# XIV.

## MAES HOWE.

By Professor V. G. CHILDE, D.Litt., D.Sc., F.B.A., F.S.A.Scot.

During 1954–5 the author had the honour of supervising operations by the Ministry of Works explicitly directed towards the elucidation of the three following problems: (1) Was the howe, like other Orcadian chambered tumuli, supported by built retaining walls as the Royal Commission on Ancient and Historical Monuments confidently assume in the Orkney Inventory? (2) How far is the berm round the tumulus an artificial platform such as is found at Quoyness? (3) How wide and how deep was the encircling ditch when originally dug? A section on the south of the mound, where the berm is widest and its rim most clearly marked, seemed best calculated to clarify all three issues. Such a section from outside the ditch well into the core of the mound was accordingly cut in 1954 and 1955 down to virgin soil or the floor-level of the chamber and completed in 1955. In the latter year supplementary sections were cut on the south to define the edges of the ditch and to expose the higher courses of the casing wall round the chamber. The answers to the three questions suggested by the results can be most simply explained in the reverse order. To understand the exposition the following points must be borne in mind (fig. 1).

(1) For the sake of brevity it is assumed that the passage from the chamber runs westward. Hence in the sequel "west" or "W." means WNW., "south" ("S.") means SSE., and so on.

(2) As there is no single axis common to chamber and passage, an arbitrary "axial line, YOU," has been defined as follows. The line, starting from the rear wall of the chamber at the south corner of the entrance into the east cell, O, runs westward, just touching the outer edge of the inner portal's jamb, H, at 20′ 9″, and thence along the passage to reach the apparent base of the mound, Y, at 70′ just beyond the northern gate-post of the wire enclosure round the door. OUV is an eastward extension of this axis over the mound down to its apparent foot, U, and thence across the ditch to V just outside the boundary dyke. In both cases distances are reckoned from O westwards or eastwards. Line OUV forms the southern margin of the sections on the south.

(3) Line LMN, which forms the western margin of the long south section, starting from L just outside the enclosure dyke, after 190′, cuts the axial

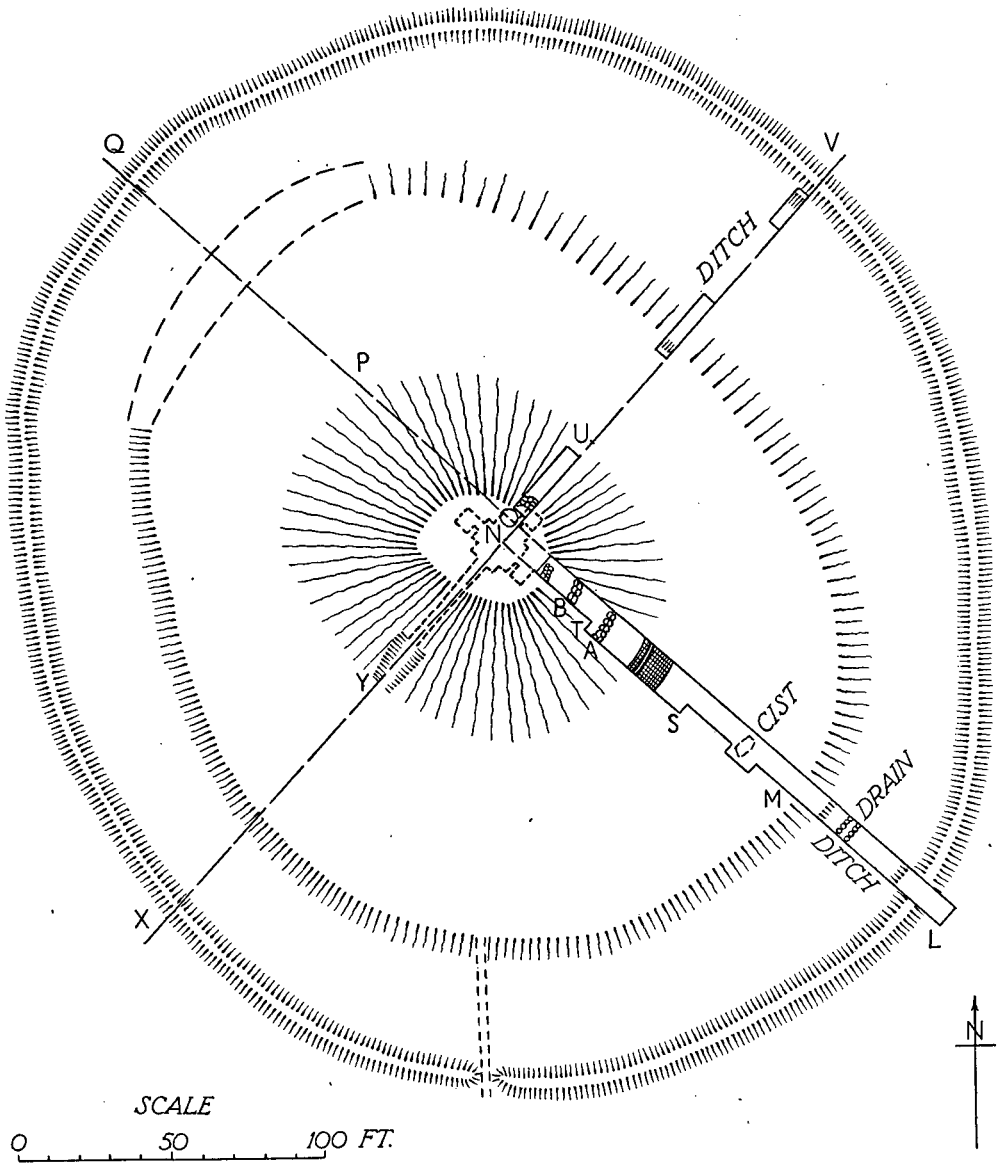



Fig. 1. Plan showing excavated areas.

line YO 8′ 1″ on the top of the mound [1] west of O. Distances are reckoned from the point of intersection, N, but in brackets are given distances from L that were used as origin in 1954. The section was 6′ wide throughout, the eastern margin being termed AB, and was expanded westward to a total width of 10′ between 80 (110) and 38 (152) with western margin ST.

