crowberry, bell heather, sedges, tormentil and woodrush were recognised together with a megaspore of lesser clubmoss. As some of these species are exclusive to heaths in Orkney, it seems highly probable that the seeds and other associated remains such as heather stems derive from burnt turves.

Remains of turf plants were found from Later Phase 7, from a broch kiln, a floor around a hearth and an earth floor; it seems probable that the first two at least were used as fuel. Early and Later Phase 8 hearth and floor deposits contained remains of both turf plants and peat. This could be an early example of the use of turves as back peats. Turf and peats were used together when peat was scarce and this also increased the quantity of ashes for manure (Fenton 1978, 207, 212).

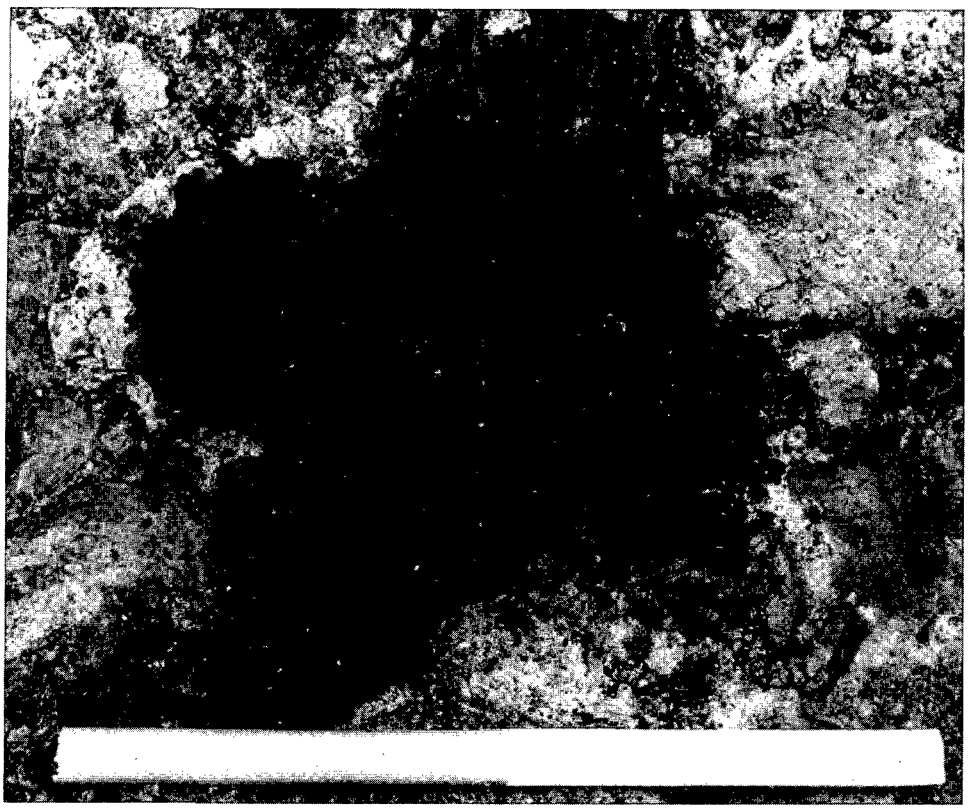
Heather was present in many samples especially in Late Phase 8. Some of the heather undoubtedly came from the heathy turves but heather only was found in hearth deposits from the very last stage of the Later Phase 8 houses; it is possible that peat was also burnt but left no trace in the ashes. Springy heather also makes comfortable beds. Straw would probably be reserved for animals and thatching.

Baskets have frequently been made from heather and a fragmentary basket survived from the Later Phase 7 use of the broch tower (illus 82). It measured *c* 13 × 17cm, and was made of 10 double strands of straight heather stems or stakes, *c* 4mm in diameter, simply woven (randing) with young heather shoots, *c* 1.5mm in diameter, passing in front of one pair of stakes and behind the next pair. The convergence of the stakes and the addition of at least one other pair suggest that it was part of the side of a basket which survived, from above the base and below the rim or border. The additional stakes indicate that the basket had a slightly flared shape. The tight weave may also imply its use was as a measure for meal, and was not unlike the traditional Orkney heather baskets or *cubbies* and more specifically the *luppie* which had a shape like a basin (Fenton 1978, 261–262).

Peat was found throughout the occupation and it may be assumed that it was an important fuel source for domestic use; it was also found in a Late Phase 7 furnace dump with other fuel. Heather and cotton-grass were very occasionally present in the mainly very small fragments of peat which survived. Blanket bog peat began forming on hillsides between 1800 and 1300 BC in Orkney although small valley bogs could have been dug for peats if first drained. Slow burning peat fires are ideal for smoking meat and fish for winter use.

FRESHWATER, BRACKISH AND MARITIME PLANTS

Fruiting bodies (oospores) of stoneworts (*Chara* spp) were recovered from the silt in a clay-luted stone tank in the burnt ***SW*** building of Early phase 7, and from the soakaway in the Early Phase 8 ***stalled*** dwelling. Stoneworts grow in calcareous, usually shallow, fresh or slightly brackish waters with little water movement. They would be most unlikely to grow in a deep well and it may be that when the well which was used from Phases 4–6 was made inaccessible, other sources of water were used. The nearest permanent source of water is the shallow Loch of Stenness, less than 0.5km distant, a brackish water loch with *c* 15% salinity along the SW side, nearest Howe (Nicol 1938, fig 1); however, the Orkney coast has become submerged during the



Illus 82
a) Section of heather (*Calluna*) basketwork from floor 2 of the broch tower, Later Phase 7 (context 861); scale – 20cm; b) suggested reconstruction drawn from early 20th-century examples.

post-glacial period and the loch may formerly have been less brackish than at present. Alternatively, a pond could have been dug in the clayey subsoil at Howe, the stoneworts could have grown in a pond or in slightly brackish water. The evidence for water storage in a tank is of particular interest, providing one clear use for what was probably a multi-purpose container. At the time of the fire, the tank seems to have contained water for animals. Water disposed of in the soakaway of the Early Phase 8 stalled house was probably from human use.

Spiral tasselweed (*Ruppia cirrhosa*), the brackish water plant represented by fruits from two Early Phase 7 buildings used by animals and a Late Phase 7 yard, must have been deliberately collected for fodder or bedding. Fruits of salt-marsh-grass (*Puccinellia* sp) from three Later Phase 8 contexts, stages 5 and 6, would have come from the nearby shore, perhaps from vegetation gathered from the strand line for hay.

A fuciod alga is represented by fragments from a Phase 7 shelly deposit and from two Early Phase 8 contexts. The seaweeds of sheltered Orkney shores are dominated by fucoid algae (Jones 1975), and no doubt the several possible uses, as previously listed, were fully exploited by prehistoric peoples.

The sea and loch shores would have provided valuable grazing as they do at present, and it may be noted that sheep in North Ronaldsay, Orkney, fed solely on seaweed, are said to thrive better than those fed on grass (Fenton 1978, 466).

COMPARISONS WITH OTHER SITES

Plant remains from the prehistoric period in N Scotland are rather few and the pre-broch sites so far published have produced mainly charcoal and barley grains (Dickson 1987a).

Both naked and hulled barley were recorded from a pre-broch phase at Dun Mor Vaul broch, Tiree (Renfrew 1974). No weed seeds were present in the cereal sample; perhaps the ears were plucked separately and hand-rubbed as the evidence suggests for Howe. Crosskirk Broch, Caithness (Dickson & Dickson 1984), produced a few grains of naked six-row barley and wild oats, a flax seed, heather and other heathland plants, bracken and arable weeds. Tanks containing ash from cereal chaff were probably used to store seafood. A cist from the Broch of Burrian, N Ronaldsay, Orkney (MacGregor 1975), contained red ash with bones and shells; the cist, also, was thought to have been used to preserve food. Cereal grains of six-row barley appeared to be of the hulled variety, pine charcoal was also noted. Bu of Cairston roundhouse, less than 2km from Howe (Dickson 1987a), yielded grain of naked six-row barley and weeds, with heathland plant remains similar to those found at Howe. It is probable that at Bu also heathy turves were collected for fuel but at an earlier time than the evidence suggests from Howe as the radiocarbon date indicates that the Bu deposits date from around 600 cal BC (Hedges & Bell 1980).

Six-row barley, with wild oats, was recorded from a possible Pictish building amongst Pictish and Norse sites in the Bay of Birsay on mainland Orkney (Donaldson *et al* 1981). From the same area, pre-Norse and Norse

excavations have produced charcoal of willow or poplar, birch, hazel, pine and oak often alongside burnt peat. The bulk of the charcoal was of willow/aspen type and Donaldson (1982) notes that: 'The presence of so many twigs and fragments of native trees in the excavation indicates the exploitation of a local resource'.

Dung has rarely been recorded from this period but an Early Iron Age farmstead in the Dutch polders (Therkorn *et al* 1984) has preserved what appears to be cattle dung containing seeds of arable weeds and those from salt-marsh habitats and other damp places.

7.3 • ANIMAL BONE REPORT

Catherine Smith with the late GWI Hodgson, P Armitage, J Clutton-Brock, C Dickson, T Holden & BBS

A total of 26,079 mammalian bones, 1,499 bird bones, 355 frog/toad bones and 19 coprolite samples, dating from the Neolithic to the Late Iron Age were recovered from Howe. The majority of the bones came from Phases 7 and 8 (Table 11). The mammalian bones are from both domestic species, cattle, sheep, pig, horse, dog and cat, and wild species, red deer, fox, otter, seal, whale, Orkney vole, field mouse, pygmy shrew, brown rat and rabbit. The latter two species were probably intrusive.

The skeletal remains of the cattle from Phases 7 and 8 correspond in size range with those reported from other Iron Age sites in northern Scotland, but are significantly smaller than those from northern Neolithic sites. Many of the sheep remains compare favourably with those from primitive Scottish breeds, the resemblance to modern Soay being the most striking. The dimensions of the pig bones, including those of a substantially complete adult skeleton, suggest that there was a small Iron Age type of pig. The horse remains came from animals which compare favourably in stature to those of a small Shetland pony.

During Phase 7, adult female sheep were allowed to produce four crops of lambs before culling, while during Phase 8 a greater number of sheep survived for longer, producing five crops of lambs. Hunting or the selective culling of red deer played an important part in the economy especially in the early phases, but became less important with time. Increased scrub clearance and agricultural activity in the Iron Age, coupled with possible over-browsing, may have contributed to the destruction of the light woodland habitat favoured by deer, leading to their eventual extinction within Orkney.

Congenital anomalies in the dentition of both red deer and fox indicated a degree of inbreeding not unsurprising in an island population. This was perhaps an additional factor which led to the extinction of both species from the island group in the Late Iron Age.

Table 11: Total numbers of animal bones by phase

Species	Phase 1	2	2/3	3	3/4	4	4/5	4–6	5	5–6	5–7	6	6/9	7	7/8	8	8/9	Total
Cattle	1	7	3	196	10	112	9	7	32	479	12	14	10	4663	608	2994	84	9241
Sheep	–	2	1	69	2	36	3	2	22	225	–	33	10	3118	375	3612	37	7547
Pig	–	2	–	5	–	2	3	–	10	51	1	21	3	1486	369	1734	9	3696
Red deer	–	2	–	3	5	12	–	84	8	415	–	5	–	1993	106	369	3	3005
Horse	–	–	–	–	–	1	–	–	–	2	–	–	–	93	4	63	3	166
Dog	–	–	–	–	–	1	–	–	–	1	–	–	–	14	1	8	–	25
Fox + cf fox	–	–	–	–	–	–	–	–	–	3	–	–	–	94	19	75	–	191
Cat	–	–	–	–	–	–	–	1	–	–	–	1	–	13	–	129	–	144
Otter	–	–	–	–	–	–	–	–	–	2	–	–	–	9	3	9	–	23
Seal	–	–	–	–	–	–	–	–	–	1	–	–	–	23	2	10	–	36
Cetacean	–	–	–	2	–	5	1	–	4	20	–	–	–	130	1	55	1	219
Vole	–	–	–	–	–	–	3	–	1	–	–	10	–	125	15	517	1	672
Field mouse	–	–	–	1	–	–	1	1	–	4	–	–	–	16	–	10	–	33
Pygmy shrew	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1
Rat	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	2
Small mammal	–	–	–	2	–	–	19	5	–	24	–	5	–	324	9	680	–	1068
Rabbit	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	10	–	10
Totals	1	13	4	278	17	169	39	100	77	1226	13	89	23	12102	1512	10275	138	26079

METHODS AND MEASUREMENTS

Mammalian and amphibian bones were identified by direct comparison with defleshed specimens of modern animals, including a Chillingham cow and Soay sheep of both sexes. A collection of red deer skeletons from the Scottish mainland, ranging in age from new-born calf to adult were also utilized. Specimens of Orkney vole and otter were acquired from mainland Orkney. Bones of brown rat were identified by Dr PL Armitage.

Despite difficulties inherent in distinguishing sheep from goats it was not thought that goat was present in Phases 1 to 8. Similarly, because of the difficulties in distinguishing certain bones of fox from those of gracile dogs, only those long bones of fox which were found associated with skulls, mandibles or teeth were ascribed to 'fox'. Isolated but apparent fox bones were described as 'cf fox'.

Vertebrae, other than the first two neck vertebrae, ribs and unidentifiable fragments were merely examined for the presence of butchery marks but were not assigned to species and thus do not appear in the total number of bones identified (Table 11). Loose teeth were assigned to species but are not included in the total. Cast or unspecified antler, fragments lacking a burr, which therefore may no represent dead animals, were not included in the total numbers of bones. A comparison of the relative frequencies of the main food-forming animals, including horse, based on the minimum numbers of individuals is given in Table 13.

The scheme of measurement follows that proposed by von den Driesch (1976), unless otherwise stated, and all measurements are in millimetres. A summary of bone size ranges for all species found, is given in Table 44mf (1:F1–F12) and the anatomical distribution of bones over the whole site, in Table 45mf (1:F13–G7).

Relative frequencies were estimated by comparing the minimum numbers of animals present and by fragment counts. Counting the numbers of bone fragments present tends to bias the estimate of the frequencies of species present in favour of the larger animals, such as cattle, with respect to the smaller animals, such as sheep, because the long bones of larger animals tend to break into more fragments than long bones of smaller animals.

The minimum numbers of each species present have been estimated by selecting one bone for each species which is common to all phases. Hence some species which are poorly represented in a given phase may disappear from the record if the selected bone is not present in that phase. Conversely, species represented by, for example, only one bone, such as the Pygmy shrew, are perhaps over-represented with respect to those species represented by large numbers of bones (Clason 1972, 141). Table 12 shows the minimum numbers of animals in each phase, together with the bones used for estimating them. Cetacean bones have not been included in this table as these tend to consist of either indeterminate or worked fragments, or vertebrae.

