

Food for thought: a survey of burnt mounds of Shetland and excavations at Tangwick

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ABSTRACT

A group of burnt mounds vulnerable to coastal erosion in Shetland was surveyed in Spring 1996. Rescue excavation conducted at one of these sites, Tangwick, uncovered a burnt mound in close association with a specialized, non-domestic structure of Bronze Age date. It is concluded that Tangwick represents a distinct site type, previously little recognized, and it is proposed that such sites may have been used for feasting, possibly on a seasonal basis. More broadly, the results of survey work indicate that burnt mounds in Shetland are not a homogenous class of site and this variety has not been adequately accounted for within the prevailing models. This project was funded by Historic Scotland and practical assistance was provided by Shetland Amenity Trust.

INTRODUCTION

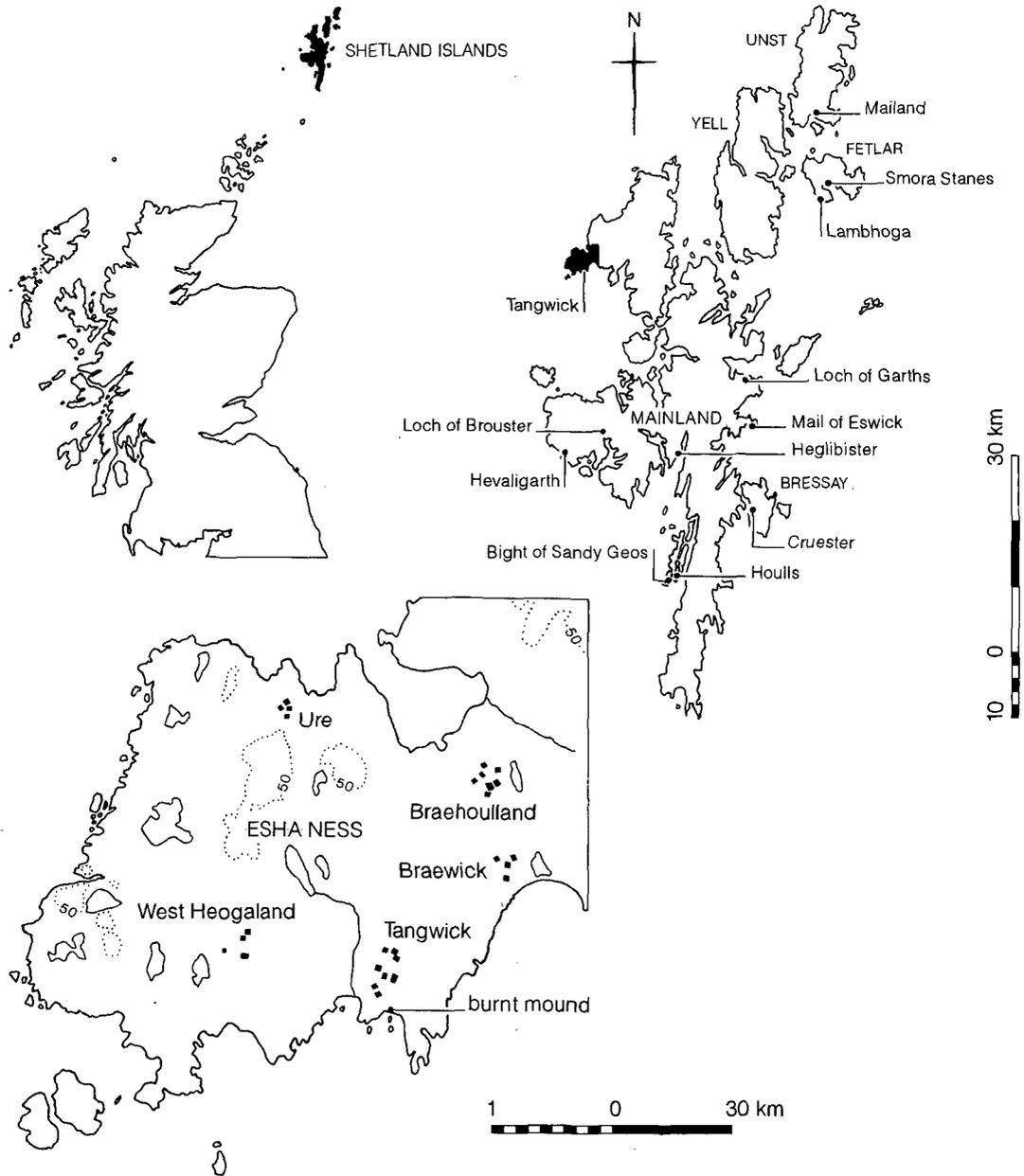
The impetus for this work was twofold: to record a number of sites vulnerable to coastal erosion and, in doing so, to attempt to reach a better understanding of the nature and complexity of a group of sites collectively classified as burnt mounds. Work was carried out by the authors, over an eight-week period. Four weeks were allotted to survey and section recording and four weeks were spent excavating at Tangwick. The weather conditions ranged from snow to brilliant sunshine — often on the same day.

The report is set out in four parts: (1) a survey gazetteer of the burnt mounds which were assessed as part of this project; (2) an account of rescue excavations at Tangwick; (3) a general discussion, including a summary of burnt mound studies to date, evaluated in the light of the findings from this project; and (4) conclusions.

BURNT MOUNDS SURVEY

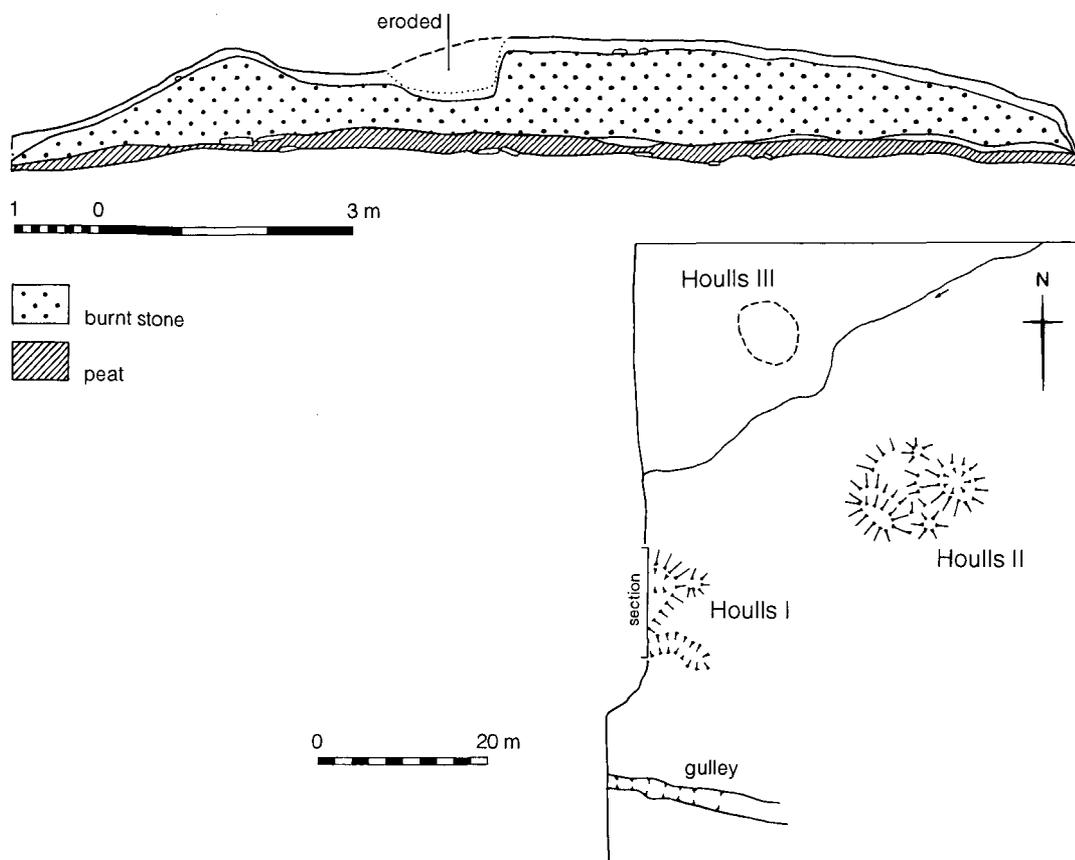
At the outset, 19 sites were selected for investigation by the Shetland Archaeologist, Val Turner, from the Shetland Sites and Monuments Record. Of these, five were later discounted, either because they could not be located or were found not to be burnt mounds. The project brief made provision for rescue excavation at one site but stipulated that investigation at the remainder was

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ILLUS 1 Location map (Based on the Ordnance Survey map © Crown copyright)

to be non-invasive. Topographic survey was carried out at 13 sites (illus 1); at three sites archaeological exposures created by coastal erosion provided convenient sections for recording. The results are summarized below; full reports are contained within the project archive.



ILLUS 2 Houlls burnt mound: plan and section

Houlls I, East Burra (HU 3755 3230)

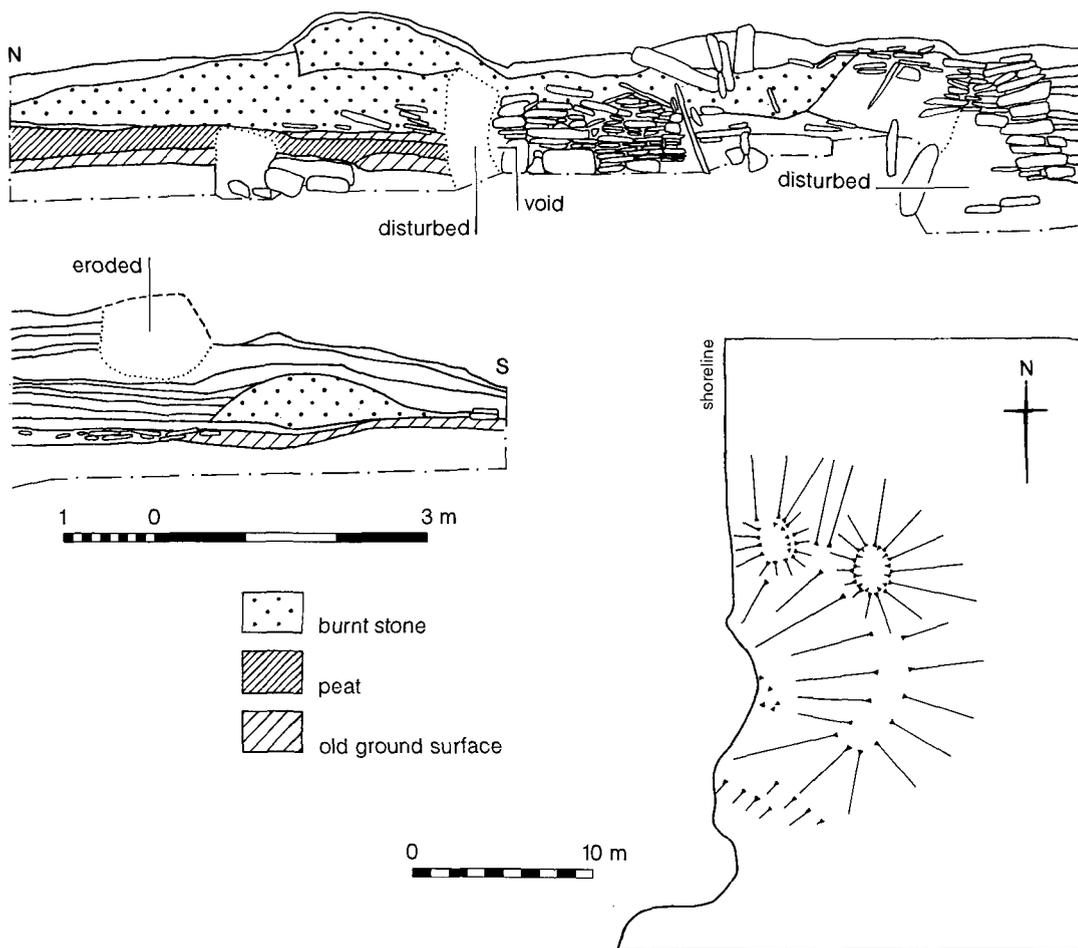
This site lies on sloping rough grassland, above a low bank, on the west coast of East Burra. It is being gradually eroded by the sea and has already been much diminished. Deposits of burnt stone are visible in the erosion face and extend inland as a low grass-covered mound.

The erosion face was cleaned and straightened, providing a continuous section, 12.4 m long (illus 2). The mound was found to comprise homogenous deposits of fire-cracked stone in a silty matrix. Part of a roughly built stone tank (not illus) was found at the north end of the section. The mound was covered by a shallow layer of turf and had been built up over localized peat deposits.

A second burnt mound (Houlls II) was identified in an adjacent field, 20 m ENE of Houlls I. This mound appears to have been disturbed in the past. It lies on the line of a modern fence and is grass covered. An amorphous earthen mound (Houlls III), located 25 m NNE of this site may be a burial monument. The landowners recall at least one further 'stony mound' and a smaller earthen mound from which a pot was recovered, in the immediate hinterland area. Neither site could be identified by the survey.

Cruester, Bressay (HU 4815 4231)

This site is situated on sloping grassland adjacent to the shore on the east coast of Bressay. It was previously recorded as a 'mound of burnt stone' and the presence of a 'beehive' cell, a well and associated steatitic pottery was noted during investigations carried out in the 1930s (RCAHMS 1946, no 1092).