(4) Heights are reckoned with reference to a datum point of 20 that is approximately the level of the chamber floor.

## The Ditch (figs. 2 and 3).

On the east, as on the south, the ditch is flat-bottomed and cut down to an impervious bed of blue rock. Its bottom runs at an approximately constant level—11·9 to 12·2 on east and 11·6 to 12·4 on south—but its width on floor varies—60′ on east, 25′ on south and, judging from surface indications, even less on west. In both sections the floor of the ditch was only 3′ to 4′ below the surface of the natural grey clay outside it. The slope from lip to floor extends horizontally over 3′ 6″ to 4′ and is covered with a thin clayey silt over ragged edges of soft rock. The ditch is filled with peat 2′ 6″ deep. On its inner edge the ditch sloped up continuously on the south, no clear boundary between the normal clay and the "platform fill" being recognizable in 1954 owing to the extremely wet conditions then reigning. On the east the slope proved to be quite steep, 4′ vertical in 4′ horizontal, and rock edges protruded through the clay-facing. After attaining a level of 15·6 76′ from O the natural clay surface flattens out, but on it rests a more stony layer, comparable to the platform fill encountered in MN. This grows thicker farther west, its top reaching 17 at 73.

Peat must have begun forming almost as soon as the ditch was dug. In the east section, cleared in the dry summer of 1955, a very thin peaty layer was observed resting against the rock at the very foot of the scarp, where it just began to rise from the ditch floor at its inner edge and less clearly on the outer edge, and this peat was overlaid by the bottom edge of the slope of clay that must have begun to form almost as soon as the soft rock was exposed by the cutting of the ditch. On both edges a deeper layer of peat rested against this clay (that everywhere masks the ragged edges of the soft rock) and climbs over it, on the inner edge, just to the top of the scarp, but on the outer edge not more than 1′ 6″ from the scarp's bottom. This second layer of peat in turn, on the inner margin of the ditch, is covered with a layer of grey clay, presumably washed down from that on the top of the scarp.

[1] A discrepancy of the order of 9″ between the points O and N on the surface of the mound from which all distances outside the chamber have been measured, and the corresponding points inside the chamber, was revealed by dropping a plumb-line through the ventilator in the roof. The line reached the chamber floor at a point D 5′ from O as defined above, but the line would have emerged through the turf on the summit—but for the slab covering the aperture— about 5′ 3″ from O as measured back from Y up the slope.

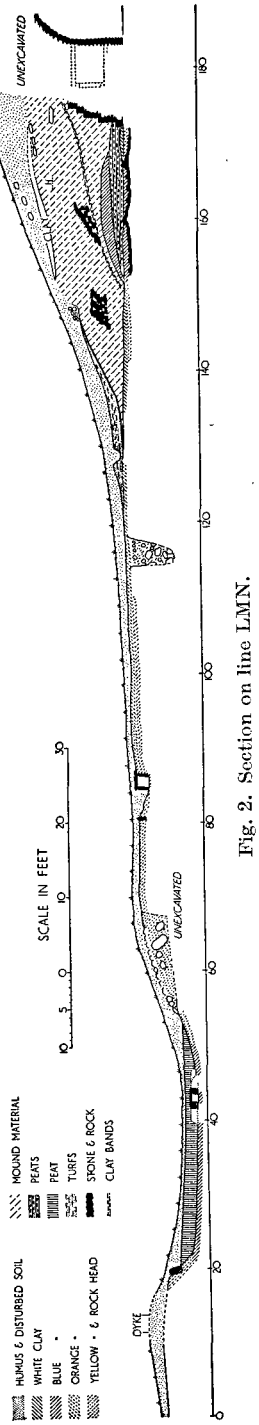



Fig. 2. Section on line LMN.

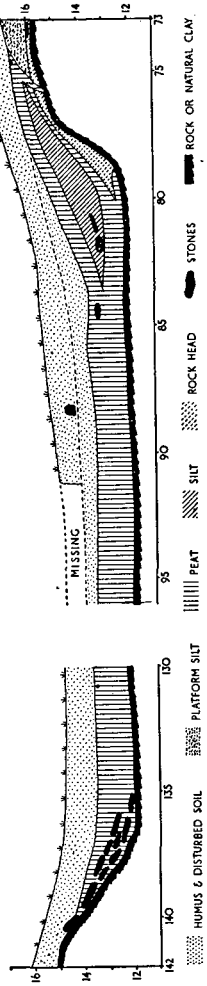



Fig. 3. Section on line VU.

This silt attains a vertical thickness of 1′ 3″ over the true foot of the scarp, but extends eastward from this point a further 3′ over the ditch floor tapering out. Above this clay is a third peat bed that also climbs up the slope and dies out only on the edge of the platform fill at its crest. On the outer edge of the ditch the second peat is overlaid by fallen slabs, all sloping, above which comes a third peat layer 12″ deep over the foot of the slope but gradually contracting and petering out after 3′.

### An Outer Bank?

The turf dyke outside the ditch is quite modern, and no unambiguous evidence for an earlier bank under it was obtained in a section through it on the south. But there a line of slabs set on edge ran along the very lip of the ditch. On UV up the scarp from the ditch floor to its outer lip a layer of flat slabs rested against the slope following its inclination. They extended out on to the very floor of the ditch, and on the slope were embedded in the lower (second) peat band and covered by the third. They must therefore be primary and, as they do not appear to have weathered out of the quarried face of the ditch, might well be derived from a bank, perhaps of turfs and slabs, along the outer edge. These slipped slabs were collected from a strip 2′ wide and piled up in the manner of a dry-stone dyke of that length and two courses 1′ 9″ thick. They formed a block $6\frac{1}{2}$′ cube, equivalent to a strip of walling 1′ 9″ high.

