

# EXCAVATION OF THREE CHAMBERED CAIRNS AT LOCH CALDER, CAITHNESS

by J. X. W. P. CORCORAN, F.S.A.SCOT.

## INTRODUCTION

THREE cairns, *Tulach an t-Sionnaich* and the two Tullochs of Assery, lie at the northern end of Loch Calder, in the parish of Halkirk, some five miles SW. of Thurso in Caithness (fig. 1). In June 1961 the writer was invited by the Inspectorate of Ancient Monuments of the (then) Ministry of Works to excavate the cairns, and this was completed during the summer of that year. The level of Loch Calder was

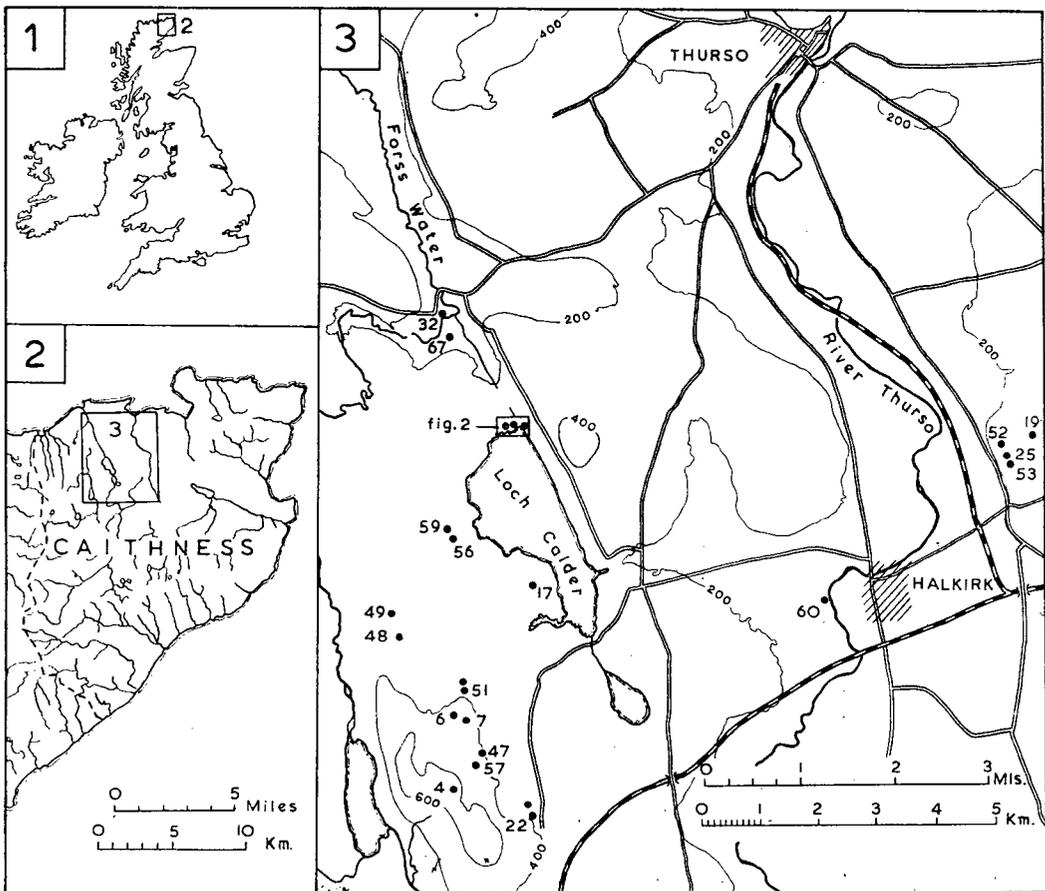


FIG. 1. Location map (based on O.S. map with permission of the Director General). (The numbering is that of Henshall, A. S., *The Chambered Tombs of Scotland*, 1, Edinburgh (1963))

about to be raised, as part of a scheme to increase the county's water supply, by the construction of a barrage to the N. of the cairns which, as a result, were to be submerged either completely or partially.

The cairns lie on the Old Red Sandstone of the Thurso Flagstone group, forming part of the Caithness Flagstone Series.<sup>1</sup> This flagstone, usually pale ochre or pale

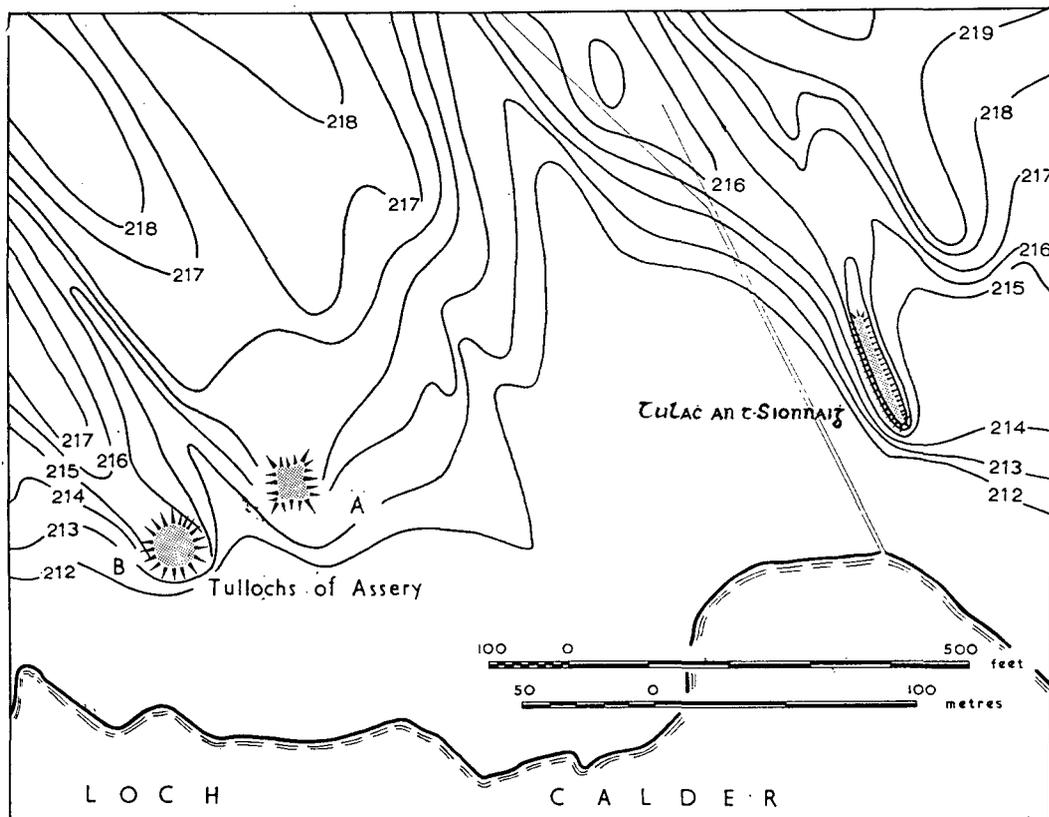


FIG. 2. Map of northern shore of Loch Calder in 1961

blue in colour, was laid down in a land-locked basin during a series of cycles of sedimentation deposits, which may be identified by the presence of ripple-marks, current bedding and fossil land plants, and by the absence of marine fossils. The ease with which the stone may be split into thin slabs for paving and roofing has encouraged the use of Caithness Flagstone as building material in recent times, as may be seen from vernacular architecture and flagstone dykes in the county. Evidence of intensive working in the past is provided by disused quarries in the vicinity of Thurso and Loch Calder. Neolithic immigrants were no less appreciative of the building potential of this flagstone, as shown by their handling of it in the construction of both Tullochs of Assery.

<sup>1</sup> Phemister, J., *Scotland, The Northern Highlands* (British Regional Geology), Edinburgh (1948), 65-67.

*Tulach an t-Sionnaich* and the Tullochs of Assery formed part of a group of chambered cairns centred on Loch Calder (fig. 1). The three cairns of differing plan were situated close together on level ground within 300 ft. of the northern shore line of the loch, as it was in 1961. The Tullochs of Assery lay 100 ft. apart. *Tulach an t-Sionnaich* lay 700 ft. to the E. of Tulloch of Assery A, and all three were situated approximately 215 ft. above Ordnance Datum (fig. 2).

In the Royal Commission's *Inventory* for the county<sup>1</sup> the description of *Tulach an t-Sionnaich*, as it was in 1910, agreed with its appearance fifty years later. The Tullochs of Assery were described as 'mounds',<sup>2</sup> and this name was retained on the latest edition of the 6-inch Ordnance Survey map, although earlier editions had referred to 'broughs'. Before excavation it was apparent that the smaller of the two mounds was a short-horned cairn and, despite the opinion expressed in the *Inventory*, the projection of upright stones through the turf mantle of the larger mound was more suggestive of a chambered cairn than of any other type of structure.

*Tulach an t-Sionnaich* was excavated during July 1961, with some additional work at the end of September of that year and in April 1963. The Tullochs of Assery were excavated during mid-August and the greater part of September 1961.<sup>3</sup> In this report the horned cairn is referred to as Tulloch of Assery A, and the circular cairn as Tulloch of Assery B. They are discussed in order of excavation.

#### SUMMARY

*Tulach an t-Sionnaich*. A Passage Grave set in a heel-shaped cairn, a type known hitherto only in the Shetland Isles, formed the southern part of a long complex structure. Most of the structural details of the former could be paralleled in one or more of the Shetland cairns. Burnt and unburnt human and animal bone were found in the paved and possibly corbelled chamber, and a secondary cremation deposit had been inserted in the forecourt. At some undefined date subsequent to the main use of the heel-shaped cairn, but possibly at the time Beakers were in use in Caithness, a long, low stone structure, apparently without chamber or cist, was added to the cairn. The composite structure was enclosed within a revetment wall which, in the forecourt of the heel-shaped cairn, overlay cairn slip. A few featureless sherds of undecorated Neolithic pottery and two sherds of Beaker provided the only indication of relative dating.

*Tulloch of Assery A*. A passage, antechamber and chamber opened from each forecourt of a short-horned cairn, which had a N.-S. orientation. There was some evidence of structural techniques, including the use of extra-revetment. In the northern chamber, which had probably been corbelled, burial deposits of unburnt bone were placed on low stone platforms. Surviving remains of the latest burial lay in articulation near the entrance to the chamber. There were no artifacts in the northern chamber. Evidence of extensive disturbance, including an apparent nineteenth-century occupation layer, accounted for the almost complete clearance of the

<sup>1</sup> The Royal Commission on the Ancient and Historical Monuments of Scotland, *Third Report and Inventory of Monuments and Constructions in the County of Caithness*, Edinburgh (1911), No. 135 (pp. 38-39) (henceforth abbreviated to *R.C.A.H.M. (Scotland), Caithness*).

<sup>2</sup> *ibid.*, Nos. 160-1 (p. 44).

<sup>3</sup> Preliminary report in *Arch. News Letter*, vii (1962), 155-9.

southern chamber. The only artifact of recognisable type was a *petit tranchet* derivative flint arrowhead which was found in the southern chamber.

*Tulloch of Assery B.* A large circular cairn enclosed a long, narrow orthostatic passage, opening from the SE., and a rectangular chamber of Camster type. The side walls of the latter were of dry-stone walling, reinforced by the use of large slabs to form end walls and two pairs of projecting orthostats, all of which contributed to the support of a probable barrel-vault, also of dry-stone construction. Unburnt human bone lay on a discontinuous paving, below which was a pre-cairn deposit of burnt bone, charcoal and sherds of undecorated Neolithic pottery. The chamber was surrounded by a massive inner wall, and there was other evidence of inner structural reinforcement.

#### ACKNOWLEDGMENTS

I wish to acknowledge with gratitude the help which I have received from many individuals while planning the excavation, during the excavation itself, and in the preparation of this report.

Mr Iain MacIvor and Mr William Boales of the Inspectorate of Ancient Monuments arranged for the supply and transport of heavy equipment, aided by Mr Hugh MacDonald. For the whole period of the excavation Mr William (Frank) Taylor of the Ministry of Public Building and Works, acted as foreman in charge of workmen recruited in Thurso, and he contributed greatly to the smooth running of the excavation. Surveying equipment was lent by the Department of Geography in the University of Glasgow, and Mr Gordon Petrie, of that department, kindly lent a camera for black-and-white photography.

Throughout the excavation my wife acted as my assistant, and for varying periods Miss Edna Durrell, Mrs Noel Hall and Mr Iain Walker acted as assistant supervisors. Mr Etienne Rynne of the National Museum of Ireland gave very considerable help during the somewhat hectic concluding weeks of the excavation, and read the greater part of this report in typescript. Several members of the staff of the Atomic Energy Research Establishment at Dounreay and their wives, notably Mr J. C. Smith, Mr Robert Macleod and Mr and Mrs Iain Wares, worked on the site at different times. Mr Peter Hall and Mrs Marjorie Jordan also joined the excavation for a fortnight. Mr Jollonds helped to prepare the contour plan of Tulloch of Assery B.

Several of my colleagues in the University of Glasgow kindly examined bone and charcoal from the excavation, and their findings are given in the Appendices. Dr Archibald Young of the Department of Anatomy gave freely of his time in examining and identifying the large quantity of human and animal bone. Dr Dorothy Lunt of the Dental Hospital and School examined and identified the teeth. Dr A. T. Sandison and Dr Mary E. Catto of the Department of Pathology arranged for radiographic photographs to be taken of the human vertebra with an arrowhead embedded in it from Tulloch of Assery B, and gave advice in its interpretation. Mr D. W. Brett of the Department of Botany identified the charcoal. I am also grateful to Professor A. J. Cain of the Department of Zoology in the University of

Manchester for identifying the mollusca. Mr C. B. Denston of the Duckworth Laboratory for Physical Anthropology in the University of Cambridge examined the secondary cremation and other bone from *Tulach an t-Sionnaich*, and his report on the former is contained in Appendix C.

I have greatly benefited from discussion with Miss Audrey Henshall, both at Loch Calder and subsequently, and with Mr T. G. E. Powell on matters relating to this excavation and to the study of chambered cairns generally.

Finally, I should like to acknowledge the travel grant given by the Court of the University of Glasgow to enable me to carry out a small supplementary excavation at *Tulach an t-Sionnaich* in April 1963. Professor and Mrs Ralph Condee of Pennsylvania State University kindly helped in the actual excavation at that time.

#### TULACH AN T-SIONNAICH ('The Mound of the Fox')<sup>1</sup>

Before excavation this appeared to be a mound orientated NNW.-SSE., measuring approximately 200 ft. in length, with the higher and broader end towards the south. Its greatest height was approximately 6 ft., and its average width 40 ft. A 'trench', referred to in the *Inventory*,<sup>2</sup> and believed to have been excavated across the cairn at about 50 feet from the southern end, was a prominent feature. The general appearance was that of a long cairn, possibly disturbed and without evidence of horns, but retaining most of its structural features. Surface indications suggested that the principal chambered structure would lie at the S. end, and initial cuttings were made in that area. It is convenient to describe the heel-shaped cairn and the northern structure separately, followed by a general discussion of the cairn as a whole.

#### *Heel-Shaped Cairn*

##### *Chamber (Pl. I)*

Excavation revealed a Passage Grave (figs. 4 and 5). The axis of the passage was aligned some 15° to the W. of the longitudinal axis of the long cairn. The chamber was approximately square in plan, measured 5 ft. across, and was built of four orthostats. Two of the latter were already broken at the time of excavation, that on the E. side being considerably disturbed. As the orthostats were not deeply set in the subsoil, on account of outcrops, alternative support was necessary. This was achieved partially by the use of 'buttress' stones and partially by dry-stone walling built against the outer sides of the orthostats. The N. wall of the chamber was supported along its whole length by a heavy buttress stone, some 6 in. thick (Pl. II, 2). In the NE. corner the buttress stone rose to a height of 16 in. above the paving of the chamber, and also gave some support to the E. wall. This buttress stone was placed in position before the erection of the western orthostat, as its western extremity underlies the latter. The floor of the chamber was paved with two slabs, both measuring more than 6 in. in thickness. The western covered approximately three-quarters of the floor area and the eastern covered most of the remainder. It is probable that these two heavy floor slabs, together with the heavy sill at the entrance to the chamber, were chosen, not merely for paving, but also as partial support for

<sup>1</sup> N.G.R. ND 07056192.

<sup>2</sup> R.C.A.H.M. (Scotland), *Caithness*, No. 135 (pp. 38-39)

orthostats. Into the space between their outer edges and the orthostats were packed smaller stones, which also provided support for uprights. On the N., S. and E. sides the orthostats were backed by roughly built walling. That on the W. side had collapsed.

There were two structural details in the chamber which were difficult of interpretation. A little less than half-way along the northern orthostat from its W. edge a small, vertically set stone projected southwards into the chamber (Pl. II, 2). It was not set into the ground, but was balanced, partially on the northern 'buttress', and partially on a small stone resting in turn on a larger stone, which itself lay on the larger of the two paving stones. It is unlikely that this arrangement was due to collapse, but its purpose is unknown, unless it was to demarcate the NW. corner of the chamber where a human cranium had been deposited. The second anomalous feature, a thin rectangular slab, measuring 2 ft. 6 in. in height and a little over 1 ft. in breadth, was similarly supported by stones set on the paving. Its purpose is undefined as its length would have been insufficient to contribute to the support of the roof (Pl. II, 1). Fragments of human and animal bone were found at its base.

The chamber had been disturbed, particularly on the E. side where the orthostat had been broken. It is not known whether the roof collapsed as a result of this disturbance, or whether it had fallen previously. There was, therefore, little evidence of original roofing. It seems improbable that the chamber had been covered by a single capstone resting directly on the orthostats, as this would have allowed a head-room of less than 4 ft. In the uppermost levels of the chamber filling there were six flat slabs, stacked in a nearly vertical position, leaning slightly to the west (Pl. III, 1). It is probable that these originally formed part of a corbelled roof and that they fell into the chamber, perhaps when the E. orthostat was disturbed. Such corbelling would have provided additional head-room of at least 2 ft. above the orthostats in the centre of the chamber.

The collapsed corbelling lay on the filling of the chamber, in the disturbed upper levels of which were many very small fragments of unidentifiable, but probably unburnt animal, bone. In the southern part of the chamber, to the S. of the stones identified as collapsed corbelling, and in the adjacent northern part of the passage there were deposits of charcoal and mollusca. The latter mainly comprised the common land snail (*Cepaea hortensis*) and a common species of limpet (*Patella* (?) *vulgata*) and other marine mollusca.<sup>1</sup> These deposits had been tightly packed between small flat stones which formed the upper levels of the filling of the chamber and passage, immediately below collapsed roofing material. To the N. of the deposit of mollusca in the chamber and at the same level, there was a layer of intensely burnt, but unidentifiable, animal bone, charcoal and burnt earth. It is possible that this had been deposited while the burnt material was still hot, as the small stones on which the deposit rested were fire-reddened. Alternatively, it is possible that these fire-reddened stones had themselves also been brought from a hearth or fire.

The mollusca and animal bones may perhaps be interpreted as remains of food

<sup>1</sup> Mollusca were kindly examined and identified by Professor A. J. Cain of the Department of Zoology in the University of Manchester.

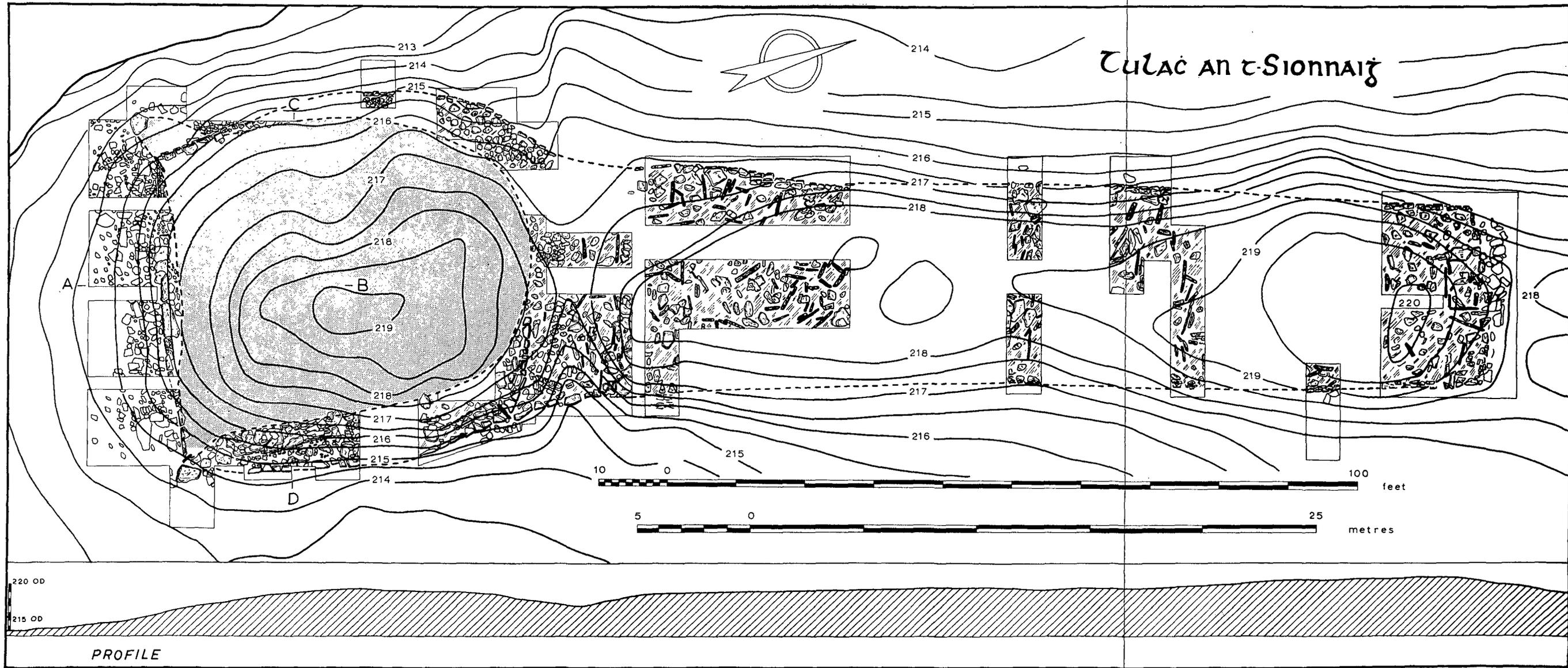


FIG. 3. *Tulach an t-Sionnaigh*: general plan. (The stippled area marks the position of the heel-shaped cairn, cf. fig. 4)

deposits. It is not known whether they represent the remains of a funerary feast or were intended as a form of *viaticum* for the dead. The latter interpretation, however, may be preferred, as these deposits appear to have been carefully placed in position as part of the act which accompanied the final filling of the chamber and passage. Some limpet shells were found with the main human burial deposit in the lower part of the chamber and these, together with animal bones, may similarly be interpreted as food offerings. A scatter of animal bone, some of it burnt, and *Cepaea hortensis*, immediately to the E. of the northern part of the passage, probably represents part of the same or a similar deposit disturbed during the destruction of the eastern wall of the passage.

Beneath the level marked by the upper deposits of shell and animal bones the remainder of the chamber was filled with a deposit of bone, both human and animal, the limpet shells already mentioned, and layers of thin, flat stones. The deposit was approximately 1 ft. 6 in. thick and lay on the paving stones of the chamber. Although the E. side-wall of the chamber was disturbed, the actual contents of the chamber appear to have suffered a minimum of interference beyond that caused by structural collapse. The human remains were not articulated, but several long bones had been laid alongside the western orthostat of the chamber at floor level (Pl. III, 2), and part of a cranium was found in the NW. corner, also at ground level, and apparently protected by the curious stone arrangement referred to above. Part of a second cranium was found at a higher level in the chamber, mixed with other bone, both human and animal, and sandwiched between small, flat stones.

The bulk of the human remains may be attributed to two individuals, the one probably an adult male in his early thirties and the second possibly a female in her late teens. It is also certain that a fragment of mandible belonged to a third, relatively old individual. Some bones which cannot certainly be attributed to either of the first two individuals, may also belong either to this third, or even to a fourth individual, particularly as two small fragments of bone are possibly those of an infant.

It is apparent that the remains of the first two individuals referred to were the last to have been placed in the chamber. As there was no evidence of deliberate subsequent human interference, it is probable that these human remains were in an advanced state of disintegration, if not already in a skeletal state, when interred. The human remains may therefore have temporarily been stored elsewhere, perhaps in an ossuary, prior to interment in the chamber. The fragmentary remains of a third, and possibly a fourth, individual are more difficult of interpretation. They may represent fragments of previous interments, the bulk of which had previously been removed from the chamber. Alternatively, they may represent fragments of burials which had already reached an advanced state of disintegration in an ossuary, and which intentionally or unintentionally were deposited with the principal burials.

The human remains, as already noticed, were sandwiched between layers of small, flat stones and animal bones. Most of the latter may be interpreted as remains of food offerings. They included domesticated cattle and red deer, and possibly bird and fish. The mollusca referred to also appear to have been part of a food offering.

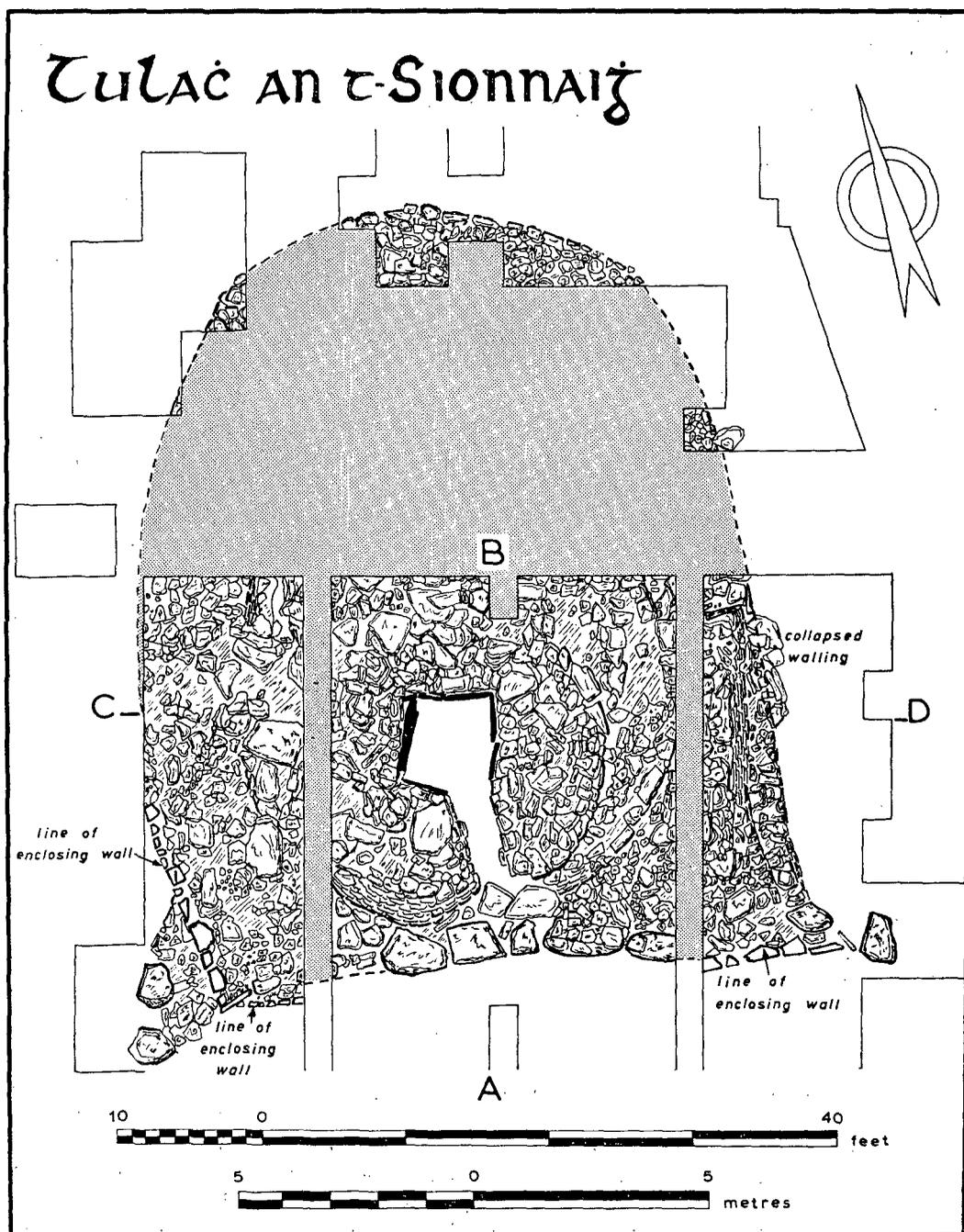


FIG. 4. *Tulach an t-Sionnaigh*: plan of heel-shaped cairn

Of greater significance, perhaps, are the remains of two dogs. The greater part of the skeleton of a mature animal was found in the middle of the main burial deposit in the chamber in a position which suggested that this animal, like the human remains, had been deposited in an ossuary and subsequently placed in the chamber. The skeleton was not articulated. There were also the remains of a young animal. These included an intact skull, found with a limpet shell and charcoal, and tightly packed into the gap between the eastern orthostat and the paving slab in the extreme SE. corner of the chamber. Unlike the remaining bones in the chamber, which were free of earth, the skull was tightly packed with earth and small stones. This may have been caused by flooding of the chamber; the skull lay at a lower level than most of the other bones in the chamber, and would therefore have been affected by flooding, which may not have risen sufficiently high to affect the rest of the deposit.

The whole deposit in the chamber was capped by a layer of mollusca, animal bone, some of it intensely burnt and unidentifiable, and charcoal. Details of animal bone are given in Appendices A and B.

The passage was 7 ft. long and was lined by dry-stone walling, built partially on the ground level and partially supported on upright stones (Pl. III, 3). The basal courses only of the E. wall survive, but the W. side of the passage adjacent to the chamber survived to a height of 3 ft. 6 in., and had been protected by a large slab which had probably been chosen as seating for roofing stones. It is probable that this was the original height of the passage, and its width of 2 ft. at the entrance, widening to 3 ft. at the inner end, could have been spanned by stone available locally. Roofing had not survived *in situ*, although two large slabs overlying the southern and more disturbed area towards the entrance of the passage may have formed part of the roof at that point. In addition to the heavy sill-stone at the entrance to the chamber, there was discontinuous paving in the passage and a second sill at its entrance. Across the entrance to the passage proper there was a carefully laid blocking of flat stones of varying size, surmounted by a large slab, chosen probably for the stability it would have offered.

On account of disturbance and robbing, precise details of the contents of the passage are unknown. A small part of the main burial deposit appears to have slipped from the chamber into the adjacent northern part of the passage. There was no evidence of a deliberate filling elsewhere in the passage, and the very few fragments of bone found probably represent pieces dropped during either the filling or the clearance of the chamber. The few finds from chamber and passage are discussed below (p. 14f.).

#### *Cairn* (figs. 4 and 5)

The outer ends of the walls of the passage were bonded into a revetment wall, which originally was probably circular in plan, and which enclosed the whole of the central area of this part of the cairn. This revetment was best preserved to the W. of the entrance, but it could also be traced on the E. side for a distance of 18 ft. Sufficient remained to suggest that its original diameter was approximately 35 ft.,

assuming that it was circular. Between the E. side of the chamber and passage and the revetment wall was an inner wall, rather roughly built, but quite stable. At its S. extremity this wall was bonded into the rear of the E. side of the passage. Thence its line could be traced for a distance of 18 ft. until it was lost in disturbed cairn material. It survived to within a few inches of the humus, and was curved in plan. On the W. side there was no trace of similar walling, but there had been considerable disturbance in that area of the cairn. This inner wall was probably oval in plan, and was intended both to bear some of the thrust from the chamber area, and to consolidate the walling built against the orthostats of the chamber. Between the outer revetment wall and the inner wall, to the E. of the chamber, two large flat slabs were set at an angle of  $45^\circ$  towards the chamber. They, too, were probably intended to support structural thrust from the chamber area. Elsewhere within the circular revetment the cairn was built of small, flat, horizontally set flagstones.