'Small mammals', as a category, has been omitted from Table 12 as it was thought that the majority of these bones came from the Orkney vole. The apparent increase in the number of small mammal bones in Phase 8 is due to the fact that a greater number of sieved samples were taken from this phase.

DISTRIBUTION AND LOCATION

PHASES 1–5

Small quantities of bones of the main domestic mammals, cattle, sheep/goat and pig, were retrieved from the earliest contexts of the site (Phases 1–2) as were bones of red deer. In the Early Iron Age (Phase 3) most of the cattle bone was derived from a midden, and although sheep/goat and pig bone were also found in this phase, red deer bone was not found in great abundance. However, the presence of meat-bearing bones was evidence of this species providing food as well as the raw material for antler artefacts.

Table 12: Estimated minimum numbers of animals present in each phase

Species	Phase 1	2	2/3	3	3/4	4	4/5	4–6	5	5–6	5–7	6	6/9	7	7/8	8	8/9	Total
Cattle	–	–	–	2	–	3	–	–	3	4	1	–	–	63	10	34	1	121
Sheep	–	–	–	2	–	–	–	–	–	4	–	1	1	88	7	63	2	168
Pig	–	1	–	1	–	–	–	–	–	1	–	–	–	35	2	41	–	81
Red deer	–	–	–	1	–	–	–	6	–	8	–	–	–	50	2	6	–	73
Horse	–	–	–	–	–	–	–	–	–	–	–	–	–	4	–	2	–	6
Dog	–	–	–	–	–	–	–	–	–	1	–	–	–	2	1	1	–	5
Fox	–	–	–	–	–	–	–	–	–	–	–	–	–	3	1	1	–	5
Cat	–	–	–	–	–	–	–	1	–	–	–	–	–	1	–	3	–	5
Otter	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	2
Seal	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	2
Vole	–	–	–	–	–	–	–	–	1	–	–	5	–	45	7	151	1	210
Field mouse	–	–	–	–	–	–	1	–	–	1	–	–	–	4	–	3	–	9
Pygmy shrew	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1
Rat	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1
Rabbit	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1
	1	2	2/3	3	3/4	4	4/5	4–6	5	5–6	5–7	6	6/9	7	7/8	8	8/9	Total

Bones used to estimate minimum numbers were:

Cattle	L. humerus	Dog	L. mandible	Field mouse	L. mandible
Sheep	L. humerus	Cat	R. maxilla	Pygmy shrew	R. mandible
Pig	L. humerus	Otter	R. mandible	Rat	R. mandible
Deer	L. tibia	Vole	Skull (only where both maxillae present)	Rabbit	R. humerus
Horse	L. calcaneum			Fox	L. mandible

Table 13: Minimum numbers and percentages of main food-forming animals, including horse

	Cattle		Sheep		Pig		Red Deer		Horse	
Phase	MN	%	MN	%	MN	%	MN	%	MN	%
1										
2					1	100.0				
2/3										
3	2	33.3	2	33.3	1	16.6	1	16.6		
3/4										
4	3	100.0								
4/5										
4–6							6	100.0		
5	3	100.0								
5/6	4	23.5	4	23.5	1	5.9	8	47.1		
5–7	1	100.0								
6			1	100.0						
6–9			1	100.0						
7	63	26.3	88	36.7	35	14.6	50	20.8	4	1.7
7/8	10	47.6	7	33.3	2	9.5	2	9.5		
8	34	23.3	63	43.2	41	28.1	6	4.1	2	1.4
8/9	1	33.3	2	66.6						

Phase 4 marked the first appearance of dog and horse bone from buildings and defences. Also found were bone debris from domestic animals, red deer and cetacean species derived from domestic refuse, especially on the W side of the site.

From Phase 4/5 came the first site evidence of both cat and Orkney vole. All the bone came from ground surfaces between the Neolithic mound and the ramparts.

The E well in Phase 4–6 was notable for the relatively high numbers of red deer bones which had been dumped into it, and at least six individuals were represented. There was evidence of burning on many of these bones, particularly on whole long bones of very young or neonatal animals.

Bone from Phase 5 came mainly from contexts associated with rampart building and ditch fills, although a few fragments of cattle, sheep/goat and red deer were recovered from a drain.

PHASES 5/6

Bones were included in the walls, ramparts and building debris connected with this phase and, in particular, the ditch fills at the settlement entrance. On the E side of the site, silts which may represent rubbish dumping, produced many cattle bones and the remains of a single otter.

Dog/fox bones were recovered from the rubbles in the S ditch and also from the E side of the site. The deposits forming the E well cut contained a significantly higher proportion of red deer than other food species, constituting 69.5% of the food-forming mammals. About half of the red deer bones came from very young animals. This rather puzzling evidence of relatively high numbers of red deer, many of them very young, is similar to that found in the E well during Phase 4/6.

PHASE 6 – BROCH 1

Bones in this phase came mainly from the wall core of the broch tower, deposited during the construction of the building, and were probably redeposited from an earlier period. Bones of cattle, sheep/goat, pig and cat were contained in the broch wall, as well as antler and bone points.

PHASE 7 – EARLY

BROCH TOWER

The rubble in the Phase 7 broch tower walls included general domestic rubbish and bone, presumably originating from an earlier date. One fragment of brown rat was found among the rubble (see below). From a paved floor came whalebone and a fox bone.

THE SETTLEMENT

The levelling rubble which formed the prepared ground for the Phase 7 buildings contained a large amount of animal bone, probably originating from domestic rubbish.

NE Building

The cleaning of floors apparently removed much of the material from the structure and entranceway. However, the earliest floor in this building contained antler tines and bone artefacts as well as bones from red deer and domestic mammals. A relatively high proportion of red deer bones came from the later floors of the passage and the external cell.

E Building and Yard

The walls and rubbles of this building contained bones from domestic mammals and red deer. Whale and seal fragments were retrieved from a later floor. However, the clay floors, hearths and ashes produced very little bone, suggesting its removal by cleaning, as in the other buildings.

Rubble levelling in the yard contained bones of domestic mammals and red deer as well as whalebone and antler artefacts cleared from the floors of the building. Floors above and below this rubble contained very little bone and had probably been cleaned.

SE Building

A late hearth, and rubble in the entrance passage, produced mainly red deer and cattle with the addition of sheep/goat. Two horse bones were included in a wall.

S Building

Bones were very scarce, possibly because of frequent cleaning of the floors.

SW Building

The walls contained the usual assemblage of animal species, including cat (see below). The earliest earth floor contained a sheep burial, alongside more general bone refuse. The clay floor of the cell in this building produced four dog bones.

NW Building

The floors and hearths of this building contained relatively few bones suggesting that cleaning took place frequently, with the rubbish being dumped in the yard. The yard produced bones of domestic ungulates, as well as dog. One dog bone was also found in the deposits of a cell floor.

DITCHES

The ditches appeared to have been used as a dumping ground during Phase 7 and contained the remains of cattle, sheep/goat, pig, red deer, horse, dog, cf fox, otter and whale.

PHASE 7 – LATER

BROCH TOWER

The second workshop floor in the broch tower contained cattle, sheep/goat, pig, red deer and fox. Contemporary deposits contained burnt bone, among other evidence of burning. The most interesting animal finds came from rubble at the end of this phase. From this possible period of abandonment came the remains of a single fox and an almost complete pig skeleton (see below).

SETTLEMENT

Southern Buildings

A dump outside the broch tower, and probably deriving from it, contained bones of domestic species, red deer, dog/fox, whale and seal, as well as bone artefacts. The rubble fill of an earthhouse, ***G***, built into the W collapse contained a fox skeleton.

NE and *E* Yards

The ***NE*** and ***E*** yards contained two major layers which formed an extensive dump of material including bones from bird, fish, frog and mammals.

A notable difference between these two contexts is that while the ***NE*** yard produced 38% red deer, compared with only 2.1% pig, the preference was apparently reversed in the ***E*** yard, with only 9.5% deer compared with 19.4% pig. Since the total numbers of bones found in each layer was almost equal and conditions of preservation appear to have been similar, this difference is most striking. Compared with Phase 7 as a whole, the ***E*** yard appears to have been uncharacteristically low in deer compared to pig.

E Building

The floor material of this building was notable for the presence of a skull of a brown rat (see below).

SE Building

An earth floor within the building contained large amounts of red deer bone amidst the bones of domestic animals. This suggests a lack of cleaning of the floor and contrasts with the apparently higher standards of cleanliness in the earlier part of Phase 7.

PHASE 7/8

BROCH TOWER

The third workshop floor in the broch tower contained the nearly complete skeleton of an immature pig of *c* 13 months of age, which may have been dumped as the building went out of use. The floor showed other signs of having been dirty, containing many other bones, although the hearth was relatively clean.

As in the third floor, the hearth of the fourth contained a paucity of material, while the floor itself produced bone and antler objects as well as food refuse. The broch tower was eventually infilled with domestic rubbish. Context 770 was a substantial dump of bone in which cattle, sheep/goat, red deer, pig, horse, dog, fox, seal and otter were represented. Bones of cattle and sheep/goat were found in almost equal numbers, while the deer remains were only poorly represented. The skulls of one male and one female red deer and a fox skeleton were present.

Bones from an articulated cattle foreleg (an entire right humerus, radius and ulna), showed signs of having been gnawed by a carnivore such as a dog or fox.

PHASE 8 – STAGES 1–4

BROCH TOWER

During this phase the broch tower continued to have been used as a midden and within it was the largest single dump of bone on site. Bones of sheep (48% of food-formers) were dumped in greater numbers than those of cattle and pig, in contrast to earlier phases where cattle were more frequent than sheep.

Pig bones (23.1% of food-formers) were almost as numerous as those of cattle (26.4%), while a great reduction in the numbers of deer, compared with earlier phases, was apparent. Deer formed only 2.4% of the food forming mammals, while horse contributed 0.1%. Other species represented in this context were dog, cf fox, Orkney vole, frog, seal, bird, fish and human. Rabbit bones may have been an intrusion.

S collapse of the Tower

Context 37 represents the collapse of the broch tower which must have caused some redeposition of bone contained within its walls. Since dumping of rubbish may still have been carried on within the ruins, the origin of the material must be uncertain. However, the increase in sheep/goat bones at the expense of cattle, which seems to have been typical of Phase 8, was apparent, while the incidence of red deer continued to show a decrease compared with that in Phase 7.

A ground surface later built up on top of the S collapse. Included in this layer were bones of fox and frog as well as the usual domestic animals remains, although the earliest floors in this area contained relatively few bones, suggesting that some cleaning took place. The later floors contained much debris but the hearths appear to have been kept clean.

THE SETTLEMENT

S & *Stalled* Buildings

Ground surfaces which developed on the S and SW collapses of the tower contained much bone. Cattle, sheep/goat and pig were

Table 14: Comparison of worked bone and artefacts from Phases 7 & 8

Species	Phase 7 artefacts No of frags	%	Phase 8 artefacts No of frags	%
Cattle and large mammal*	54	8.0	31	9.0
Sheep/goat	20	2.9	13	3.8
Pig	6	0.9	9	2.6
Horse	1	0.1	1	0.3
Red deer antler	468	68.9	234	68.2
Whale	130	19.1	55	16.0
Totals	679	99.9	343	99.9

* 'large mammal' indicates bones cannot be ascribed to species but on the basis of their size are probably from cattle.

well represented, while red deer again appeared in comparatively reduced numbers. Cat bones were more frequent than in earlier phases.

W Workshop

The hearth and floor of this building contained domestic animal bone as well as antler. At the end of its use, the building was filled in with material which included 23 antler fragments.

SUMMARY

The general impression gained from Early Phase 8 is one of repeated redeposition of bone, from broch and building collapses and levelling, which became incorporated into new wall cores. Perhaps the most noticeable trend in Early Phase 8 was the decline in red deer and increase in sheep/goat. It is perhaps significant that while the percentage of artefacts made from antler, compared from those made from bone, remained constant from Phase 7 to Phase 8, the percentage of red deer bones actually decreased (see Table 14).

Deer remains fell from 17.6% of food forming mammals in Phase 7 to 4.2% in Phase 8. It is possible that supplies of antler were imported in Phase 8, perhaps from the mainland, when the island red deer population decreased. (See also 8.2 below for possible import of reindeer antler from Norway).

LATER PHASE 8 – STAGES 5–12

The trend of reduced numbers of red deer continued into Later Phase 8, while sheep/goat apparently increased. This shift in the balance of the site economy suggests that it was no longer necessary to hunt deer, since the protein requirements of the community were being met by increasingly better kept domestic stock. In addition, the deer population may have been reduced by the depletion of the light scrub cover which would have formed their habitat. An additional factor in the demise of the red deer may have been the increase in the numbers of pigs in Phase 8 as compared with Phase 7. Increased competition from pigs foraging on scrub land, combined with increased pressure from sheep on the more open ground may have contributed to the eventual extinction of red deer on the island.

Although cattle numbers decreased in Phase 8 (34.1% food-formers compared with 41.6% in Phase 7), they continued to be an important resource. Horses, however, were present in only small numbers in Phase 7 (0.8%) and Phase 8 (0.7%).

The number of cat bones showed a large increase in Phase 8. This may have been due in part to the ramshackle nature of some of the later buildings which would have provided shelter for a thriving cat population. Food in the form of the Orkney vole would have been abundant, as shown by the large numbers of vole and small mammal bones which were retrieved.

STAGE 5

The usual domestic mammals, as well as cat and whale bone were recovered from this stage. Red deer antler artefacts outnumbered those made from domestic mammal bone.

STAGE 6

Bones were found in both walls and floors. A fox skull was found in a wall as were several cat bones.

STAGE 7

Most of the bone originated from floors and included one otter bone.

STAGE 8

Bones from rubble levels were reworked into wall cores. Cat bones were especially frequent within these walls. One partial skeleton of an adult cat showed signs of gnawing by rodents. One red deer skull was recovered from an earth floor.

STAGE 9

Bones in general were not plentiful but cat bones related to a skeleton found in rubble in Stage 8 were recovered.

STAGE 10

This phase contained the usual domestic mammals as well as seal, cetacean and cf fox.

STAGE 11

Only small numbers of bones from cattle, sheep/goat and pig were found.

STAGE 12

The E floor [1269] contained bones of cattle, sheep/goat, pig, red deer, and the partial skeleton of a kitten.

TYPE, SIZE, AGE, AND SEX OF ANIMALS

CATTLE (*Bos* sp.)

Very few complete long bones of cattle have been recovered from Howe, a pattern which is reported at other prehistoric sites in the north of Scotland. The measurements of 21 complete cattle long bones are given in Table 15mf (1:D3). For the purposes of comparison, data on metacarpal length from other northern Scottish sites are quoted in Table 16mf (1:D4).

The metacarpals from Howe show the typical Iron Age reduction in size from the larger Neolithic type of cattle, but one larger bone is possibly from a bull. Published information on metatarsal length is scarce, although measurements from Noddle (1976) from pre-Norse Buckquoy, are comparable with those from Howe.