### The Platform.

On the south, the grass-covered surface of the berm runs almost dead-level for 55′ from the inner lip of the ditch to the base of the mound, and this surface is 2′ 6″ or more higher than that of the adjacent land anywhere immediately outside the ditch. On the north, line CN, there is a drop of only 2′ 6″ between the base of the steep mound and the rather ill-defined inner lip of the ditch, 36′ away. But on the west, along OY, the turf slopes down almost continuously from the level of the passage at its exit from the mound to the marshy fosse 7′ below, while on the east too in 39′ the turf rises gradually 5′ 4″ from the apparent inner lip of the ditch to the base of the mound without any sort of step or level berm surface. Hence if Maes Howe stands on a platform, the latter is an elongated oval rather than a circle in plan and the mound stands near its northern extremity (fig. 4).

Nevertheless, the section on the south (fig. 2) did prove that the wide grass-covered berm does represent an artificially levelled surface, on the level of the chamber floor, directly traceable for 110′. For the first 15′–20″ from the crest of the slope up from the ditch at 137 (63) this surface consisted of yellow earth, mixed with fragments of rock ("yellow clay"), which was

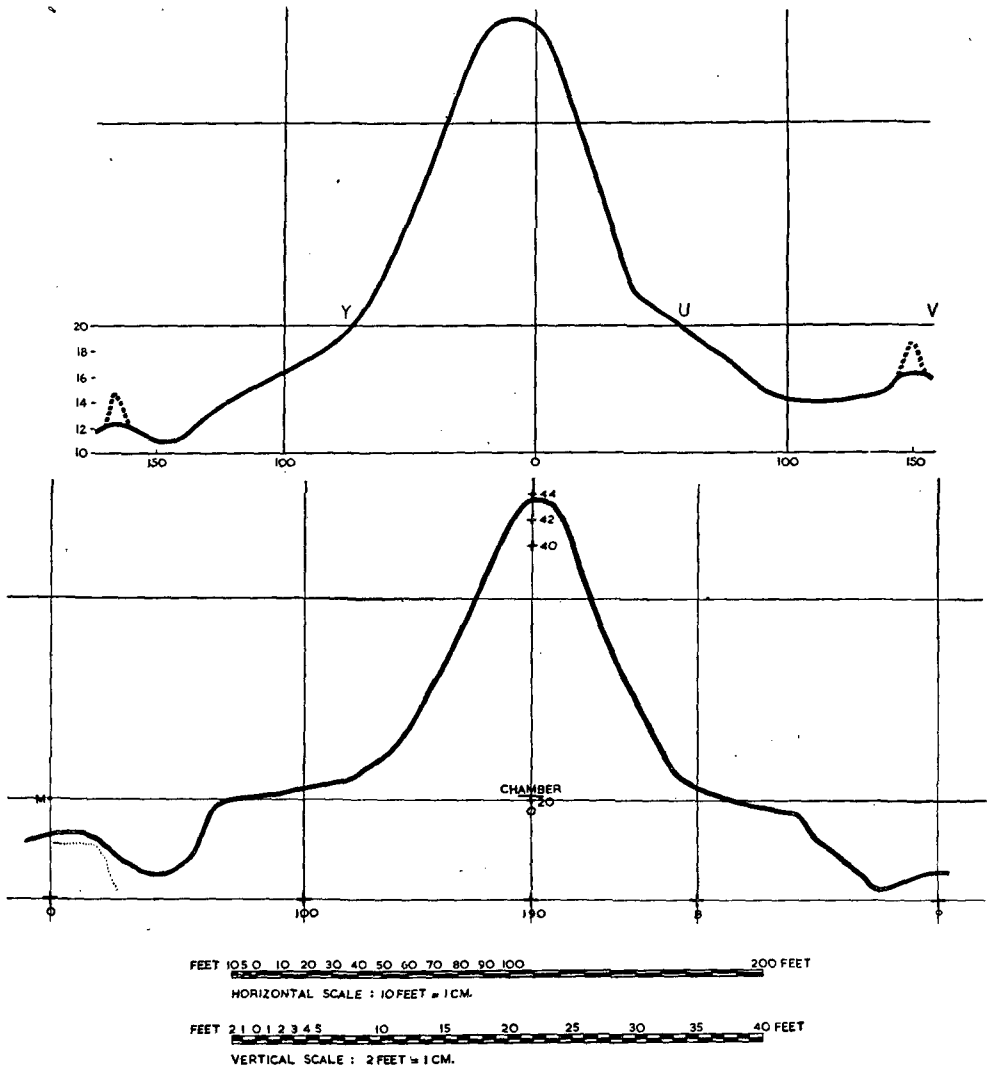



Fig. 4. Sections across fosse, platform and mound on lines XYUV (above) and LMPQ (below).

too hard to dig but had to be picked. Thereafter as far north as 64 (126) the yellow clay is covered by a layer, up to 6″ deep, of orange soil ("orange clay") of looser texture and freer from rock chips. This may well represent an old humus that had been ploughed away south of 70 and had never formed north of 64, where the original mound begins. For here the orange clay fades out. Its line is continued by a thin layer of quite impervious

clean white clay or marl, 1″ to 3″ thick. The latter band runs on at about 20·20 under the mound from 64 to 39 (151), where it is interrupted by an accumulation of bright blue clay, identical with that on the floor of the ditch and presumably scraped up thence. The blue clay forms a bank that rises to a height of 23 at 30 (160), continues at that level to 23 (167), but then dips steeply and disappears at $20\frac{1}{2}$ ($169\frac{1}{2}$). But the level of the white clay at 20 is continued from 39 (151) to 23 (167) by a layer of peats laid horizontally with the green top surface downwards. Additional layers of peats, laid horizontally in the same way, in turn form a bank under the blue clay that reaches a maximum elevation at 21·9 at 19 (171) and continues, only slightly shallower, up to the wall-face at $17\frac{1}{2}$ ($172\frac{1}{2}$). However, from 23 (167) northwards the basal layer of peats is replaced by a thin bed of whitish clay which continues the level of the marl, though it is not quite so white, and runs under the wall's plinth.