Immediately to the S. of the entrance there was a slightly curved setting of five large stones, considerably larger than the average stones of the body of the cairn, and forming part of the basal layer of a concave façade. The latter was built across the entrance to the passage, and almost touched the circular revetment wall at each side. The original height of the façade is unknown, due to disturbance, but it is unlikely to have exceeded three or four courses in thickness above the massive basal course. Between the façade and outer revetment wall cairn material was so built that it masked the lower courses of the revetment wall. This was best preserved in the area to the E. of the entrance (Pl. I).

Owing to disturbance, both prehistoric and recent, it was not possible to recover either the complete plan of the façade or the side walls of the heel-shaped cairn. On the E. side of the cairn two lines of well-built dry-stone walling converged and met at a large vertical buttress stone, set at right angles to the walls some 24 ft. from the S. end of the cairn (Pl. IV, 1). The two walls were approximately in alignment with the passage, splaying slightly outwards in plan towards the SE. limit of the cairn. The inner wall stood in places to a height of 2 ft. and the outer to a height of 1 ft. Both walls abutted on to a large flat slab, the shape and position of which continued the outward splay of the walls. The original junction of façade and side wall at the SE. corner was apparently disturbed in prehistoric times by the construction of the wall which incorporated the heel-shaped cairn into the long cairn. It is therefore unknown whether an upright stone had originally stood here and at the SW. corner, a common feature in heel-shaped cairns. Near both corners, however, large stones, which may once have stood upright, were lying on the former ground surface. Sockets for them could not be identified, but it would have been possible for them to have been set upright, as at least one of their sides would have provided a stable base. It is also possible that any such upright stones would have been deliberately thrown down when the later enclosing wall was built.

The W. side of the heel-shaped cairn was disturbed and robbed, so that very little survived and the exact position of the side wall could not be identified. Assuming that the heel-shaped cairn was symmetrically planned, comparison with the position of the E. wall in relation to the passage and diameter of the circular revetment wall,

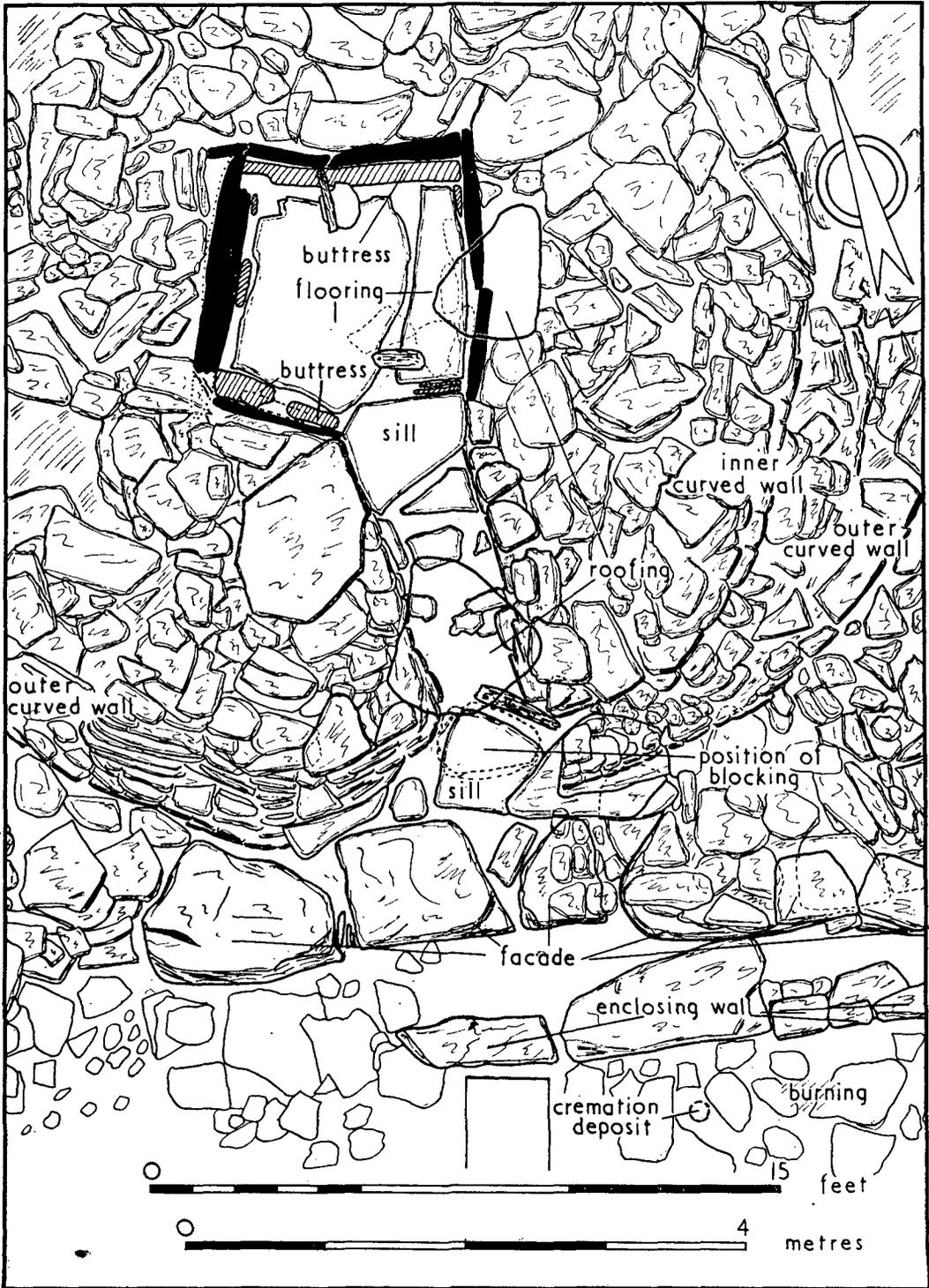


FIG. 5. *Tulach an t-Sionnach*: plan of passage and chamber

suggests that the W. wall should in part have lain in approximately the position occupied by the later enclosing wall. Part of the original wall of the heel-shaped cairn may have been incorporated into the later revetment wall. A short stretch of the foundation course for the former was identified, protruding from under the later enclosing wall at the point where the former splayed in plan towards its SW. extremity (Pl. IV, 2). At this point, as on the E. side, the wall was aligned on a recumbent slab.

Although there had been considerable disturbance and robbing on the W. side of the heel-shaped cairn, it was possible to identify some internal structural details. Many stones of the basal layer of the cairn were of considerable size, some measuring more than 4 ft. in length. One of these stones appeared to have formed part of a roughly built internal wall, aligned on the S. wall of the chamber, and presumably intended to absorb some of the stress from the chamber.

The N. limits of the heel-shaped cairn were identified in the area of the so-called 'trench', where the disturbed remains of dry-stone walling, approximately 18 in. high, were identified. The walling was slightly curved in plan and was aligned approximately at right angles to the longitudinal axis of the composite long cairn. Although it was not possible to trace the outer wall of the heel-shaped cairn throughout its perimeter, sufficient was identified to allow a reconstruction of the original plan, and was supplemented by traces of the line of the wall visible on the ground surface.

The heel-shaped cairn measured approximately 51 ft. in width, along a line drawn from the SW. to the SE. corners, and 53 ft. in length, measured from the centre of the façade to the rear of the cairn.

#### *Secondary Cremation Burial*

A cremation deposit was inserted into slip from the heel-shaped cairn, approximately 10 ft. SSE. of the blocking of the entrance, and approximately 1 ft. 6 in. S. of the later enclosing wall built over slip from the heel-shaped cairn (cf. p. 18). The remains are apparently those of a single individual, possibly an adult female. A single animal bone, probably of pig, was identified among the human remains. Details of the cremation are given in Appendix C.

When first discovered it was believed that the cremation had been enclosed in a container of some perishable substance.<sup>1</sup> It was subsequently recognised that the container was a pot which had been so inadequately fired that, on discovery in the relatively moist conditions obtaining in the southern part of the cairn, it was quite plastic. As much of the deposit as possible was removed in a matrix from the fore-court area. When fully dried, the true nature of the container was recognised. The outer surface of the pot, however, was completely abraded and morphological details are unknown. It was probably an urn in the Bronze Age tradition, inserted upright into a small pit dug into cairn slip, carefully packed round with small flat stones and covered by similar stones. A thumb-nail scraper of flint and two unworked fragments of flint were found inside the deposit (cf. p. 15).

<sup>1</sup> Corcoran, *Arch. News Letter*, VII (1962), 156.

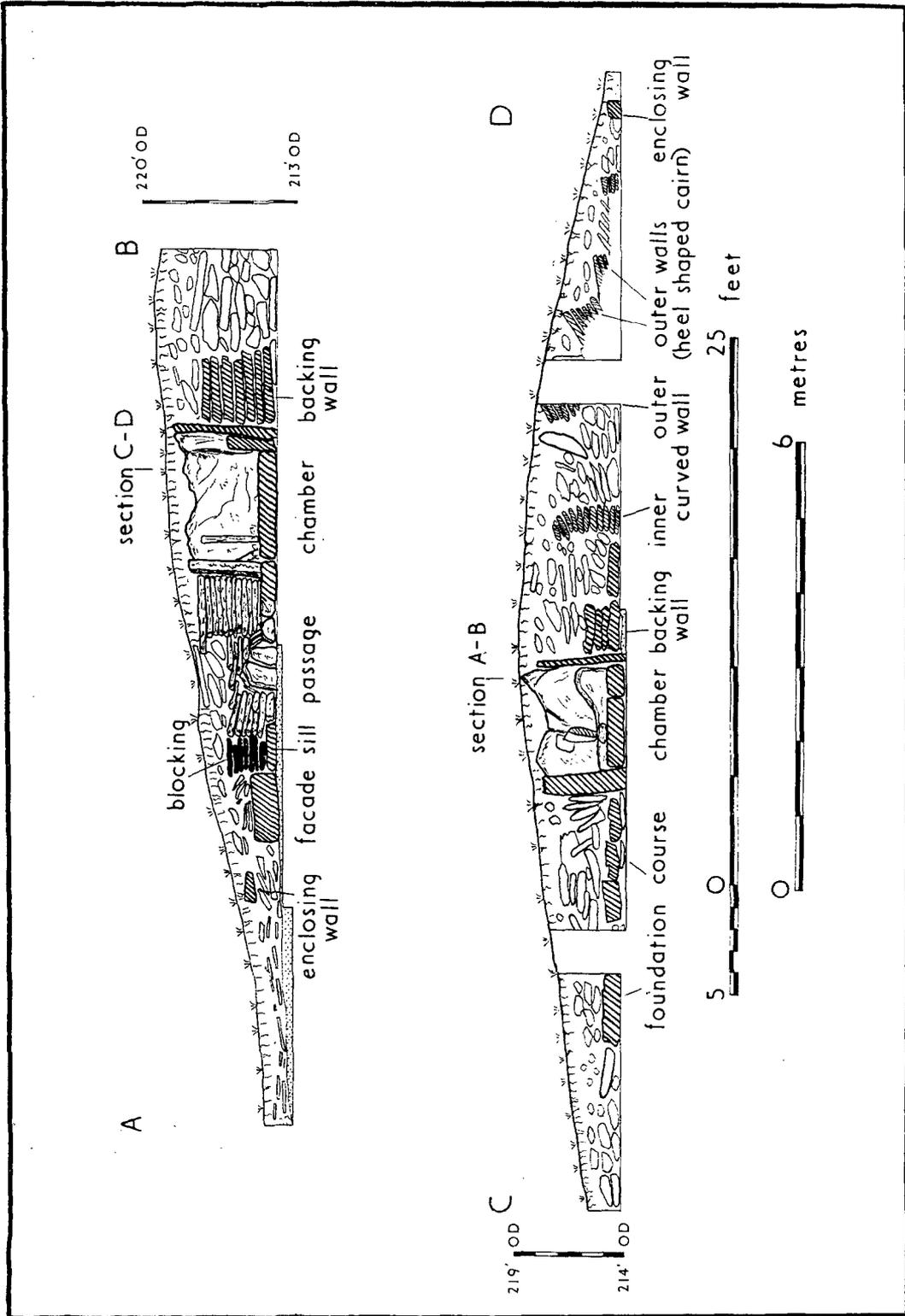


FIG. 6. *Tulach an t-Siomnaich*: sections through heel-shaped cairn.

It is suggested below that the secondary cremation post-dates the building of the northern structure, and therefore the deposit was made in the SE. part of what, in effect, was a long cairn. In this it may be compared with a group of cremations in urns found in the SE. part of a long cairn in Wigtownshire.<sup>1</sup>

### *Finds*

#### (1) *Pottery*

(a) One small, dark grey, featureless sherd was found in the main burial deposit in the chamber, immediately below the layer of mollusca, burnt bone and charcoal (cf. p. 6). The sherd is too small to allow any identification to be made of the type of pot to which it belonged. Its fine sandy texture, use of small pieces of quartz as filling, and smooth outer and inner faces compare closely with the finer sherds from Tulloch of Assery B, which belong to undecorated Neolithic pottery (cf. p. 42).

(b) Thirteen sherds and several small fragments were found with animal bones to the E. of the entrance, between the façade of the heel-shaped cairn proper and the later enclosing wall built across the forecourt. The sherds, all apparently belonging to a single pot, lay below the basal level of the enclosing wall a few inches above former ground level, and were sealed below cairn slip. The sherds vary in length between 3.5 and 13 mm., and in thickness between 6 and 8 mm. The texture is sandy with a filling, largely organic, the disintegration of which has given a somewhat 'corky' appearance to the surface. Both surfaces are smooth, but lack evidence of burnishing. The outer surface is generally dark grey in colour and the inner fawn-coloured. None of the sherds preserves any features which might allow a reconstruction of the pot, but the general texture, apart from the filling of organic material, compares with some of the coarser sherds of undecorated Neolithic pottery from Tulloch of Assery B.

(c) Two sherds of a Bell Beaker were found immediately to the north of the northern orthostat of the chamber in the upper, disturbed levels of the chamber area (fig. 7a and b). Both sherds appear to have belonged to the upper part of the same pot. One is a rim sherd; the rim is out-turned, rounded, but not thickened. From this sherd it is possible to reconstruct the diameter, which was  $4\frac{1}{2}$  in. The average thickness of the wall of the pot in the surviving sherd is 7 mm. The fabric is hard and well made, having a fawn-coloured surface and a hard, grey-fawn coloured core, with a filling of very small pieces of quartz, rarely exceeding 2 mm. in greatest extent. Decoration consists of at least three, but more probably five, horizontal grooves, apparently produced by a blunt-toothed implement. Each groove measures approximately 2 mm. in width and the grooves are spaced approximately 4 mm. apart. The top-most groove lies 1 cm. below the rim. Below the lower-most, at a distance of 1.5 mm. from it is a row of deep diagonal impressions, some of which appear to overlie a lighter series of diagonal impressions arranged at right angles to the first and so producing an imperfect line of X-shaped impressions. Sherds of this Beaker have not survived below this point.

(d) Remains of a cinerary urn were found enclosing the secondary cremation to the S. of the heel-shaped cairn and S. of the later enclosing wall (cf. p. 12). The surviving sherds are fragile and it is apparent that the pot was imperfectly fired. When discovered it was thought to be a container of some perishable substance, as in moist conditions the fabric was quite plastic. The outer surface was completely abraded, and there is no indication of decoration. The upper part of the urn did not survive and it is therefore unknown whether it had a collar. Sufficient remained to show that the urn had been deposited upright. The greatest surviving diameter was approximately 6 in.

The inner surface was relatively smooth. The fabric is medium brown in colour, sandy in texture, and has a filling of small pieces of mica and quartz. Surviving sherds have an average thickness of approximately 7 mm.

(e) A sherd consisting of part of the straight wall and flat base of a large, heavy, apparently wheel-made, pot with a basal diameter of approximately 8 in., was found lying immediately above

<sup>1</sup> Mid Gleniron I, *Discovery and Excavation Scotland* 1964, 54.

the enclosing wall built across the forecourt to the SE. of the entrance. The fabric is hard, compact, with a filling of quartz. Its outer surface is brick-coloured and appears to have been glazed; the inner surface is black. The average surviving thickness of the wall is 13.5 mm. and of the base, 19 mm.

The sherd has no known prehistoric parallels and appears to be late medieval or early modern in date.

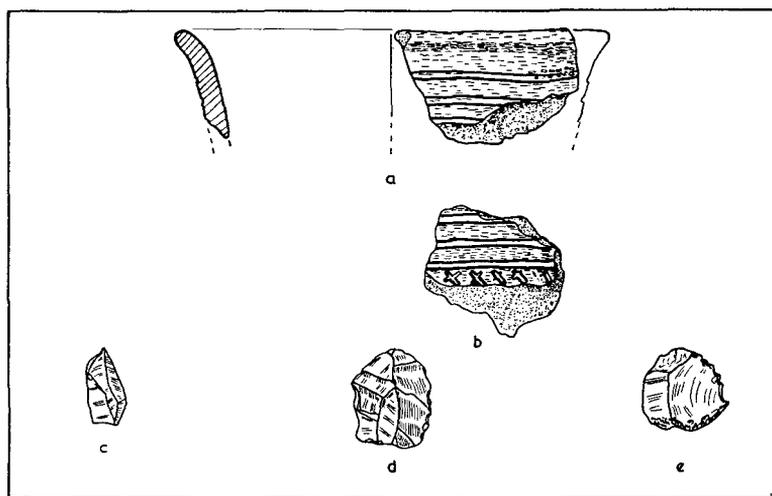


FIG. 7. *Tulach an t-Sionnaich*: a, b, Beaker sherds; c, Arran pitchstone; d, e, flint ( $\frac{1}{2}$ )

### (2) *Flint*

Thirteen pieces of flint were found, three in the chamber, two in the passage, four in the forecourt and one in the body of the cairn. Seven of these are unworked, although one blade-like flake may have been utilised. One fragment, associated with bone, some of it burnt, and found in the chamber, was similarly burnt. A piece of water-rolled beach pebble flint found in the body of the cairn appears to have been used as a side scraper (fig. 7*d*).

The three remaining flints were found inside, and near the base of, the cinerary urn in the forecourt. Two are small, unworked fragments. The third is a crudely worked thumb-nail scraper (fig. 7*e*).

### (3) *Arran Pitchstone*

One small worked point of Arran pitchstone was found 3 in. above the floor of the chamber. It is 2 cm. long, its greatest width is 1 cm. and is 2 mm. thick. It is not possible to cite close parallels for this artifact, apart from two flint points of similar shape and proportions found in Tulloch of Assery B (cf. p. 44). The pitchstone point, however, lacks the secondary working around the edges of the flint points but, like them, was struck from a slightly curved flake which retained its bulb of percussion. The opposed face is worked (fig. 7*c*).

## *Discussion*

Some of the structural features in the S. part of *Tulach an t-Sionnaich* may be paralleled among the heel-shaped cairns of Shetland,<sup>1</sup> although there are variations,

<sup>1</sup> For a full and recent discussion see Henshall, A. S., *The Chambered Tombs of Scotland*, 1, Edinburgh (1963), 135-53 (henceforth abbreviated to Henshall, C. T. S.). See also Calder, C. S. T., *P.S.A.S.*, xcvi (1962-3), 58-67.

both in overall size and proportions and in the construction of the chamber. There are similarities, for example, in cairn construction between *Tulach an t-Sionnaich* and Vementry (SHE 45),<sup>1</sup> despite differences in dimensions and in the plans of the respective chambers. At both sites a circular cairn surrounding the chamber was enclosed by a heel-shaped structure. At Vementry the circular cairn apparently rises from within a heel-shaped platform. Allowing for differences in building materials, *Tulach an t-Sionnaich* may originally have presented a similar appearance, the base of a central, circular dome surrounded by a heel-shaped structure, defined by a revetment of dry-stone walling. It is probable that the maximum height of the latter was 3 ft.

In both cairns, and possibly in other cairns of similar type in Shetland, the façade was built across the entrance to the passage. Miss Henshall has suggested that access was by means of a 'drop-entry' behind the façade.<sup>2</sup> Had a heel-shaped cairn with an unbroken façade been built as a unit, this would have been the only possible means of access. There is nothing to suggest, however, that the heel-shaped structure at *Tulach an t-Sionnaich* was not added to a circular cairn after the latter had already enjoyed an independent, although possibly short, existence. Without the heel-shaped structure the latter is a simple Passage Grave set in a circular cairn, the entrance of which was carefully blocked independently of the façade.

A typological sequence has been proposed for heel-shaped cairns in Shetland<sup>3</sup> and, according to this, *Tulach an t-Sionnaich* should be early in the sequence. It is one of the 'narrow' group in which the overall length from the chord across the façade to the back of the cairn equals or exceeds the maximum width. In the present state of knowledge neither the origins of the heel-shaped cairn may be defined, nor may the relationship of *Tulach an t-Sionnaich* to the Shetland group be established. It cannot be assumed, for example, that the Caithness cairn was ancestral to those of Shetland, although the rejection of such a hypothesis poses the problem as to the means by which a cairn of a type at present identified only in Shetland, came to be built in Caithness.

In the almost complete absence of datable finds from the heel-shaped cairns of Shetland, it is all the more unfortunate that *Tulach an t-Sionnaich* yielded so little. The similarity of the small featureless sherd from the chamber to the undecorated Neolithic pottery from Tulloch of Assery B is insufficient of itself to allow the assumption that the final deposit in the chamber of *Tulach an t-Sionnaich* dates from the *floruit* of that type of pottery in Caithness. A single sherd might have easily have survived from an earlier use of the chamber, or have accidentally been included in the burial deposit long after the remainder of the pot, from which the surviving sherd came, was destroyed.

<sup>1</sup> In this discussion each cairn of the Shetland group is followed by the abbreviation SHE (for Shetland) and a number. The latter refers to the numbering in Miss Henshall's *Catalogue* (Henshall, *C.T.S.*, 156-82), where full references may be found. A similar method is used elsewhere in this paper to refer to other cairns catalogued by Miss Henshall, abbreviations for counties being as follows:

CAT - Caithness  
 ORK - Orkney  
 SUT - Sutherland.

<sup>2</sup> Henshall, *C.T.S.*, 143-6.

<sup>3</sup> *ibid.*, 145-7.

The sherds from immediately in front of the façade and apparently belonging to a single pot may also be compared with undecorated Neolithic pottery from Tulloch of Assery B. This suggests that the sherds were deposited in front of the façade of *Tulach an t-Sionnaich* before slip had accumulated in that area, and some time before the later enclosing wall was built. If so, then it might be suggested that the pottery and the cairn were at least in part in contemporary use.

Two sherds of Beaker were found in a disturbed area immediately to the north of the chamber at the level of collapsed roofing material. As the bulk of the burial deposit in the chamber was undisturbed below the level of collapsed corbelling, it is possible that the Beaker sherds post-date the final use of the chamber. Taken together, these facts might suggest that the main use of the heel-shaped cairn of *Tulach an t-Sionnaich* in fact took place during the *floruit* of undecorated Neolithic pottery and prior to the local arrival of Beakers.

#### *Northern Structure*

Until the rear of the heel-shaped cairn had been identified, it had been assumed that the entire structure of *Tulach an t-Sionnaich* had been built as a unit, although during the early stages of excavation the alignment of the passage and side walls in the S. part of the cairn appeared to be anomalous. Once the heel-shaped cairn had been recognised it was necessary to establish its relationship with the remainder of the cairn (fig. 3).

The S. limit of the northern structure appeared to be defined by a straight façade of low, upright stones set at right angles to its longitudinal axis, at a distance of approximately 13 ft. from the rear of the heel-shaped cairn (Pl. V, 1). As similar arrangements of low, upright stones, in a similar alignment, were identified in other cuttings elsewhere in the northern structure, it is doubtful whether this façade-like feature was visible after the building of the northern structure was completed. All the evidence from the other cuttings in this area suggests that the intention of the builders was to incorporate the heel-shaped cairn into a long, composite structure. This was most clearly demonstrated by the remains of a low wall, mostly surviving only in its foundation course, which joined the northern and southern structures, and which extended southwards to enclose the heel-shaped cairn.

It has been shown that this later enclosing wall probably overlay part of the W. wall of the heel-shaped cairn. The builders of the northern structure chose an orientation some 15° to the E. of that of the heel-shaped cairn, probably in order to take advantage of a low ridge which gave the illusion of greater height to the final appearance of the composite structure. The position of the heel-shaped cairn close to an inlet of the loch on its W. side would also have prevented the alignment of the northern with the earlier structure. On account of this change of alignment, the S. sector of the later enclosing wall on the W. side was obliged to depart from the smooth alignment which was possible on the E., and the final plan was therefore slightly asymmetrical. To reduce this asymmetry to a minimum, the later enclosing wall did not take in the SW. corner of the heel-shaped cairn. On the E. side the later enclosing wall was built at a distance of approximately 7 ft. from the E. edge

of the heel-shaped cairn. The intervening area was found to be filled with loose stone, possibly slip from the latter. There also appears to have been a low dry-stone wall, probably built to stabilise this loose material before the later enclosing wall was built. Immediately to the NE. of the heel-shaped cairn there was a short stretch of subsidiary dry-stone walling which extended westwards from a small vertical stone set in the line of the enclosing wall. This may similarly have been necessary to stabilise the rear of the heel-shaped cairn, which perhaps had become unstable by the time the northern structure was built (Pl. V, 4).

The suggestion that there had been slip from the heel-shaped cairn prior to the construction of the enclosing wall is reinforced by evidence from the area in front of the façade. Dry-stone walling extended in a straight line across the shallow fore-court and overlay cairn slip, which had accumulated at this point to a thickness of about 1 ft. The wall was built of no more than three courses, although one large slab used near the centre was more than 1 ft. thick. At each end this wall abutted on to a small, thin vertical slab which marked the junction of the former with the long sides of the enclosing wall.

Although several cuttings were made in the northern structure particularly in areas where surface indications had suggested the existence of a chamber, neither chambers nor cists were identified. In several of these cuttings various cist-like arrangements of stone, such as that at the N. end of the cairn, were shown to be part of the cairn's structure. The latter differed from that of the heel-shaped cairn in being less carefully constructed. Whereas the predominant arrangement of flag-stone forming the body of the heel-shaped cairn was horizontal and with little earth, that of the northern structure was vertical with many earth-filled gaps. This vertical arrangement in several places suggested the appearance of disturbed chambers or cists, particularly where two or more stones were in alignment or at right angles to each other. In particular, there were a number of rough alignments, lying at right angles to the longitudinal axis, and they resembled the pseudo-façade which marked the S. limit of the northern structure (Pl. V, 2).

Roughly built dry-stone walling, rarely surviving to more than four courses in thickness, enclosed the northern structure (Pl. V, 3). The latter was straight-sided and tapered slightly from a width of 34 ft. at the pseudo-façade to 26 ft. at the slightly convex N. end. The distance between the two was 127 ft.; the average height of this structure was 2 ft., and did not exceed 3 ft. at any point. An illusion of greater height was given by building the cairn along the crest of a low ridge. Neither artifacts nor bone were found in this northern structure.

#### *Discussion*

Two important facts emerge from the excavation of *Tulach an t-Sionnaich*. One is the identification of the first heel-shaped cairn to be recognised on the mainland of Scotland. The second is the recognition of a later structural addition to a chambered cairn, already complete in itself, which altered the external appearance of the original cairn.

Any interpretation of the northern structure at *Tulach an t-Sionnaich* is inhibited

by lack of comparable data. It has been shown that in none of the cuttings made was there evidence of chamber or cist. Without complete excavation, which was impossible in the time available, it cannot be assumed that remains of some structures did not exist somewhere in the unexcavated part of the cairn. The low elevation of the structure, however, was unsuitable for the concealment of such structures, and cuttings were made wherever surface indications had suggested their existence.

This complex structure has posed a new problem in megalithic studies. The purpose of the northern structure, if indeed it lacked either burial or chamber, is elusive. Newcomers to Loch Calder perhaps wished to be associated with ritual centred on the heel-shaped cairn. Having deposited their dead in the chamber, they may have wished to add to the architectural complexity, and possible ritual efficacy, by adding the northern structure. In so doing, they produced a long cairn. Such a suggestion is inadequate, but so will be any alternative hypothesis until more detailed knowledge has been acquired of chambered cairns in the north of Scotland. *Tulach an t-Sionnaich* is of particular interest, and perhaps of added complexity, as the heel-shaped cairn has not previously been recognised on the Scottish mainland.

The only excavated site in Britain which offers any basis for comparison with the structure as a whole is the chambered cairn of *Bryn yr Hen Bobl* in Anglesey,<sup>1</sup> although, even here, the similarities are superficial. At *Bryn yr Hen Bobl* there is a large circular cairn with an apparently rectangular chamber opening from a deep, funnel-shaped forecourt which faces east. Attached to the cairn is what the excavator termed a 'terrace', consisting of a long mound, approximately 325 ft. long, 40 ft. wide, but not more than 3 ft. high. It lies to the S. of the circular cairn and, in the excavator's opinion, its construction preceded that of the chambered cairn, perhaps only by days or even hours. Evidence for this is not clear, and the chambered cairn itself may be of rather more complicated construction, possibly of more than one period. This is suggested by a change in the method of construction in its upper levels. The core of the 'terrace' was built of a mass of stones pitched on end, compacted with smaller stones and earth and enclosed by walling which was poorly built in places. At the S. limit the wall was slightly convex in plan. In those parts of the 'terrace' excavated, neither chambers nor cists were found, but a cremation under a cinerary urn and other cremations were found immediately S. of the structure. Beneath the 'terrace' were Neolithic artifacts and traces of occupational debris. The excavator was unable to offer any suggestion as to the purpose of the 'terrace', and the theory that it might have been used as a bank for the transport of building material during the construction of the cairn is as inadequate as it is improbable.

There are certain similarities of construction between the long structures of both *Bryn yr Hen Bobl* and *Tulach an t-Sionnaich*, such as the enclosing walls attached to the chambered cairn, the make up of the long structures, and inferiority of their construction when compared with that of the cairns proper. There are also differences, particularly in length, but this may be a difference of degree rather than of kind, as the heights of both are comparable. Of greater importance, perhaps, is the apparent absence of a chamber or a cist. Even if these similarities are accepted to

<sup>1</sup> Hemp, W. J., *Archaeologia*, LXXXV (1935), 251-92.

the extent of regarding both structures as belonging to the same generic type, it removes none of the problems of interpretation and lack of comparable data. As the excavator of *Bryn yr Hen Bobl* remarked, features such as his 'terrace', if attached to chambered cairns, may well have disappeared in cultivated land. Piggott has commented on the possibility of some connection between the 'terrace' at *Bryn yr Hen Bobl* and the long, low ridge, apparently linking a circular cairn with a smaller cairn at Long Low, Wetton, Derbyshire.<sup>1</sup> This 'ridge' was found to contain cremations, but without re-examination of the whole complex no valid conclusions may be drawn. It does not suggest a close parallel with the northern structure of *Tulach an t-Sionnaich*, which differs both from the 'terrace' of *Bryn yr Hen Bobl* and the ridge of Long Low in that both the former's proportions and dimensions are closer to those of a more conventional long cairn.

