

Excavation of two Orcadian burnt mounds at Liddle and Beaquoy

by John Hedges

Burnt mounds are a distinct and enigmatic type of site; heaps, sometimes in excess of two hundred cubic metres, of little other than fire-cracked stone, ash and carbon, which are always next to water. Their unpromising nature was understandably not conducive to early enquiry but even now, although among the most common field monuments in the parts of the British Isles in which they occur, their significance seems to be underestimated. The opportunity is taken in this article not only of describing excavations at the sites of Liddle and Beaquoy, Orkney, and comparing them with other burnt mounds, but also of discussing the context of this class of site in British prehistory.

LIDDLE I BURNT MOUND, SOUTH RONALDSAY NGR ND 46468411

Liddle burnt mound, otherwise known as Isbister (RCAMS 1946, II, 834), is situated about four hundred metres NE of Liddle farmhouse on the side of a shallow, poorly drained valley with a small stream at the bottom (fig 1). On the opposite side, and formerly not noted, are the remains of another burnt mound (Liddle II), which was thought to be a cemetery because of the 'headstones' poking out of it (structural orthostats); these were removed when the land was brought back into cultivation in the early decades of this century. Orcadian burnt mounds generally are thought of little worth and most have been destroyed; Liddle I had in fact been half quarried away for road metalling by the present landowner, Mr R Simison, before he found a building which he brought to the attention of Professor Colin Renfrew and the author. Although structures had occasionally been noticed before when burnt mounds were being destroyed in Orkney and Shetland (p 62), the records are tantalisingly scant and make little sense on their own; the site of Liddle I therefore offered an opportunity for greatly increasing an understanding of this numerous class of monument. It was apparent, even before excavation, that the site could most conveniently be thought of in two parts; the structure and the burnt mound butting against it. This division has been maintained in the description of the excavation.

The burnt mound

As can be seen from fig 2 and pl 2a, the majority of the extant burnt mound lies to the SW of the structure where it attains a maximum height of nearly two metres. It appears however that, prior to quarrying, as much, if not more, burnt mound material had been to the E of the building; this had a separate prominence so that between the two deposits was a declivity leading south-eastwards from the structure. The mound seems to have been larger than any other recorded in Orkney and must have originally had a volume in excess of two hundred cubic metres.

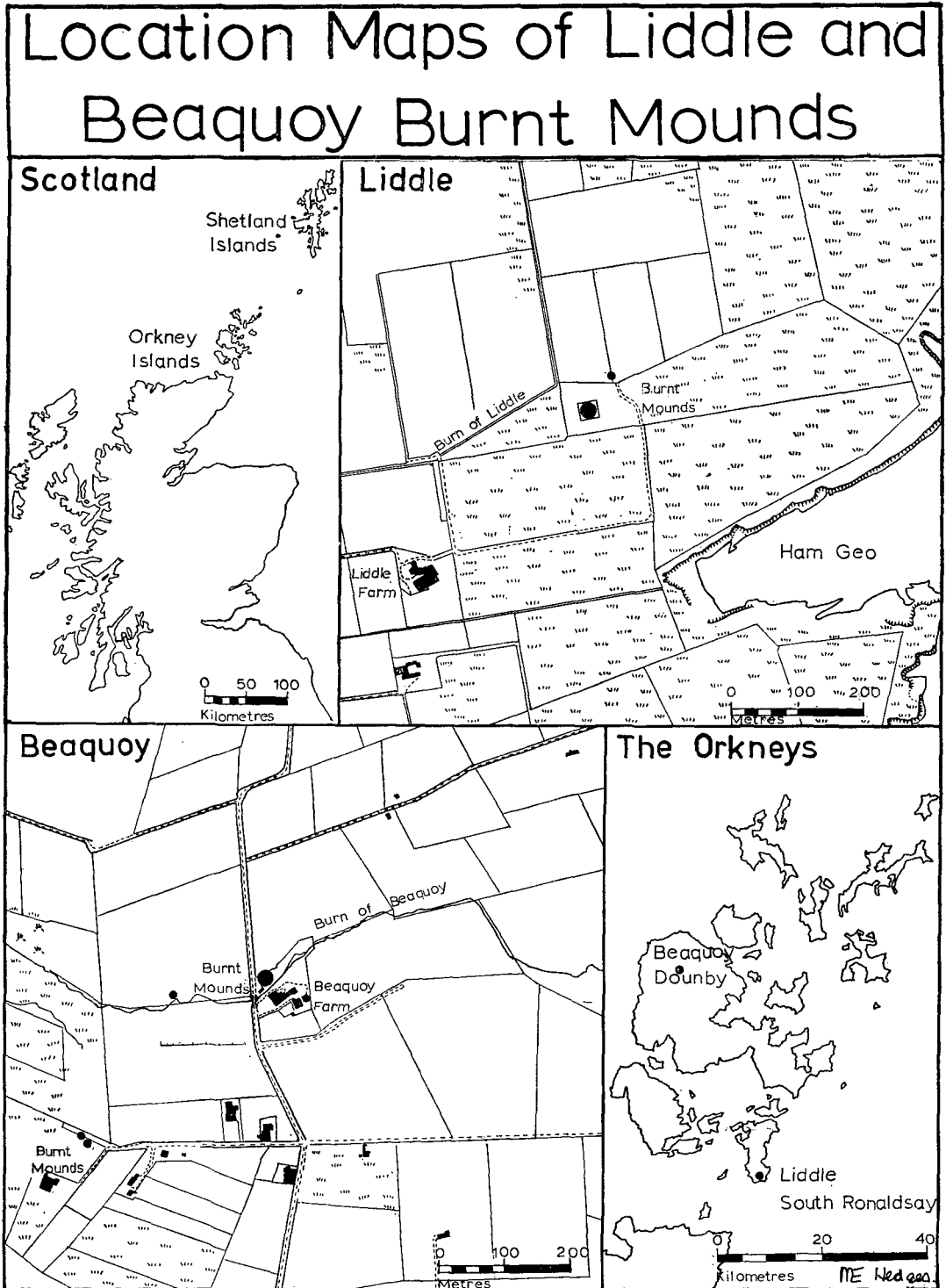
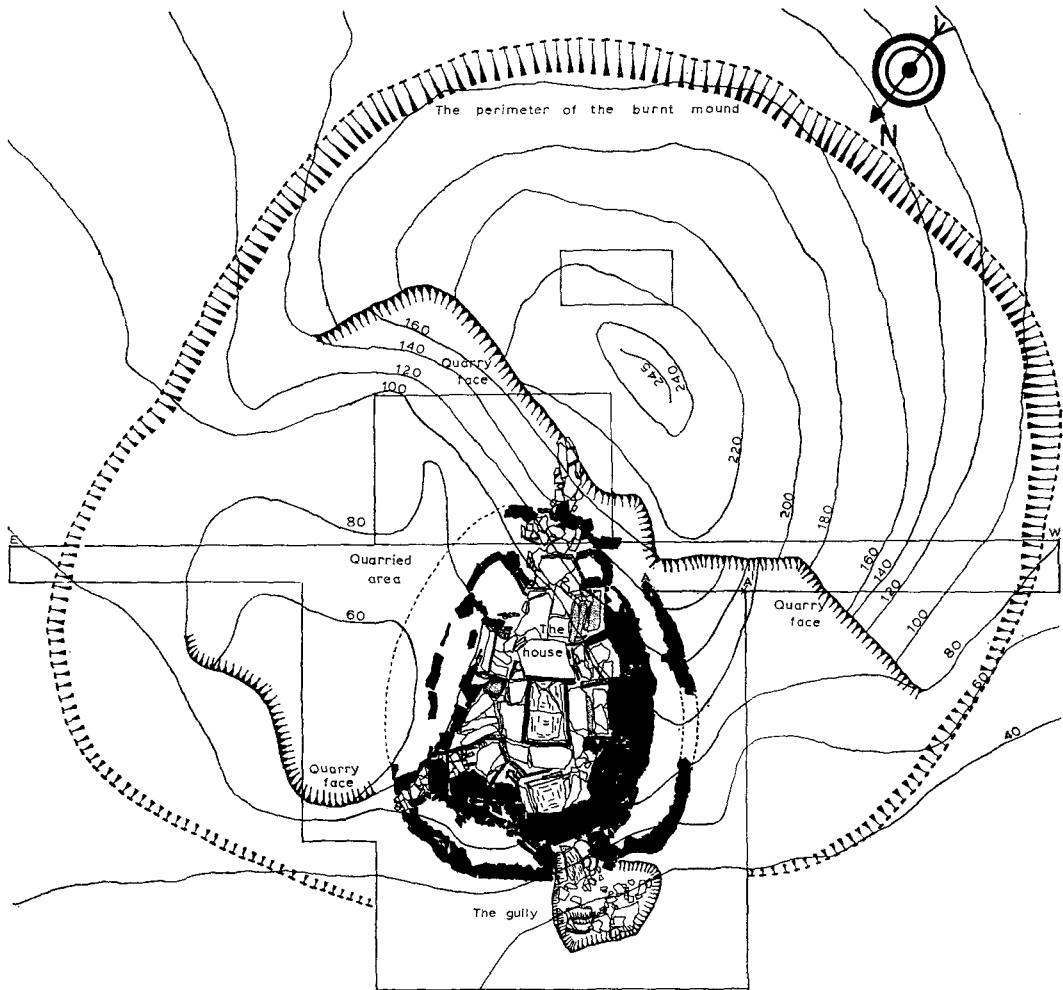


FIG 1

Site Plan of Liddle. Burnt Mound



0 1 2 3 4 5 10
Metres. Contours at 20 cm intervals.

FIG 2

Excavation of the deposit in sample areas (figs 2 and 3) showed that, as with other burnt mounds investigated, it consisted mainly of fire-affected stones, ash and carbon. The stones were shattered fragments and the occasional weathered surface indicated that at least some had been field-stones; as the local sandstone is ferruginous, the fragments had been turned a varying degree of red by the heat due to oxidisation. The ash was compact and white, pink or orange while the

carboniferous material was powdery with hard organic inclusions and contained no recognisable charcoal; it is evident that the main fuel used was peat. These components, together with occasional sterile brown soil, were found either intermixed or in homogeneous pockets, but were always seemingly deposited in small dumps so that the mound as a whole was made up of hundreds of lenses rather than distinct strata. One occasional inclusion of interest took the form of light vesicular nodules of shiny material, very reminiscent of burnt plastic, which were either off white in colour or near black. This material, cramp, has been found on many sites of different types in Orkney and Shetland in contexts which suggest it to be connected with heat (Callander 1936, 444-8), and analyses have shown it to be simply fused local soil or silt (Appendix VIII; *ibid*, 448-52); it seems likely that it is derived from the subsoil which often clings to the undersurface of the lowest peats taken from a cutting.

Very little was found in the burnt mound other than the debris of fuel and the shattered remains of stones it was probably used to heat. The complete absence of bone, as is usual, may be accounted for by the acidity of the midden as a whole, while in the case of plant remains, although flotation of samples was carried out, it proved impossible to distinguish those contemporary with the mound from ones derived from fossil fuel. Small finds were few in number, simple and restricted in range, consisting of sherds from a very few coarse pots and crude stone implements.

Although the burnt mound surrounded the building on all but the N side, it seems originally to have been purposefully dumped a few metres away from the walls. Encroachment was resisted for a while by the building of a small secondary wall which delimited a pathway around the house but eventually this too was dumped over (fig 4).

The building

The fill of the building had been disturbed to floor level in its S half and to a lesser extent elsewhere but it seems to have originally consisted of large unburnt building rubble, at least 0.30 m deep, overlying a thin grey silty layer, and in turn overlain by light brown/yellow soil which contained a large amount of burnt stone. Some of the grey layer may have been occupation material but it yielded only three small sherds, a few small twigs, some cramp and a piece of vegetable-fibre cord, and seems mostly to have been silt which had percolated through the wall stones after they had collapsed on to a rather clean floor. The whole then seems to have been covered over in time with a mixture of brown earth and redeposited burnt mound material, incorporated in which were crude stone implements similar to those found in the burnt mound itself.

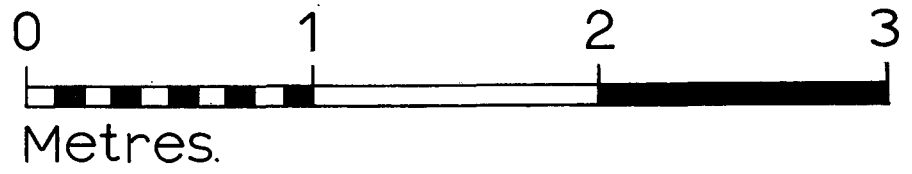
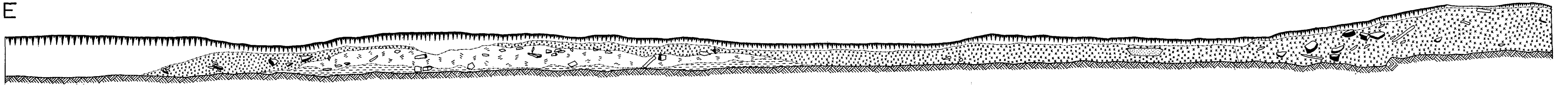
The building itself was roughly oval in plan with a maximum internal length of 6.5 m and width of 4 m (fig 5; pl 2a); most of it was built directly on the old ground surface which overlies clay but to the N part was over a very local pocket of peat (Appendix IV). For the sake of clarity the parts of the structure, together with secondary additions and alteration, will be described under separate headings.

The primary wall Although the primary wall had been levelled in the S of the building for a secondary extension (*vide infra*) and was heavily damaged in the area adjacent to the recent quarrying, it was well preserved elsewhere, particularly on the E, and it is possible to reconstruct both its course and structure with little loss of detail.

The wall was c 1.2 m broad up to a height of 0.45 m when it was constructed as two skins, the outer sometimes simply flags on edge, with a rubble core, which included burnt stones. The wall then narrowed, only the inner skin being continued with some rubble and flags piled against it, up to a maximum preserved height of 0.9 m. Some possible evidence for it once being higher is given by a stone 1.54 m in length, found lying across the floor of the building in such a position as to suggest that it once stood near the wall (p 45).

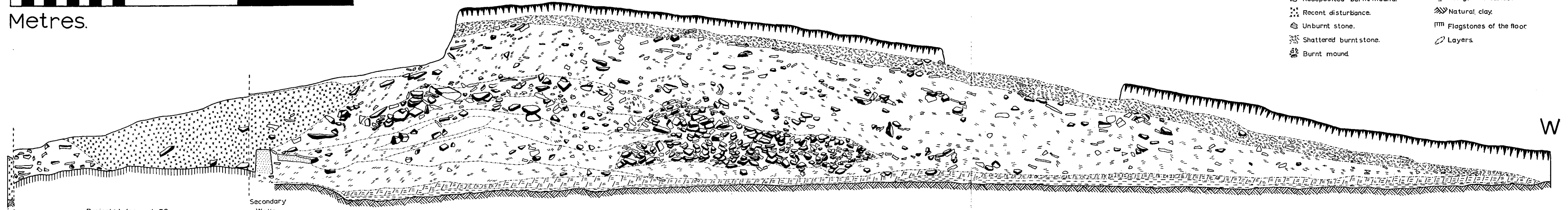
LIDDLE : Main E - W Section.

E



- KEY**
- ▼ Turf and associated soil.
 - ⊞ Redeposited burnt mound.
 - ⊞ Recent disturbance.
 - ⊞ Unburnt stone.
 - ⊞ Shattered burnt stone.
 - ⊞ Burnt mound.
 - ⊞ Top of old ground surface.
 - ⊞ Old ground surface.
 - ⊞ Natural clay.
 - ⊞ Flagstones of the floor.
 - ⊞ Layers.

Metres.



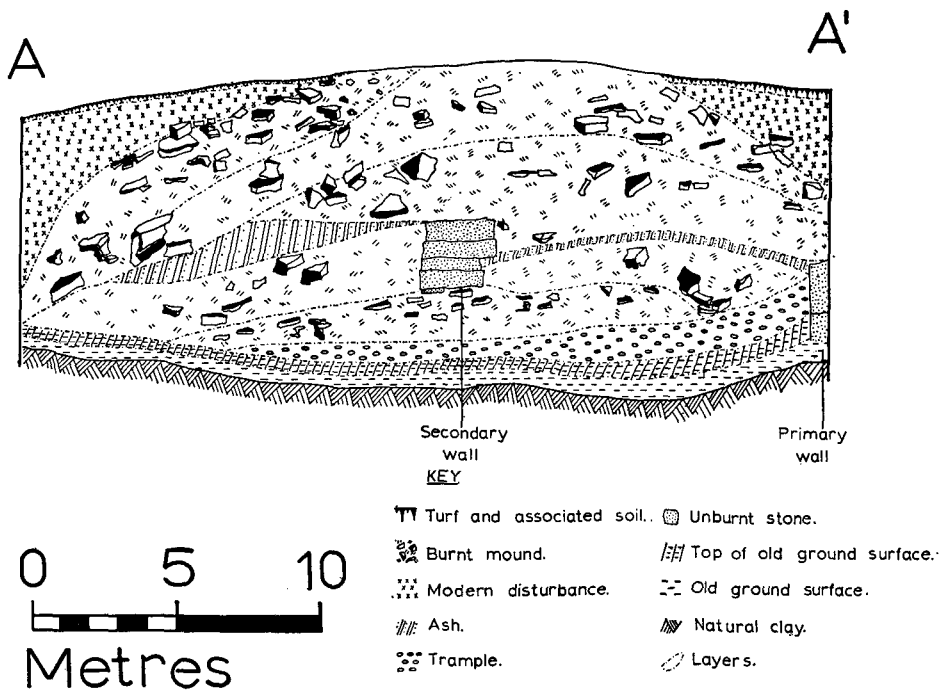
W

Projected forward 50 cms.

Secondary Walls.

FIG 3

LIDDLE: Section through Secondary Wall.



ME Hedger.

FIG 4

The flagged floor The floor of the building was roughly flagged throughout. The flagstones had not been shaped or particularly well fitted together, but some care had been exercised in their selection as they filled the spaces left between the walls and built-in furnishings tolerably well. As has been mentioned, the N part of the building was over a local deposit of peat and the floors in compartments 3 and 5 were raised with another layer of flags to counteract their sinking into the peat. The flags around the trough were also cracked through subsidence.

The hearth This feature was unfortunately very heavily disturbed by the quarrying; most of the N part being removed and the rest reduced to a maximum preserved height of 0.25 m. It appears, however, to have taken the form of a sub-rectangular cavity in the wall 1.2 m wide and 1.1 m from front to back. Its function was evident as not only were all the stones reddened on the inside but the unlined clay bottom was scorched and had over it a layer of black carboniferous debris 5 cm thick, in turn covered with brick red peat ash which was banked around the edge to a depth of 15 cm. There appears to have been at least one more lens both of carbon and ash on top of these, but the extent of the disturbance makes further comment impossible. Thorough cleaning of the hearth had caused a noticeable depression in the natural clay bottom.

The trough Set centrally in the floor of the N end of the building was a trough of monumental construction and proportions (pl 2b). Although floored by three flagstones, the sides were made by single stones, 10 cm thick, forming a cist-like arrangement 0.6 m deep, 1.6 m long on the inside and with an average width of 1 m. From the subsidence of the neighbouring floor it can be seen that the trough was set in an oversized hole which was then backfilled around it. The flagstones forming the bottom of the trough underlie the sides and must have been laid first.

When found, the upper part of the trough was filled with large unburnt building rubble similar to that which had fallen on the floor elsewhere. Below this was a deposit, varying from 0.25 m to 0.4 m in thickness, consisting of nothing but burnt stone at the base of which was about 1 cm of sterile grey silt. Under this was the floor of the trough covered with a layer of packed black vegetable material 1 cm thick, consisting mainly of heather roots, but also containing macroscopic remains from nettles, crowberries, rushes and grasses (Appendix V). As such preservation would suggest, the trough was watertight, although originally it would have had to be manually filled (and emptied).

The flag-lined gully Set in the floor in the N apse of the building was what appeared at first sight to be a cist-like structure not dissimilar from the trough described. It was trapezoid in plan, 1.36 m by 0.9 m and 0.85 m deep; the bottom was unlined and three of the sides were formed by slanting flagstones, the fourth being the wall itself. The feature and the surrounding floor-level were overlain with redeposited burnt mound material but the structure itself was devoid of any fill, other than water, except for a 7 cm thick deposit at the bottom which consisted of grey silt containing numerous flecks of burnt stone and small pebbles.

Further excavation showed this to be part of a larger feature which may be described as a flag-lined gully leading to a floored hollow, which had been cut in the peat to the north of the building. The part of the gully beyond the building was 1 m long and 0.3 m deep; the sides sloped to give a width of 1.1 m at the top and 0.4 m at the bottom. The hollow was approximately 3 m by 1.8 m and had a maximum depth of 0.4 m, having been dug to the bottom of the peat.

Trampled burnt mound material like that overlying the surrounding peat was found on the sides of the flag-lined gully and hollow but other than that the feature only contained peat formed subsequent to the building of the site, except nearest the building where there was a deposit of silt.

The entrances The original entrance to the building, 0.7 m wide and set to the NE, was

LIDDLE I : The Building.

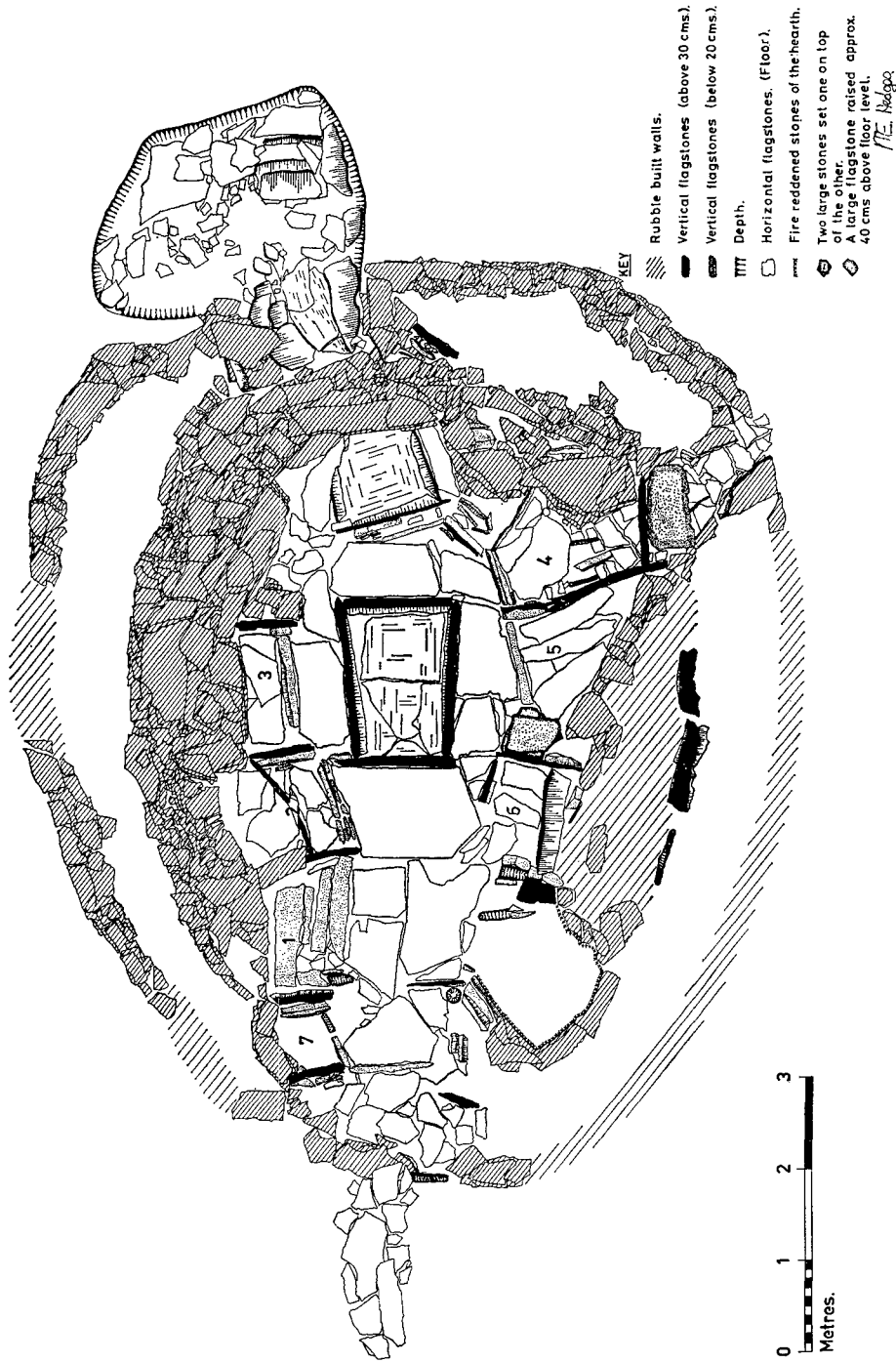


FIG 5

secondarily blocked by a drain (see compartment 4 below) when another was made to the S. This involved the demolition of the primary wall at that point and consisted of a gap 0.8 m wide, on the inside of where the wall had been, flanked by two upright slabs, one of which was 0.95 m high. Two post-holes, both only 10 cm deep, may have been connected with a wooden super-structure for the door.

The area where the wall had been was made into a flagged vestibule, 0.85 m across, with a small side compartment (compartment 7) on the outside of which was an entrance 0.8 m wide with a sillstone 15 cm high flanked by flagstones of similar size to the inner ones. Meeting this was the pathway over the mound discussed below.

The compartments Radiating from the walls of the building were flagstones up to 0.95 m in height which had been set in slots in the natural and made firm by chocking stones; these defined areas may be best called compartments. To facilitate description these have been numbered 1–7 on the general plan (fig 5).