ILLUS 3 Cruester burnt mound: plan and section

The mound measures some 20 m in diameter and stands up to 2.79 m high. An erosion face to the western side of the mound was cleaned and straightened to provide a continuous section, 17 m long (illus 3). At the northern end of the section, deposits of burnt stone, interspersed with layers of ash and soil, sealed peat deposits. A buried soil, into which a stone-lined pit had been cut, was identified below the peat. The central and southern portions of the mound contained a substantial stone structure, which showed signs of several phases of alteration.

Bight of the Sandy Geos, West Burra (HU 359 294)

This area was surveyed by Parry, who identified two burnt mounds and two houses (Hedges 1984, 44–9). These classifications were confirmed for all but one of the house sites (Parry's House I), which is more likely to be a heel-shaped cairn. The burnt mounds are not closely connected to these other sites, but all are sited within a landscape in which the remains of prehistoric settlement are numerous and well preserved.

The northernmost of the burnt mounds (illus 5e) lies on the coast edge and is actively eroding. It measures 8 m in diameter and stands to 1.5 m high. It may originally have been crescentic in form, but is now rather amorphous, partly due to the fact that it lies on a vehicle track and has been disturbed. A

watercourse is located 1 m to the north of the site. The sides of the mound slope steeply and are retained by a kerb formed from large unburnt boulders. A small box, formed from edge-set stones is exposed at the south end of the mound. Three sides of this box survive; the seaward side is now missing. It appears to be of recent origin and was possibly used for storing potatoes.

The second burnt mound (illus 5d) lies 10 m from the coast edge. In plan, it is oval or slightly crescentic, measuring 12 m (north/south) by 9 m (east/west). It stands up to 1.5 m in height and the centre is hollowed, revealing burnt stone fragments. Two watercourses lie to the north and south sides of the mound.

Heglibister, Tingwall (HU 3908 5157)

This site (RCAHMS 1946, no 1512) is situated to the west side of Weisdale Voe, 20 m from the loch shore. The mound is sub-circular in plan and has a hollow centre (illus 4). It measures 21 m (east/west) by 7.5 m (north/south) and stands up to 1 m in height. Fragments of angular burnt stone can be seen in short exposures to the centre of the mound. Two larger stones which protrude from the base of the hollow may be part of a larger structure. A field boundary adjoins the west side of the mound, but does not appear to run beneath it, suggesting either that the mound and boundary are contemporary, or that the boundary is later.

Loch of Brouster, Walls (HU 2590 5149)

A large burnt mound lies close to the north shore of the Loch of Brouster (RCAHMS 1946, no 1629). This site is located 1.3 m from the loch margins and is not actively eroding. It is oval in plan, measuring 10.5 m (NW/SE) by 9 m (NE/SW). In profile, this mound is conical and stands up to 1.5 m in height (illus 4). Fragments of burnt stone are visible in a small exposure beneath the highest point of the mound. A large unburnt boulder which protrudes from the north-east side of this hollow may form part of a kerb or associated structure.

Hevaligarth, Walls (HU 2018 4913)

This site is set back from the sea, close to a small loch ('Hebdirgarth', RCAHMS 1946, no 1650). Visible now as two low, conjoined grass-covered rises, the remains represent a single burnt mound (illus 4). It is amorphous in shape, measuring 11 m (north/south) by 6.5 m (east/west), it stands up to 1 m high. Fragments of burnt stone are visible in short exposures over the entire site area and extending into the loch.

Mail of Eswick, Nesting (HU 4946 5384)

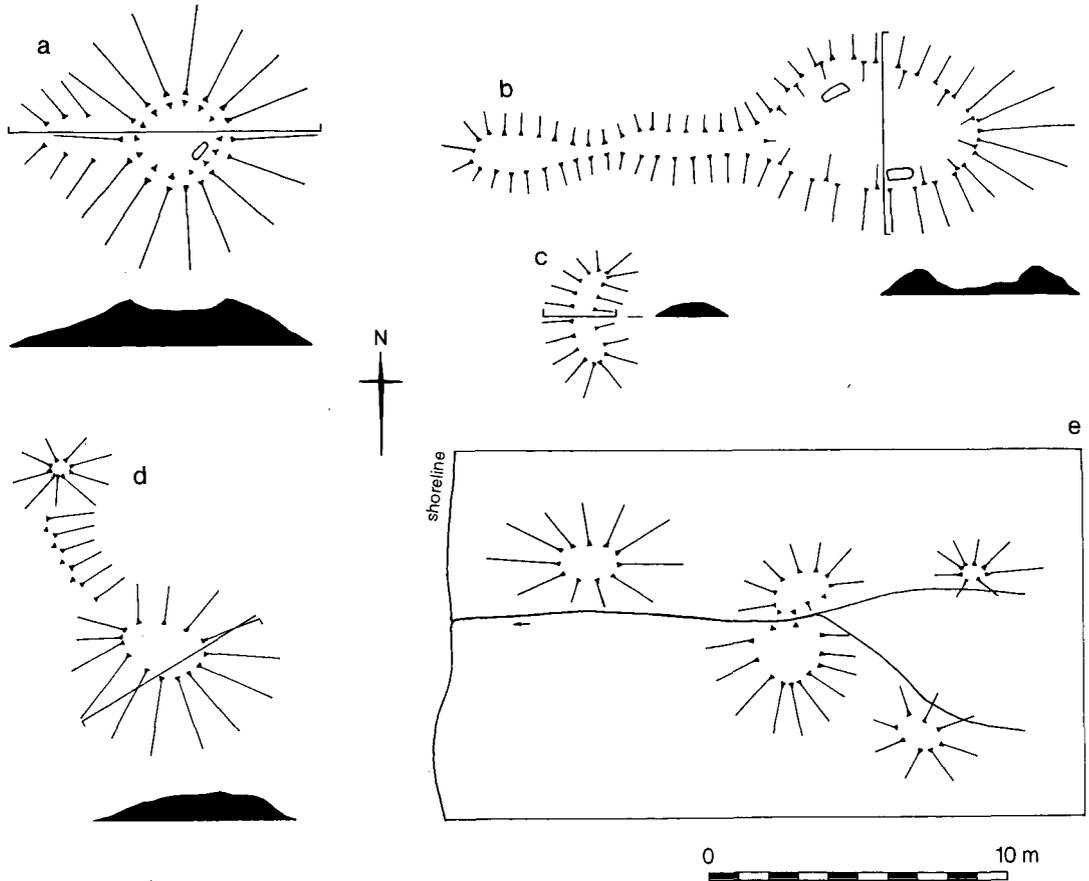
This site has been badly damaged by a vehicle track and the insertion of a modern fence. It is now visible as several separate small mounds of burnt stone spread out over an area measuring 18 m (east/west) by 10 m (north/south) (illus 4). The western part of the site is sited above high cliffs and is actively eroding.

Mailand, Unst (HP 6050 0180)

This site (RCAHMS 1946, no 1570) is visible as a low crescentic mound, 4.5 m (north/south) by 3 m (east/west), and stands to a maximum height of 0.5 m (illus 4). It is situated on improved grassland and is not threatened by coastal erosion. Small fragments of angular stone protrude through the turf. A watercourse, which has been channelled in recent times, lies 15 m to the south-west of the site.

Loch of Garths, Nesting (HU 4843 6026)

This burnt mound is a Scheduled Ancient Monument (Historic Scotland index no 3462; RCAHMS 1946, no 1293). It lies on a narrow strip of land between a pebble beach and an inland loch. It is sub-rectangular



ILLUS 4 Burnt mounds surveyed: (a) Brouster, (b) Heglibister, (c) Mailand, (d) Hevaligarth and (e) Mail of Eswick

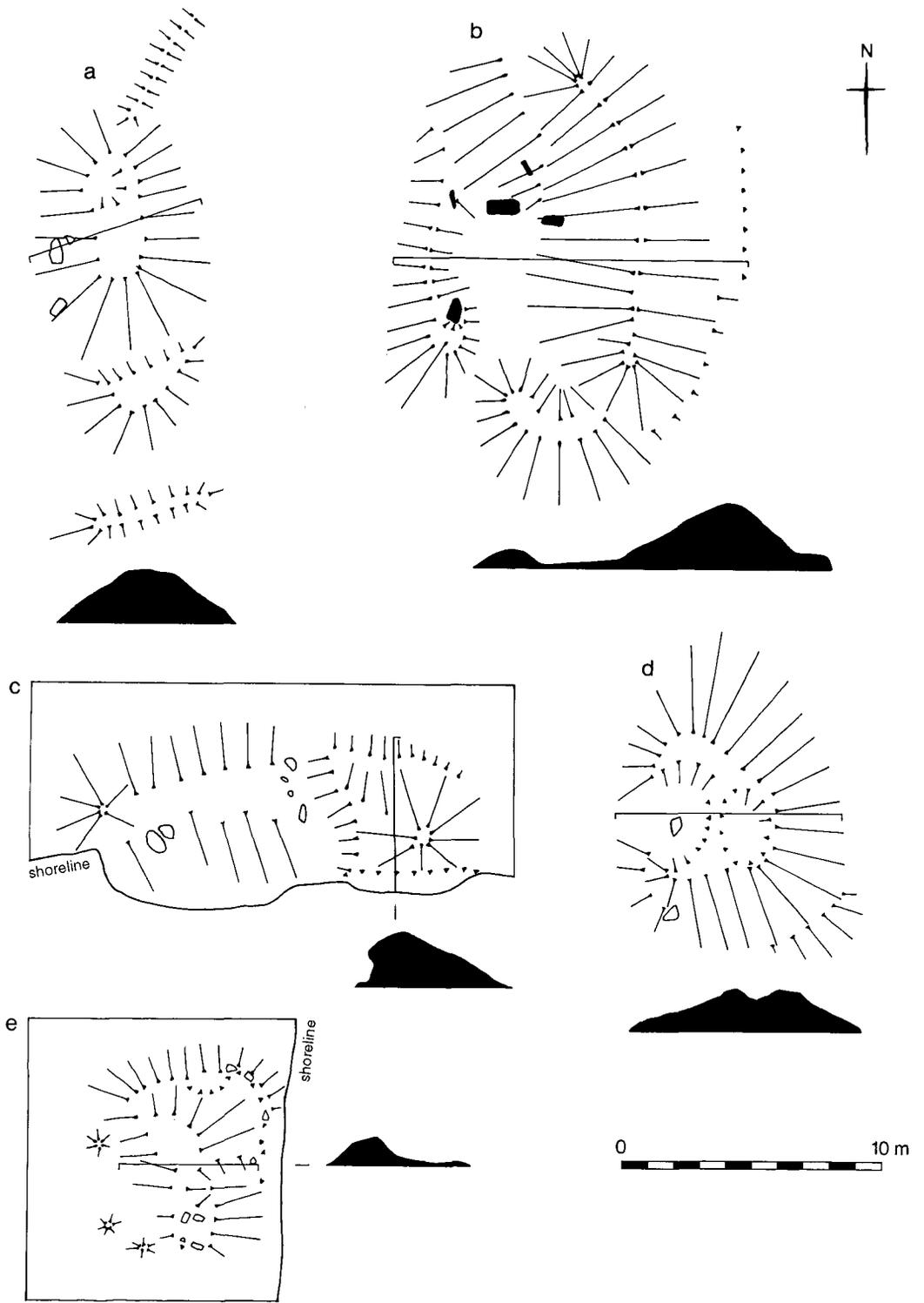
in shape, measuring 16 m (east/west) by 7 m (north/south); it stands up to 1.5 m high (illus 5). The southern side of the mound is actively eroding into the loch. In this exposure a thin layer of turf and topsoil covered deposits of burnt stone, which in turn covered layers of silty soil containing inclusions of peat ash and lumps of burnt peat. Several larger unburnt stones which are now under the loch appear to represent a structure associated with the mound.

Lambhoga, Fetlar (HU 613 874)

This site (RCAHMS 1946, no 1222) lies on boggy ground at the boundary between upland moor and the rough grazing land of a narrow coastal plain. It is not actively eroding. The site is crescentic in plan and comprises a conical mound of burnt stone from which two turf banks curving out from the mound to enclose a slightly dished 'forecourt' area (illus 5). Overall, it measures 20 m in diameter and, at its highest point, the mound stands up to 2 m. Several orthostatic boulders further define the internal space and indicate the presence of a structure.

Smora Stanes, Fetlar (HU 6204 9054)

This mound lies on a low slope on the banks of a watercourse and is not actively eroding. It is sub-oval in plan, rising up into two prominences. It measures 14 m (north/south) by 7 m (east/west) and stands up to



ILLUS 5 Burnt mounds surveyed: (a) Smora Stanes, (b) Lambhoga, (c) Loch of Garths, (d) & (e) Bight of the Sandy Geos

2 m in height (illus 5). A separate, smaller spread of burnt stone lies to the south side of the mound. A remnant field bank which adjoins the north-east end of the mound appears to be part of a contemporary field system.

Sand Lodge, Sandwick (HU 4360 2490)

This site (not illus), which was located to the east side of a pier, was apparently destroyed during dredging operations in 1980. There is no sign of any remains in the area now. One piece of steatitic pottery was recovered from the site in 1980 and is held by the Shetland Museum (find ref: ARC 1996, 130).

RESCUE EXCAVATIONS AT TANGWICK

First mentioned by Calder (1963, 80), Tangwick was recorded as one of a group of Shetland burnt mounds which had not been included in the Royal Commission's *Inventory* (RCAHMS 1946). The site is located at NGR: HU 2335 751. Calder noted that 'a tank-like structure with a drain, all of slabs on edge' was said to have once been visible running seaward from the mound, but that the site had later been badly affected by storm damage.

Prior to excavation, the site was visible as a low mound of burnt stone situated on the margin between a storm beach and rough boggy ground, which is prone to periodic flooding and occasional marine inundation. The landward side of the mound was sparsely covered with turf, while the seaward side, which appeared to have been truncated by erosion, was covered with beach pebbles which formed part of a steep-sided storm beach. Closer inspection of the immediate seaward side of the mound revealed the tops of several large earthfast boulders, which suggested the survival of structural remains beneath the level of the storm beach.