Excavation of *Tulach an t-Sionnaich* has revealed the existence of a chambered cairn of two structural periods, separated by some undefined period of time. It has been assumed that the enclosure of the heel-shaped cairn was contemporary with the construction of the northern structure. There is no conclusive evidence of this, apart from the alignment of the side-walls of the latter with the later walls enclosing the heel-shaped cairn, and the absence of any break in this alignment. The importance rests on the identification of two distinct periods of construction within a cairn which, prior to excavation, had appeared to have been of unitary construction.

Before excavation what may now be seen to have been a gap between the two main cairn masses had the appearance of 'a trench . . . excavated right across at about 50' from the ESE. end'.<sup>2</sup> There are similar surface indications in other long cairns in Caithness, such as the long cairn at Camster (CAT 12). Published plans of this cairn tend to obscure some possible structural features. In profile there are two depressions running across the width of the cairn. The N. end of the cairn is both considerably higher and broader and has the appearance of having been an independent cairn. The depressions have not been caused in recent years, as they may be identified in a woodcut accompanying Anderson's paper, published in 1870,<sup>3</sup> on the horned cairns of Caithness. While not suggesting that the cairn had three periods of construction, although this is not improbable, it does seem possible that the N. chamber, a Passage Grave, was once enclosed in its own circular cairn. To this may have been added a chamber of Camster type, apparently within its own circular cairn, and the whole complex was ultimately enclosed in a long-horned cairn, either simultaneously with the construction of the Camster-type chamber or subsequently. In doing so, it compelled the builders to produce a laterally chambered cairn, having a forecourt from which there was no access to a chamber. The sequence of chamber construction might have been reversed, but this seems less likely. This must remain merely a hypothesis until the site is fully excavated.

Elsewhere in the county there are other long cairns which have similar surface features. The long-horned cairn on Cnoc Freiceadain (CAT 18), a little over four

<sup>1</sup> Piggott, S., *Neolithic Cultures of the British Isles*, Cambridge (1954), 268-9. Bateman, T., *Ten Years' Diggings . . .*, London (1861), 144-7, 182-3.

<sup>2</sup> R.C.A.H.M. (Scotland), *Caithness*, No. 135 (p. 39).

<sup>3</sup> Anderson, J., *P.S.A.S.*, VII (1867-8), 484. See also Henshall, *C.T.S.*, plate 10.

miles to the NW. of *Tulach an t-Sionnaich*, has a prominent southern end 'which rises almost like a separate cairn'. To the N. is 'a slight depression or trench across the body' which the Royal Commission's *Inventory* believed may have been secondary.<sup>1</sup> A second long-horned cairn, *Na Tri Shean* (CAT 41), situated a little over 100 yds. to the south of Cnoc Freiceadain, has a similar 'trench' and the appearance of a large circular cairn incorporated into a long structure. Miss Henshall has grouped together long cairns of this type, some of which are horned, and refers to them as the *Na Tri Shean* type, drawing parallels between them and long mounds of her Balnagowan group.<sup>2</sup> Long cairns of the *Na Tri Shean* type have a large and distinct circular mound at the more easterly end. The body of the cairn is much lower, rarely more than a few feet high, compared with a height of 8 to 12 ft. for the mound at the E. end. The long-horned cairn at Head of Work (ORK 18) in Orkney is similar. Without excavation it is unknown whether or not these are cairns of more than one period of construction. Such a hypothesis would nevertheless account for the alignment of the E. chamber at *Tulach Buaille Assery* (CAT 59) which differs by about 45° from the longitudinal axis of the cairn as a whole. In several cairns of this type, such as Brawlbin Long (CAT 6), Cnoc Freiceadain (CAT 18) and *Tulach Buaille Assery* (CAT 59), the tops of thin upright slabs, set at right angles to the longitudinal axis, are visible and they resemble similar settings at *Tulach an t-Sionnaich*.

Excavation has since revealed the existence elsewhere in Britain of multi-period cairns.<sup>3</sup> At Wayland's Smithy in Berkshire a megalithic chamber was added to a long barrow and the composite structure enclosed in a long trapezoidal mound.<sup>4</sup> Surface indications, in the form of so-called 'trenches', have been recognised in some long cairns in the Cotswolds, and may indicate the existence of multi-period cairns within the Cotswold-Severn group.<sup>5</sup> The particular importance of *Tulach an t-Sionnaich* and other known cairns of more than one period of construction is that the recognition that such cairns exist may contribute to a clearer understanding of the means by which some well-defined types of chambered long cairns may have evolved within Britain.

It is not possible to date the northern structure of *Tulach an t-Sionnaich* by associated finds. It is obvious, however, that it post-dates the heel-shaped cairn which, it has been suggested, may date from the use of undecorated Neolithic pottery in Caithness. The position of the secondary cremation outside the later enclosing wall suggests that the cremation was deposited after the enclosing wall was built. Had the cremation and the wall been contemporary, it might be supposed that the cremation would have been deposited within, and not outside, the area enclosed by the wall. These two factors suggest both a *terminus post quem* and a *terminus ante quem* for the building of the northern structure and the associated wall surrounding the heel-shaped cairn, a period between the *floruit* of undecorated Neolithic pottery and

<sup>1</sup> R.C.A.H.M. (Scotland), *Caithness*, No. 370 (p. 102).

<sup>2</sup> Henshall, *C.T.S.*, 75.

<sup>3</sup> e.g., Dyffryn Ardudwy, Merioneth (Powell, T. G. E., *Antiquity*, xxxvii (1963), 19-24); Mid Gleniron I and II, Wigtownshire (Corcoran, J. X. W. P., *Trans. Dumfriesshire and Galloway Nat. Hist. and Ant. Soc.*, xli (1964), 99-110 and forthcoming).

<sup>4</sup> Atkinson, R. J. C., *Antiquity*, xxxix (1965), 126-33.

<sup>5</sup> Corcoran, J. X. W. P., in Powell, T. G. E., et. al., *Megalithic Enquiries in the West of Britain* (forthcoming).

Bronze Age cinerary urns. A date at the beginning of the local Early Bronze Age might be appropriate, and it may tentatively be suggested that the presence of Beaker in the upper levels of the heel-shaped cairn is in some way associated with this event. Such a hypothesis would not contradict the generally accepted view that the use of chambered long cairns came to an end in Britain with the local arrival of Beakers.

#### TULLOCH OF ASSERY A<sup>1</sup>

Excavation of this short-horned cairn presented few problems, either of technique or of interpretation. Before excavation the general characteristics of its type, including both pairs of horns, were visible, but there was doubt as to the position of what was then thought to be a single chamber and passage. Published plans of the short-horned cairns of Ormiegill (CAT 42) and Garrywhin (CAT 26) showed that entrance to a single passage and chamber was from either SSE. or SSW. Surface indications at Tulloch of Assery A suggested that a passage opened from the northern forecourt, the cairn being orientated almost exactly N.-S. At an early stage of excavation, however, it was realised that the cairn contained a passage and a chamber entered from each forecourt. Excavation was planned to uncover as much as possible of the body of the cairn. Considerably more than half of the total area of the cairn was uncovered, and the major structural details were located. A reconstruction of the original plan of the cairn may therefore be offered (fig. 8).

#### *Northern Chamber and Passage* (figs. 8, 9, and Pl. VI)

The northern chamber comprised the chamber proper and an ante-chamber. The latter was subrectangular in plan, 7 ft. 6 in. wide and 5 ft. long. Its E. and W. walls were built of dry-stone walling. Its N. and S. limits were each marked by two orthostats which separated it respectively from the passage and chamber, with gaps between each pair of orthostats to allow access. The chamber proper was polygonal in plan, measured 10 ft. at its greatest width, and was 8 ft. 9 in. long. Its N. limits were formed by two orthostats, common to both chamber and antechamber. A large orthostat, set leaning backwards at a slight angle, formed the end wall. The E. and W. walls were each built of a single orthostat, each leaning backwards, and linked to the other three orthostats by very well-built dry-stone walling.

There was no evidence that the sockets of the orthostats were packed with stones to aid stability. In this, Tulloch of Assery A and *Tulach an t-Sionnaich* differ from Tulloch of Assery B. The sockets of Tulloch of Assery A were set in sockets whose shallow depth was limited by outcrops of flagstone beneath the cairn. Stability was achieved by the selection of orthostats having flat bases, their incorporation into a composite structure of orthostats and dry-stone walling, backing walls and, where appropriate, the setting of orthostats at a small angle from the vertical.

The side-walls of the passage were constructed of dry-stone walling which had a slight backward batter, that of the eastern wall being more pronounced than the

<sup>1</sup> N.G.R. ND 06816189.

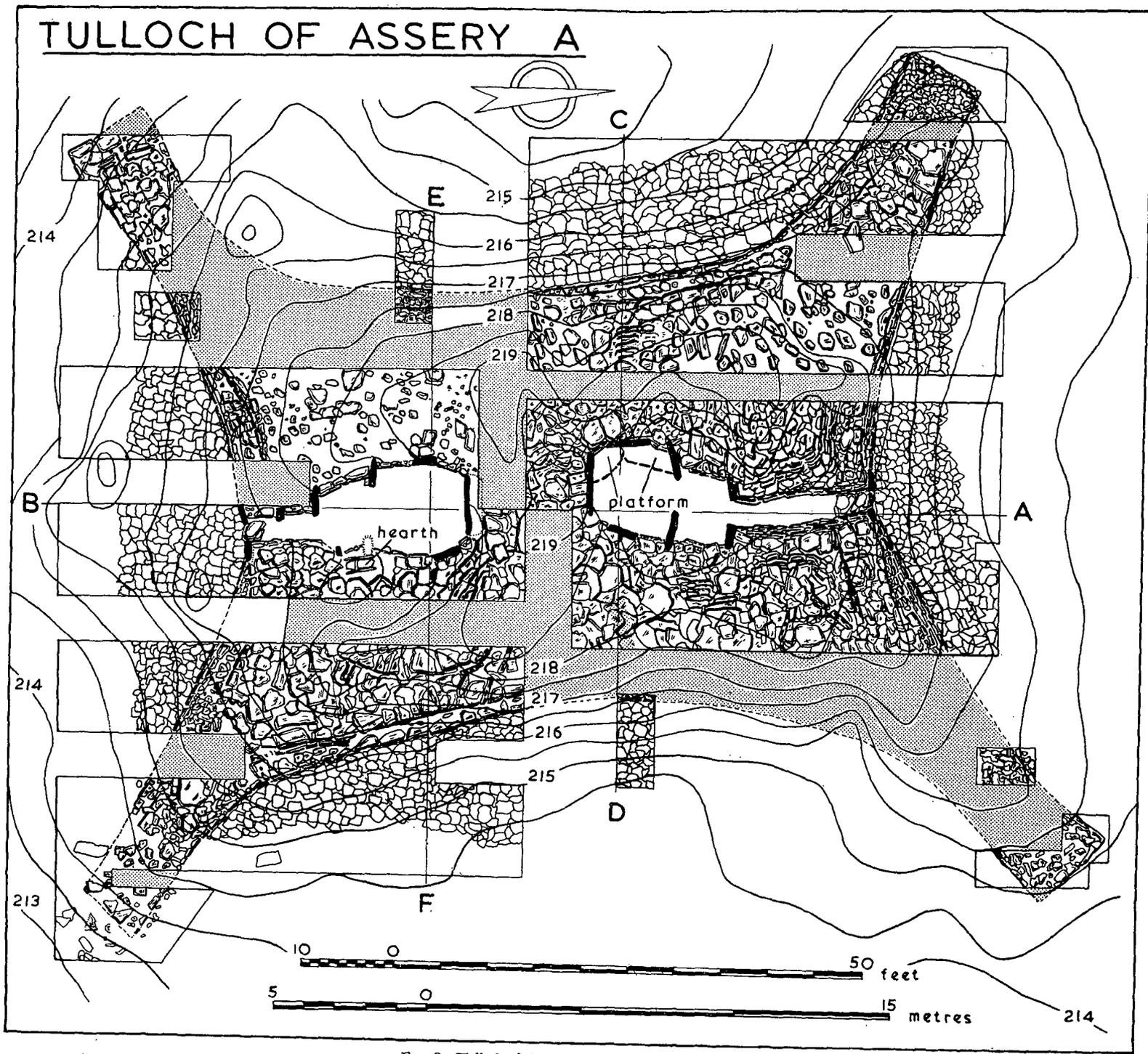


FIG. 8. *Tulloch of Assery A*: general plan

western. Slabs of greater than average length were used in the foundation course. A pair of jamb-stones, aligned with the line of the façade, marked the entrance. The western orthostat had been slightly displaced and leaned outwards into the forecourt. Between the jambs, and extending for a distance of 3 ft. into the passage, there was a blocking of carefully laid horizontal slabs. The passage measured 14 ft. 6 in. from the entrance to the pair of orthostats which separated it from the antechamber. Its width varied slightly at ground level from 2 ft. 3 in. to 3 ft. and from 3 ft. 6 in. to 4 ft. 9 in. at its uppermost surviving courses. The S. end of the passage was blocked by loosely, but carefully, laid slabs.

Roofing did not survive *in situ* in any part of the cairn. A considerable number of large flat slabs, having an average width of 3 ft., lay at different angles in the northern chamber, and were of a size suitable for roofing material. Several slabs lay close together in vertical stacks as they had fallen. One very large slab, measuring approximately 5 ft. by 3 ft., which had fallen near the junction of antechamber and chamber, would have been of a size and of proportions appropriate to a capstone. This evidence suggests the former existence of a fairly massive corbelled roof.

Recent interference in the N. part of the cairn was considerably less than that in the S. and, apart from roofing, the only direct evidence for disturbance came from each side of the W. orthostat, set between antechamber and chamber, and from the N. side of the opposed orthostat. While this interference may have been sufficient to disturb and destroy the delicate stability of the roofing, there is no evidence to suggest further human depredation in either passage or chamber. Beneath the infill of stone in the chamber burials were found, apparently undisturbed since prehistoric times.

The highest point of the W. orthostat in the chamber was 5 ft. above floor level, but the underside of the roofing at its highest point must have exceeded this. It is most improbable that the chamber could have been spanned by roofing stones resting directly on the side-walls and, as has been suggested, the quantity of fallen stone found in the chamber suggests that some form of corbelling was employed. The upper course of dry-stone walling, in those areas where it survived undisturbed, was formed of a single large slab, similar to that in the passage at *Tulach an t-Sionnaich* (cf. p. 9). These appear to have been chosen, both for their stabilising effect, and as seating for corbels. Behind the orthostats cairn material was built up in horizontal layers in the form of a rough, but substantial, backing wall. The uppermost undisturbed material forming the body of the cairn in the immediate vicinity of the chamber was composed of flagstones, set with a slight upward inclination towards the centre. Each of these details would have contributed to the stability of a corbelled structure. It is not known to what height such a corbelled structure would have been built, although it would undoubtedly have afforded clearance sufficient to allow a man to stand upright, at least in the centre of the chamber. Evidence for corbelling was noted by Anderson in both long- and short-horned cairns in Caithness, although roofing did not remain intact in any of the cairns examined by him.<sup>1</sup> The floor of the chamber was not paved. Two platforms of dry-stone construction were

<sup>1</sup> Anderson, J., *P.S.A.S.*, VII (1867-8) 495.

built in the W. sector of the chamber, and they are discussed below in connection with the burial.

Some form of corbelling may also have been used in the ante-chamber, as both longitudinal and lateral distances would seem to have been too great to be spanned easily by single slabs of flagstone. The height of the roofing of the antechamber is unknown. It is similarly unknown whether it was roofed by an independent corbelled structure, or whether chamber and antechamber were both covered by the

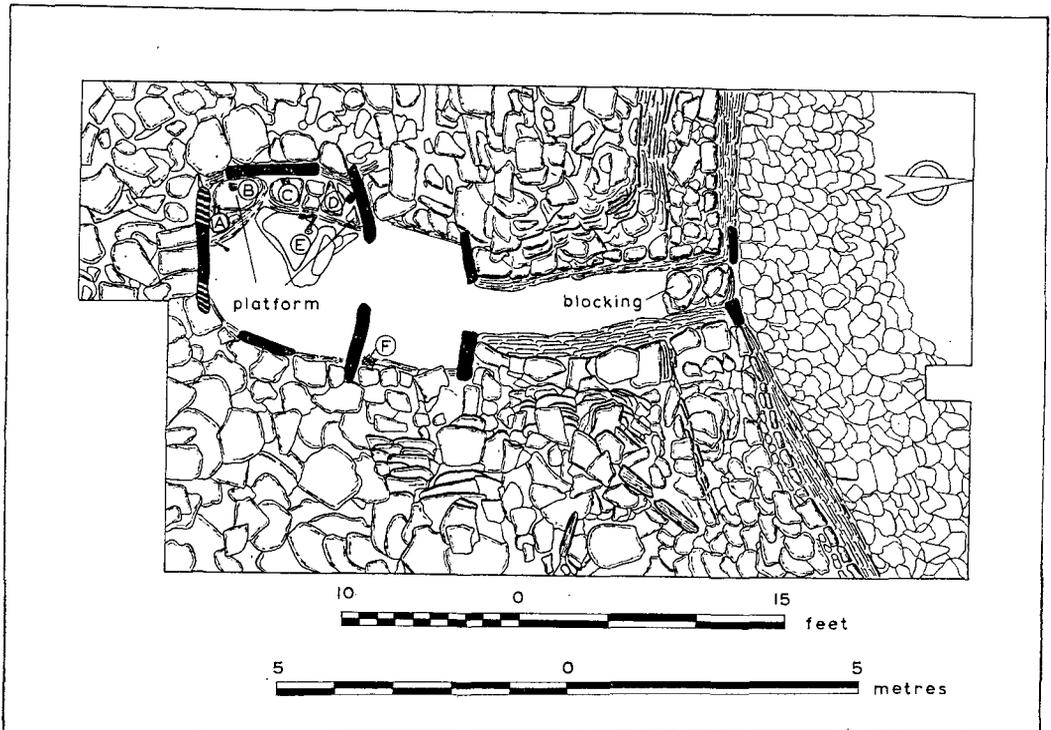


FIG. 9. *Tulloch of Assery A*: plan of northern passage and chamber, showing position of burial deposits A-F

same roofing. The width of the passage, with the possible exception of a short length about half-way along, would have allowed it to have been spanned by individual slabs. The walls of the northern passage survived to an average height of a little under 4 ft. and, as they showed little evidence of disturbance, apart from collapsed roofing, this may have approximated to the original height of the passage for most of its length. For a distance of 3 ft. from the entrance the roof of the passage was probably lower, perhaps only 3 ft. high. An inner wall in the body of the cairn was situated at a distance of 3 ft. from the northern façade, and this survived at the edge of the passage to a height of approximately 1 ft. above that of the façade. The evidence suggests that at the entrance the passage was no higher than the low portal stones, which were 3 ft. high, and that the roofing remained at that height for the

first 3 ft. of its length. At both Ormiegill (CAT 42) and Garrywhin (CAT 26) the passage appears to have been roofed by simple slabs, and surviving evidence suggests similar roofing at Tulloch of Assery A.

*Southern Chamber and Passage* (fig. 8)

Because of extensive disturbance in the southern part of the cairn it was not possible to recover structural evidence comparable with that from the northern, but sufficient remained to allow a plan to be made of the southern chamber and passage. This revealed that there were minor differences in lay-out and dimensions between the northern and southern structures.

The southern chamber was subrectangular in plan, with slightly curved side-walls, and rather more symmetrical than the northern chamber. Its back wall was formed by a large orthostat, leaning backwards in a manner similar to that of the corresponding orthostat in the northern chamber, and the southern limits were defined by a pair of orthostats with a gap to allow access from the antechamber. The western orthostat alone survived, but the socket of the eastern was located. The greatest width and the greatest length of the chamber were both 9 ft. 9 in. Side-walls were each constructed of a single orthostat, and were joined to the northern and southern walls by dry-stone walling. Although the overall plan of the chamber was symmetrical, the orthostats of the side-walls were not set symmetrically in relation to each other. The original floor of the E. side of the chamber had been intensively burnt, but it was not possible to determine whether this had occurred in prehistoric times or during more recent disturbance.

The plan of the western part of the antechamber had survived, but the eastern had been completely destroyed by later disturbance which included the construction of a hearth. Had the antechamber been symmetrically planned, the plan would have been approximately trapezoidal and would have measured 6 ft. in length and approximately 8 ft. at its greatest width. The surviving western side-wall was built of dry-stone walling and the antechamber was probably separated from the passage by a pair of orthostats, the western of which remained *in situ*. The base of a small broken vertical stone was found set into the subsoil on the assumed line of the eastern wall of the antechamber. Its original height is unknown. Its function appears to have been connected with an inner wall following the line of the southern façade, and is discussed below.

The passage measured 7 ft. in length and was 3 ft. wide. Apart from the small orthostat, set half-way along the W. wall, the walls were dry-stone built. At the entrance there was a pair of jamb-stones, set in line with the frontal façade and similar to those at the N. entrance. The S. entrance was also sealed by blocking similar to that in the N. entrance, and extended into the passage for a distance of 3 ft.

On account of disturbance in the S. part of Tulloch of Assery A it was impossible to recover details of roofing. As structural details of the walls of passage and chamber resembled those of the northern structure, it may perhaps be assumed that the roofing may have been similar to that suggested for the latter.

Disturbance in the S. part of the cairn appears to have been associated with a

temporary encampment on the site within the last century or so. The cairn was levelled in this area at a height of about 2 ft. above the original ground level, and a discontinuous paving laid down. Immediately to the E. of the antechamber there was a small stone-built fireplace. Alongside was a small, stone-lined socket, possibly intended to hold a forked branch from which cooking vessels were suspended (Pl. VII, 2). There were no traces of post-holes, and it may be assumed that there had not been a permanent domestic structure. Artifacts of recent date were found associated with this disturbance.

### *Cairn*

Reference has been made to the construction of the cairn in the area immediately surrounding the N. chamber. In those parts of the cairn which had been relatively undisturbed, it could be seen that almost every cairn stone had been carefully and precisely laid in position. There was no impression that the builders had thought in terms of constructing inner retaining walls, and of merely tipping cairn material in between them. The particular properties of Caithness Flagstone allowed perfection of detail, denied to many chambered cairn groups.

Despite some disturbance in the body of the cairn, it was possible to determine that a massive 'core', penannular in plan, surrounded each chamber and its backing material. This core was more than a simple retaining wall which, as at *Tulach an t-Sionnaich*, was never more than one course in thickness. Wherever measurements could be made, it was seen that the core measures at least 8 ft. in thickness and possibly 36 ft. in diameter. Details of its construction were more easily identified in the N. part of the cairn, but surviving cairn material in the S. part showed a similar construction. The tips of the penannular core formed walls set back some 2 ft. from the upper courses of the walls of the northern passage, probably to allow room for roofing stones. In the N. part of the cairn, the northern limits of the core in part coincided with an inner wall, built some distance behind the northern façade. The outer limits of the core had largely been disturbed, but those of the southern core were more readily identified in a curved setting to the E. of the chamber. Considerable traces of the inner faces of both northern and southern structures were identified, and in each case the core was built up against the end-stone of its respective chamber.

This type of construction resembles the circular wall, approximately 25 ft. in diameter, which surrounded the chamber at Ormiegill (CAT 42) and, apparently, at Garrywhin (CAT 26). Anderson noted that the wall was built of heavy blocks, rather more massive than the stone used in the construction of the outer walls.<sup>1</sup> Although there are similarities between the three cairns, it is not known whether the internal walls which Anderson identified were similar to the less massive structure at *Tulach an t-Sionnaich* or whether they were the more easily identified outer courses of the type of core recognised at Tulloch of Assery A.

Despite careful planning and execution, it is probable that there were local areas in the cairn where overall design was unable to prevent instability of cairn material. Although Caithness Flagstone is a raw material which possessed considerable ad-

<sup>1</sup> Anderson, J., *P.S.A.S.*, VII (1867-8), 493.

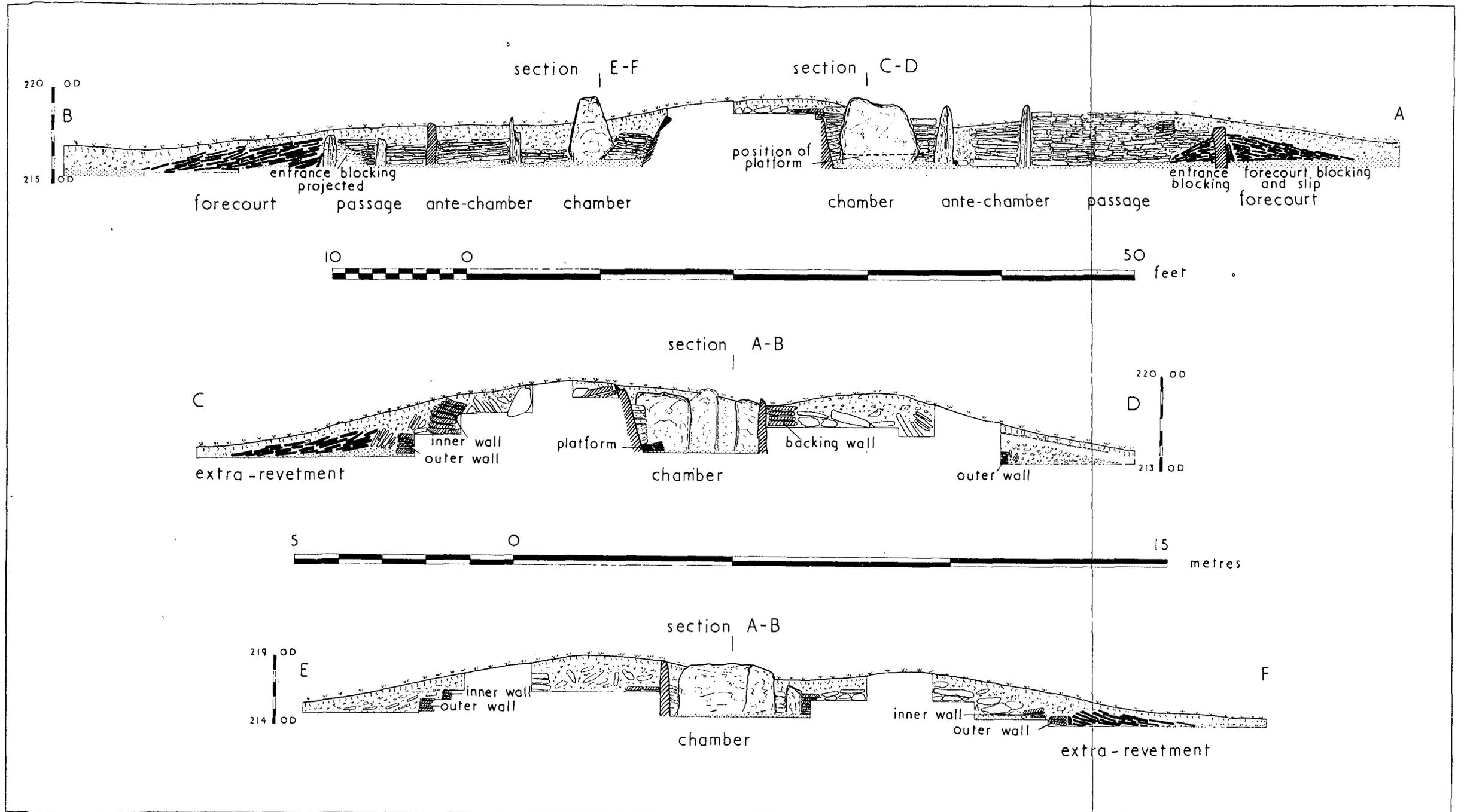


FIG. 10. Tulloch of Assery A: sections

vantages for the builders of chambered cairns, a cairn almost entirely constructed from it had certain inherent weaknesses due to movement and slip. The need for local stability was partially satisfied by the use of vertical buttress stones which were identified to the E. of both northern and southern chambers. There were also traces of internal walling to the W. of the N. chamber. It was slightly curved in plan and joined the inner of the two lateral walls of the cairn to the chamber area, and was probably intended as some form of inner reinforcement additional to that allowed for in the original design.

Wherever identification was possible, the limits of the cairn were defined by well-built dry-stone walling. Greater attention to appearance was probably paid in the construction of the façades (Pl. VII, 1). Both N. and S. façades were built from horizontally laid flagstone. Where tested by excavation, the lowest course had been set in a shallow trench, which had probably been cut to mark out the edge of the cairn. Slabs used in the construction of the façade varied in length from 1 ft. to 3 ft., but maintained a uniform thickness of approximately 3 in. Both N. and S. façades survived in height at the respective entrances to the tops of the entrance jambs, approximately 3 ft., and it is probable that this was the original height of the façade at this point. From each entrance the height of the façades gradually diminished until, at the tips of the horns, they were only a few inches high, and were built from one or two courses of flagstone. For a distance of 20 ft. or more on each side of the entrances, the façades had a slight batter, which would have aided stability.

For some distance on each side of both passages there was an inner wall which followed the line of the façade at a distance varying between 2 ft. 6 in. and 5 ft. from the upper courses of the façade. Neither the outer limits of this walling nor its relation to the lateral inner wall were determined because of disturbance, but it could be seen that in the S. part of the cairn the walling continued for a distance of at least 16 ft. on each side of the passage. In the N. part of the mound, the corresponding wall also marked the outer face of the central raised area of the cairn. At its inner limits the lower courses were built into the walls of the passage at the point at which the height of the passage was increased. In the S. part of the cairn the E. inner wall converged in plan towards the façade and met it at the E. entrance portal. The corresponding W. inner wall appears to have been aligned on an orthostat set half-way along the W. wall of the S. passage.

The N. inner wall also partially coincided with, and formed lower courses of, the northern limits of the core. This interdependence of structural elements ensured internal stability within the cairn, and the whole central mass built around each chamber contributed to the security of the roofing. It is impossible to offer a precise reconstruction of the original appearance of the cairn, but it was possibly dome-like in the central area. The deposition of individual cairn-stones, set with a slight upward tilt towards the centre of the cairn, would have contributed to this effect. Assuming that the capstones of the chambers had been completely covered by cairn material, the original height of the cairn would have been several feet higher than it was at the time of excavation. It has been suggested that the façade was no more than 3 ft. in height, but that the inner wall was somewhat higher. The intervening

area appears to have formed a level platform at the height of the upper courses of the façade. This would have given the cairn a 'stepped' appearance, provided that cairn material had not been added to mask it. There was no evidence for the former existence of additional cairn material at this point.

The side-walls of the cairn were similar in construction to the façades, but had been rather more extensively disturbed. It was impossible to recover satisfactory evidence of the junction of the inner walls following the line of the façades and those of the side-walls. The little evidence that existed in the NW. quadrant suggested that the junction occurred at the point at which a projection of the lines of both surviving inner walls would have met. It is improbable that the inner walls continued into the horns of the cairn.

On account of disturbance it was not possible to determine the original height of the side-walls. In most places where the outer wall was identified, it rarely survived to a thickness of more than two or three courses. In the NW. quadrant, however, up to nine courses of the outer wall survived in short stretches to a height of 2 ft. In the same quadrant the inner wall survived to a height of 4 ft above the old ground surface and collapsed walling in the immediate vicinity suggested that the height of the inner wall at this point was originally still greater. It is probable that the inner wall along the sides of the cairn was built to a greater height than that of the façade. It is probable, too, that the inner wall was built to a height greater than that of the outer wall at any given point on the perimeter of the cairn, and this accords with evidence from other short-horned cairns. The inner wall followed the line of the outer wall at an average distance of 2 ft. 6 in. behind the face of the latter. If the interpretation of the junction of the inner walls is correct, the ground plan of the area enclosed by the inner wall would have been subrectangular. It formed a firm retaining wall built around the twin cores and additional strength was achieved in the frontal areas by bonding together the two structures, the core and the inner wall.