Compartment 1 was 1.2 m by 0.8 m and had, lying within it, four long stones which formed a platform 15 cm above the floor. Compartment 2 was 1.1 m by 1.2 m, divided longitudinally by a flagstone 22 cm high. This had been broken by the fall of the large stone mentioned above. Compartment 3 was 1.3 m by 0.42 m and had a flagstone, which projected 6 cm from the floor level, defining its inner side. In the wall at the N end of this compartment was a triangular cavity 20 cm long, 15 cm high and 16 cm deep.

Compartment 4, which was trapezoid in plan, 1 m wide and deep, was defined on the inside in a similar fashion to compartment 3. The entrance to the building had originally been at the back of this compartment; when one was made elsewhere a drain was let into the floor and the gap above it blocked. The drain, which could be traced for 1 m outside the building, was rectangular in section, being a line of horizontal flagstones overlain by two parallel courses of rubble with a gap between them, which were in turn capped with flagstones; internally it was approximately 20 cm across and 12 cm deep. The blocking above this was evidently not just designed to fill a gap for the stones flanking the drain were built upon to a height of 20 cm, and on this was set vertically a flagstone 0.5 m high with a semicircular notch 15 cm in diameter at its base, thus creating a hole 25 cm high and 15 cm across connecting with the outside.

Compartment 5 was triangular in shape with a length and maximum depth of 1.40 m; like compartments 3 and 4, a thin flagstone set on edge defined the inside. Flagstones had been laid over the original floor to compensate for subsidence into the peat below. Two large stones had been placed on top of each other in the S angle of the compartment to form a flat-topped pillar 0.32 m wide, 0.5 m long and 0.5 m high.

Compartment 6 was a cist-like arrangement, 1 m by 0.7 m and 0.5 m high, open towards the hearth. On excavation it was found to be full of burnt and unburnt stones resting on a layer of ash.

Compartment 7 was an unfloored rectangular area, 0.7 m by 0.6 m, in the W part of the vestibule of the secondary entrance. Its sides were formed by two of the uprights flanking the inner and outer doorways and its back by a rubble-built secondary wall with a preserved maximum height of 0.3 m; a slot on the inside suggests that there had been a thin flagstone on edge as with some other compartments.

The circumambient walk As has been mentioned, an attempt was made to restrict the encroachment of the burnt mound material by building a flimsy wall with a maximum height of 0.35 m completely around the structure on top of such debris as had accumulated. It seems that for a time at least this served as a walking area and that midden was thrown outside of it (fig 4).

The path over the mound Although most of it had been destroyed by quarrying, 3 m of a

flagged path 0.7 m wide was uncovered leading from the secondary entrance over the mound; it is likely that this had continued along the declivity mentioned. As some of the stones overlay the secondary wall around the building, it must have been of a later phase.

The finds

Objects of sandstone

- LF1 An ard-share from the burnt mound (fig 6).
 LF7 A hammerstone from the fill of part of the flag-lined gully inside the house. Length 11.5 cm, breadth 10 cm, thickness 3 cm.
 LF9 A hammerstone found among the burnt stones in the trough (fig 6).
 LF10 A hammerstone found among the building rubble covering the floor of the house. Length 16 cm, breadth 6 cm, thickness 5 cm.
 LF11 A fragmentary hammerstone from the burnt mound. Length 14.5 cm, breadth 4.5 cm, preserved thickness 2.5 cm.
 LF12 A hammerstone found among the building rubble covering the floor of the house. Length 13 cm, breadth 7.5 cm, width 6.5 cm.
 LF14 Unstratified hammerstone bearing possibly recent scratches. Length 13 cm, breadth 6.5 cm, thickness 4 cm.
 LF15 As above. Length 13 cm, width 9.5 cm, thickness 4 cm.
 LF16 A small hammerstone from the fill of the house. Length 5 cm, breadth 3.5 cm, thickness 2 cm.
 LF19 A small scratched hammerstone found in topsoil. Length 8.5 cm, width 3.3 cm, thickness 2.7 cm.
 LF20 Unstratified fragment of a shattered hammerstone. Preserved length 8 cm, breadth 7.5 cm, preserved thickness 3.5 cm.
 LF27 A scratched hammerstone found in topsoil. Length 11.5 cm, breadth 10 cm, thickness 3.5 cm.
 LF28 An unstratified hammerstone. Length 4.5 cm, width 7 cm, thickness 6.5 cm.
 LF29 Another unstratified hammerstone. Length 10.5 cm, breadth 7.5 cm, thickness 2.5 cm.
 LF32 A hammerstone found in the fill of the house (fig 7).
 LF33 A hammerstone found in the burnt mound (fig 7).
 LF34 A fragment of a hammerstone found in the topsoil; the scratches on it are probably recent. Length 9.5 cm, breadth 7 cm, thickness 2.2 cm.
 LF37 A hammerstone from the peat filling the 'soakaway' to the N of the house. Length 8.2 cm, breadth 7.5 cm, thickness 4 cm.
 LF38 A hammerstone found in the burnt mound (fig 6).
 LF42 As above (fig 6).
 LF109 Unstratified fragment of a pounder. Preserved length 10.5 cm, breadth 8.5 cm, thickness 2.5 cm.
 LF110 A fragment of a hammerstone from the burnt mound (fig 7).
 LF111 A flake from a hammerstone or a crude knife/scrapper found in the burnt mound. Length 10 cm, breadth 9 cm, thickness 1.5 cm.
 LF115 An unstratified hammerstone (fig 7).
 LF108 A pot-lid from the burnt mound (fig 8).
 LF113 Fragment of a large perforated flag found in the peat below the trampled burnt mound material to the N of the building; it may have been a slate or a cow-tether (fig 8).
 LF112 A pebble possibly kept for a slingstone from burnt mound material (fig 7).
 LF114 Another possible slingstone; from the trampled burnt mound material to the N of the building (fig 7).
 A large number of pebbles similar to 112 and 114 were found in the course of the excavation.
 LF18 An irregularly shaped piece of thin stone with a central perforation (fig 8).

Objects of flint

- LF31 Light brown/yellow fragment with cortex, found in topsoil. Length 0.9 cm, breadth 0.8 cm, thickness 0.5 cm.

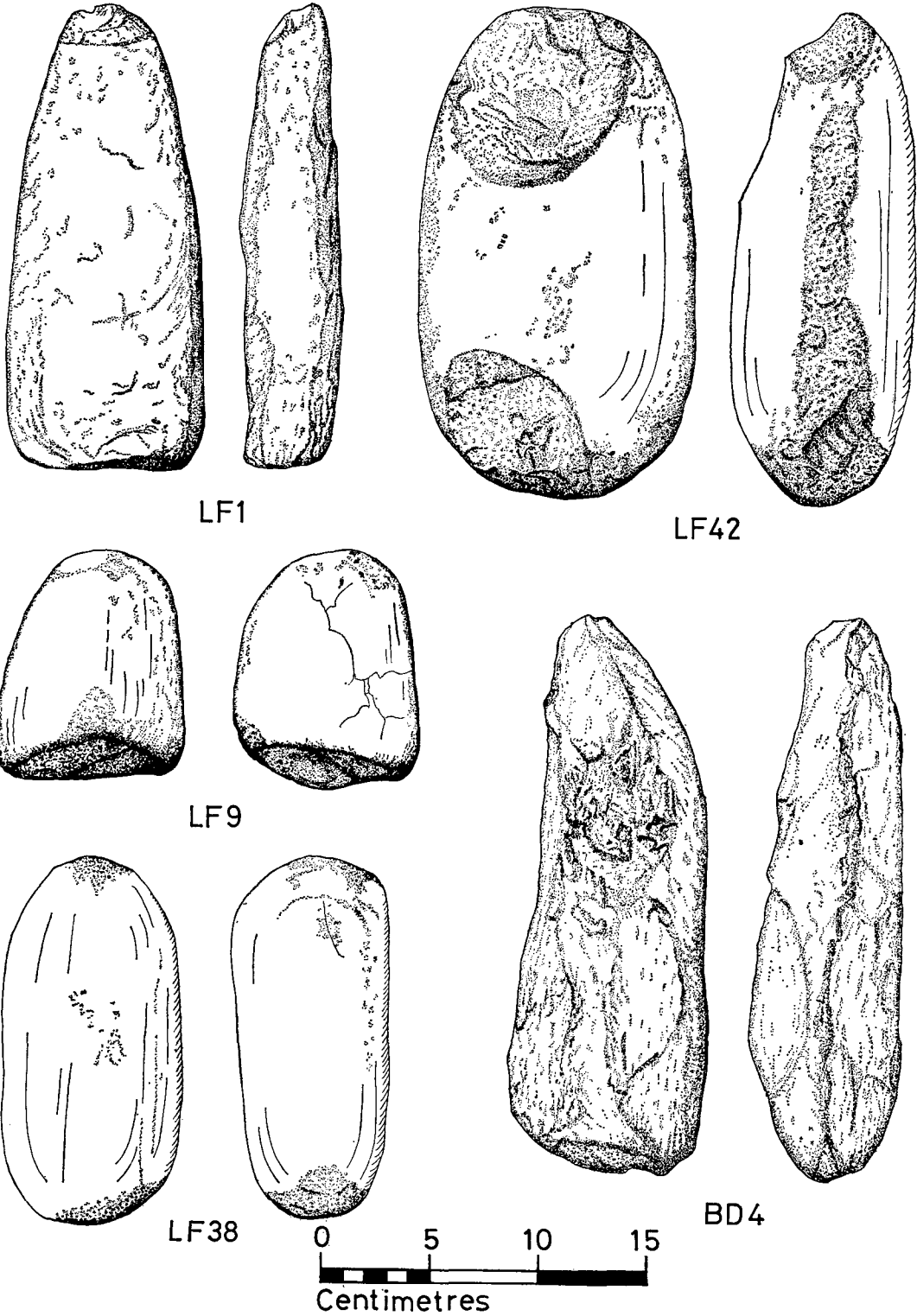


FIG 6 Ard-shares and hammerstones

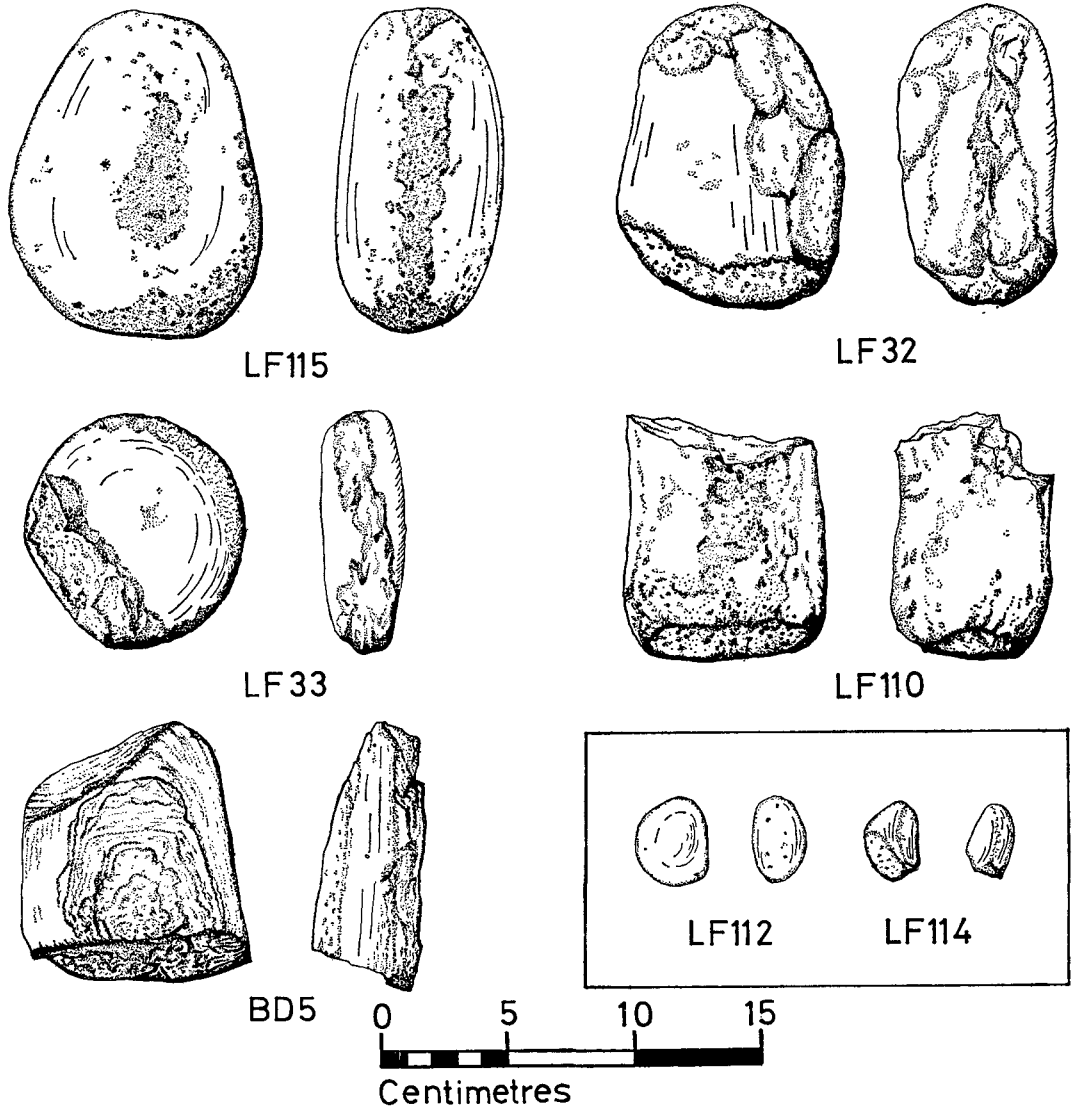


FIG 7 Hammerstones, possible slingstones and an ard-share

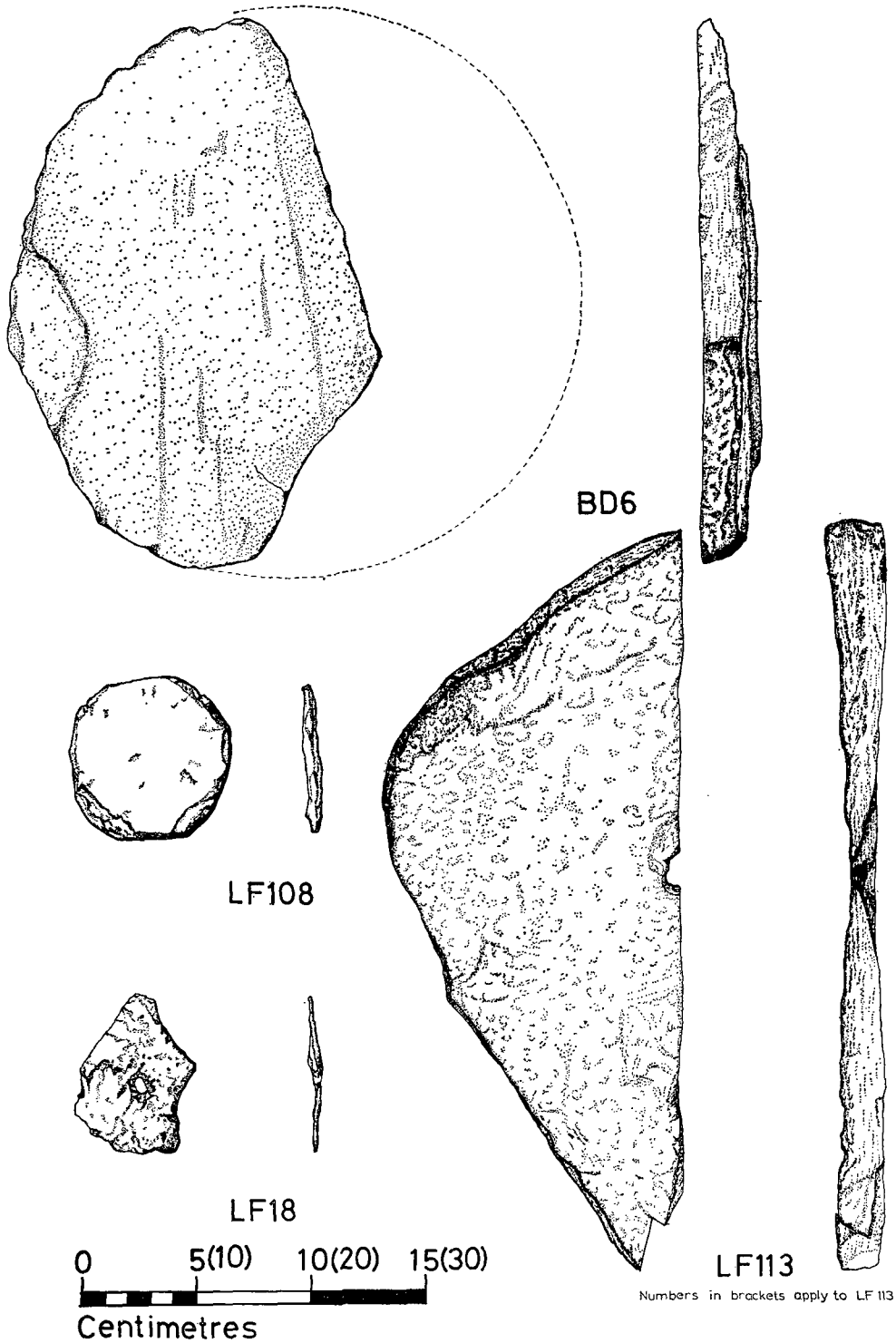


FIG 8 Pot-lids and perforated stones

Pottery

LF35, 40, 41 Sherds of a bucket-shaped, flat-rimmed pot (fig 9); found in an unstratified context. Although the fabric is fairly well fired, the surface is unsmoothed. The inside is black as is the outside to a distance of 1 cm from the rim when it becomes light brown in colour. Tempering includes ground burnt stone. LF41 and part of LF35 were destroyed in the course of thermoluminescence dating (Appendix II).

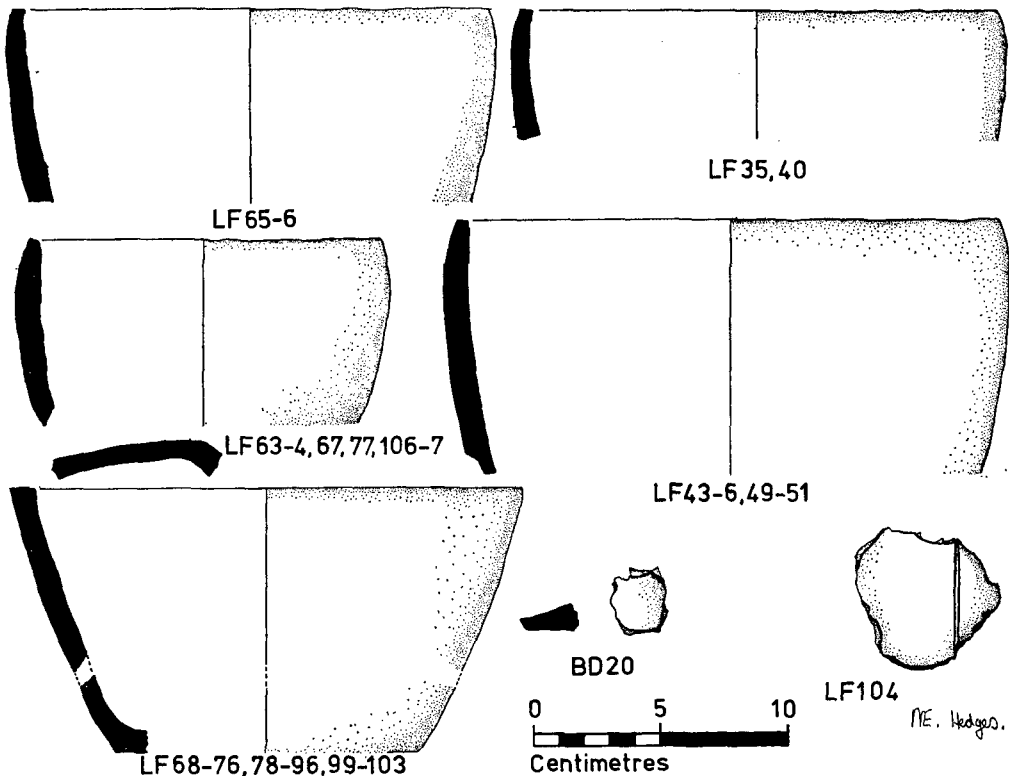


FIG 9 Pottery

- LF63, 64, 67, 77, 106, 107 Sherds of a pot very similar in shape to the above but smaller (fig 9); found in the burnt mound. The fabric is comparably hard but has a vesicular surface. Both inside and outside surfaces are light brown in colour and the clay has been tempered with ground burnt stone.
- LF68-76, 78-103 Sherds which probably all belonged to an asymmetrical flat-rimmed pot with a flat base (fig 9); found in the burnt mound. The pottery is relatively poorly fired and many pieces lack their outer surface. Both inside and outside surfaces are black and vesicular and the clay has been tempered with ground burnt stone.
- LF43-62 Sherds belonging to a bucket-shaped, flat-rimmed pot (fig 9); found in the burnt mound. The fabric is well fired near the rim but less so in the body; the surfaces are slightly vesicular. The colour of the inside of the pot is black as is the outside to a distance of 5 cm from the rim when it becomes pink. Tempering includes ground burnt stone.
- LF65, 66 Two sherds from a flat-rimmed pot (fig 9); found in the burnt mound. The fabric is much more highly fired and smoother than any of the other sherds and is not at all vesicular. The inner surface is pink/brown while the outer has areas of cream, brown and pink. Burnt stone has been used for tempering but there are also very small micaceous, or at least reflective, particles which may have been contained in the clay.

- LF22 A body sherd found in occupation debris in the house. Length 5 cm, breadth 4.5 cm, thickness 1 cm. The fabric is hard but unsmoothed and both sides are pink; ground burnt stone has been used as tempering. Half destroyed through thermoluminescence dating (Appendix II).
- LF105 A body sherd from the burnt mound. Length 4.5 cm, breadth 4 cm, thickness 1 cm. Hard, unsmoothed fabric, brown on both surfaces and containing crushed burnt stone as temper.
- LF36 Unstratified sherd. Length 4 cm, breadth 3 cm, thickness 1 cm. Hard unsmoothed fabric, black on the outside and pink on the inside, tempered with burnt stone.
- LF104 A body sherd from the burnt mound bearing an incised line which may have been part of a larger design (fig 9). The fabric is well fired and smoother than usual and is only slightly vesicular. The outside of the sherd is pink and the inside greyish; burnt stone has been used as tempering.
- LF26 Two small sherds from the same vessel found in occupational debris in the house. Length 2 cm, breadth 1.5 cm surviving thickness 0.8 cm; length 1.5 cm, breadth 1.5 cm, thickness 0.8 cm. The fabric is poorly fired and in both cases the outside surface is missing. The brown inner surface bears a black encrustation and the clay has been tempered with ground burnt stone.

Cord

- LF21 A piece of cord made from two grass? stems twisted together; from the occupational debris in the house. The length remaining is 5 cm and the total diameter seems to have been twisted in a 'Z' direction before being plied in an 'S'.

BEAQUOY BURNT MOUND, NEAR DOUNBY MAINLAND NGR HY 30102198

Beaquoey burnt mound was situated in a triangular piece of waste ground on the opposite side of a small stream to the general complex of farm buildings (figs 1 and 10). Considering its rural setting, it and the surrounding topography had suffered from an amazing number of factors. On the one side former damming of the stream had not only caused the course of the latter to alter but was responsible for scattered heaps of waste earth; on a second side was a farm track and adjacent road, which had occasioned much shifting of soil when re-routed this century; while the third was a ploughed field; the main part of the mound itself had been levelled in the 19th century for the erection of two sheds, one of which still stands and was recently extended. In view of plans to level the site totally in order to take part of it into the adjacent field and build on the rest, it was decided to investigate what remained.

The burnt mound

As the margins of the mound were so affected, it proved impossible to say anything about its extent of size other than that it had bordered the stream. It turned out in fact to be two mounds in the sense that it was associated with two buildings which were probably occupied sequentially. One of the buildings rested on the old ground surface and was probably primary; some, at least, of the rubbish from this was thrown to the E where later a second house was built. The mound sealed a natural stream bed (K Tasker, pers comm) (fig 10) in which were found the majority of the flint artefacts, including a barbed and tanged arrowhead, and cetacean and red deer bones (Appendix VI). The actual composition of the mound was identical to that at Liddle and requires no further comment (figs 11 and 12).