Few horn cores survived intact, but those which did suggest that the cattle were akin to the Celtic Shorthorn type. The horn cores were small, curved, pointed in a forward direction, and were apparently all from cows or castrates. No polled individuals were found, although this is not surprising considering that most of the skulls were reduced to very small fragments.

Noddle (1983) has used the varying position of the nutrient foramen of the femur to demonstrate differences and similarities in cattle populations. Fifty specimens of Howe cattle femora were examined and the position of the foramen noted in Table 17mf (1:D4). The percentages shown are not substantially different from those given by Noddle for Pictish cattle at Skaill.

The age of cattle at death was determined through assessment of the state of epiphyseal fusion of long bones and eruption and wear patterns of mandibular teeth (Tables 18 and 19mf (1:D5)). Absolute ages could not safely be given to the long bones because the age at which epiphyseal fusion occurs is not constant in domestic animals. It can be affected by genetic factors, levels of nutrition and sex of the individual (Noddle 1984, 21). Comparison of the Tables shows a large discrepancy between the ages derived from epiphyseal fusion evidence and those derived from mandibular evidence. Differential preservation may have played a part in obliterating evidence of the more fragile foetal/neonatal (F) (only 2.5% in Table 15mf (1:D3) compared to 38.6% in Table 16 (1:D4)) and juvenile (J) bones, thus biasing the results towards older animals. The number of foetal and juvenile mandibles is undoubtedly an underestimate, suggested by the large numbers of loose deciduous and unworn teeth which were found.

In the case of mandibles from older age groups, it was noted that the larger mandibles tended to be more heavily fragmented, either by post-mortem damage, or more probably by butchery as some older specimens bore knife marks. Breakage effectively removed them from the record. Similarly, the adult long bone count of 27% is almost certainly an underestimate, as they would have been removed from the bone assemblage for the purpose of producing artefacts.

Although the recognisable bones which were utilised as artefacts have been added to the appropriate age categories, it is obvious that many were not recovered. In spite of these discrepancies, it may be cautiously speculated that on combined evidence, about a quarter of the cattle population at Howe reach maturity. These animals were probably kept for traction and breeding purposes.

Fenton (1978, 428) described the Orkney cattle of 1814, before improvement, as being small, of various colours, though commonly black, with low heads, high backs, thin buttocks, and horns which were short and contracted, with their tops bending towards the forehead. It would seem that in some respects the Iron Age cattle from Howe would not look entirely out of place among the unimproved beasts of early last century.

SHEEP (*Ovis* sp.)

Dimensions of complete sheep bones are given in Table 20mf (1:D6) in comparison with measurements from a modern 4-year-old male Soay sheep. The mean measurements of the long bones are shorter than those of the Soay in all cases except the tibia, which is slightly longer. The Howe metapodials were substantially shorter than those from Jarlshof, with the exception of a single example from Phase 3. The tendency towards shorter metapodials was also observed by McCartney (1984) in her examination of sheep bones from Crosskirk Broch, Caithness.

The sheep horn cores showed great similarities in length and shape to the modern Soay, falling into two distinct groups. The smaller, shorter specimens which were more oval in cross section, were assumed to be female, or perhaps castrates. The much heavier and thicker examples with a more circular cross-section were from males. Only one polled skull was found.

A total of 93 sheep femora were examined for the position of the nutrient foramen in comparison with data from other Orkney sites and modern Soay (Table 21mf, 1:D7). As in the case of cattle, it also varies its position (Noddle 1978). It would seem that the sheep populations of Howe and Pictish Skaill correspond, as they both contain foramina in the anterior proximal position in 50% of the samples. Howe examples with midshaft positions also compare well with Neolithic Skara Brae sheep and to the modern Shetland breed.

A total of 176 sheep half mandibles were assessed for tooth eruption and wear pattern, after the method of Payne (1973) (Table 22mf, 1:D8). Only Phases 7 and 8 contained enough specimens to enable separate culling curves to be drawn for each phase (Tables 23 & 24mf, 1:D9–D10). Table 22mf shows that from the site as a whole, almost half the sheep, and probably many more if differential preservation is taken into account, died in what was most likely their first year of life. Approximately 30% of the flock survived to the end of the second year, and it is presumed that the animals which survived to the age of 8 years were either females or castrates.

An interesting variation in age groupings occurs when Phases 7 and 8 are compared (Tables 23 & 24). In Phase 7 only 22.6% of sheep had survived to the second year of life (stage D), but in Phase 8 this was 40.2%. Similarly, proportionately more animals survived into their third and fourth years in Phase 8 than in Phase 7 (see below).

The overall picture from the skeletal evidence is of a sheep with strong affinities to other animals from prehistoric sites in Orkney and the north of Scotland, and in many respects appearing to resemble the modern Soay (see also Ryder (1982, 34).

GOATS (*Capra* sp.)

In spite of the difficulties of distinguishing the bones of goats from those of sheep, a numerical procedure was carried out on the metapodials (Boessneck 1971, 353–5), which gave a reliable clue to the presence or absence of goat. Of the 25 specimens (complete metacarpals and metatarsals) all were shown to be sheep. In addition no horn cores from goat were recognized.

It is thought that goat bones were not present in the Howe samples during Phases 1 to 8 in contrast to small numbers of goat found at Broxmouth (Barnestson 1982, 102), Crosskirk (McCartney 1984, 133) and Buckquoy (Noddle 1976, 205). However a fused radius and ulna from Phase 9 was thought to have come from a goat.

PIG (*Sus* sp.)

The find of a substantially complete pig skeleton from Phase 7 (SF 2152/3011) indicated a domestic animal, small by modern standards, with slim, fine bones. The measurements of this animal appear in Table 25mf (1:D11–D12). This pig exhibited some arthritic changes in one shoulder and in its right hind limb. There were no signs of butchery on the skeleton.

101 pig mandibles from the site were assessed as to tooth wear and eruption (Table 26mf, 1:D13) (Bull & Payne 1982). It can be seen that 52.5% of the pigs from Howe were killed about the end of their first year of life. It was not thought possible to assign most of the pig long bones to a fusion category due to the fact that pig epiphyses detach readily during cooking and that fusion points of the epiphyses are probably subject to differential preservation. However, 15.8% of the pig long bones could definitely be ascribed to foetal animals. This is probably an underestimate, due to the very small size of the bones which suggests that not all may have been retrieved during excavation. Table 27mf (1:D13) shows the percentage of pigs killed up to 1 year old, in comparison with other Iron Age Orkney sites. Only a few animals would have been required to reach breeding age in order to keep numbers stable and the high cull of very young animals reflects the high litter yield of pigs.

Very little evidence was available as to the sex of the pigs. The canine teeth which were found were, in the majority of cases, split or broken and offered little evidence of the sex of the animals from which they came. The single pig skeleton, described above, had well formed muscle scars, but these may have been as much an indication of advanced age or energetic lifestyle, as evidence of maleness.

The summary of pig bone sizes indicate animals both slightly smaller and larger than those from Crosskirk (McCartney 1984). None of the Howe pigs appear to have approached the size of wild pigs and all of the specimens were probably from a domestic animal not unlike the 'hardy, ferocious and tasty' beast which survived into historic times (Gillespie 1983).

RED DEER (*Cervus elaphus*)

Few long bones of red deer survived intact but the dimensions of those which did are shown in Table 28mf (1:D13). Comparable dimensions of a modern 4.5-year-old red deer from the Scottish mainland are shown in Table 29mf (1:D14). Comparisons between these measurements and those given by Noddle (1974 & 1982) for various Neolithic and Iron Age sites throughout Britain show the presence of animals which were smaller than Neolithic specimens but larger than those of the present day.

Evidence of age of the Howe red deer came from 86 half mandibles which were grouped in age classes 0–10 according to the tooth wear scheme outlined by Lowe (1967) and Ratcliffe (1977) (Table 30mf, 1:D14) (see also Mitchell & Youngson). A subdivision of age class 0 was designated 'F' to include newborn animals which had unworn or erupting deciduous teeth. A diagrammatic representation of the probable age at which red deer were killed is shown in Table 31mf (1:E1).

There appears to have been a high incidence of neonatal mortality, with 46.6% of the red deer dying or being killed in the first year of life. This may not however, reflect the true herd structure of the wild animals, but a deliberate culling pattern (see below). The high proportion of individuals killed in the age classes 4–8 is remarkably similar to the present day situation where the average age of the hind cull lies between 4–5 years and the stag cull between 6–7 years (RW Youngson pers comm).

Further evidence of the age of the deer came from analysis of the antlers. In modern Scottish red deer stags the sequence of appearance of antler tines is as follows:-

1st year a simple spike appears after 10 months of age, 2nd year a spike and brow tine, 3rd year a spike, brow and trez tine, 4th year a brow, trez and 2 'points on top', and 5th year a brow, bez, trez and 2 'points on top' or crown tines. In subsequent years more crown tines are added.

Evidence of the ages of the Howe deer from antlers is unfortunately scanty. In spite of the large number of antler fragments recovered, all had been butchered, worked or otherwise damaged. In addition, the majority of fragments were cast or were indeterminate, and do not represent dead animals. Table 32mf (1:E2) shows the least age from the 2nd to the 6th year, at which a total of 65 cast or indeterminate fragments must have been shed. It must be emphasized that assessment of the thickness and weight of the antler fragments suggests that the minimum age of shedding has been greatly underestimated. In addition, 3 further fragments with brow tines and attached skull fragments, must have come from animals of a minimum age of 2 years at death.

The numerous finds of antler indicates the presence of male animals, but two skulls which had no pedicles and had never borne antlers showed the presence of females. There is, however, the slight possibility that these had come from male animals which were castrated before the age of 10 months, when the pedicles appear in modern Scottish deer (Staines 1980, 12).

HORSE (*Equus* sp.)

Measurements from a very few complete long bones are given in Table 34mf (1:E2). These indicate that the Howe horses did not differ greatly in stature from those of a small modern pit pony, and compare favourably with measurements from Jarlshof (Platt 1934a), Crosskirk and the modern Shetland pony (McCartney 1984).

Both young and adult animals were represented in the sample. Table 33mf (1:E2) shows the proportion of unfused long bones in comparison with the age of fusion in modern animals (Silver 1969). Unfortunately, no mandibles or maxillae bearing teeth were found, although the presence of unworn loose teeth confirmed that immature animals had died.

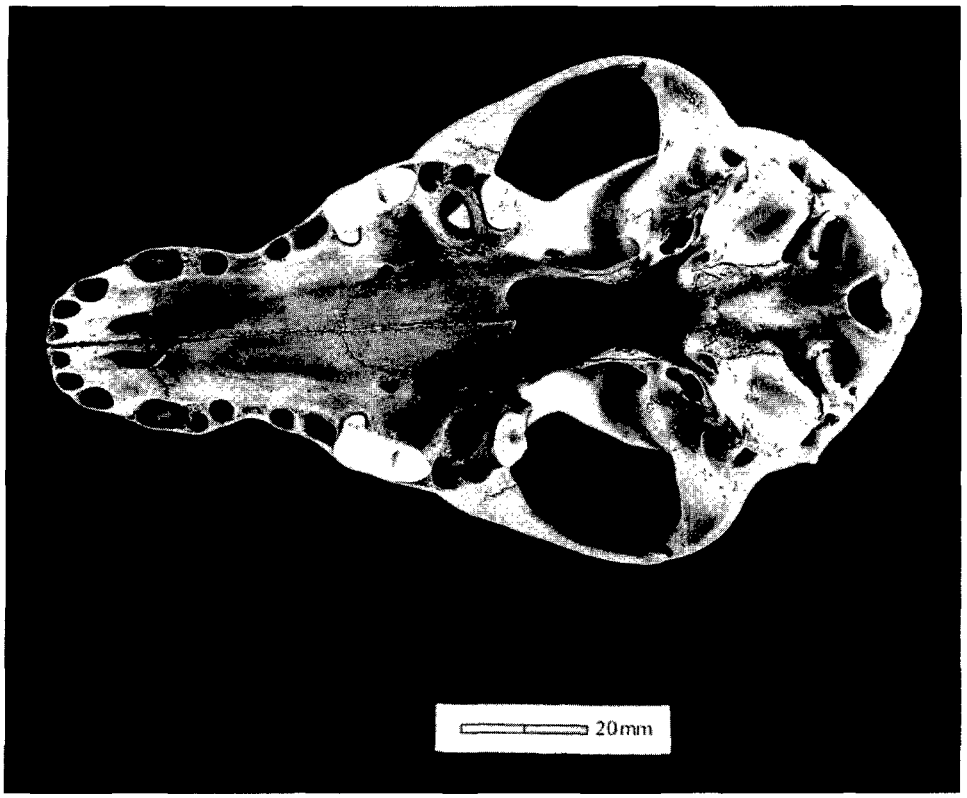
DOG (*Canis* sp.) and FOX (*Vulpes vulpes*)

Only 25 bones out of a total of 216 canine/vulpine bones were ascribed to dog. Very few measurements of dog bones were obtained. However the dimension of a complete dog skull SF 5959, and a maxillary fragment SF 3867, measured according to Harcourt (1974) are given in Table 35mf (1:E3), along with the dimensions of a partial fox skull SF 2605 and Harcourt's measurements of the Jarlshof dog. Dog skull SF 5959 (illus 83) was shorter in length than the Jarlshof example and other Iron Age examples given by Harcourt. However, it did not otherwise diverge from the pattern of Iron Age dogs: that is, it had broad zygomatic arches, a moderately long snout and a fairly broad muzzle.

Of the bones, 2 left mandibles came from puppies of *c* 4 months, but the possibility that these mandibles came from fox cubs could not be ruled out. The remaining dog mandibles came from adult animals. In one right mandible, SF 3946, the 3rd incisor still retained its characteristic fleur-de-lys shape, which is completely lost by 2 years of age in modern animals (Silver 1969).

All the dog long bones came from adults with the exception of 2 scapulae from foetal or new born animals, which again could have come from fox cubs. Immature foxes were present, although all these bones were assigned to the 'cf fox' category (see above).

Skull SF 3867 had a palatal breadth of 76.2mm, which is much larger than measurements given for Iron Age dogs by Harcourt, indicating that it could have been a wolf. Table 36mf (1:E3) shows a comparison between measurements made on this skull, a female



Illus 83
Dog skull (SF 5959), Phase 7.

wolf of French origin and an Iberian wolf. Clutton-Brock (pers comm) suggests that the main difference between Howe skull SF 3867 and the French example, lies in the flat shape and small size of the tympanic bulla of the Howe specimen, a dog-like feature. She suggests that SF 3867 came from a hybrid between wolf and dog. Alternatively she argues that the example came from a very small wolf whose skull was imported from the mainland along with its skin as it is unlikely that wild wolves were present on Orkney as late as the Iron Age. If, however the animal was a domestic dog, it was certainly a large one and may possibly have been a guard dog or a 'dog of war' (Barnetson 1982, 104).