The outer wall was built probably to give the cairn its distinctive ground plan, rather than for structural reasons. Most of the thrust from the centre of the cairn would have been absorbed by the cores and the inner wall, although additional material built up against the latter and the facing provided by the outer wall would have had some additional structural value. As the height of the façade decreased from the entrance towards the horns, it is possible that along the side walls the height increased towards the waist of the cairn. The horns were of negligible structural importance, as they were quite low in elevation, and at Tulloch of Assery A there was no evidence that the inner walls extended into the horns. Anderson claimed at Ormiegill (CAT 42) that the inner wall extended completely round the cairn without a break, but found breaks in similar structures in other, unspecified horned cairns.<sup>1</sup>

The plan of the cairn proper, as defined by the outer wall, was almost symmetrical and compared closely with horned cairns of its type, having the appearance of a stretched animal hide. The northern façade measured 81 ft., taken along the chord between the tips of the horns, and the southern 80 ft. From entrance to entrance

<sup>1</sup> Anderson, J., *P.S.A.S.*, VII (1867-8), 489.

the cairn measured 60 ft. 6 in., and at the waist 45 ft. The chord between the rear tips of the horns measured 96 ft. on the eastern side and 82 ft. on the western. Each horn projected for a distance of approximately 25 ft. from the main mass of the cairn. Across the tips the NW. and SE. horns measured approximately 8 ft. 6 in., the NE. and SW. 9 ft. 6 in.

#### *Extra-revetment*

Beyond the outer wall there was a considerable quantity of stone in each of the forecourts and along the sides of the cairn. Its interpretation involves some consideration of the problem of extra-revetment material, whether or not it was deliberately placed in position and, if so, for what purpose. At Tulloch of Assery A it seems possible that, although some cairn material had slipped from the mound proper into the surrounding area, the outer revetment walls had been deliberately masked by extra-revetment, not necessarily at the time of their construction, but possibly at some time during the use of the cairn. In both forecourts and along the sides of the cairn layers of flagstones were found lying at a slight angle against the outer wall. In places a flat slab was found lying almost vertically against a wall face, between the latter and the mass of extra-revetment material.

It is difficult to interpret this evidence. Experiments conducted on the site showed that pressure from the cairn could cause collapse of several courses of an outer wall which had no revetment. The top course frequently fell into an almost vertical position. Simultaneous collapse of several courses often resulted in a stack of near vertical slabs, as were found in a number of places (cf. section C-D, fig. 10). On the contrary, collapsed walling very rarely settled itself into the near horizontal position of so much of the extra-revetment material around the cairn. At Tulloch of Assery A, therefore, it is possible that extra-revetment material resulted partially from collapse and was partially placed in position by the users of the cairn. The relatively few sections in which nearly vertical slabs were found may represent early collapse, although it is possible that they may have been placed in that position to act as a seating for extra-revetment material. Deliberately placed extra-revetment is probably that represented by what appeared to be carefully laid and nearly horizontal flagstone, sometimes consisting of slabs measuring more than 2 ft. in length. That in the forecourts differed little from that along the sides of the cairn. No attempt has been made in either plan or section (figs. 8 and 10) to distinguish between what may have been deliberately set extra-revetment material and slip from the body of the cairn. Attempts at such an identification could only be made at a site where there had been little or no disturbance. In the forecourts extra-revetment extended at its greatest extent opposite the entrances for a distance of between 9 and 13 ft., and along the sides of the cairn for between 12 and 15 ft. There was no evidence to suggest that the extra-revetment in the forecourts had subsequently been removed to allow later access to the passage.

The problem of interpretation of extra-revetment material is one which has not been solved to their complete satisfaction by some scholars<sup>1</sup>: one excavator in Ireland

<sup>1</sup> See discussion in Daniel, G. E., *Prehistoric Chamber Tombs of England and Wales*, Cambridge (1950), 41-43.

subsequently revised an earlier interpretation of deliberately set extra-revetment to one caused by slip.<sup>1</sup> Although similar evidence from chambered cairns elsewhere in the Hiberno-British province may not necessarily be relevant to the interpretation of such features in cairns of northern Scotland, it is perhaps germane to refer to this lack of unanimity. It is also possible that there has been a tendency to oversimplify the problem and regard all extra-revetment material as being either entirely the result of deliberate construction or entirely the result of slip.

The present writer was able to visit this cairn on three occasions subsequent to excavation. The first visit took place just under one year after the excavation of 1961, the second nine months later, and the third three years after the original excavation. During this time the site had been left uncovered and had been undisturbed. Walling remained relatively stable, but there had been progressive flaking of dry-stone walling, some of the individual stones of which had entirely disintegrated into small flakes (Pl. VII, 3). Perhaps more than other evidence, this supports the conclusion that Tulloch of Assery A could not have been left without some sort of extra-revetment for any length of time. Such evidence cannot be applied indiscriminately to cairns of similar construction elsewhere, as it is not known to what extent factors such as climate, physical properties of the stone used in construction and the length of time incorporated in a cairn, may be relevant. The present writer found that similar weathering of a similar type of revetment wall occurred within a similar period of time at Luckington in Wiltshire.<sup>2</sup>

#### Finds

Only one Neolithic artifact of recognisable type, a flint arrowhead, was found in the cairn as a whole. Despite apparent absence of disturbance in the northern chamber, there was only one, very small fragment of flint. Sherds, glass and metal objects of recent date were found in the disturbed, southern part of the cairn.

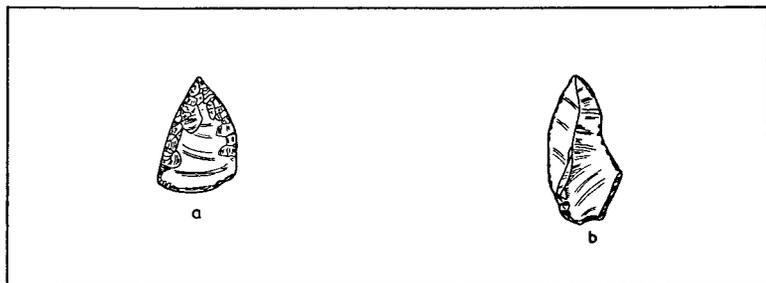


FIG. 11. *Tulloch of Assery A*: flint ( $\frac{1}{2}$ )

#### (1) Flint

(a) *Arrowhead*. A triangular arrowhead of blue-grey flint was found on the original floor level of the southern chamber. It measures 1.2 in. (30.5 mm.) in overall length and has a greatest thickness of 4 mm. (fig. 11a). It belongs to a class G of Clark's *petit-tranchet* derivatives,<sup>3</sup> and a similar arrowhead was found in the short-horned cairn of Ormiegill (CAT 42).

<sup>1</sup> Collins, A. E. P., *U.J.A.*, xvii (1954), 11-13; xxii (1959), 21-23.

<sup>2</sup> Corcoran, J. X. W. P., *Wilts. Arch. Magazine*, forthcoming.

<sup>3</sup> Clark, J. G. D., *Arch. J.*, xci (1934), 52.

(b) *Flakes.* Three flakes were also found scattered on the floor of the S. chamber. One, of grey flint, has traces of secondary working along one concave edge (fig. 11b). The other two, one large flake of brownish-red flint, and one smaller blue-grey flake, consisting almost entirely of a bulb of percussion, lack traces of secondary working, although they may have been utilised as scrapers. A small, struck flake of light grey flint was found on the floor of the S. antechamber. A small, water-rolled fragment of brown flint lay at the bottom of the small socket adjacent to the hearth.

The remaining flints are a small rounded and much worn blade of pale, fawn-coloured flint, which was found near the surface of the cairn in the SE. quadrant, and a very small scrap of reddish-brown flint, which was found close to burial deposit A in the N. chamber.

(2) *Rock crystal*

A very small fragment of rock crystal was found immediately below the hearth in the disturbed S. area of the cairn.

(3) *Finds of Recent Date*

Sherds of recent domestic earthenware and a fragment of spectacle lens were found on the surface of the cairn, immediately below the humus. In addition, a small iron shovel with carbonised wooden handle, a bill-hook, button, fragments of thick glass and sherds of earthenware were associated with disturbance in the S. part of the cairn.

### *Burials*

Apart from collapsed roofing material, the N. chamber did not appear to have been disturbed, and burial deposits were here recovered intact. Two low platforms of dry-stone construction were built and burials were placed on them. One platform was built of seven courses of dry-stone walling and was set in the SW. corner, in an angle formed by the W. and S. orthostats and their intercalary walling. It formed a segment of a circle in plan, having a curved frontal edge. The other platform was of similar construction. It was approximately rectangular in plan, and lay along the W. side of the chamber between the SW. platform and the NW. orthostat of the chamber.

Five burial deposits were found in the N. chamber, two lying on each platform. Each of these four latter deposits comprised disarticulated assemblages of human bone. The surviving portion of the fifth burial was articulated and lay on large slabs immediately to the E. of the N. platform. Bone was not found in the E. part of the chamber, but a small deposit was found in the E. part of the N. antechamber. Full details of bones identified are given in Appendix A, and it is convenient here to summarise that evidence (Pls. VIII-X, fig. 9).

*Burial deposit A.* The main part of this deposit lay on the S. part of the SW. platform and was concentrated in an area of approximately 1 ft. square. At the time of excavation, it could be seen that parts of a crushed cranium overlay vertebrae and other bones. Parts of bones of the forearm and a scapula had fallen from the platform. The greater part of an ulna and three ribs lay against the S. orthostat of the chamber. A femur had been jammed into a cranium, and part of a pelvic margin was in contact with a mandible. Traces of burning could be identified on the surface of two bones of the foot. It was apparent that this deposit represented the careful collection of bones from decayed bodies.

Remains of two individuals were identified. One was a mature adult, some of

the hand bones suggesting an elderly person. Surviving parts of long bones further suggested a rugged individual. A strong muscle ridge on one of the arm bones and the very large bones of both hands and feet would support the identification of a male. Traces of osteo-arthritis were found on the left ulna and on one of the metatarsals.

The second individual was an adolescent, whose age at death was approximately 14 years, according to evidence from the cranium, dentition, axial skeleton and long bones. There was evidence to suggest that the skull had been deliberately struck a hard blow, but it could not be determined whether this was an *ante-* or *post-mortem* injury. Rather more of the skeleton of this individual survives than of the accompanying adult.

*Burial deposit B.* This had been placed on the W. side of the S. platform and was found in two parts. One part, the smaller, lay parallel with the W. orthostat and consisted of two clay-covered long bones, one of which, a femur, was partly overlaid by part of a mandible with the teeth still in position. The larger part of the deposit consisted of a large mass of moist clay, in which several fragments of bone were subsequently identified. Teeth and three long bones, humerus, femur and tibia, could be identified on the surface of the deposit, arranged in the form of a reversed N. The deposits were removed intact in their matrices and examined in the laboratory (Pl. X).

The moist condition of this deposit, particularly that of the larger part, contrasted with the dry, brittle state of bone in deposit A. It was apparent that bones, some of which were already decayed, were collected and liberally encased in clay to such an extent that clay had been forced into the interior of long bones, even into the gaps in bone structure caused by disease.

As far as could be ascertained, the remains were those of a single individual, a fully grown adult, aged approximately between 38 and 40 years at death. Bone of the cranium was not very thick, the left humerus, radius and femur were each lightly built, appropriate to a female. The right femur was both heavier and thicker than the left, one result of osteo-myelitis which, however, had not been the immediate cause of death. Traces of osteo-arthritis were identified in the second cervical vertebra. One fragment of the cranium had too abrupt a bevel to have been the normal joint between temporal and parietal bones, and it is possible that this represents a *post-mortem* cut. Although none of the long bones was complete, the humerus, radius and femur were compared with closely comparable complete bones in the Department of Anatomy, University of Glasgow. Calculations based on these figures<sup>1</sup> suggested that, if this individual had been a woman, her height was approximately 5 ft. 3 in.

*Burial deposit C.* This small deposit lay at the S. end of the N. platform and comprised badly crushed bone embedded in earth. It was not possible to determine either age or sex, although the long bones appeared to have been lightly built. There is no reason to assume that this deposit does not represent the remains of an individual distinct from others in the N. chamber,

<sup>1</sup> Cornwall, I. W., *Bones for the Archaeologist*, London (1956), 236-7.

*Burial deposit D.* This lay at the N. end of the N. platform and consisted of teeth and small fragments of bone mixed with soil. The skeletal remains may belong to a single individual. As surviving parts of the cranium are relatively thick, and as there is a petrous temporal bone of average size for a fully grown individual, this was probably an adult. The fragmentary head of quite a large femur confirms this, and suggests a male. Three molars may be attributed to an adult of approximately 36–38 years of age at death. These may belong to the same individual.

In addition, there were teeth of an adolescent and a single tooth of a possible third individual, perhaps an adult.

*Burial deposit E.* The fifth deposit in the northern chamber lay immediately to the E. of the N. platform. It partially overlay large, loosely arranged slabs, having the appearance of fallen roofing material, similar to that which filled the entire chamber. As the surviving bones of this deposit were found in articulation, such a hypothesis would suggest that the roof had at least partially collapsed prior to the burial of deposit E, which seems improbable. An alternative suggestion, that these slabs represent an attempt to build a crude platform alongside the existing N. platform, which was already occupied at this time, seems preferable. As these five deposits were the only burial found in the chamber, it appears that the users of the tomb did not wish to place human remains on the floor. By the time the final deposit was made, it may have been decided to increase the area occupied by platforms. Because of cramped conditions, it may have been difficult to construct the third platform as carefully as the other two, which had the appearance of having formed part of the original plan of the chamber.

The human remains are those of an adult, aged over 20 years at death, and fragments of a fairly heavy pelvis suggest that it may have been a male. The body had been buried on its right side, with its hands near its knees, and in a position so tightly flexed that it suggests the cutting of the knee muscles. There is no evidence of disease in the surviving skeleton, which lacked bones of the skull, including teeth, the vertebral column and all but one bone of the foot. The bones of both hands were remarkably well preserved.

*Burial deposit F.* This deposit was found in a disturbed area immediately to the N. of the SE. orthostat in the N. antechamber. The remains appear to be those of two individuals. Teeth apparently belonged to a young adolescent, whereas remains of a large, thick femur suggest a fully grown adult, probably male. Traces of scoring, probably of prehistoric date, were identified on the lower end of the right humerus. This perhaps suggests a *post-mortem* removal of flesh from the bone.

With the exception of a single incisor in the disturbed area to the east of the chamber and of a few fragments of unidentifiable burnt fragments of bone and recent animal bone in front of the entrance blocking, these were the only bones found in the N. part of the cairn. Disturbance had destroyed all valid evidence of burial in the S. chamber.

#### *Discussion*

Tulloch of Assery A was a chambered cairn of the type which has been known

for almost a century as a short-horned cairn,<sup>1</sup> the distribution of which is apparently limited to Caithness, Sutherland and Orkney. Its size, relative proportions and method of construction compare with those of other excavated cairns of its class, although Tulloch of Assery is the only known cairn of the type to have been built with a separate chamber and passage entered from each forecourt. The ground plan of the cairn is similar to those of Ormiegill (CAT 42) and Garrywhin (CAT 26), although its horns splay outwards in plan more than do those of the two cairns cited and those of the unexcavated cairn at Skelpick South (SUT 55). The plan of the horns of unexcavated short-horned cairns at Eday Church (ORK 15) and Fara (ORK 17) and those of the long-horned cairn at Head of Work (ORK 18) resemble those of Tulloch of Assery A. It is not suggested that conclusions concerning typological sequences should be drawn from these observations. The plan of both chambers in Tulloch of Assery A resembled the bipartite arrangement of chamber and antechamber at Garrywhin (CAT 26). Both differ in this from Ormiegill (CAT 42), where the chamber was of tripartite construction, and from Eday Church (ORK 15) and Fara (ORK 17), at both of which the chambers appear to have at least three sub-divisions.

The back-to-back arrangement of independent chambers with their passages under a single cairn is paralleled in Caithness at Langwell (CAT 34), but here the cairn has been much disturbed. At present it is oval in plan and apparently without horns. It has chambers of Camster type. A more widespread use of this back-to-back arrangement may be seen in the double-horned (or dual-court) cairns of the Carlingford Culture in the north of Ireland.

#### TULLOCH OF ASSERY B<sup>2</sup>

Prior to excavation Tulloch of Assery B was a large, circular, grass-covered mound, measuring approximately 110 ft. in diameter and over 12 ft. in height (fig. 12). Although it had been recorded on earlier editions of Ordnance Survey 6-in. maps as a broch, and lay hidden under the anonymous designation of 'mound' on the most recent edition, it had the appearance of a burial mound. There was no visible evidence of a chamber. Surface indications on the summit suggested later activity, possibly associated with the insertion of secondary cists, but this interpretation was shown to be incorrect. Although there were several small depressions in the surface of the mound, there was little external evidence of extensive disturbance. This interpretation was also incorrect.

On account of the size of the mound, the primary aim of the excavation was the location and excavation of any chamber and its contents, and any secondary structures. If possible, within the time available, it was also hoped to recover some evidence of the method of construction of the cairn. These aims were largely achieved and rather more than a quarter of the area of the cairn was examined.

*Passage and Chamber* (figs. 13 and 14, Pls. XI and XII)

Entrance was from the SE. The passage measured a little over 26 ft. in length and, with the exception of dry-stone walling at the entrance and a short stretch of

<sup>1</sup> Anderson, J., *P.S.A.S.*, VII (1867-8), 489.

<sup>2</sup> N.G.R. ND 06766187.

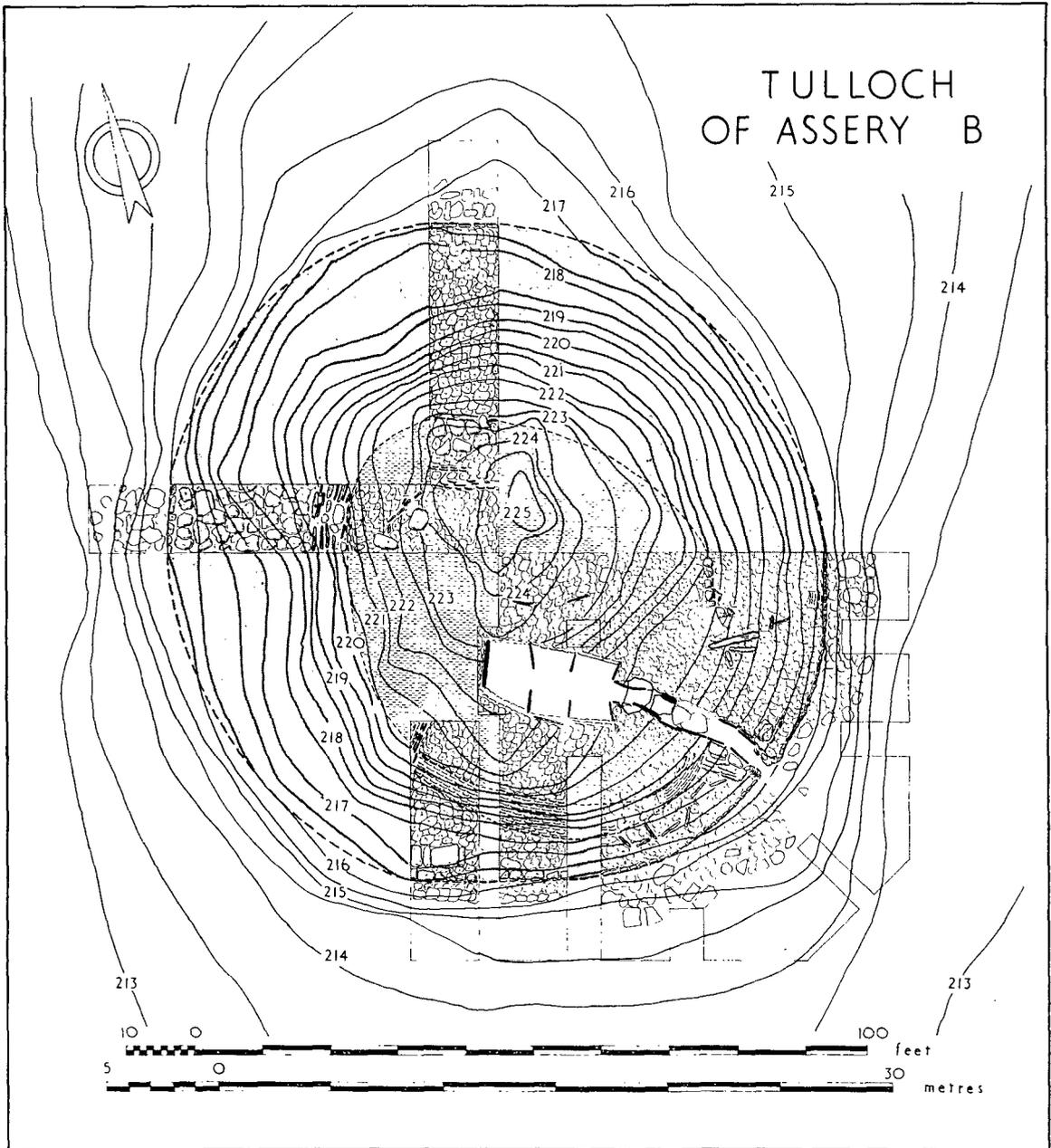


FIG. 12. *Tulloch of Assery B*: general plan

similar walling on the S. side of the passage at its inner end, was built from thin orthostats. There had been considerable disturbance in the area to the N. of the passage. This had caused two orthostats to fall inwards, and they were found lying flat on the floor of the passage.

For a distance of 6 ft. from the entrance, as far as the inner ends of the outermost pair of orthostats, the passage was aligned on the centre of the cairn. The alignment then backed through  $18^\circ$  on to a new heading, which was maintained for a distance of approximately 14 ft. The remainder of the passage and longitudinal axis of the chamber were laid out on a different alignment, some  $15^\circ$  to the S. of the previous alignment. These alterations in the alignment of the passage would explain the position of the chamber to the S. of the centre of the cairn. Had a passage and chamber of the same dimensions been built, and the alignment at the entrance maintained throughout, the end-stone of the chamber would have been placed close to the centre of the cairn and the whole alignment would have lain along one of the axes of the cairn.

The passage does not appear to have been built with care comparable with that of the chamber. Orthostats of varying size were used, causing overlapping in places, an arrangement unlike planned imbrication. This overlap was structurally unnecessary, as the orthostats were adequately supported by strong backing and, where necessary, by packing stones in the sockets. The use of dry-stone walling at the inner end of the passage cannot be explained satisfactorily.

At the entrance the passage was only 1 ft. 9 in. wide. On the S. side dry-stone walling, which linked the kerb and the first orthostat of the passage, extended for a distance of 2 ft. 9 in., and on the N. side for 3 ft. 6 in. The outermost pair of orthostats were set 2 ft. 6 in. apart and thereafter the average width of the passage was 3 ft. It narrows at a distance of 4 ft. from the chamber, at the point where dry-stone walling on the S. side began, to 2 ft.

Only two roofing stones were identified, at the inner end of the passage, and it is uncertain whether or not they were in their original position. The inner was resting at an angle of  $70^\circ$  on dry-stone walling on the S. side, and partly on an orthostat on the N. The outer roofing stone was jammed against the inner side of a tall orthostat on the S. side, but rested in a horizontal position on the opposite side. It is possible that the remainder of the passage was roofed by slabs resting directly on the side-walls, which would have been suitable for the purpose. Construction of a narrow passage suggests that high roofing was not required. The side-walls increased in height from the entrance towards the chamber. The innermost orthostat on the southern side was considerably taller than the remainder. It is possible that the builders had been unable to obtain a stone of suitable size and that they therefore used this unsuitably large orthostat. This would also perhaps account not only for the use of dry-stone walling in the adjacent section of the passage, but also the position of the surviving roofing stones. It is probable, therefore, that the height of the passage increased from the entrance to the chamber. The outer orthostats were approximately 2 ft. 9 in. tall, and the outer of the two surviving roofing stones was 4 ft. above floor level. The entrance proper probably extended as far as the outer

kerb of the cairn, and the outer limits of the passage were defined by the dry-stone walling already noticed. The height of the entrance is unknown, but it is unlikely to have exceeded that of the outer orthostats of the passage. A blocking of thin flat slabs, four courses of which survived, set at an angle, with their inner ends sloping downwards into a shallow pit, sealed the entrance. Immediately outside the entrance there was a flat sill-stone.

Support for the side-walls of the passage was provided by a roughly built, but strong, wall, which on the S. side was over 3 ft. wide and survived for a distance of 8 ft. behind the first two orthostats. There had been extensive disturbance on the N. side, but sufficient remained to show that a similar backing wall had been built. On this side additional reinforcement had been provided by an orthostat-like slab which had been erected behind the first two orthostats. There had been too much disturbance on both sides of the passage to establish whether the backing wall continued behind the orthostats to the W., or whether support was provided by the inner core of the cairn. The available evidence suggested the latter.

The chamber was subrectangular in plan and was divided into three, approximately equal, segments by two pairs of orthostats. A third pair formed the outer limits of the chamber between which was a gap allowing access from the passage. The end-stone was a large gabled orthostat, which measured 7 ft. 6 in., both at its greatest height above old ground level and at its greatest width. The side-walls were built of dry-stone walling which, at the time of excavation, was somewhat unstable owing to partial collapse. Each wall was built in a single section, which extended from the outer edge of each of the outer pair of orthostats to a length of dry-stone walling, forming the backing of the end-stone, and resting on the outer edges of the other orthostats in the chamber. The quality of dry-stone walling had been very high, but the stone used had been unable to withstand stresses imposed on it and had tended to collapse, particularly where it was not directly supported by orthostats. Each segment measured between 5 ft. 9 in. and 6 ft. 6 in. in length. The total length of the chamber was 18 ft., and measured approximately 9 ft. at its greatest width.

Each orthostat in the chamber was tightly packed with large stones in a socket cut into the subsoil, and together the orthostats were intended to provide most of the structural stability of the chamber (Pl. XIII, 1). The side walls were built so that they rested against the outer edges of the orthostats (Pl. XII, 1). There was some evidence that there had been a 'bench', built of dry-stone walling, between each pair of orthostats. On account of collapse, precise details could not be recovered, but in the inner segment on the S. side, the bench survived to a height of 1 ft. 6 in., and may originally have been higher (fig. 14). Whatever ritual function these benches may have had, as in some Orcadian cairns where burials were placed on benches or shelves,<sup>1</sup> they would also have served a structural function in adding both to the support of the orthostat and the walls themselves. In two of the segments it was possible to see that a broad, but thin, slab of flagstone had been set vertically between the rear of the bench and the wall proper. It is improbable that these were visible once the chamber had been built, and their purpose was probably structural

<sup>1</sup> Henshall, *C.T.S.*, 78, 91-92.

in providing as much support as possible against pressure from the body of the cairn for the lower courses of the wall.

Roofing stones did not survive *in situ* over the chamber, but large slabs found in the upper layers of the filling in the chamber were probably fallen roofing material. Some idea of the method of roofing is suggested by the shape and size of orthostats used in the chamber. At a height of approximately 4 ft above floor level the outer edges of each of the three pairs of orthostats tapered inwards at an angle of approximately  $45^\circ$ . Undisturbed side-walling had not survived above this height, but it seems probable that it would have continued to rest against the outer edges of the orthostats and, in doing so, would have been corbelled inwards. It is not known whether corbelling of the side-walls was continued upwards and inwards beyond the tops of the orthostats, or whether capstones bridged the gap of approximately 4 ft. at the level of the tops of the orthostats. Slabs of a size suitable to have been capstones of that type were not found in the chamber. A larger quantity of smaller stone found in the upper levels suggests that corbelling was carried above the height of the orthostats, but, if so, the original height is unknown. The three pairs of orthostats increased in height above the floor of the chamber from 5 ft. 6 in., at the entrance to the chamber, to 7 ft. 6 in. at the innermost pair. The end-stone was gabled and, although asymmetrical, it would have been possible for corbelling to have been built against it. If this evidence has been interpreted correctly, it suggests that the roof took the form of a kind of barrel-vault built of dry-stone walling. There is no evidence that lengths of flagstone were laid as supports for roofing, across the orthostats forming part of each wall of the chamber. A dry-stone barrel-vault of the type suggested, had it existed, would have been a *tour de force*, comparable, in its own way, with the tall corbelling of Maes Howe (ORK 36), Quoyness (ORK 44) and similar sites. It would, however, have possessed a much greater instability, inherent in the use of such a large area of inadequately supported dry-stone walling.

The floor of the chamber had a discontinuous layer of flat slabs of varying sizes, which increased in number towards the inner segment. It is possible that this paving had been laid as part of some ritual activity, which had taken place before the cairn was built, as at least one of the larger slabs was overlaid by the side-wall (the N. wall of the outer segment). The paving had been placed over a layer of burnt material, which could be seen to have extended beyond the limits of the chamber, under the side-walls and into the area covered by the body of the cairn (Pl. XII).