The primary building (Beaquoey I)

The primary building had all but been destroyed during the construction of the extant shed and its extension, being not only levelled but bisected by one of the walls. Excavation both inside

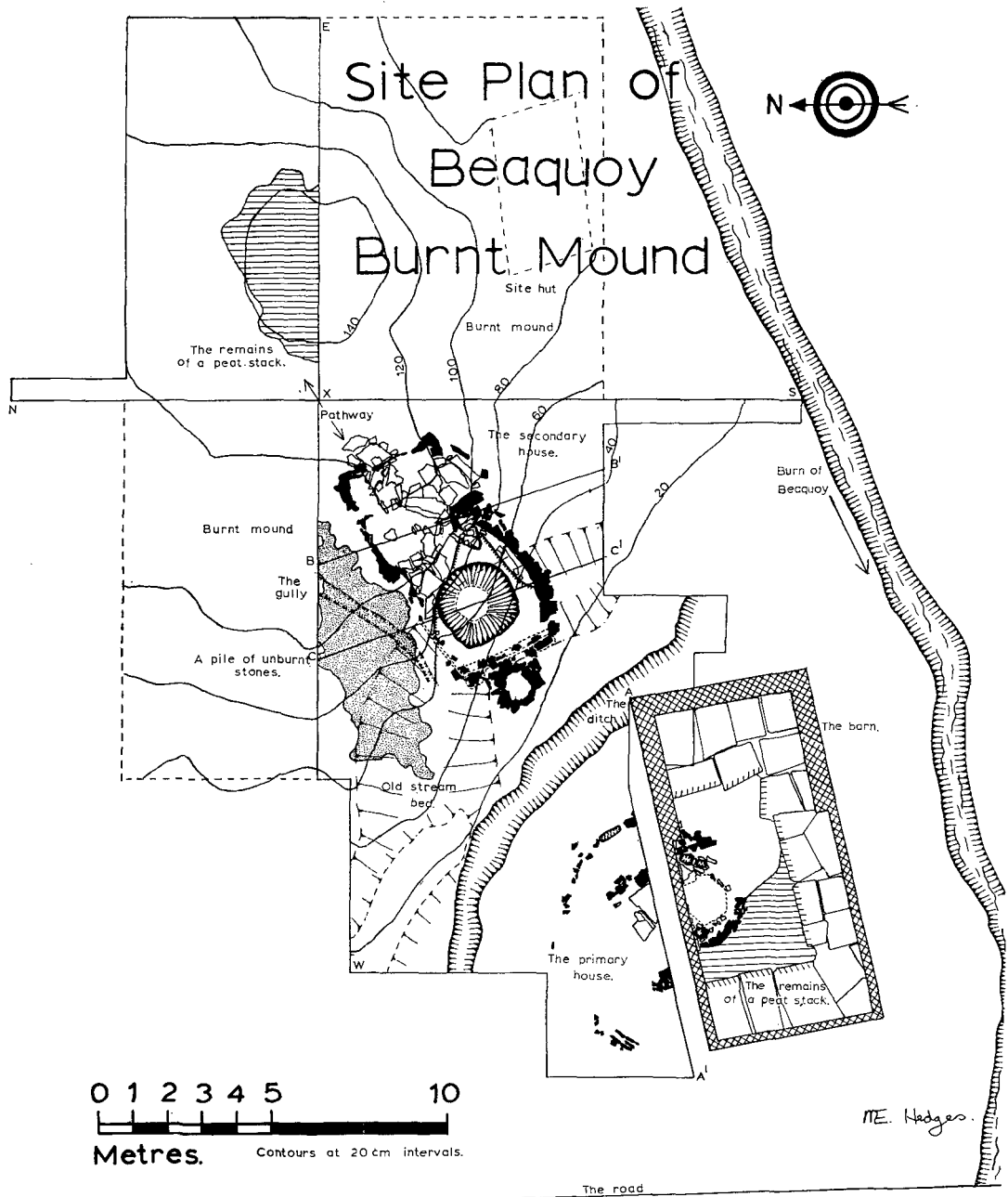


FIG 10

BEAQUOY: Main E-W Section.

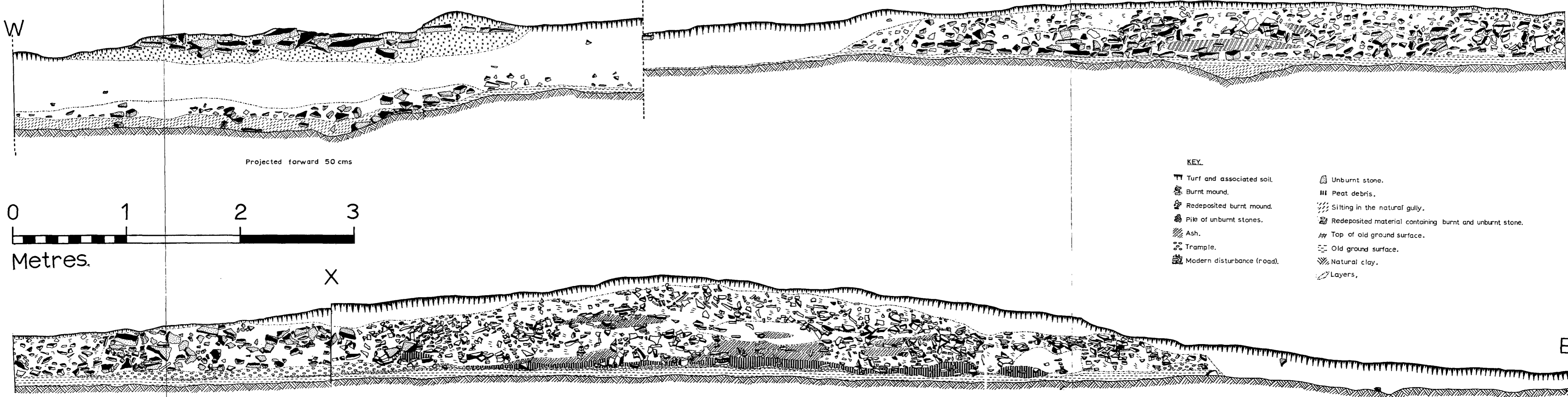
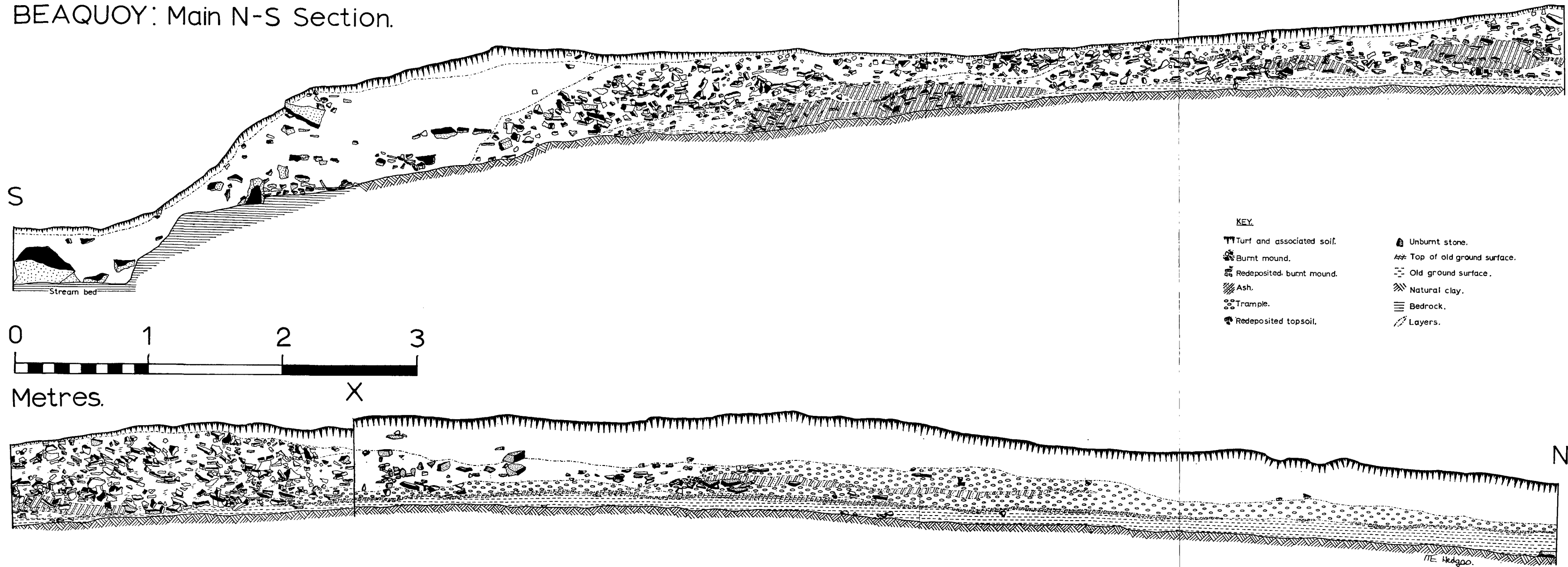


FIG 12

BEAQUOY: Main N-S Section.



- KEY.
- Turf and associated soil.
 - Burnt mound.
 - Redeposited, burnt mound.
 - Ash.
 - Trample.
 - Redeposited topsoil.
 - Unburnt stone.
 - Top of old ground surface.
 - Old ground surface.
 - Natural clay.
 - Bedrock.
 - Layers.

FIG 11

and outside of the shed revealed the remains of a building which was possibly subrectangular in outline, 2.6 m by c 4.5 m (fig 13), the features of which are described below. Hardly any of the house fill remained (fig 14) but such as there was proved to be redeposited burnt mound material devoid of any finds.

BEAQUOY: The Primary Building.

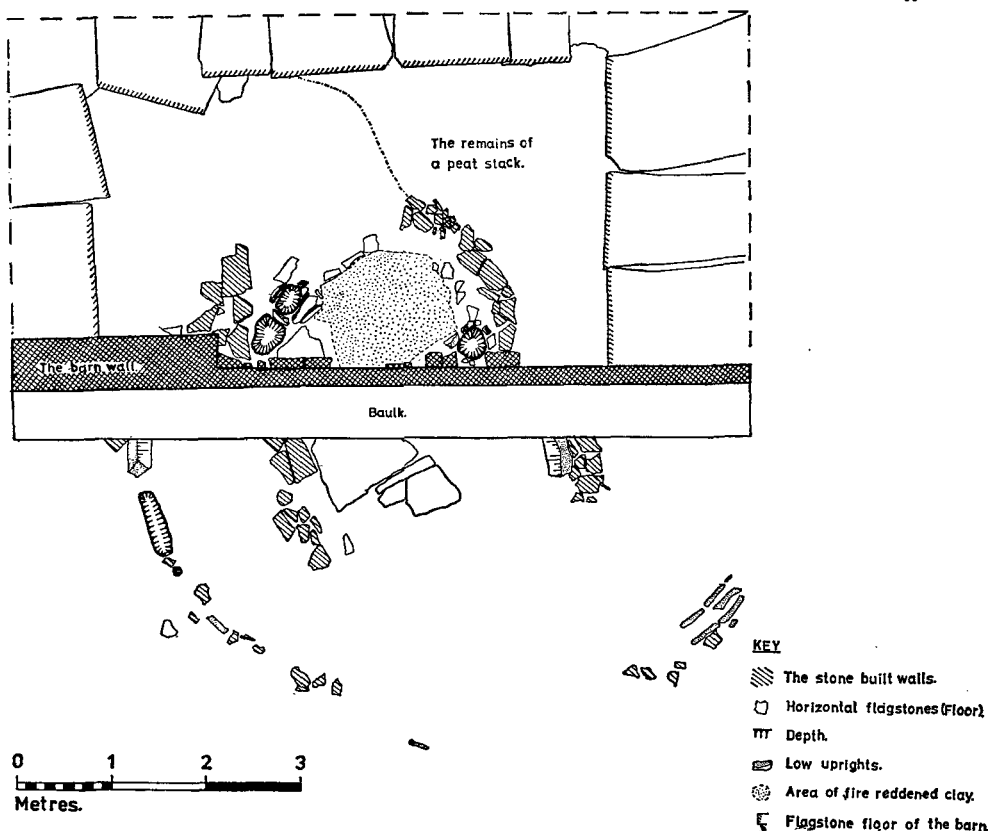


FIG 13

The wall The wall was rubble-built with a maximum width of 0.5 m and preserved height of 0.35 m; it could only be traced on the long sides of the building and may either have been destroyed at the ends or never have existed.

The flagged floor A few very poor quality flagstones were still *in situ* in the N part of the building; they had been laid on the old ground surface and butted against the wall.

The hearth The S end of the building was completely taken up with a hearth measuring 1.6 m by 1.3 m. The bottom of this was originally mostly made up of a flagstone set in clay but as this grew fragile the whole was covered with yellow clay 10 cm thick. On either side of the hearth, 1.8 m apart, were fire-reddened sockets, 0.3 m deep, which were packed around with stones; these may have been to support a spit or a cross-piece over the fire.

The circumambient walk At a distance of 1.2 m from the main wall were indications in parts of a flimsy second wall consisting more or less of just a line of stones with a maximum preserved height of 0.3 m. This was strongly reminiscent of the secondary wall at Liddle which was erected to define an area to be kept free of midden.

The peat stack To the SW of the buildings and adjoining the main wall was the debris of a peat stack compacted to a depth of 5 cm.

The secondary building (Beaquooy II)

The secondary building had been largely destroyed by levelling of the site and the W half had in fact been dug out to below floor level to accommodate a small shed which made use of part of the original wall. House fill, as such, was therefore confined to the E half, where it consisted mainly of redeposited burnt mound material containing large pieces of building rubble with a maximum preserved depth of 17 cm; finds in this included a hammerstone and a pot lid. Below this, in areas, was a thin layer of occupation debris and silting, generally grey in colour but with patches of carbon and ash. The building was rectangular in outline (fig 16; pl 3a) with an internal length of 6 m and a maximum internal width of 3.5 m; as with the other buildings, the parts will be described under separate headings.

The wall The walls of the building followed the incline of the primary burnt mound and were the first things to be built; peculiarly, two quite distinct methods of construction were used. All of the S wall and part of the N wall, forming the long sides of the building, were rubble-built out of land and river stones. These lengths of walling, which only had a maximum preserved height of 0.3 m, were very insubstantial in parts where their width was as little as 15 cm and only the inside was faced. The method of construction of the remainder of the walling was demonstrated most clearly at the W end. Here a trench, some 20 cm wide and 19 cm deep, had been dug in the primary burnt mound and chocking stones had been put in it to accommodate either a wooden wall, 5-6 cm wide, or, more probably, vertical flags, considering the comparative absence of wood in Orkney in the past as well as the present (Appendix III). It is of interest that these packing stones protruded some 15 cm from the top of the slot but that they would have been covered over subsequently by the floor levelling.

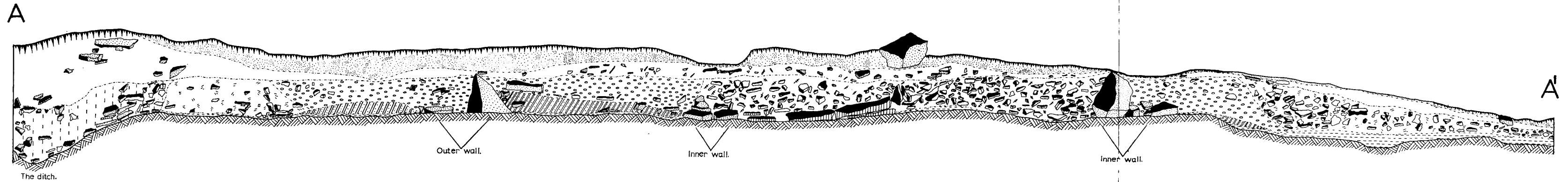
The floor Floor construction involved several stages (fig 15). At first it seems merely to have consisted of the top of the primary burnt mound for some of the clay lining of the trough goes over this (*vide infra*). Burnt mound material was later deposited, particularly in the W end, in order to counteract the slope of the building site, and the whole of the floor was subsequently flagged with poor-quality stone. These do not, however, seem to have been consecutive stages in a task carried out at one time for the laying of the flagstones involved the demolition of a rectangular compartment (*vide infra*). At a later stage still, a patch of flooring 2 m by 1.5 m was taken up in the SE corner of the building and relaid in yellow clay; this could mark the site of an inner division.

The trough The trough consisted simply of a rough hole about 2.5 m across and 1.7 m deep which, as it was dug into the primary burnt mound, had to be lined with yellow clay up to 0.4 m thick in order to make it watertight (fig 15). The trough was filled in with building rubble, at some time after the site went out of use, amongst which were sheep teeth (Appendix VI) and a quern. Overlying this infill, and one of the floor stones, which sloped into the trough, was a layer of redeposited burnt mound material which also contained a quernstone fragment.

The hearth The absence of a hearth in this building can probably be attributed to the very heavy disturbance in its W end.

The quoined well-like structure Halfway along the outside of the W end-wall was a quoined well-like structure which penetrated 0.52 m through the primary burnt mound and, judging from

BEAQUOY: Section through the Primary Building.



Metres.

FIG 14

KEY

- | | |
|---------------------------|--------------------------|
| Turf and associated soil. | Ash. |
| Redeposited sand. | Flagstones of the floor. |
| Trample. | Unburnt stone. |
| Burnt mound. | Old ground surface. |
| House fill. | Natural clay. |
| Ditch fill. | Layers. |

BEAQUOY: Sections through the Secondary Building.

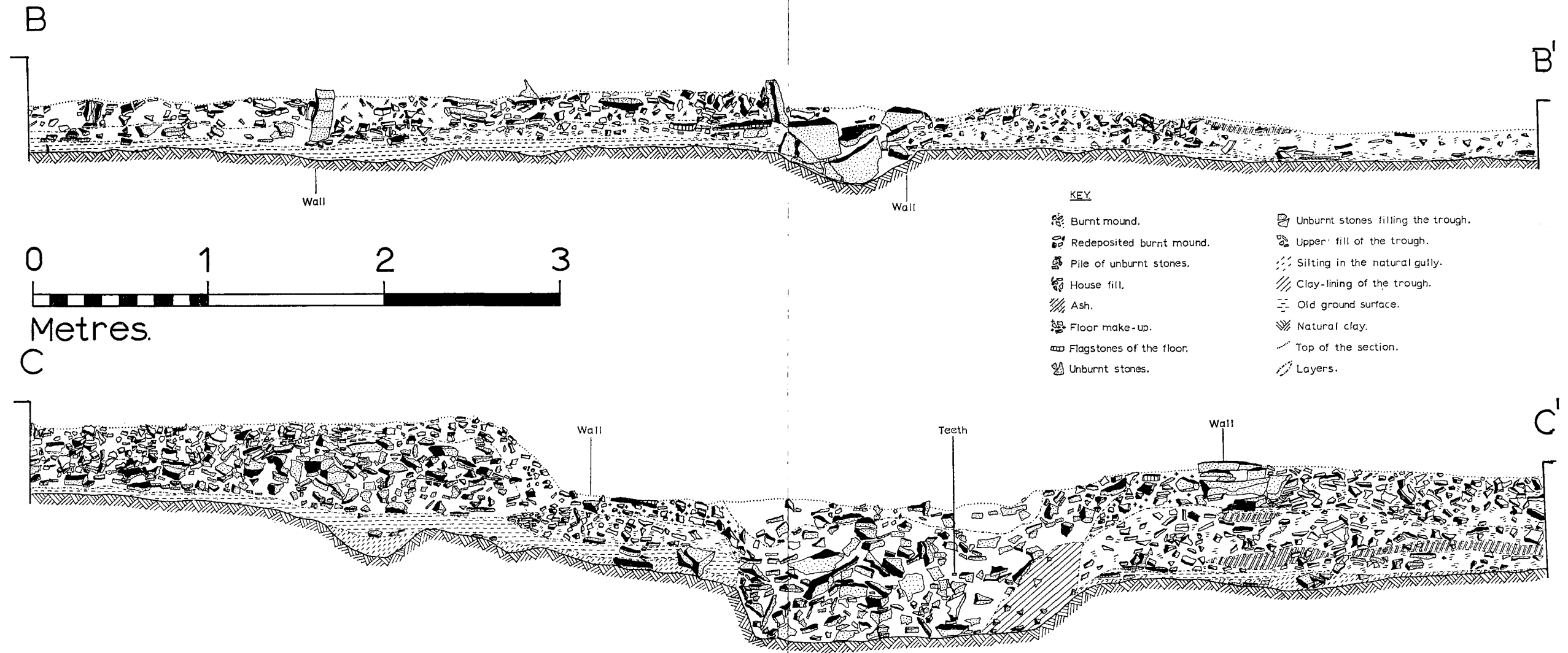
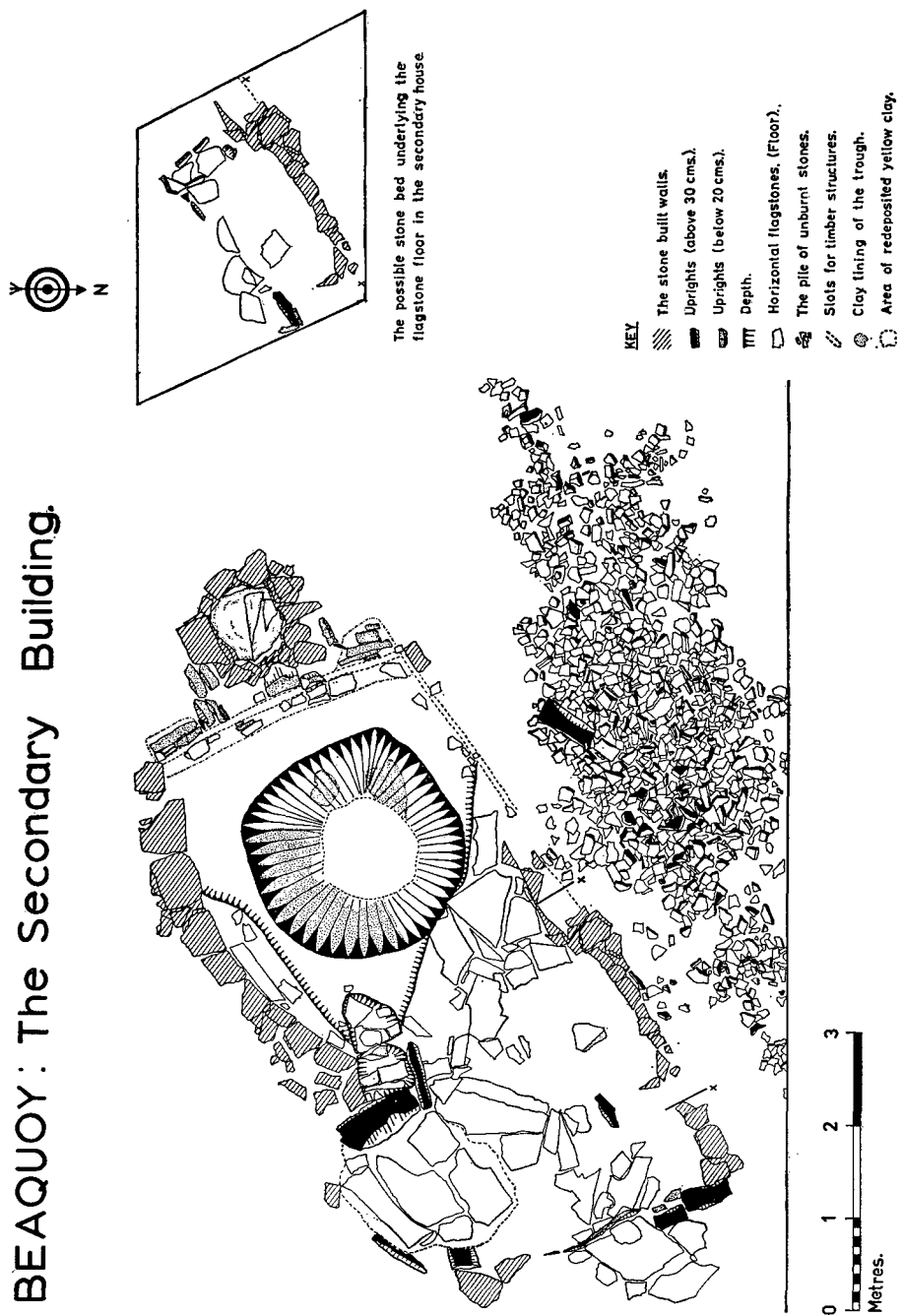


FIG 15

BEAQUOY: The Secondary Building



collapse, had once been at least 25 cm higher than the latter (pl 3b). A hole, 1.2 m in diameter, had firstly been floored with a flagstone and then quoining put in with packing behind it. As the primary burnt mound was quite thin at this point, the structure was mostly in natural clay and would therefore have retained some 0.5 m of water; anything in excess of this would have overflowed into the adjacent ditch. The upper part of this structure was filled with some very large building rubble, at the bottom of which was loose brown earth. Below this was a black greasy layer, 4 cm thick, with inclusions of both burnt stone and building rubble, which rested on the flagstone bottom of the feature. When the structure was taken apart mineralised twigs were found beneath the latter (Appendix V).

The demolished compartment below the flagstone floor On removal of the flagstone floor some traces of a rectangular compartment, over 2 m long and 1.25 m wide, were found along the N wall. This was not very distinct and all that can be said is that it was edged, and probably once floored, by small flagstones; it could have been a bed.

The entrance The entrance, in the middle of the E wall, was marked by a sillstone 0.8 m long and 6 cm high; outside were a few flagstones laid horizontally to prevent the doorway becoming muddied. The area round this door and to the NE was relatively free from burnt mound material although some of it had been trampled underfoot; it seems that this must have been the general direction of entrance and egress but access must also have been readily available to the unburnt stones piled alongside the northern wall.

The peat stack Some 3.5 m from the doorway in a NE direction was found compacted debris from one or more peat stacks occupying an area at least 5 m in diameter (fig 10). At some stage this siting went out of use and midden was dumped over it.

The pile of unburnt stones Against the N wall of the building was a pile of unburnt stones 8 m long, 2.4 m wide, with a maximum preserved height of 0.4 m. This was evidently the place where stones were dumped ready for use; most of the stones appeared to have come from off the land but several discarded implements were included.

The ditch To the SW of the building was a V-shaped ditch with a preserved width of 1 m and depth of *c* 0.35 m (fig 10). This cut the natural gully underlying the whole site and was dug into the primary burnt mound; it was therefore later though not necessarily contemporary with the secondary building. The fill was scarcely distinguishable from the burnt mound except perhaps that it contained a greater proportion of unburnt stones.

The finds

Objects of sandstone

- BD4 A possible hammerstone from the primary burnt mound but of friable sandstone (Appendix VII) (fig 6).
- BD5 A fragment of an ard-share, of similar material, from the fill of the secondary house (fig 7).
- BD7 An unstratified piece of very friable sandstone which may have been used as a hammerstone. Preserved length 14.5 cm, breadth 9 cm, thickness 5 cm.
- BD40 A flake of hard sandstone from what may have been a water/glacially rounded pebble used as a hammerstone: found in the shallow natural gully underlying the site. Length 7 cm, width 6 cm, thickness 2.5 cm.
- BD1 Two fragments of a rubber with a plane face (fig 17); found among the unburnt stones piled alongside the N wall of the secondary house.
- BD12 Possibly a sandstone rubber although the plane surface may be natural (Appendix VII) (fig 17); found among the pile of unburnt stones near the secondary house.
- BD14 Another possible rubber found in the pile of unburnt stones next to the secondary house. Preserved length 14 cm, width 7.5 cm, thickness 3.5 cm.