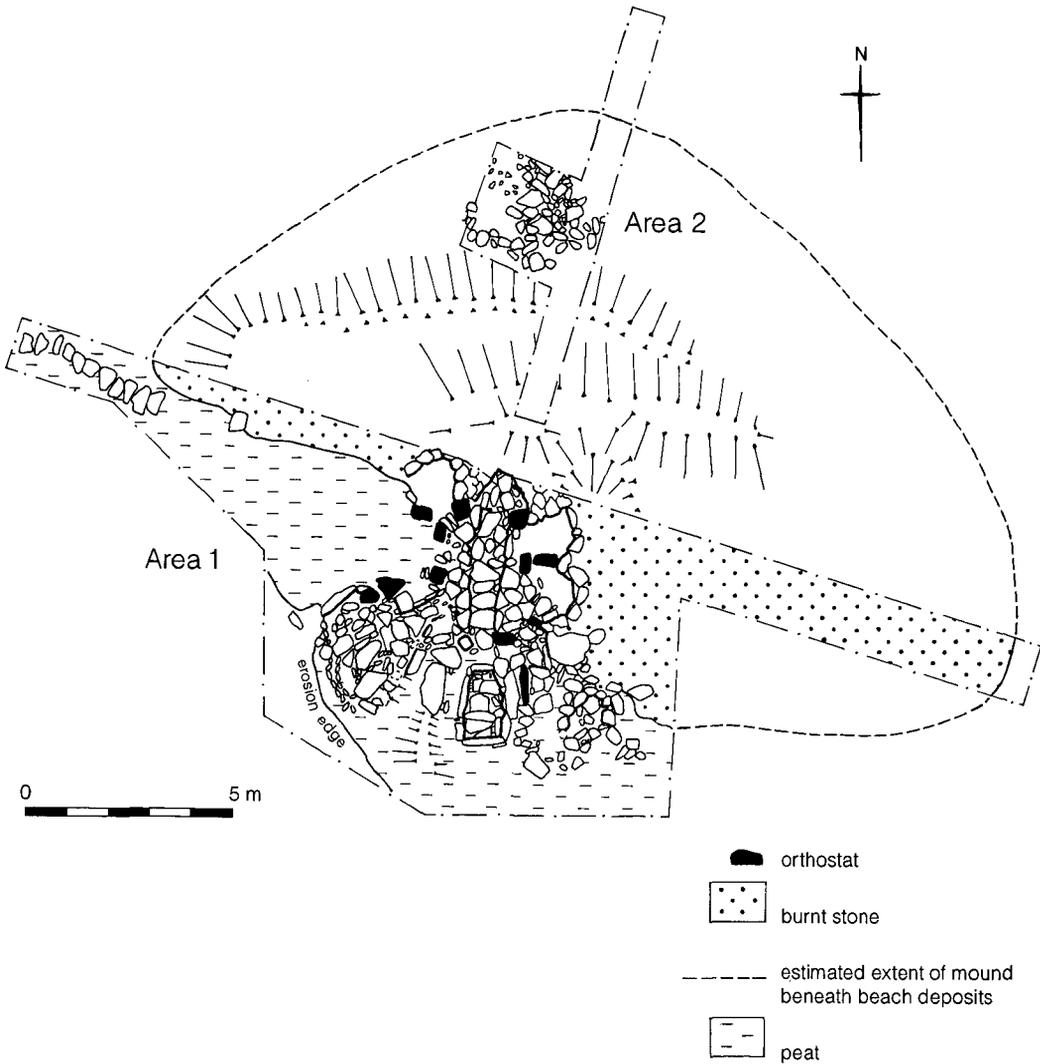
There was no evidence to indicate that the site formed an ancillary unit within a larger settlement and no structures of similar date are recorded in the immediate area. It should be borne in mind, however, that the coastline has been subject to erosion and any such remains, if they had existed, may now be lost.

While the site had already suffered losses from coastal erosion, it was felt that the portion which survived, which included both a mound of burnt stone and structural deposits, could provide a representative level of information. This factor influenced the decision to select Tangwick, from amongst the other sites investigated by survey, as the site most suitable for rescue excavation within the aims and confines of this project.

EXCAVATION

The burnt mound had been truncated from east to west by the sea. This erosion face was cleaned and straightened to provide a section across the site (illus 7). When the beach stone was cleared from in front of the mound it became apparent that the remains of a structure of some complexity were preserved on the foreshore. This area was excavated, although the structure was not fully removed (Area 1, illus 6). Two trenches were mechanically excavated at the eastern and northern extremities of the mound (Areas 2 & 3, illus 6) to investigate further the mound and its immediate environs.

Two major phases of activity could be identified: the deposition of the primary mound deposits (Phase 1) and the erection of a structure and continued deposition of burnt stone over the primary mound (Phase 2). It is likely that Phase 1 activity used features such as a water tank and hearth area, and these may even have been housed within a structure, but, since neither the

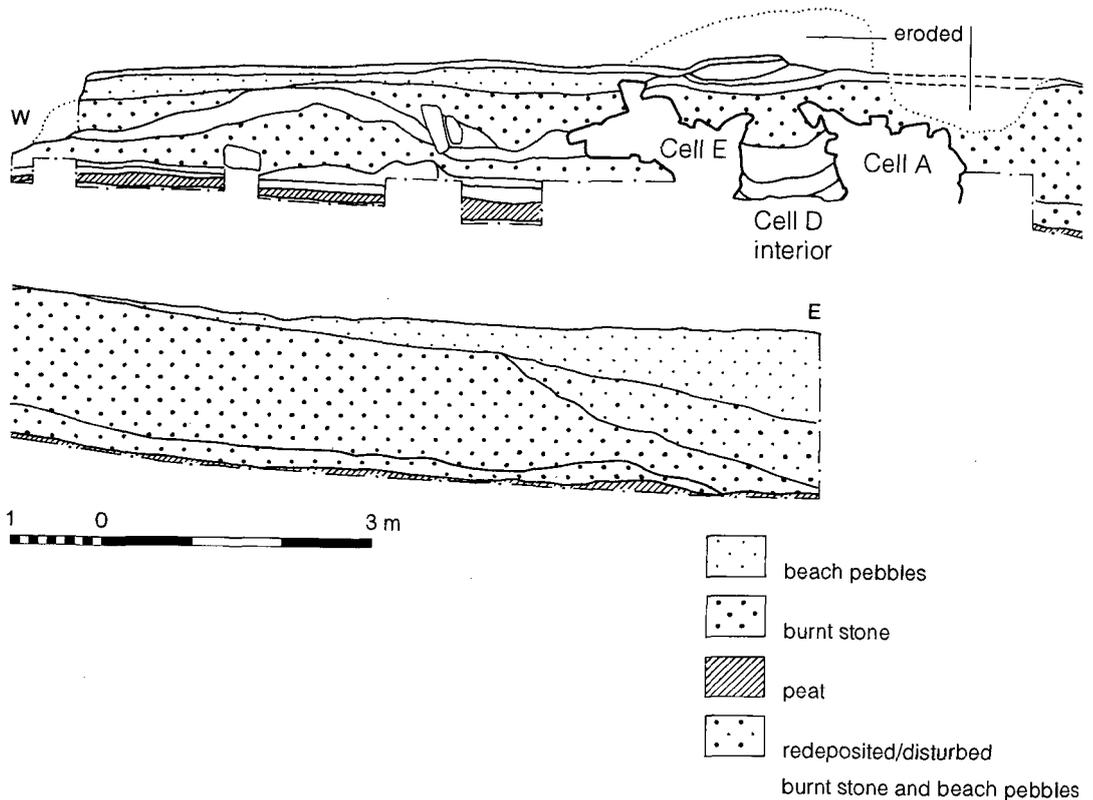


ILLUS 6 Tangwick: excavated areas

mound nor the later structure were entirely removed, this could not be ascertained. ‘Keyhole’ investigations below the floor of the structure failed to find any earlier anthropogenic deposits and indicated that the paved surfaces had been laid directly over peat. It is possible, however, that features associated with the primary mound, such as a tank or paved areas, may have been incorporated into the later structure.

Mound

The mound was composed of ash and stone which had been fractured into angular fragments as the result of having been burnt. The stone constituent was identical to that which forms the present-day storm beach, comprising lavas, tuffs, agglomerates and igimbrites (Mykura 1976,



ILLUS 7 Tangwick: main east/west section

57–8). There was no stratigraphy within much of the mound; it appeared to have developed gradually and without any periods of hiatus. Towards the west end of the main section (illus 7), however, two distinct deposits of burnt stone, separated by a layer of ash, were visible. This distinction was also noted, but was less clearly visible, at the east end of the main section. The lower deposits were interpreted as primary mound material, the upper deposits as the secondary mound. Both primary and secondary mounds were roughly crescentic in form.

Primary mound The primary mound deposits were heaped over the natural ground surface, comprising peat, covered by thin lenses of silt. These deposits could be clearly seen to predate the erection of the structure, which was built over and revetted into them. The original dimensions and shape of this mound cannot be accurately reconstructed; however, the minimum size is estimated to have been 15 m (east/west) by 5 m. It survived to a height of 0.4 m, in section. The relatively even nature of these deposits suggested that they had been deliberately levelled out, possibly in preparation for the construction of the structure.

Secondary mound The mound continued to develop during the use of the structure; the burnt debris was heaped both around the structure and over the primary mound. Two orthostatic stones found within the west side of the mound may have served to retain the looser, ashy material which was only deposited in this area. The effects of erosion make it difficult to reconstruct the ultimate shape and dimensions of the mound, but it is estimated to have stood to at least 2 m high, and to have covered an area 10 m (north/south) by 21 m (east/west).

Built features

An oval structure was partly revetted into the primary mound. Its southern and western parts had been truncated by coastal erosion, but it is estimated that the interior originally measured 7.6 m by at least 6.6 m. The interior was divided into a series of cells which were symmetrically arranged around a narrow, sloping, paved area and a sunken water-tank (illus 8). One of the cells had been used as a hearth area. Further, more fragmentary, structural remains were found in a trench cut on the north side of the mound, in Area 2 (illus 6) and at the western extremity of Area 1 (illus 6).

Chute and paving A linear depression was situated to the centre of the interior. It measured 3.4 m in length, 0.6 m in width and was up to 0.15 m deep. The base and sides of this feature were lined with stones which were reddened and abraded in a manner consistent with heat-damage. The area between this feature and the entrance to the cells which flanked it was also paved. The depression extended, on a downward slope, from the hearth area (cell D) to a portal which stood immediately before the sunken tank (illus 8 & 9). This portal had originally been formed by a pair of orthostatic stones; one of these remained *in situ*, the other was indicated by a socket.

This feature was interpreted as a chute or channel along which hot stone was transported from the hearth area to the tank. It has no direct parallel among the published Bronze Age sites in Shetland and is one indicator of the specialized or purpose-built nature of the structure at Tangwick.

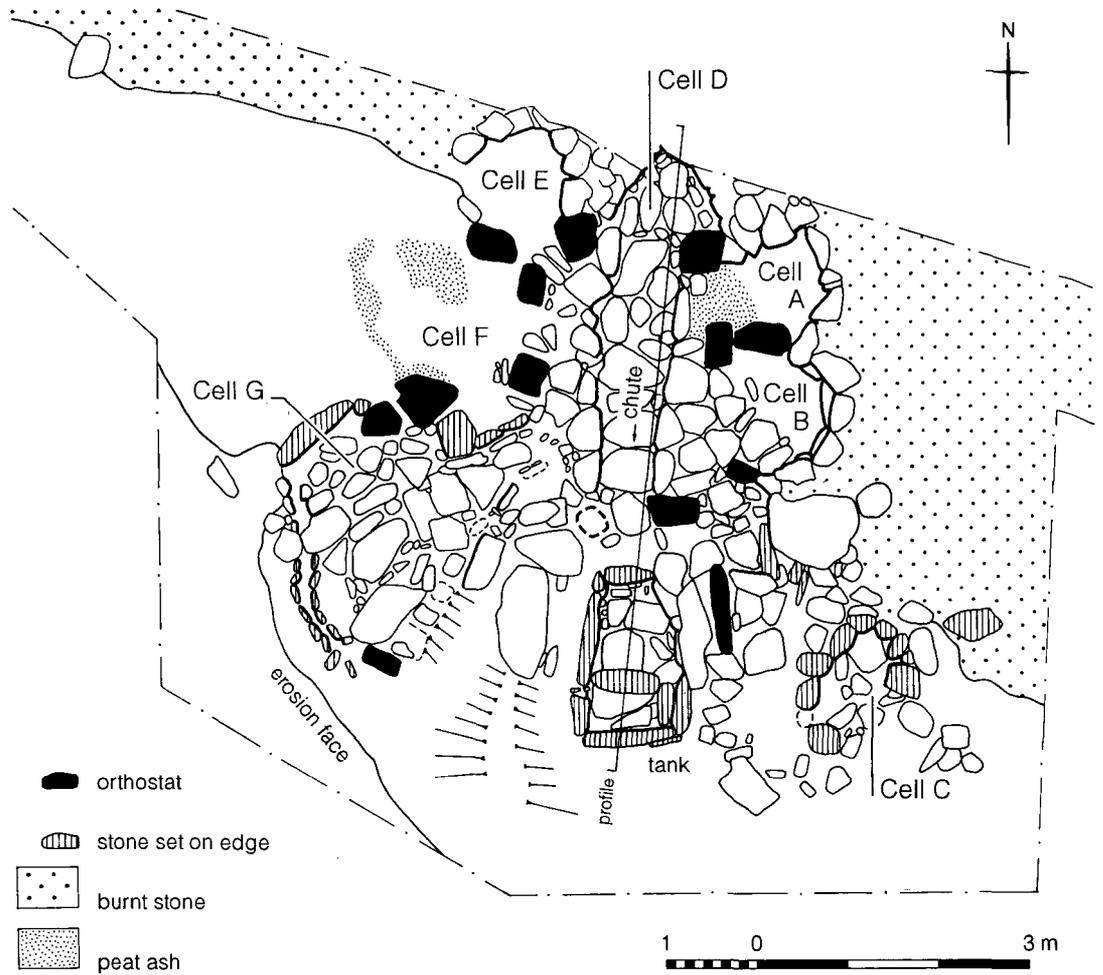
Tank At the south end of the structure, a stone-lined tank was recessed into the peat deposits which lay below the site. Approximately rectangular in plan, it measured 1.6 m long, 0.9 m wide and up to 0.6 m deep. Its sides were formed from a series of slabs set on edge; the base was paved. The joints between the slabs were clay-luted, except at the north end. The tank was self-filling, by virtue of having been set into peat deposits at the lower end of a slope, and water naturally percolated into it. The lack of clay luting between the side slabs at the higher, northern end allowed water to trickle in; elsewhere sealed joints retarded water loss from the tank. Immediately adjacent to the east side of the tank, a large flat slab, backed by an edge-set boulder, formed a level area. This may have served as a working position for operations centred on or near the tank.