The outer limits of the chamber were marked by a shallow trench cut into the subsoil, immediately inside the outermost pair of orthostats. It measured 3 ft. in length, the same distance as that of the gap between the orthostats, but was not in line with them. It was approximately 9 in. wide and 6 in. deep, and on its W. side it was lined with small, flat stones. Had it been aligned with the orthostats, it might be considered to have been in some way associated with their sockets, but this seems unlikely. At the N. limit of the trench there were three small, but firmly wedged, stones set vertically across its long axis. Although they lay close to the packing stones of the N. orthostat, they were set at an angle of  $45^\circ$  to the latter, unlike the parallel setting of normal packing stones. Taken together with the stone lining of the trench,

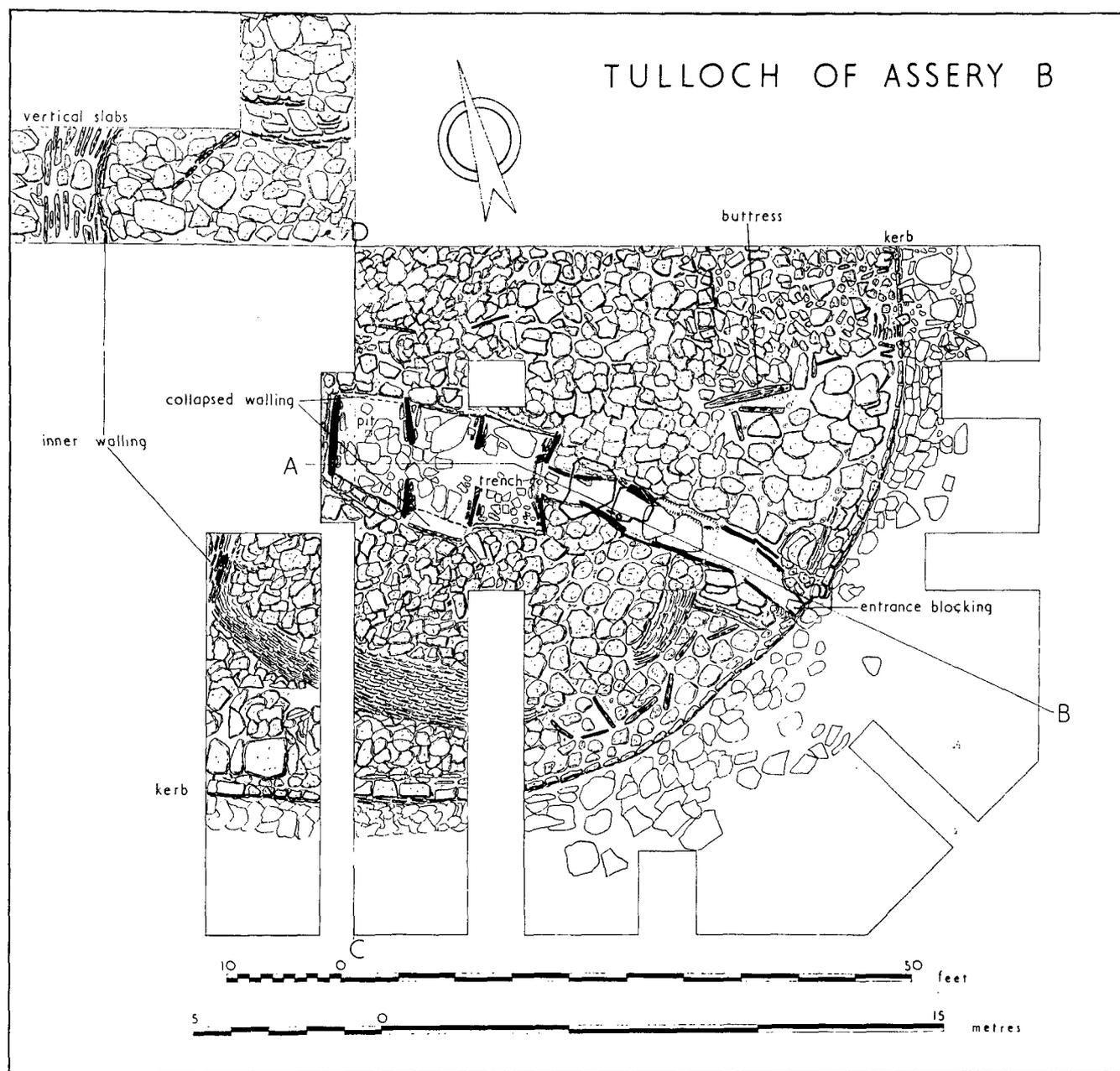


FIG. 13. *Tulloch of Assery B*: plan of passage and chamber

the evidence seems to suggest that the latter had been a shallow socket for an upright stone. If this interpretation is correct, both the size of any such stone and whether it was intended to be fixed or movable, must remain unknown. Analogies for low septal stones are plentiful, but parallels for a movable stone dividing chamber from passage are rare. A thin vertical slab dividing the chamber from the passage was found in a Passage Grave at Balvraid Farm, near Glenelg, Inverness-shire, excavated by the writer in 1965.<sup>1</sup>

*Cairn* (figs. 12 and 14)

Cuttings in the southern area of the cairn revealed two walls of dry-stone construction (Pl. XIII, 2). The outer wall was subsequently identified in cuttings in the W. and N. sectors of the cairn, and its line traced throughout the SE. quadrant. It was much ruined, but could be seen to have been laid out in an almost perfect circle, 96 ft. in diameter, with a slight tendency towards a flattening of plan in the area adjacent to the entrance. It formed the outer kerb of the cairn and had been built from long, carefully set slabs of varying sizes, some of the basal stones being more than 1 ft. thick, but the majority measured only a few inches. In most places the basal course alone remained, but in a few places the wall survived to a height of 3 ft., which may have been its original height throughout the circumference.

The inner wall was not concentric with the outer, but in the southern cuttings the distance between the two could be seen to increase towards the W. Although it was not possible to uncover the entire circuit of the inner wall, it appears to have been oval in plan and to have surrounded the chamber (fig. 13). Its line was defined in the SE. quadrant where it was massively built, with a pronounced batter, to a maximum height of 6 ft. above the old ground level. Approximately 12 ft. to the SW. of the end-stone of the chamber there was a break in the wall where it had been built up against vertical slabs. Within the time available it was not possible to make additional cuttings in this area, but it was possible to show that the wall was continued to the W. of the upright stones, but on a different alignment. In the W. cutting the outer edge of the inner wall was identified, and here it was closer to the centre of the cairn than it was in the SE. quadrant. In the N. cutting it was possible only to locate the upper levels of the wall, at approximately the same distance from the centre of the cairn as in the W. cutting. To the N. of the passage the inner wall was almost completely destroyed, but traces of it were identified, built up against the N. side of a large buttress stone, set vertically into the subsoil at right angles to the line of the wall. To the S., the end of the inner wall appears to have been built up against the side-walls of the passage.

The plan of the inner wall, then, was oval and enclosed the whole of the chamber and two-thirds of the passage. Along its longitudinal axis it measured approximately 60 ft. and 45 ft. at its greatest width. It had not been built as a continuous wall, but in sections which were marked by vertical slabs or buttress stones, the original number of which is unknown. A detailed examination was not possible, but the wall

<sup>1</sup> Unpublished. Preliminary note in *Discovery and Excavation Scotland*, 1965, 20.

itself probably measured at least 8 ft. in thickness and resembled the cores identified in Tulloch of Assery A. Between the inner wall and the chamber cairn material appears to have been carefully built in horizontal layers. In places, particularly in the upper levels of the cairn, vertical slabs were incorporated among the predominantly horizontal material, presumably to give stability to the cairn mass. They formed no regular pattern and were not firmly embedded in the cairn.

The inner wall or core provided support for the central area of the cairn, including the chamber and the greater part of the passage, where structural stresses would have been greatest. The builders of Tulloch of Assery B, however, may have felt that even the solidly built central core was not sufficiently stable. They did not merely add a capping of stone to give the cairn the appropriate shape, but, before doing this, added a series of buttress stones around the perimeter of the core. S. of the entrance in the SE. quadrant seven of these vertical buttress stones were set into the subsoil at differing angles, but with relatively even spacing, close to the outer limits of the core. In the W. cutting the line of the inner wall was built at a distance of only 22 ft. from the centre of the cairn and over 26 ft. from the outer kerb. Between the two were set a considerable number of large flagstones. Built up against the outer face of the core, and extending towards the perimeter of the cairn for a distance of more than 4 ft., there were several vertical slabs, arranged in layers and firmly set parallel with the circumference of the core. To the W. of the vertical stones were foundation layers of larger slabs, several measuring 4 ft. by 3 ft. and more than 1 ft. in thickness, arranged horizontally and extending almost to the inner edge of the kerb.

In the S. cutting the filling of the gap between core and kerb appears to have been less firmly constructed. Although several very large slabs were found, they belonged to horizontal foundation courses and firmly set vertical buttress stones were not identified. Stones, set almost vertically, had been laid against the core, and cairn material was built up against the latter and overlay the foundation course. It was not possible to obtain elsewhere in the cairn precise details of construction in the area between core and kerb, but to the N. of the passage vertically set stabilising slabs appear to have been used. The builders appear to have varied the construction of the outer kerb of the cairn according to the spatial relationship between core and kerb. Where the two were in relatively close proximity, as in the S. area of the cairn, the inner wall was given a batter which, in the absence of outer buttressing, added to stability and the upper levels of which could be incorporated into the profile of the finished cairn. Where the distance between kerb and core was greater, the outer facing of the latter appears to have been built vertically, and added support given by the arrangement of large vertical and horizontal slabs, as identified in the W. cutting.

A final capping of smaller stones covered all structures within the kerb. The capping was carefully laid and gave the cairn its rounded profile. In undisturbed areas it could clearly be seen that this outer mantle had been carefully constructed and was not the result of a haphazard tipping of stone.

The kerb appears to have been built with more attention paid to its appearance

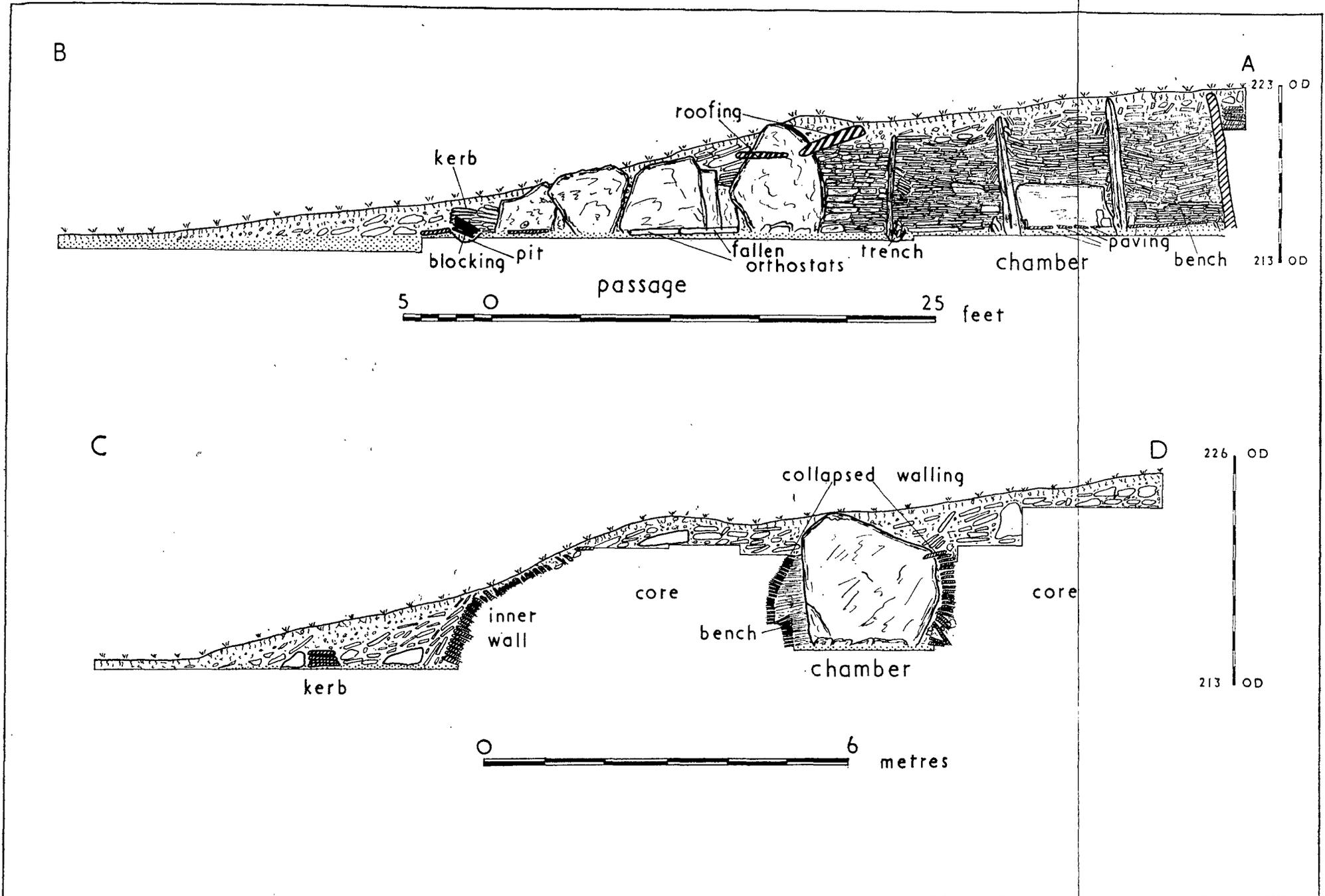


FIG. 14. *Tulloch of Assery B: sections*

than had the inner wall. The whole of the inner structure had been designed to give maximum internal stability in such a manner that very little stress was imposed on the kerb. Taking into account the size of the cairn, very little stone was found outside the kerb and there was no evidence of extra-revetment material. Lack of slip demonstrated the success of the builders of Tulloch of Assery B in their attempt to ensure the internal stability of the cairn. In turn, this stability allowed them to enclose their cairn with a low, well built wall, above which rose the mass of the mound. Entrance to the passage was restricted in size, and was probably contained within the height of the kerb. With the blocking of the entrance in position, the kerb probably presented the appearance of an uninterrupted dry-stone wall around the entire circumference of the cairn.

Without complete excavation, there is no certainty that there were not additional chambered structures in the cairn, either as part of the original or modified plan, or added as secondaries. There may have been secondary cists or the like, added at a later date, but it is improbable that there had been chambered structures other than that described. Although the chamber was situated some distance to the S. of the centre of the cairn, the change of alignment in the passage appears to have been accidental, and it may have been intended that it should have been aligned on the centre of the cairn. Again, the inner wall was so built that it enclosed the centre of the cairn, and the area so enclosed would have allowed little suitable space for additional structures. The outer parts of the cairn were so built that they suggested a unified plan centred on the chamber. Vertical slabs, the tops of which were visible in the upper part of the cairn before excavation, and which resembled the sides of cists, were found in every case to form part of the inner structural complex.

#### *Finds*

It has been shown that the cairn had been extensively disturbed in and around both the passage and chamber, but it appears that collapse of the roofing of both passage and chamber preceded any robbing of the cairn for building material. Artifacts other than those of prehistoric date were not found. The lower part of the chamber was filled with flagstone. There was no evidence to suggest that this represented the result of deliberate infilling by the original users of the tomb. It may best be interpreted as the remains of collapsed walling, roofing and cairn material. As most of the roofing of the passage had been robbed, the loose stone found there is similarly best interpreted as the result of collapse and disturbance.

The larger part of the burial deposit was found lying on a layer of flat stones in the innermost segment of the chamber. The bones of this deposit were not articulated, but were heaped together in the centre of the segment and were surmounted by an almost complete, but shattered, cranium. Human bone was also found in the other two segments and in the passage. With the exception of part of the mandible of a newly-born child or foetus, a single bone of what appears to have been a child's foot, and one molar attributable to a young adult, the human bone may be attributed to two adults only. The nature of the burial deposit suggests that the remains were interred as a single act. Lack of articulation further suggests that the bodies were

already decayed and, as in the case of *Tulach an t-Sionnaich* (cf. p. 7), had previously been stored elsewhere. Further details are given in Appendix A.

Animal bones were similarly found in all three segments and in the passage. Most appear to represent food remains deposited in the chamber with the human burials, as the greater part of the animal bones were found above the paving. A few animal bones were found below the paving, but differ considerably from the small burnt fragments which occur in the underlying burnt deposit. The food remains include Red deer and domesticated cattle, rather fewer bones of sheep and possibly of pig, and a few bones of possible bird or water fowl. Although the remains of dog are fewer than those from *Tulach an t-Sionnaich*, they, like the latter, may perhaps have formed part of the original burial deposit. Remains of fox found in Tulloch of Assery B are probably intrusive. Animal remains are listed in Appendix B.

Most of the artifacts were found beneath the paving, associated with a burnt deposit consisting of charcoal and very small fragments of intensely burnt and unidentifiable bone. As this deposit continued beneath the walls of the chamber, it appears to represent the remains of some activity which preceded the erection of the cairn. Although only small sherds of Neolithic pottery were found, the unabraded condition of most of them suggests that this deposit was laid down not very long before the construction of the cairn. It might be assumed that the 'paving' was placed in position immediately after the burnt deposit and artifacts were scattered over what was to become the chamber area.

(1) *Pottery* (fig. 15)

A total of 107 small sherds were found, all from the chamber area, with the exception of six wall sherds found under fallen orthostats in the passage. The pottery found in the chamber lay on the old ground surface, most of it below the paving, where the latter existed. Sherds were found in each of the three segments, scattered through the N., central and S. parts of each, with the exception of the S. sector of the inner segment, where both pottery and flint were absent. The greatest concentration of sherds was in the middle segment.

The sherds, with one exception, form a homogeneous group of well-made, dark-coloured and mostly undecorated pottery. The texture is sandy and normally has a filling of quartz. One sherd has a filling of mica and quartz, and another has a filling of charcoal. Whether burnished or not, the surface of the majority of the sherds is smooth, with the exception of a few in which the quartz filling protrudes beyond the inner surface. There is finger-tip fluting on the outer surface of at least one wall sherd (fig. 15*p*). The thickness of the wall sherds varies between 5 and 15 mm.

Eleven rim sherds were found, belonging to nine pots. Eight of these appear to have out-turned rims, which vary from simple (fig. 15*i, j*) to rolled forms (fig. 15*b, d, e*). Sufficient remained of only one of these eight pots to allow a reconstruction of its diameter, which was approximately 12 in. at the outer edge of the rim (fig. 15*b*). The rim of this pot is out-turned and slightly rolled, having a maximum thickness of 9 mm. The average thickness of the wall is 7.5 mm. On the outer surface fine finger-tip vertical fluting begins approximately 1 cm. below the top of the rim and continues downwards for an unknown distance. Fine fluting also extends vertically downwards from the upper part of the rim for an unknown distance on the inner surface. Both surfaces are very hard and burnished. The ninth rim sherd (fig. 15*a*) is fawn-coloured and appears to have come from a closed bowl with an external rim diameter of 8 in. It has a rounded rim, immediately below which is a perforation. The sherd differs in colour and texture from the others.

Three shoulder sherds were found; one has a marked ledge shoulder (fig. 15*g*), the second (fig. 15*k*) has a slight thickening, which emphasises a carination, and the third has a simple carination.

This last sherd (fig. 15o) has shallow parallel grooves on the inner surface. There are three lugs. Of these, the largest projects 14 mm. from the wall of the pot, which at this point is 7 mm. thick (fig. 15m). The other two lugs are smaller. All three are unperforated.

The sherds from Tulloch of Assery B belong to that family of mostly undecorated wares, variously referred to as 'Western Neolithic', 'Neolithic A' or 'Primary Neolithic'. The class as a whole has a

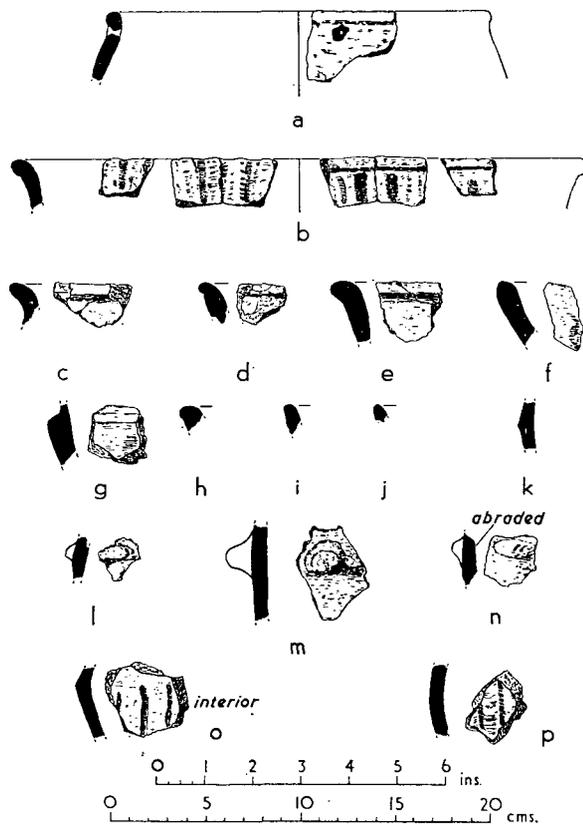


FIG. 15. *Tulloch of Assery B*: Neolithic sherds

wide distribution in Britain and Ireland, and has been found in chambered cairns of the Cotswold-Severn, Carlingford and Solway-Clyde groups. Parallels within Scotland may be cited for the more meaningful sherds from Tulloch of Assery B. Some of the pottery from Easterton of Roseisle, Morayshire, for example, has vertical fluting. Sherds of shouldered bowl from this site<sup>1</sup> resemble rim sherds from Tulloch of Assery B (fig. 15b). There are also resemblances between the shoulder profiles from the pottery of each of these sites. The large lug from Tulloch of Assery B is analogous to one from East Finnercy, Aberdeenshire (National Museum of Antiquities EO 386), a site at which pottery with finger-tip fluting was also found.<sup>2</sup>

The occurrence of this class of pottery at Tulloch of Assery B is of interest in that it extends the distribution pattern to the extreme north of Scotland.<sup>3</sup> This may eventually contribute to a more precise identification of the cultural background of the type of cairn represented by Tulloch of

<sup>1</sup> Callander, J. G., *P.S.A.S.*, LXIII (1928-9), 56, figs. 37, 38, no. 1 (N.M.A. EO 351).

<sup>2</sup> Atkinson, R. J. C., in Piggott S., (editor), *The Prehistoric Peoples of Scotland*, London (1962), 34.

<sup>3</sup> cf. maps and list of such pottery in Atkinson, *op. cit.*, 14 (fig. 2), 34-35.

Assery B. It must nevertheless be emphasised that the sherds from this cairn appear to have been deposited prior to its construction. The interval of time between the two acts, however, may not have been long. It is unfortunate that most of the pottery found by Anderson in chambered cairns in Caithness is lost,<sup>1</sup> but his descriptions of it having been dark-coloured and well-made suggest that it may have resembled that from Tulloch of Assery B. There may be a further resemblance in that much of the pottery found by Anderson in Caithness appears to have come from pre-cairn layers,<sup>2</sup> similar in composition to that at Tulloch of Assery B. What appears to have been a similar layer was identified under the cairn at East Finnercy.<sup>3</sup>

(2) *Flint* (fig. 16)

Forty pieces of flint were found in the cairn. Of these, 29 came from the floor of the chamber, three from the passage and the remaining seven from the body of the cairn. The remaining flint is part of an arrowhead embedded in a vertebra. Flint was found in the N., central and S. parts of each of the segments of the chamber, with the exception of the S. part of the inner segment. The distribution of flint compares with that of the pottery, in that the greatest concentration was found in the middle segment.

Twenty-five pieces of flint comprise small lumps of beach pebble flint, retaining part of the cortex, and struck, but not utilised flakes. The remainder show evidence of retouch or utilisation, and include arrowheads or points and scrapers.

(a) *Arrowheads*

(i) Two small points made from slightly curved flakes of pale, grey flint with small, but pronounced bulbs of percussion, were found near the N. wall of the middle segment (fig. 16*a-b*). The larger is 18 mm. long, 11 mm. in greatest width, and 2.5 mm. thick. The smaller is 17 mm. long, 9 mm. in greatest width and 2 mm. thick. Secondary working is confined to the edges of the larger, but there is slight working on the non-bulbar face of the smaller. Both have very sharp tips and were probably intended as missile points. They resemble arrowheads from Hurst Fen<sup>4</sup> and Windmill Hill,<sup>5</sup> although the Caithness points are smaller than their English analogues. They resemble the point of Arran pitchstone found in the chamber of *Tulach an t-Sionnaich* (cf. p. 15).

(ii) A thin, burnt and abraded fragment of white flint, also found near the N. wall of the middle segment is probably the lower part of a leaf-shaped arrowhead (fig. 16*c*).

(iii) In the innermost segment a broken, light-grey coloured, arrowhead was found embedded in what appears to have been a lower thoracic vertebra of a fully grown adult, forming part of the principal burial deposit. The surviving portion of the arrowhead measures  $c. \frac{9}{16}$  in. (14 mm.) in length, and  $\frac{1}{3}\frac{9}{2}$  in. (15 mm.) in greatest width, at the point where the break occurred. At this point it is  $\frac{9}{32}$  in. (4 mm.) in greatest thickness and is elongated lozenge-shaped in section. The surviving portion is triangular in plan and has serrated edges. It is not known whether it was leaf- or lozenge-shaped or was barbed-and-tanged (Pl. XIV).

Several examples of wounds caused by flint arrowheads are known from Neolithic contexts,<sup>6</sup> including chambered cairns.<sup>7</sup> In several instances it was a vertebra which was penetrated.

(b) *Scrapers*

(i) A small, light grey-coloured thumbnail scraper made from beach pebble flint was found at the foot of the outer wall on the S. side of the cairn (fig. 16*g*).

(ii) A second, cruder, much worn and abraded scraper was found in the outer segment.

(iii) A flake of medium grey flint and a lump of light grey flint (fig. 16*h*) both have secondary working along one edge, and appear to have been used as scrapers. Both were found in the middle segment.

<sup>1</sup> Henshall, *C.T.S.*, 105-6.

<sup>2</sup> *ibid.*, 94.

<sup>3</sup> Atkinson, *op. cit.*, 18.

<sup>4</sup> Clark, J. G. D., *P.P.S.*, xxvi (1960), 220, fig. 13, F36, 37.

<sup>5</sup> Smith, I. F., *Windmill Hill and Avebury*, Oxford (1965), 100-1, fig. 45, F103, 108.

<sup>6</sup> Calvin Wells, *Bones, Bodies and Disease*, London (1964), 47-49.

<sup>7</sup> *eg.* in the Hérault; Arnal, J., *Préhistoire*, xv (1963), 215.

(iv) A pointed flake of light grey flint, retaining part of the cortex has secondary working along one edge and may also have been used as a scraper (fig. 16e). It was found in the body of the cairn.

(c) *Blades*

(i) A blade of honey-coloured flint from the inner segment has secondary working along one edge and may have been used as a knife (fig. 16d). It is 5 cm. long.

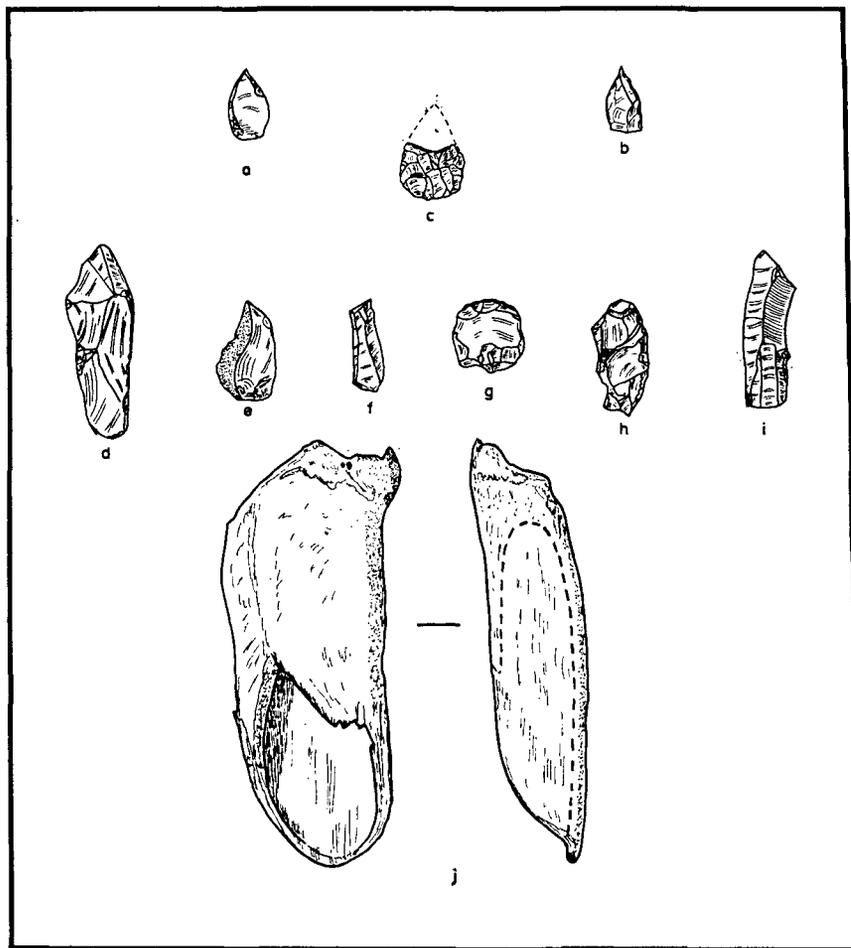


FIG. 16. *Tulloch of Assery B*: a-i, flint; j, bone ( $\frac{1}{2}$ )

(ii) A small blade with one blunted edge appears to have been used, perhaps as a blade in a composite tool. It is made from flint similar to that of the worked blade (i), and was found with it in the inner segment (fig. 16f).

(iii) A light-grey coloured blade, possibly utilised, was found at the foot of the inner wall in the S. part of the cairn (fig. 16i).

(d) *Miscellaneous*

Two very small fragments of light-grey flint, one from the middle segment and one from the

inner segment, may originally have been parts of artifacts, possibly broken from the face of a leaf-shaped arrowhead. A very small fragment of flint, 8.5 mm. long, appears to have been worked into a point with a rudimentary tang. It was found in the outer segment.

(3) *Crystal and Quartz*

Three pieces of rock-crystal were found in the outer segment. Two rounded quartz pebbles were found with animal bone near the S. wall of the outer segment.

(4) *Bone*

Part of a long bone found in the innermost segment, possibly the distal end of the femur of an ungulate, appears to have been worked. The bone, which was scorched, seems to have been cut transversely, and edges of the cut smoothed, either deliberately, or as the result of wear. If this was an artifact, its purpose is obscure. It might have been used as a scoop or scraper. It would have served as the handle of a composite tool, but if so, there are no visible abrasions in the interior which might be expected to have been caused by jamming into it an object such as a flint blade. Its greatest length is  $4\frac{3}{8}$  in. (fig. 16j).

### *Discussion*

Tulloch of Assery B was a Passage Grave of Camster type.<sup>1</sup> As Miss Henshall has shown, this type of chamber may be enclosed in cairns of differing plan, both round and long.<sup>2</sup> The focus of distribution is centred on Caithness, with apparent derivatives in Orkney. In this section discussion of Tulloch of Assery B is restricted to comparisons with round cairns.

The normal chamber of Camster type has a tripartite plan. Side-walls in all excavated cairns were carefully built of dry-stone masonry. Seven orthostats are normal, the end-stone and three pairs of tall upright slabs, two pairs of which segment the chamber. Tulloch of Assery B had each of these features, but differed from known analogues in the size of the orthostats relative to one another, a factor which has a bearing on the arrangement of the roofing. In several chambers the end-stone is frequently the shortest orthostat, but at Tulloch of Assery B it was approximately the same height as the tallest pair of orthostats. In several cairns the outer pair of slabs which segment the chamber are the tallest orthostats in the structure. At Tulloch of Assery B the three pairs increase slightly in height from the entrance inwards, although the height of the tallest, approximately 7 ft., compares with those of other known chambers.

At Camster Round (CAT 13) most of the roofing is intact. The tripartite division forms an antechamber and a chamber proper: The former is a little wider, and is roofed by lintels at a height little greater than that of the passage. It is separated from the chamber by a pair of tall orthostats. The chamber proper has a vaulted roof, and is divided into two segments of unequal size by a pair of transverse orthostats which are only 4 ft. high, and which do not reach the full height of the roof. The side walls begin to oversail at a height above the floor level of approximately 7 ft., and rise to a maximum of 10 ft., at which height they were closed by a capstone. A similar arrangement may have existed in other cairns and, if so, would have differed from that at Tulloch of Assery B. It has been suggested that the entire chamber of the

<sup>1</sup> Piggott, S., *Neolithic Cultures of the British Isles*, Cambridge (1954), 234-6, 240-3.

<sup>2</sup> Henshall, C.T.S., 69-84.

latter cairn was roofed by a structure resembling a barrel vault, as the outer edges of the upper part of all the orthostats would have provided a seating for corbelling. The tallest pair of orthostats at Camster Round have similar sloping upper surfaces which support the over-sailing courses of the side walls. If the chamber at Tulloch of Assery B had been roofed in the manner suggested, its greatest height would probably have been similar to that of Camster Round. Both the length and breadth of the chamber of the former were greater than those of most normal chambers of Camster type.