An incomplete ulna from Phase 7 was from a dog with an estimated shoulder height of 52cm (Harcourt 1974, 154). This is in agreement with a height range of 47–56cm calculated on the ulna for Iron Age dogs. Platt (1934) estimated the shoulder height of the Jarlshof dog at 45.72mm (18 inches). A short but strongly curved ulna SF 126 from a disturbed context was similar to a specimen illustrated by Mennerich (1968, 144). It probably came from a small bow-legged dog and may have been recent in date.

CAT (*Felis* sp.)

Dimensions of complete cat bones are given in Table 37mf (1:E4). It was thought on the basis of long bone size that these bones came from domestic cats, rather than wild. Further evidence came from a mandible in which the teeth showed crowding, which is often cited as a sign of domestication.

A single left maxilla from Phase 8 contains a deciduous molar and is thought to have come from a kitten. All of the mandibles present (a total of 8) came from animals over the age of 6 months (illus 84). However, the evidence of fusion of long bones shows that kittens as well as adult animals died or were killed (Table 38mf, 1:E4).

Illus 84
Domestic cat, right mandibles (SF 3009 & 3728), Phase 8.

OTTER (*Lutra lutra*)

Three mandibles, a maxilla and a skull all came from adult animals. An unfused proximal tibia indicated that one immature otter was present in Phase 8.

SEAL (family *Phocidae*)

Two left humeri from Phases 7/8 and 8 had both their epiphyses missing and probably came from seal pups. Three other bones from Phases 7 and 8 had unfused epiphyses suggesting they were also from juvenile seals.

SMALL MAMMAL

This category includes Orkney vole (*Mycrotus arvalis orcadensis*), Field mouse (*Apodemus sylvaticus*), Pygmy shrew (*Sorex minutus*), Brown rat (*Rattus norvegicus*) and Rabbit (*Oryctolagus cuniculus*).

A large number of immature animals were present, mainly Orkney vole and a few field mice. Table 39mf (1:E4) shows the percentages of unfused bones recovered.

Six bones of brown rat were however identified and sent to PL Armitage for confirmation. The Howe specimens were stratified in Phase 7 but it was questioned whether they were in fact brown rat, as the species was not introduced to the British Isles until the late 17th–early 18th century. Recent identifications of the black rat (*Rattus rattus*) from Roman levels in London and York establish an earlier introduction than previously thought for the species (Armitage *et al* 1984).

The Howe bones were however confirmed as brown rat (*Rattus norvegicus*) but posed the problem that they had burrowed down through 1.5m of rubble both within the broch wall and on the E side of the site. Disturbance and excavation in the 19th century may have allowed entry of small mammals into the site to burrow to lower levels. Another example of this is the finding of viable dock (*Rumex*) seeds (7.2 Plant report above), again on the E side of the site, due most probably to the activities of the field mouse (*Apodemus sylvaticus*).

COPROLITES – BBS

Identifications by Camilla Dickson (Glasgow) and Tim Holden (London)

Other mammalian evidence came from the site in the form of coprolites (Table 40mf, 1:E5), the desiccated and partly fossilized remains of excreta. In all, 19 samples were collected with the majority found in Phase 7. The earliest samples were connected with the E well, either deposited inside during Phase 4–6 or in rubble associated with its alteration in Phases 5–6. The Phase 7 samples came mainly from levelled rubble surfaces associated with the settlement in Later Phase 7 – the workshops in the S, SW, SE, NE and the broch tower. This contrasts with only two Early Phase 7 samples which were found in rubble layers. One sample only came from Phase 8, from a midden context. The trend towards a more untidy and less well maintained settlement from Later Phase 7 onwards, with debris and rubbish in and around buildings, has been noted with respect to other finds types and contrasts with the situation in Early Phase 7.

The contexts in which the coprolites were found ensured a rapid desiccation and, or mineralization, and enabled this form of environmental evidence to survive. Where analysed, the amount of hair and bone suggest that the majority of the samples were from dogs, and only four samples could possibly be referred to as human – from the Phase 4–6 well silts, and from Later Phase 7. Many of the samples were highly mineralized and no firm identification as to their origin or contents was possible.

PATHOLOGY

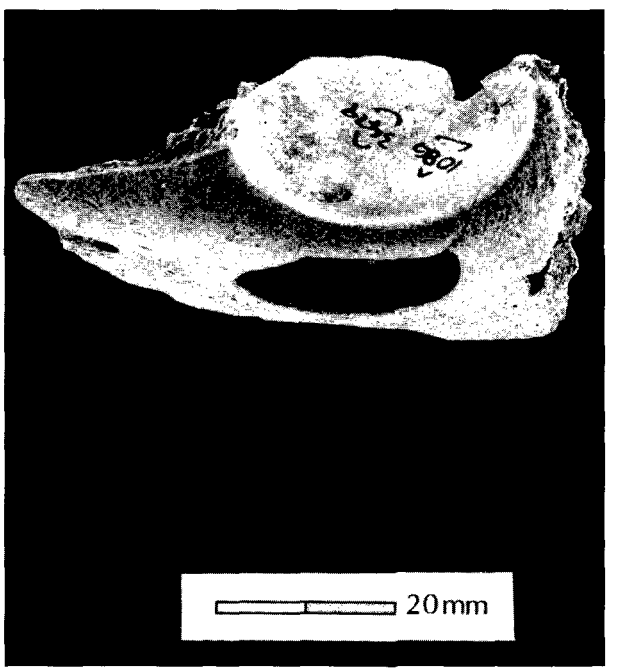
Surprisingly few of the bones of domestic animals were affected by disease, injury or congenital anomaly. The wild red deer and fox, were affected by apparent congenital dental anomalies and some were affected by arthritic changes. Pathological specimens from all phases, are listed by species in Table 41 (1:E6–E11).

Congenital dental anomalies were present in only two cattle mandibles, where the absence of the lower 2nd premolar, PM2, was noted. This condition was not uncommon in prehistoric domestic ruminants (Andrews & Noddle 1975). Several of the cattle had suffered from osteoarthrosis.

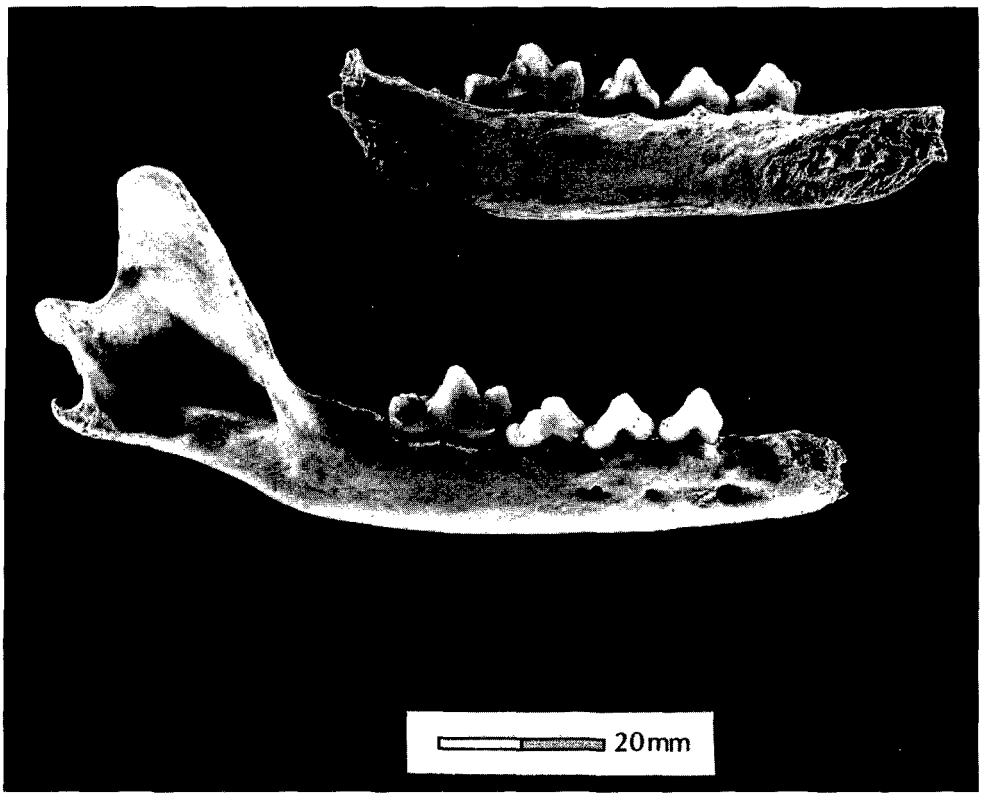
As with cattle, dental abnormalities were noted in two sheep mandibles and osteoarthrosis in several sheep long bones. Some sheep were apparently affected by spavin, which is an arthropathy of the hock joint. Several sheep bones also showed indications of having suffered traumatic fracture, infection and dislocation.

Pathological conditions of pig included evidence of a healed skull fracture (illus 85). This injury was possibly the result of a previous abortive attempt to kill the animal which died at least c2–3 months after receiving the blow, sufficient time to allow the injury to heal (Noe-Nygaard 1974, 245). One neonatal pig skeleton showed symptoms of rickets, and tooth crowding in other examples may have indicated inbreeding.

Dental anomalies were seen in 14 half mandibles of red deer (reduced 3rd pillar or 5th cusp of the third molar). This condition occurs in present day populations, but the large numbers involved suggest a limited gene pool. Peridontal disease was also observed in several mandibles.



Illus 85
Skull fragment of a young pig showing evidence of a healed fracture (SF 3479), Phase 7.



Illus 86
Fox, left and right mandibles (SF 3135), Phase 7.

Skull SF 5959 (illus 83) also exhibited a degree of dental anomaly unusual for an adult dog. It had lost both the left and right 2nd upper premolars and the sockets or alveoli were resorbed. There were also two sockets for its 1st premolar in the right maxilla, where the tooth was lost post-mortem (Table 41mf, 1:E6–E11), rather than the normal single socket.

Dental anomalies in fox half mandibles range from lack of development of the first premolar (PM1), to absence of the same tooth, possibly due to injury (see also Lund 1962). In two cases of paired fox mandibles (illus 86), it was noted that both the first premolar and the third molar were absent in both sets. This indicated that the absence of lower cheek teeth in the Howe foxes was congenital.

Lloyd (1980, 238) has suggested that tooth loss in foxes may be either inherited, or dependent on diet. It is thought that the opportunities for predation on domestic animals must have been good, and wild food in the form of the Orkney vole was abundant. Lund (1962, quoted by Lloyd 1980, 71), found that Microtus of which Orkney vole is a sub-species, was preferred by red foxes. Similarly, studies in Poland have shown that 65% of the diet of foxes consists of small mammals, of which a further 93% is the common vole (*Microtus arvalis*) (Goszczynski 1974, quoted by Lloyd 1980). Therefore, lack of reasonable diet as a cause of dental abnormality may be ruled out. As with the red deer, inbreeding due to enclosure within an island group may have led to frequently occurring abnormalities arising in the population.

HUSBANDRY AND ANIMAL MANAGEMENT

Farming at Howe from Phase 3 onwards was probably mixed, with both the keeping of domestic animals, cattle, sheep and to a lesser extent pigs, and the growing of cereal crops, notably barley. Cattle were relatively small and presumably hardy; sheep could have been similar to the modern Soay or the native North Ronaldsay breed; pigs were small and horses similar in stature to a modern Shetland pony. Comparison of the nutrient foramen of the femur of cattle and sheep suggest that the domesticated animals at Howe were similar to those from other Iron Age sites in Orkney.

Hunting of wild species, especially red deer, was an important aspect of the site's economy. Environmental evidence for phases prior to Phase 7 is limited and the information drawn from the early remains is inconclusive. However, during the earlier phases, prior to and including Phase 5/6, red deer were more important as a food species than either cattle or sheep. From this is it possible to suggest that husbandry of the domesticated animals was either inefficient, difficult, or problematic due to the harshness of the environment (Grant 1981, 209).

The increase in survival of environmental evidence from Phase 7 onwards allows a more detailed analysis of the settlement's farming methods. Mixed farming was the standard practice with changes noted in both cereal production and animal management, as well as hunting practices. In Phase 7 the sheep population had increased in size over that of cattle, while deer remains became less profuse. By comparing the kill-off curves of sheep in Phases 7 and 8 it can be seen that in Phase 8 relatively more sheep survived to a greater age than did in Phase 7. This change in emphasis in sheep husbandry was accompanied by a dramatic decrease in the numbers of red deer bones found in Phase 8.

Evidence of a high infant mortality rate amongst the domestic animals and pathological evidence (see above) suggests that animal husbandry methods, whilst not efficient, were adequate to ensure a mature breeding stock. The high infant mortality could be due to poor husbandry rather than killing off the animals deliberately for meat. Conversely, the more pliant animal skins may have been valued as highly as wool from adult sheep. By contrast, evidence of potentially crippling pathological conditions

suggests defective animals were not killed off but were allowed to survive to maturity.

The ability to overwinter stock was most likely to have been dependent on the collection of hay, supplemented by chaff, and possibly heather and seaweed (7.2 Plant Report above; 7.2.1mf 1:C1–D2). Little evidence of the stalling of domestic animals has been identified from within the Phase 7 settlement, although the ***S*** and ***SW*** buildings may have been used as byres at the very end of Early Phase 7. The general lack of environmental deposits from this phase does not help solve the problem of whether animals were stalled in the house yards during the winter months, nor does the evidence from the Phase 8 buildings where a little burnt dung was found. Given the environmental conditions of an Orkney winter, and the tradition, from the 8–9th centuries to the present day, of stalling cattle inside from the autumn to the spring, the inference is that Iron Age cattle were probably also kept inside during the winter.

Yards provided some structural evidence in the form of upright stone slabs or stalls set at right-angles to the yard walls, in the ***NW*** building, and a soakaway in the ***SW*** building. Subsequent rebuilding and accumulation of building debris have not aided the preservation of these structural remains, and what evidence there is, is not consistent within each yard. The paucity of suitable environmental evidence, may be due to organized manuring of fields in the spring and the thorough cleaning out of the yards. The use of of manure as a fuel has already been commented on, and no evidence of it was found in hearth samples. This does suggest that animal dung was used as a fertilizer on the fields and that fields were manured regularly (7.2 Plant Report above). Transportation of manure from byre to field is an unresolved problem suggesting some form of wheeled vehicle or the use of straw or heather baskets.

RED DEER

The most important wild species at Howe was the red deer. Now extinct on Orkney, red deer were probably imported by Neolithic settlers, their survival after the last glaciation as a relict species being unlikely (Clutton-Brock 1979, 113). It has been suggested, by the same author, that the deer population of Neolithic Orkney was under the direct control of the inhabitants as evidenced by the presence of foetal deer remains at Quanterness.