At some stage after its initial construction and use, the tank was modified. A sub-compartment, formed from two edge-set stones, was inserted at the southern end (illus 10). This secondary construction was chocked into position with smaller stones and was built over deposits of burnt stone which covered the base of the tank. The internal dimensions of this sub-compartment measured 0.8 m by 0.44 m; it was 0.3 m deep.

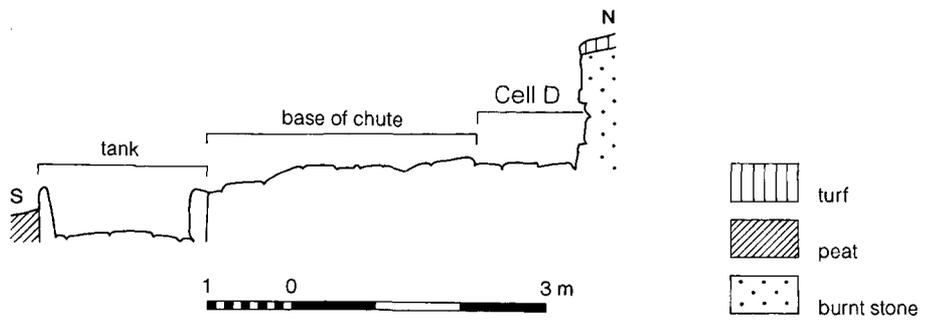
The secondary sub-compartment would not only have reduced the volume of water to be heated, but may also have served to separate fragile items, such as pots or foodstuff, from the mass of hot stone within the main area of the tank. The use of this feature as a 'top oven' to contain vessels is suggested by the condition of some of the potsherds recovered from the mound, which showed damage consistent with immersion in hot water (MacSween, below).

The tank had been covered over, possibly in antiquity, with one very large boulder at the south end and several smaller slabs at the north end. Beneath the covering, a thin, intrusive layer of sand covered the upper fill of the tank, which comprised burnt stone fragments in a matrix of loose fen peat. Below this, further deposits of burnt stone were contained within a more dense peat matrix.

While tanks have been recorded at several excavated prehistoric house sites in the Northern Isles, the proportions, relative to the size of the overall internal area, and the focal location of the Tangwick tank are unusual.



ILLUS 8 Tangwick: the structure



ILLUS 9 Tangwick: profile of the interior from hearth to tank



ILLUS 10 Tangwick: tank with subcompartment

Cell A measured 0.75 m by 1.2 m and was enclosed by a curving wall, which survived to a height of 1.2 m. On the north and east sides, the wall was formed from coursed masonry, revetted into and overlying the primary mound. The southern arc of the wall was formed from a mixture of small blocks and orthostats. A single, west-facing entrance was defined by two large orthostatic boulders, set 0.6 m apart. The floor was not paved. Later on in the use of the building, the entrance to this cell was blocked up with a rough length of walling. Deposits of burnt stone and ash which covered the entire floor area of this cell were sealed in place by this blocking.

Cell B covered an area 1.4 m by 1 m and was defined by a curving wall, which survived to a maximum height of 0.6 m. The wall was partially revetted into and overlaid the primary mound. The west-facing entrance, 1 m in width, was flanked by two large, rounded orthostats. The floor of the cell was paved only in the vicinity of the entrance. Deposits of burnt stone, which had accumulated over the floor of this cell, were sealed in place when, at an intermediate stage, the entrance to the cell was blocked off.

Cell C was situated to the south-east end of the building and had been severely damaged by erosion. The wall was constructed from a series of edge-set stones, which were probably revetted into the early mound. This could not be clearly determined due to the reduced and disturbed nature of the deposits in this area. The 'interior' measured 1.05 m by 0.6 m, and the floor was roughly paved. In places, the paving extended beneath and beyond the cell wall, indicating that the wall was a secondary construction. This was also suggested by the markedly different style of wall construction and the unmatched orientation of the entrance, which faced away from the central paved area.

Cell D (hearth area) This cell measured 0.9 m by 1 m. The wall was constructed from rounded and angular blocks, revetted into the primary mound, and survived to a maximum height of 1.1 m. The upper portion of the walls sloped inward slightly, suggesting that it may have had a corbelled roof. The joints between stones in the wall were sealed with clay which appeared to have been applied as luting or grout after construction, rather than as a bonding material. The entrance terminals were formed from a pair of orthostats. In total, three consecutive layers of paving had been laid within this cell. The primary floor was covered with a layer of clay, while the two successive paved surfaces sealed accumulations of peat ash. Where it was exposed on the inside face of the wall, the clay luting was baked. In addition, the wall and paved floor were reddened and roughened in a manner which suggested repeated exposure to intense heat. This scorching was not restricted to the lower part of the cell, but extended almost to the full height of the walls. Accumulations of



ILLUS 11 Tangwick: excavated structure, from the south-east

burnt stone and ash which covered the floor were sealed in place when the entrance was blocked off. Further accumulations of stratified burnt debris built up over the blocking wall, indicating that activity continued within the structure even after the abandonment of this cell.

Excavation provided ample evidence that this area was used as a hearth. In both its manner of construction and location within the building, however, it is not typical of a domestic hearth. It would appear to have been designed as an enclosed or semi-enclosed feature, possibly offering some control to be exerted over air-flow and temperature. In this respect it may be more comparable to a kiln or small furnace.

Cell E had been damaged by erosion on the south side, where much of the wall was lost. What survived stood to a height of 0.9 m and was revetted into the primary mound. The interior measured 1.1 m by 1.2 m. The entrance was flanked by two orthostatic boulders, set some 0.3 m apart, and faced south-east onto the central paved area. The 'threshold' area between the orthostats was paved, but the interior of the cell was not. Deposits of burnt stone and silty soil which had accumulated over the floor were later sealed in place when the entrance to the cell was blocked off. This event occurred prior to the abandonment of the site.

Cell F The entrance to Cell F was defined by two orthostats, forming a portal between the interior and the central paved area. The interior is estimated to have measured approximately 1.95 m by 1.8 m. The rear section of the wall of this cell did not survive, but it was probably revetted into the primary mound. The lowest levels of ashy floor deposits inside the cell terminated abruptly in a wedge, suggesting that they had built up against a barrier. Since subsequent floor layers, which included rough paving, had spread over and beyond this putative wall line, it may be surmised that, if such a wall or barrier had existed, it had been removed at an intermediate stage in the use of the structure. This remodelling may have provided an exit to

the rear of the cell through which debris from the interior of the building could be transported for deposition onto the mound. In this connection, it is worthy of note that concentrations of ashy debris within the mound were found only to the rear of Cell F.

Cell G was the largest of the cells, covering an area of 2.4 m by 2 m. A short paved passage, defined by small edge-set stones, connected the entrance to the central paved area. The north-west portion of the cell wall was formed from large, rounded, edge-set stones. This part of the wall may have been revetted into burnt mound material, however, the evidence for this did not survive. The south-eastern part had largely been removed by erosion and was inferred from a series of large pebble-filled hollows, interpreted as stone sockets. At the south-east side of the interior, which was entirely paved, the paving stones were contiguous with this projected wall line. The primary paved surface comprised both flat slabs and rounded stones. This surface was later repaired and augmented with further layers of slabs. A soft fen peat had developed in the gaps between successive layers of paving. Neither primary nor secondary floors appear to have formed an entirely level surface. The uppermost of the paved surfaces was covered with an almost continuous layer of green clay. The clay was evenly spread over the floor area. The function or origin of this clay is unclear. It may be interpreted simply as a flooring material or may derive from a collapsed superstructure, or even the remains of clay working. However it is interpreted, the clay had to be imported on to the site, presumably to fulfil a specific function.

The south-western limit of the cell was defined by a curvilinear cut or slot. This feature was formed from two sets of small upright stones, set 0.2 m apart. This slot had been scoured out by the sea prior to excavation and filled with coarse sand and beach pebbles; it is thought, however, originally to have housed a barrier, perhaps of wood. Two paving stones were laid across the slot, at approximately its mid-point, and may have provided access into the cell from outside the building.

Wall The remains of a wall were found to the west of Cell E. It was aligned east/west and constructed from sub-angular blocks. It survived to a length of 5.8 m, but was reduced to a single course in height. It was built over the natural ground surface and partly covered by beach deposits. While it is possible that the wall may have served as a kerb to the mound, there was no stratigraphic evidence to confirm this.

Area 2

Fragmentary structural remains were uncovered in Area 2 (illus 6). The remains comprised the foundation courses of two walls and associated surfaces. An arc of walling enclosed an area approximately 1.6 m in diameter, the floor of which was roughly paved. As far as could be determined from the foundation course, the wall appears to have been a revetted, as opposed to a free-standing, structure. It extended beyond the limits of the excavation and, cannot, therefore, be more fully characterized. The second wall fragment was a roughly linear construction which was revetted into burnt stone deposits. It may have acted as a kerb to the mound at an intermediate phase in its development. A layer of silty clay and a trampled stone surface lay to the north side of this wall.

This area was not fully excavated because it was waterlogged, and the basal deposits lay below the water table. It was not possible to link these remains stratigraphically with either of the two main phases of activity identified in Area 1, although the fact that they were sealed between layers of burnt stone points to their construction and use at an intermediate stage in the development of the site.

Later activity

At some period, prior to the final abandonment of the site, the entrances to several of the cells were blocked up. Burnt stone debris was then deposited over the blocking walls, indicating that the site remained in use. When it was finally abandoned, the mound slumped and the structure was gradually covered with re-deposited burnt stone and soil. With the encroachment of the sea, the southern part of the site became obscured by a storm beach. The northern part of the site was colonized by rough vegetation.

FINDS

Two significant categories of finds were recovered from the site at Tangwick: pottery and stone objects. Fragments of unburnt bone recovered from the site were not from secure contexts and have been identified as intrusive and of recent origin.

POTTERY

Ann MacSween

The assemblage from Tangwick comprises around 700 sherds and 1.4 kg of spalled flakes and small, abraded sherds. An estimated 185 vessels are represented — this is probably an overestimate as sherd matching was difficult due to similarities in fabric and colour throughout much of the assemblage. Some of the vessels are represented by only a few sherds whereas in other cases much of the vessel is represented (a spreadsheet of the pottery data can be found in the archive). Most of the pottery was recovered from the hearth dumps associated with the structure, with much less pottery (c 8% on sherd numbers) from the earlier deposits.

Condition and some implications for use

Much of the pottery was damaged, spalling being noted on one or both surfaces of around 65% of the vessels. About 20% of the vessels were split along a coil junction. This is much more damage than is noted on most assemblages. The cause of the damage was not clear either from examination of the sherds or from the contextual information. One possibility was that salt crystallization resulting from the site being soaked by sea water had caused the damage. The other possibility was that the damage had occurred during use as cooking vessels.

The lack of pottery assemblages of any size from Scottish burnt mounds has often been remarked on, the theory being that food was cooked in the tank by adding hot stones, negating the need for the use of pottery vessels. Barber (1990, 100) has noted that ‘with both the preparation and consumption of food taking place at some remove from the site, there is no need to anticipate . . . that the artefact assemblages associated with these functions would be found at the site of the cooking’. However, if a liquid or gruel was being heated, then a container would have been required. If a porous vessel was placed into a tank of water rather than directly onto a fire, there would be a higher risk of spalling as water would soak into the vessel and steam would be produced within the vessel wall. Examination of the pattern of damage indicated that it resulted from exposure to heat in the tank rather than from salt damage, because where several sherds were present from the same vessel, damage was generally consistent across the vessel, whereas a more random pattern would have been expected from salt damage. Most of the sherds from V3 (illus 12), for example, are badly spalled on the exterior of the vessel and on the interior

of the rim, and the vessel has split along one of the upper coil junctions. Another example is V83 where the exterior is missing on all eight sherds. The lack of heavy sooting on the exterior of the vessels adds weight to the theory that they were used for cooking in the tank.

Technology

Coil construction was the favoured forming method and coil junctions were noted on many vessels. Vessel surfaces were often smoothed (76%) and a few were burnished (13%). Most vessels were reduced (grey/black) with oxidized surfaces (red, buff or brown). The fabrics used were a fine, medium or coarse micaceous clay usually with additional temper (up to 60%). All the sherds have some steatite fragments, even if a very small amount. No chronological difference in fabric could be detected. Voids were noted on a few sherds, probably the result of the erosion of softer inclusions — none was identified as the result of the use of organics as temper.