Under the platform surface, defined by yellow clay, orange clay, marl, peats and whitish clay, various deposits were exposed in test pits. In a short section cut in from the platform edge to a depth of 3′ between 132 and 130 (58–60), and a narrow pit dug down from the orange clay at 75 (115), we encountered intensely hard yellow clay mixed with rotten stone and angular fragments, including blocks of 2′ cube (the "platform fill"). Only at a depth of 6′ (*i.e.* at 14·0) in the test pit at 75 did we reach anything like solid rock. On the other hand, north of 39 under the very unnatural layer of inverted peats came a shallow bed of blue clay, interrupted by, and filling fissures between, angular ridges of rock. One of these ridges projects through the blue clay into the peat layer at 30 in the south wall of the cutting. Finally, in front of the plinth the whitish clay covers a seemingly natural rock-head which passes over into solid rock at 18·5, while in a very small pit at the centre of the chamber, rock, though none too solid, was reached at just the same level. The ridges encountered north of 39 (151) presumably represent country rock left or tilted 4′ or more above the rock-level on the lips of the ditch. A couple of hundred yards north of Maes Howe just such a hillock rises from the swamp at the summit of which quarrying has likewise exposed solid rock. The tomb then would stand on the top of a natural rock knoll.

But it has been levelled. The blue clay under the peats must have been deliberately laid down to fill natural irregularities in the rock surface. Others may have been levelled down. The platform surface must be equally artificial. That need not be equivalent to asserting that the platform on the south has been artificially heaped up. The yellow clay or platform fill exposed under the orange clay and in the bank-face is certainly quite unlike any natural deposit exposed in ditches or quarries in the immediate vicinity. Still, it might quite well be a natural boulder clay heaped by glacial action round a preglacial rock outcrop. The tomb's builders may

have levelled down the resultant glacial hummock, using its superfluous material for their mound.

## The Mound.

On the south, the grass-grown surface begins to rise from the platform level at 74 (116) on MN (fig. 2). Deturfing exposed a bank of sods laid on the orange or white clay of the platform surface, but sloping up over the skirt of the clay mound. The turves are easily recognised in both horizontal and vertical sections by the dark humified band covering the grey-white clayey core. They appear to have been of irregular form and not to have been laid in horizontal courses. A continuous black band dividing the sod pile from the underlying surface of the platform or mound should mean that the sods had been laid inverted, like the peats nearer the centre. The sod slope is interrupted by a trench 1′ 6″ wide and 1′ deep that curved across our enlarged trench from 60 (130) on the east (AB) to $62\frac{1}{2}$ ($127\frac{1}{2}$) on the west (ST). As far as could be judged from so short an arc it should follow the contour of the primary mound. The ditch, which nowhere cuts right through the sod layers, was filled with loose brown earth, but at intervals thin slabs, 8″ to 12″ long, were lying obliquely across it. They could have served as packing-stones if the trench be the foundation for a palisade. No relics were recovered from the sod pile, whereas in the overlying humus recent china and glass did occur. Perhaps, then, the sod bank did serve as a support to the skirt of the original mound. Traces of sods were in fact also observed in a very restricted test pit at the base of the mound, U, on the east.

The mound proper, of clay and stones, begins to rise from the platform surface at 52′ 6″ (137′ 6″) on the east side (AB) and at 57′ 6″ (132′ 6″) on the west (ST) side of the section. It is composed, apart from the blue clay and peats low down in its core, of a very tough mixture of clay and angular fragments of rock. It can only be worked with a pick, and stands quite firm in a vertical face of 16′. From its start at 64 (136) on MN to 47′ 6″ (142′ 6″) the surface of this primary mound is unmistakably marked by the black band that defines the underside of the turf bank. This then stops short, but the surface of the mound still seems to rise continually till it reaches a level of about 28′ at 38 (152). Farther north above this level the mound seems to have been superficially disturbed on the line of the section MN. (No similar evidence of disturbance was encountered at a corresponding elevation along OU.) A layer of greyish clay, 6″ to 8″ thick, which slopes up much more gently, seems to mark the surface of this disturbance. Below the grey clay the core of the mound continues intact up to the wall-faces.

Incorporated in the core, low stone revetments were exposed at

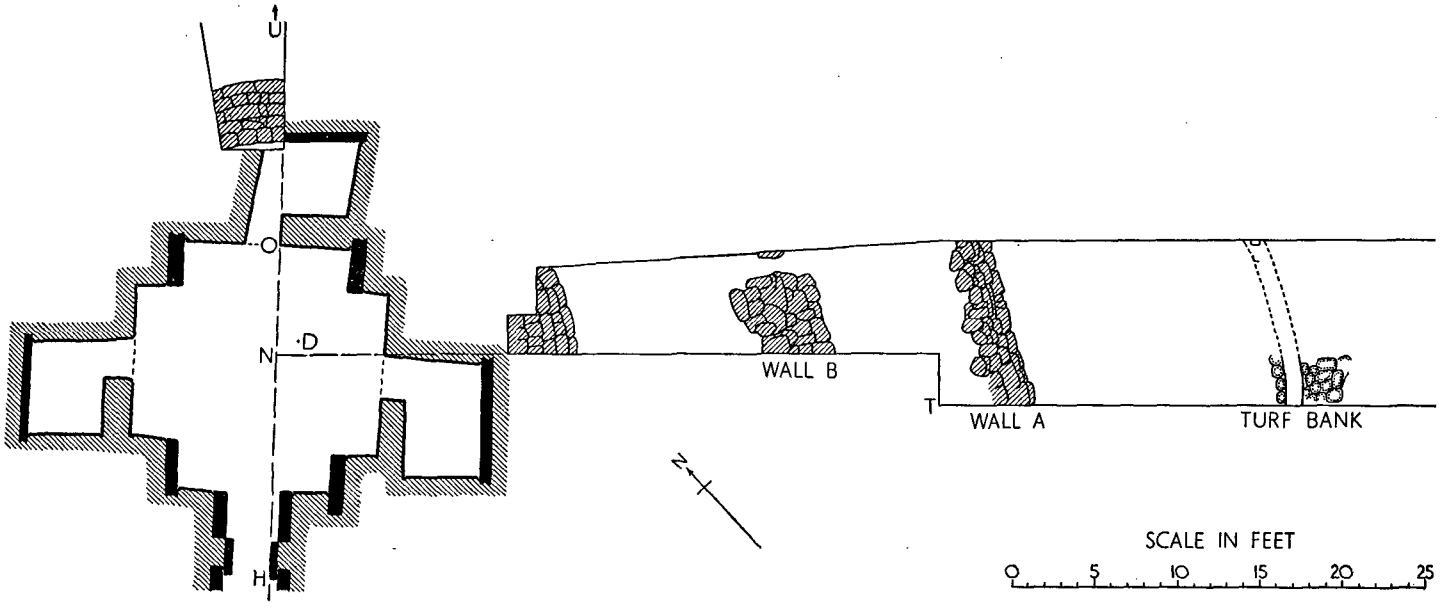



Fig. 5. Detailed plan of excavated areas SNU.