The passage of Tulloch of Assery B differs from most known cairns of Camster type in having orthostatic walls, apart from short stretches of dry-stone walling at the entrance and the inner end, in place of the more normal dry-stone construction. It was also longer than most known passages in round cairns, including that of Camster Round (CAT 13). It has been suggested that the passage at Tulloch of Assery B had been roofed by flat slabs, and this appears to have been common practice. At Camster Round roofing stones at the inner end of the passage appear to have been set at an angle from the horizontal. This would provide a parallel for a possibly similar arrangement at Tulloch of Assery B. The narrowness of the passage and the low height, which increases from the entrance inwards, have been noted in several cairns, and in this, too, Tulloch of Assery B conformed. It has been shown that, in the latter cairn, the outer limits of the wall, built at this point of dry-stone walling, were bonded with the kerb. This, too, is a common feature of the class as a whole.

The average diameter of round cairns covering chambers of Camster type in Caithness varies between 50 and 60 ft., Camster Round having a diameter of about 60 ft. On the mainland there are a few cairns having a diameter of between 70 and 100 ft., but these apparently cover chambers of elongated plan and not of normal Camster type. Tulloch of Assery B, with its diameter of 96 ft., is larger than any known cairn of its type. Most round cairns of the class, where evidence is available, have low, dry-stone kerbs similar to that of Tulloch of Assery B, and like this cairn, do not appear to have an extra-revetment. Some cairns in Caithness, such as Camster Round (CAT 13), had an inner wall, possibly similar to that of Tulloch of Assery B, but their precise plan is unknown.

Some structural details recognised in Tulloch of Assery B are paralleled in Orcadian derivatives of Camster type. Flattening of the plan of the kerb on each side of the entrance, for example, may be seen at Bigland Round (ORK 2), Kierfea Hill (ORK 26) and Knowe of Craie (ORK 27). Some Orcadian round cairns appear to have inner walls, as at Bigland Round (ORK 2) and Sandyhill Smithy (ORK 47), the former also incorporating buttress stones in its structure. Of greater significance, perhaps, is the recognition of dry-stone 'benches' at Tulloch of Assery B, which resemble those of the stalled cairns of Orkney.<sup>1</sup>

While it cannot be demonstrated that Tulloch of Assery B, rather than any other circular cairn of Camster type, influenced Orcadian development, the position of this cairn, within a few miles of the coast facing Orkney, does suggest that it could

<sup>1</sup> Henshall, *C.T.S.*, 78.

have been in part parental. Excavation in the N. of Caithness would help to clarify the relationship between excavated cairns in the S. of the county and the excavated cairns of Orkney.

#### CONCLUSION

Evidence derived from the excavation of each of the three cairns described in this paper has been discussed individually. In this final section reference is made to matters of more general interest concerning the three. Any discussion of possible relationship between them is inhibited by lack of detailed evidence of absolute chronology. Although the *floruit* of each cairn appears to lie within the Neolithic in Caithness, the period as a whole certainly extended over several centuries, and on present evidence there is no certainty that any two of the cairns were in simultaneous use. There is similarly no evidence to suggest that the builders of any one cairn adopted either the building techniques or the ritual usage of the others.

Each of the three cairns provided evidence that their builders possessed a high degree of competence in handling local building materials. Structural details of the individual cairns have been discussed separately, and it is here only necessary to refer again to the use of 'cores', inner walls and buttress stones in the achievement of internal stability. The type and scale of the cores vary, but in each instance the need to support and contain thrust from the chamber area was achieved. Having accomplished this, the outermost wall of each cairn was not required to fulfil any structural function beyond that of containing the capping of the cairn, and of acting as a revetment wall. The small amount of slip from Tulloch of Assery B demonstrates the effectiveness of this method of construction. It has been suggested that at Tulloch of Assery A the extra-revetment was deliberately built, and was not the result of slip. If this were so, the extra-revetment had a function which was not simply structural, as the system of cores, inner walls and buttress stones ensured that little pressure was exerted on the revetment wall from the interior of the cairn. Disturbance, due at least partially to the building of the later enclosing wall, had destroyed some evidence from the heel-shaped cairn at *Tulach an t-Sionnaich*, but here again the outer-most walls appear to have experienced a minimum of thrust from the interior. There was no evidence of a deliberately built extra-revetment in this cairn. Stone alone appears to have been used in the construction of each of the cairns, without any admixture of earth or turf, apart from the northern structure of *Tulach an t-Sionnaich*.

The original external appearance of the cairns is unknown in detail, but it might be assumed that the distinctive ground plan of both the heel-shaped and the horned cairn was to some extent reinforced in the elevation of each. It has been suggested that the central mass of each cairn rose above a lower, flatter platform. In its original condition Tulloch of Assery A may have had a stepped appearance, and the heel-shaped cairn at *Tulach an t-Sionnaich* may similarly have been stepped. Tulloch of Assery B appears to have been a hemispherical cairn rising from its straight-sided revetment.

Each of the three cairns yielded evidence of multiple burial, but again there

appears to have been little uniformity in the method of depositing the dead in the different chambers. The evidence from the N. chamber of Tulloch of Assery A appears to be the most ambiguous. There were the remains of at least nine, and possibly eleven, individuals. Of these, all but one, burial deposit E, were fragmentary and disarticulated. It is uncertain whether this implies a sequence of successive interments which, after the decay of the non-skeletal parts, may have subsequently been collected together and retained within the chamber, or whether there had been a simultaneous deposit of remains which previously and temporarily may have been housed elsewhere, perhaps in some sort of ossuary. The condition of burial deposit E which, although incomplete when excavated, was almost certainly interred while flesh still remained on the body, might argue that successive burial was practised. On the other hand, the condition of the other deposits, and their fragmentary condition, might support the hypothesis that these deposits represent a token burial of remains brought from an ossuary. Burial deposit B, in its casing of clay, might similarly be thought to add weight to such an hypothesis. Had this been so, the position of burial deposit E demonstrates that space on the platforms was not cleared for it. It seems probable, on account of its position, that burial deposit E represents the remains of a body deposited in the chamber subsequent to the interment of the remaining deposits on the platforms, whenever these latter deposits may have been placed there.

The small number of individuals buried in both *Tulach an t-Sionnaich* and Tulloch of Assery B – apparently no more than three or four in each cairn – and the condition of the burial deposit suggest that the human remains found in these two cairns had previously lain elsewhere. In each cairn, and more particularly in Tulloch of Assery B, there would have been adequate room in which to lay the newly dead. The incomplete skeletal remains and complete lack of articulation of all human remains from the two cairns were clearly not the result of subsequent disturbance. Furthermore, the occurrence of animal bones mixed with human bone, and in the case of *Tulach an t-Sionnaich* of layers of stone, in the same deposit suggests that the contents of each chamber had been deposited simultaneously. Although the remains of four individuals were identified in these two cairns, in each case the third and fourth individuals were represented by very fragmentary remains, and the possibility must be allowed that the chamber had been used previously and cleared to make room for the final deposit. The remains of the third and fourth individuals might therefore be regarded as skeletal debris from an earlier use of the chamber.

To what extent this was common practice in the N. of Scotland must await evidence from future excavation. Should it eventually be proved to have been normal, only then will it be possible to begin to speculate on the implications inherent in the hypothesis of an ossuary. The occurrence of a small quantity of burnt bone in the chamber of *Tulach an t-Sionnaich* must similarly pass without comment until comparable data are available. The final use of each chamber was marked by the construction of a carefully built blocking to seal the low and narrow entrance to the passage. At Tulloch of Assery A this was followed by the positioning of the forecourt blocking and, perhaps, of extra-revetment along the sides of the cairn.

Any attempt to compare evidence of burial in these three cairns with that from those cairns in Caithness excavated during the nineteenth century is hampered by lack of detailed data from the latter. In general, it may be seen that most of the individual features observed in Tulloch of Assery B were paralleled in one or more of the other Caithness cairns in which unburnt bone overlay a deposit of burnt bone. Tulloch of Assery A appears to be unique in the evidence derived from its N. chamber, and *Tulach an t-Sionnaich* should properly be compared only with Shetland cairns.

The layer of charcoal and burnt bone from Tulloch of Assery B was much thinner than that, for example, from Camster Round (CAT 13), both being round cairns with Camster-type chambers. The thin layer of the former, and possibly the 'paving' overlying it, are more closely paralleled by those in the Camster-type chambers of the two long-horned cairns at South Yarrows (CAT 54, 55). The little evidence available suggests that the burnt deposit in each of the Camster-type chambers of the four cairns on Warehouse Hill (CAT 62-65) was relatively thin. At Garrywhin (CAT 26) and Ormiegill (CAT 42), both short-horned cairns, there was a thick burnt layer in each chamber. There was no evidence whatever of a burnt layer in the N. chamber of Tulloch of Assery A, and disturbance in the S. chamber had destroyed all relevant evidence. Where the burnt deposit reached a thickness of some 12 in., as at Kenny's Cairn (CAT 31) or Ormiegill, it clearly differed from the thin scatter identified at Tulloch of Assery B.

It is not known to what extent the practice, observed at the latter cairn, of scattering the burnt deposit on the former ground surface prior to the building of the chamber, was followed. It would appear that a distinction should be made between a *scatter* and a *deposit*. The former, as at Tulloch of Assery B, might be covered and protected to a certain extent by a 'paving'. A layer, however, measuring 12 in. or more in thickness, had it been deposited prior to the building of the chamber, could hardly have survived the activity attendant on such an operation. It may be inferred that burnt material of this quantity was deposited in an already existing chamber. A further distinction may be observed. Burnt bone in the thicker deposits appears to have been derived from the common type of prehistoric cremation, in that some of the bone was only partly burnt and that recognisable fragments were included. Burnt bone from Tulloch of Assery B and South Yarrows South (CAT 55) was, to use Anderson's expression in referring to the latter, 'extremely comminuted'. In the former cairn no individual fragment of burnt bone measured more than  $\frac{1}{2}$  in. across, the majority of them measuring less than  $\frac{1}{4}$  in., and were unidentifiable. If the distinction is accepted between a pre-cairn scatter and a deposit made subsequent to the building of the chamber, it may be assumed to reflect some variation in cult practice. On present evidence it is not possible to correlate such distinctions with the plan of cairn or chamber.

Although imperfect in detail, accounts of early excavation in Caithness suggest that the condition of unburnt bone in most cairns resembled that of Tulloch of Assery B. Evidence of articulated remains is ambiguous, but in any case appears to have been a rare occurrence. Human and animal bone appear to have been deposited together. This fact, and the broken, scattered and fragmentary condition of

the human skeletal material suggests, as in the case of Tulloch of Assery B, that the majority of deposits were placed in position after the decay of flesh.

There is no known parallel in the north of Scotland for the arrangement at Tulloch of Assery A of skeletal material in small, well-defined deposits. The articulated remains of burial deposit E may be compared with at least one crouched burial in the short-horned cairn at Lower Dounreay (CAT 38), where the remaining burials appear to have been heaped together in the centre of the chamber. In every other respect Tulloch of Assery A is at present unique, when compared with known short-horned cairns, not only in its two chambers, but also in the absence from the N. chamber, both of a burnt deposit, and of animal bone. It is unfortunate that destruction in the S. chamber removed all evidence of burial and ritual, as it would have been instructive to have discovered whether this chamber, having an orientation similar to that of known chambers in short-horned cairns, differed in its burial deposit from that of the northern.

Although the few artifacts found make difficult any attempt to assign the three cairns at the N. end of Loch Calder to a precise cultural horizon, their very paucity may surely be taken as evidence that the burial ritual did not involve the placing of grave goods with the dead, at least in the chambers. None of the artifacts found in the chambers may properly be interpreted as grave furniture. There is of course no evidence of ritual which might have been observed in any hypothetical ossuary. The animal bones found mixed with human remains at *Tulach an t-Sionnaich* and Tulloch of Assery B have been interpreted as a *viaticum*, but it might equally be suggested that they represent the remains of funeral feasts, eaten prior to the placing of the burial deposit in the chambers. Whatever interpretation is preferred, the absence of animal bones from the northern chamber of Tulloch of Assery A contrasts with their abundance in the other two cairns. In this may be seen some variations in ritual observance.

Such variation is perhaps most clearly demonstrated in the choice of cairn plan. In this the three cairns demonstrate in microcosm the variety of plan which is so marked among the cairns of the Orkney-Cromarty group. More than any other single fact, perhaps, this rich variety abundantly proves that fertility of megalithic invention had not weakened by the time the practice of building chambered cairns had reached northern Scotland. Accepting the premise that the design of any structure devoted solely to cult activity is a conscious response to specific ritual needs, then this variety may similarly be accepted as evidence of differing cult emphasis. It seems improbable that it will ever be possible to do more than speculate on the reasons which impelled one group to choose a circular plan, another a short-horned and a third a heel-shaped plan, or why some passages were short and others long. These were surely a matter of deliberate choice, and were not merely influenced by the type of building stone available locally. Whatever symbolism may have underlain this choice must similarly remain hidden.

It nevertheless remains possible that future excavation may reveal significant inter-relations between tomb structure, artifacts and the method and number of burials. Absence of animal bone at Tulloch of Assery A and its abundance in the

other two cairns may be regarded as a pointer. If, for example, it were to be proved that different types of cairn were in simultaneous use, then some hint of social organisation or ritual variants might emerge. But this is for the future. For the present it is not without interest to note that the close proximity of a long, a short-horned and a round cairn is paralleled at Skelpick in Sutherland. Skelpick Long (SUT 53) is a long-horned cairn and Skelpick Round (SUT 54) appears to have a polygonal chamber. The type of chamber in the short-horned cairn, Skelpick South (SUT 55), is unknown. Three cairns near the W. shore of Loch Calder, while not grouped quite as closely together as those on the N. shore, exhibit a similar diversity of cairn plan. These are a long cairn, *Tulach Buaile Assery* (CAT 59), a round cairn with a Camster-type chamber, Carriside (CAT 17), and a third cairn, *Torr Ban na Cruagaich* (CAT 56), which contains at least one antechamber and chamber similar to the type identified in Tulloch of Assery A. The detailed plan of the enclosing cairn is unknown; at present it appears to be oval, but may have been horned. Admittedly, these are not true analogues of the group at the northern end of Loch Calder, as there is a lack of precise correlation between chamber plan and cairn plan. It is of further interest, however, to note that each of the three long cairns was almost certainly of multi-period construction.

Human skeletal remains from the three cairns described in this report suggest that age at death varied from infancy until the late forties, fifties or older. It is not possible from this small sample of nineteen or so burials to draw conclusions as to life expectancy during the Neolithic of northern Scotland, although the evidence shows that the mortality rate was evenly spread among age groups from the early teens upwards. There is similarly no evidence to suggest that any one type of tomb was restricted to the burial of a certain age group or of one sex.

There was some evidence of disease. Osteo-arthritis appears to have been normal in persons over the age of thirty, but may also have occurred in at least one individual in her late teens, as suggested by one of the burials from *Tulach an t-Sionnaich*. Three individuals appear to have suffered from osteo-myelitis, but there is no evidence that the disease was the immediate cause of death. A possible tubercular tumour was identified in the vertebral column of the larger individual from *Tulach an t-Sionnaich*, and the same individual appears to have suffered from a prolapsed intervertebral disc as well as osteo-arthritis. He died in his early thirties. Hypoplasia of the enamel of the upper left lateral incisor of a young adolescent suggests that this individual had suffered from some disease, such as measles, or possibly from malnutrition in early childhood at about the age of three or four years. One individual from Tulloch of Assery B appears to have died as a result of having been shot in the back by an arrow (Pl. XIV).

Study of the dentition revealed an apparent absence of caries, and in this the burials from the three cairns appear to conform to the low incidence of caries typical of the Neolithic in Britain.<sup>1</sup> On the other hand, there is considerable evidence of attrition, some of which was severe in the older individuals. This has a bearing on any consideration of the basic food-producing economy of the people concerned.

<sup>1</sup> Emery, G. T., *Antiquity*, xxxvii (1963), 277.

Paradontal disease was identified in a number of individuals; there was evidence of one case of chronic sinusitis and two of abscesses.

The animal bones from *Tulach an t-Sionnaich* and Tulloch of Assery B demonstrate that both herding and hunting played some part in the economy of the cairn builders. Hunting is also suggested by the occurrence of arrowheads. Owing to the difficulty of identifying fragmentary bones, it was not possible to distinguish with certainty between remains of cattle and deer, the two principal ungulates represented. This in turn prevents any estimate from being made of the relative importance of hunting and herding within the economy as a whole. The evidence from dentition, however, suggests that in *Tulach an t-Sionnaich* remains of cattle may have been more numerous than those of deer, whereas in Tulloch of Assery B both species may have been represented in approximately similar quantities. The cattle in both cairns may be identified as *Bos taurus longifrons* and the deer as *Cervus elaphus* (Red deer).

Neither bones nor teeth of sheep or of pig were identified in *Tulach an t-Sionnaich*, but both animals were certainly represented in Tulloch of Assery B, although in smaller quantities than were cattle and deer. It was not possible to attribute them to specific breeds. The sheep were almost certainly domesticated, but the pig may have been wild.

Remains of dog were found in both cairns, the species probably being *Canis familiaris palustris*. It is not suggested that the remains of dog were part of food deposits. It may be inferred from the one apparently complete skeleton at *Tulach an t-Sionnaich* that the animal was buried with human remains as part of the burial deposit. Fewer remains of dog were identified in Tulloch of Assery B. This was clearly a domesticated animal, useful to both hunter and herdsman.

There is no definite evidence of crop-raising from the three cairns, either in the form of carbonised grain or of grain impressions on potsherds. The marked attrition of many of the human teeth from all three cairns, however, may indicate a diet at least partially composed of inadequately ground cereals. The diet also appears to have been supplemented by the flesh of both bird and fish. Evidence of mollusca further suggests that limpets and land snails were collected as food, more particularly by the users of *Tulach an t-Sionnaich*.

It is not to be assumed that the contents of Neolithic burial mounds will necessarily provide an accurate indication of the local Neolithic economy. So much must have depended on ritual observance and local custom, insofar as they may have involved food remains. The absence of animal bone of any sort in the N. chamber of Tulloch of Assery A, and its occurrence in the other two cairns, is surely apposite in this context. The evidence nevertheless suggests that, in addition to hunting Red deer, the cairn builders possessed domesticated cattle and sheep, and possibly grew crops. Their basic economy may therefore have compared with that of other known chambered cairn groups in Britain.

The paucity of artifacts in the three cairns hinders any interpretation of the material culture of their builders. Although skeletal remains attest the hunting of Red deer, antler, either unworked or as artifact, was absent. There were no axe-

heads, yet the presence of charcoal<sup>1</sup> and the bones of Red deer suggest that some woodland lay at no great distance from Loch Calder. It might be inferred that timber was used to some extent, certainly for fuel and artifacts, and possibly for building. On present evidence it is not possible to offer either a reconstruction of the natural environment of this area at the time the cairns were being built<sup>2</sup> or any indication of changes brought about in it by the economy of the time.

The paucity of artifacts again does not allow the relationship of the three cairns to those of Britain in general, and those of northern Scotland in particular, to be established precisely. The finds from each cairn have been discussed separately. At Tulloch of Assery B the scatter of Neolithic sherds predates the building of the cairn and cannot therefore be used to date its construction, although it has been suggested that the two events were separated by no great period of time. The two sherds of Beaker from *Tulach an t-Sionnaich* were found in a disturbed part of the cairn, as was the petit tranchet derivative arrowhead from Tulloch of Assery A, and again are of little value in attempting a precise dating of the respective cairns.

Morphological parallels for each of the three cairns have been discussed. It is premature to go beyond this and to enter into any discussion of typological sequences. Tulloch of Assery B nevertheless appears to offer some support to Piggott's hypothesis that the stalled cairns of Orkney were derived from those of Camster type.<sup>3</sup> As Miss Henshall has shown,<sup>4</sup> the outer segment in the normal type of Camster chamber is roofed at a lower level than the inner. It has been suggested that the roof of Tulloch of Assery B took the form of a barrel-vault, and a similar form of roofing may have been employed in the stalled cairn of Midhowe (ORK 37).<sup>5</sup> Reference has also been made to the 'benches' in the chamber of Tulloch of Assery B; they resemble those of the stalled cairns. Finally, it is of interest to contrast the thin burnt scatter of Tulloch of Assery B with the thicker deposits in some of the chambers of Camster type on the mainland, such as Camster Round (CAT 13). In this, the deposit of Tulloch of Assery B compares with the thin layers found in some Orcadian cairns, which sometimes contained small fragments of calcined bone.<sup>6</sup>

One of the outstanding problems in the study of British chambered cairns as a whole, is that of origins. Precise analogues outside northern Scotland and the Northern Isles cannot be cited for the three cairns at the N. end of Loch Calder. It may perhaps be assumed that local invention played a considerable part in the evolution of the plan of both chamber and cairn. To a limited extent this may be demonstrated by the apparent derivation of stalled cairns from cairns having chambers of Camster type. The origins of the latter are unknown, but future excavation and research may eventually yield traces of connections with areas to the south. In doing so, the cairn of Achnacree in N. Argyll may prove to be significant.<sup>7</sup> This appears to be the only cairn of which sufficient details are known at present to offer

<sup>1</sup> Mr D. W. Brett of the Department of Botany of the University of Glasgow identified charcoal of birch, hazel, sorbus and willow.

<sup>2</sup> For general discussion of the natural environment of Caithness during the Neolithic period, see Henshall, *C.T.S.*, 59-60.

<sup>3</sup> Piggott, S., *Neolithic Cultures of the British Isles*, Cambridge (1954), 240-2.

<sup>4</sup> Henshall, *C.T.S.*, 115.

<sup>5</sup> *ibid.*, 80-81.

<sup>6</sup> *ibid.*, 91.

<sup>7</sup> Smith, R. A., *P.S.A.S.*, IX (1870-2), 409-16.

any parallel, admittedly imprecise, to those of Camster type. The Neolithic pottery from Achnacree includes carinated and lugged forms, and some with finger-tip fluting. Each of these features may be paralleled in the pottery from Tulloch of Assery B.

Of the origins of the short-horned and heel-shaped cairns it is impossible on present evidence to offer any useful comment. It may be suggested that, as in the case of the Camster type, Caithness Flagstone influenced the development of local building traditions. Beyond that one may simply include the chambers of all three cairns described in this paper within the broad classification of Passage Graves, which appear to have exercised a strong influence on the development of chambered cairn traditions from the Cotswolds to Shetland.

## APPENDIX A

### *Human Remains*

Skeletal material from the three cairns was examined by Dr Archibald Young, T.D., M.A., M.B., CH.B., F.R.C.S.(GLASGOW) of the Department of Anatomy in the University of Glasgow. Dentition was examined by Dr Dorothy A. Lunt, M.D.S., PH.D., H.D.D., of the Dental Hospital and School in the University. This appendix has been compiled from their identifications by the present writer (J.X.W.P.C.); Dr Lunt's contribution has been inserted *verbatim* in the appropriate section of the Appendix.

*Dr Lunt writes*, 'The teeth are indicated in dental notation. The quadrant of the mouth to which a tooth belongs is indicated by a system of vertical and horizontal lines.

Thus  $\begin{array}{|c} \hline 1 \\ \hline \end{array}$  = maxillary first incisor on the left side

$\begin{array}{|c} \hline 5 \\ \hline \end{array}$  = maxillary second premolar on the right side

$\begin{array}{|c} \hline 3 \\ \hline \end{array}$  = mandibular canine on the left side

$\begin{array}{|c} \hline 7 \\ \hline \end{array}$  = mandibular second molar on the right side

Attrition has been recorded according to Broca's scale<sup>1</sup>:

*1st degree* – facets on the enamel

*2nd degree* – dentine exposed at the cusps

*3rd degree* – exposed area of dentine coalescing

*4th degree* – dentine forms the entire occlusal surface

Age has been assessed from the degree of attrition of the molar teeth, following Miles' table of values.<sup>2</sup> This scale of values was worked out from a series of Anglo-Saxon skulls, and can be applied to other material only if the assumption is made that the diet was of comparable roughness. If there is any reason to believe that the Neolithic diet was considerably coarser, grittier or tougher than that of the Anglo-Saxon, then age estimates should probably be lowered, but there is no means of telling by how much. I have assumed meantime that the rates of tooth wear were similar in the two groups.<sup>3</sup>

### *Tulach an t-Sionnaich*

#### (a) *Larger Individual*

*Skull.* Greater part of the back of the cranium, including parts of both parietal bones, squamous part of the occipital bone, the major part of both temporal bones, but lacking the squamous parts of the latter. Right zygomatic bone, right maxilla, two halves of mandible.

*Dentition.* The right maxilla is split, cleaving at the mid-line suture anteriorly, and includes the tuberosity posteriorly.

<sup>1</sup> Broca, P., *Bull. Soc. Anthropol. Paris*, II (1879), 128.

<sup>2</sup> Miles, A. E. W., in Brothwell, D. R., (editor), *Dental Anthropology*, Oxford (1963), 191.

The mandible has been broken in the  $\overline{45}$  area, but the halves match well, with only slight *post mortem* loss of the alveolar process. The bone is of medium size and well formed, with a square chin, fairly broad ramus set almost vertically to the body and an everted angle with bony ridges suggesting strong muscle attachments.

$$\text{Teeth still present are: } \frac{8 \ 654 \ |}{7654 \ 1 \ | \ 2345678}$$

$$\text{Teeth lost } \textit{post mortem}: \frac{732 \ |}{32 \ | \ 1}$$

$$\text{Teeth lost } \textit{in vivo}: \ 1 \ | \ \text{and possibly } \overline{8} \ |$$

*Attrition.* Many of the teeth show 2nd degree attrition (dentine just exposed at the cusps), but  $\frac{6 \ |}{76 \ | \ 6}$  show 3rd degree attrition, and  $\frac{\quad \ |}{1 \ | \ 2}$  4th degree attrition, while  $\frac{8 \ |}{\quad \ | \ 8}$  are hardly worn at all.

The degree of attrition of  $\frac{6 \ |}{76 \ |}$  suggests an age of *c.* 36, while attrition is less pronounced on  $\overline{678}$  and suggests an age nearer *c.* 28. This of course means that function was not evenly distributed, but was heavier on the right side. Probably the true age would be somewhere between these extremes, perhaps 31-34.

*Pathology.* Caries is absent from all these teeth.

There is considerable evidence of severe paradontal disease, with infection of the soft tissues around the teeth, infection and resorption of the bone of the sockets, the formation of deep pockets beside the teeth and the loosening of the teeth. This is most marked in the molar regions, and resorption of alveolar bone round  $\overline{7} \ | \ \overline{678}$  has been so severe that these teeth were almost certainly mobile.  $\overline{8} \ |$  may also have been loose. Though deep pockets have also formed round the roots of  $\overline{6} \ |$  and  $\overline{6} \ |$ , these teeth are still firmly held in their alveoli. Similar bone loss can be seen in the socket of  $\overline{2} \ |$ .

The premolars, canines and lower incisors do not appear to be affected by the disease. The socket of  $\overline{2} \ |$ , however, shows fairly severe resorption of bone. The loss of  $\overline{1} \ |$  *in vivo* may be due to paradontal disease or to trauma. This tooth was obviously lost some time before death as the socket has healed over completely. The  $\overline{8} \ |$  is not present and there is no trace of its socket. It may be that this tooth was present originally, but had been lost before death due to paradontal disease. On the other hand, it is also possible that the tooth was congenitally missing. In the present state of bone loss, it is impossible to decide which is the more likely alternative, although the very light wear on  $\overline{8} \ |$  suggests that  $\overline{8} \ |$  was in fact missing.

The mesial side of  $\overline{8} \ |$  shows normal wear, but the distal side is unworn, and this suggests that  $\overline{8} \ |$  was either absent or embedded. The difference in degree of attrition between the two sides is interesting, but in the total absence of the left maxilla no conclusions can be reached. Paradontal disease is more marked round  $\overline{6} \ |$  than round  $\overline{6} \ |$ , and it may simply be that the former tooth was too painful to allow of mastication. The cause, however, may lie in the maxilla.

#### *Axial skeleton*

- Vertebrae*    *cervical*, portions of C1 and C2; C7.  
                   *thoracic*, portions of six, including posterior part of an upper thoracic, with evidence of disease, osteo-arthritis and probably a tubercular tumour.  
                   *lumbar*, L5 displaying partial sacralisation, probably due to osteo-arthritis.  
                   *sacrum*, upper part in two pieces, the body of one and the upper margin of the second being fused, perhaps indicative of a prolapsed intervertebral disc.
- Ribs*            *right*, 1st and 2nd and portions of at least four others.  
                   *left*, part of 2nd and portions of at least three or four others.

<i>Scapula</i>	part of right.
<i>Clavicles</i>	pair, almost complete, suggesting a measurement of <i>c.</i> 19 in. across the shoulder. The right clavicle is more heavily built than the left, suggesting a right-handed individual.
<i>Pelvis</i>	possible fragments.
<i>Arm</i>	<i>humerus</i> , left, complete. <i>radius</i> , portions of right, including mid-shaft, and almost complete left. <i>ulna</i> , proximal end of right and portion of left.
<i>Hand</i>	<i>scaphoid</i> , part. <i>metacarpals</i> , III right complete, proximal half of a large III, distal half and part of shaft of unidentified metacarpal.
<i>Leg</i>	<i>femur</i> , evidence of both right and left, including distal ends. Apparently slightly asymmetrical. <i>tibia</i> , distal end and shaft of right, distal end of left. <i>fibula</i> , proximal and distal ends of right, almost whole of left. <i>patella</i> , both right and left, the former arthritic.
<i>Foot</i>	left <i>calcaneum</i> , <i>talus</i> and <i>cuboid</i> . portions of V <i>metatarsal</i> , an intermediate <i>phalanx</i> and I proximal phalanx.

*Comment.* Remains of the skull suggest a very broad-skulled individual with a prominent chin. Clearly a fully grown adult and probably male. Study of the dentition suggests an age at death of *c.* 31–34 years. Several vertebrae exhibit apparent arthritic changes in the spine, particularly in the lipping and fusion of the vertebrae. There was also evidence suggestive of a tubercular tumour of the spine and of a slipped intervertebral disc.

(b) *Smaller Individual*

*Skull.* Part of right side of frontal bone, part of parietal bone, part of left spheno-parietal junction. right sphenoid bone, part of right temporal bone, part of occipital bone and four parts of vault.

*Dentition.* This individual is represented by the loose teeth  $\frac{76 \quad | \quad 45}{| 1 \quad 3 \quad 5 \quad 78}$ , which appear to belong to the same person.

*Attrition.*  $\frac{6 \quad | \quad 45}{| 1 \quad 3 \quad 5}$  show early 2nd degree attrition, and  $\frac{7 \quad |}{| 78}$  show 1st degree attrition.

The amount of wear on the molars  $\frac{76 \quad |}{| 7}$  suggests an age of *c.* 18–20.

*Pathology.* Caries is absent from all these teeth.

Paradontal disease cannot be assessed, in the absence of bone.

There is an attrition facet on the mesial aspect of  $\overline{8}$ , but the distal part of the tooth is covered with calculus (tartar), which indicates that it was not in occlusion. This may mean either that  $\overline{8}$  was not fully erupted, or that  $\underline{8}$  was not completely erupted, or that  $\underline{8}$  was missing. From a study of the proximal attrition facets of  $\overline{7}$  and  $\overline{8}$ , it is possible that  $\overline{8}$  may have been lying in an abnormal position, tilted distally and possibly covered partially by a flap of soft tissue, and therefore incompletely erupted. This would account for the appearance of the occlusal surface.