Morphology and decoration

Where morphology could be determined, the vessels are flat-based, either bucket-shaped (eg V14, illus 14) with flat or internally bevelled rims, more open forms with slightly everted rims (eg V3, illus 12), or shallower bowls (eg V12, illus 14). The slightly everted rims were all from Phase 2 contexts but there is so little pottery from Phase 1 that any chronological implications must be tentative. It is just as likely that the division is related to the function of the vessels. The more open forms would, for example, be most suitable for pouring liquids, while the smaller, shallower bowls were perhaps used as serving rather than storage vessels. Several of the vessels were perforated, indicating the attachment of a handle or cover.

Only three of the vessels are decorated. One (V1, illus 12) is a flat-rimmed vessel decorated just below the rim with a row of prominent, closely spaced bosses. The exterior was burnished after the bosses were added and the overall effect is almost that of a riveted metal vessel. Another vessel from Phase 2 (V2, illus 12) has a horizontal pinched-up cordon just below the lip and a vertical cordon running down the vessel from the horizontal cordon, the decoration, if it was repeated around the vessel, perhaps dividing the exterior into panels. A vessel with sherds from Phases 1 and 2 (V3, illus 12) was decorated with horizontal rows of fingernail impressions. The only other decoration noted on a sherd from a Phase 1 context is a twisted cord impression (V15, illus 14). Fingernail impressions were recorded below the rim on some vessels (eg V3, illus 12), but as these were only visible where the outer surface had spalled off, they were interpreted as manufacturing marks.

Comparative material

Due to the small number of decorated sherds and the undiagnostic morphology of the assemblage, discussion of the material in a wider context must be tentative. As has already been mentioned, assemblages of more than a handful of sherds are rarely recovered from burnt mound sites in Scotland, so comparative material has to be sought on other types of sites.

The flat-rimmed, sometimes slightly inverted rimmed vessels can be paralleled with pottery attributed to the later Bronze Age at other Shetland sites. Similar vessels have been found associated with a timber-framed building at Kebister (Dalland & MacSween 1999), and at Sumburgh (Downes & Lamb 2000). At Old Scatness broch, comparable pottery was recovered from the lowest levels of the settlement mound (MacSween 1998a). A vessel very similar in its

upper profile to V17 (illus 14) was recovered during the excavations at Upper Scalloway broch (MacSween 1998b, 12). The burial form was thought to be most similar to that associated with vessels characteristic of the late Early Bronze Age (later half of the second millennium or early first millennium BC) (Sharples 1998, 17). The vessels from these sites find parallels in the assemblages from the 'Late Bronze Age Village I' at Jarlishof (Hamilton 1956) and the 'Late Bronze Age Farmstead' at Clickhimin (Hamilton 1968).

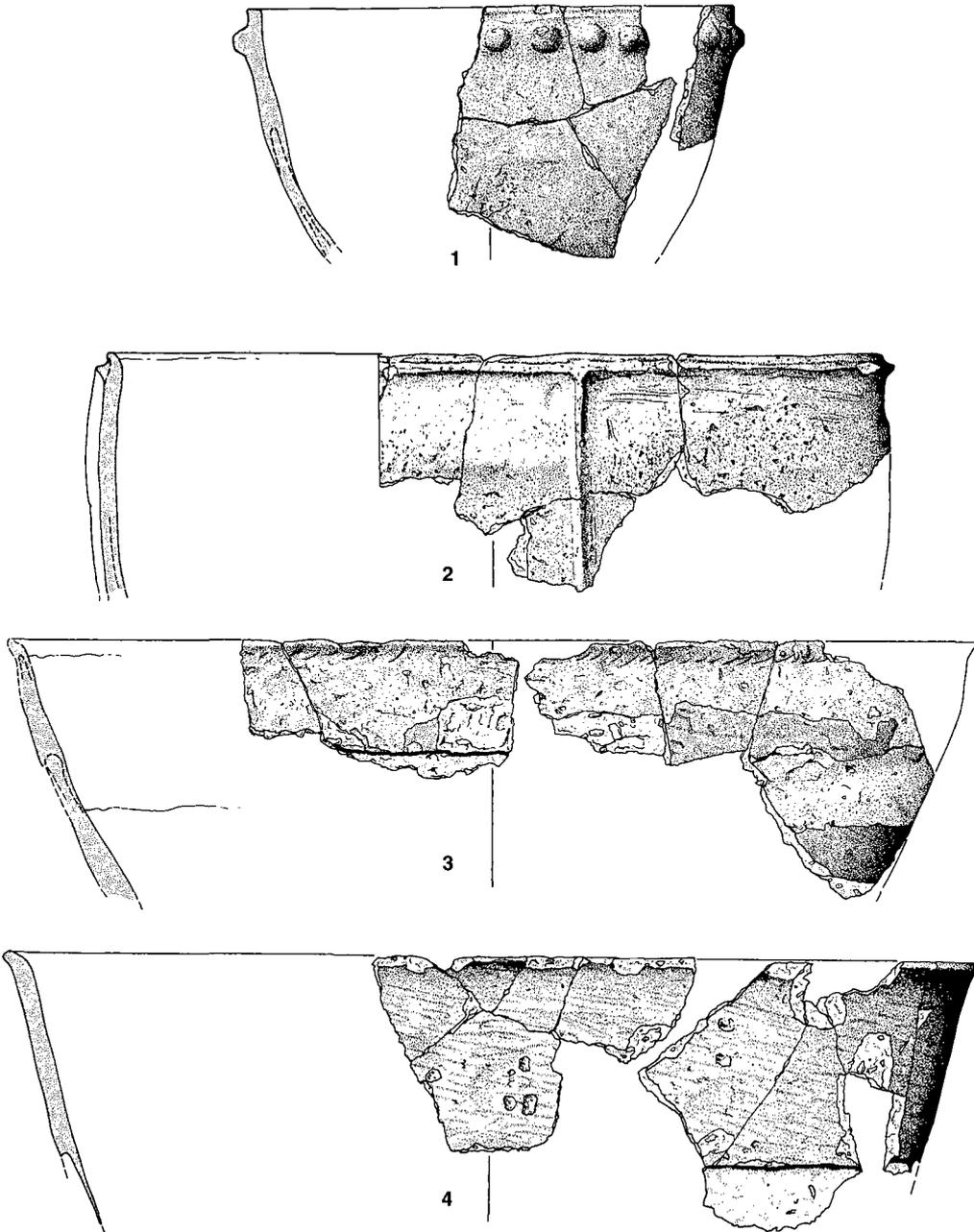
Decorated pottery is not common in the above assemblages and the decorated sherds from Tangwick are difficult to parallel. Decoration such as cord impression and fingernail impressions are used throughout prehistory. No parallels have been found for the bossed decoration on V1 (illus 12). Similar use of horizontal and vertical cordons to that on V2 (illus 12) has been noted on a vessel from Sumburgh (Downes & Lamb 2000).

Conclusions

The assemblage from Tangwick is important in that it is the largest assemblage of pottery so far recovered from a burnt mound site in Scotland, and also in the extent and nature of damage to the sherds which is indicative of the placement of pottery vessels in the cooking tank. While, in spite of a number of recent excavations, there is still a lack of a securely dated pottery sequence for Shetland, comparisons with sequences from other sites indicate a pre-Iron Age, probably late Bronze Age date for the Tangwick pottery.

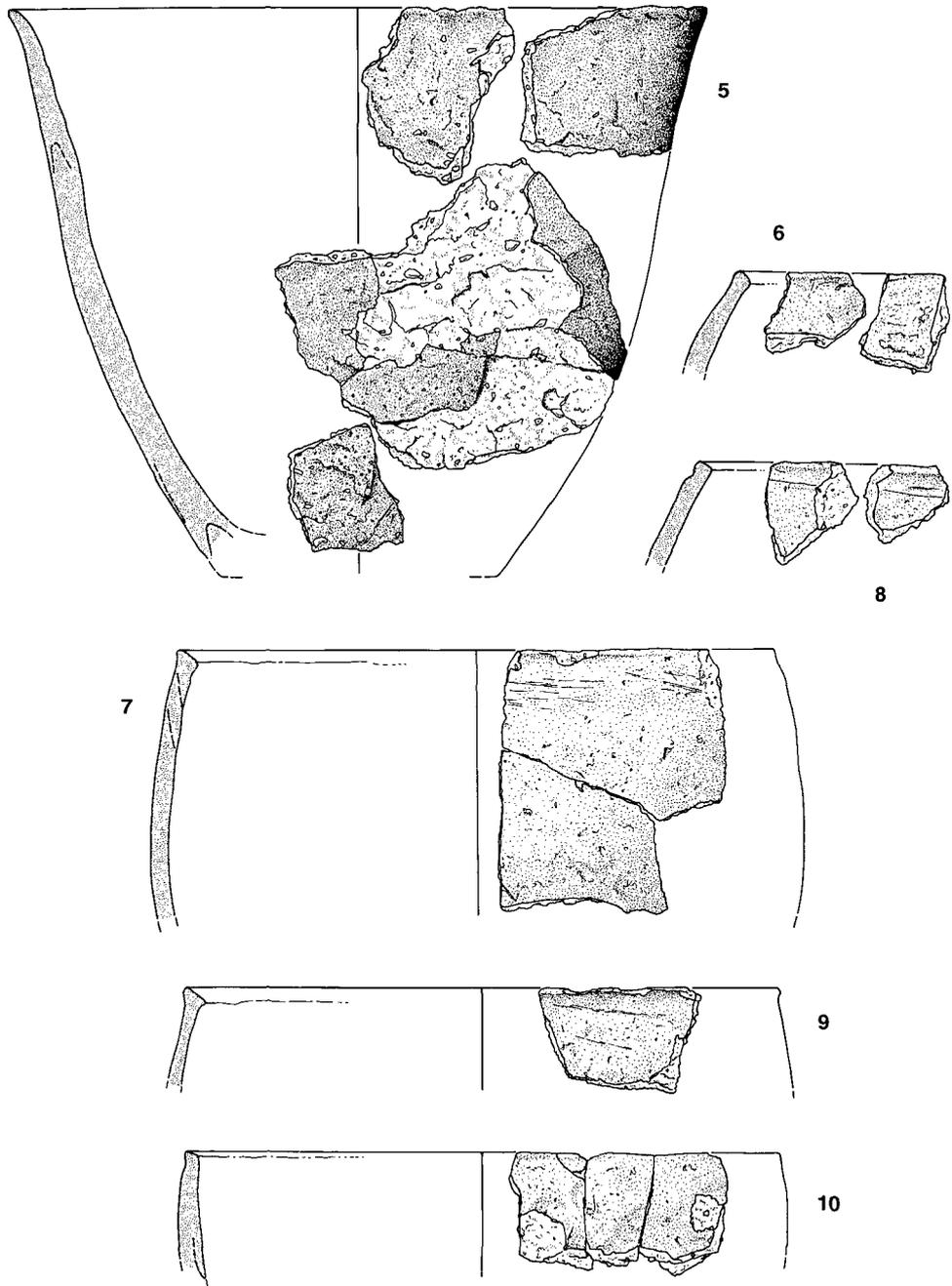
Catalogue of illustrated sherds (illus 12–14)

- V1 Flat rimmed vessel decorated on the exterior just below the rim with a row of prominent, closely spaced bosses. Exterior burnished after bosses were added. Flat base with slightly angled walls. Probably a bucket-shaped vessel. Coil constructed — broken along N-shaped junctions. The fabric is fine micaceous clay with c 60% crushed steatite up to 9 mm long which has fired hard and is reduced (grey) with brown surfaces. Exterior sooted, most heavily around the rim. Small patches of sooting in the interior. Dia (rim) 200 mm, (base) 160 mm; Th 6 mm; Wt 312 g.
- V2 Plain rim, the lip slightly everted in sections. Just below the lip on the exterior is a pinched-up cordon and one sherd has a vertical cordon running down the vessel from the horizontal cordon. Exterior smoothed after the decoration was added. Coil constructed — unsmoothed junctions in the interior. The fabric is fine micaceous clay with occasional steatite fragments which has fired hard and is oxidized (brown). Sooting on both surfaces. Dia 320 mm; Th 6 mm; Wt 173 g.
- V3 Slightly everted rim. Large part of the rim circumference represented. Fingernail impressions just under the lip of the vessel on the exterior probably result from forming the rim as they are only visible where the outer smoothed surface has flaked off. Coil constructed — N-shaped junctions. The fabric is medium micaceous clay with c 30% angular steatite fragments up to 10 mm long which has fired hard and is reduced (grey) with partly oxidized surfaces (brown). Most of the sherds are badly spalled on the exterior and on the interior of the rim, and the vessel has split along one of the upper coil junctions. Dia 400 mm; Th 11 mm; Wt 1376 g.
- V4 Slightly everted rim. Exterior surface burnished. Coil constructed — N-shaped junctions. The fabric is coarse micaceous clay with c 20% angular steatite fragments up to 6 mm long which has fired hard and is oxidized (brown). Both surfaces sooted. Spalling on both surfaces and split along an upper coil junction. Dia 400 mm; Th 11 mm; Wt 396 g.