44′ 6″ (145′ 6″) (wall A) and at 54 (156) (wall B) (Pl. XXXIV, 1 and 2). Both rest on the clay-rock core mixture and are backed up against it. Wall A is represented by five to seven courses of flat slabs of poor quality and so heavily battered that the rise is only 2′ 6″ in a horizontal distance of 2′. Under the basal course are 1′ 9″ of the usual core material above the marl layer. Behind the facing-slabs two to three further layers of slabs, even more carelessly placed with empty gaps between them, extend back 3′ to 5′ from the basal course of the "face." Wall B, 11′ farther north and 1′ higher up in the core than wall A, is even more casually piled up and more heavily battered. Eight courses of the face survive, the front edge of the topmost being only 2′ above but 3′ 6″ behind (north of) the front of the basal course. The latter rests on core material about 4′ 6″ above the peat layer that marks the level of the platform surface. Wall B too is backed up against core material, and covered thereby with an irregular skin of dirty grey clay immediately veiling its face.

In neither case were any slipped stones encountered in front of or below the faces. Hence neither wall was ever higher nor deeper than to-day. Both were presumably built to consolidate sloping layers of the mound at successive stages in its construction. The surface of a still earlier stage may be marked by a recognisable band of clay that in the section wall slopes up from the platform surface at 40 (150) under wall B, to override step 4 in the wall-face at 13 (177) at a height of 27′ 5″. The piling of the peat mound and the blue clay bank over it may have been the immediately preceding stage in heaping up Maes Howe.

## The Containing Wall.

The earthen mound surrounding the chamber at Maes Howe is not supported by any built retaining wall comparable to those that surround the classic chambered cairns of Orkney and Caithness. But the chamber is contained in a sort of staged tower externally faced with a built wall or rather with a series of walls, comparable to the inner retaining wall of a Caithness cairn or to wall A at Quoyness: it is a counterpart to wall A′ that is missing at Maes Howe. But, unlike wall A at Quoyness, which runs vertically from floor-level to the summit of the chamber, the Maes Howe wall is constructed in a series of narrow steps. The wall was first encountered at 27′ 6″ (712′ 6″) in the south section on MN, where segments, 5′ wide, of the plinth and first step and narrower segments of three further steps were exposed. The top of the fourth step, at 28′ and so 2′ 4″ above the roof of the south cell, was followed back for 1′ 4″ without reaching the next face (fig. 2).

To get an idea of the continuation of the structure above this height, a cutting was made on the steep east slope of the mound on line OU, beginning

from the 28-foot contour, working west till the faces were reached, and then digging down to the second course below the top of a step at 27′ (fig. 6). Above the latter, segments of five further steps were exposed over an arc of 5 (Pl. XXXIV, 3). The top of the uppermost lay at 34·2′ and was partly covered by the concrete raft 5′ higher up. The top of the lowest step here exposed is less than 1′ above the roof of the rear cell, the underside of which lies at 26′, and its face, if it continues down vertically so far, would run less than 4′ from the inner face of the block that forms the back wall of that cell. Now the top step exposed in MN (if the horizontal direction of the wall has been correctly calculated from the very short section exposed) should run

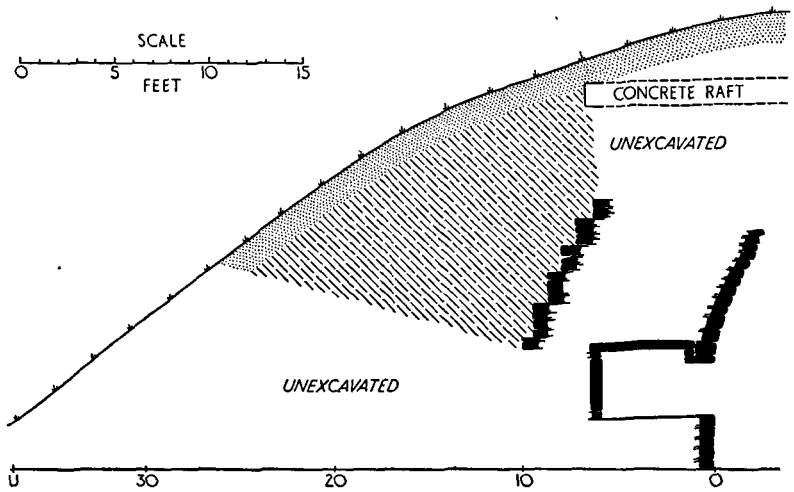



Fig. 6. Section VO.

just over 3′ from the back wall of the S. cell. Though its top is relatively higher above the cell roof than that of the lowest step in OU, it may well be that the latter should be correlated with step 4 on the south; the base of step 3 there would lie some 8″ below the roof of the S. cell. There is, however, no evidence that cell floors or roofs ran through from the interior to the outer face, and it is established that the steps did not maintain precisely the same level all round the mound. So the equation of the steps in the two sections is uncertain. The bottom step in OU corresponds, in its relations to the cell to step 4 in MN, in its absolutely level more nearly to step 3.

The casing wall therefore rose to its present height in 8 or 9 steps above a plinth. On the east it actually stands intact 14′ 3″ high, quite the highest wall of that sort of age surviving anywhere in Europe!