*Axial skeleton*

<i>Vertebrae</i>	<i>cervical</i> , most of C2, C4 and C5 and possibly C7. <i>thoracic</i> , posterior part, two almost complete, and four fragments.
<i>Ribs</i>	<i>right</i> , portions of five or six ribs. <i>left</i> , portions of five ribs.
<i>Scapula</i>	two portions.
<i>Clavicles</i>	approximately three-quarters right and complete left, suggesting measurement of approximately 16 in. across the shoulder.
<i>Pelvis</i>	fragments.

<i>Arm</i>	<i>humerus</i> , portion of right, including proximal end. Almost complete left. <i>radius</i> , parts of right. <i>ulna</i> , proximal and distal ends of right and parts of left.
<i>Hand</i>	portions of three <i>carpal</i> bones, one <i>metacarpal</i> , two complete and one-half proximal <i>phalanges</i> .
<i>Leg</i>	<i>femur</i> , parts of both right and left, with evidence of osteo-arthritis. <i>tibia</i> , parts of shaft and distal ends of right. Parts of shaft, proximal and distal ends of left. <i>fibula</i> , part of right and complete left. <i>patella</i> , part of right and complete left.
<i>Foot</i>	right and left <i>calcanea</i> , left <i>talus</i> and left <i>navicular</i> . <i>metatarsals</i> , parts of II and V. <i>phalanges</i> , one intermediate, two proximal and head of third.

*Comment.* The fact that the vertebrae were completely formed, traces of a fully formed iliac crest and absence of cartilage, indicate that this was an adult. Study of dentition confirms this and shows that this was a young adult. It is not possible to determine sex, although the lighter build of this individual, compared with individual (a), might suggest a female.

(c) *Not attributed*

*Skull.* Part of hyoid bone. Small fragment of cranium, possibly of infant.<sup>1</sup>

*Dentition.* This person is represented only by a small fragment of the left mandible. This fragment includes a portion of the ascending ramus and two molar sockets. Anterior to the molar sockets the bone rises sharply to form the posterior wall of another socket, possibly that of a premolar.

The molar sockets are very shallow and the porosity of the bone suggests that here, too, parodontal disease had resulted in infection and resorption of bone. Evidently the premolar has not been so seriously affected by the condition, as have the molars. One of the molars is missing, but on available evidence it is neither possible to say which tooth is absent, nor to state whether its absence is due to *in vivo* loss or failure in formation. From the appearance of the bone, it seems that the body of the mandible was fairly shallow, and this would suggest that the individual was fairly old.

*Axial skeleton:* first rib of adult and portions of rib. Part of shaft of left clavicle, possibly of an infant.<sup>2</sup>

*Hand:* trapezium, parts of three *metacarpals* (probably including IV) and one proximal phalanx.

*Leg:* parts of *tibia* and *fibula*.

*Comment.* It is uncertain whether these bones, with the exception of the fragment of mandible of an elderly person and the possible remains of an infant, belong to two individuals represented above or to third and fourth individuals. The fragment of mandible certainly belongs to a third individual as none of the molars found fit the molar sockets of this fragment. A similar uncertainty applies to many unidentifiable fragments, particularly of long bones, including ends, possibly of humerus, ulna, femur and tibia, and skull fragments.

*Tulloch of Assery A*

*Burial Deposit A*

(a) *Adult*

*Skull:* part of crumbled mandible.

*Axial skeleton*

*Vertebrae* *cervical*, two, very large.  
*lumbar*, possible IV, part V, and part of third.  
*sacrum*, part of upper right side.

<sup>1</sup> Identified by Mr C. B. Denston.

<sup>2</sup> Identified by Mr C. B. Denston.

- Arm* *radius*, right, part of shaft and distal end.  
*ulna*, somewhat squashed part of right, proximal end and greater part of shaft of left, showing lipping, suggestive of osteo-arthritis.
- Hand* right, very large *scaphoid*, large *cuneiform*, *metacarpals* I-IV inclusive, large, apparently of an elderly person.  
 proximal *phalanges*, II, III, IV and possibly V, large.
- Leg* *femur*, upper end of right shaft, diseased.
- Foot* right, *cuneiform*, large, left *talus*, cuboid and parts of *navicular*, metatarsals I and II, large, the former showing evidence of arthritic lipping.

*Comment.* The remains suggest an elderly, rather rugged individual, possibly male, with very large hands and feet, with evidence of osteo-arthritis in arm and foot.

(b) *Adolescent*

*Skull.* Parts of right and left temporal bones, part of basi-occipital bone, part of maxilla with teeth, parts of mandible with teeth. Skull struck heavy blow but not known whether *ante* or *post mortem*.

*Dentition.* A fairly complete maxilla, a small fragment of the mandible and some loose teeth. The central suture of the palate is not yet united and this suggests that the individual was young.

$$\begin{array}{r} \text{Teeth present:} \quad \frac{876 \ 43 \ | \ 3 \ 678}{54321 \ | \ 1234 \ 67} \\ \text{Teeth lost } \textit{post mortem}: \quad \frac{5 \ 21 \ | \ 12 \ 45}{\phantom{54321 \ | \ 1234 \ 67}} \end{array}$$

*Attrition.* All the teeth show a very slight degree of attrition, dentine having just been exposed along the incisal edges of  $\frac{\quad}{21 \ | \ 12}$  and on one cusp of  $\overline{6}$ . It seems very probable that  $\frac{7 \ | \ 7}{\quad \ | \ 7}$  had not long erupted, and the roots of  $\frac{8 \ | \ 8}{\quad \ | \ 8}$  have only just started to form. This suggests an age of perhaps 13 or 14. It is interesting that  $\frac{6 \ | \ 6}{\quad \ | \ 6}$  show rather less attrition than might be expected at this age.

*Pathology.* There is no evidence of caries or of any other pathological condition in the surviving teeth. The base of the socket of  $\underline{5}$ , however, opens into a large abscess cavity, which in turn opens into the floor of the maxillary sinus. This means that the pulp of the  $\underline{5}$  must have become infected, either as a result of caries, or more probably because of traumatic damage to the tooth.

Both third maxillary molars are embedded in their crypts, and while  $\underline{8}$  appears to be in normal position,  $\underline{8}$  is placed unusually high in the bone.

There is no evidence of any paradontal condition.

*Axial skeleton*

- Vertebrae* *cervical*, odontoid process of C2, C7.  
*thoracic*, part, probably of T1, part of right side of second and parts of four thoracic vertebrae. Three vertebral bodies and one vertebral epiphyseal plate.  
*sacrum*, part.
- Ribs* 30 fragments.
- Scapula* part of left.
- Pelvis* part of right region of Y-cartilage and several fragments, part of rather thin acetabulum, part of right pubic ramus and part of left ilium with cartilage.
- Arm* *humerus*, fragments of left.  
*radius*, distal end of left and part of distal end of second (presumably right) without epiphysis.
- Hand* one *metacarpal*.

*Leg* femur, fragments of shaft and part of distal femoral epiphysis.  
tibia, part of right shaft and distal end and left proximal epiphysis, and part of proximal head, side unknown.

*Foot* two phalanges, one proximal.

*Comment.* Evidence from the attrition of the teeth suggests an age of 13 or 14, and evidence from the pelvis and the tibian epiphysis suggests that this was an individual whose age at death was between 14 and 16. A mean age of *c.* 14 years may therefore be accepted. Remains of skull indicate a rather flat face with broad skull, perhaps measuring approximately 22 cm. in width with a vertical height of approximately 14 cm.

(c) *Not Attributed*

*Skull:* fragments, including part of zygomatic bone.

*Axial skeleton:* part of scapula.

*Long bones* several fragments, including parts of femur and part of one unidentifiable long bone with traces of osteo-myelitis.

*Foot* part of metacarpal.

Several unidentifiable fragments, including some calcined bone.

*Burial Deposit B*

*Skull.* Parts of right and left petrous temporal bone, other parts of temporal bone and part of mastoid process. Left articular process and other parts of mandible with teeth, fragment of right maxilla with teeth. Loose teeth.

*Dentition.* Teeth present: 
$$\frac{876543 \quad | \quad 12345678}{87654321 \quad | \quad 345678}$$

*Attrition.*  $\frac{6}{6} \quad | \quad \frac{6}{6}$  are all heavily worn, showing advanced 3rd degree attrition. The incisors also show 3rd degree attrition. The other teeth show 2nd degree attrition, with the exception of  $\frac{8}{8}$  which show 1st degree attrition. This amount of wear suggests that the individual was *c.* 38-40 years old at death.

*Pathology.* There is no evidence of caries. Bone infection cannot be studied properly, but there is some evidence of slight paradontal disease.

*Axial skeleton*

*Vertebrae* cervical, parts of C1, C2, and probably C5, C6 and C7. C2 has evidence of arthritic enlargement.

thoracic, part of low thoracic.

*Ribs* fragments, with evidence of pitting.

*Pelvis* greater part of broken ilium.

*Arm* humerus, part of right, greater part of shaft of left, adult, build appropriate to female.  
radius, greater part of left shaft, fairly light build, appropriate to female.

ulna, greater part of right shaft.

*Leg* femur, middle part of right shaft with clear evidence of osteo-myelitis, the onset of which occurred some considerable time before death.

mid shaft of left femur, with relatively weak markings, appropriate to female.

right femur is considerably thicker than left, the result of osteo-myelitis.

*Long bone fragments,* unidentifiable, but with evidence of osteo-myelitis.

*Comment.* Skeletal remains suggest an adult female and evidence of dental attrition suggests that the age at death was *c.* 38-40.

*Burial Deposit C*

*Axial skeleton*, and *pelvis* parts, including possible part of *acetabulum* in articulation with head of femur.

*Leg: femur*, parts of possible shaft and part of proximal end in articulation with acetabulum.  
Small mass of unidentifiable bone.

*Comment.* Fragments of long bones suggest a lightly built individual.

*Burial Deposit D*

*Skull.* Parts of left temporal bone, including relatively large petrous temporal bone.  
Many fragments of relatively thick cranium with eroded outer surface. Loose teeth.

*Dentition.* Teeth present:  $\frac{| 3}{| 345678}$ . At least two individuals are represented.

(a) *Adolescent*

It is probable that  $\frac{| 3}{| 34}$  represent a fairly young individual.  $\overline{| 3}$  shows early 2nd degree attrition, while dentine is not yet exposed on  $\overline{| 4}$ . An age of perhaps 16–18 could be suggested.  $\overline{| 3}$  has a peculiar worm-eaten appearance, which may be the result of *post mortem* damage. It may, however, represent either very severe hypoplasia of the enamel, or resorption, if the tooth was unerupted. It is not now possible to decide which is the correct interpretation.

(b) *Adult*

Three molars  $\frac{| 678}{| 678}$  can reasonably be assigned to a single individual.  $\overline{| 6}$  shows advanced 3rd degree attrition and  $\overline{| 78}$  both show 2nd degree attrition. The degree of wear suggests an age of *c.* 36–38.

*Pathology.* There is no evidence of caries.

(c) *Third individual (?)*

A  $\overline{| 5}$  was found in this deposit. This tooth may belong to the  $\overline{| 678}$  of (b), but it is rather less worn, and unless this individual had some abnormality of occlusion, it is perhaps more likely that this tooth belonged to an individual perhaps in the mid-twenties.

*Leg* *femur*, fragments of apparently large proximal end.  
*fibula*, fragment of shaft.

*Comment.* The skeletal remains appear to be those of an adult, possibly the same individual represented by teeth (b). Adolescent (a) and the possible third individual (c) are represented by teeth alone.

*Burial Deposit E*

*Scapula* small fragments.

*Pelvis* 10 small fragments, probably of left side, relatively heavy.

*Arm* *ulna*, fragments of right and almost intact left.  
*radius*, almost intact left.

*Hand* *carpus*, both complete, apart from two cuneiforms and one pisiform. *Metacarpals*, two each (either complete or fragmentary) of I, II, III, IV and V.  
*phalanges, proximal*, two each of I, II, III, IV and V.  
*intermediate*, three missing.  
*distal*, six missing.

*Leg* *femur*, part of right, greater part of left with patella attached in a position showing extreme flexion, and suggesting that leg muscles must have been cut.  
*fibula*, greater part of right, apart from slight erosion of proximal end.  
*tibia*, large parts of both right and left.

*Foot* one *phalanx* and a possible *metacarpal* II, adhering to part of right tibia.

*Comment.* The position of the left femur and patella show that the body had been tightly flexed in such a position that the leg muscles had probably been cut. This may suggest that the body had been tightly bound in the flexed position.

The remains are those of a fully grown adult, over 20 years of age at death. It is not possible to determine sex with any certainty, although the heavy build of the pelvis may suggest a male.

#### *Burial Deposit F*

*Dentition.* Teeth present:  $\frac{5 \ 2 \ | \ 2 \ 456}{654 \ | \ 678}$ . There is a fragment of the labial enamel of another incisor. This collection of loose teeth has a uniform degree of wear and probably belongs to a single individual.

*Attrition.* The  $\frac{| \ 6}{6 \ | \ 6}$  all show early 2nd degree attrition, as does  $|2$ . The premolars and  $\overline{7}$  show 1st degree attrition - i.e. wear facets in the enamel but no exposed dentine, and this suggests that these teeth had not long erupted. The *post mortem* destruction of nearly all the roots makes an exact assessment of age (to within one year) rather more difficult than usual, but it seems that the roots of  $\overline{7}$  were fairly complete, and this indicates that the person could not have been much younger than 14. On the other hand, the very slight degree of attrition of all the teeth suggests that the individual could hardly have been older than 15. The  $\overline{8}$  is quite unworn, had obviously not erupted, and only a little of its root appears to have formed, which also supports the suggested age of c. 14-15.

*Pathology.* There is no caries.

On the crown of  $|2$  two grooves are present indicating hypoplasia of the enamel. This means that the individual suffered either from famine or from a disease such as measles at two fairly close intervals and at the age of 3 or 4. The crown of  $2]$  is fragmentary but the same two lines of hypoplasia can just be distinguished.

*Arm* humerus, distal end of right with evidence of scoring, possibly caused by removal of flesh (?)

*Hand* part of *scaphoid*, part of either *metacarpal* IV or V, and proximal half of III. Two proximal *phalanges*, including III, relatively large.

*Leg* femur, part of shaft and distal end, including condyles, of thick, heavy right femur, suggesting a large individual. Part of proximal end, side unknown.  
tibia, proximal end of right.

*Foot* part of possible *calcaneum*.

*Comment.* The bulk of this deposit may be attributed to a large, full grown adult, but the teeth are clearly those of an adolescent.

*Single Incisor Tooth.* A single incisor,  $|1$ , was found in a disturbed area on the E. side of the northern chamber, immediately south of the orthostat dividing the antechamber from the chamber. The tooth could belong to either the adult or the third individual represented in Burial Deposit D, but not the adult represented in Burial Deposit B. The tooth does not seem to be sufficiently worn to belong to the adult of Burial Deposit D, but it is too much worn to belong to any of the adolescent individuals identified. It may belong to the problematical third individual of Burial Deposit D, represented solely by  $\overline{5}$ , or it could represent another individual altogether.

#### *Tulloch of Assery B*

##### *From Inner Segment (principal deposit)*

###### *(a) Larger individual*

*Skull.* Broken but complete from foramen magnum to glabella with many small fragments, suggesting that skull was deposited whole. The bone of the vault is thick and heavy. Greater part of maxilla, complete mandible.

*Dentition.* The maxilla is almost complete, but has become compressed, particularly posteriorly, due to loss of the palate. The mandible is of medium size, and is not heavily built. The ascending ramus is fairly short and not very wide, and is set at a slightly obtuse angle to the body. The chin is rather delicate and pointed. The angle is slightly everted and the muscle attachments seem to have been of moderate strength.

Teeth present:	$\frac{87 \quad 43}{87654321}$	$\frac{ 1234 \quad 6}{ 12345678}$
Teeth lost <i>post mortem</i> :	$\frac{65 \quad 21}{5 \quad 7 \text{ or } 8}$	
Teeth lost <i>in vivo</i> :	$\frac{ 7 \text{ or } 8}{}$	

*Attrition.* Nearly all the teeth are heavily worn.  $\frac{43}{76}$   $\frac{|1234 \quad 6}{|67}$  show 4th degree attrition and other teeth show 3rd degree attrition, except for  $\frac{8}{8} \frac{|}{8}$  which show 2nd degree attrition.

With advanced attrition such as this, the estimation of age is less reliable, but a figure of *c.* 48–54 may be suggested. This may not be very accurate, but the individual was certainly at least middle-aged.

*Pathology.* In the mandible there is slight evidence of paradontal disease and bone resorption around the roots of  $\frac{6}{6}$ . Pocket formation is quite marked on the mesial root of  $\overline{6}$ . There is also very slight evidence of paradontal infection around  $\overline{87}$ . The other teeth appear to be reasonably healthy, and there is no evidence of caries.

A large carious cavity is present on the mesial aspect of  $\frac{6}{6}$ . It has involved most of the mesial side of the crown from the occlusal surface down to the gingival margin. The pulp of the tooth has become infected and the infection has tracked through the apical foramina with the formation of two separate apical lesions. One of these lesions has formed on the two buccal roots and has caused a small punched-out hole to appear in the buccal alveolar bone. The second lesion, on the palatal root, has tracked up the side of the root instead of perforating the alveolar bone. Both of these lesions were probably chronic abscesses with sinuses in the soft tissues which allowed the pus to drain into the oral cavity.  $\frac{65}{5}$  are unfortunately missing, but there is evidence of bone infection around these teeth, with formation of abscesses on  $\frac{65}{5}$ . It seems probable that the abscess on the palatal root of  $\frac{6}{6}$  has involved the maxillary sinus, and this would have resulted in a chronic sinusitis. There is also evidence of bone pathology in the region of  $\frac{2}{2}$ . In the  $\frac{78}{}$  area there is severe bone infection, and one of these teeth had been lost *in vivo*. It is impossible to decide which of the two molars had been lost.

#### *Axial skeleton*

*Vertebrae* sacrum with part of vertebra L5 fused together. portion of the body of a very abraded vertebra with part of a flint arrowhead embedded in it. It appears that this was a lower thoracic vertebra of a fully grown adult and that the arrowhead entered from the rear and above. It is also probable that the wound inflicted by the arrowhead was the cause of death (Pl. XIV).<sup>1</sup>

<sup>1</sup> I am grateful to Dr A. T. Sandison of the Department of Pathology in the University of Glasgow for this opinion. Dr Sandison and Dr Mary Catto arranged for radiographic photographs to be taken of the specimen in the hope that trabecular detail might allow a more precise identification to be made in the absence of external morphological features. Dr Sandison (*in litteris*) informed me that some radio-opaque material, possibly dust or earth, inside the bone structure prevented this. He concluded, having cut down a similar vertebral body from an ancient Egyptian specimen and having compared it with that from Tulloch of Assery B, that the latter was probably a lower dorsal vertebral body, and that the arrowhead must have entered from the posterior aspect and passed into the spinal cord through the intervertebral space. The arrow was probably in a falling trajectory at the time.

- Pelvis* right ischium, most of acetabulum and part of ilium.  
part of left ischial tuberosity.
- Leg* femur, almost complete right, proximal end and part of shaft of left.  
tibia, large part of shaft of right, distal end and part of left shaft.

(b) *Smaller Individual*

*Skull*: mandible.

*Dentition.* The mandible is fractured into four pieces which fit together accurately. The  $\overline{1}$  has been lost *post mortem*, but all the other teeth are in position in their sockets. The mandible is a large and heavy bone with a deep body. The ascending ramus is quite long but is set at an obtuse angle to the body. The angle of the mandible is not very strongly developed. It is slightly inverted and the muscular ridges are not pronounced. The chin has been lost.

The teeth are also large, and this, together with the large mandible, might suggest a male.

Teeth present:  $\overline{87654321} | \overline{2345678}$

Teeth lost *post mortem*:  $\overline{1}$

*Attrition.*  $\overline{76|6}$  show 3rd degree attrition and the remaining teeth all show 2nd degree attrition, with the exception of  $\overline{4|}$ , which is very little worn because it is in an abnormal position outside the arch. The degree of molar attrition suggests an age of *c.* 36-38, although the anterior teeth show less wear than might be expected at that age.

$\overline{76|67}$  show the usual type of flat-topped occlusal wear, but in  $\overline{8|8}$  there is a rather saucer-like hollowing of the occlusal surface.

*Pathology.* There is no caries in any of the teeth. Deep pits are present in the occlusal surfaces of  $\overline{78}$ , but these are developmental, and caries does not seem to have started in them. There is a fairly heavy deposit of calculus (tartar) round the necks of the teeth. It is present on both buccal and lingual sides of the teeth. Some resorption of alveolar bone has occurred, particularly around the molars, as the result of a mild paradontal infection, but deep pockets and severe bone loss are not apparent.

In spite of the large heavy mandible, there has not been sufficient room for the permanent dentition and crowding of the anterior teeth has occurred. The incisors and canines are not set in an even curve, and the first premolars show a tendency to be pushed buccally. This is most noticeable in the right premolar, which is lying almost completely outside the arch and has not been in proper occlusion. The second premolars and all the molars are evenly spaced and in correct alignment.

- Scapula* part of left interior angle acromial process and part of spine.
- Pelvis* left ilium and part of acetabulum, part pubis and part of ilium, probably right.
- Arm* humerus, part of left shaft and distal end.  
ulna, part of left shaft and proximal end.  
radius, part of left shaft and proximal end and probable distal end, side unknown.
- Leg* tibia, part of left shaft and distal end.

(c) *Not Attributed*

*Skull*: probable fragments.

*Axial skeleton*

- Vertebrae* parts of several bodies, including one low thoracic or lumbar. Part of left auricular surface of sacrum.
- Ribs* many fragments, including one from right mid-thorax with old fracture.
- Scapula* left glenoid surface.
- Pelvis* fragments, including parts of acetabulum.

- Arm*        *humerus*, part of proximal end, side unknown.  
               *ulna*, part of right shaft.  
               *radius*, probable distal end, side unknown.
- Leg*        *femur*, fragments of shaft, proximal and distal ends, side unknown. Large part of left.
- Foot*        *talus*, right *metatarsals* IV and V, left *metatarsals* I and II, left *phalanx* I (fits *metatarsal* I).

*From Middle Segment*

*Dentition.* An extremely fragmentary tooth, which seems to have been partially burnt. It can nevertheless be identified as  $\bar{6}$ .

The degree of attrition suggests an age of *c.* 18–20.

*Femur*        part of shaft. This was found in association with a deposit of animal bones, sherds and flints, beneath the paving and continuing under northern wall of chamber.

*Calcaneum* left, probably adult, burnt.

*From Outer Segment*

*Skull*        probable fragments.

*Pelvis*        probable parts of *os innominatum*.

*Femur*        fragments, with evidence of osteo-myelitis. Left distal end, including both condyles, small, but fully adult.

*Foot*        left *talus*, left *metatarsal* III, both adult, but relatively small. Proximal *phalanx* of immature person.

*From Passage*

*Dentition.* Right half of a mandible at or shortly before birth. All the tooth germs have been lost from their crypts.

*Humerus*     possible fragments.

*Femur*        proximal end, probably right, fully grown adult, fairly heavy, probably male.

*Phalanx*     one tarsal phalanx and part of flattened shaft of carpal phalanx I.

*Metatarsal* right IV, adult, relatively large.

*Comment.* With the exception of the right half of the mandible of a newly born child or foetus found in the passage, a single proximal phalanx of an immature person found in the outer segment and the molar from the middle segment, the human bone from Tulloch of Assery B appears to represent the remains of no more than two adults. This is true of the large deposit in the inner segment, but the few scattered remains from the other two segments and the passage could be also attributed to the same two individuals.

## APPENDIX B

*Faunal Remains*

Skeletal remains were examined by Dr Archibald Young, T.D., M.A., M.B., CH.B., F.R.C.S.(GLASGOW), and the following summary of bones represented has been compiled by the present writer (J.X.W.P.C.) from Dr Young's identifications. On account of the very fragmentary nature of most of the faunal remains, it was not possible to attribute all of them to specific species. It must be emphasised that, with the exception of a few bones from the extremities, only portions of the bones listed were available for identification. For this reason evidence from dentition acquires an added significance, and Dr Lunt's identifications of, and general comments on, the dentition comprise part II of this Appendix.

## Part I - Skeletal

*Tulach an t-Sionnaich*

The faunal remains listed were found either in the chamber or passage, or from positions in the cairn where it was apparent that they had originally been placed in either chamber or passage.

*Ruminantia (Bos taurus longifrons and Cervus elaphus)*

- Skull* portions of hyoid and molar bones.  
*Vertebrae* C2, large thoracic of young animal, several other portions.  
*Ribs* various portions.  
*Pelvis* right ischium and ilium.  
*Fore-limb* humerus, distal end left, proximal end right, and part of shaft.  
*Hind-limb* femur, part of shaft, distal end right.  
*tibia*, ?distal end.  
*Long bones* ?humerus/femur, immature animal.  
 ?radius/tibia, portions.  
 various portions of shaft.  
*Extremities* portions of two carpals, three metacarpals, one terminal phalanx and at least seven metatarsals/metatarsals.

*Comment.* The problem of identification lies in distinguishing between Cervidae and Bovidae. Although all but one of the teeth of the Ruminantia in this cairn may be attributed to *Bos taurus longifrons*, the presence in the main burial deposit of a single incisor of *Cervus elaphus* shows that this animal was represented (cf. part II of this Appendix). The remains of the second cervical vertebra, pelvis, humerus and femur compare with those of *Cervus*. Other remains are almost certainly of *Bos*.

*Canidae (Canis familiaris palustris)*

- Skull* almost intact skull of young animal.  
 portions, including the ear region, two portions of zygomatic arch.  
*Vertebrae* six cervical (C6/7) missing, thirteen thoracic, portions of three lumbar, and indeterminate parts. Portions of sacrum and atlas.  
*Ribs* portions of several ribs.  
*Scapula* one intact, greater part of second. Two portions of immature animal.  
*Pelvis* three portions, including os innominatum.  
*Fore-limb* humerus, left and right, adult, but ossification not quite complete Proximal end of humerus.  
 radius, complete, and portions of second.  
 ulna, portions of two.  
*Hind-limb* femur, one complete, distal end of second.  
 tibia, two, epiphysis only just formed.  
 fibula, one complete, greater part of second.  
 patella, one.  
*Extremities* cuneiform, carpal, two calcanea, terminal phalanges and portions of at least eight metatarsals/metacarpals.

*Comment.* Evidence from the skulls and scapulae shows that two individuals are represented. The greater part of the remains belong to a mature specimen. These remains were closely associated with the main burial deposit in the chamber. The second specimen is that of an immature animal, most clearly represented by the skull and parts of scapula.

*Miscellaneous*

It was not possible to identify the many very small fragments of animal bone, but with the exception of possible fragments of bones of bird and fish, they appear to be attributable exclusively to Ruminantia and Canidae.

*Tulloch of Assery B**Ruminantia (Bos taurus longifrons and Cervus elaphus)**From the chamber*

- Vertebrae* parts of cervical of large animal, various portions of vertebrae. Part of upper thoracic of small ?deer.
- Ribs* several portions of ribs.
- Scapula* large portions of left scapula, portions of large unidentified scapula
- Pelvis* part, including acetabulum
- Scapula/pelvis* parts of either scapula or pelvis.
- Fore-limb* *humerus*, portion of shaft of relatively small right, portion of left, immature humerus. Proximal and distal ends and portions of shaft of large humerus, probably of young animal.  
*radius*, portions of shaft of immature animal, greater part of right, probably of *Cervus*.  
*ulna*, distal end and large part of shaft of right adult ulna.  
*radius/ulna*, portions of right, fused, possibly of *Bos*.
- Hind-limb* *femur*, proximal end, distal end and portions of shaft, possibly of immature animal. Portions of left femur of adult animal.  
*tibia*, large portion of shaft of right, distal end of left, probably *Bos*, distal end, probably of *Cervus*, several portions of broken and distorted tibiae.  
*fibula*, parts of shaft, possibly of *Bos*.  
*patella*, two patellae (one left).
- Long bones* several unidentified portions.
- Extremities* *astragalus*, possibly *Cervus* (or pig?).  
*calcaneum*, two large.  
*metacarpals/metatarsals*, at least four and several portions.  
*proximal phalanx*, small ?deer.

*From the passage*

- Vertebrae* *cervical*, C2 and C3, apparently articulated. Portions of bodies of large vertebrae.
- Rib* one fragment, ?sheep/deer.
- Scapula* parts of left.
- Pelvis* several portions, large animal.
- Fore-limb* *humerus*, portion of proximal end and shaft of immature ?deer.
- Long bones* portions of ends and shafts of long bones.
- Extremities* *calcaneum*  
*metacarpal/metatarsal*  
*phalanx*, part.

*From area immediately N. of passage*

- Fore-limb* *humerus*, portion of distal end.  
*ulna*, distal end and portions of shaft of left ulna, ?*Cervus*.
- Hind-limb* *tibia*, distal end of right tibia, ?*Bos*.
- Extremities* *metacarpal*, ?*Cervus*.  
cannon bone, immature ?*Cervus*.

*Near large buttress stone to N. of passage*

- Fore-limb* *radius*, greater part, ?*Cervus*.

*Between core and revetment in S. sector of cairn*

- Hind-limb* *tibia*, distal end and large part of shaft of left tibia of immature ?deer.

*Comment.* Evidence from dentition (cf. part II of this Appendix) demonstrates that both *Bos taurus longifrons* and *Cervus elaphus* are represented.

*Sheep**From the chamber*

Possible portions of ribs, large portion of left scapula, possibly of sheep, portions of head and shaft of femur of ?sheep, and portions of unidentified long bone. Two metacarpals/metatarsals, possibly of sheep.

*From the passage*

Rib of ?sheep.

*From the area immediately N. of passage*

Two phalanges, ?sheep/pig.

*Canidae**From the chamber*

- Skull* portions, including parts of orbit, small ?dog. Temporal bone and possible temporal bone.
- Vertebrae* portions of cervical, thoracic and caudal, some of which suggest immature animal.
- Ribs* several portions.
- Scapula* portions, including parts of right scapula and others of young animal.
- Pelvis* various portions, including part of right, part of ilium, and two ischia of immature animal.
- Fore-limb* *humerus*, two distal ends, one of young animal.  
*radius*, proximal end and portion of shaft.  
*ulna*, portion of proximal end and shaft.
- Hind-limb* *femur*, proximal end, proximal and distal end of left and portion of shaft.  
*tibia*, proximal end of left tibia, portions of proximal end and portions of shaft.
- Long bones* portion of shaft.
- Extremities* metacarpus/metatarsus, phalanx and portion of shaft of cannon bone.

*From the passage*

- Skull* fragments, young animal.
- Vertebrae* portions of cervical, portion of upper thoracic of ?large dog or ?small deer. Low thoracic.
- Ribs* portions.
- Scapula* portion.
- Pelvis* portion os innominatum, young animal.
- Fore-limb* *humerus*, portion.  
*radius*, portion of proximal end and greater part of shaft.  
*ulna*, portions of head and shaft.
- Long bones* portion of shaft.
- Extremities* right and left calcanea, talus, portion of metatarsal, two metacarpals/metatarsals, condyle of cannon bone.

*From the area immediately N. of passage*

- Skull* portions, including orbital wall and portion of sphenoid of young animal.
- Ribs* portions.
- Pelvis* portion.
- Long bones* portions of shaft, young animal.
- Extremities* *calcaneum*.

*Near buttress stone to N. of passage*

*Skull* four fragments.

*Long bones* portion of shaft of immature animal.

*Comment.* Evidence from dentition (cf. part II of this Appendix) demonstrates the presence of both dog and fox. The dentition of the latter was found either in disturbed areas of the body of the cairn and in the upper parts of the passage and chamber. It is probable, therefore, that the remains of fox were intrusive and did not form part of the original burial deposit.