Jarman (1972) has suggested that deer in the Mesolithic and Neolithic were semi-domesticated, the relationship between man and deer tending to produce a husbanded herd. Certainly the kill-off pattern of the Howe red deer gives the impression of selective culling, but the eventual herd structure may have been produced unintentionally rather than by conscious selection.

Modern attempts to farm red deer in the same way as other domesticated animals have met with difficulties arising from the behaviour patterns of the wild animal. Deer are highly territorial creatures and the stags, especially at rutting time, become very unpredictable, while the hinds can also become untrustworthy and aggressive. It has been found that the traditional British deer park, where the deer are confined within set boundaries but are not otherwise interfered with, has proved the most successful means of managing herds of this, at times, both timid and aggressive animal (Clutton-Brock 1981, 182–3). Certainly an island would have formed an ideally naturally limited environment, and it is probable that the Howe deer were not managed, other than by culling.

Definite evidence of domestication would have been provided by the presence of castrate antlers. In the first year these are difficult to distinguish from normal yearling antlers but in subsequent years may become grotesque and malformed. Castration prior to puberty precludes antler growth (Goss 1983, 270–2) but no evidence of such was found at Howe.

The culling of very young or neonatal deer was seen during Phase 4/6 from the bones of six individuals recovered from the E well. Many of these bones were burnt, which suggests that whole carcasses of young deer were roasted over a fire.

Pathological analysis of the red deer bones indicated inbreeding, perhaps a contributory factor in the status and declining numbers of red deer during the Iron Age in an enclosed island environment (Youngson pers comm). The decrease in deer remains seen from Phase 5/6 and especially in Phase 8 many have been due to environmental changes brought about by the activities of Iron Age man and of the deer themselves. The natural light scrub woodland, the habitat of red deer, was exploited for fuel, charcoal and presumably for timber. A substantial decline in wood use during Phase 8 relative to the earlier periods (7.2 Plant report above; 7.2.1mf 1:C1–D2), perhaps indicates an over-exploitation of woodland resources which may directly correlate to the decrease in the number of deer bones recovered.

The decrease in the number of deer utilized by the inhabitants at Howe may indicate an actual decrease in the deer population, as animals were forced into less favourable and more open habitats by the combined effects of reduced tree cover, caused by over browsing and felling, and by arable farming. The decrease in size in red deer between Neolithic times and the present day has been attributed to decreasing nutritional status and poorer habitat. Perhaps the relatively small size of the deer bones from Howe compared with Neolithic specimens is an indicator of the results of escalating human pressure on the deer population, due to an increased need for arable land and pasture for domestic animals. Certainly the fact that there are no red deer on modern day Orkney indicates that removal of scrub/shrub vegetation and the increased use of land for farming has led to their eventual extinction on the islands.

USE OF ANIMALS

BUTCHERY

Evidence of butchery marks was found on bones of domestic species such as cattle, sheep, pig, horse, and cat and on wild species such as red deer, cf fox, otter, cetacean and bird. Armitage (1978, 134–5) has described three stages of butchery encountered at an archaeological site: primary butchering – a dressing down of the carcass, ie removing the head and the horns; secondary butchering – or disjointing, ie dividing the carcass into two halves and the production of joints of meat; tertiary butchery – the cracking and splitting of the bones to extract marrow, and the cutting of flesh from the bone.

PRIMARY BUTCHERY

Evidence of primary butchery as regards removal of the head was demonstrated by the incidence of butchered cervical (atlas and axis) vertebrae. Only four cattle atlas vertebrae out of a total of 73 survived relatively intact. The remainder were butchered either by chopping in the sagittal plane, by chopping down through the lateral edges or by oblique blows across the body of the centrum, and knife cuts were visible on many of the specimens. Similarly only one cattle axis out of 82 survived whole. Most of those which had been butchered were chopped obliquely, and then again in a transverse direction. In one case a cattle axis had been sawn rather than chopped.

Red deer cervical vertebrae were treated in a similar manner. However, a larger percentage of deer axis vertebrae survived intact, perhaps as a result of their somewhat smaller size. This trend was repeated in the case of sheep.

Horns or antlers were cut off if present, either before or after the removal of the head. One cattle horn core had grooves cut into it

Illus 87
Sagitally split male red deer skull with knife cut on pedicle, antler and burr removed (SF 3244), Phase 8.

near the tip, possibly to facilitate removal of the horn sheath, and one sheep horn core was sawn near the base. Several red deer skull fragments (illus 87) had knife cuts on the pedicle, associated with antler removal. In addition to removing the horns or antlers, sheep, cattle and red deer skulls were further subjected to butchery by being split, often in the sagittal plane, presumably to remove the brains. One fragmentary cattle and one incomplete pig skull bore knife cuts probably associated with this operation.

SECONDARY BUTCHERY

Carcass splitting

There was very little evidence from the vertebrae of cattle and red deer to suggest that carcasses were split into two halves as is the modern practice. Instead of this, the majority of the vertebrae had had their lateral edges chopped off. A large number had then been chopped in a transverse direction, leaving only the centrum and many broken neural spines.

In the case of sheep and pig, more vertebrae tended to survive intact than did those of cattle and red deer. Of those which had been butchered, although a minority were chopped sagittally, a greater number were dealt with in the same way as the vertebrae of larger animals. Armitage (1982) has shown that many of the cattle, sheep and pig vertebrae from the Roman levels of various sites in the City of London, instead of being split in half, had their lateral edges sliced off in a similar manner to those at Howe. This suggests that butchery took place while the carcass was lying either on the ground or on a table, in contrast to suspending the animal by its hind legs in order to split it into halves, as is the modern practice.

Cuts of meat

Evidence for the production of recognisable joints of meat is provided by sets of bones which were articulated (eg a red deer right radius and ulna) with knife cuts. The distal part of an articulating red deer right tibia and astragalus had been discarded as being relatively meatless, the upper part of the tibia providing the shank joint. Many sets of articulating carpals and metacarpals were found, presumably as with the tibia and astragalus, these had been thrown away with the connecting tissue (tendons and ligaments) still intact, thus ensuring the eventual recovery of the smaller elements.

TERTIARY BUTCHERY

Extraction of marrow

Many of the long bones, especially of cattle and red deer, had been split, usually in the sagittal plane, probably to extract as much of the valuable marrow as possible. In addition several phalanges of red deer were found to have circular holes pierced through one wall near the distal end possibly to extract marrow though other explanations such as the production of artefacts may be postulated. Curle (1933–4) cites the case of six similarly perforated ox phalanges found at Jarlshof, and one from a chambered cairn at Lower Dounreay.

Cutting flesh from the bone – boning-out

There was a great deal of evidence for this stage of butchery. Thin knife cuts were apparent on many of the food bones, especially around the scapula, distal humerus, innominate and the proximal end of the metapodials. This type of fine cut was also seen on fragments of a cat skeleton, and on bones of otter, fox, cf fox and seal. These cuts may have arisen either through skinning of the animals or through utilizing them for food, or oil in the case of seal.

DISPERSAL OF PARTS OF THE CARCASS

Table 42mf (1:E12) shows the expected numbers and percentages of bones from the carcass of a complete ox or sheep (excluding ribs, sternebrae, hyoids and vertebrae other than axis or atlas), compared with actual numbers recovered.

It can be seen that the smaller elements such as carpals and tarsals are somewhat under-represented, though sieving did not recover large numbers. Because of this, there is an apparent over-representation of limb bones; however, the numbers of high meat-yielding bones (humerus and femur) compared with the numbers of low meat-yielding bones (metacarpals and metatarsals) gives a ratio which is the same as that obtained for a complete skeleton. This indicates that butchering took place on the site and that butchery waste and kitchen refuse were dumped in the same place. The comparatively high numbers of mandibles may indicate the relative loss of long bones through bone working.

The statistics for red deer indicate that whole carcasses were brought back to the site. This would have been much more practical than bringing deer back as a collection of joints of meat, antlers and hide. Evidence of this can be seen in the disposal of six young or neonatal animals in the Phase 4/6 well after having been roasted whole.

BONE WORKING

(See also 8.2 Bone Artefact Report; 8.2.1mf 3:A3–D2)

Bone and antler were obviously valued as raw materials to be used in the production of artefacts. The long bones used most frequently were sheep and cattle ulnae for awls and points, sheep tibiae for awls and points, cattle/deer metapodials for handles and awls, sheep metapodials for weaving tools, pig fibulae for needles and pins, cattle and horse scapulae for shovels and cattle/deer femur heads for spindle whorls. Other unidentifiable shafts of long bones were used to make scrapers and awls.

Antler was valued for its strength and resilience, being without the medullary cavity found in long bones. It was eminently suitable for manufacturing such items as handles, picks and weaving combs (illus 97; 101; 102). The tines may have been used without much modification as awls, although some tines may have been

naturally polished by the activities of the living deer in removing their velvet.

Cetacean bone was another natural resource (illus 104; 105). The vertebrae of large species were hollowed out to form vessels, while the vertebral epiphyses were made into lids. Weaving combs and mattocks were also made from whale bone.

Bone gnawing by both carnivores and rodents was noted on samples retrieved from the site. These could have included the activities of dog, fox, otter and Orkney vole. Bones gnawed by rodents have also been noted on other Orkney sites (Platt 1935, 342).

USES OF DOMESTIC ANIMALS

When considering the role of animals in the economy of the site, it is of value to assess the uses to which they and their by-products could have been put. During their lives, the mature cattle and sheep could have provided milk for human consumption at least once a year, through whether prolongation of lactation in cows was considered worth the effort is open to doubt. A second by-product of the living beast was wool from the sheep. Although neither wool nor textiles were recovered from Howe, the evidence of various weaving and spinning artefacts indicate that the sheep were wool bearing.

Thirdly, both cattle and horses would have provided transport or traction for carts and plough. Also all of the domesticates would have produced dung (see above). As well as providing meat, the animals would have yielded hides for the manufacture of clothes and shoes. Thongs made from hide would have been a major resource, providing fastenings for clothes and shoes, and bindings for tools and building timber. Lamb and calf skins from the numerous young animals which died would also have been used for pliable and decorative clothing which was probably valued as highly as wool from adult sheep. Although no leather was recovered from Howe to corroborate this, the Early Christian site at Iona provided examples of leather from cattle, horses and goat (Groenman-van Waateringe 1979, 319). Both cattle and sheep provided horn for the making of utensils and evidence from the site shows that the horn sheath was indeed stripped off the core. Pigs produce neither wool nor milk for human consumption, so their main value comes from their meat, fat and manure. The entrails of both sheep and pigs have been used traditionally in the Northern Isles in food production – puddings and sausages, and as well as providing fat, pigs would have afforded their bristles, perhaps for rope making. Cattle hair could equally well have been used to make ropes and tethers (Fenton 1978, 431, 451).

Dogs and cats, once their working lives were over, may have been skinned before disposal. Knife marks were present on some cat bones which indicate that this indeed was the fate of the felines. None of the scant remains of dogs had been butchered, which perhaps suggests they were of higher value than cats. The comparative lack of dog remains may indicate that they were buried outside the settlement and were not recovered. Although there is a possibility that cats may have been eaten, tasting midway between rabbit and hare (Montagne' 1961, 222), most of the cat bones represented partial or complete skeletons. They were likely to have been discarded with the flesh, or at least with the ligaments intact.

USES OF WILD ANIMALS

As with the domestic cats, the evidence of knife cuts on several bones of foxes and otters shows that these animals were utilised for their skins, although they may also have been used for food. However the Larousse Gastronomique is not complimentary about either species (Montagne' 1961, 428). The presence of several almost complete or partial fox skeletons implies that the flesh was not eaten although additional isolated fox bones and all of the otter bones were found singly or in pairs, scattered throughout the levels.

Otters were traditionally hunted or trapped in Orkney and they are mentioned in the Orkneyinga Saga as being hunted in Rousay (Groundwater 1974, 267). They were caught in stone traps called 'otter-hooses' which were built above ground over the otters' tracks (Fenton 1978, 525).

Seals, both common and grey seals, were caught principally for their skins and oils, but their flesh was also palatable (Brown 1981). Seal skins were traditionally used to make shoes, and seal oil used for a variety of purposes such as lighting, spinning and for oiling harnesses. It was also used as cattle fodder in recent times (Fenton 1978, 525).

Whales, probably in the form of beached carrion, were also used. The amount of bone recovered is probably a poor indicator of the amount of meat and blubber actually taken, since most of the unwanted remains would have been left on the beach. Smaller species of whale such as the Pilot, or Ca'ing whale (ca'ed like sheep) may have been driven ashore in schools (Miller 1976). This practice is still carried out in the Faroes from small boats.

The bones of small mammals and frog/toad, along with those of the smaller birds (7.4 Bird Report below) were more likely to have originated from the activities of birds of prey than from man. These predatory birds were probably owls, rather than hawks or falcons, because of the uneroded condition of the bone recovered (Bang & Dahlstrom 1974, 198). Bones of the Tawny owl were recovered from the site, as well as bones of the Short-eared owl, which is considered to be the principal predator on the modern day Orkney vole (Groundwater 1974, 279).

The presence of amphibian remains indicate that damp conditions prevailed in the vicinity of the site, confirmed by the finds of plant remains from mires and peat bogs (7.2 Plant Remains above).

USES OF COPROLITES AND URINE • BBS

It is possible that both animal and human urine was collected during Phase 7. Each house contained a large slab-lined water-tight tank set into the floor, usually with a pair of notches cut into the end slabs. The notches indicate that items were suspended inside, hung on or over poles stretched the length of the tank. Urine may have been collected in the tanks and in the form of ammonia used for the processing and preservation of leather by sweating to remove the hair (Hodges 1989, 148–149). Dog excreta could have also been used, and perhaps also bird droppings, as an infusion on leather to make it flexible and softer (Thomson 1981, 164). Ammonia was also used for the dyeing of fleeces (Frazer 1983, 15) and for the preservation of ropes and fishing nets.

ANIMAL BURIALS

Details are given in Table 43mf (1:E13–E14) of burials of cattle, sheep, pig, foal, dog and cat from Phases 5/6 to 9. All were accompanied by bones of other animals, probably in the case of Phases 8/9 and 9, by bones of greater antiquity than the burials themselves. Apart from the intrusive burials of Phase 9, all others with the exception of three partial cattle skeletons from Phases 7, 8 and 8/9, were securely stratified.

It would seem that the horn cores of the buried cattle and sheep were butchered in order to remove the horn sheaths before disposing of the rest of the animal, which must have been unfit for consumption as food, but were otherwise unbutchered. The exact means of disposal, whether by actual burial or by merely throwing the animal onto a midden, is unclear in the case of the non-intrusive skeletons. The good preservation of some of the skeletons suggests however that burial was rapid. The ***SW*** building

in Early Phase 7 contained a sheep burial within its original floor which seems to have been a deliberate action.