The plinth, exposed only on MN, consists of a single course of slabs about 9″ thick (the edges of 4 are exposed in 5′) and projects only 4″ beyond the

line of the first step's face. Above the steps rise almost vertically, but vary in height and width.

| Step from bottom. | Height. | | Number of courses. | | Width. | |
|---|---|---|---|---|---|---|
| | MN. | UV. | MN. | UV. | MN. | UV. |
| 1 | 2′ 3″ | | 6 | | 7″ | |
| 2 | 1′ 10″ | | 5 | | 9″ | |
| 3 | 1′ 6″ | – ? | 3 | | 8″ | 9″ |
| 4 | 1′ 4″ | 1′ 10″ | 4 | 4 | ? | 8″ |
| 5 | | 1′ 6″ | | 4 | | 9″–10″ |
| 6 | | 1′ 5″ | | 3 | | 5″–10″ |
| 7 | | 1′ 6″ | | 4 | | 10″–11″ |
| 8 | | 1′ 0″ | | 3 | | |

The masonry of the plinth and the first two steps, though not quite so finished, is really reminiscent of that superbly displayed in the chamber's inner walls—the same selected even edges, the same trick of intercalating a square block at intervals to replace two courses of thinner slabs. The latter feature is noticeable too in higher steps, even in 7, but in general the masonry deteriorates in the higher steps. Only in the top step is any sign of disturbance, incidental to the breaching of the chamber, detectable. (Here one large slab seems to be tipped down inwards.) The face of each step rests on the top of the step below. In no case does one step run on down behind the next. On the other hand, the overlap between the foundation stones of one step and the coping-stones of the step below is often only 3″ or 4″ and individual facing-stones can be seen to be only 9″ deep. Through chinks between the facers a blast of westerly wind blows up from the chamber and glimpses of the core can be obtained. Through these gaps I could not observe the back edges of interior facing-slabs or corbels, but only loose rubble. One coping-stone in step 4 on the south is only 9″ deep, and behind it was a gap, once perhaps covered by a thin slate now decayed, down which earth trickled and a rod could be inserted for 8″.

Obviously these step walls were never intended to be seen, and indeed could never have stood but for the outer mass of earth that supports and masks them. It would seem inherently probable that the earth was heaped against each face as it was built, the mound rising *pari passu* with the staged tower. In the wall of the section along MN the surface of one such stage in the heaping of the mound may be marked by a recognisable band of clay that slopes up from the platform surface at 40 (150) under revetment wall B just to override step 4 at 3 (177).

The four lower courses may then have served to define a more or less circular platform wide enough to contain both the chamber and the cells that extend back 6′ into its walls. On it would be superimposed further steps to support the heavy stones serving as counterpoises to the lintels, but over the lower cells of the south and presumably on the north these could be set back further from the edge than on the east where the cell is rather more lofty.

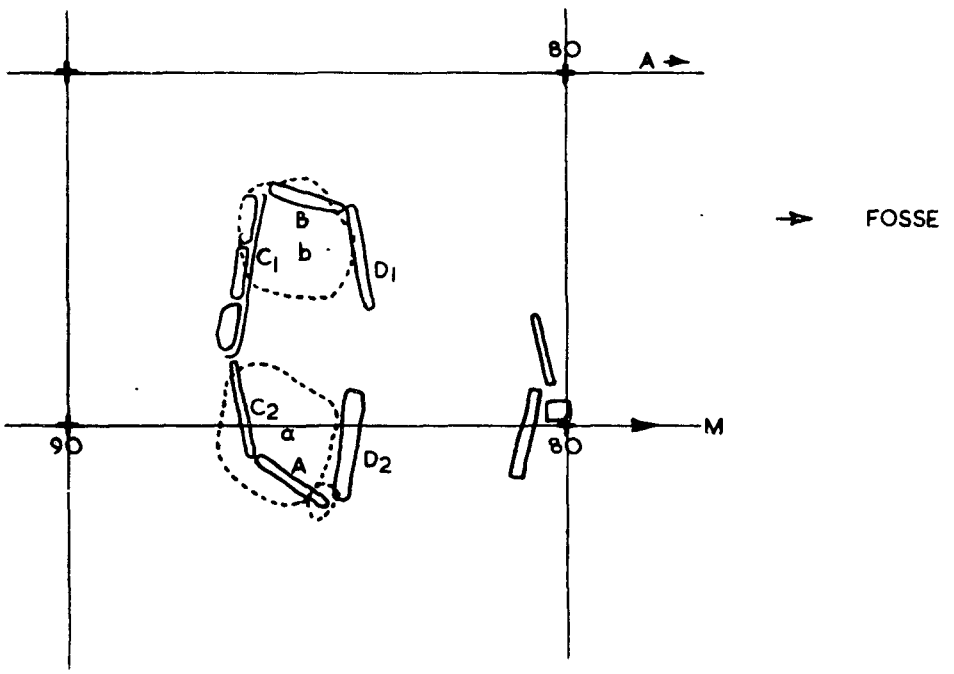



Fig. 7. Long cist in section LMO.

## Long Cist in Platform.

Between 84′ 6″ and 86′ 6″ on line MO our trench cut a long cist lying almost exactly at right angles to MO. The two end capstones, *a* and *b*, were in position, the former being plough-grooved on top. The middle coverstone, *c*, had been pushed southward and was lying tilted down with one edge still supported on upright $D_2$. At the same time, one upright on this side seems to have been removed or broken up and the ground immediately south of the cist disturbed. Otherwise the cist has been sunk into the "yellow clay" of the platform, the coverstones lying flush with its surface.