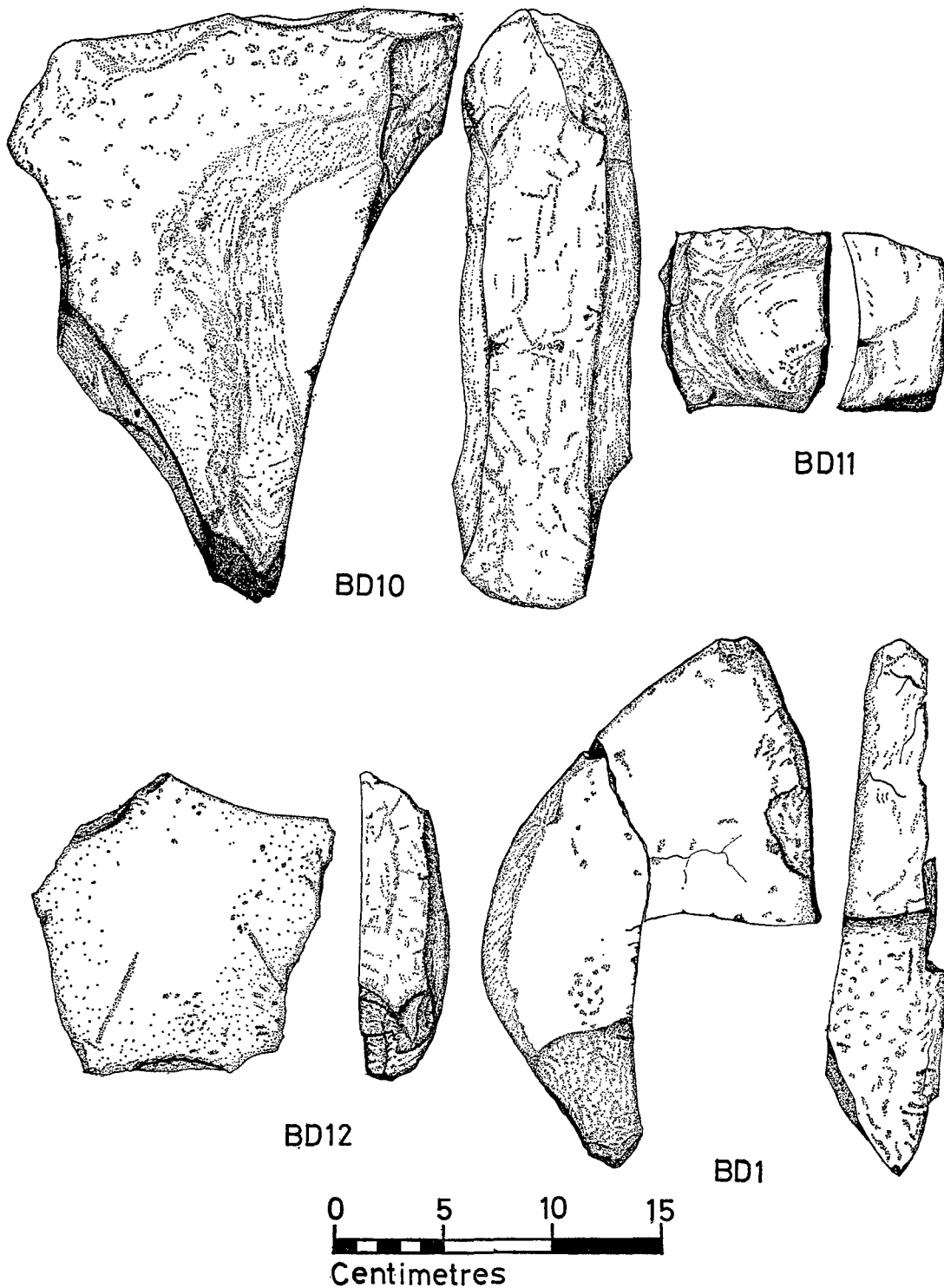


FIG 17 Quernstones

- BD29 A fragment of another possible rubber from the trampled top of the primary burnt mound to the W of the secondary house. Preserved length 7.5 cm, width 6.5 cm, thickness 2 cm.
- BD39 A possible rubber from the fill of the primary house. Length 14.5 cm, width 8 cm, thickness 2 cm.
- BD3 Part of a large sandstone quern with a concave surface found partly in the fill of the secondary house (fig 18).

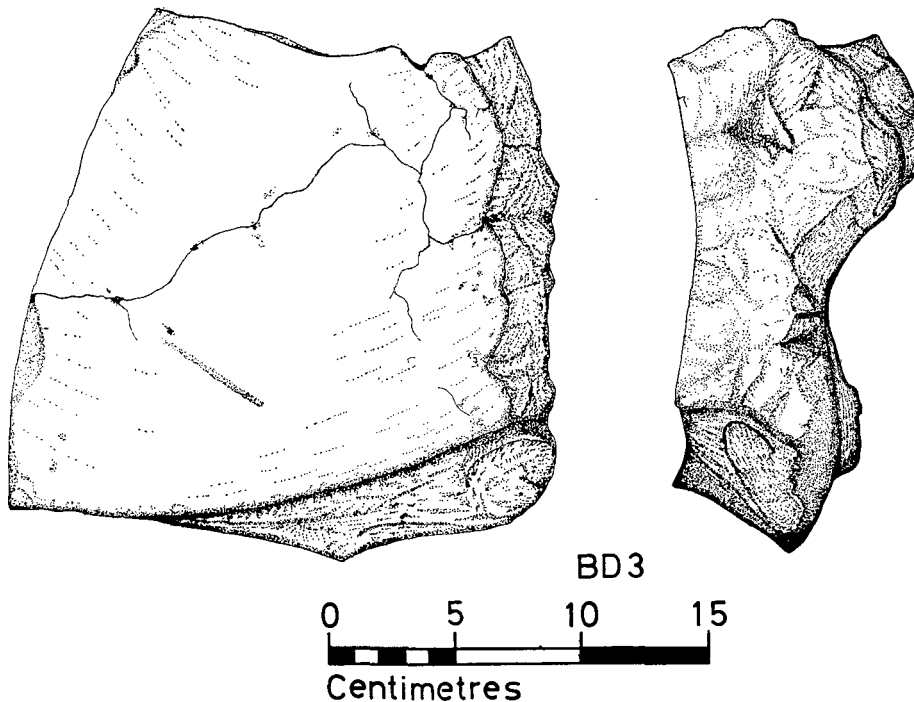


FIG 18 Quernstone

- BD10 Possibly part of a large sandstone quern with a concave surface found in the upper fill of the trough in the secondary house; the stone is however rather soft and the shape could be natural (Appendix VII) (fig 17).
- BD11 The greater part of what may have been a small sandstone quern which was found in the lower fill of the trough in the secondary house; its shape could however be natural (Appendix VII) (fig 17).
- BD6 Part of a pot-lid from the fill of the secondary house, (fig 8). Thickness 2 cm, original diameter c 25 cm.

Objects of flint

	<i>Context</i>	<i>Colour and presence of cortex</i>	<i>Stage of manufacture</i>	<i>Dimensions in cm or fig no.</i>
BD13	On levelling below flags of secondary house	Red/brown Cortex	Flake	fig 19
BD15	In old ground surface under site	Dark grey Cortex	Implement	fig 19
BD16	„	Caramel	Flake	fig 19
BD23	„	Grey Cortex	Implement	fig 19
BD41	„	Caramel	Implement	fig 19

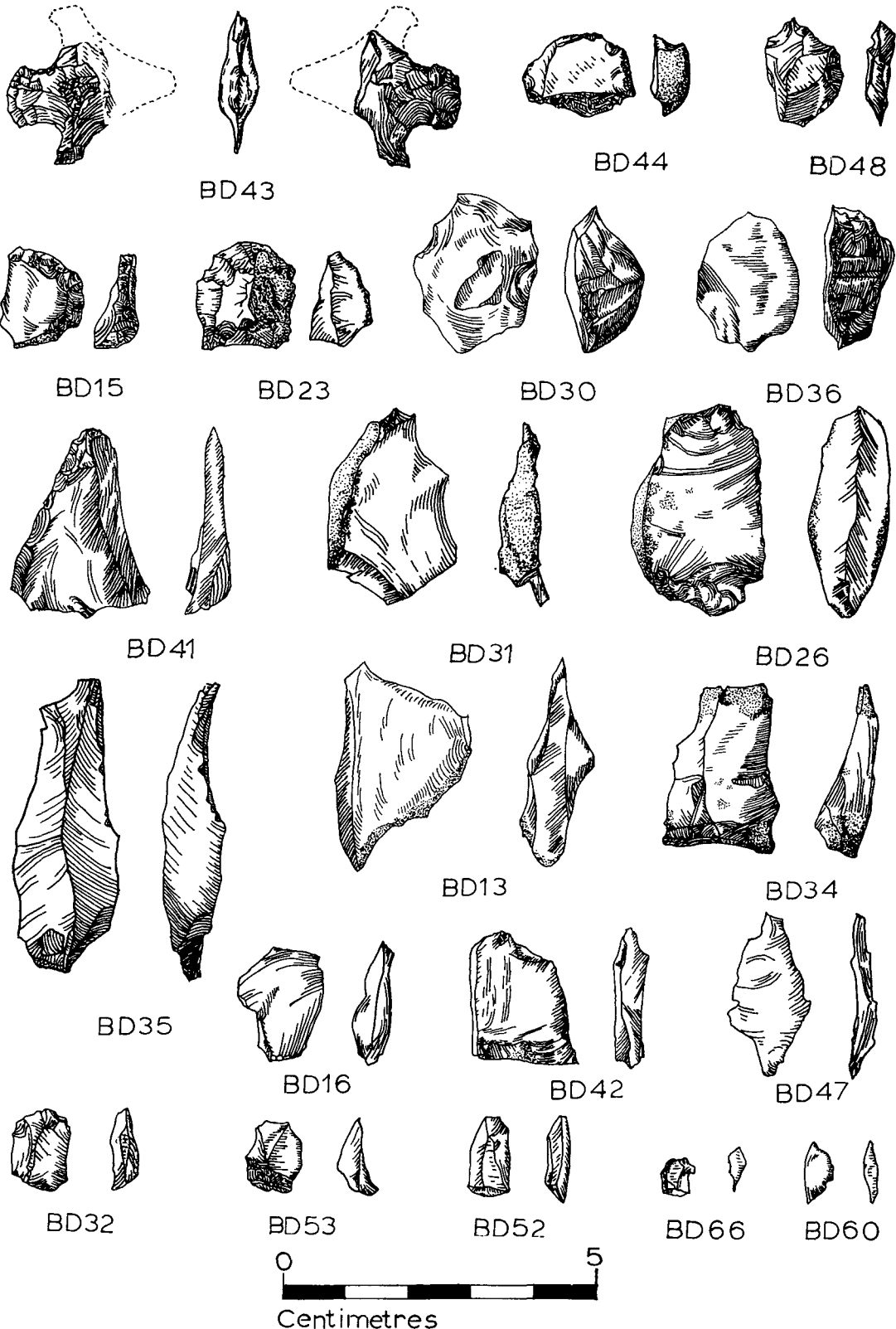


FIG 19 Flints

	<i>Context</i>	<i>Colour and presence of cortex</i>	<i>Stage of manufacture</i>	<i>Dimensions in cm or fig no.</i>
BD17	In natural gully below site	Caramel Cortex	Flake	1.8 × 0.8 × 0.2
BD24	„	Light brown/ yellow	Flake	2.5 × 1.4 × 0.2
BD25	„	Calcined	Core frag	2.3 × 1.6 × 1.0
BD26	„	Caramel Cortex	Implement	fig 19
BD27	„	Off-white	Flake	1.0 × 0.7 × 0.1
BD31	„	Grey/brown Cortex	Implement?	fig 19
BD32	„	Caramel	Flake	fig. 19
BD33	„	Calcined	Heat fractured frag	1.0 × 0.8 × 0.2
BD34	„	Light brown/ yellow Cortex	Flake	fig 19
BD35	„	Caramel	Flake	fig 19
BD36	„	Grey	Core	fig 19
BD38	„	Calcined	Flake	0.8 × 0.4 × 0.2
BD42	„	Caramel	Flake	fig 19
BD43	„	Grey	Implement	fig 19
BD44	„	Grey/brown Cortex	Implement	fig 19
BD45	„	Calcined Cortex	Flake	2.4 × 1.5 × 0.3
BD46	„	Calcined	Heat fractured frag	1.7 × 1.0 × 0.3
BD47	„	Light brown/ yellow	Flake	fig 19
BD48	„	Grey (Calcined)?	Implement	fig 19
BD49	„	Calcined	Heat fractured frag	2.0 × 1.5 × 0.2
BD50	„	Light brown/ yellow	Flake	1.5 × 0.8 × 0.2
BD51	„	Caramel Cortex	Flake	1.1 × 1.0 × 0.5
BD52	„	Light brown/ yellow	Flake	fig 19
BD53	„	Grey/brown	Flake	fig 19
BD54	„	Calcined	Heat fractured frag	1.1 × 0.9 × 0.2
BD55	„	Light brown/ yellow Cortex	Flake	1.5 × 0.8 × 0.15
BD56	„	Calcined	Flake	1.1 × 0.5 × 0.1
BD57	„	Calcined	Flake	1.0 × 0.6 × 0.05
BD58	„	Grey (Calcined)? Cortex	Flake	1.1 × 0.6 × 0.3
BD59	„	Light brown/ yellow	Flake	1.1 × 0.8 × 0.1
BD60	„	Caramel	Flake	fig 19

	<i>Context</i>	<i>Colour and presence of Cortex</i>	<i>Stage of Manufacture</i>	<i>Dimensions in cm or fig no.</i>
BD61	In natural gully below site	Calcined	Flake	0.7 × 0.6 × 0.05
BD62	„	Calcined	Flake	0.9 × 0.8 × 0.2
BD63	„	Calcined	Flake	1.8 × 0.9 × 0.4
BD64	„	Calcined	Flake	0.8 × 0.5 × 0.05
BD66	„	Caramel Cortex	Flake	fig 19
BD67	„	—	A number of very small flakes	
BD30	Unstratified	Grey	Core	fig 19

Object of quartzite

BD37 A flake of quartzite from the natural gully underlying the site; it shows signs of wear and may have been part of a hammerstone. Length 3 cm, breadth 3 cm, thickness 0.5 cm.

Mineralised leather

BD8 A piece of convoluted grey material with a low density, superficially resembling stone, found between the flagstones of the floor of the secondary house; its structure is laminated, a vesicular layer being contained by two solid ones; it has every appearance of mineralised leather (W N Robertson, pers comm).

Pottery

BD18 A sherd of very poor quality pottery found in the old ground surface below the site; the fabric is brown in colour and contains ground quartz, burnt stone, and mica. Length 2.2 cm, width 2 cm, preserved thickness 0.6 cm.

BD19 As for 18. Length 2.8 cm, width 2 cm, preserved thickness 0.6 cm.

BD20 Possibly a base sherd from a flat-bottomed pot of poor quality found in the lower fill of the quined structure to the W of the secondary house; the fabric is grey in colour and has burnt stone, mica, and charcoal inclusions (fig 9).

DISCUSSION

The mounds of burnt stone and other debris

Burnt mounds do not seem to be found outside the British Isles and have a curious distribution within them (fig 20; Appendix X). They only appear to have been found in the extreme north (Shetland, Orkney and Caithness, with a single example in Ross and Cromarty) and in a large area to the west covering the greater part of Ireland and Wales and including occurrences in the Isle of Man, Dumfriesshire, Kirkcudbrightshire, Staffordshire, Warwickshire and the New Forest in Hampshire. It is felt that, although this distribution may be filled out to a certain extent by further fieldwork, it is none the less a real one.

Where found, they can be extremely common. In Orkney no fewer than 230 have been recorded, which is an average of one every 4.5 square kilometres (fig 21). This remarkable density is also to be found in Shetland, where more than 200 are known, including eleven on tiny Fair Isle (Calder 1963, 6–8) (fig 21), and there seem to be areas in S Ireland and in S Wales where their occurrence is equally prolific (O'Kelly 1954, 150–2; Cantrill 1911, 264).

Burnt mounds are generally low in relation to their diameter and are irregular in outline, although they may approximate to a horse-shoe shape. They vary tremendously in size from small ones with heights in the tens of centimetres and diameters of a few metres to examples approaching that of Vaasetter on Fair Isle, which, with a height of over 3 m, a length of 37 m and a width of 27 m, is probably the largest (RCAMS 1946, I, 40). They are invariably next to a non-saline

water source – be it a spring, river, or just boggy ground – towards which any concavity in their shape faces, and they are frequently found in groups.

Like Liddle and Beaquoy, the mounds tend to consist of three elements – burnt stone, ash and carbon. Local differences are apparent, however, for although sandstone was generally used, less suitable stones were pressed into service on the peripheries of the distribution such as flints

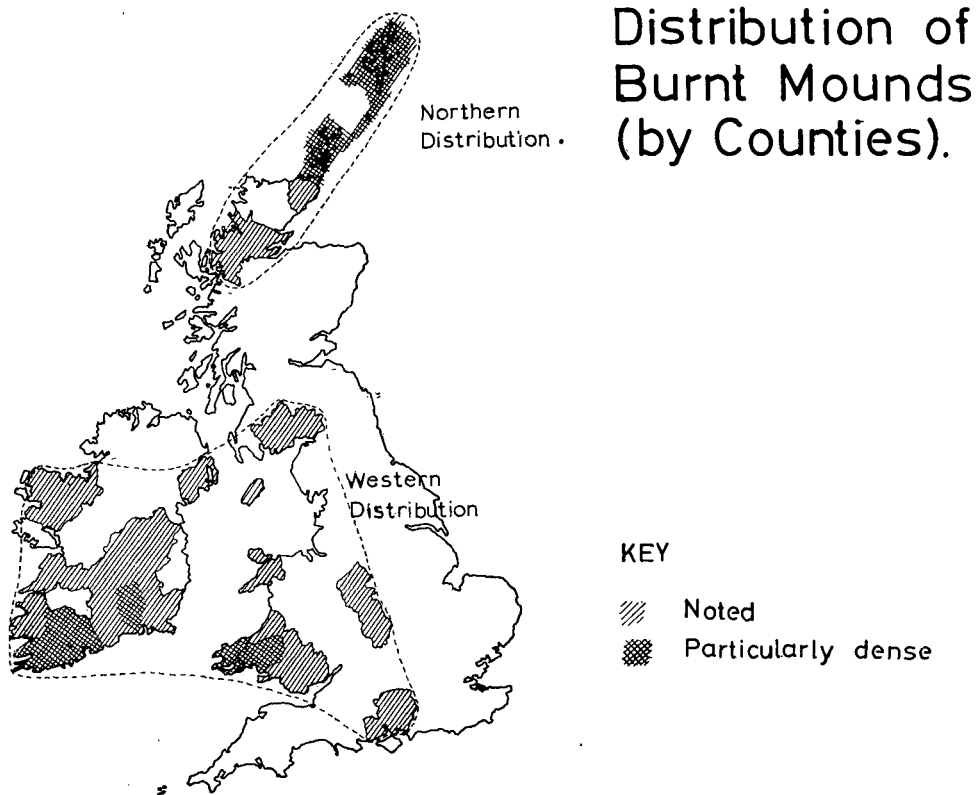


FIG 20 Distribution of burnt mounds in the British Isles (source: Appendix X)

in Hampshire (Pasmore and Pallister 1967, 15) and quartzites in Warwickshire (Cantrill 1913, 649). Peat or wood was used as available. At Liddle and Beaquoy the former seems to have been used exclusively, but at sites excavated in the W part of the general distribution only charcoal has been mentioned.

The associated structures

In countless instances structures have been noticed in association with these mounds either as revealed by natural agencies, inquisitiveness (both amateur and antiquarian), and in the course of destruction. The Ordnance Survey and Royal Commission records for burnt mounds in Orkney and Shetland for instance (RCAMS 1946) abound in references to 'cist like arrangements of slabs', 'cists', 'slab built boxes', 'coffins', 'buildings', 'walling', 'earth fast stone slabs', 'hearths', 'masonry', 'tanks', 'fire-boxes', 'small cells' etc. Such observations can be paralleled in Ireland (O'Kelly 1954, 150-2) and Wales (RCAMW 1937, 137; 1956, 127; 1960, 171, 219) as well as some of the more peripheral areas, e.g. Dumfriesshire (Truckell 1961b, 164), but make little sense on their

own even though in some cases a large amount was exposed (e.g. RCAMS 1946, II, 246, 326). Viewed in the light of a small number of recent excavations, however, they show that the structures associated with burnt mounds were of a markedly uniform nature over the whole area in which the latter occur.

The feature most commonly found is a trough, which is in essence a watertight receptacle generally with a volume of between 0.7 and 1.2 cubic metres, i.e. capable of holding around about a thousand litres of liquid, although some are larger and some smaller. The exact construction of the trough was governed by available materials and local conditions as well as whim and cultural tradition. A hole simply dug into impermeable or waterlogged ground would, and did, suffice, as at Killeens III in Co Cork (O'Kelly 1954, 135), Clay Head I and II on the Isle of Man (Cubbon 1964, 566, 583) and Deadman Bottom, Hampshire (Pasmore and Pallister 1967, 17). More usually, this was lined with a rectangular wood or stone construction, which was not in itself watertight. In the Northern Isles, wood being scarce and good quality flagstone abundant in most areas, troughs like that at Liddle I and the Ness of Sound, Shetland (*DES* 1972, 38) seem to have been the main type. Although comparable troughs have been found in Ireland, as at Drombeg, Co Cork (Fahy 1960, 7), wooden ones seem to have been more usual because of different circumstances of availability. These were either built from planks, as at Ballycroghan III, Co Down (Hodges 1955, 22), Mallow, Killeens I and II, and Mashanglass, Co Cork (O Riordain 1953, 43; O'Kelly 1954, 129, 133; Fahy 1957, 71) and Tomgraney, Co Clare (O'Kelly 1954, 150), or from branches or thin trunks cut into logs, as at Ballycroghan I and IIb, Co Down (Hodges 1955, 19, 21), and Ballinguilla and Ballyvourney I, Co Cork (O Riordain 1953, 43; O'Kelly 1954, 106). At Clay Head I, on the Isle of Man, the poor quality of the secondary trough can probably be attributed to an absence of both good quality flag and timber (Cubbon 1964, 569, 576).

It is perhaps a reflection of the state of technology that troughs which were watertight in themselves – and which would have been essential in some areas and have made man independent of the vagaries of local topography in most – are so rarely discovered. Dug out troughs have been conjectured (Sayce 1949) but have only been found *in situ* on a few sites such as Ballyvourney II and Killeens II, Co Cork, and Clonkerdon, Co Waterford, and, in at least the first two cases, a trough of any other type of construction would have sufficed (O'Kelly 1954, 125, 132; Quinlan 1887, 391). Elsewhere we have hints, or at least suggestions, of alternative solutions such as lining holes with skins (Bullows 1927, 292) or setting bronze cauldrons in shallow depressions (Hodges 1955, 25; Cubbon 1964, 582) but it seems a fairly true generalisation that locations where such complexities would be necessary were avoided. It is interesting, however, that the trough at Beaquoy II, being dug into previously deposited burnt mound, had to be partly lined with clay and we can expect to find clay lining or luting employed at other sites.

It is obvious from the general siting of burnt mounds that water was of prime interest and by the construction and setting of the troughs it seems that they were greatly involved in its use. While only some of the troughs would have had to be filled manually, because of seepage in most cases, all would have had to have been emptied by hand, assuming this was necessary. It is no surprise that at the three most sophisticated sites excavated, Liddle I, Beaquoy II and Drombeg, Co Cork, there are features next to the trough having a superficial resemblance to wells (Hedges 1974, 253; Fahy 1960, 8, 9), by means of which water could have been disposed of, although in the case of the last two examples a depth of some 0.5 m would have been retained. While less impressive, gullies leading from the troughs at Ballycroghan I, Co Down (Hodges 1955, 21), and Clay Head I on the Isle of Man (Cubbon 1964, 579) would have been equally as functional.