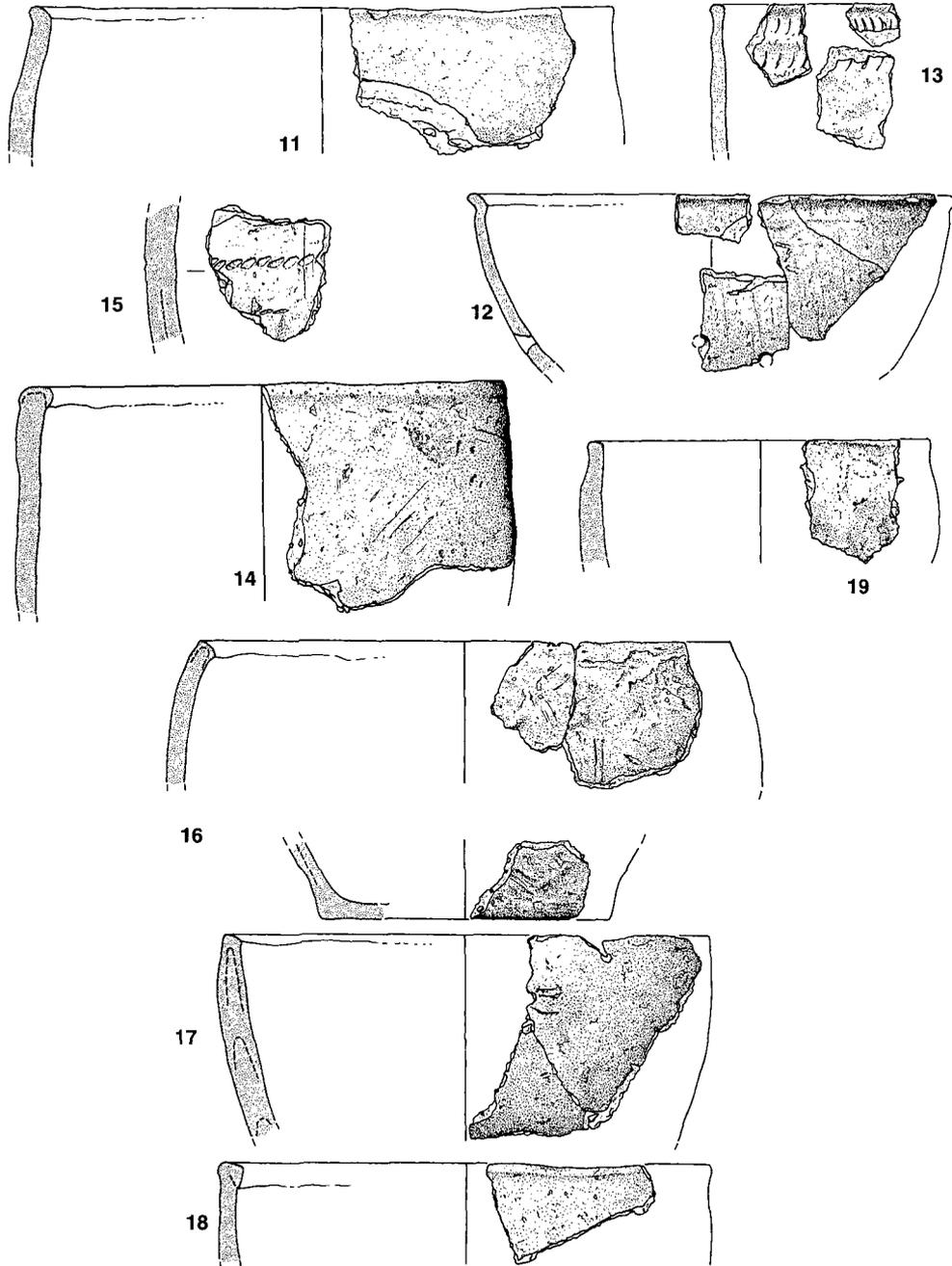
ILLUS 12 Tangwick: Vessels 1-4 (Scale 1:3)

- V5 Plain rim with slight neck. Exterior smoothed. Coil constructed — split along N-shaped junctions. The fabric is coarse micaceous clay with c 40% angular rock fragments to 8 mm which has fired hard and is reduced (grey) with an oxidized exterior margin. Sooting on both surfaces. Spalling on both surfaces. Dia 280; Th 11 mm; Wt 908 g.



ILLUS 13 Tangwick: Vessels 5-10 (Scale 1:3)

- V6 Inverted rim with a flat lip, bevelled to the interior. Exterior burnished. The fabric is a medium micaceous clay with c 20% angular rock fragments to 3 mm which has fired hard and is oxidized (brown). Sooting on both surfaces. Dia not determined; Th 10 mm; Wt 43 g.



ILLUS 14 Tangwick: Vessels 11–19 (Scale 1:3)

- V7 Slightly inverted rim with a flat lip bevelled to the interior, probably from a barrel-shaped vessel. Exterior smoothed. Coil constructed — N-shaped junction. The fabric is medium micaceous clay with c 10% rounded steatite fragments up to 5 mm which has fired hard and is oxidized (brown). Interior sooted. Dia 240 mm; Th 7 mm; Wt 108 g.

- V8 Inverted rim with a bevel to the interior. Exterior decorated just below the rim with a finger impressed groove. The exterior was burnished before the decoration was carried out. The fabric is medium micaceous clay with c 10% steatite inclusions to 5 mm which has fired hard and is reduced (grey). Both surfaces sooted. One sherd is spalled on the exterior. Dia not determined; Th 8 mm; Wt 23 g.
- V9 Slightly inverted rim with a sharp internal bevel. Exterior burnished. The fabric is a medium micaceous clay with occasional steatite fragments which has fired hard and is reduced (grey) with an oxidized exterior margin (red). Interior sooted. Exterior spall. Dia 240 mm; Th 6 mm; Wt 25 g.
- V10 Plain rim. Exterior well smoothed. Coil constructed — split along N-shaped junction. The fabric is a coarse micaceous clay with occasional steatite fragments up to 3 mm which has fired hard. Some sherds are reduced (grey) and others are oxidized (buff). The sooting is probably post-depositional as it is confined to individual sherds. Four of the rim sherds are spalled on the exterior. Dia 240 mm; Th 10 mm; Wt 49 g.
- V11 Flat rim with a slightly everted lip. Exterior smoothed. The fabric is medium micaceous clay with occasional steatite fragments up to 5 mm long which has fired hard and is reduced (grey) with oxidized surfaces (red). Exterior spalled. Dia 240 mm; Th 10 mm; Wt 66 g.
- V12 Slightly everted rim from a shouldered or barrel-shaped vessel. Exterior surface burnished. One of the body sherd is perforated (broken across the perforation) and there is a possible second perforation. The fabric is medium micaceous clay with occasional steatite fragments up to 4 mm which has fired hard and is oxidized (brown). Sooting on both surfaces. Dia 200 mm; Th 6 mm; Wt 57 g.
- V13 Flat rim decorated on the exterior with at least two horizontal lines of vertical fingernail impressions. Exterior smoothed before being decorated. The fabric is fine micaceous clay with c 10% of angular steatite fragments up to 7 mm which has fired hard and is reduced (grey) with an oxidized exterior (brown). Sooting on both surfaces. Exterior spalled. Dia not determined; Th 5 mm; Wt 49 g (37 g from F48, 12 g from F41).
- V14 Slightly inverted rim with a flat lip, probably from a barrel-shaped vessel. Exterior smoothed. The fabric is fine micaceous clay with c 20% angular rock fragments up to 7 mm which has fired hard and is oxidized (red). Patches of sooting on both surfaces. Dia 200 mm; Th 10 mm; Wt 138 g.
- V15 Body sherd decorated on the exterior with a fairly thick (5 mm) twisted cord impression. The exterior of the vessel was well smoothed prior to decoration. The fabric is fine micaceous clay with c 20% crushed steatite to 5 mm which has fired hard and is reduced (grey) with an oxidized exterior (brown). Exterior sooted. Interior spalled. Th 13 mm; Wt 42 g.
- V16 Slightly inverted rim with a flat lip, bevelled to the interior. Flat base with angled walls. Exterior smoothed — much of the surface is abraded. The fabric is fine micaceous clay with c 10% angular steatite fragments to 3 mm which has fired hard and is reduced (grey). Both surfaces sooted. Dia rim 220 mm, base 120 mm; Th 8 mm; Wt 80 g.
- V17 Rim with a slight interior bevel, probably from a barrel-shaped vessel. Exterior burnished. Coil constructed — N-shaped junctions visible in section. The fabric is coarse micaceous clay with c 40% angular steatite fragments to 5 mm which has fired hard and is reduced (black). Both surfaces sooted. Dia rim 200 mm; Th 13 mm; Wt 108 g.
- V18 Inverted rim with a flat lip, bevelled to the interior. Exterior smoothed. The fabric is a medium micaceous clay with c 30% angular steatite fragments to 3 mm which has fired hard and is oxidized (brown). Patches of sooting on both surfaces. Dia 200 mm; Th 8 mm; Wt 28 g.

- V19 Flat rim from a necked vessel. Exterior well smoothed. The fabric is medium micaceous clay with c 30% angular rock fragments up to 8 mm which has fired hard and is reduced (grey). Both surfaces sooted. Dia 140 mm; Th 10 mm; Wt 27 g.

STONE (NOT ILLUS)

In total, 60 stone objects were recovered from the site. The majority of these came from deposits within the structure or from the secondary mound deposits. A summary of the finds is given below and a full version of the catalogue is included within the project archive. The finds can be broken down into four groups: (1) tools (including stones used but not fashioned), (2) quartz, (3) pumice and (4) unworked stone of non-local origin.

Tools and used stone

Twenty-two tools or used stones were identified. These included pot lids, hammer stones and grinders, pot boilers, abrasive tools and ard tips. In general, the assemblage shows a preference for the use of locally available beach stone. Ten of these objects had not been prepared prior to use, but could be identified as 'tools' from use-wear; all had at least one chipped or worn surface. These tools appear to have been used as rough hammers, pounders, grinders and choppers. Two small rounded, heat-cracked pebbles may have been used as pot boilers. Eight thin discoid objects, all of rhyolite, were tentatively identified as 'pot lids' (Clarke 1998, 144–7). These varied in thickness from 4 mm to 35 mm, and in diameter from 75 mm to 125 mm. Very little evidence for working was visible other than very rough chipping around the edges. Two ard tips of a dense metamorphic stone were recovered from the site. One came from a late fill in Cell A, the other from secondary mound deposits in Area 2. These may derive from cultivation in the area of the burnt mound as broken tools deposited casually onto the site. It is unlikely, however, that cultivation would have taken place in the immediate vicinity of the site, since the ground is wet and peat had already begun to develop prior to the development of the mound. It is perhaps more likely that they were brought on to the site for some other, unknown, purpose.

Quartz

Every piece of quartz encountered during excavation was collected; in total only 15 pieces were recovered. The problems with identifying worked quartz are discussed elsewhere (Whittle 1986, 64–72), but it would appear that none of the pieces had been worked, although they may have been casually used as rough cutting or chopping implements.

Pumice

Seventeen pieces of pumice were recovered from the site. Pumice frequently washes ashore on beaches in Shetland, and these pieces were probably obtained locally. Twelve pieces show signs of use-wear in the form of flattened or slightly concave surfaces, consistent with use as abrasives. In three cases there are also notches or grooves present and one fragment had been burnt.

Unworked, imported stone

Three pieces of unworked steatite were recovered from below the blocking of Cell A. Two of the fragments fitted together to form a roughly squared block measuring 270 mm by 140 mm by 75

mm. No tool or quarry markings were visible on any of the fragments. The nearest known sources of steatite to Tangwick are at Hillswick and Fethaland. Since neither of the fragments were waterworn, it is probable that they were carried on to the site rather than washed up onto the beach. This material may represent the import of raw materials for processing at the site, one potential end-use of which could have been as temper for pottery production. The thermodynamic properties of steatite were probably well known at this time and it may have been used in a variety of ways, for which no evidence survives.

Three fragments of unworked felsite were found, all were water worn and most likely were brought to the site as beach pebbles. The nearest known source of felsite occurs in outcrops at the Beorgs of Uyea.

PALAEOENVIRONMENTAL SAMPLES

Bulk samples, comprising a minimum of two litres of soil, were routinely collected from each secure context. The samples were processed using standard wet-sieving methods. Both flots and retents were then sorted for environmental remains and artefactual material. The full report is in archive form.

MACROPLANT REMAINS

T G Holden

Most samples contained both charred plant remains and uncharred plant and insect remains. Some of the uncharred plant remains contained weed seeds and other plant parts which would have been typical of waste ground or agricultural fields whereas others, notably F13, F14 and F15 (tank fills), were dominated by mosses. There is no reason to suppose that any of these elements are ancient in origin and all uncharred material can therefore be discounted as being relatively modern.

The charred fraction consisted of several different elements. A single barley grain (*Hordeum sativum* indet.) was recovered from context F24 (a buried old ground surface). This was not well preserved and it was impossible to determine if it was of a hulled variety or not. On its own, this offers little scope for detailed interpretation.

Small fragments of wood charcoal were present in low concentrations in most samples. Many of the better preserved fragments were from small roundwood and would be compatible with having derived from heather (*Calluna vulgaris*). The stems and rhizomes (underground stems) of a monocotyledon taxon, probably a grass or sedge, were also recovered from a number of samples. These, together with the large quantities of charred amorphous material which probably represents burnt and highly humified peat, are thought to represent evidence for the use of peat as fuel. Large fragments of what are thought to be the rhizomes of flag iris (*Iris pseudoacorus*) were encountered in one sample (F48, an ashy deposit between primary and secondary burnt stone deposits within the mound). It is possible that these rhizomes could have been used as a source of starch although a more prosaic and more likely explanation is that the peat used as fuel came from an area in which the Iris was growing.

RADIOCARBON DATES

Radiocarbon dates were obtained from two samples of charred plant remains from Tangwick and appear to indicate either a very long period of use, or a hiatus between the formation of the primary and secondary burnt mound deposits. The results are summarized in Table 1.