The cist, rather irregular in plan, was nearly 7′ long, just over 2′ wide at its widest point, and 1′ 4″ deep. It is framed by six uprights, two headstones, two side stones on the north and two on the south. A gap between

the latter was presumably once occupied by a seventh. A pair of narrow slabs had been laid horizontally on the top of the long stone $C_1$ to bring its top flush with the rest, and a small triangular slab has been similarly placed across the corner between A and $D_2$.

| | | | |
|---|---|---|---|
| A | $18'' \times 14'' \times 1\frac{1}{4}''$ | B | $25\frac{1}{2}'' \times 15'' \times 1\frac{1}{4}''$ |
| $C_1$ | $35\frac{1}{2}'' \times 12'' \times 3''$ | $D_1$ | $28'' \times 20'' \times 5\frac{1}{4}''$ |
| $C_2$ | $27'' \times 16'' \times 1\frac{1}{2}''$ | $D_2$ | $22'' \times 16'' \times 5''$ |

Several flat slabs were lying irregularly in the gap between $D_1$ and $D_2$; over the "yellow clay" floor of the cist a few small slabs were lying without order and not forming a regular pavement. The cist was full of plough soil that contained no relics. Any bones would, of course, have dissolved in the acid soil.

Under the southern edge of capstone C, a very heavy roundish slab lay at 82′, 2′ south of $D_1$–$D_2$, in disturbed soil, and under it a quite irregular depression could be traced to a pair of slabs on edge that just came flush with the surface of the yellow clay of the platform. The western slab is nearly 2′ long and 1′ deep, the other 18″ by 18″. They presumably formed part of a second cist, but beyond them the platform surface shows no superficial indications of disturbance.

# APPENDIX.

## REPORT ON THE PEAT SAMPLES.

By H. GODWIN, F.R.S., Sc.D., Reader in Quaternary Research, University of Cambridge.

Professor V. Gordon Childe submitted for botanical analysis three peat samples he had taken from the Neolithic tomb at Maes Howe in Orkney.

Pollen analyses were made, a total of more than 500 grains being counted in each, and from the main mass of the sample after digestion in dilute nitric acid macroscopic remains were recovered and identified. This work was undertaken by Miss C. A. Lambert, whose results are summarised below.

### Results.

1. *Macroscopic Remains.*

| | Type of remains. | Abundance. | | |
|---|---|---|---|---|
| | | M. | L. | K. |
| *Carex* spp. | Nut | .. | Rare | .. |
| *Hippuris vulgaris* | Fruit | Common | .. | .. |
| *Hydrocotyle vulgaris* | Fruit | .. | Rare | .. |
| *Juncus effusus* | Seed | Occasional | Occasional | Occasional |
| *J.* spp. | Seed | .. | .. | Occasional |
| *Menyanthes trifoliata* | Seed | Common | .. | .. |
| *Potamogeton polygonifolius* | Fruitstone | Common | Rare | .. |
| *Potentilla anserina* | Seed | .. | Occasional | .. |
| *P. palustris* | Seed | Common | .. | .. |
| *Plumatella* (*Bryozoan*) | Statoblast | Rare | .. | .. |

[2. *Pollen Analyses*

2. *Pollen Analyses.*

Prep. NaOH/Oxid./Acet./HF.

| | M. | | L. | | K. |
|---|---|---|---|---|---|
| No. of tree pollen grains | 49 | | 100 | | 5 |
| Total pollen grains | *562* | | *535* | | *549* |
| *Betula* | 34 | *3* | 36 | *6·7* | .. |
| *Pinus* | 30 | *2·7* | 47 | *8·8* | *0·4* |
| *Ulmus* | 2 | *0·2* | 3 | *0·6* | .. |
| *Quercus* | 6 | *0·5* | 1 | *0·2* | *0·2* |
| *Alnus* | 26 | *2·3* | 13 | *2·4* | *0·4* |
| *Corylus* | 44 | *4·0* | 80 | *15* | *0·5* |
| *Salix* | .. | .. | 11 | *2* | .. |
| Gramineæ | 410 | *36·5* | 262 | *49* | *28·7* |
| Cyperaceæ | 236 | *21* | 134 | *25* | *2* |
| Cf. *Calluna* | 14 | *1·2* | 8 | *1·5* | *54* |
| Caryophyllaceæ | 6 | *0·5* | 1 | *0·2* | *0·2* |
| Chenopodiaceæ | .. | .. | 1 | *0·2* | .. |
| Compositæ: | | | | | |
| *Bellis* type | 2 | *0·2* | 4 | *0·7* | .. |
| *Matricaria* type | 72 | *6* | 6 | *1* | *0·2* |
| *Taraxacum* type | 10 | *1* | 12 | *2* | *0·4* |
| Cruciferæ | 4 | *0·3* | .. | .. | .. |
| *Epilobium* | 8 | *0·6* | .. | .. | .. |
| Ericaceæ | .. | .. | .. | .. | *1* |
| *Filipendula* | 40 | *3·5* | .. | .. | *4·4* |
| Leguminosæ | .. | .. | .. | .. | *1* |
| *Lemna* | + | + | .. | .. | .. |
| *Menyanthes* | 4 | *0·3* | .. | .. | .. |
| *Plantago lanceolata* | 36 | *3·2* | 64 | *12* | *1* |
| *P. maritima* | .. | .. | 1 | *0·2* | *0·2* |
| Cf. *Potentilla* | 66 | *5·9* | .. | .. | *0·7* |
| Ranunculaceæ | 156 | *14* | .. | .. | *1* |
| *Rumex acetosa* or *acetosella* | 4 | *0·3* | .. | .. | .. |
| *Scabiosa* sp. | 14 | *1·2* | 3 | *0·6* | *3·8* |
| *Valeriana officinalis* | .. | .. | .. | .. | *0·2* |
| *Filicales* | .. | .. | 230 | *43* | *0·2* |
| *Ophioglossum* | .. | .. | 11 | *2* | + |
| *Polypodium* | .. | .. | 83 | *15·5* | .. |
| *Pteridium* | .. | .. | 4 | *0·7* | .. |
| *Sphagnum* | .. | .. | 2 | *0·4* | .. |

Ordinary numerals—percentage of total tree pollen.

Italic numerals—percentage of total pollen.

The frequencies of spores of ferns and mosses are calculated as percentages of total pollen or total tree pollen but are not included in those totals.

+ indicates presence in sample but not in the counted traverses.