At several sites, including Liddle I, Sharmer Farm, Warwickshire (Shotton 1973, 465) and Killeens II and III, Co Cork (O'Kelly 1954, 132, 135), the troughs when excavated were part full

Distribution of Burnt Mounds in the Northern Isles

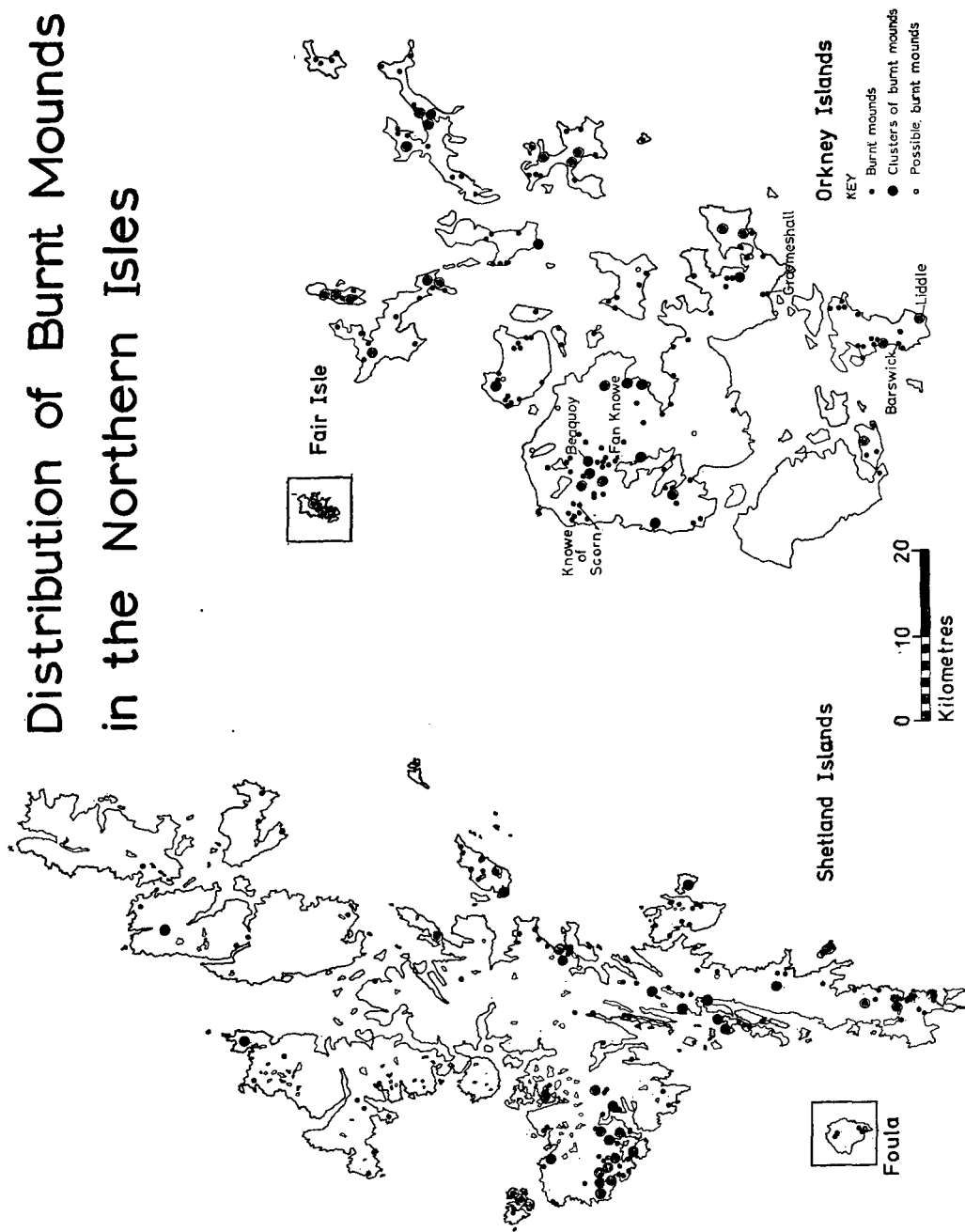


FIG 21 Distribution of burnt mounds in the Northern Isles (source: OS card index)

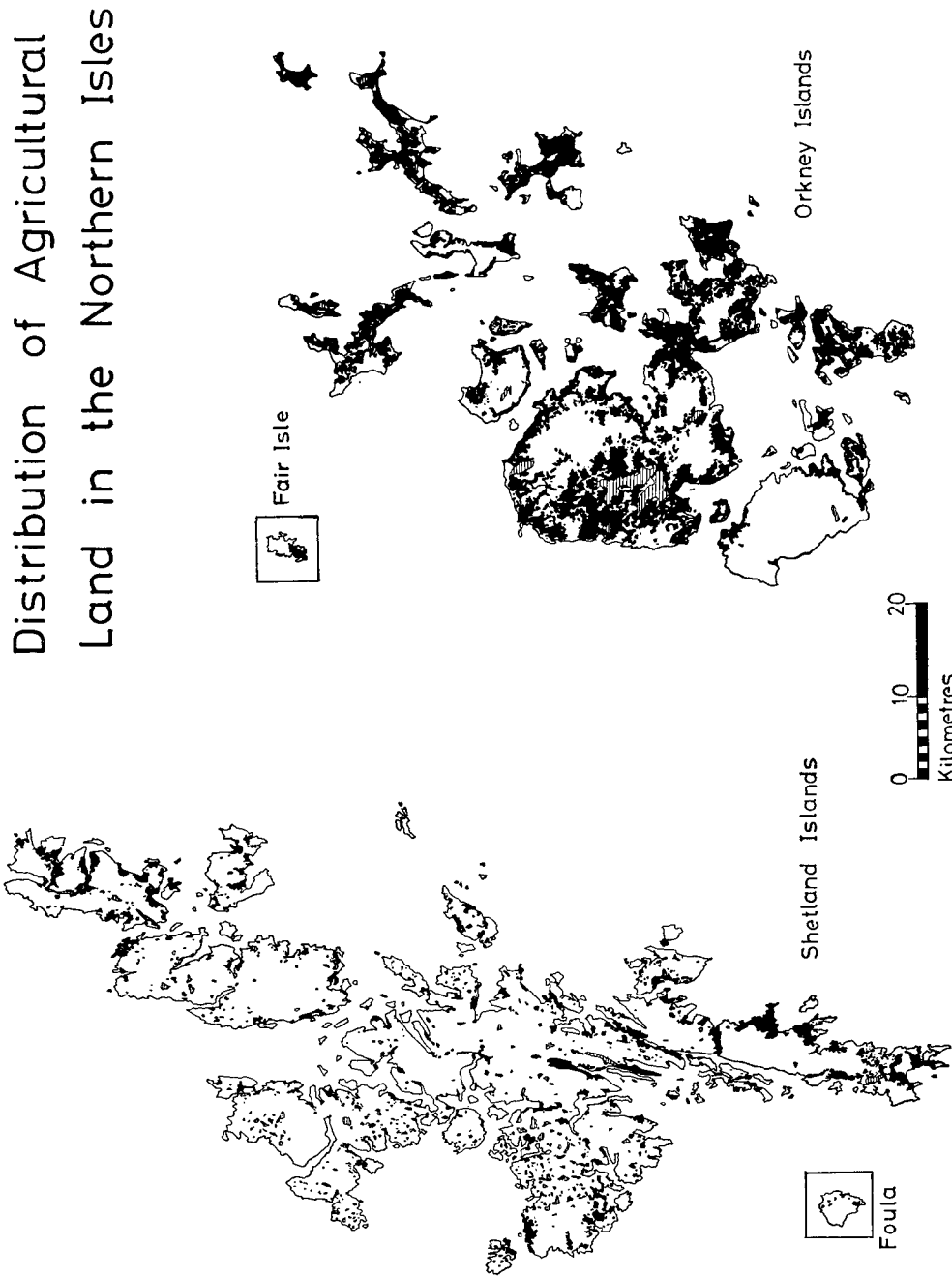


FIG 22 Distribution of agricultural land in the Northern Isles (source: O'Dell 1939, fig 4; 1940, fig. 3)

of burnt stones. This shows a clear functional link between the troughs and the indications of large fires which are nearly always on their edges (Liddle and Ness of Sound, Shetland, are in this respect anomalous). Sometimes this takes the form of a large hearth, with an area of between 1.5 and 5.5 square metres, which is rarely floored and usually just defined on the outside by stones. Most frequently the hearths take the shape of an arc, as at Clay Head I, Isle of Man, and Ballyvourney I, Co Cork (Cubbon 1964, 569; O'Kelly, 1954, 110), or a horse-shoe, as at Clonkerdon, Ballyvourney II and Killeens II in Co Cork (Quinlan 1887, 391; O'Kelly 1954, 126, 133); at Drombeg, however, a rectilinear hearth was found. The fact that the hearth at Liddle is integrated into the building is just a facet of the differences apparent between the N and W groups, which will be discussed below.

Insufficient information is available for the Northern Isles, but elsewhere, as often as not, there is no hearth as such, fires just having been lit next to the trough. Sometimes the evidence of burning is confined to an area similar to that of the hearths mentioned above as at Sharmer Farm, Warwickshire, Mashanglass, Cork, Deadman Bottom, Hampshire, and Clay Head III, Isle of Man (Shotton 1973, 465; Fahy 1957, 71; Pasmore and Pallister 1967, 17; Cubbon 1964, 582); at other sites, such as Ballycroghan I, IIb and III, Co Down, and Killeens I, II (secondary) and III, Co Cork, fires seem to have been lit all around the trough (Hodges 1955, 19, 21, 22; O'Kelly 1954, 129, 134, 135).

At Ballyvourney I, Co Cork (O'Kelly 1954, 112), a fire-reddened cist-like structure was found located on dry ground. This was trapezoid in shape, about 2 m long, over 1 m broad, and 0.6 m deep; on one side there was a break around which was a spread of charcoal. A practically identical, though smaller, structure was found at Drombeg, Co Cork (Fahy 1960, 4), filled with burnt stone. The 'fire boxes' recorded as exposed at several burnt mounds in Orkney and Shetland may have had a similar function, as may have simple pits dug into dry ground which have sometimes been found full of burnt stone as in an earlier phase at Drombeg, Co Cork (Fahy 1960, 3, 6).

Building in the Northern Isles has, since the time of the first occupants, been affected by two factors – the almost total absence of timber (apart from driftwood) and the abundance of flagstone in most habitable areas. The effect of this is that buildings of all different periods remain well preserved where in other areas they have decayed without obvious trace. There is little doubt, for instance, from the Royal Commission and Ordnance Survey records (RCAMS 1946; OS) that associated with most, if not all, burnt mounds in the area in question were substantial buildings of which Liddle I, Beaquoy I and II and Ness of Sound, Shetland (*DES* 1972, 38) can be taken as examples. It is less obvious whether this is the case in the W part of the burnt mound distribution, although circular post-hole structures have been found at Drombeg (at an early phase) and at Ballyvourney I and II in Cork (Fahy 1960, 3; O'Kelly 1954, 113, 126) and one with stone walls at a later phase at Drombeg (Fahy 1960, 5). This apparent lack of buildings can be partly explained by their having been made, like the troughs, of timber and other perishables; they would not therefore be noticed unless the site were scientifically excavated. It is, however, a fact that, in the cases known, the hearths, troughs, fire-boxes, etc, were at some distance from the structures, while in the Northern Isles they have been within the buildings. A concomitant of this is that if there were any buildings they would be at a distance from the deepest deposit of burnt stones, ash and carbon, and certainly not under it. The comparative absence of buildings in the W area may therefore just be due to an over-emphasis on excavating the mound itself which would only be centred on the hearth and associated features.

The buildings so far found in the W and N areas are not really like each other but reflect local traditions which, in the case of the Northern Isles, are partly accommodations to available

materials. Although the buildings at Liddle and Beaquoy share some common features, due largely, no doubt, to functional requirements and the qualities of flagstone, they also differ greatly. Bearing this, and the smallness of the sample in mind, it would be premature to make exhaustive comparisons with structures found in other contexts. The general similarity between Liddle and the late bronze age houses at Jarlshof, Clickhimin and Wiltrow in Shetland (Hamilton 1956, fig 10; 1968, 28; Curle 1936, fig 1) might, however, be mentioned and it is worth noting, for use in a future context, that these buildings and those which have been found in association with burnt mounds (both inside and outside of the Northern Isles) have a very similar floor area, as do, for example, the supposedly neolithic houses of Shetland (Calder 1956, figs 1, 3, 5).

The finds

A characteristic of burnt mounds is that finds are few and, by and large, unimpressive. Practically all the objects from Liddle and Beaquoy, as from other burnt mounds, can be described as flints, other worked stone and pottery and are discussed below under these headings. The apparent absence of a bone industry can undoubtedly be accounted for by the unfavourable conditions of preservation that burnt mounds consistently present for this material. These self-same conditions, however, particularly considering the waterlogged setting of some of the sites, should be favourable for the preservation of articles made of, for example, wood, wool and leather, although little of this nature has been recovered to date. There is some evidence for the use of metal, but this is significantly sparse.

Flint A discussion of the flint industry is impaired by the fact that at Liddle only one small unstratified flake was found while at Beaquoy the finds in this category were either unstratified or sealed by the burnt-mound phase of occupation; the one exception (BD13) may have been redeposited. We cannot be certain, therefore, that the flints found have any connection with the burnt mounds as such except that most, at Beaquoy, will be earlier, if not contemporary. The flint used is of variable, but generally very poor quality, containing a lot of voids and not flaking at all cleanly; this and the fact that a large proportion of the flints found, implements as well as flakes, bear traces of cortex, suggests that the material used was locally available nodules which occur occasionally in glacial and marine deposits (Appendix VII). The presence of a large number of flakes and three cores (fig 19) further implies that implements were made on site while the size of the latter – which can be described as pygmy cores – underlines how unavailable even poor quality flint must have been.

Apart from the cores mentioned and what must have been, for the most part, waste flakes, a number of implements were found at Beaquoy (fig 19). Two of these are simply flakes which show signs of having been used (BD26 and 31), one is a small knife (BD41), four thumbnail scrapers (BD15, 23, 44 and 48) and, finally, a barbed and tanged arrowhead (BD43). The arrowhead suggests that the assemblage is bronze age while the crudeness of its manufacture would usually be associated with the last half of that period although it may, in this instance, have been due to the material available. Paucity of the flint industry does, however, seem to be a characteristic of burnt mounds, only a few having produced crude flakes and implements as at Swanlake, Pembrokeshire, Deadman Bottom, Hampshire, and Clay Head I and II on the Isle of Man (Leach 1909, 244; Pasmore and Pallister 1967, 18; Cubbon 1964, 575, 585, fig 10).

Other worked and used stone The finds in this category from Liddle and Beaquoy are all of sandstone, although varying somewhat in its exact nature, as this is the local suitable material (Appendix VII). They may be divided into hammerstones, quernstones, pot-lids, perforated stones and possible slingstones (the ard-shares will be discussed in a forthcoming paper).

Hammerstones (figs 6 and 7) were particularly common at Liddle, where nearby Ham Geo

would have provided suitably hard beach pebbles, while at Beaquoy, where only soft sandstones was available, they were comparatively scarce. Whatever their functions, and a hammerstone may have had several, they are probably the commonest find on sites in the Northern Isles from the neolithic to the Viking period as, for example, at Rinyo (Childe 1947, 39) and Jarlshof (Hamilton 1956, 26, 50, 51, 54, 61, 64, 69, 79, 114), sometimes occurring in their hundreds (e.g. Calder 1956, pl 39). They are known to have been recovered from other burnt mound sites in the northern distribution such as Kennaby and Burn of Furse, Fair Isle (RCAMS 1946, III, 47), and Nestaness, Ness of Sound and Westerwick in Shetland (RCAMS 1946, III, 123; *DES* 1972, 38; Moar 1949, 231). Outside of this area they have not been noted with the same frequency although one was found at Ballyvourney, Co Cork (O'Kelly 1954, 117), and another in a mound on the Afon Lligwy, Anglesey (RCAMW 1937, 137).

The types of quernstone found (figs 17 and 18) were flat rubbers (BD1, 12, 14, 29, 39), saddle querns (BD3, 10) and a small mortar or lamp, which could have been natural (BD11) (Appendix VII); the rotary quern introduced in the pre-broch iron age was not in evidence (MacKie 1972, 137, fig 3). Artefacts of this type were only found at Beaquoy and were of unsuitably poor quality sandstone implying that the occupants made do with what was locally available. Two fragments of one rubber (BD1) were found among the unburnt field-stones piled next to the secondary house. Querns, while as uncommon as any other class of finds in burnt mounds, have been found on several sites in S Ireland including Drombeg, Co Cork (O'Kelly 1954, 142; Fahy 1960, 11 fig 4).

Both Liddle and Beaquoy produced a pot-lid (fig 8), a common artefact on sites in the Northern Isles from the neolithic to the Viking period as, for example, at Rinyo (Childe 1939, 29), and Jarlshof (Hamilton 1956, 62, 69, 81, 83-4, 114); they are presumed to have been used for sealing vessels. Objects of this type were also found during excavations at Drombeg and Ballyvourney I, Co Cork (Fahy 1960, 11, fig 4; O'Kelly 1954, 116, fig 4).

The two perforated objects from Liddle (fig 8) are unlike each other and one found at Drombeg (Fahy 1960, 11, fig 4). It is difficult to imagine a use for the smaller of the two (LF18) but the larger (LF113) is probably half of a cow or sheep tether as used at present in Orkney. Rousay flagstone is easily perforated by repeated blows in one place with even the simplest pointed implement; the vertical slab blocking the primary entrance at Liddle had had a notch made in it in this way.

At Liddle, small beach pebbles of a fairly constant size were frequently found; although unworked, two of these were kept as representative (LF112, 114; fig 7) as they had obviously been imported and may have been slingstones.

There can be no doubt that the excavation of further sites will add types of stone artefact to those given above; at present, however, the only additional ones that come to mind are two small 'marbles' found in a trough at Webbsborough, Co Kilkenny (O'Kelly 1954, 142), a whetstone from Housegord, Shetland, which may or may not have come from a burnt mound (RCAMS 1946, 123; Society of Antiquaries 1866, 310) and part of a shale bracelet found in an unstratified context during the excavation at Ballycroghan, Co Down (Hodges 1955, 22).

Pottery The pottery from Liddle, and possibly Beaquoy, belongs to that ill-defined class known as *flat-rimmed ware*, the evolution of which has been given in full by Griffiths (1959, 117-22) and does not need repeating here in detail. Generally speaking, the pottery ascribed to this category is coarse with heavy grit - the exact nature depending on locality - and is found in the simplest of shapes (the bucket or barrel) with the least complicated of rim forms (flat, rounded, or nondescript) and is only rarely decorated in any way or very well finished. It seems clear from some of the Liddle sherds that the pots were simply fired upside down in a bonfire and this

would account for the general scarcity of bases as well as the variable surface colour on any one vessel.

Flat-rimmed ware is generally regarded as nothing better than 'the lowest common denominator of bad pottery' (Piggott 1955, 57) which Coles has attempted to show is not particularly assignable to any one period as it was produced as early as the third millennium BC (1970, 97). It would be facile to point out that out of Coles' four examples of instances where *flat-rimmed ware* has been found with neolithic pottery (*ibid*) only one, Croft Moraig, Perthshire (Piggott 1971, 10) bears much close scrutiny. The site report of the Loanhead of Daviot, Aberdeenshire (Kilbride-Jones 1935), is open to a number of interpretations; only the barest idea of what was excavated at Easterton of Roseisle, Morayshire, can now be pieced together (Walker 1968) and the sherds found below the neolithic barrow at Pitnacree, Perthshire (Coles 1965, 43), are not only minute but none of them comes from either a rim or base. This argument is not worth following, for although some of these examples may be suspect it remains a fact that what has been called *flat-rimmed ware* is so unsophisticated in manufacture and form that it is very likely to occur, for that reason, on sites of all sorts of periods.

While agreeing that this pottery is not datable in itself, if all its multitudinous occurrences in unstratified, secondary, and uncertain contexts are put on one side and only the clear instances examined, where it formed all or most of the ceramic assemblage on a site dated by independent means, then something of a pattern emerges. Although the evidence is not as full as would be desirable, it is fairly clear that, whether or not current at other times, it was the principle ceramic type in use outside of the Deverel-Rimbury and Trevisker area in the middle and late bronze age and survived into the earlier part of the iron age: it neatly fills the gap in the pottery sequence left by the re-allocation of all the supposedly middle and late bronze age urns to the early bronze age by Burgess (1974, 176) and parallels the poor quality ceramics current at that time in the rest of Britain. The term *flat-rimmed ware*, in itself, is quite an inaccurate description for what are really simple, crude, bucket and barrel shaped pots.

To judge by the amount of pottery recorded from burnt mounds other than Liddle and Beaquoy one could easily come to the conclusion that the material culture was more or less aceramic. When it is considered, however, how few burnt mounds have been scientifically excavated and that potsherds are scarcely distinguishable from burnt shattered sandstone in the field, allowance has to be made for the possibility that pottery simply has not been recovered, though present. It is interesting in this respect that the only other site which has produced a reasonable number of sherds is Deadman Bottom, a burnt mound in the New Forest largely made up of calcined (i.e. white) flint fragments (Pasmore and Pallister 1967). It should also be taken into consideration that the volume of non-decomposable rubbish generated on burnt mound sites in a given length of time would have been far greater than on other types of site and that small finds, including pottery, would therefore appear to be comparatively sparse.

The Royal Commission did note five Shetland burnt mounds which had produced pottery – Lochs of Beosetter, Cruester, Selfster, Housegord and Nestaness (1946, III, 5, 110, 123). Sherds from the first three could not be traced in the National Museum, although they may be extant; the urn, whetstone and glass bead from the Housegord area were not necessarily found together or in a burnt mound (Society of Antiquaries 1866, 310); and the pottery preserved from Nestaness was found to consist of one body sherd. Two pieces were, however, recovered from a burnt mound at Westerwick, Shetland, when it was being destroyed (Moar 1949, 231, fig 1) and one is a rim sherd which may be early iron age, as suggested, although its profile compares well with a late bronze age sherd from Jarlishof (Hamilton 1956, fig 18). Sherds found during excavations at the Ness of Sound have been identified as belonging to the pre-bronch iron age by Small (*Shetland*

Times 1972, 9). The sherds from Deadman Bottom, which have already been alluded to (Pasmore and Pallister 1967, 18-19), are of a fabric distinctly like that of the Deverel-Rimbury pottery found in the immediate vicinity (e.g. Hedges 1975, 31); and are likely therefore to be middle or early late bronze age.

Artefacts made from organic materials Although the conditions often found in burnt mounds would be expected to be favourable to the preservation of particular types of organic materials, few artefacts of this description have been found as yet. From Liddle there was a short length of cord made from grass or something similar (LF21) and from Beaquoy a small piece of mineralised leather (BD8); of more interest is a wooden shovel, or paddle, apparently found at the Ness of Sound, Shetland (*DES* 1972, 38).

Evidence for metalwork Although not found at either Liddle or Beaquoy, metalwork and slag have occurred at a very small number of other burnt mounds. The most important find is a flanged bronze axe from Millstreet, Co Cork, which can be dated to the middle bronze age (O'Kelly 1954, 143), but some very corroded bronze was found at Clay Head I, Isle of Man (Cubbon 1964, 575), iron slag at the Ness of Sound, Shetland (*Shetland Times* 1972, 9), and the remains of what had been a tin ring covered with gold foil at Killeens I, Co Cork (O'Kelly 1954, 131).

It should be noted that, while Raftery stated that copper axes had been found in Irish burnt mounds (1951, 157), O'Kelly could find no basis for this claim (1954, 142); similarly a late bronze age gold ornament said to have come from a mound at Balla, Co Mayo (O Riordain 1953, 44), was not necessarily connected with it (O'Kelly 1954, 142), and the La Tène brooch from a site at Merthyr Mawr, Glamorganshire (O'Kelly 1954, 144), which does not really seem to have been a burnt mound, was a surface find (Fox 1927, 44, 50).

Other types of artefact In this residual group belongs a glass bead from Housegord, Shetland (RCAMS 1946, III, 123), which, like the pottery and whetstone, quite possibly did not come from a burnt mound (Society of Antiquaries 1866, 310). To this may be added a stone marked with a cup and ring which was found built into the wall of a building connected with the burnt mound at Pickaquoy, Orkney (RCAMS 1946, II, 162; Petrie 1857, 61, pl 3).

Looking at the finds from Liddle and Beaquoy in the context of those from other burnt mounds it can be seen that, although the situation is likely to be modified to a certain extent by further excavation, this type of site tends to produce few artefacts and they are generally of a very undistinguished nature. Just two or three decades ago the only means of dating burnt mounds would have been on the basis of the finds, and the conclusions would have been limited and tenuous because of their indistinctiveness and the consequent ability to parallel them in contexts sometimes thousands of years apart. This is because they are the lowest common element in a material culture which, in its basics, was operative, in certain areas, for millennia. As an adjunct of scientific dating, we need no longer feel a predominant concern that the finds are so undistinguished; it is of interest that at the time the burnt mounds were occupied the material culture seemingly reached an unprecedented low ebb.

THE FUNCTIONAL ASPECT OF BURNT MOUNDS AND SOCIAL ISSUES

The interpretation of burnt mounds has centred, not unnaturally, on their peculiar features – the large troughs, fire reddened cists, and hearths, and the great dumps of burnt stone, ash and carbon around them – which were, as early as 1815 (Cantrill 1913, 648), recognised in writing as

being connected with cooking in some way and in fact have the common appellation in parts of Ireland nowadays of *cooking places* (O’Kelly 1954, 138). Cooking with hot stones may seem, from a 20th-century viewpoint, to be the least obvious of solutions to a universal problem, but for cultures which do not possess the means of making water-tight containers capable to withstanding direct heat and large enough to be practical it is the simplest way available of boiling food and, given a primitive state of culinary technology, alternative methods of baking and steaming could not be much more efficient. Other methods of cooking food are surprisingly few, the most practical being simply putting it in or on hot embers, with or without any protection, and roasting.

The ethnographic parallels available (e.g. Tylor 1865, 260–67; Cantrill 1911, 255–6) not only speak for the feasibility of this means of cooking and for its once widespread popularity, but, in giving practical details, enable us to discern three methods – boiling, baking, and steaming – which can be related to various of the features commonly associated with burnt mounds. In order to boil food, a container which will retain water is essential – this may be a hole in the ground lined with raw-hide, a suspended skin, a closely plaited and proofed basket, or any other construction which would serve the purpose such as a dug-out log, or a wooden or stone structure sunk in either impermeable or waterlogged ground. Food is cooked simply by bringing the water to the boil and keeping it there by the addition of hot stones. Troughs would have to be large in order to accommodate the stones, as well as the food and water, and the hearths, of appropriate dimensions, would be preferably as close as possible in order to ease the transference of the hot stones and to reduce heat loss. Baking is carried out by heating a hole in the ground with a fire, adding the food together, usually, with hot stones, and clamping the whole over for the period of cooking; steaming differs only in that water is added, most conveniently in the form of damp vegetation. The fire reddened cist-like structures and the simple holes in the ground occasionally found on sites would of course be ideally suited to either of these processes. All of the means of cooking with hot stones require a plentiful supply of fuel and stone, although the latter could be re-used to an extent depending on its rate of fragmentation, and would generate ash, carbon, and shattered burnt stones as waste products; boiling is peculiar in that it would need a large volume of water, making proximity to a good source advantageous and a means of disposing of it once dirtied by use helpful.