Only three partial cat skeletons have been included in Table 43mf, although it was thought that the isolated bone finds of cat in many of the contexts were probably all that remained, or was recovered, of animals which were dumped intact, as is usually the case at archaeological sites. Even if the skin was removed, the carcass was unlikely to have been eaten by humans and thus the bones would have been deposited together. Scavenging by dogs would result in the later chance finds of single bones.

The presence of cat bones within walls was noted from Early Phase 7 onwards. Although their location within the structures of buildings may have been fortuitous, derived from the reworking of older rubble and midden material, it is possible that they were introduced deliberately. In more recent times, whole cat skeletons have been found built into walls of dwellings as a form of sympathetic magic against rats and mice (Clutton-Brock 1981, 111–2). Many cat bones were found within the building walls during stage 8 of Later Phase 8. It is possible that the bodies of felines were deliberately buried to 'act' against rodents. Certainly the large numbers of small mammals in this phase may have forced the human inhabitants to resort to any means available to be rid of the nuisance.

Carcasses of foxes were also likely to have been skinned but not eaten by humans. Three fox skeletons are not included in Table 43mf (1:E13–E14), but it is interesting to note that the partial skeleton of a fox was retrieved from the same context as a pig in Phase 7. The fox, SF 2152/3011, had suffered from an infectious arthritis in the feet. The animal may have crawled into the unused broch tower and died there naturally. Alternatively the body may have been thrown on to the floor in an articulated condition after having been skinned. The accompanying and almost complete pig skeleton had no signs of butchery. The animal however suffered from a probable infectious arthritis, particularly in the left shoulder. Its meat was possibly purulent and thus unfit for human consumption.

CONCLUSIONS

A factor in the keeping of animals which is difficult to assess is the status conferred on the owners of, for example, cattle. Tacitus, writing about the Germani, said 'it is a national custom for gifts of cattle or agricultural produce to be made to the chiefs' and, again, that among other gifts, a team of oxen and 'a horse with its bridle' were given as a dowry (trans Mattingly 1980, 114, 116). Although Tacitus was recording the customs of quite a different, but contemporary culture to that of Iron Age Orkney, it is possible that the criteria of wealth were not dissimilar.

When old age, disease, natural mortality or human selection brought about the death of the domesticates, the main value of the carcass would have been as meat, both dried and fresh. Butchery marks on the bones show that horses as well as cattle, sheep and pigs were used for their meat. The fact that the Early Christian church in Celtic Britain frowned upon the custom of eating horseflesh as a 'practice fitting only for thieves' (McCormick 1979, 315) indicates that it was customary, at least before conversion, so to do.

Animals such as fox, otter and to some extent cats were utilized for their pelts. The small numbers of skeletons found suggest that furs were for local need rather than for trade or export. However, the status of cat during the Iron Age is slightly dubious, valued both as a rodent killer and for its fur. The occurrence of kitten bones does indicate that the animals bred successfully in the settlement, although the appearance of cat from Phase 4/5 and certainly from Phase 6 indicates that the evidence from Howe is earlier by a century or two than the postulated introduction of the animal by the Romans. It is possible however, that small numbers of domestic felines may have arrived in the British Isles through trade-links between the Phoenicians and the Celts (Tabor 1991, 36).

The status of dog is also questionable. Do the few remains indicate a valued species? Certainly the large sized specimens suggests hunting animals for rounding up both the domestic livestock and red deer, but it is not known whether they were bred for specific purposes. The non-utilisation of their skins indicates a different status to that of cat.

The hunting and use of red deer poses many questions concerning ownership, territoriality, organization and leadership, not just within the settlement at Howe, but between Howe and its neighbours. How far did the Howe inhabitants travel to hunt deer? Where did they hunt? Did the Orkney mainland herds satisfy the demand of the local inhabitants or did people hunt on neighbouring but less well populated islands such as Hoy? Was there organization between broch settlements for a regular cull on the deer herds? Did specific numbers of deer belong to certain settlements and how was the meat shared out? What happened when the red deer herds declined significantly in numbers but the demand for antler artefacts remained high? Certainly, the evidence from the later phases of the site indicates that antler was valued so highly as a raw material that its importation, in isolation from the rest of the carcass, must have occurred. Its place of origin and the possibility that it was an article of trade remain a matter of conjecture.

The information gleaned from the faunal remains from Howe is unsurpassed by any previous Iron Age excavation in the Northern Isles. The preservation and stratigraphic analyses have provided an insight into

the life of the settlement in great detail. Recently published evidence from the nearby Warebeth Broch (Sellar 1989, 122–127) shows a similar picture to that from Howe, although the material was from a restricted context, that of the broch well. Information from the recent excavations on the island of Sanday and from Skaill in Deerness may broaden the picture established by Howe and fill in some of the missing details to provide a more comprehensive view of Iron Age husbandry and hunting practices.

7.4 • THE BIRD REMAINS

Dr Don Bramwell with BBS

The excavation produced one of the largest stratified bone assemblages in the north of Scotland with bird bones recovered from all but the earliest phase. Over 1700 bird bones were found (Table 47). Of these, 90% were identified representing 113 species (Table 46mf 1:G9–G14). Only one of these species, the great auk, has become extinct, while the rest are still found as island breeders or visitors.

DISTRIBUTION BY PHASE

Very few bones, about 6%, were recovered from Phases 2 to 6 of the site, from ditch fills and levelling horizons. Some of the larger food species, gannet and great auk are represented, but from the small number of bones preserved no conclusions can be drawn. The majority of the bird bones, 76%, were found in Phases 7 and 8. 17% were unstratified.

The greater survival of bird bone in the Iron Age Phases 7 and 8 is consistent with the more detailed preservation of the archaeological record at this time; equal numbers of bones were found from these phases (Table 47). Most bones were found in levelling layers and ditch fills, with the larger food species – the gannet, cormorant, golden plover, great auk, and red grouse – being well represented. Large numbers of smaller birds present during these phases – the thrushes and starlings – represent birds that were breeding on the site.

Bones of a single goshawk were spread across the E half of the site in Phase 7, and bones representing one short-eared owl were found in several floors and rubble horizons inside the broch tower during Phase 7–8. The earliest record of domesticated fowl and geese came in Phase 7 but in small numbers. There are some changes in bird bone numbers later in the Iron Age, in that there are twice as many red grouse in Phase 8 as in Phase 7, but half the number of great auk bones, whereas the presence of golden plover and starling remained consistent throughout these two phases. The filling of the derelict broch tower in Phase 8 produced a large number of bones from 30 species, including debris from food species such as grouse, as well as bones of smaller birds which may well represent the prey of ravens who seem to have nested in the disused building. The presence of bones of red kite, juvenile crane and stock dove in Phase 8 represent unusual kills (see below).

EXPLOITATION OF BIRD RESOURCES

HABITAT AND AVAILABILITY

No detailed attempt has been made to categorize bird species by habitat as their natural environments are complex and their definitions are being constantly refined. Guides to the birds of Britain and Europe cite the breeding and non-breeding habitats of individual species and they are not repeated here. Many types of habitat provide the opportunity for Howe's inhabitants to capture birds; sea cliffs for guillemot, razor bill, shag, cormorant, gannet and perhaps raven, with puffin and black guillemot at the top and at the base; shorelines and estuaries for ducks and wading birds; moorland for golden plover, some gulls and red grouse; marshes and lochs for passage and wintering ducks, geese and swans; farmland for wintering birds and foragers such as rock dove, golden plover and starling. The settlement at Howe (illus 1) was situated close to open sea, shorelines and inland lochs, with the nearest marsh and moorland about 3km away and high sea cliffs about 6km away.

Small birds, such as thrushes, blackbirds and starlings were most likely to have been resident breeders about the site, using old buildings and surroundings fields, whilst redwing and fieldfare may have inhabited the area of the settlement during passage north and south.

The smaller birds, the thrushes and buntings, may have also been victims of predators such as owls, merlin and peregrine which could have used derelict buildings on the site as roosts or plucking stands. They may also have become casualties of hunting foxes, otters and the domestic cat which brought its prey to the settlement.

It is assumed that most of the larger birds would have been hunted and brought to the site by man, as food. Other species such as the birds of prey, may have been accidental finds, trophies of the hunt, or used for hunting, and their location in the archaeological record might well be for reasons other than for food (see below).

Table 47: Total number of bird bones by phase

Phase	2	3	3–4	4	4–5	5	5–6	5–7	6	6–9	7	7–8	8	8–9	9	Totals
identified	1	2	1	1	2	18	50	1	19	5	545	75	582	1	272	1499
unidentified		1				2	2		2		58	7	32		27	126
Totals	1	3	1	1	2	20	52	1	21	5	603	82	614	1	299	1625

ACQUISITION

With a lack of direct evidence from the site, methods Iron Age man used to acquire birds as food have been inferred from examples used in the Northern and Western Isles during the last two centuries. The bird remains from Howe have not provided evidence for the processes of capturing and killing, but blunt-ended arrows, clubs and snares were probably used (Clark 1948, 116, 117). It can only be suggested that ropes, probably of heather simmens, were used to explore the cliffs and reach nesting birds which could then be clubbed or killed by hand. Hooks and nets may also have formed part of the apparatus of bird collection (Baldwin 1974, 67, 89). Most birds taken as food were adult. Immature and juvenile birds account for only 14% of the total number of bones. Sea birds were exploited as a common food from the 16th to the 19th centuries (Fenton 1978, 510), and there is no reason to suppose they were not exploited in earlier times to supplement the diet, especially in the summer when made vulnerable by cliff nesting in large numbers (ibid, 522). Last century, men working nests on cliff ledges would throw the bird down to a waiting boat at the foot of the cliff, or carry the birds on their backs. The bird bone numbers from Howe suggest small scale killing of sea birds, for which a boat may not have been necessary. Gulls, shags, auks and perhaps gannets could have been taken by hand or with nets and dogs. Puffins could have been poked out of their burrows with a hooked stick or noose or pulled out by hand (Fenton 1978 517, 518, Steel 1975, 62).

First in the summer season would have been the taking of sea bird eggs, notably puffin, black guillemot, guillemot and gulls, followed by the culling of the birds in June or July. Heather baskets either carried or suspended on a rope were most likely used for the collection of eggs (Fenton 1978, 513). There are only a few fragments of eggshell from Howe, and none of it has been identified, the rest presumably was recycled.

Gannet is well represented at Howe with 68 bones present from Phase 5/6 onwards. It has been suggested (P Reynolds & I Lorimer pers comm) that local gannetries were present in Orkney in the past, which have since been over-exploited or abandoned by the bird. The relatively small number of gannet bones, as compared to the number of birds taken earlier this century on St Kilda (Steel 1975, ch 2), suggest that 51km journey by boat to Sule Stack, west of mainland Orkney (now Orkney's only gannet colony) was not justified. Small scale local exploitation seems the norm for the Iron Age inhabitants at Howe.

Sloping rock platforms, accessible rock ledges and caves mainly found on the west coast of the Orkney Islands would have formed suitable nesting sites for the flightless great auk (Buckley & Harvie-Brown 1891, 245). It would seem that access to, and killing of, these birds was quite easy and less hazardous than other species, as more bones (77) are recorded from the site than any other sea bird.

During the autumn, it is evident that Iron Age man turned to the heather moorland and fields, to the red grouse for meat. In poor winter weather grouse would have also come down to feed on stubble in fields (Buckley & Harvie-Brown 1891, 195; Cramp 1980, 392). There they could have been trapped or caught by dogs. If hawking was in practice, birds like the peregrine and goshawk (see below) could have been employed to attack grouse in flight (Vesey-Fitzgerald 1946, 1–26). The larger number of grouse (165 bones for the Iron Age), both from Howe and the neighbouring settlement of Bu, indicate that it was the bird species most commonly taken. Apart from sea birds and grouse, fresh water fowl such as swans and duck could have been killed using arrows, nets and dogs, probably during the winter months when migrant birds in large numbers would have been quite noticeable on the lochs. Also during the winter migrating and passage, geese coming to rest in fields and inland wetlands would have been relatively easy targets targets for the Iron Age hunter. Fields in the vicinity of the settlement would have provided feeding grounds for greylag geese as well as rock doves, golden plovers and starlings. Snares, hawks, arrows or dogs would probably have been used to take the larger birds. Golden plover are reported to be excellent eating, but difficult to catch (Vesey-Fitzgerald 1946, 164). In Phase 8, juvenile crane bones (see below) form one of the most important samples from Howe, indicating the taking of a young bird from its nest on boggy ground. Seasonality of the availability of birds and their eggs was probably an important consideration of inhabitants at Howe. The general paucity of young bird bones suggests that in the main they were not taken, in spite of the heavier meat weights of fledglings such as gannet. Provision of meat may have only been one of several factors in the taking of birds but the relatively small number of total bird bones compared to mammal bones indicates that killing birds was only a subsidiary activity and the inhabitants of Howe were not dependant on them.

UTILIZATION OF CARCASES

Some of the Iron Age bird bones from Howe exhibit evidence of butchery. Once caught, a gannet from Phase 5–6, SF 6448, was butchered to remove its wings and legs, whilst knife cuts on its head might indicate that the carcase was split down the middle then hung up to dry.

In the same phase, a pair of great auk legs, SF 6463, were found which had been roughly hacked off the carcase and discarded. Knife cuts were also found on other great auk bones in Phase 7. Butchery marks were noted on species found in Phase 8, whooper swan, greylag-domestic goose and domestic fowl. The combination of butchery marks and the grouping of some bones in Phase 7 suggest that wings, feet and heads were removed from carcases before cooking, smoking, drying or eating raw.

At a time when all food was predominantly boiled or stewed, some of the bird carcases may have been hung up to air dry out of the wind or smoked above the domestic fire, to provide some dietary variety. On St Kilda, some birds were hung up to dry in store houses to preserve them, and the fat from boiled sea birds was skimmed off and used to provide fuel for lamps (Steel 1975, 58, 67). Nothing from bird carcases was wasted and Howe's inhabitants would have readily made use of sea bird oil and fat for lighting, medication and culinary uses.

There are a few examples of charred bird bones. In Phase 7 a few samples showed evidence of birds having been cooked, found either near hearths or in a burnt condition, such as a calcined guillemot humerus and a scorched cormorant humerus.

It is quite likely that some raptors would have been taken for their feathers, for example the white-tailed eagle, red kite and ravens, whilst scavenging on middens for refuse, or on dead lambs and pigs. Sea birds may have also been utilized for their skins, which would have been both light and warm (Fenton 1978, 520). The paucity of eiders from all phases, and also at Bu, is quite remarkable, as they are easy to approach when on the nest. They could have been exploited for eggs, meat and especially feathers. Their scarcity in the Iron Age might suggest low bird numbers due to over exploitation, or that the species was protected for its down. Eider duck were supposed to be a favourite food (Groundwater 1974, 83–85).

Although wing extremities of some sea birds are noted as being removed from the carcase, some groups of bones have been clearly identified as being from wings, such as the guillemot bones from the broch tower in Phase 7. It is suggested that these wings may have had a domestic use in the form of a brush or winnower (Baldwin 1974, 96, Plate 46).