Sample OxA-8195 was a charred cereal grain found in context F24. This was a silty layer which lay under the primary burnt mound and over peat. The grain was not well preserved (Holden, above) and the possibility exists that the events which resulted in its burning pre-dated the site, or were unrelated. No evidence was found for any activity which pre-dated the site, however, and the preferred interpretation is that the charred grain derives from activities carried out during the earliest use of the burnt mound, in the early to mid second millennium BC.

Sample OxA-8196 was one of several large fragments of charred iris rhizome (Holden, above). The sample came from context F48, a concentration of ash and soil which contained many sherds of pottery. This context lay over primary, and under secondary burnt mound deposits and was contemporary with the adjacent structure. It was most probably derived from the clearing out of refuse within the structure. The date from this sample is interpreted as representing activities which occurred at an intermediate stage in the use of the burnt mound, in the late second or early first millennium BC.

TABLE 1

Radiocarbon dates

Lab no	Sample	yrs BP	Calibrated dates		$\delta^{13}C$
			1 sigma	2 sigma	
OxA-8195	F24: charred grain from beneath primary mound	3390 \pm 55	1870–1840 BC (0.06) 1760–1620 BC (0.94)	1880–1520 BC	–24.6‰
OxA-8196	F48: charred iris rhizome between primary and secondary mound material	2815 \pm 40	1015–915 BC	1100–850 BC	–24.0‰

INTERPRETATION AND RECONSTRUCTION

DEVELOPMENT OF THE MOUND

Mounds of burnt stone, such as that at Tangwick, have been widely interpreted as the debris which resulted from the use of stone to heat water. In this process, stone is roasted in a fire until very hot, and then quenched by immersion in a water-filled receptacle. Heat is thereby transferred from the stone to the water. Stone which is rapidly quenched shatters and becomes fragmented. These fragments may be reused for several successive heatings, but eventually they become too small to be of use, and must be discarded. The size of the resulting mound is, therefore, in rough proportion to the number of episodes of heating which have taken place and to the tendency of the rock types used to fragment under heating/quenching cycles.

Using an index formulated through experimentation, O'Kelly (1954) estimated that 0.5 cu m of stone would be required to heat a tank containing 450 litres of water to a temperature sufficient for cooking purposes. The tank at Tangwick has a maximum capacity of 864 litres, but is unlikely to have been filled to the brim; it is estimated that it would usually have held around 550 litres. While this is slightly larger than O'Kelly's tank, it is generally comparable. On this basis the figure of 0.5 cu m of stone per boiling has been used to calculate the number of boilings represented by the mound.

The volume of the mound at Tangwick can only be estimated since the seaward side of the mound has been diminished by erosion and the landward part, which was only partly excavated, was covered by peat and was not readily visible. The minimum extent of the mound, based on the visible deposits, is calculated to be in the region of 100 cu m. The original extent, based on a reconstruction of the site, is estimated to be about 185 cu m. In calculating these volumes, the two

phases of mound deposition have been taken together, because it was not possible to distinguish between them other than in part of the main section.

$$\begin{aligned} 100 \text{ cu m (min vol of mound)}/0.5 \text{ cu m (vol of stone for one boiling)} &= 200 \text{ boilings} \\ 185 \text{ cu m (original vol mound)}/0.5 \text{ cu m (vol of stone for one boiling)} &= 370 \text{ boilings} \end{aligned}$$

This would mean that the mound represents a minimum of 200 boilings. However, as Buckley (1990, 170–2) has demonstrated, igneous stones, such as those found in the mound at Tangwick, could have been reused over 25 times. If the mound comprised stones which had been reused 25 times, it would represent between 5000 and 9250 boilings:

$$\begin{aligned} 200 \text{ (min no boilings)} \times 25 \text{ (no of times stone may be reused)} &= 5000 \\ 370 \text{ (max no boilings)} \times 25 \text{ (no of times stone may be reused)} &= 9250 \end{aligned}$$

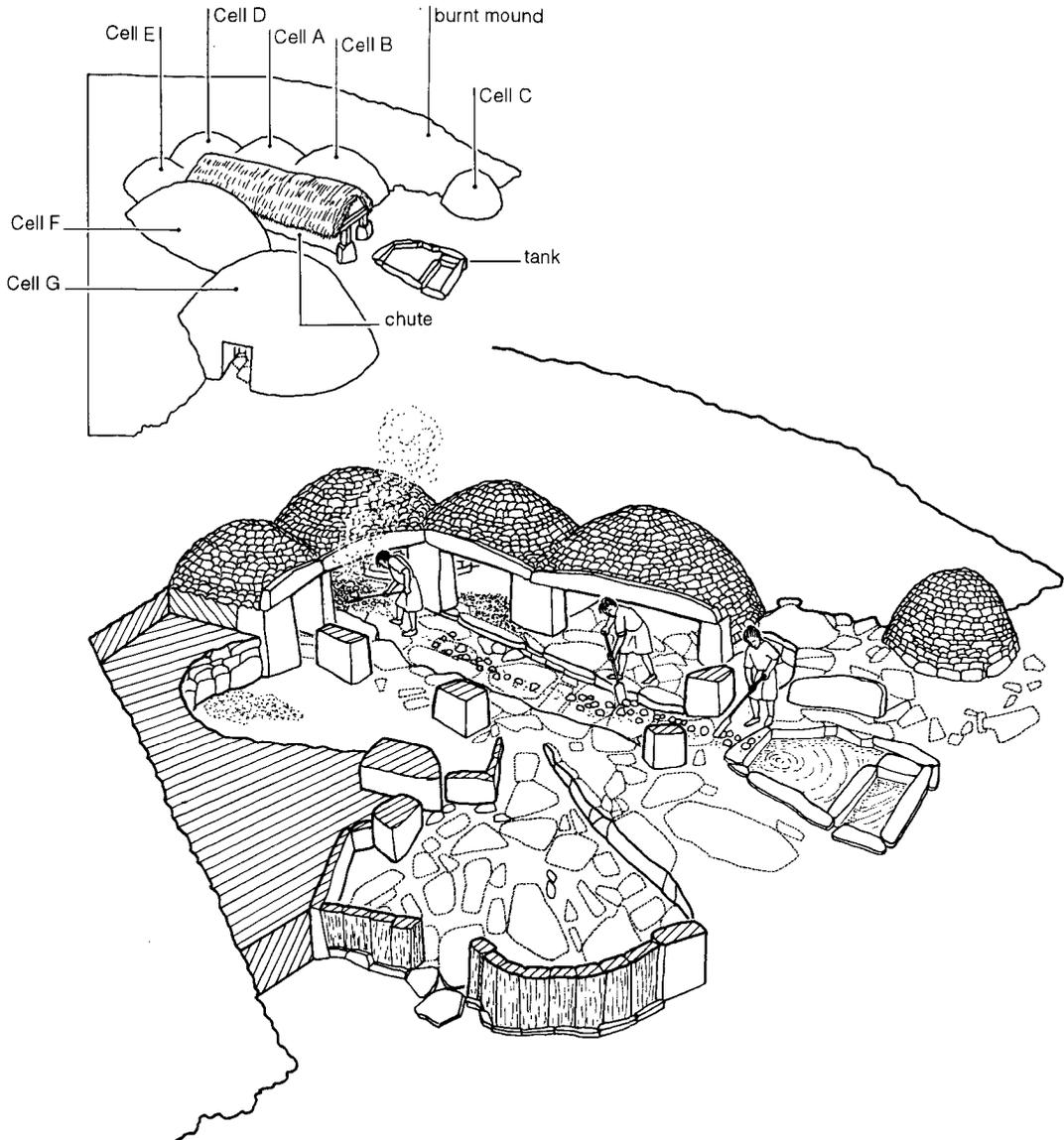
Since there was an ample supply of locally available stone, it is unlikely that the stones would have been reused as much as 25 times, but the size and shape of the fragments found in the mound indicate that the stones were reused several times, at least. The real amount of boilings represented by the mound at Tangwick may be considerably less: even than the minimum figure of 5000, but is likely to advance the estimate of 400 boilings for Scottish burnt mound sites previously postulated by Barber (1990, 100–1). The presence of the structure at Tangwick, indicative of extended rather than temporary usage of the site, may, in part, explain the disparity.

DESIGN AND USE OF THE STRUCTURE

The symmetry displayed within the structure argues that it was conceived as a unit: the design exhibits a clear linkage of the various spaces, as demonstrated by the paved surfaces and the portals, and, in its incorporation of a series of separate spaces, reflects a desire for spatial differentiation or privacy. The manner in which the interior is divided and defined, namely the presence of entrance portals and the proximity and small size of the cells, is best understood as elements within a roofed building rather than an open-air space (illus 15). It is by no means certain, however, that the entire area of the structure was covered by a single roof. The walls of Cell D were battered inwards, in a manner which suggests that it may have had a roughly corbelled roof. The revetment of this cell into the burnt mound would have facilitated this type of roofing arrangement. This may also have been practicable at the other revetted cells, A, B, C and E. It is likely that the larger cells, F and G, and the area extending from Cell D to the tank were also covered. Here, stone is unlikely to have been a suitable roofing material; it is more likely that wood, thatch, skins or textile were used instead.

Considerable energy and resources were expended in the construction of the Tangwick structure and it was repaired and altered on several occasions. This, together with the large number of boiling episodes inferred from the volume of the burnt mound, indicates that the site was used and maintained over an extended period.

The ground plan of the structure is comparable in its symmetry and cellular nature with Shetland houses of Neolithic/Bronze Age date, such as Wiltrow (Curle 1936), Jarlshof (Hamilton 1956), Punds Water (Calder 1963, reassessed by Winham 1980) and House 1 at Scord of Brouster



ILLUS 15 Tangwick: reconstruction

(Whittle 1986). There are, however, several substantial differences: the structure is intimately associated with a mound of burnt stone; the central floor area at Tangwick is occupied by the hearth/chute/tank unit; and very few stone tools were recovered, in contrast to the excavated house sites which all yielded large numbers of rough stone implements and quern stones.

It seems clear that the burnt stone debris which formed the secondary mound was generated inside the structure through the use of hot-stone technology. Moreover, the main features of this

structure appear to have been specifically, even ergonomically, designed to facilitate this activity. When hot stone was being processed, the effects of heat, steam and shattering stone would have rendered a large part of the structure inhospitable and movement within the structure must have been severely restricted. The size of the smaller cells, A, B, C and E, all of which were less than 1.4 sq m in area, argues against their use as 'rooms' and they may be better interpreted as storage spaces. The two larger cells, F and G, are more readily identified as loci for activities associated with the use of hot-stone technology than as residential quarters. Even were these processes not carried out on a regular basis, leaving the structure technically 'habitable' for at least some of the time, it does not appear ever to have been used as a house.

We can be reasonably certain that the heating of water was one of the major activities carried out at this site. What is less clear is how this water was used. It may have had a number of end-uses, from cooking to craftworking and bathing. In addition, other types of activities may also have been carried out; the enclosed hearth area, for example, would have made it possible to generate and maintain higher temperatures than could be achieved on an open domestic hearth, and could have been used for firing pottery, drying grain or working metal. The evidence for any of these activities is scant: the few stone tools were not diagnostic. The presence of clay over the floor of Cell G and the recovery of a block of steatite, a material used as temper in all of the sherds within the Tangwick assemblage, may point to some form of clay preparation; although there were no indications that firing actually took place on site.

The absence of bone and the negligible amounts of grain and plant material recovered at Tangwick do not do much to advance the cooking hypothesis. The pot assemblage, however, provides some stronger leads. Two types of vessels were identified: storage and serving vessels. The presence of serving vessels, including several which were decorated, would suggest that food was being consumed on site, and by extension, that food was being prepared on site. That cooking was carried out within the tank is suggested by the condition of the pottery, with over half of the vessels showing damage consistent with being immersed in hot water. It may be that the 'top oven' compartment was used to contain these vessels.

Since the Tangwick site would not appear to be closely associated with a settlement, it could be assumed that the activities which were carried out, in particular cooking, were not of an everyday or domestic nature. This is reinforced by the fact that houses of this period, in which cooking would also have taken place, are not found to be surrounded by heaps of burnt stone. Furthermore, the scarcity of stone tools from the site, in contrast to their abundance on houses of this period, would suggest that, although it was used over a long duration, it was not in constant use. It cannot be argued that the provision of a special cooking place was a functional response on the part of an aceramic population, or one which did not have access to pottery of a quality which could be used for cooking, since pottery of an adequate standard was found at the site, and, indeed, appears to have been used in conjunction with the tank. Thus, it would appear the cooking activities carried out at Tangwick were not of the everyday kind and that they only occurred on an occasional basis. Could this 'special' kind of cooking have been carried out in the context of seasonal feasting? It can be imagined that there would have been opportunities for such feasting when seasonal food surpluses were available, following the harvest, perhaps or when stock was culled. The occasional stranding of marine mammals or abundance of wild fowl may also have provided food for a feast, as well as a myriad of by-products. It may be that surplus foods were also processed for preservation; offal, for example, would have had to be consumed quickly or made into pudding or haggis. Unless the butchering was actually carried out on site, such preparations would be unlikely to leave any trace.

GENERAL DISCUSSION

BURNT MOUND STUDIES

The term 'burnt mound' has been used to classify all sites where the most visible element consists of a mound of fire-shattered stones. These sites have a wide, although localized, distribution throughout the British Isles and in parts of Europe and Scandinavia (Larsson 1990, 142–53; Thrane 1995, 152–4). They are generally accepted as a recognizable, relatively homogenous site type. The majority of those sites which have been dated are broadly of the Bronze Age period, although some medieval examples are also known, and the use of similar hot-stone technology is attested around the world in various forms up to recent times.