Ethnographic parallels are, of course, not the most acceptable method of demonstrating function; we do, however, have, for the British Isles, the additional evidence of a few literary references which not only show that cooking with hot stones was practised until quite recently but give some idea of how it was carried out. One commentator, for instance, as late as the mid 18th century, says of the Hebrides and Hebrideans (Burt 1754, II, 279):

‘I have been assured, that in some of the islands, the meaner sort of people still retain the custom of boiling their beef in the hide; or otherwise (being destitute of vessels of metal or earth) they put water into a block of wood made hollow by the help of the dirk and burning; and then with pretty large stones heated red-hot, and successively quenched in that vessel, they keep the water boiling, till they have dressed their food.’

Boiling in the hide was also used by Irish soldiers on campaign in France in 1544 (French 1899, 43):

‘Not only were the Irish soldiers in those days accustomed to catch their cows in a strange manner, but they had an equally strange manner of cooking them. They in fact boiled them in their skins; having skinned a cow, they formed a bag or trough by lashing the skin firmly at the four corners to trees or stakes, and then having poured water into the trough,

they kindled a large fire at one side, and they boiled the water and cooked the meat by heating stones to a great heat and throwing them into the trough.'

Much older references than these to stone boiling exist in early Irish literature where the exploits of the *fianna* of Finn MacCumhaill when hunting and of others are recorded (O'Kelly 1954, 147-150; O Riordain 1953, 44). The most detailed of these tells us that it was the custom of the *fianna*

'to send their attendants about noon with whatever they had killed in the morning's hunt to an appointed hill, having wood and moorland in the neighbourhood, and to kindle raging fires thereon, and put into them a large number of emery stones; and to dig two pits in the yellow clay of the moorland, and put some of the meat on spits to roast before the fire; and to bind another portion of it with suagans (straw rope) in dry bundles and set it to boil in the larger of the two pits and keep plying them with the stones that were in the fire, making them seethe often until they were cooked' (ibid, 147-8).

Whether or not Finn MacCumhaill actually was a person who lived in the first centuries AD, there can be little doubt that these references record a practice usual in early Irish society.

As well as boiling, another process of food preparation is attested by the early Irish literature (*indeonadh*), and it would appear that for this a specialised piece of equipment was required (*indeoin*): O'Kelly identifies these terms respectively with roasting and a roasting pit, but the latter interpretation, in particular, was rather tentative and the references cannot be taken to demonstrate the use of earth ovens (1954, 141, 147-8). There is, however, a reference in *The Poems of Ossian* to cooking with hot stones at a location in Ulster; while this may not be important in itself, due to its vagueness and the possible inauthenticity of the composition as a whole, some notice must be taken of MacPherson's annotation (1806, II, 18):

'The ancient manner of preparing feasts after hunting is handed down by tradition. A pit lined with smooth stones was made; and near it stood a heap of smooth flat stones of the flint kind. The stones as well as the pit were properly heated with heath. Then they laid some venison in the bottom, and a stratum of stones above it; and thus they did alternately till the pit was full. The whole was covered over with heath to confine the steam. Whether this is probable I cannot say; but some pits are shewn, which the vulgar say, were used in that manner.'

Such methods have been shown to be viable by practical experiment (e.g. Bullows 1927, 297; O'Kelly 1954, 117-23; Fahy 1960, 14-15). The most important of these were carried out by O'Kelly using the actual features uncovered at Ballyvourney I, restored where necessary. In the final boiling experiment a leg of mutton, weighing 4.5 kg, was bound in straw, in accordance with the reference cited above, and immersed in approximately 450 litres of water in the trough, which was brought to the boil in 35 minutes with pieces of sandstone heated on a fire made of dead wood and kept simmering for three hours and forty minutes by occasional additions. The enormous hearth was found to be an advantage as the amount of stone necessary was about half of a cubic metre or, in this case, sufficient to fill two-thirds of the trough. In spite of the water, by the end, being filthy with fat, ash, charcoal and mud, the leg of mutton was deemed edible and the experiment considered successful proof that cooking could be carried out as it was described in early Irish literature. The more limited experiments of Fahy (ibid) suggested that less sandstone, perhaps half the volume of the trough, would be required if it was heated sufficiently. Burnt mounds are not all of course made of burnt sandstone and charcoal, but experiments by the author,

modelled on those of O'Kelly, using flints heated with wood (as for sites in the New Forest) and sandstone heated by peat (as for the Northern Isles), have resulted in perfectly cooked legs of mutton and suggest that greater efficiency overall could be obtained by practice.

O'Kelly had a suspicion that the fire-reddened flag-lined cist at Ballyvourney I had been for roasting (*sic*) and he carried out a successful experiment, again with a leg of mutton, in which the structure was pre-heated with a fire and then swept clean; the meat was placed in it and hot stones banked around which were periodically replaced (seven times) until, after three hours and forty minutes, the meat was cooked. Unlike the boiling experiments, this had the major disadvantage of being purely theoretical, there being no close guidelines to be found in the early literature; in the light of ethnographic parallels and MacPherson's description of the process, as given above, it is likely that less care would have been taken to bank the stones around the food and that the whole would have been covered in some way to reduce heat loss.

There cannot really be much doubt, in view of the above evidence, that the peculiar features associated with burnt mounds were used as adjuncts to cooking with hot stones and that the mounds themselves are composed largely of the debris. This aspect of burnt mounds has, however, preoccupied any thought about them and it seems a little obsessive as we have evidence, archaeological and literary, that cooking with hot stones was a method used in the British Isles from the neolithic period, and quite possibly earlier, up until the 18th century and possibly later. 'Pot boilers' are such a frequent find on archaeological sites that it would be tedious to labour this point with a great catalogue of examples, and in fact a comprehensive study of the use of such means of cooking forms a subject in itself. This notwithstanding, random instances may be cited, such as, for the Northern Isles, Skara Brae (Childe 1929, 267) and Jarlshof and Clickhimin at all levels from the bronze age to the Viking period (J Hamilton, pers comm). Elsewhere they are most strikingly common on settlement sites of the middle and late bronze age and the earlier part of the iron age in S England (Stone 1941, 119; Burstow and Holleyman 1959, 172; Rahtz 1962, 289; Wilson 1940, 180, pl III; Bersu 1940, 35, 103). Although the mere presence of 'pot boilers' and even associated cooking structures is not sufficient to class a site as a burnt mound, as one at Merthyr Mawr, Glamorgan, has been (Fox 1927; O'Kelly 1954, 144), it has to be admitted that in cases where they are particularly abundant, e.g. Buckenham Tofts Park, Norfolk (Layard 1922), the distinction is less easily made.

Such methods of cooking would be appropriately used where alternative equipment was unavailable, for instance, on hunting expeditions and military campaigns, but also by cultures which did not possess good pottery, metal vessels, and where other means of baking and steaming, which are not particularly advantageous, simply were not employed. It might well be possible, given time, to show a correlation between the incidence of 'pot boilers' on sites in general and the quality of the pottery present but, in the short term, it seems significant that not only is pottery from burnt mounds scarce but it is relatively poorly made.

O'Kelly interpreted burnt mounds as seasonal and temporary camps such as those described in early Irish literature (1954, 138, 143) – with which he all but identified the majority (*ibid*, 145) although, on the basis of archaeological evidence and some late literary references either to cooking with stones or such an institution (*ibid*, 143), the period of their use, as hunting camps, was extended from about 2000 BC to the 16th century AD (*ibid*, 144). In support of this strongly uni-functional interpretation he offered the archaeological evidence from his sites: several phases of occupation, the finding of autumnal debris in some of the troughs, and the general absence of finds (*ibid*, 137, 142) which he took to show intermittent use of short duration in the milder seasons of the year. This viewpoint naturally coloured his interpretation of some of the features uncovered at his sites, which need not necessarily have had any connection with cooking – the

huts were meat stores and shelters for an attendant who stayed at camp while the hunters were away; a rectangular post-hole structure became a 'butchers block'; and two post-holes a 'meat rack' (ibid, 139, 114).

In a rather negative way certain aspects of O'Kelly's argument can be questioned – phases of reconstruction are commonplace on archaeological sites and do not necessarily imply abandonment; autumnal debris, by the nature of the seasons, is the most likely to be encountered; and finds are rare on other classes of site, e.g. hut circles (Feachem 1965, 94-9; Fairhurst 1971, 1) which are not generally thought of as seasonal. This means that the interpretation of burnt mounds as hunting camps hinges totally on their similarities with those described in early Irish literature and the fact that they have always been referred to in writing in Ireland as 'cooking places' and are still commonly called that. An alternative case can, however, be made for their being connected with permanent settlements and having nothing to do with roving hunters or warriors.

It is not a matter of major concern that the methods of cooking mentioned in early Irish literature and those used on burnt mound sites are similar for such means are known to have been used for a very long period and it is quite clear that burnt mounds, i.e. prominent heaps of rubbish, do not necessarily result. Moreover, while we have literary evidence for historical times that this method of cooking was used when hunting and on military campaigns, with the possible exception of one (p 77), all of the dated burnt mounds are prehistoric. By implication it seems that the temporary camps of the historic period must have been so insubstantial that they have escaped notice and, arguing backwards, the use of the known burnt mounds must have been considerably less transitory. It might also be the case that people using this method of cooking when hunting would recognise the debris of existing burnt mounds for what it was and interpret them as large cooking places.

It is useful that the northern part of the distribution of burnt mounds is almost totally in Orkney and Shetland as an island setting often makes obvious aspects which would be less evident in other situations. In both island groups, certain areas of land are more cultivatable than others (fig 22) and this is reflected in recent agrarian patterns of settlement. It happens that the distribution of burnt mounds is almost identical (fig 21) and it seems unlikely that seasonal hunting camps would be on the land most suited to permanent settlement; such a suggestion would in fact be tantamount to relegating the Northern Isles to the status of a reserve. It should also be remembered that the density of known burnt mounds in this area – one every four to six square kilometres, including marginal land, must be one of the highest in Britain for any type of non-funerary site. Not only does this seem a very heavy concentration of temporary hunting camps but, as will be shown, most burnt mounds in the British Isles appear to belong to the middle and late bronze age and the earlier part of the iron age and, particularly early in this period, it would mean an embarrassment of summer accommodation and a total absence of anything for the rest of the year. There is moreover a little archaeological evidence for Liddle and Beaquoy to suggest that these sites were in fact permanent settlements – the sheep teeth from the latter (Appendix VI) may have come from a feral domesticate but the pollen evidence and the ard-shares certainly suggest mixed agriculture (Appendix III), while the solidity of the buildings and the extensive use of peat – which has to be cut, dried, carted, and stacked – are both incompatible with the idea of occupation for short periods.

If the references in early Irish literature had never existed, it is doubtful if burnt mounds would ever have been thought of as temporary hunting camps. In the Northern Isles, as far as can be seen, there were cooking facilities in a building, which in all other respects was a perfectly ordinary house, and the debris was piled around the outside. In the western distribution of burnt mounds, in contrast (and again on the basis of a very small sample), it would appear that the

cooking facilities stood in the open and the debris was simply scattered around; buildings have only rarely been found (p 66) but have always been separate and it seems possible that their frequent absence can be attributed to the remains of wooden structures not being obvious to inexperienced eyes and the tendency of archaeologists to concentrate on the mound of rubbish and the cooking area it encloses to the exclusion of anything that might have been on the periphery. The idea that burnt mounds are just tips of rubbish, largely from cooking with hot stones, which are found around or near otherwise perfectly normal dwellings, is capable of proof or disproof and must be considered in the meanwhile as a hypothesis which usefully draws attention away from the more or less unquestioned acceptance of these sites as temporary hunting camps (Fahy 1960, 14). Should the early Irish literary references and the evidence of nomenclature be shown to have been a red herring then burnt mounds will represent one of the most formidable pre-historic settlement patterns in the British Isles and their clustering in groups will take on a greater significance than if they were just hunting camps used at different times (O'Kelly 1954, 138).

DATING

The dating of burnt mounds has always hinged on very slender evidence simply because distinctive small finds are almost totally absent. Initially, they were considered to be neolithic on the basis of stone axes found near, not in, burnt mounds at Clonkerdon, Co Waterford (Quinlan 1887, 392); a view accepted by Cantrill and Jones for the Welsh examples (1906, 23) and endorsed, in their minds, by the discovery of two nondescript flint flakes in mounds in Pembrokeshire (1911, 261; Leach 1909, 243).

In 1951 Raftery considered at least some of the Irish burnt mounds to be early bronze age because of discoveries of copper axes in them (157); these could not however be traced by O'Kelly (1954, 142). O Riordain (1953, 44) gave as dating evidence Quinlan's unstratified stone axes (*ibid*), a late bronze age gold ornament from a site near Balla, Co Mayo (with which it was not necessarily connected (O'Kelly 1954, 142)), and a flanged bronze axe from Millstreet, Co Cork (*ibid*, 143). The latter, which is of middle bronze-age type, was stratified and is the only datable small find from Ireland which was certainly found in a burnt mound.

Evidence of this type is as scanty and unreliable elsewhere. Apart from the flint flakes already mentioned, O'Kelly added, for Wales (1954, 144) iron age pottery from Radyr, Glamorgan, reputedly datable to within the period 100 BC to AD 100, and a La Tène brooch and other objects from Merthyr Mawr, in the same county, which would fix the date of that site between 400 and 300 BC although the occupation may have continued. Both of these instances are, however, suspect. The report on Radyr (Grimes 1935) was written up from rough notes on an excavation which had taken place twenty years previous and there is a good chance that the pottery was unstratified (*ibid*, 50); moreover, the two parallels brought forward for the sherds were only used to suggest that it could not have been produced in the Roman period and must have been late prehistoric, probably iron age – it was therefore simply considered to be earlier than AD 50. The site at Merthyr Mawr has only a superficial resemblance to burnt mounds and, in any case, the La Tène I brooch and ring-headed pin were both surface finds (Fox 1927, 44 ff, esp 50, 47, 54). The list of datable finds for the western part of the distribution of burnt mounds can then be completed by the poor additions of a piece of corroded bronze from Clay Head I, Isle of Man (Cubbon 1964, 575), and nine flint-tempered sherds from Deadman Bottom in the New Forest which may well be assignable to the middle or earlier part of the late bronze age (Pasmore and Pallister 1967, 18, 19).

The situation in the Northern Isles is better. At the Ness of Sound, Shetland, pottery and

iron slag indicate occupation in the pre-broch iron age (*DES* 1972, 38; *Shetland Times* 1972, 9) and sherds found during the destruction of a site at Westerwick in the same county probably belong to the same period (Moar 1949, 231 fig 1). It should be noted in passing that the urn, glass bead, and whetstone often ascribed to a burnt mound at Housegord, Shetland (Callander 1933, 349; RCAMS 1946, III, 123), were not necessarily found there, or even together (Society of Antiquaries 1892, 216; 1866, 310). In Orkney only one datable find has been recovered – the barbed and tanged arrowhead found below the site at Beaquoy which, from the crudity of its manufacture, is likely to be middle or late bronze age.

The finds, even now, give a very unclear idea of the date of burnt mounds but in the past, especially clouded by instances of dubious association, the only vague conclusion that could have been arrived at was that at least some of the sites were prehistoric. To this was added the literary evidence, which, largely on the idea that cooking with hot stones, seasonal hunting, and burnt mounds were inseparable, gave rise to the extreme date bracket given by O'Kelly of between about 2000 BC and the end of the 16th century AD for this type of site (1954, 144). This wide range has by and large been accepted (Hodges 1955, 25; Fahy 1957, 73) but, as argued elsewhere, a large number of these references have nothing more in common with what we know of burnt mounds than a method of cooking which archaeological evidence shows us was practised in the British Isles for millennia in many different cultural settings without great mounds composed almost exclusively of burnt stone, ash and carbon resulting. O'Kelly, however, presented information, particularly about the *fianna* of Finn MacCumhaill (1954, 138–41, 143, 147–55), which cannot be dismissed out of hand and the possibility must be allowed that some of the Irish sites, at least, were used as temporary hunting camps in the early part of the first millennium AD, and possibly later, judging by the terms by which burnt mounds are still known in that island (ibid 1954, 138). It must be noted however, that, with the exception of the radiocarbon dates from Drombeg, Co Cork, discussed below, this idea is not as yet supported by any independent dating evidence.

Pollen analyses have been carried out on peat samples associated with three of the excavated Irish sites, Ballycroghan I, Co Down, and Milleens and Ballyvourney I, Co Cork (Smith 1955, 26–8; Mitchell 1954, 152–4). Aside from the evidence these give with regard to environment they are, in the circumstances, very valuable as rough guides to dating. The relationship between independently datable objects found in bogs and a decline in pine values in SW Ireland enabled Mitchell to assign the two sites in Co Cork to the late and middle bronze ages respectively (ibid). Smith considered Ballycroghan I to belong to the late bronze age on the basis of similarities between his pollen diagram and others for the area which were relevant to the transition between zones VII and VIII (ibid). Due to the fact that there has been little change in the environment in Orkney since the late neolithic (Davidson *et al* forthcoming), pollen analyses for that area are of no dating value.

Scientific methods of absolute dating, such as radiocarbon assay and thermoluminescence, are, of course, invaluable where more traditional means fall short. O'Kelly took very early advantage of radiocarbon dating by submitting samples from the troughs at Killeens I and II to Libby at the Institute for Nuclear Studies, Chicago University (Libby 1954, 734). These gave dates of (C-877) 3506 ± 230 bp and (C-878) 3713 ± 270 bp which, when calibrated according to the method of Clark (1975), correspond to $1909 + 313 - 294$ BC and $2178 + 428 - 811$ BC (68% confidence), placing both sites in the early bronze age. In assessing the exactitude with which these dates can be credited, however, more than the wide error terms have to be taken into consideration. Not only were the samples processed at an early time for radiocarbon dating but the wood from which they were taken was certainly in one, and probably in both, cases over 120 years old (O'Kelly 1954, 130, 132; pers comm). Radiocarbon dates were also obtained for

charcoal from the base of the trough and the old ground surface near it at Drombeg in Co Cork and were published by Fahy (1960, 17). These were tentative at the time (O'Kelly, pers comm) and slightly different dates were given in *Radiocarbon* (McAulay and Watts 1961, 35) after the samples had been re-run. The dates, (D-64) ad 430 + 120 and (D-63) ad 560 ± 120, when calibrated (Clark 1975), correspond to AD 454 + 150 – 109 and AD 604 + 109 – 150, making the site early Christian in period. It should be noted that a third sample from Drombeg, charcoal associated with pottery in a recumbent stone circle, was processed with the two from the burnt mound and was given the date (D-62) ad 600 ± 120; this is clearly anomalous although it may perhaps be accounted for by assuming the sample to have come from an intrusive burial (O'Kelly, pers comm). The site at Sharmer Farm, Warwickshire, was not recognised as a burnt mound but it is quite clear, from the short *Radiocarbon* entry (Shotton 1973, 465), that it was. Charcoal from the trough and hearth gave dates of (Birm 344) 2950 ± 100 bp and (Birm 371) 2990 ± 100 bp, which in calendar years are 1250 + 154 – 174 and 1306 + 142 – 171 BC (Clark 1975); the site would therefore appear to belong to the middle bronze age.

Middle bronze-age dates were also obtained for heather roots from the trough and some peat formed over the flag-lined gully at Liddle (Appendix I). These, (SRR-701) 2826 ± 75 bp and (SRR-525) 2908 ± 45 bp, when calibrated are 1066 + 166 – 127 and 1187 + 159 – 161 BC (Clark 1975). Two samples from Beaquoy have been submitted to the same laboratory but dates were not received in time for inclusion in this report. One sample, comprising bone from the natural gully under the site, should pre-date the period of major activity, while the other, bone from the trough of Beaquoy II, should slightly post-date it.

In view of the extensive use of fossil fuel on the Orcadian burnt mounds as well as the lack of bone it was not expected that suitable C14 samples would be recovered. With this in mind, a programme of thermoluminescence dating was initiated using pottery and burnt stone from Liddle I and was subsequently extended to include analyses of stones not only from Beaquoy but from five other unexcavated sites – Barswick (S Ronaldsay), Fan Knowe (Sandwick), Knowe of Scorn (Birsay and Harray) (RCAMS 1946, II, 289, 268, 34), Liddle II (fig 1) and Graemeshall (Holm, NGR HY 017495) (fig 21). Although, for technical reasons, the material was not sufficiently satisfactory to make a single date reliable, the large number of determinations, forty-three for the seven sites, cluster in the date range from 1300 to 100 BC and thereby give the impression that the burnt mounds belong to the middle and late bronze age and the pre-broch iron age. In the case of two sites, the Knowe of Scorn and Graemeshall, it proved possible to give the more precise dates of 430 BC (± 70, ± 130, OxTL 189i) and 1130 BC (± 40, ± 160, OxTL 189 f), which are in accord with the above conclusion (Huxtable 1975; Appendix II).

These means – small finds, pollen analyses, radiocarbon and thermoluminescence – have each been productive of a few dates for sites in which some confidence can be placed. On their own they are inconclusive but, taken together (fig 23), they demonstrate clearly that most burnt mounds are to be ascribed to the period from about 1400 to 100 BC or the middle and late bronze ages and the earlier part of the iron age. The only evidence that any may belong outside of this period takes the form of the radiocarbon dates from Killeens and Drombeg, Co Cork, and the references found in early Irish literature recording the use of similar sites at a previous period identified with the first few centuries AD.

SETTING

The siting of burnt mounds, and the reasons for it, can be considered at two levels – purely local and in terms of the British Isles as a whole. The most obvious consideration would have

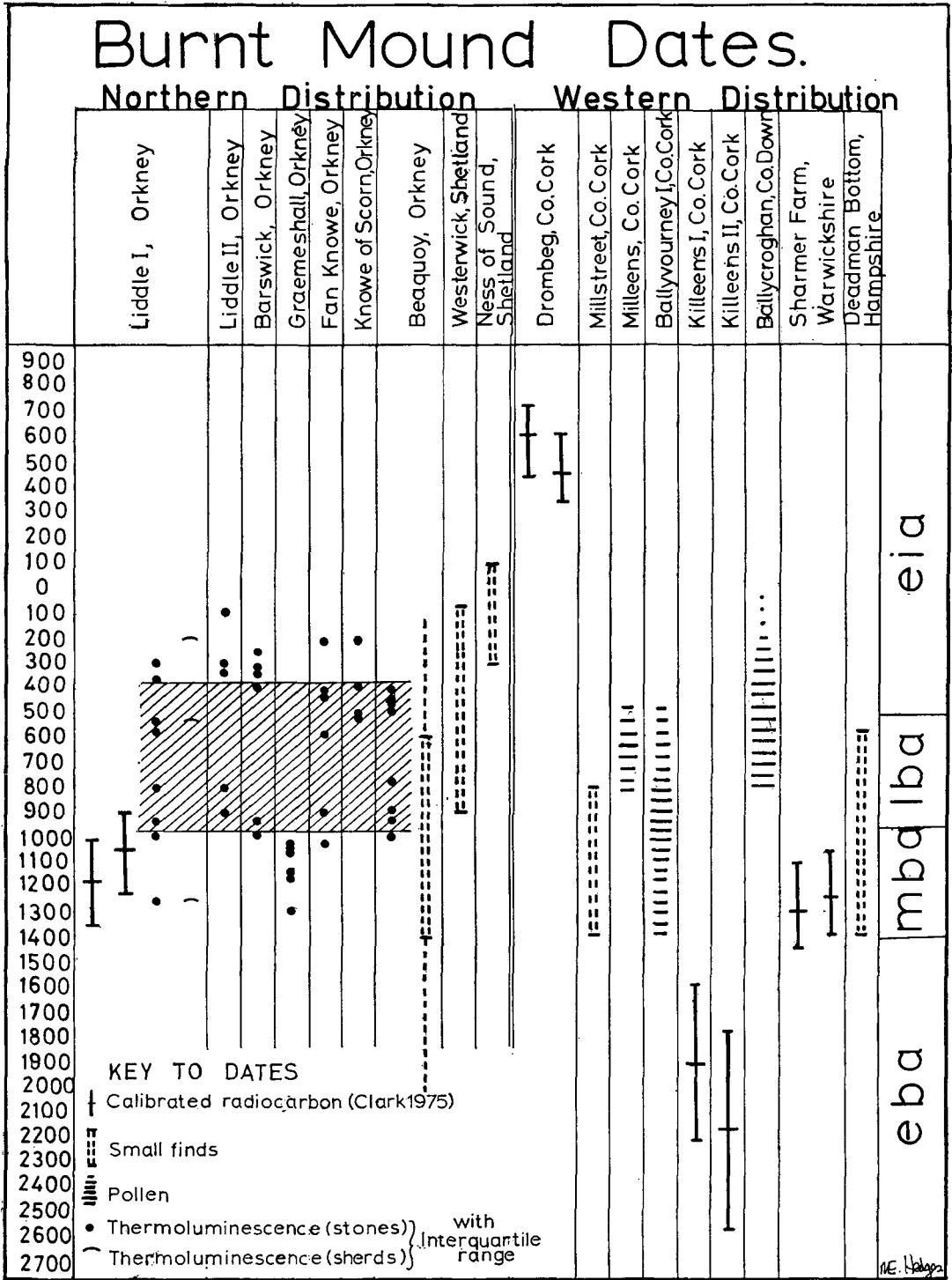


FIG 23

been proximity to reliable, though not necessarily large, supplies of water, stone and fuel. Burnt mounds are almost invariably said to be next to a stream, a spring, boggy ground or a similar source and those in Orkney are no exception for, in spite of extensive modern drainage and possible climatic changes, 40% are presently situated next to streams, and 8% border on lochs, while 23% are coastal; of the remainder, 80% are on poorly or imperfectly drained land (F Dry, pers comm). The likelihood of proximity of suitable stone is more difficult to measure although 21% of burnt mounds in Orkney are in situations where bedrock is at a lesser depth than 50 cm and outcrops in the vicinity would be therefore quite likely (F Dry, pers comm): this may, however, have no relevance as none of the burnt stones found at Liddle I, Beaquoy or at any of the other sites from which thermoluminescence samples were taken looked as though it had been quarried; most of them bore a strong resemblance to those which are still taken off the fields, although at Liddle II and Barswick, South Ronaldsay, some beach pebbles had been used. Fuel in Orkney would have meant peat then as in the recent past, for as long as man has occupied the islands they have been relatively treeless although there may have been a very slight increase in arboreal coverage in the late bronze age (Davidson *et al* forthcoming). While this is the case, burnt mounds are not always close to existing peat cuttings (Liddle is some ten miles from the nearest), but it must be remembered that, prior to recent drainage and soil improvement, small deposits were widely spread and were used before alternative fuels became easily available.