BIRD SMALL FINDS
(see also Bird Bone Artefacts in Small Finds Reports)

Only four worked bird bones were found made into tools or implements. Two goose ulnas, SF 3398 and 3326, from Late Phase 7 were rubbed down, the former formed a smooth square sectioned shaft, whilst the latter had been sawn at one end and then broken by use (illus 89). In Early Phase 8, two smoothed gannet ulnas SF 1958 and 1976, were found. The former was damaged.

A bird bone tube was found among the bone collection from the broch of Midhowe, Rousay. It was identified as a goose sp. or white-tailed eagle ulna (Platt 1934b, 489, fig 29, 516), but few such finds have been made on Orcadian sites.

DISCUSSION OF CHANGES IN BIRD DISTRIBUTION AND GENERAL REMARKS

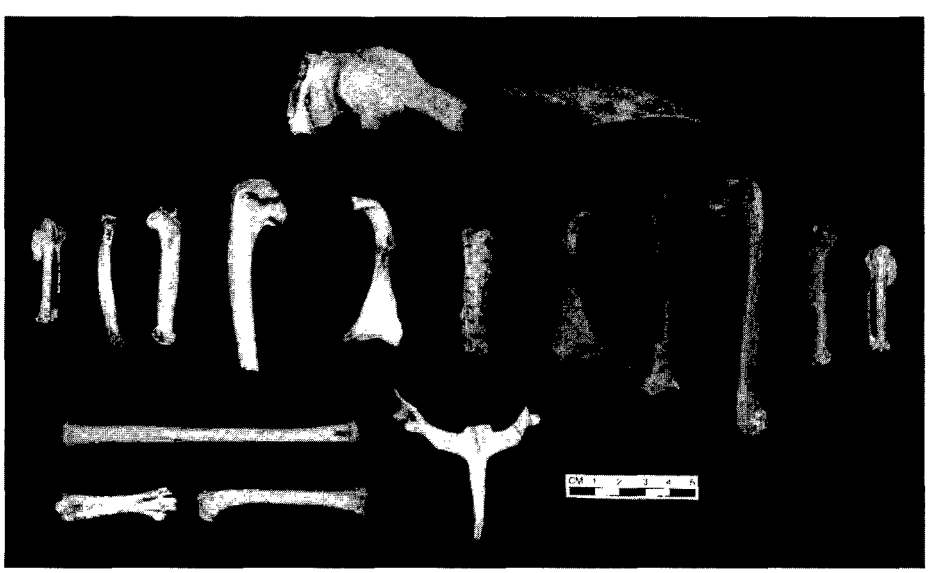
Comparison of the number of bones of the species with their present day abundance (see Meek 1985), infers that some species were always plentiful, such as gannet, cormorant, shag, red grouse and raven. Other species such as the now extinct great auk and the white-tailed eagle which is no longer a breeding bird or a regular visitor, were obviously more numerous in the prehistoric period. In spite of the haphazard collection of animal and bird bones from previously excavated Orcadian prehistoric sites, the pattern of common bird species is more or less consistent (Smith 1984, 262–264).

Other bird species have high bone numbers, but in some cases they only represent single individuals, such as the adult goshawk in Phase 7 and 8, found in rubble contexts on the E side of the site, and the white-tailed sea-eagle in Phases 8 and 9, again on the E side of the settlement. Goshawk is at present a rare visitor in Orkney, and although it is predominantly a bird of woodlands, it might have passed over Iron Age Orkney during migration periods. Alternatively, the goshawk has been highly prized for hawking for game birds as it easy to handle and returns to the hand. It might have been a prestigious object of trade or exchange to someone of high social rank, unlike the peregrine or kestrel which could have been caught and trained for hawking locally (Vesey-Fitzgerald 1946, 1–3).

It is interesting that bones of rare birds of prey such as the red kite from Late Phase 8 and an immature tawny owl from Later Phase 7 found their way to the settlement at Howe. The tawny owl is an unusual predator whose presence in Norse times has previously been noted in Orkney (Brothwell *et al* 1981, Table 3). These birds could well have been blown off course; whilst looking for shelter these tired and disorientated birds would have been easy prey to the hunter.

The occurrence of four ravens and adult and immature short-eared owls in late rubbles in the broch tower, suggest nesting and roosting birds in the derelict building. Walls would have been used as plucking stands to deposit torn off wings and sternum and other bones of their kill onto the rubble beneath. This probably accounts for the high numbers of starlings and thrush species found in these contexts. Young raven may have been eaten or kept as pets, as several at the fledgling stage were found (Luff 1984, 41).

The great auk (illus 88) is an extremely interesting and exciting find. The best collections of bones in the British Isles have come from Orkney, although none were identified from the settlement at Bu. Its lack of



Illus 88
Composite skeletal remains of great auk bones found at Howe.

flight and the fact that it bred colonially on shelving rock platforms, rock ledges and in caves close to the tidal levels made it easy to kill. In Phase 7, parts of a juvenile bird were found, indicating culling by the islanders in late summer. Juvenile bones were found in Phase 6–9, indicating again locally reared young, but in the main, young great auks were not primary targets for food. When the great auk was not breeding it was probably widely dispersed at sea. It was last seen in Orkney in 1813 and became extinct in June 1844 (Buckley & Harvie-Brown 1891, 245; Cramp 1985, vol 3, 207).

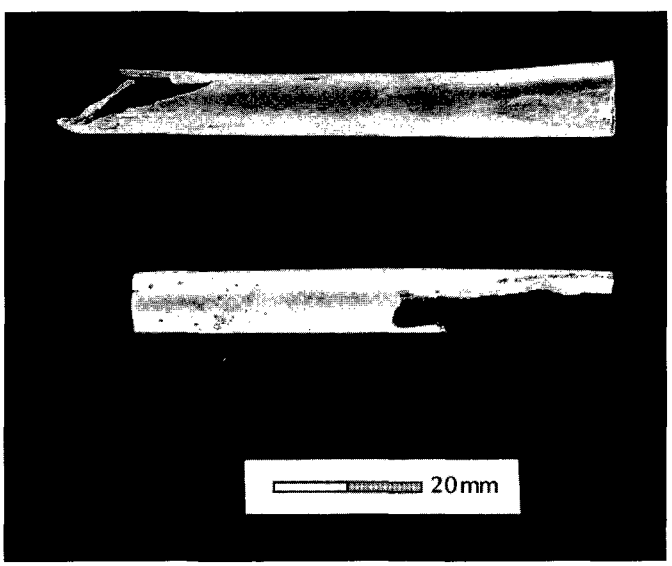
The presence of fulmar at Howe during the Iron Age is also worthy of note. The fulmar is known to have expanded southwards from Iceland in the 18th and 19th centuries, only reaching the British Isles in 1878 (Cramp 1980, vol 1, 122), and only since the 1900s has it rapidly increased its numbers. The five fulmar bones, from well stratified contexts in Phases 5/6, 7 and 8, do not significantly aid our interpretation of its past status. They do, however, indicate that the species was at least present as a visitor rather than breeder.

The juvenile and immature bones of turnstone in Phases 7 to 8 are also of interest as they may indicate that the bird was a former breeder on the islands. Its present status is that of a passage winter visitor. Bones were found of a very young crane, SF 3305, possibly a single individual from an abandonment horizon in Phase 8. Confirmation of the identification and the following report is by Dr CJO Harrison and Mr GS Cowles.

The ends of the bones are incompletely ossified, making recognition difficult. Those offering some diagnostic features are a pair of femora, a humerus showing some development of the proximal part of the brachialis depression at the incomplete distal end, but almost featureless and rounded at its proximal end; and a tarsometatarsus, expanded proximally, and distally incomplete but retaining the basal part of the trochlea for the second toe, and showing the elongated facet at its base for the attachment of the first, or hind, toe.

On comparison with a large range of material it is apparent that these are the bones of a juvenile crane, comparable in size with those of the common crane (*Grus grus*). The tarsometatarsus is much shorter than that of an adult, barely half the length, and this together with the relatively unmodified ends of the bones indicates that the bird was a chick, and almost certainly in down. This would appear to constitute good evidence, possibly the first in juvenile form, for local breeding of a crane in the British Isles. It is claimed, mainly on the basis of early writings, that the common crane bred in southern England, in East Anglia, until about 1600 and perhaps in Ireland until the 14th century (British Ornithologists Union 1971).

It should be noted that a second larger species of crane, now extinct – the European crane (*Grus primigenis*) – was present in north-west Europe including the British Isles from the Late Pleistocene until the Iron Age and Romano-British period (Harrison & Cowles, 1977). Its breeding grounds are unknown, and while the smaller species is the more likely in this instance, the larger species cannot be ruled out absolutely on the basis of such juvenile material. Crane is at present a very rare visitor to Orkney (Meek 1985, 38).



Illus 89
Bird bone whistles, (upper) greylag? goose ulna (SF 3326), (lower) gannet ulna, (SF 1958).

The ubiquitous starling was a common breeding bird on the site, during the excavation, and tolerated disturbance near its nests. With starlings nesting inside Iron Age walls it is possible that some of their bones are intrusive. Their presence in Phase 5/6 and their high numbers in Phase 7 and 8 indicate that the starling was equally common in the Iron Age as it is at present. Starlings were also found in quite large numbers in the Iron Age at Bu broch, just over 1km away from Howe.

'One hundred and fifty years ago it [the starling] was a comparatively rare bird, except in the NW of Scotland and the Scottish islands, but since then its increase has led to it becoming one of our more widespread birds.' (Fearce 1986, 378). The starling exploited the cultivated fields around Howe, and was unlikely to have been culled for human consumption.

The earliest evidence of domesticated birds has come from the ***SW*** building in Early Phase 7 with both fowl and goose recorded. Domestic fowl was also identified from Later Phase 7 and contexts in Phase 8. Domestic duck is less well represented but it was present in the broch tower in Phase 7–8. Only domestic fowl has been noted from other Orcadian Iron Age sites such as Midhowe and Broch of Ayre, but none were identified from the brochs of Gurness or Bu (Bramwell 1987, 135–136). Domestic fowl and goose were recorded from the Pictish and Norse site of Buckquoy (Bramwell 1977, 209–211) and the Norse and post-Norse phases of Newark Bay (Brothwell *et al*, 1981, Table 3), but have generally not been well noted from Orcadian sites. Further work on present and future excavations may help our understanding of the fluctuating fortunes of bird populations both natural and domestic.

7.5 • THE FISH REMAINS

Alison Locker

A total of 3,122 fish bones (including 8 fragments of crab claw) identifiable to species or group level were present in deposits in Phases 3 to 9. These were mainly recovered by sieving and sometimes by hand picking on site.

The species and non-specific groups and the total number of bones from each in each phase are shown in the summary Table 48; the more detailed tables indicating the bone type identified for each species/group in every context for each phase are available in the archive. Unidentifiable material (often found in quantity in fish bone deposits as a result of fragmentation due to the friable nature of the bone) has been omitted from the summary table, but is indicated as present or absent in the tables (described in detail in the archived report).

It is clear from the summary table that the most important and numerous species from the whole site belong to the cod group (77%), and in particular saithe (49%). Evidence for the exploitation of marine resources, and in particular that of immature saithe, rises in the broch tower and village occupation of Early Phase 7, peaks in the later settlement of Late Phase 7 and continues, with an increased variety of species, during Late Phase 8.

DISTRIBUTION

THE EARLY PHASES 3–6

Little fish bone was found in Phases 3 to 6 which encompass the Early Iron Age occupation of the site, the roundhouse and Broch 1, until its levelling early in Phase 7. Given the site location, it could appear that fishing was not considered important during this period but more likely suggests a lack of suitable deposits, although the preservation of fish is both good and prolific from Phase 7 onwards. The most interesting find from these early phases is the only example of angler fish from the site, identified from a maxillary fragment from the shillet bank in Phase 5. This is a bottom living fish, most commonly found below 18 metres on sandy, shell or gravel bottoms, and has a tasty if fibrous flesh (Wheeler 1978, 145). The fishery for young saithe is indicated by 42 fragments from Phase 5/6 and a line fishery for ling by three bones.

PHASES 7 AND 8

From the construction of the broch tower and surrounding village in Early Phase 7 to the later settlement of Phase 8 a wide variety of species have been identified. In terms of their food value and frequency of occurrence they can be broadly divided into three groups:

a) Prime food fish – roker (and other elasmobranchs), eel, conger eel, salmonids, cod, saithe, ling and the flatfishes.

b) Food fish (but occasional) – haddock, hake, whiting (and ?poor cod and ?Norway pout), garfish, scad and mackerel.

c) Incidental? (these are mainly small shoreline species) – rockling, bullrout, corkwing wrasse, sea scorpion, cf bass, grey gurnard, sea bream and black goby.

Table 48: Fish remains – summary

Species	Phase 3	4–6	5	5/6	5–7	7	7/8	8	8/9	9	T	%
Elasmobranch *Elasmobranchii* indet						1		4			5	.1
Roker *Raja calvata*								2			2	.06
Ray indet. *Rajidae* indet.	1							1			2	.06
Eel *Anquilla anquilla*		1				6		35		2	44	1.4
Conger eel *Conger conger*						4	1	21			26	.8
Salmonid *Salmonidae* indet.						11		8		3	22	.7
Angler fish *Lophius piscatorius*			1								1	.03
Cod *Gadus morhua*						11		42	1	4	58	1.8
Haddock *Melanogrammus aeglefinus*							1	2			3	.09
Whiting *Merlangius merlangius*								4			4	.1
cf Poor cod *Trisopterus minutus*						50		10			60	1.9
cf Norway pout *Trisopterus esmarkii*						3					3	.09
Saithe *Pollachius virens*				42		1214		276			1532	49.0
Rockling *Rockling* indet.						7		10			17	.5
Ling *Molva molva*				3		2		10		1	16	.5
Sm Gadoid *Gadoid* indet.		6			1	292		145		2	446	14.2
Lg Gadoid *Gadoid* indet.						119	3	121		5	248	7.9
Hake *Merluccius merluccius*						2		1			3	.09
Garfish *Belone belone*						14		5			19	.6
Stickleback *Gasterosteus aculeatus*								1			1	.03
cf Grey Gurnard *Eutrigla gurnardus*								1			1	.03
Sea scorpion *Taurulus bubalis*						31		7			38	1.2
Bullrout *Myoxocephalus scorpius*							1	3			4	.1
Cottid indet.						8		4		5	17	.5
cf Bass *Dicentrarchus labrax*						7					7	.2
Scad *Trachurus trachurus*						19		9		1	29	.9
cf Sea Bream *Sparidae* indet.								12			12	.3
Corkwing wrasse *Crenilabrus melops*						59	5	8			72	2.3
Wrasse indet. *Labridae*						2		385			387	12.3
cf Black goby *Gobius niger*								3			3	.09
Mackerel *Scomber scombrus*						3					3	0.9
Plaice/flounder *Pleuronectes platessa/ Platichthus flesus*						8	1	13			22	.7
Sole *Solea solea*						3		1			4	.1
Flatfish indet.								3			3	.09
Crab *Cancer* sp						7		1			8	.2
Total	1	7	1	45	1	1883	12	1148	1	23	3122	100
%	.03	.2	.03	1.4	.03	60.2	.3	36.6	.03	.7	100	

In the first group of prime food fish, saithe is the most numerously occurring species, and the measurements (see archive – Appendix 3) and estimated total lengths of the fish suggest that the majority are between 20–40cm, with a small number below 10cm. These are immature fish and Wheeler (1979, 159) states that from Scotland northwards young saithe are particularly abundant in inshore waters, in their first year in intertidal pools and in their second year close to the shoreline. They could therefore be easily netted or caught on lines by the inhabitants of the settlement. Rokers and other rays could be caught on lines from the shoreline or from small boats, The latter were also probably used for catching cod or ling, as seasonal migrations of many species bring them into shallower waters at certain times of the year. Conger eels often inhabit rocky shorelines and crevices and can be caught on lines or in traps. Eels may also have been caught along the shoreline with the flatfishes.