Traditionally interpreted as the temporary cooking places of hunters or warriors, in recent years there has been some debate as to the exact function of these sites. The most popular hypothesis to emerge so far is that they were the locus of a simple domestic process, with cooking being the favoured option. Several experiments have successfully demonstrated that it is possible to boil joints of meat in a trough using roasted stones to heat the water (O'Kelly 1954; Fahy 1960; O'Drisceoil 1988; Allen 1994); moreover, the resulting burnt stone and ash is comparable to the debris found in burnt mounds. This not only illustrated the processes which may have been responsible for the formation of such sites, but, in demonstrating that very little preparation or equipment was required, also reinforced their interpretation as *ad hoc* cooking places.

When it was recognized that some prehistoric burnt mounds were associated with structures, one interpretation was that they were no more than temporary shelters, while others argued that they represented permanent settlements. This dichotomy in opinion is neatly illustrated in two different reconstruction drawings of a burnt mound site at Liddle in Orkney, where the structure is variously shown both as an open-air cooking place (Ritchie 1995, 95) and as a house (Armit 1997, 39). The latter hypothesis was developed to propose that all burnt mounds were Bronze Age houses, on the basis that they were relatively abundant while few other types of settlement could be attributed to this period.

The lack of artefactual or faunal evidence led some commentators to argue that burnt mounds functioned as saunas or sweat lodges (Barfield & Hodder 1987). The problems with this hypothesis have been dealt with elsewhere (Ó Drisceoil 1988); although most commentators concur that the hot water generated at burnt mounds could have been put to a number of subsidiary uses, after it had been used for cooking.

In Scotland, burnt mounds have been recognized for over a century, however they have received relatively scant attention until recent times: Liddle and Beaquoy were the first sites to be extensively excavated and dated (Hedges 1977). While subsequent fieldwork has identified many previously unrecorded sites, the number of excavated burnt mound sites remains a tiny fraction of the total. It has been stated that 'Burnt mounds are, individually, among the most boring sites with which a field archaeologist must deal' (Barber & Russell-White 1990). They are frequently considered to be more informative in terms of what they can reveal about settlement patterns generally rather than as individual sites, and work has been largely directed towards the collection of data for statistical analyses.

SHETLAND BURNT MOUNDS

The sample of burnt mounds examined during this survey was limited and specifically focused on sites considered vulnerable to coastal erosion; however, the work provided an opportunity to look in depth at a single site type and generally assess its nature and diversity. These observations

are supplemented by insights gained during several seasons of coastal zone assessment survey in Shetland and Orkney.

Shetland burnt mounds display a wide variety of forms and sizes; the most common forms observed were crescentic, mounded/conical and linear. There does not appear to be a clear correlation between the volume of a mound and what shape it takes, nor is any clear structural development evident from one form to another. Most are well defined, discrete constructions rather than haphazard dumps, although the potential area which they could have occupied is unlikely to have been tightly restricted. The presence of retaining kerbs, as seen at Tangwick, Bight of the Sandy Geos (above) and at Kebister (Lowe 1990, 86) further indicates that a degree of forethought was involved in the construction and management of burnt mounds. This implies that the shape and size of a mound was significant to the people who built them; one effect of concentrating the debris within a limited area was to increase the height of the mound. They would have been strong visual symbols within the landscape, as many remain today. Crescentic mounds have been thought simply to represent a discard pattern, resulting from the disposal of waste stone from a central working area to a peripheral midden. More than merely being an effect of disposal, it may be that deposits were deliberately built up in such a way as to form encircling rubble bank, providing shelter to a working area. Such protection would have helped to reduce heat loss from wind chill and would have been particularly beneficial in windy Shetland. Mounded/conical forms would not appear to afford shelter to a working area nor would they lend themselves so readily to the incorporation of structures into their fabric. This may not preclude the future discovery of structures in association with this mound form; indeed there is some suggestion of a structure associated with such a mound at Brouster (above). Linear mounds or composite mounds with linear extensions may reflect a discard pattern which respected or was restricted by boundaries or fence lines, which in most cases will have disappeared. An association between burnt mounds and field walls was noted at Tougs, West Burra (Hedges 1986), and Griesta, Tingwall (unpublished, results summarized in Hedges 1986). Two further examples of burnt mounds in direct association with remnant field banks were observed during the survey at Smora Stanes and Heglibister (above).

Structures have occasionally been found in close association with burnt mounds. From the few dates available, it is not presently possible to chart any chronological progression. At one end of the scale are structures such as the putative shelter found at Kebister (Turner 1998a, 56; Owen & Lowe 1999, 35–7) or simple stone constructions such as that indicated at Lambhoga (above). These are comparable to sites known elsewhere in Britain and Ireland, such as Ballyvourney I, County Cork (O’Kelly 1954), and Carne, Fishguard (Williams 1990, 132). At the other end of the scale are the more complex stone buildings found in Shetland at Tangwick, Tougs (Hedges 1986), Ness of Sound (Small 1972; Turner 1998a, fig 35) and Cruester (above), and in Orkney at Liddle (Hedges 1977).

The requirements of stone, water and fuel (peat) are widely available throughout Shetland and thus unlikely to have placed a major restraint on where burnt mounds could be located. A recent project carried out in South Nesting, however, indicated that the burnt mounds in this area were located within settled prehistoric landscapes, alongside field systems and houses (Dockrill *et al* 1998). A survey in Shetland has shown that the majority of burnt mounds and most of the houses within the sample group were situated less than 50 m above sea level and were generally sited on the better-quality land (Canter 1998, 54). It is notable, however, that many of the sites observed by the present authors were located in areas which are marginal in local terms; the burnt mounds at Houlls, Cruester and Tangwick, for example, are built over peat deposits. By implication, Canter and Dockrill *et al* assume some contemporaneity between burnt mounds and

houses and field systems. This was not conclusively demonstrated, however, and further field work will be required to clarify the situation. In general, however, it would appear that there is some correlation between burnt mounds and settled areas, although the burnt mounds are frequently sited at some remove from houses.

BURNT MOUNDS REASSESSED IN THE LIGHT OF WORK IN SHETLAND

Shetland burnt mound sites exhibit a degree of variation which cannot be neatly accommodated within any single explanation; nor have attempts to chart a chronological development been entirely successful. Each of the models put forward by previous authors may hold true for a proportion of sites, but none accounts for all site types. It may be that regional variation accounts for some of the differences, such as the greater number of sites with associated structures found in the Northern Isles, but even here there would appear to be several types of burnt mound being used contemporaneously. Excavation at Tangwick, in particular, and survey in Shetland, in general, together with a review of other excavated sites in the Northern Isles, indicates a wealth of variation, offering much potential for future analysis.

In the context of the Northern Isles, it is difficult to apply the interpretation of burnt mounds as the temporary cooking places of hunters, as first proposed by O'Kelly (1954) in an Irish context. The opportunities for wild game hunting would have been limited and it is unlikely, therefore, that all burnt mounds can have served only as hunting camps. Furthermore, there would appear to be a correlation between burnt mounds and settled areas, whereas hunting camps could be expected to be more numerous in uninhabited, wild areas.

The suggestion that burnt mounds may in themselves constitute settlements is based largely on the interpretation of the structure found at Liddle (Hedges 1977; Barber 1990). In reassessing Liddle, however, Ovrevik (1985, 147–8) argued convincingly that this structure was too small and confined to have been a house and suggested, alternatively, that it may have been a communal cookhouse. At Toug in Shetland, a small structure found in association with a burnt mound was interpreted as a shelter (Hedges 1984, 47). To date, not one of the structures found in immediate association with burnt mounds can readily be interpreted only as houses. The findings at Tangwick not only strengthen this position, but, more than this, indicate that such structures may constitute a specialized site type, possibly associated with feasting.

The Shetland evidence does not concur with the proposition that differences in form, location and association can be accounted by chronological progression (Barber 1990, 98–101). This identifies four different classes of burnt mound, progressing from isolated, crescentic mounds (Class 1), to clusters of small non-crescentic mounds, interpreted as settlements (Class 2), to structures found in close association with burnt mounds (Class 3) and finally to deposits of burnt stone found in association with settlements (Class 4). Within this scheme, Class 1 sites are interpreted as hunting camps while the burnt stone deposits at Classes 2 to 4 are defined as refuse from domestic cooking, close to or inside settlements.

There are several problems with this hypothesis. Firstly, it is very unlikely that all crescentic burnt mounds in the Northern Isles are hunting camps. Furthermore there are indications that structures are present at some crescentic mounds in Shetland, such as Lambhoga (above). The excavated evidence does not support the interpretation of Class 2 sites as houses, while none of the published sites which matches the definition of Class 3 (Liddle, Toug and Tangwick) can be readily interpreted as a house.

With regard to function, Barber argues that Class 1 sites could be assumed to have had a specialized function only if they had coexisted with other classes of site, which is said not to be the

case. However, this position is contradicted by later accounts of excavated sites, where both Class 1 and Class 2/3 sites are shown to overlap during a considerable part of the Bronze Age period. This overlap is further reinforced by a set of Early Bronze Age dates from Tougs and Beaquoy (Hedges 1986, 25) which indicate the coexistence of burnt mounds with associated structures and 'isolated' crescentic mounds rather than a progression from one form to the other.

The thesis which views burnt mounds as settlements in themselves has explained the paucity of material culture and lack of features generally associated with houses as a product of economic impoverishment (Hedges 1977, 82). This is bound up with theories of a 'prehistoric recession' in northern Britain during the later Bronze Age. This argument has been facilitated by the scarcity of known examples of Bronze Age houses in places, and this has allowed burnt mounds to be used to fill the gap in the record. In Shetland, however, burnt mounds, settlements, burial monuments and field systems of contemporary date frequently survive relatively unscathed within their landscapes. This means it is often possible to differentiate between burnt mounds and settlements, and in the case of burnt mounds with associated structures, to differentiate between these structures and the houses. In the case of Tangwick, it is concluded that they are not interchangeable. Moreover, if, as it appears, some burnt mounds represent specialized structures rather than temporary camps, this would argue in favour of settled communities and an ordered landscape and not, as has been sometimes suggested, a return to a semi-nomadic way of living at a time of climatic downturn.

Finally, the use of burnt mound site distribution data as an index for prehistoric settlement — whether in the sense of burnt mounds representing actual settlement or as elements associated with settlement (Hunter 1996, 57–67) — assumes that the majority of sites, which are unexcavated, can be assessed on the basis of their visible component alone. It is also frequently assumed that all burnt mounds are of Bronze Age date. The date and complexity of any individual burnt mound site cannot be determined without recourse to excavation, however, and a proportion of the excavated Scottish burnt mound sites have yielded medieval dates. In this regard, it is also instructive to consider a site such as that found at Inishkea North, County Mayo, interpreted as a dye-works of Late Iron Age/early medieval date, which, prior to excavation, would have appeared much like a burnt mound site in its composition (Henry 1952).

CONCLUSIONS

The view that burnt mounds can be seen as cooking places, either as hunting camps or as adjuncts to larger settlements, has tended to relegate their significance in the minds of many commentators. This has been reinforced by the paucity of artefacts and faunal remains generally found at these sites. The underlying attitude has been that 'the real action is happening elsewhere'. Even if it is accepted that burnt mounds were used primarily for cooking, it should be remembered that there are several contexts in which such activity may have occurred. On the basis of the findings at Tangwick, it has been proposed that some burnt mounds may have been used for communal feasting; but it should be noted that this hypothesis may not be applicable to other types of burnt mound.

Little has been said on the subject of what burnt mounds may reveal about Bronze Age society in general. The recognition that some burnt mound sites contain specialized buildings adds a further dimension to the range of known Bronze Age architectural forms. It should come as no surprise to find buildings other than dwellings, tombs or ritual monuments, at a time of growing craft specialization and technological advance.

The adoption of hot-stone technology appears to be a phenomenon of the Early Bronze Age and may be connected generally with the development of metallurgical processes and advances in ceramic manufacture, which also require the ability to control and manipulate heat. The scarcity of metal objects in Orkney and Shetland at this time, allied with the relative paucity of Beaker-type artefacts, might be interpreted as a sign that these islands were somewhat isolated from developments which were occurring widely throughout the rest of Britain and Ireland. However, the sheer abundance of burnt mounds, some of which are of Early Bronze Age date, must imply some contact with the 'outside' world. Furthermore, the skeuomorphic pottery found at Tangwick indicates a knowledge, if not possession, of metal vessels.

If feasting is seen as one function of specialized Tangwick-type sites, there is much yet to be discovered about the society in which such activity occurred. Ethnographic parallels would suggest that communal feasting acts as a mechanism for social cohesion, providing an opportunity for scattered communities, or possibly more exclusive groups among them, to come together. There is much evidence that feasting played an important part in prehistoric culture throughout Europe (Almagro-Gorbea 1995, 140–5; Gomez de Soto 1993) and that such activity may also have had religious and political contexts and thus played a symbolic part in the life of a community. In this connection, it may not be out of place to wonder if the often highly visible and sometimes strategically located burnt mounds formed a tangible display of status or wealth, much as has been suggested for extensive midden mounds in southern Britain (McOmish 1996) and the Brandopferplätzen of the Alpine Region (Gomez de Soto 1993, 192).

In practical terms, this work has been instructive in several ways: it has demonstrated that some of the apparently 'unremarkable' burnt mounds may be worthy of investigation, and that it is erroneous to downgrade all such sites simply because some excavations have not yielded much of interest. Work at Tangwick has illustrated that some sites, even those which have suffered coastal erosion, may yet offer much potential for excavation.

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