Although the availability of stone, fuel and water must have played a part in the siting of burnt mounds it would be easy to overemphasise their importance. What is much more interesting is that, in the Northern Isles, the distribution of burnt mounds is almost indistinguishable from that of the good agricultural land (figs 21 and 22). In an island situation it seems improbable that seasonal hunting camps would be spread over the best land because any game present could be easily reached from the permanent settlements. It is a much more reasonable proposition, especially in the absence of any other type of non-funerary site for most of the period they were in use, that the burnt mounds themselves were the permanent settlements and that they are sited on the best land because their occupants were primarily agriculturalists.

The counties in which burnt mounds have been noted in the British Isles have already been listed and their general distribution, based on this, illustrated (Appendix X, p 61, fig 20). While minor changes will undoubtedly result from future fieldwork and there is scope for a great deal of refinement, the crude distribution given is felt to be a real one. One point, already made, is that there are two areas of occurrence separated by some two hundred and fifty miles in which no sites have been found and between which there may be little connection. The first, referred to as the northern distribution, consists of the heavy concentration in Orkney and Shetland, those in Caithness, and the single outlying example, so far noted, in Ross and Cromarty. The western distribution is larger and more diffuse, covering the greater part of the Republic of Ireland and the W seaboard of Wales but with particularly dense concentrations in some of the southernmost counties of the former and the south-western of the latter and with outlying occurrences in the north of Ireland, the Isle of Man, Dumfriesshire, Kirkcudbrightshire, Staffordshire and Warwickshire and the New Forest, Hampshire. Although the available information is very limited, there is some indication for the western distribution that the more peripheral sites are the least sophisticated, e.g. Clay Head, Isle of Man (Cubbon 1964), Sutton Park and Sharmer Farm, Warwickshire (Bullows 1927; Shotton 1973), and Deadman Bottom, Hampshire (Pasmore and Pallister 1967).

Cantrill was undoubtedly correct when he suggested that the occurrence of burnt mounds had a connection with the availability of stone that could be heated satisfactorily (1911, 264), as a glance at any simple geological map will show that they lie outside of the area of the British Isles where the softer sedimentary rocks predominate. It is, however, equally obvious that they

do not occur over the whole potentially suitable area, and we know, further, that cooking with hot stones has been practised over the greater part of the rest of the British Isles, for example using flint. Geology is then, at best, a partial explanation for the distribution under consideration.

Another physical factor of interest is the land potential of the area in question and, taking height above sea level as a very crude indication of this, it can be seen that burnt mounds are not associated with the highland zone, as has been suggested (Huxtable 1976), either spatially or in terms of altitude, but with low-lying cultivatable land.

There can be no doubt that these and other physical factors influenced the distribution of burnt mounds but one cannot speak of settlement patterns in an area as great as the British Isles without introducing the human element in that at any one period in the past certain areas were settled by different cultures. It has been suggested above, on the available dating evidence, that the burnt mounds are to be attributed to the middle and late bronze ages and possibly the earlier part of the iron age and their distribution must be seen in the context of other cultural groupings in that timespan. It is unfortunate that this is a period in the British Isles for which very little is known in terms of settlements and funerary practice (following Burgess' reallocation of most of the middle and late bronze-age urn types to the early bronze age (1974, 176)) and for which knowledge has been largely restricted to chance finds of distinctive metalwork. From the summary recently published by Cunliffe (1974, 11-27) it can be seen that, while there is a clear pattern in the south of England of homesteads, enclosures and cemeteries, the evidence, although similar, thins out drastically the further north and west one goes so as to be scant for the midlands, N England and Wales and, by and large, nonexistent for the rest of the British Isles for the middle bronze age and the best part of the late bronze age. There can be little doubt, however, that with further excavation and the application of scientific means of dating, some of the very numerous, although hitherto comparatively fruitless, homesteads which occur in N England and the best part of mainland Scotland, and which are usually attributed to the centuries subsequent to the late bronze-age/iron-age transition, will be found to belong to this earlier period (Feachem 1965, 94-9; Fairhurst 1971, 1), thus filling out a settlement pattern for the British Isles in which the burnt mounds must take a part. As Cunliffe has remarked, the middle and late bronze age can be typified as a conserving society (1974, 217) and it is at the end that changes began to occur. It is then that we get a different type of settlement occurring in the Northern Isles, the farmstead, which continued through into the pre-broch iron age (Hamilton 1956; 1958) and when fortification, although started earlier, became commonplace further south (Burgess 1974, 219-20; MacKie 1971, 59-61).

It must however be stressed that terms such as 'the middle and late bronze age' and the 'pre-broch iron age' have even less meaning in the Northern Isles than they have elsewhere as only the merest ripples of the technological innovations that were occurring at the other end of the British Isles were felt (MacKie 1971, 65, 69); not a great deal of metalwork was in use (Laing 1974, 90-1) and the material culture differed little from that of the stone age. This was, however, in the same timespan when metal was in quite common use in other parts of Britain and seemingly there was a widespread trading network in either finished objects or skills (Cunliffe 1974, 25). It is interesting that in other areas in which burnt mounds are dense (e.g. the very south of Ireland and SW Wales), finds of suitably dated bronze objects are as scarce as they are in Orkney and Shetland (e.g. Hodges 1956, figs 1-7; Coles 1960, maps 1-9; 1964, figs 4, 7, 11, 13, 15), and it could be concluded from this, as it has from the only slightly more positive evidence of the small finds, that if a culture was involved then it was poor compared to some of its neighbours. The lack of evidence for trade in metal is paralleled by a general absence of imported materials even to a local extent, reflected in *quernstones and flint being found almost exclusively at Beaquoy and good pottery and hammerstones at Liddle.*

As can be seen from the relevant specialist reports on macroscopic plant remains, pollen and soils (Appendices III, IV and V), the environment of the burnt mounds in Orkney differed little from what it would have been, say, fifty years ago before the onset of major land reclamation, and the general opinion at present is that it has in fact changed little since the late neolithic (Davidson *et al* forthcoming). The landscape can be roughly described as almost treeless and impoverished with a predominance of heath, which shows itself nowadays in the peaty topsoil of 'improved' land (F Dry, pers comm); in part at least this was caused by early agriculture which was responsible for soil degeneration (Davidson *et al* forthcoming). We know, however, from pollen samples from Fan Knowe and Liddle and the ard-shares from Liddle and Beaquoy, as well as more limited evidence from macroscopic plant remains, that at least parts of the landscape were under cultivation at the time of the burnt mounds and that there was some pastoral practice. Altogether there is a picture of mixed farming which is supported at Beaquoy by the presence of querns and sheep teeth (Appendix VI); if the deer and seal or whale remains from that site are contemporary with its main phase, it would seem that farming was supplemented by hunting.

Although Davidson, Jones and Renfrew found no evidence for climatic change in Orkney since the neolithic in their work, and favoured a stable situation, they left the subject somewhat open (Davidson *et al* forthcoming). If there has been no change in climate, Orkney would be very unusual in this respect since there is abundant evidence from other parts of the British Isles, and indeed W Europe, that there was a marked climatic deterioration around the transition between the sub-boreal and sub-atlantic periods (pollen zones VIIb and VIII), which from bog finds has been traditionally associated with the end of the bronze age and the start of the iron age, for which a date of around 500 BC was envisaged (Godwin 1956a, 33). This situation has become modified in the sense that the decline has become to be seen as a gradual occurrence, with internal improvements and deteriorations, but it has none the less remained a real event in most minds (*ibid*, 34; Pennington 1969, 78; Taylor 1975, 12, fig 3). In terms of current opinion the phase of climatic worsening is considered to have lasted from about 1250 to 600 BC (Piggott 1972, 111), a period very close to that which is posited for the burnt mounds with the further coincidence that the extreme north and west of the British Isles are thought to have been worst affected (Godwin 1956, 31). It is well known that a similar situation in the medieval period had extensive social implications (Burgess 1974, 166–7). Climatic deterioration means a decrease in land potential and hence productivity and it is quite possible to see the impoverished nature of the material culture associated with the burnt mounds (linked with a lack of trade) as being connected with this factor.

CONCLUSION

Apart from the Ness of Sound, Shetland, full information about which is as yet unavailable, Liddle and Beaquoy are the first Scottish burnt mounds to be systematically excavated and published. This is surprising in view of their numbers, particularly in the Northern Isles, but can probably be accounted for in two ways. In the first instance, early investigators in the area could make little sense of these sites, which were often mistaken for burial mounds (Cantrill 1913, 648) – sometimes chambered (RCAMS 1946, II, 162; Henshall 1963, 225) – and which, especially in view of the paucity of finds, must have been very untempting when set alongside the other types of monument available. Secondly, one has to take account of the effect of the theory which has been progressively refined in Ireland from Quinlan (1887) to O'Kelly (1954), and which is based on references in early literature and philology, that the burnt mounds are the temporary, seasonal cooking-places of roving hunter-warriors.

The presently available information for the Northern Isles suggests quite a different state of affairs. The burnt mounds are densely scattered on the best agricultural land; the buildings associated with them are solid, permanent structures, which look like houses; and their occupants, although poor, appear to have carried out mixed farming. While it is true that hunters and warriors have found that cooking with hot stones has saved them carrying culinary equipment, sedentary people have also found it useful when they do not have such equipment.

These findings have not only brought the accepted function of burnt mounds under suspicion but also the period of their occupation as, of course, it is unlikely that one type of settlement would have remained in use for four thousand years amidst others that were constantly changing. Evidence from the Northern Isles suggests that these habitations were occupied in the middle and late bronze age and the earlier part of the iron age; a period for the most of which no settlement sites are known.

It is difficult to say at present whether the situation in the Northern Isles can be definitely extrapolated so as to embrace the more western area, incorporating large parts of Ireland and Wales, in which burnt mounds are also found. Such evidence as is available suggests that this may be the case and it is the tentative conclusion of this article that the burnt mounds found in such density in certain parts of the British Isles are middens associated with the dwellings and cooking facilities of the occupants of those areas in the middle and late bronze age and the beginning of the iron age.

APPENDIX I

Dating – radiocarbon (*based on radiocarbon dates supplied by D D Harkness, Scottish Universities Research and Reactor Centre, East Kilbride, Glasgow*)

All dates given in the text and in this appendix have been converted from radiocarbon to calendar years using Clark's calibration curve (1975) and have been quoted with 68% confidence intervals. Although normal, it seems senseless to publish a calibrated date with uncalibrated confidence limits as this gives little idea of the date range one can be 68% certain that the sample should fall in. Due to the undulations of the calibration curve, the upper and lower limits, once calibrated, will usually be separated from the calibrated radiocarbon date by a different number of calendar years.

Liddle: first peat formed in the flag-lined gully

This should post-date the occupation of the site slightly.

SRR – 525. 2908 ± 45 bp $^{13}\text{C} = -29.6\text{‰}$

When calibrated (Clark 1975) this corresponds to

1187 BC + 159 – 161

Liddle: organic detritus, mainly heather roots, from bottom of trough

This should slightly post-date the occupation of the site.

SRR – 701. 2826 ± 75 bp $^{13}\text{C} = -25.0\text{‰}$

When calibrated this corresponds to

1066 BC + 166 – 127

APPENDIX II

Dating – thermoluminescence

by J Huxtable, Research Laboratory for Archaeology and the History of Art, 6 Keble Road, Oxford

Forty-three burnt stones from seven mounds – Liddle I and II, Beaquoy, Barswick, Graemeshall, Fan Knowe and the Knowe of Scorn (fig 21) – were dated by the fine-grain thermoluminescent (TL)

method (Zimmerman 1971), but using a routine of measurement designed to avoid error due to anomalous fading (Wintle 1973). This project was an extension of the TL method to a new type of material. Being mainly Orcadian sandstone (Rousay flag) it was expected that the stones would contain enough quartz grains to make the inclusion method (Fleming 1970) viable. In fact only two stones (both from Liddle I) contained sufficient quartz with satisfactory TL characteristics for this technique to be used, and the inclusion dates obtained were used only as reassurance that the fine-grain results were not seriously affected by anomalous fading.

Some sherds were found at Liddle I and although their TL characteristics were poor, so that there was a lack of precision in the ages obtained for the sherds, three of them were dated (LF35, 41, 22) as a further check that the stones were giving sensible results.

The probability that the stones had not been sufficiently burnt to give complete removal of the geological TL was considered, and excluded by tests carried out on an unburnt stone from Liddle II. For a full report of the dating technique and all the tests carried out on the stones see Huxtable, Hedges, Renfrew and Aitken 1976.

The R.M.S. deviation calculated for the scatter of the individual dates about the average for the site (Table I) is about three hundred years for stones from Liddle I and II, Barswick, Beaquoy and Fan Knowe, five hundred and fifty years for sherds from Liddle I, and about a hundred years for stones from Graemeshall and the Knowe of Scorn.

TABLE I
THE THERMOLUMINESCENCE DATES

Site	No. of samples	Predicted scatter*	Individual dates (BC)
b. Liddle I (stones)	8	130	(2) 540, (3) 810, (4) 930, (5) 990, (6) 1270, (7) 590, (8) 400, (9) 330
b'. Liddle I sherds)	3	525	(13) 210, (14) 1260, (15) 530
d. Liddle II	5	125	(1) 300, (3) 120, (5) 340, (6) 900, (7) 800
e. Barwick	6	125	(1) 990, (3) 340, (4), 260, (5) 950, (7) 320, (9) 410
f. Graemeshall	6	150	(3) 1180, (4) 1160, (5) 1300, (6) 1050, (7) 1040, (8) 1060
g. Beaquoy	8	140	(2) 950, (3) 770, (6) 480, (8) 470, (9) 420, (10) 490, (11) 890, (12) 990
h. Fan Knowe	6	135	(1) 900, (2), 450, (3) 230, (4) 1040, (5) 430, (6) 600
i. Knowe of Scorn	4	130	(3) 220, (4) 520, (6) 510, (7) 410

* This column gives the predicted standard deviation of the scatter of the individual dates for a site, about the average for the site; it is obtained by multiplying the predicted random error on the average (calculated according to the system of Aitken and Allred 1972) by the square root of the number of samples.

The scatter predicted using the system proposed by Aitken and Allred (1972) is about a hundred and thirty years, except for the sherds from Liddle I when, because of the low light level, it is five hundred years. The excess scatter for stones from Liddle I and II, Barswick, Beaquoy and Fan Knowe could be due to unsuspected sources of random error or it may be that the spread of dates is indicative of prolonged occupation. The tight groupings obtained for samples from Graemeshall and the Knowe of Scorn suggest that additional error is not intrinsic to this type of sample and so prolonged occupation is indicated for all sites except Graemeshall and the Knowe of Scorn. On the other hand, for the five samples from Liddle I, there was archaeological indication of stratigraphic order and the sequence of the dates obtained is in conflict with this. There is a distinctive lens of stone in the mound (fig 3) and two samples above this (b5 and 6) gave dates of 1000 BC and 1300 BC, two samples (b7 and 8) from within the lens gave 600 BC and 400 BC, while one sample (b9) from below the lens gave 330 BC.

It is, however, a reasonable archaeological proposition that the sites were likely to have been occupied for at least several centuries and, whether or not there is additional methodological scatter, it seems appropriate to use the dispersion diagram system proposed by Ottaway (1973) for dealing with the radio-carbon dates of a cultural phase. In this the dates are arranged in chronological order and the duration of the phase is taken to be the interquartile range (for a sequence of n dates this is the range that includes:

the middle $\frac{1}{2}n$ of them). Inspection of the individual dates given in fig 23 shows that the interquartile ranges of the separate sites are mutually overlapping, with the exception of Graemeshall. If one was confident that methodological error was not contributing significantly to the scatter, the conclusion that, except for Graemeshall, the sites were contemporaneous would be firm. Because such error may be contributing contemporaneity is taken as a working hypothesis and we note the following interquartile ranges and median values:

- i. all sites except Graemeshall: 900 BC to 380 BC, median 510 BC;
- ii. Graemeshall: 1180 BC to 1050 BC, median 1110 BC;
- iii. all sites: 980 BC to 410 BC, median 590 BC.

On this basis it would be concluded that Graemeshall is significantly earlier than the rest of the burnt mounds that were sampled, though to deduce that there is a gap of a century between the end of occupation at Graemeshall and the commencement of occupation at the other mounds would seem to be too naive an interpretation. For archaeological discussion the TL results should be taken to show that the burnt mounds were in use over the period 1000 BC to 400 BC with a median date of 590 BC. For quotation of this the following style is proposed: 1000 BC – 400 BC (OxTL 189 b-i).

For Graemeshall and the Knowe of Scorn, since the observed scatter is no greater than the predicted scatter, it is allowable to derive dates using the Aitken and Allred (1972) system (though the implication that the Knowe of Scorn is significantly later than the rest should not be taken too seriously on account of the restricted number of samples). These are: 1130 BC (± 40 , ± 160 , OxTL 189F) and 430 BC (± 70 , ± 130 , OxTL 189i).

It will be recalled that the first error limit quoted is appropriate to comparison with TL dates for similar sites in the region, whereas the second error limit is for comparison with TL dates for dissimilar or distant sites, or with sites dated by radiocarbon. The first limit, derived from the observed scatter of the individual dates, is the standard error on the mean value; the second is the predicted limit (at the 68% level of confidence) taking into account both random and systematic sources of error.

APPENDIX III

Environment – pollen

by R L Jones, Geography Department, Lanchester Polytechnic, Coventry

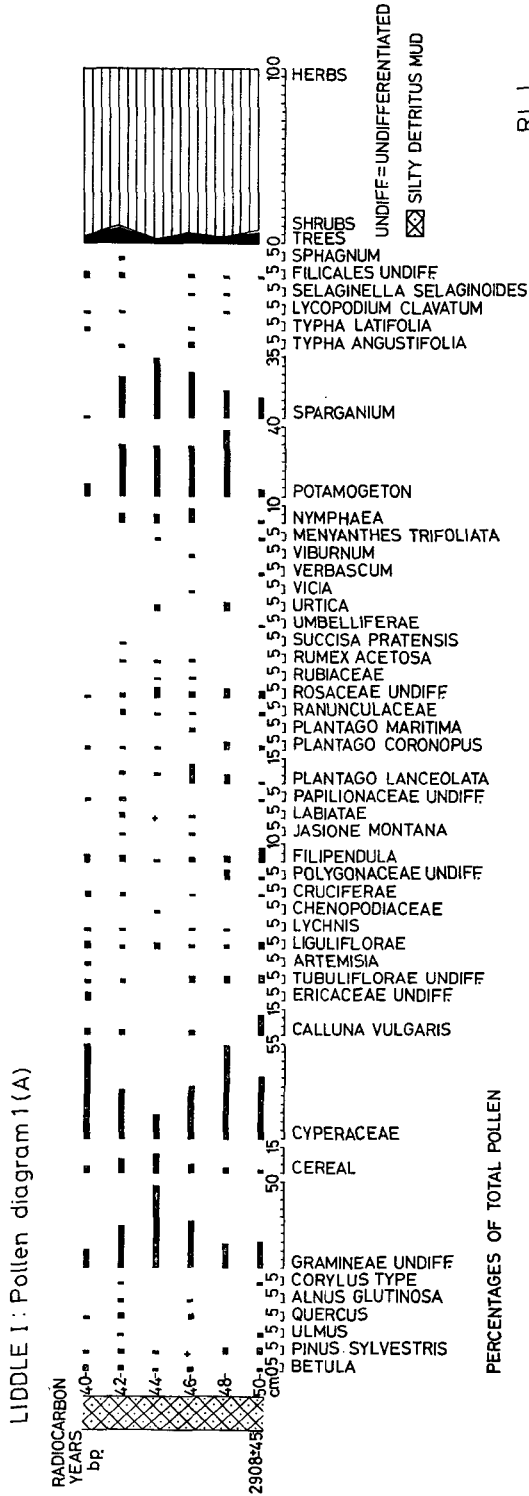
The samples subjected to palaeobotanical analysis fall into two categories. Firstly, those from two organic deposits associated with the house structure at Liddle I. Secondly, those from a number of buried soil profiles beneath both Liddle I and other burnt mound sites at Beauquoy and Fan Knowe (fig 21). The chemical preparation techniques used were those appropriate to the particular sediment type; the majority of samples required prolonged digestion with hydrofluoric acid to remove siliceous matter. All pollen data are expressed as a percentage of total dry land pollen (excluding aquatic pollen and fern spores).

Samples from organic deposits

Liddle I: (A) silting of flag-lined gully (fig 24)

This profile consists of 10 cm of silty detritus mud forming the basal fill of a flag-lined soakaway which is part of the structure associated with the burnt mound. The depositional environment is indicated by high values of *Potamogeton* and *Sparganium* pollen together with the presence of that of *Nymphaea* and *Typha*. The existence of open water is demonstrated together with a fringing reedswamp. Vegetational history around the site is dominated by herbaceous components with tree and shrub pollen accounting for no more than 5% of total pollen.

Within a fairly impoverished flora certain taxa indicative of human activity are discernible. Cereal pollen is present throughout the profile together with that of *Liguliflorae*, *Cruciferae* and *Urtica*; ruderals commonly associated with cultivation practices. Values of *Calluna* pollen decline at the base of the profile to be followed by an expansion in those of *Plantago lanceolata*. This suggests some clearance of heathland accompanied by the colonisation of cleared areas by plantain and other weeds. It appears that some form of mixed agrarian economy was in operation nearby at this stage; the base of the profile yielded a radiocarbon date of 2908 \pm 45 bp (SRR—525) (Appendix I), thereby placing such events in a middle bronze-age context and providing a time before which the underlying structure was built.



RLJ.

Fig 24

Liddle I: (B) localised peat deposit into which the flag-lined gully was cut (fig 25)

This profile consists of 35 cm of silty peat, the upper 10 cm or so of which has been disturbed by trampling and reworking. It was secured from the base of a shallow localised organic deposit next to the house structure (Appendix IV). A hole was dug in this peat by the burnt-mound dwellers who then lined it with flagstones. It was in this hole that the Liddle (A) profile accumulated. On stratigraphic grounds the Liddle (B) sediment should be older than that of Liddle (A). A date for the inception of peat growth at Liddle (B) is expected from a radiocarbon assay from the base of the profile but was not available at the time of writing (Appendix I).

The depositional environment was that of a sedge-dominated swamp for much of the time, though pollen of *Sparganium* and *Potamogeton* indicate phases and areas of wetter conditions. Vegetational history adjacent to the site again is dominated by herbaceous plants, though there are substantially higher values of tree and shrub pollen (up to 15% of total pollen at some levels). This allows the inference that a limited amount of woodland or at least a scatter of trees and shrubs was present. Within the herbaceous sector, there appears to have been some *Calluna* heath, while a rising curve for *Plantago lanceolata* accompanied by a suite of ruderals such as grasses and *Rumex acetosa*, together with spores of *Pteridium aquilinum*, suggest the presence of human activity. There are consistent curves for *Urtica* and *Liguliflorae* pollen, characteristic taxa of disturbed soils and arable practices. The available evidence points once again to some type of mixed farming, though cereal cultivation is represented only in rare instances and the general level of anthropogenic influence seems to be quite low.

Samples from buried soils below burnt mounds

Liddle I

Two samples from below the burnt mound were analysed.

The first sample was from a moist, brownish grey clay loam situated 60 cm below present ground surface. It contains substantial amounts of quite well-preserved pollen and a vast number of fern spores. Tree pollen values are quite high, especially *Pinus* and there is also *Betula*, *Ulmus* and *Quercus*. Compositae are the most frequent of the dominant herbaceous taxa but there are no conclusive indications of human activity; *Plantago lanceolata* values are low and there is no cereal pollen. The large number of fern spores are probably the result of local occurrence of suitable damp habitats for pteridophyte growth.

The second sample came from a slightly more organic horizon (Appendix IV). Its pollen spectrum is similar in most respects. There is less tree pollen but the herbaceous taxa show that same pattern of occurrence and include Compositae, Gramineae, Ranunculaceae and Rosaceae. There are also substantial quantities of fern spores. The environmental picture portrayed in the first sample is hence repeated – one of open conditions and little signs of human activity.