Most of the species assigned to the second group could equally well have been put in the first if they had occurred more frequently. Whiting, cf poor cod and Norway pout were probably netted and haddock, hake, garfish, scad and mackerel caught on lines. The garfish was identified from its distinctive jaws as well as vertebral centra.

Mainly small shoreline species have been assigned to the third group. Many of these could be found in rocky pools and are not normally regarded as food fish, although Colley (1983, 163) cites the bullrout and five-bearded rockling as providing extra food and variety in the diet of communities of the Shetlands and Orkneys from the 16th to 19th centuries.

Within Phases 7 and 8, certain buildings had larger deposits of fish bones associated within them than others. In particular the ***S*** workshop in Late Phase 7 had large numbers of saithe and wrasse bones (some of which were burnt) as well as other species (see appendix 2 in archive).

The buildings of the Early Phase 7 broch and village, the Late Phase 7 settlement and Phase 8 buildings up to stage 8, do show a wide variety of species, even if individually they are not very numerous. If these deposits are a fair representation of the fishing and fish consumption of the community, then fishing would appear to be opportunist, exploiting all habitats whenever possible, rather than as a result of a specific strategy.

The small group of unstratified material from Phase 9 contains many of the species identified from earlier phases although saithe is absent.

COMPARISON WITH OTHER SITES

The importance of the fishery for young saithe in Orkney in the more recent past shown by Colley (1983) has already been mentioned. Her tabulation of the species from five Orkney sites (*ibid*, 159) Isbister, Noltland, Bu Broch, Saevar Howe and Brough Road, Birsay, dating from the Neolithic to the Norse periods, shows a close correlation between the species identified from those sites and those from Howe.

Wheeler (1979) identified 7 species from the Neolithic tomb at Quanterness, including ling, five-bearded rockling, scad, corkwing wrasse, ballan wrasse, sea scorpion and flounder. He comments on the scarcity of the corkwing wrasse in the region today (which was also identified from Isbister and Noltland as well as Howe), suggesting its apparent abundance in the Neolithic could be indicative of a warmer climate than at present. The Howe finds extend this possibility into the Iron Age.

At Bu quantities of small fish in Iron Age deposits (Colley 1987) of under 15cm in length led Colley to suggest that these were the contents of otter spraints rather than human food remains. The bones from these deposits correlated well with the species and size of fish identified during zoological studies of contemporary spraints. Although there are fish in this small size range from Howe, their association with larger fish remains, sometimes burnt, within buildings has suggested to the author that this is not likely to be a significant source of contamination in this instance.

SUMMARY AND CONCLUSIONS

Fish bones from the settlement overlying the Neolithic tomb at Howe are mainly found from Iron Age deposits in Phases 7 and 8. The cod fishes are the most important group, in particular large quantities of immature saithe found in the deposits from the S workshop. In addition small shoreline species were also frequently present especially small wrasse. Bones from large cod and ling were rarely found, and the measurements from Phase 8 were insufficient to suggest whether there was any increase in deep water fishing from Phase 7 to 8 which might be shown by any increase in size in the later period.

In conclusion, fishing as represented by the fish remains from Howe seems to be largely opportunist, exploiting the immediate shoreline with nets, lines and traps, extending into the shallow water inhabited by immature saithe, but rarely penetrating into deeper water for large cod or ling. The shoreline and nearby waters may have always provided plenty of fish without having to make the effort of taking to the open sea.

7.6 • MARINE MOLLUSCS

A Kimble Howard with BBS

The excavation at Howe provided a very large sample of marine molluscs for study, over 26,000 shells. This report, however, consists only of an identification of the species involved and a determination of their frequency within the different phases of the site. The sample was collected both by hand and from sieve residues, and was sufficiently large to exhibit a wide range of species to provide a few conclusions concerning their exploitation on the site. The preservation of the molluscs, on the whole, was good.

IDENTIFICATION AND LOCATION

Samples from the early phases of the site Phase 3 to 4–6 are very small and of little significance (see Table 49). They consist almost solely of limpet species (*Patella*) and the flat periwinkle (*Littorina littorea*). By Phase 5 and into Phase 5/6 the numbers of molluscs increased, and although *Littorina* and *Patella* are the dominant species, the number of specimens considered does not allow reliable conclusions to be drawn. The number of molluscs decreased significantly in Phase 6, which may be accounted for simply by the lack of suitable deposits rather than economic factors.

By Phase 7 a wider range of specimens is noted, with limpet dominating the sample and flat periwinkle of secondary importance. The quantities of common mussel (*Mytilus edulis*), common cockle (*Cerastoderma edule*) and razor shell (*Ensis* sp.) began to increase during this phase to significant numbers, and in fact the common cockle reached its peak, though these never attained the numbers of limpet and flat periwinkle. Phase 7 produced one of the fullest range of species from the site, 14 in all, although many of the other species which appear in very low numbers suggest an accidental incorporation in to the sample.

In Phase 8 the quantities of limpet and flat periwinkle began to decline but the assemblage was still dominated by limpet, followed by flat periwinkle and common mussel reached its peak. Recent and unstratified material present for study exhibited high numbers of limpet, flat periwinkle,common mussel and common cockle, but are not considered further.

Phases 7 and 8 also produced evidence but in small numbers of the sea urchin (*Echinus esculentus*), claws of the edible crab (*Cancer pagurus*), the common shore crab (*Carcinus maenas*) and

Table 49: Marine Mollusca by phase

Species	Phase 3	4	4/5	4/6	5	5/6	6	7	7/8	8	8/9	9	Total
Limpet *Patella* sp.	19		2	5	20	304	23	10338	319	4758	11	2000	17799
Grey top shell *Gibbula cineraria*								1		2		1	4
Flat periwinkle *Littorina littoralis*								44	7	32		12	95
Rough perwinkle *Littorina saxatilis*												2	2
Common periwinkle *Littorina littorea*	16	1	1	1	14	263	11	2943	39	1367	19	602	5277
Tower shell *Turritella communis*								4		1			5
Dog whelk *Nucella lapillus*						1		34	2	184		12	233
Common whelk *Buccinum undatum*						2	1	25	2	26		6	62
Common mussel *Mytilus edulis*			+	3	1	10	9	518	79	1121	4	346	2091
Common European oyster *Ostrea edulis*								7	2	5		1	15
Great scallop *Pecten maximus*								1					1
Variegated scallop *Chamys varia*							1	1		1			3
Tiger scallop *Chamys tigerina*										1			1
Common cockle *Cerastoderma edule*					1	8	1	261	29	218		225	734
Pullet carpet shell *Venerupis pullastra*						1		2		+		1	4
Razor shell *Ensis* sp.						2	+	88	32	11		21	158
Total													26493

the Norway lobster (*Nephropus norvegicus*). These species are still found in Orkney today but their occurrence in the molluscan record for Howe suggests there was no serious exploitation in the Iron Age.

A further point may be made on the utilization of the limpet species. In all phases where limpets were recovered there were numbers of individuals which were partially burnt and encrusted with orangey-brown material of ferrous origin. Originally thought to be from the iron-working on the site, it is now assumed that limpets were not used in metal production for their lime content, but rather the encrustation was a natural accretion leached from soil and rocks. With the start of Late Phase 7 and throughout Phase 8, both fresh and well work individuals were present which further suggests that limpets may have been serving another purpose other than as a dietary supplement.

DISCUSSION

The majority of species within the sample are edible varieties but the flat periwinkle (*Littorina littoralis*) is too small to have been considered as a food source. The species is not present in any significant numbers to suggest other than their accidental incorporation into the material, either in consequence of the collection of other species or perhaps in the collection of the large kelp (*laminaria*), which tends to inhabit the shallow sublittoral zone where there is an abundance of molluscs, crustaceans and echinoderms (Jones 1975). The small quantities of grey top shell (*Gibbula cineraria*) and fragments of *Echinus* species including the seaurchin (*Echinus eschulentus*), may also have been incorporated accidentally in the exploitation of the shallow sublittoral zone. The great scallop (*Pecten maximus*) and other scallop species (*Chamys*) are present but both in very low numbers. They inhabit the level bottom areas around the Orkney Islands, with limpet and mussel on the littoral rocks and cockle in the estuaries and sandy shores.

In terms of dietary importance, limpet, flat periwinkle, common mussel, common cockle are the significant species. Throughout the different phases of the site, the size of the individuals collected of flat periwinkle (*Littorina littorea*) and common cockle (*Cerastoderma edule*) does not greatly fluctuate. The same cannot be said of limpet Patella and common mussel (*Mytilus edulis*). During the periods of the Early Iron Age, Phase 6 and Early Phase 7 the size of limpet remained fairly constant, consisting of small to medium sized individuals with very low cones. With the start of Late Phase 7 not only were much larger specimens being selected with high cones but there was also a fuller range of sizes present in the sample. The relationship between the height and the length of limpet shells is determined to be primarily due to their position in the intertidal zone. Limpets which inhabit the lower parts of the tidal shore are much flatter than those on the higher parts. The limpets collected during the earlier phases of the site appear to have been collected from this lower part of the tidal zone, perhaps even from low tide situations exposed during the spring tides. This may suggest an exploitation of the species during these phases at a specific time period, ie early spring. A change in the Late Phase 7 phase toward larger limpets and a wider range of sizes may also suggest a dietary change or one of economy. This could imply that limpets were utilized primarily as bait for line fishing (Clarke 1976) rather than as a food source. Perhaps even, an over exploitation of the lower tidal reaches during the earlier periods of the site necessitated a change in collection practices. The size of the common mussel (*Mytilus edulis*) also increased overtime and by Late Phase 7 individuals were fairly large, up to 90mm in length.

Marine shells were noted on many of the earlier excavations in the Northern Isles, but on the whole were not considered important enough for detailed analyses. Many of collections, if indeed they were collected, have long since been lost. Marine molluscs were however, reported from Clickhimin broch, and especially from the early levels where the three main species of limpet (*Patella*), cockle (*Cerastoderma*) and common European oyster (*Ostrea edulis*) were recorded (Hamilton 1968, 168). The latter species was found at Howe but not in any significant numbers, and suggests that different marine habitats were exploited.

Mollusca totalling 671 shells were also collected from Crosskirk Broch in Caithness, but from selected contexts. The species present closely parallel those found at Howe with limpet and flat periwinkle having the highest numbers but no conclusions were thought significant in the light of the sampling procedures (Fairhurst 1984, 135). Mollusca were also recovered from Bu but totalled less than 1000 shells (Colley 1987, 130, 134). The assemblage closely resembled that from Howe reflecting that a similar marine environment was exploited, but further south on the Cairston headland. In comparison with both Crosskirk and Bu, Howe has produced a very significant collection of marine molluscs, and further research would undoubtedly produce more information on the exploitation of this resource during the Iron Age period.

In conclusion a wide range of marine species is represented at Howe, in particular large quantities of the edible species limpet, flat periwinkle, common mussel and common cockle. Although these species may have provided an important dietary component of the site, only the limpet in particular may have served a secondary function.

7.7 • NON-MARINE MOLLUSCA

Stephen Carter

Non-marine mollusca, although not intentionally sampled for, were recovered from many contexts in either of two ways. These were, the hand collection of large shells and the wet sieving of soil samples. Neither of these methods was satisfactory as hand collection was biased towards large species and usually recovered only one, and the wet sieving programme used a minimum mesh size of 1mm. Many shells are smaller than 1mm and therefore a 0.5mm is usually recommended as a minimum mesh (Evans 1972). However, in view of the lack of any prehistoric assemblages from this period in Orkney, any results are worth noting if only as species list.

Table 50: Non-Marine mollusca by phase (Nomenclature follows Kerney, 1976)

Species	Phase 5 Context 999	7 Early 1539	7 Late 981
Carychium tridentatum		2	
Cochlicope lubrica		5	
Cochlicopa spp		7	
Lauria cylindracea		7	
Discus rotundatus	25	177	7
Vitrina pellucida		1	
Vitrea contracts		51	20
Aegopinella pura		3	
Aegopinella nitidula		9	
Oxychilus cellarius	1		1
Oxychilus alliarius	14	13	29
Clausilia bidentata		12	2
Balea perversa			1
Clausiliidae			1
Cepaea/Arianta spp		1	
Hydrobia ulvae			16
Contexts 999 – earthhouse 1539 – ditch fill 981 – dump			

RESULTS

SIEVED SAMPLES

Only six soil samples from two contexts contained sufficient shells and these are listed on Table 50. All the species recorded are still present in Orkney and the terrestrial species include those common around settlements notably, *Discus rotundatus, Vitrea contracta* and *Oxychilus* spp. The only unusual record is *Hydrobia ulvae* from the Phase 7 dump [981]. This is a brackish water species and must have been carried unintentionally into the settlement, perhaps on animal fodder. The carbonized remains of salt marsh plants were identified by Camilla Dickson from other contexts on the site.

HAND COLLECTIONS

In all except one case, all large shells were of one species, *Arianta arbustorum*. The exception was the collection of shells from the floor of the Phase 5 earthhouse [999], and this assemblage is listed on Table 50. The earthhouse was clean and contained only these shells and the skull of a wren (identified by Dr Bramwell). The bird and the snails could all have entered the earthhouse until Late Phase 7 when the entrance shaft was permanently sealed under paving. Large collections of *Ariant arbustorum* came from the main rubble layers and broch walls where there were large gaps between the stones for the snails to move into. It is interesting that in a collection of 690 shells from deposits spanning a 1000 years, no examples of *Cepaea hortensis* were present. This large helicelid snail, very similar in appearance to *Arianta arbustorum* is present in Orkney today and was recorded from Neolithic deposits at the Knap of Howar (Evans and Vaughan 1983) where *Arianta arbustorum* was apparently absent.