C. A. LAMBERT.

## Comment.

*Sample K.*—This consists of the laid turves sealed under "an impervious layer of blue clay which, before the peats were laid, seems to have been used also to fill up interstices in the rock below them." This material lies below the barrow mound and presumably represents the prevalent ground surface at the time of construction of the tomb.

The outstanding feature of the pollen spectrum is the exceedingly low frequency of tree pollen, less than 1 per cent. of the total pollen. The very high percentages of ling (*Calluna*) and grass pollen, together with the occasional *Juncus* seeds, suggest a *Calluna* heath as the site of the construction of the tomb. It is to be noted, however, that pollen of the ribwort plantain is present (1 per cent.), together with low frequencies of types of Compositæ which often occur as weeds. There is thus some indication of local settlement and husbandry.

*Samples M and L.*—These samples were taken from the great ditch surrounding the tomb and near its inner margin: L was below M and separated from it by a silt layer.

The plant remains from L and M are similar. The macroscopic remains are almost all of aquatic or marsh plants, but whereas marsh plants preponderate in L, plants indicative of shallow open water are commonly represented in M, so that it is apparent that the ditch did not fill up with water at first. The silt layer is presumably connected with the onset of wetter conditions.

In both L and M the proportion of the total pollen rain contributed by trees is much greater than in K (18·7 and 8·7 per cent. as against 1·0 per cent.). Likewise hazel is much increased. By contrast, pollen of *Calluna* has now been reduced to negligible amount. Pollen indicative of weeds and ruderals has much increased, especially that of the most notable indicator, *Plantago lanceolata*, which now constitutes 12 and 3·2 per cent. of the total pollen in L and M respectively. The records for pollen of dock (*Rumex*), Chenopodiaceæ and Cruciferæ will be noted, as well as the increased frequencies of pollen of Compositæ and Gramineæ. Although the frequency could not be definitely assessed, it is certain that some of the grass pollen was that of cereals. All these features suggest that between building of the tomb and growth of peat in the ditch the *Calluna* heath (at least locally) had been largely taken over for cultivation or for pasture. One cannot say whether the pollen of *Plantago maritima* came from coastal habitats or from this plant growing as a crop weed or casual.

This heath replacement would in itself allow a better representation in the pollen-rain of trees growing at some distance, but the actual increase is too large to be wholly attributable to this effect, and it seems likely that an actual increase of woodland took place despite the general increase of agricultural activity. The evidence is too slender to bear much weight, but if the effect is genuine the increased tree-growth might well be attributable to improvement of soil conditions following deturfing: whether it was accompanied by any measure of tree protection or climatic change is not evident. The pollen frequencies of the individual tree-genera are of no value as chronological indicators, but the relatively high frequency of pine is consonant with the idea of persisting native pine woodland in northern Scotland, and the presence of elm, oak and alder in these substantial frequencies must certainly imply growth on the islands themselves.

A striking difference between L and M lies in the high frequencies of fern spores of different types in the former and their absence later. A mere conjecture

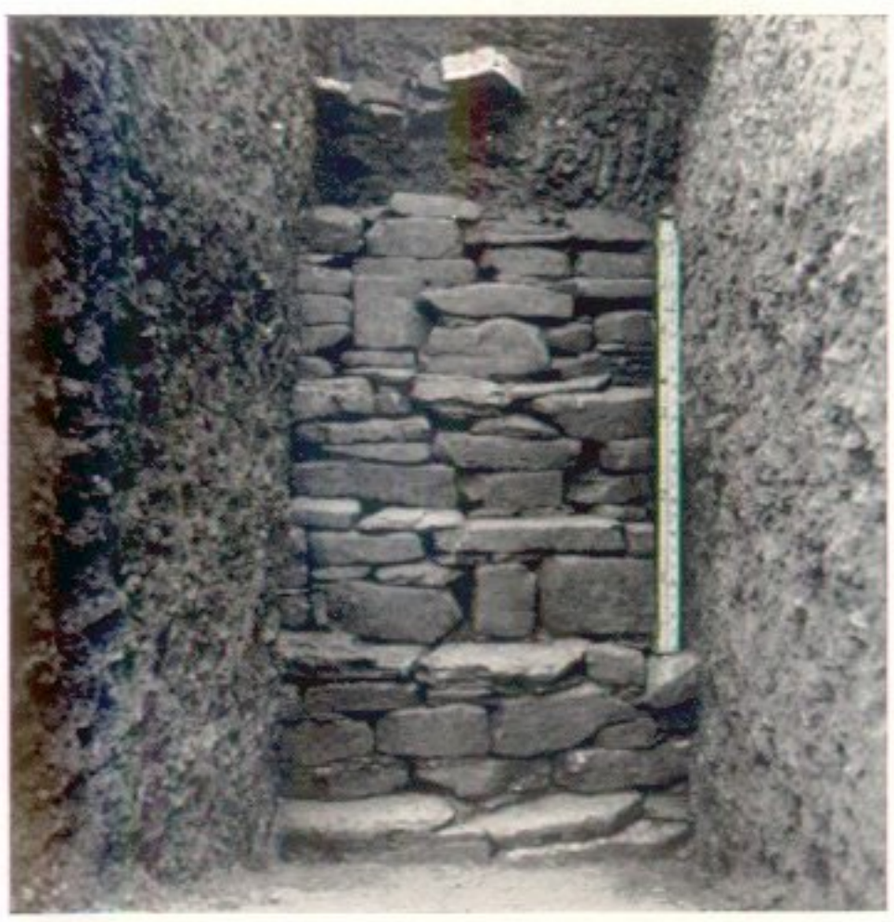
might be that the initial heath clearance or tomb construction provided suitable but transient habitats for ferns.

It will be noted in passing that the occurrence of pollen of *Lemna* (duckweed) and *Menyanthes* (bogbean) accords with the indications given by the seeds that open water prevailed when sample M was deposited.

There seems no good reason why samples L and M should not have formed within the period of occupation of the area by the tomb-builders, so that the sequence of events deduced relate to features of this occupation alone, but proof of this is lacking.

1. Wall A in LM.

2. Wall B with Wall A in foreground.



3. Containing wall on east.

4. Cist grave.

V. G. Childe.