Beaquooy II

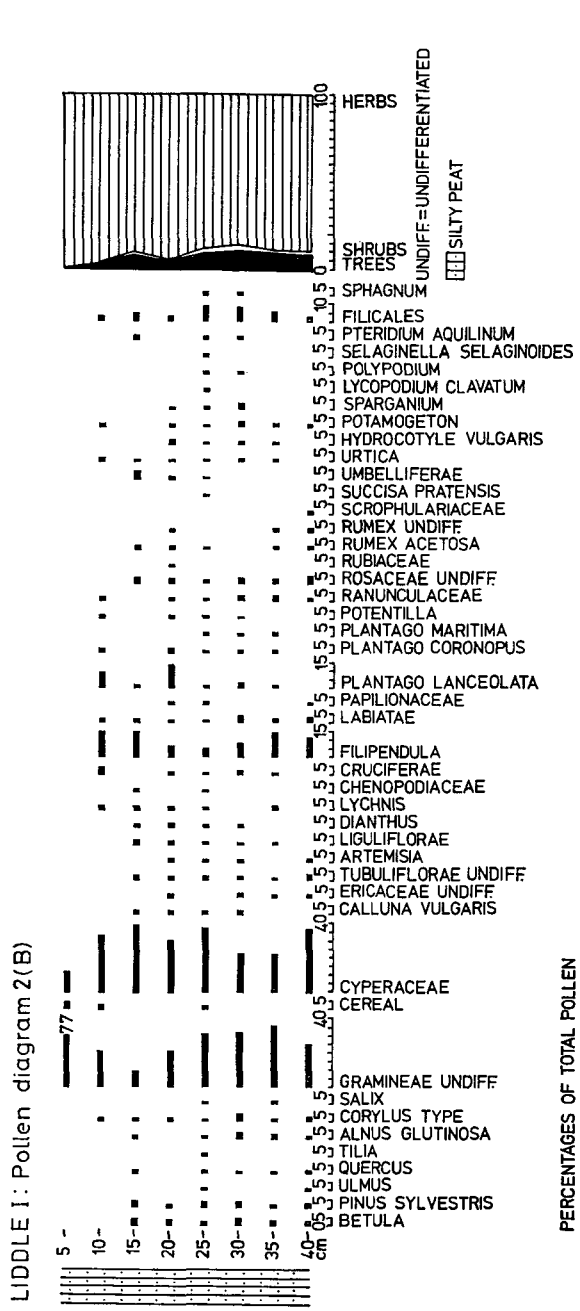
The sample was from a mottled clay loam 45 cm below the surface of the burnt mound and underlies fire-shattered stones in a black organic matrix which were deposited by occupants of the secondary house on the site. A very small number of pollen grains in a poor state of preservation was recovered. Pollen of *Calluna*, *Labiatae* and *Liguliflorae* do not allow any inferences as to the nature of the vegetation cover around this site.

Fan Knowe

The sample was from a moist, brownish-black silty loam 43 cm below the surface of the burnt mound and underlies fire-shattered stones in a highly organic black matrix. Substantial amounts of pollen of a few taxa in a reasonable state of preservation were recovered. *Plantago lanceolata* is most frequent, accompanied by *Calluna* and *Filicales* spores. There are a few pollen grains of *Betula* and *Pinus*. A very open landscape is depicted in which *Calluna* heath was prominent together with areas which may have been utilised for pastoral farming.

Conclusions

The soil pollen analyses are fragmentary and little clear environmental evidence can be deduced from the results. Assuming no truncation of the profiles when the mounds were constructed in middle and late bronze-age times, there appears to have been a period prior to this when the now firmly established open landscape of late prehistoric Orkney (Jones 1976) was subjected to a fairly low level of human influence. This is consistent with findings from other sites associated with archaeological monuments on



RLJ

Fig 25

the mainland of Orkney where bronze-age landscapes are generally assigned to a phase of recovery after fairly intensive late neolithic husbandry (*ibid*). Indeed, the pollen diagram from Liddle (B), which probably represents at least a part of earlier bronze-age time, exhibits similar trends, including evidence of low-intensity mixed-farming practices. Liddle (A) pollen diagram, beginning in the middle bronze age, demonstrates a much more positive agrarian economy with consistent cereal cultivation. This deposit could have been accumulating while the burnt-mound dwellers were in occupation, or it may provide clues as to the practices of their successors after they had abandoned the site. Whoever was responsible made a considerable impact on the surrounding landscape in middle and late bronze-age or, perhaps, early iron-age times.

APPENDIX IV

Environment – soils

by C M K Tasker, Geography Department, St David's University College, Lampeter, Dyfed

Recent palynological research in Orkney has indicated that the natural environment of the islands during the late neolithic and the early bronze age was similar to that which occurs there today, if one discounts those modifications resulting from man's recent agricultural activities (Davidson *et al* forthcoming). The main evidence for this conclusion derives from the interpretation of pollen spectra; there is a general similarity between the earlier vegetation of the islands and the present flora, particularly in the non-arboreal spectra. This agrees with other pollen work for the neolithic in Orkney (Godwin 1956; Moar 1969). Davidson, Jones and Renfrew thus suggest that the Orcadian natural environment has not substantially changed since the late neolithic. Romans and Robertson made a similar conclusion for the W Highlands of Scotland, after work on soils buried beneath ancient monuments of various ages (1975). A recent symposium summarises and adds to the existing literature on the geology, climate, soils, flora and fauna of Orkney (Goodier 1975). Davidson, Jones and Renfrew discuss the present-day environment and agriculture of Orkney and their implications for the neolithic (forthcoming). If there has been no change in the Orcadian environment since those times, the situation envisaged must have prevailed for the period the burnt mounds were in occupation.

The profiles of the soils buried beneath five burnt mounds were investigated – Liddle I and II (60 ft OD), Beaquoy (100 ft OD), Knowe of Scorn (30 ft OD) and Fan Knowe (75 ft OD). It is presumed that these were contemporaneous with the initial building-up of the mounds. Micromorphological study of undisturbed samples from these buried profiles, by J C C Romans, is not yet complete.

It was observed that there is much similarity between the buried-soil profiles at all the sites. This is a reflection of the characteristic topographical location of burnt-mound sites, i.e. adjacent to a source of water, a stream, pond or loch, at or near the base of a gentle slope. Also all the sites are at low altitude and the soils are developed upon clayey drift which mantles the lower parts of the islands (either the purplish-red, shelly, sandy-clay till, or the yellow to grey rubby-clay drift). Thus the soils developed under conditions of comparable surface and groundwater drainage in essentially similar parent materials.

The buried-soil profile described at Liddle II (fig 26) is representative of those observed beneath the burnt mounds. The Bg and B/C horizons are characteristic of an imperfectly-drained gley. Comparable horizons are found in the adjacent present-day soils, which are best described as cultivated, imperfectly-drained gleys, though occasionally soils akin to brown forest-soils occur (fig 27).

At Liddle I, Knowe of Scorn and Fan Knowe, the buried-soils lower horizons (B and B/C) are more gleyed by surface water as are those of the adjacent soils. Gleying due to ground water is evident at depth.

The horizon at 62 to 69 cm, in the Liddle II profile (fig 26), is of uncertain formation. Such a horizon is common to all of the sites, though not always so well defined. Some of the mounds, including Liddle II, have been lowered by ploughing in the past thirty years. Rooting of the present-day vegetation is penetrating through the fabric of the mound into this horizon. The occurrence of fine pores and ferric iron staining in the horizon is a result of pedogenetic processes caused by this rooting. Small orange and beige fragments of burnt sandstone are incorporated into the horizon. The black mottles may be flecks of charcoal. It is tentatively suggested that the original turf-horizon was removed from the soil, the immediate surface was disturbed and thus some debris from the activity at the site incorporated into the upper mineral horizons. The lack of structure of the resultant horizon could be attributed to disturbance of the soil by trampling when wet. Subsequently the soil was covered and preserved by the building up of the burnt

mound. It has not been possible from field observation to suggest precisely the derivation of this type of horizon but it seems evident that it was mineral and that any organic horizon had been removed prior to its formation.

At the Liddle I site, prior to construction, about 40 cm of peat had developed over a wet, grey gleyed horizon. The mound is at the edge of a topographic hollow which, before drainage and cultivation,

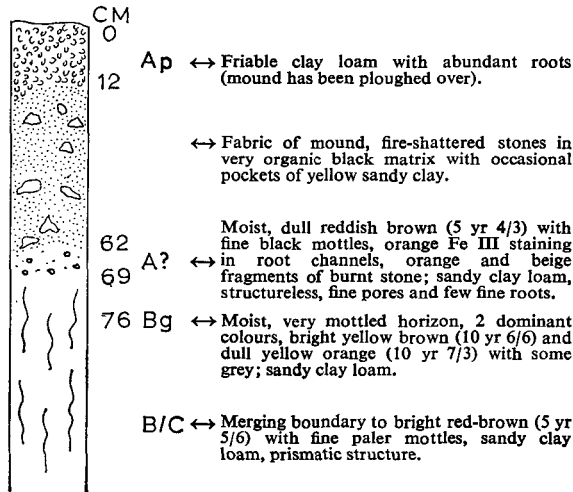


FIG 26 Liddle II: profile of the buried soil.

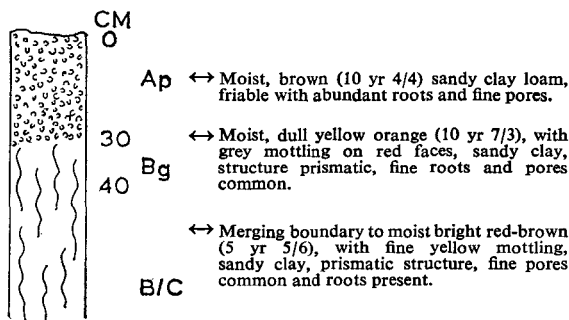


FIG 27 Liddle II: profile of the adjacent soil.

was the site of peaty gley soils. Occasionally within, or just below the ploughed soil, pockets of peaty material are to be found. The base at the centre of the mound lies above the level of the peat. Here an unusual buried-soil profile was observed, though elsewhere a profile comparable to that at Liddle I was found. Immediately below the mound was a distinct but shallow (less than 4 cm deep) horizon of grey clay. This lay over a discontinuous black silty clay horizon of not more than 1 cm depth. A sample from this horizon was found to be 18.09% organic material by a loss-on-ignition method (Ball 1964). This may represent a Bh horizon but is more probably a buried turf horizon perhaps preserved because it was covered with the grey clay. The clay might be waste material from the digging of the trough. Results of micromorphological work upon samples from this soil profile should aid in its interpretation. The pre-burial soil was an imperfectly drained gley with, possibly, a mor top.

Although study of these buried soils is not yet complete and part of the evidence is obscure, field study has indicated no change in pedogenic process in the lower (i.e. B and C) horizons of soils near burnt mounds, since the period of their occupation. It is probable that the surface horizon of the buried soils were comparable to those observed in Orkney today, in similar topographical locations and unaffected

by drainage, cultivation, heavy grazing or peat cutting. Such soils have more to peaty surface horizons, being peaty when the site is poorly drained. The toposequence representative of present-day soils in Orkney described by Davidson (Davidson *et al* forthcoming), is similar to that which will have been typical at the time of construction and building of the burnt mounds.

Acknowledgments

For his help and advice in Orkney, I am most grateful to Frank Dry, of the Soil Survey of Scotland. To J C C Romans, also of the Soil Survey of Scotland, who is investigating the micromorphology of the buried soils, grateful thanks are expressed.

APPENDIX V

Environment – macroscopic plant remains

by P Murphy, Department of Archaeology, University of Southampton

Liddle: vegetable material from bottom of cooking trough

1050 cc of waterlogged silty clay soil were left to soak in water for twenty-four hours to break down its compacted structure: subsequently plant material was extracted by paraffin/water flotation, following the method of Coope and Osbourne (1967). The following fruits and seeds were extracted and identified:

<i>Urtica dioica</i> L.	Stinging nettle	Nuts	80
<i>Empetrum nigrum</i> agg.	Crowberry	Fruitstones	9
<i>Juncus</i> sp.	Rush	Seeds	3
<i>Gramineae</i> .	Grasses	Caryopses	2

A large number of fragmentary pieces of heather root (*Calluna*) were also noted.

Liddle: carbonised vegetable remains found among occupation debris on house floor

This sample consists of a few fragmentary carbonised twigs. The clustering of what appear to be the remains of buds at the apex of one specimen may suggest that these are of oak, *Quercus* sp.

Beaquooy: twigs from silt at the bottom of the quined, well-like structure connected with the secondary building

The woody tissue has almost entirely disappeared, leaving the bark in a sub-fossil state, impregnated with mineral matter; no identification is possible.

It is difficult to make any very definite statements about the environment on the basis of such a small collection of material. However, the large numbers of *Urtica* nuts from Liddle would suggest that in the immediate vicinity of the site there was disturbed soil, locally base – and nitrogen rich, as is typical of human habitation. Rushes are commonly found in moist habitats. *Empetrum* is a common plant of heathlands in N and W Britain (Godwin 1956a, 218–19), and the presence of its fruitstones must mean that heath communities were present at the time the sediment at the bottom of the cooking trough was formed, as do the heather roots. As twigs, of whatever species, occur at both Liddle and Beaquooy, we may assume that the heath community was not the sole type of vegetation in the area.

APPENDIX VI

Environment – bones

by R E Chaplin, Netherfield, Upper Blainslie, Galashiels, Selkirkshire, Scotland

Beaquooy: bone sample from rubble infill of trough in secondary building

This sample comprised very small and friable fragments of the teeth of a sheep or goat. The fragments are consistent with the presence of a single half lower jaw lacking the full permanent dentition. A well-developed but not fully erupted second molar was recognised together with a developing fourth premolar and a well formed but unworn permanent first incisor. It is significant that the only parts of the

teeth and jaws that survive are the enamel crowns. These teeth indicate the approximate age of the animal and the figures quoted by Silver (1969, 297) would indicate an age of approximately 12–18 months – 21–24 months in modern improved breeds and 18–40 months on the data for 18th-century hill sheep. The ageing of ancient sheep from their tooth development is potentially subject to considerable error, far more so than with deer and these figures for sheep are a guide only.

Beaquoy: bone sample from silting of natural gully underlying site

This sample comprised very small charred and calcined fragments of compact bone which could not be matched to bone or species, indeterminate larger fragments, occasionally charred, of seal or whale and the unburnt but heavily leached crowns of molar and premolar teeth from a Red deer (*Cervus elaphus*). A rather unusual combination of physical states and species.

The small fragments are unusual by virtue of their condition and small size. This size of fragment and degree of calcining is more usual in cremation deposits but could occur in a domestic situation. They are not certainly identical to either bone or species and could be from the Red deer. They resemble more closely however, fragments of cremated limb bones of sheep/goat found cremated in Professor Atkinson's excavations at Sollas and this is the most likely identification. The larger fragments of cancellous tissue resemble that of the vertebrae of marine mammals and the likely origin of this is from stranded or hunted whales or seals. The Red deer is represented by the enamel crowns of the lower cheek teeth. A single half jaw is present. These teeth are not burned or charred in any way but are highly leached so that all trace of surrounding jaw, root, cement and dentine have gone. The deer was immature, having the second molar erupting but not in wear, a stage reached at about 12 months of age, suggesting an early summer killing.

APPENDIX VII

Geology – small finds (*based on information supplied by N H Trewin, Department of Geology and Mineralogy, Marischal College, Aberdeen*)

There is no reason to suppose that any of the artefacts are made from materials which are not purely local. The flint, from Liddle as well as Beaquoy, because of its poor quality and the large amount of cortex present, is likely to have been derived from beach pebbles or glacial deposits. All of the other artefacts are of local sandstone; the hammerstones from Liddle are mainly beach pebbles of hard laminated sandstone while those from Beaquoy are soft land or river stones which would not have lasted very long; all of the quernstones from Beaquoy are made from unsuitably soft sandstone and in some cases (BD10, 11, 12, 14) the 'worked surfaces' appear to include curved bedding planes and concavities caused by load-casts which are both of natural origin.

APPENDIX VIII

Geology – cramp

by S Sofranoff, Department of Archaeology, University of Southampton

A sample of 'cramp' from Beaquoy was examined in hand specimen and in thin-section with the petrologic microscope. In hand specimen the 'cramp' appears a very friable, amorphous, dark, earth-covered mass whose weight is considerably less than expected. A cross-section through the sample reveals a vesicular 'honeycomb' structure very similar to that of volcanic pumice. The average vesicle is approximately 3 mm in apparent width but some extend as tubes through the entire fragment. In thin-section the sample still has a dark, isotropic appearance except for random areas of no special shape which contain close-packed, evenly distributed grains of quartz.

The evidence indicates a fine soil or silt with a small percentage of quartz sand included which has undergone a heating of unidentified type with temperatures resulting which were high enough to fuse the silt, trapping volatiles in a manner similar to volcanic pumice, and releasing them only after the substance had solidified, thereby retaining the shape.

APPENDIX IX

Reported finds of flat-rimmed pottery

Pottery found in clearly stratified and independently dated contexts

Ballinderry 2, Co Offaly	Crannog	With LBA metalwork	Hencken 1942, 10, 12, 21-25, figs 2, 8, 9
Clickhimin, Shetland	Settlement	In pre-broch iron age and earlier contexts	Hamilton 1968, 33, figs 14, 19
Covesea, Morayshire	Cave	With LBA metalwork	Benton 1931; 188, figs 10, 11; Coles 1960, 34
Croft Moraig, Perthshire	Stone circle	Infill of ditch with 3 bodysherds of neolithic pottery	Piggott 1971, 10, pl 4
Culbin Sands, Morayshire	Midden	C14 (Q-990) 1259 ± 75 bc (MBA)	Coles 1970, 90, 95-6
Dalnaglar, Perthshire	Enclosures	Dated to the LBA/EIA on presence of cordoned pottery	Stewart 1962, 153, 154, fig. 10; Coles 1970, 97
Green Knowe, Peeblesshire	Platform settlement	Dated to LBA/EIA on settlement type	Feachem 1961, 83, fig. 4; 1965, 96
Jarlshof, Shetland	Settlement	Dated by moulds for LBA metalwork	Hamilton 1956, 13, 16, 29, figs. 6, 9, 15
Liddle, Orkney	Burnt mound	C14 (SRR-701) 876 ± 75 bc (SRR-525) 958 ± 45 bc (MBA)	Appendix I
Lough Gur, Co Limerick	Settlement	Neolithic to MBA contexts	O Riordain 1954, 451, figs 16, 17, 18, 55
Sands of Forvie, Aberdeenshire	Settlement	Dated to LBA/EIA on settlement type	Kirk 1953, 161, 163, 168, fig 8
Sandy Road, Perthshire	Stone circle	C14 (GaK-787) 1200 ± 150 bc (MBA)	Stewart 1966, 15-16; Coles 1969, 97

Pottery found in unstratified, undated, secondary, and uncertain contexts

Balnuran of Clava	Passage grave	Apparently secondary; now lost	Lauder 1830, 418; Piggott 1954, 260-1; Henshall 1963, 39
Calf of Eday	Settlement	No independent dating	Calder 1937, 147, figs 21, 23; 1939, 182
Fair Isle	Inurned burial in small mound	No independent dating	Callander 1933, 351
Gownie, Banffshire	Clava-type cairn?	Apparently secondary	Henshall 1963, 28, 39
Keiss, Caithness	Inurned burial in peat	No independent dating	NMAS
Kildalton, Islay	Cave	Stratigraphy unclear; ascription of finds to periods uncertain	Stevenson 1944, 120-23, fig 1
Largs, Ayrshire	Urnfield	No independent dating	Munro 1910, 239, 240, fig 2
Loanhead of Daviot, Aberdeenshire	Recumbent stone circle	Stratigraphy unclear; ascription of finds to periods uncertain. <i>NB:</i> similar pot found in nearby structure with iron workings	Kilbride-Jones 1935, 197, fig. 10; 1936, 297, fig 9; 1937, 403, 405, fig 3
Monzie, Perthshire	Cairn	Sherds not necessarily same period as cairn as one was unstratified and the other in a possibly secondary layer	Young and Mitchell 1939, 64, 66, 68, 69, fig 5
Mullaghmore, Co Down	Ring barrow	No independent dating	Mogey and Thompson 1956, 24-7, figs 3, 4
New Cave, Kildonan Bay	Cave	No independent dating	NMAS
Nisetter, Shetland	—	No independent dating	Callander 1833, 350, fig 7
Old Keig, Aberdeenshire	Recumbent stone circle	According to Childe primary; according to Henshall secondary	Childe 1933, 45, 47, fig 5; 1934, 391 figs 13, 14; Henshall 1963, 38

Pottery found in unstratified, undated, secondary, and uncertain contexts (contd.)

Pen Llystyn, Caernarvonshire	Unidentified hollow	Sealed by Roman occupation	Griffiths 1959, 114, fig 1
Quarf, Shetland	Cremation in cist	No independent dating	Callender 1933, 349–50, fig 6
Ronaldsway, Isle of Man	Settlement	Stratigraphy unclear; ascription of finds to periods uncertain	Neely 1940, 85; Stevenson 1944, 125
Rudh an Dunain, Skye	Cave	Stratigraphy unclear; ascription of finds to periods uncertain	Childe 1935, 172
Tentsmuir, Fife	Sand dunes	Stratigraphy unclear; ascription of finds to periods uncertain	Childe 1935, 172
Traprain Law, East Lothian	Hillfort	Generally described as 'native'	Childe 1935, 172

Pottery which does not seem to be flat-rimmed ware or about which insufficient detail was gained

Banffshire	Hoard?	A 'curious cinerary urn' associated with bronze-age metalwork	Childe 1935, 172
Bragar, Lewis Dalrulzion, Perthshire	Hut circles	Said to be in NMAS; not found Although the EIA pottery is quoted as <i>flat-rimmed</i> ware it is difficult to see why	Childe 1935, 172 Thorneycroft 1933, 196, fig 7; Feachem 1965, 97; Coles 1969, 97
Easterton of Roseisle, Morayshire	It is very unclear what this site was and what relationship finds have to each other. Neolithic pottery was present but not necessarily <i>flat-rimmed</i> ware		Walker 1968, 106; Coles 1970, 97
Glenshee, Perthshire Heathery Burn, Co Durham	Cave	Said to be in NMAS; not found In association with LBA metalwork. Although quoted as <i>flat-rimmed</i> ware the sections published by Hawkes do not give this impression Insufficient information	Childe 1935, 172 Hawkes 1957, 160, fig 6
Knockaholet, Co Antrim Pitnacree, Perthshire	Neolithic barrow	The coarse sherds under the barrow were just body sherds Not <i>flat-rimmed</i> ware Not traced	Stevenson 1944, 124; Childe 1935, 172 Coles 1965, 43; 1970, 97
Port of Ness, Lewis Rathlin Island, Co Antrim Sordale Hill, Caithness	Chambered tomb?	Actually a food vessel	Childe 1935, 172

APPENDIX X

Counties in the British Isles in which burnt mounds have been noted

Scotland

(For Scotland all OS Index Cards were checked through.)

Caithness – OS record four definite burnt mounds and groups and one possible instance. An impression of a greater density is given by Anderson (1872, 295).

Dumfriesshire – five are recorded by the OS of which further details are given by Truckell (1960, 203, *DES* 1961, 34; 1961, 161).

Kircudbrightshire – One (*DES* 1961, 34).

Orkney – Some recorded in RCAMS (1946) but more by OS (fig 21).

Ross and Cromarty – One only noted by OS.

Shetland – Some recorded in RCAMS (1946) and Calder (1963); fig 21 is based on OS records.

Ireland

In O'Kelly's list of 1954 (in which full references are given) he noted occurrences in the following counties – Clare, Cork (very numerous), Down, Kerry, Kildare, Kilkenny (quite numerous), Laoighis,

Mayo, Meath, Offaly (possibly), Sligo (possibly), Tipperary, Waterford and Wexford. Since then, although the distribution has not been enlarged, at least two more have been found in Waterford, four in Tipperary, two in Cork, four in Kerry (one of which has been excavated, Twohig 1974) and two in Kilkenny (O'Kelly pers comm).

Wales

Cantrill lists occurrences in the following counties (1906; 1911) – Anglesey, Brecknockshire, Caernarvonshire, Cardiganshire, Carmarthenshire (particularly numerous), Glamorgan, Monmouthshire and Pembroke (particularly numerous); more details for the relevant counties are given in the RCAHMW volumes (1937, 137, 141; 1956, fig 6; 1960, fig 4; 1964, fig 14; 1917, xxx-xxxii; 1925, ccviii-xxx).

England

Details of ones found in N Warwickshire and S Staffordshire are given by Cantrill and Bullows (1913, 649; 1927, 291) to which may be added one excavated recently at Sharmar Farm, Warwickshire (Shotton 1973, 465). Others have been found in the New Forest, Hampshire (Pasmore and Pallister 1967, 15).

Isle of Man

Occurrences are noted by Cantrill and Cubbon (1913, 648; 1964, 501).

ACKNOWLEDGMENTS

The excavations at Liddle, initially under the direction of Professor A C Renfrew, passed to the author and were continued, together with those at Beaquoy, on behalf of the Orkney Heritage Society. All excavation and writing-up costs were borne by the Department of the Environment of which Dr D J Breeze and Mr P J Ashmore, of the Inspectorate of Ancient Monuments, and Mr J Drever, local foreman, are to be especially thanked for their help at various stages of organisation. Mr R Simison and Mr R Scott, owners of the sites of Liddle and Beaquoy respectively, are to be greatly thanked for their co-operation, assistance and interest. M E Hedges, as site assistant, did almost all planning in the field and prepared the line illustrations for publication. The author is also indebted to a number of other people for information, including the Ordnance Survey, Professor M J O'Kelly, Mr J R C Hamilton, Mr F Dry, Mr A E Truckell, Dr J Close-Brooks and Mr W N Robertson. The finds are to be housed in Tankerness House Museum, Kirkwall.

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*The Society is indebted to the Department of the Environment
for a grant towards the cost of this paper*



a Liddle: excavated site from N



b Liddle: trough



a Beaquoy: excavated secondary building from W



b Beaquoy: quoined well-like structure of secondary building