*Miscellaneous*

In addition to the skeletal remains listed above, there were many very small fragments of bone which could not be identified with certainty including possible bones of pig. There is no evidence to suggest that they may not be attributed to one or other of the species represented in the cairn by bones and teeth. A small number of bird bones were found in the chamber and passage. These appear to belong to two types; the smaller approximates in size to that of pigeon or grouse, and the larger that of goose, gannet or gull.

*Part II – Dentition*

by DOROTHY A. LUNT, M.D.S., PH.D., H.D.D.,  
of the Dental Hospital and School in the University of Glasgow<sup>1</sup>

*Tulach an t-Sionnach*<sup>2</sup>*Bos taurus longifrons*

*Incisors* six mandibular permanent incisors.

*Premolars* one mandibular premolar, two maxillary premolars.

*Molars* mandibular, deciduous, one first (?) and one third, and fragments of one third and one first (?) deciduous mandibular molars.

*permanent*, four first or second and one third permanent mandibular molars.

*maxillary, deciduous*, one second (?) and one other deciduous maxillary molar.

*permanent*, one first or second permanent maxillary molar.

*Doubtful* possible premolars or deciduous molars of *Bos*.

*Cervus elaphus*

One mandibular incisor.

*Ruminantia*

Part of mandible and unidentifiable fragments of cheek teeth.

*Canis familiaris palustris*

*Skull* young animal with three deciduous molars *in situ* on each side. The developing carnassials and first permanent molars can be seen lying in their crypts.

*Mandible* almost complete adult mandible, with permanent teeth *in situ*, except for all six incisors, both third molars, and the first premolar on the right side.

<sup>1</sup> I should like to thank Dr A. S. Clarke of the Royal Scottish Museum, Edinburgh, and Dr W. D. I. Rolfe of the Hunterian Museum, University of Glasgow, for their assistance in providing me with comparative material from the collections under their care, and for their advice on the identification of the specimens.

<sup>2</sup> In addition to the teeth listed here, Dr Lunt also identified the following:

*Sheep*, part of mandible of a very young animal with three deciduous molars *in situ*.

*Pig*, fragmentary maxillary molar.

The mandible was found in the upper levels of cairn material, some eight feet to the N. of the chamber. The molar of pig was an isolated find from near the entrance to the passage. Neither sheep nor pig are otherwise represented in the cairn. It is probable, therefore, that these two finds do not belong to the main use of the cairn. (J.X.W.P.C.)

- Maxilla* one fragment of left maxilla with three incisors, canine and two premolars *in situ*.  
Another fragment of left maxilla with fourth premolar (carnassial) and both molars *in situ*.  
A third tiny fragment carries the remaining maxillary premolar.  
There are also loose teeth from the right maxilla - two incisors, canine and the first premolar.
- Doubtful* possible buccal half of maxillary first permanent molar of *Canis*.

*Tulloch of Assery B*

*Bos taurus longifrons*

*From the chamber*

- Incisors* two mandibular incisors.  
*Premolars* one mandibular and one maxillary premolar.  
*Molars* *mandibular, deciduous*, worn mandibular third deciduous molar, two deciduous third mandibular molars.  
*permanent*, two developing permanent mandibular first or second molars.

*Cervus elaphus*

*From the chamber*

- Incisors* two mandibular incisors.  
*Molars* *mandibular*, fragment of left mandible with third deciduous molar *in situ*.  
*maxillary*, developing maxillary first or second permanent molar.

*From the passage*

- Molar* developing maxillary first or second permanent molar.

*Sheep*

*From the chamber*

- Part of right mandible with three deciduous molars and one permanent molar *in situ*.  
Incisor and developing incisors and one deciduous maxillary molar.

*Doubtful ungulates*

*From the chamber*

- Crown of ungulate molar, possible of *Cervus*.  
Small fragment of ungulate tooth, and three unidentifiable ungulate teeth.

*Pig*

*From the chamber*

- Portion of maxilla with canine tusk and second and third premolars *in situ*.

*From the passage*

- Incisor* maxillary right first incisor.

*Canis familiaris palustris*

*From the passage*

- Fragment of mandible with worn fourth premolar.  
Worn mandibular left first permanent molar and mandibular canine, all from same animal.

*Fox*

*From the chamber*

- Part of right mandible with first and second permanent molars *in situ*.

Part of left mandible of young animal with permanent canine erupting and premolars about to erupt.

Portion of maxilla of young animal, probably fox, with three deciduous molars *in situ*.

*Canine* one mandibular canine.

*Molar* crown of mandibular left permanent first molar.

*From the passage*

Fragments of both sides of the maxilla of a young animal, with second and third deciduous molars *in situ*.

*From area immediately N. of passage*

Left mandible with three premolars and two molars *in situ*.

Fragment of right mandible with fourth premolar and first permanent molar *in situ*.

*Near large buttress stone to N. of passage*

Right maxilla of young animal with second deciduous molar *in situ*, and fourth premolar just erupting.

*Doubtful*

*From the chamber*

Isolated mandibular deciduous third molar, either of fox or dog.

*From area immediately N. of passage*

Fragments of mandible, either fox or dog, with deciduous molars and canine.

### *Discussion of Animal Dentition*

by DOROTHY A. LUNT

The animal teeth in the Loch Calder material belonged to members of three different groups of mammals: the ungulates, the carnivores and the rodents. Of these, the ungulates are most fully represented, and they contribute the majority of the specimens.

#### *Ungulates*

The greater part of the ungulate material consists of isolated teeth which can be assigned to some species of *Bos taurus*. Comparisons of these teeth with the dentitions of specimens of *Bos taurus primigenius* and *Bos taurus longifrons* in the Royal Scottish Museum, Edinburgh, and in the Hunterian Museum, University of Glasgow, show that the Loch Calder teeth match those of *Bos longifrons*, both in morphology and in size. The teeth of *Bos primigenius* (the large wild species of cattle, variously called Urus and Aurochs) are considerably larger than the Loch Calder teeth. Many of the Loch Calder animals appear to have been quite young, since among the teeth there are three developing and unerupted mandibular first or second permanent molars, two developing mandibular premolars, and nine deciduous molars, of which five are mandibular third deciduous molars. Worn permanent teeth include three specimens of mandibular first or second molars, three maxillary premolars, one mandibular third molar and one maxillary first or second molar, and eight mandibular incisors.

Since the first permanent molars of cattle erupt at approximately 6 months and the second permanent molars at  $1-1\frac{1}{2}$  years, the presence of these teeth in developmental stages must indicate animals which were certainly less than  $1\frac{1}{2}$  years old and perhaps less than 6 months old. The premolars in these animals erupt between  $1\frac{1}{2}$  and 3 years, so the presence of worn premolars suggests that some animals were at least 2 years old. The third permanent molar of cattle erupts at  $2-2\frac{1}{2}$  years and the worn specimen of this tooth indicates that the animal concerned was over 2 years old.

Both adult and immature specimens are to be found among the Newstead bovine skulls, which

Ewart<sup>1</sup> identified as *Bos longifrons* or 'Celtic shorthorn'. It is possible to find the exact counterpart to each of the Loch Calder teeth in these skulls from the Newstead excavations, and thus the identification of the Loch Calder cattle as the domesticated variety, *Bos taurus longifrons*, seems reasonably certain.

Three developing cheek teeth, smaller in size than the teeth of *Bos longifrons*, have been identified as developing maxillary permanent molars of a red deer. A mandibular third deciduous molar, which was also smaller than the corresponding tooth of *Bos longifrons*, is similarly identified as having belonged to a young red deer. Three mandibular permanent incisors are also those of a red deer, probably an adult. All of these teeth are exactly similar in size and morphology to the corresponding teeth of a modern red deer.

Part of a small mandible, with three deciduous molars and one permanent molar *in situ*, has been identified as belonging to a sheep, of a breed similar in size to the modern Shetland sheep. The teeth and jaws of both the Loch Calder specimen and the Shetland sheep are smaller and more delicate than those of most modern breeds. The presence of the first permanent molar indicates that this animal was more than 3 months old. None of the deciduous molars has been lost: thus the sheep cannot have been more than 1½ years old. The mandible is broken behind the first permanent molar, and the stage of development of the second permanent molar, which erupts at 9-12 months, cannot be ascertained.

Other fragments of sheep are part of the mandible of a very young animal, less than 1 month old, whose deciduous molars were just erupting, an isolated maxillary deciduous molar and an isolated mandibular incisor.

The pig is represented by three specimens, of which the largest is a fragment of the left maxilla with the canine and two premolars *in situ*. The canine is quite well-worn, and is a relatively small tooth. This may perhaps indicate that the animal was a sow. The other specimens are a worn maxillary molar and a maxillary central incisor.

#### *Carnivores*

All the carnivore teeth can be definitely assigned to the group Canidae. Two varieties of animal can be distinguished, one which has teeth similar in size to those of a modern greyhound and another with teeth the same size as those of a modern fox.

The larger type of animal can be identified with certainty as a domesticated dog. It is much too small to be a wolf. The adult is represented by one complete mandible, three small fragments of a maxilla which fortunately has the carnassial and first molar *in situ*, a fragment of another mandible bearing the fourth premolar, an isolated canine and an isolated mandibular carnassial tooth. There is also an almost complete skull and maxilla of a young animal, with the deciduous teeth *in situ* and the first permanent molars still contained within their crypts.

Degerbøl<sup>2</sup> studied the skull and maxillary dentition in dogs of Mesolithic and Neolithic date, and published a series of measurements made on the cranium and maxilla. Since there is no complete adult maxilla in the Loch Calder material, Degerbøl's measurements cannot be repeated on this material, with the exception of the maxillary carnassial length. This measurement in the Loch Calder dog falls within the range of values obtained by Degerbøl for the Neolithic dogs from Bundsø.

A comparison was made between the jaws of the Loch Calder dog and those of the Bronze Age dog discovered during the excavations at Jarlshof in Shetland. In the length of the mandible and in the size of the teeth, the two specimens are identical. Platt,<sup>3</sup> in her report on the Jarlshof dog, stated that this animal was about 18 in. high at the shoulder and in general proportions resembled a terrier. She also remarked that the Jarlshof dog's skull seemed to be more closely related to the Stone Age type of *Canis palustris* than to the larger *Canis inostranzewi* of the Bronze Age. It seems possible therefore that the Loch Calder dog may of the *Canis palustris* variety.

The smaller member of the family Canidae could represent a second smaller breed of dog, but the appearance of small additional cusps on some of the mandibular teeth suggests that it is more

<sup>1</sup> Ewart, J. C., Appendix on Animal Remains; in Curle, J., *A Roman Frontier Post and its People, The Fort of Newstead in the Parish of Melrose*, Glasgow (1911), 362.

<sup>2</sup> Degerbøl, M., *P.P.S.*, xxvii (1961), 35-49.

<sup>3</sup> Platt, M. I., *P.S.A.S.*, LXVIII (1933-4), 224.

probably a fox, since these additional cusps can also be observed on the teeth of some modern foxes. The adult fox is represented in the Loch Calder material by parts of two mandibles bearing most of the mandibular teeth, and by isolated specimens of the mandibular carnassial (first molar) and canine. There are also fragments of the maxillae of three cubs and portions of two mandibles from young animals. In all of these specimens the deciduous dentition is still *in situ*.

#### Rodents<sup>1</sup>

The rodent material all belongs to the group of voles, and two distinct species can be identified.

The smaller species is about the size of a mouse. On the basis of the number of columns forming the molar teeth, the lack of root formation in these teeth, and the presence of an additional postero-internal loop of tooth substance on the maxillary second molar, this species can be identified as the short-tailed vole.

The larger species, which is about the size of a rat, is almost certainly the water vole.

In the Loch Calder animal material there are three maxillae, one mandible and one isolated incisor of the short-tailed vole, and one maxilla, one mandible and one incisor of the water vole.

It is most probable that these burrowing rodents are recent intruders into the Neolithic cairns at Loch Calder.

The Loch Calder animal material is extremely fragmentary and it is almost impossible to give any estimate of the number of individuals present, except in the case of the dog. The dog jaws are more complete than those of other species, and clearly indicate the presence of two adults and one pup.

### APPENDIX C

#### *The Secondary Cremation from Tulach an t-Sionnaich*

by C. B. DENSTON

*Duckworth Laboratory of Physical Anthropology,  
Department of Archaeology and Anthropology,  
University of Cambridge*

The examination of the material follows the technique used on previous occasions by the writer<sup>2</sup> and is based on procedures in cremation reports by Lisowski<sup>3</sup> and by Gejvall.<sup>4</sup> The primary aim in a study of this type is to try to determine the age, sex and number of individuals cremated.

#### *Material and Methods*

*Cremated remains.* The majority of the remains were forwarded to the laboratory in a fairly clean condition, other fragments were embedded in small clumps of earth which necessitated soaking in water to free the smaller of the fragments. No charcoal was observed.

*Preparation of material.* The cremated material was first washed in a sieve of 2 mm. mesh to get rid of any soil adhered to the fragments of bone, and to float off any other light material. The material was then allowed to dry and fragments of the various bones and teeth were sorted into groups. The remaining material was then sieved again to get rid of the dust, and picked free of small particles of earth and other foreign material. This residue of small bone fragments was then

<sup>1</sup> Considerable skeletal remains of rodents were found in all three cairns, all apparently of recent date. They have not been listed individually in this report. (J. X. W. P. C.)

<sup>2</sup> Denston, C. B., (a) Unpublished ms. report in Duckworth Laboratory Archives (1962) - (1) *A cremation from Stonea Barrow*. (2) *A cremation from Whiteditch Bridge, Feltwell, Norfolk*; (b) 'The cremations from Pitnacree, Perthshire', *P.P.S.*, xxxi (1965), 49-57.

<sup>3</sup> Lisowski, F. P., in Powell and Daniel, *Barclodiad y Gawres*, Liverpool (1956), 62-69; 'The Rath Cremation', *J.R.S.A.I.*, lxxxix (1959), 26-29.

<sup>4</sup> Gejvall, N. G., 'Bestämning av brända ben från forntida gravar', *Fornvännen* 1 (1947), 39-47. Gejvall, N. G., and Sahlström, K. E., 'Gravfältet på kyrkbacken i Horns socken Västergötland. II Antropologisk del', *Kungl. Vitterhets Historie och Antikvitets Akademiens Handl. Del.* 60, 2 (1948), 153-80.

classified after further inspection as unidentifiable. The various groups of identified material were then examined in detail in order to establish as far as possible the number of individuals cremated, their sex and age. A few fragments of individual bones could be glued together, though actual reconstruction of complete bones was out of the question.

*Estimation of number, sex and age.* The number of individuals identified from material of a cremation is usually established by the presence of certain definite duplicated skeletal parts, or a great dissimilarity in thickness of certain bones, or the fact that epiphyseal union has taken place in some bones, while in other similar bones epiphyseal union has not taken place at all. Assessment of the sex of an individual from cremated remains is a very precarious procedure unless there are preserved definite diagnostic portions of bone from which the sex can be ascertained. The possible sex can be diagnosed from the robustness of certain bones, but the conclusion is only a tentative one. A possible age at death can be suggested by an examination of the state of endocranial and ectocranial suture closure, by noting the fact that epiphyseal union was completed or had not started, by an examination of the vertebrae, state of the pubic symphysis, and by the eruption and wear of the teeth. These features, however, may not have survived the combustion.

#### Results

*General description of the material.* Total weight of the bone and teeth fragments was 397.5 gm. The fragments of bone were irregular and varied from minute fragments to 67 mm. in overall length. Their colour was predominantly white with a very small number of fragments black. Of the larger fragments some were twisted and distorted and displayed elliptical cracks. A few of the skull fragments had the outer table split from the inner one. As the amount of material available was not very large, it was not possible to subject the data to a full quantitative analysis.

*Estimation of number, sex and age.* Definite recognisable fragments of particular bones were very few, with no duplicate portion noted. The remains were possibly of one individual, there being nothing to suggest otherwise. The sex was possibly female. This conclusion was decided by the thickness of the cranial fragments, and the overall size of a petrous portion of a temporal bone which was fairly intact. Also the compact bone of the fragments of long bones were not thick, and a portion of a shaft of a tibia would seem to be of too small proportions to have come from a male individual. The age at death represented by the remains could not be ascertained, but possibly the individual was an adult. The slender evidence for this is that a very small portion of cranium displayed part of a suture which was partially fused. Some fragments of teeth were found among the remains, but these were too fragmentary to be of any assistance in ascertaining the subject's age.

#### Details of Material

*Skull.* There were one hundred and four fragments ranging in length from 10 mm. to 46 mm. The largest piece was the petrous portion of the right temporal bone, and other recognisable fragments were the posterior-inferior angle of the right parietal bone, and a piece that articulated with the former portion was a small part of the right mastoid process. Other fragments were a portion of a mandibular fossa of the cranium, and a possible fragment of an orbit. Fifteen cranial fragments displayed sutures, and the rest, numbering eighty-four, were fragments which could have come from varying parts of the cranium, mainly the vault.

*Odontological remains.* Possible roots of maxillary central incisor, a maxillary premolar, and a maxillary molar. There were a few more fragmentary roots of teeth but these defied identification.

*Long bones.* Very little of these remains could be identified as being portions of particular bones. Those which were identified were a portion of a shaft of a tibia which was the largest of the fragments and measured 62 mm. in length, a possible portion of a shaft of a fibula, and a fragmentary olecranon process of an ulna.

*Miscellaneous long bone.* Numerous fragments, possibly in the region of two hundred came under this category, and ranged in length from 7 mm. to 55 mm.

*Miscellaneous bone.* These fragments could represent parts of any bones that make up the skeleton and ranged in length from 2 mm. to 29 mm.

*Animal bone.* There was a fragment of bone among the remains measuring 71 mm. in length,

and a few very small pieces which belonged to this same bone which definitely were not human. The larger fragment has been identified as being possibly that of the proximal end of an ulna of a pig.

The weight and distribution of the total identified and unidentified cremated human remains:

<i>Skeletal material</i>	<i>gm.</i>	<i>% Total</i>
Identified total	224·0	56·4
Unidentified total	173·5	43·6
	<hr/>	
Total	397·5	100·0

*The Society wishes to acknowledge a generous grant from H.M. Treasury towards the cost of publishing this paper*



*Tulach an t-Sionnaich*: central area of heel-shaped cairn from the south



1. *Tulach an t-Sionnaich*: general view of chamber



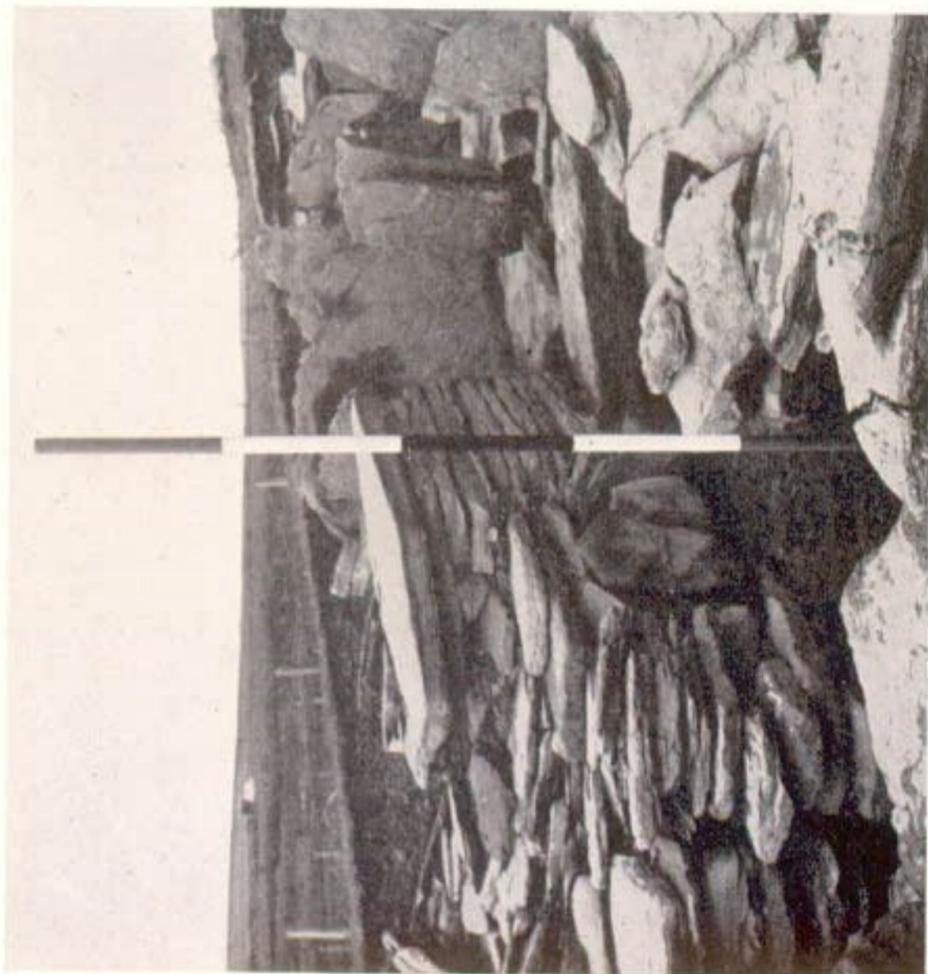
2. *Tulach an t-Sionnaich*: detail of north wall of chamber



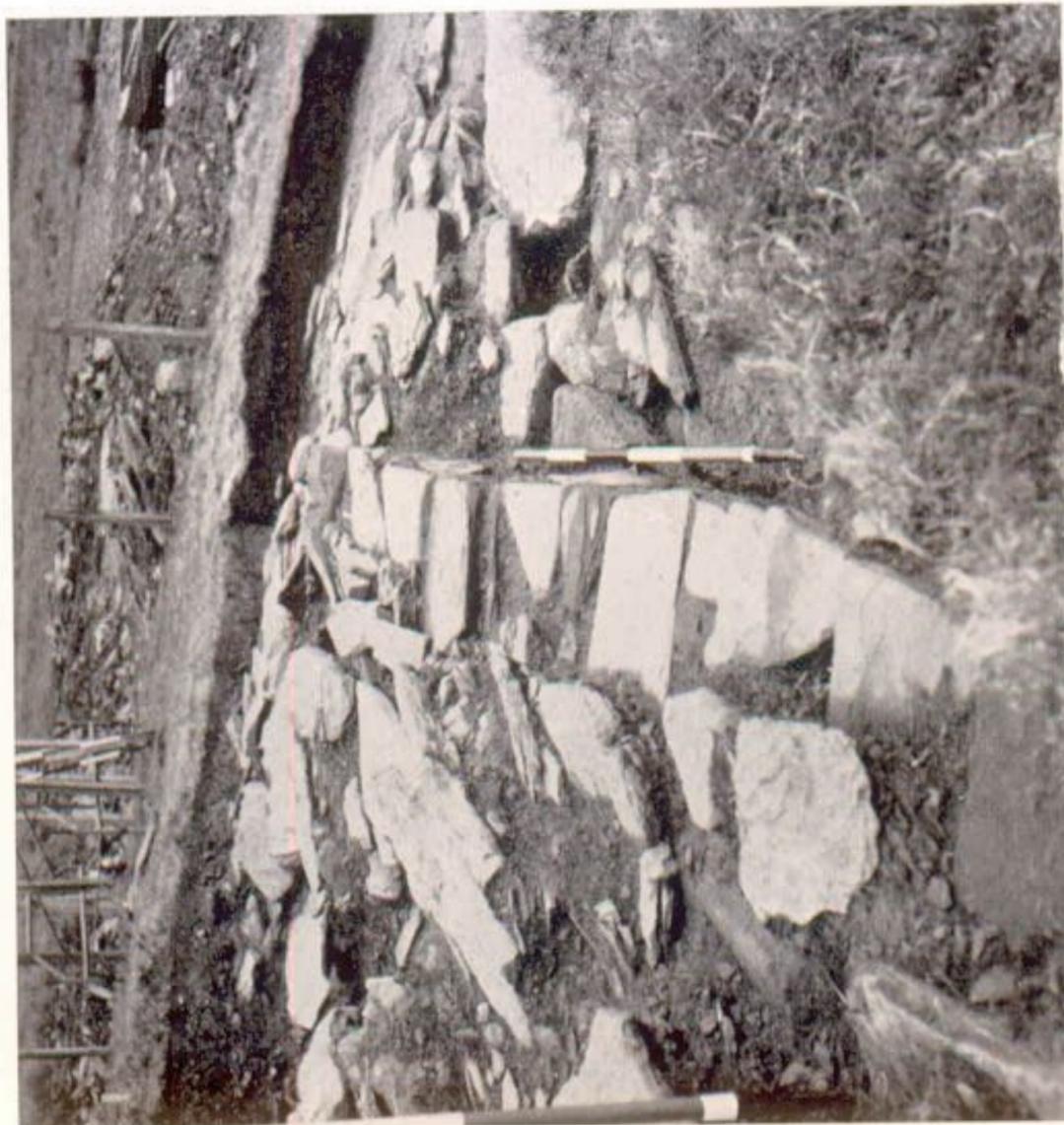
2. *Tulach an t-Sionnaich*: human remains



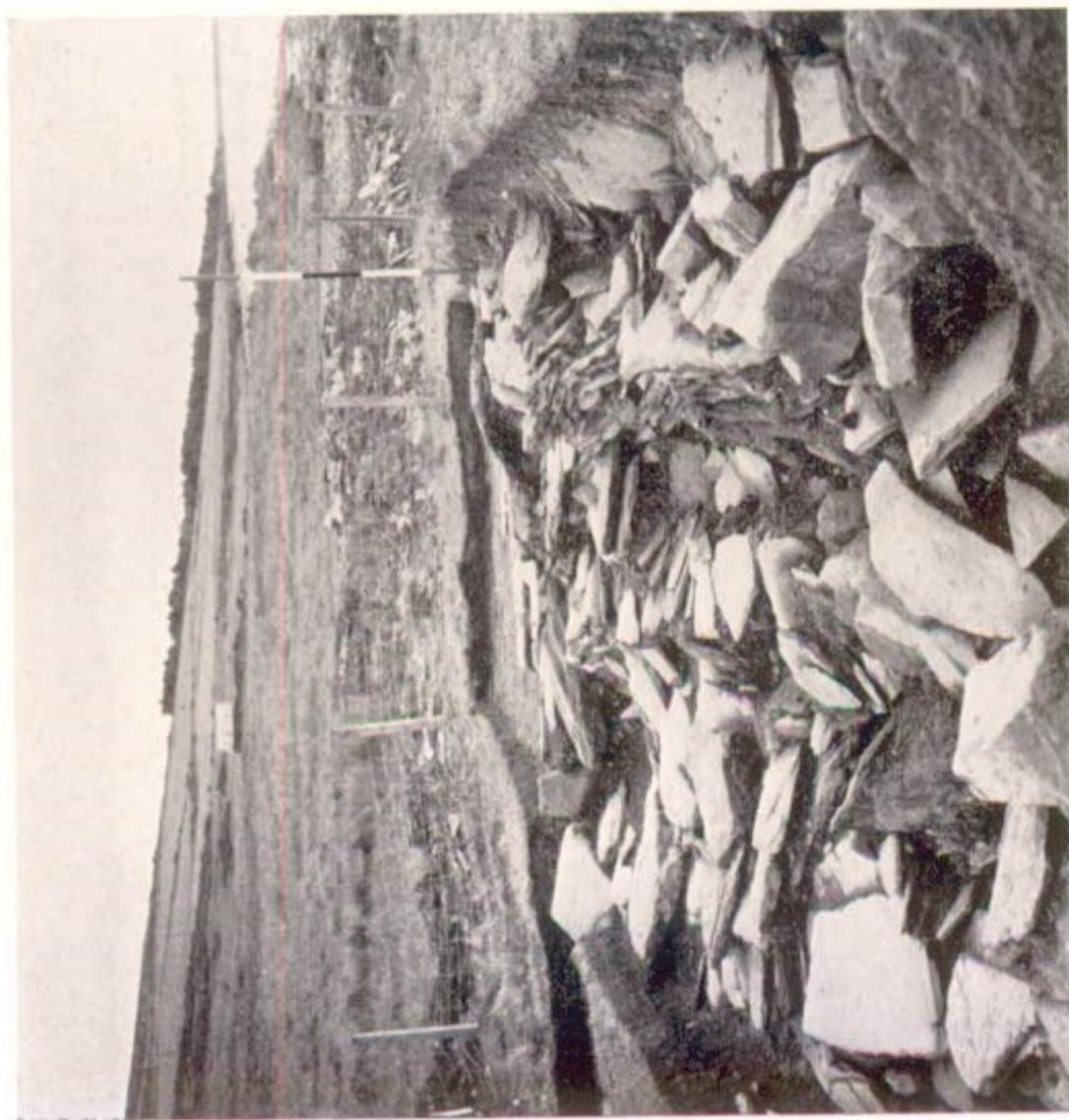
1. *Tulach an t-Sionnaich*: collapsed roofing stones



3. *Tulach an t-Sionnaich*: view of passage



2. *Tulach an t-Sionnaich*: west side of heel-shaped cairn partly overlain by later enclosing wall



1. *Tulach an t-Sionnaich*: east wall of heel-shaped cairn from the north



2. *Tulach an t-Sionnaich*: structure of the long cairn



3. *Tulach an t-Sionnaich*: walling of enclosing cairn



1. *Tulach an t-Sionnaich*: pseudo-façade



4. *Tulach an t-Sionnaich*: 'linking' walls



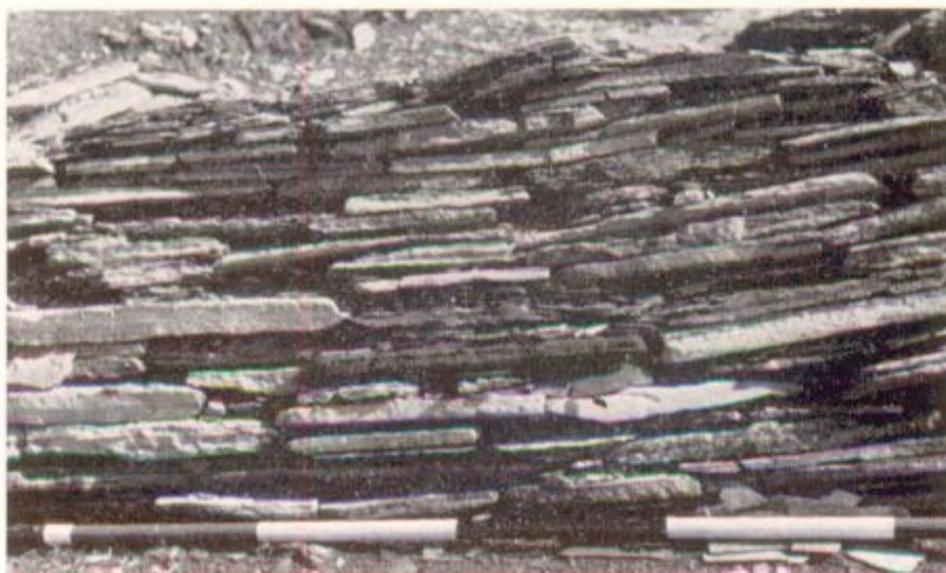
*Tulloch of Assery A: north passage and entrance from the north*



1. *Tulloch of Assery A*: north façade



2. *Tulloch of Assery A*: the hearth



3. *Tulloch of Assery A*: detail of walling



1. *Tulloch of Assery A*: general view of burials



2. *Tulloch of Assery A*: burials on the south-west platform



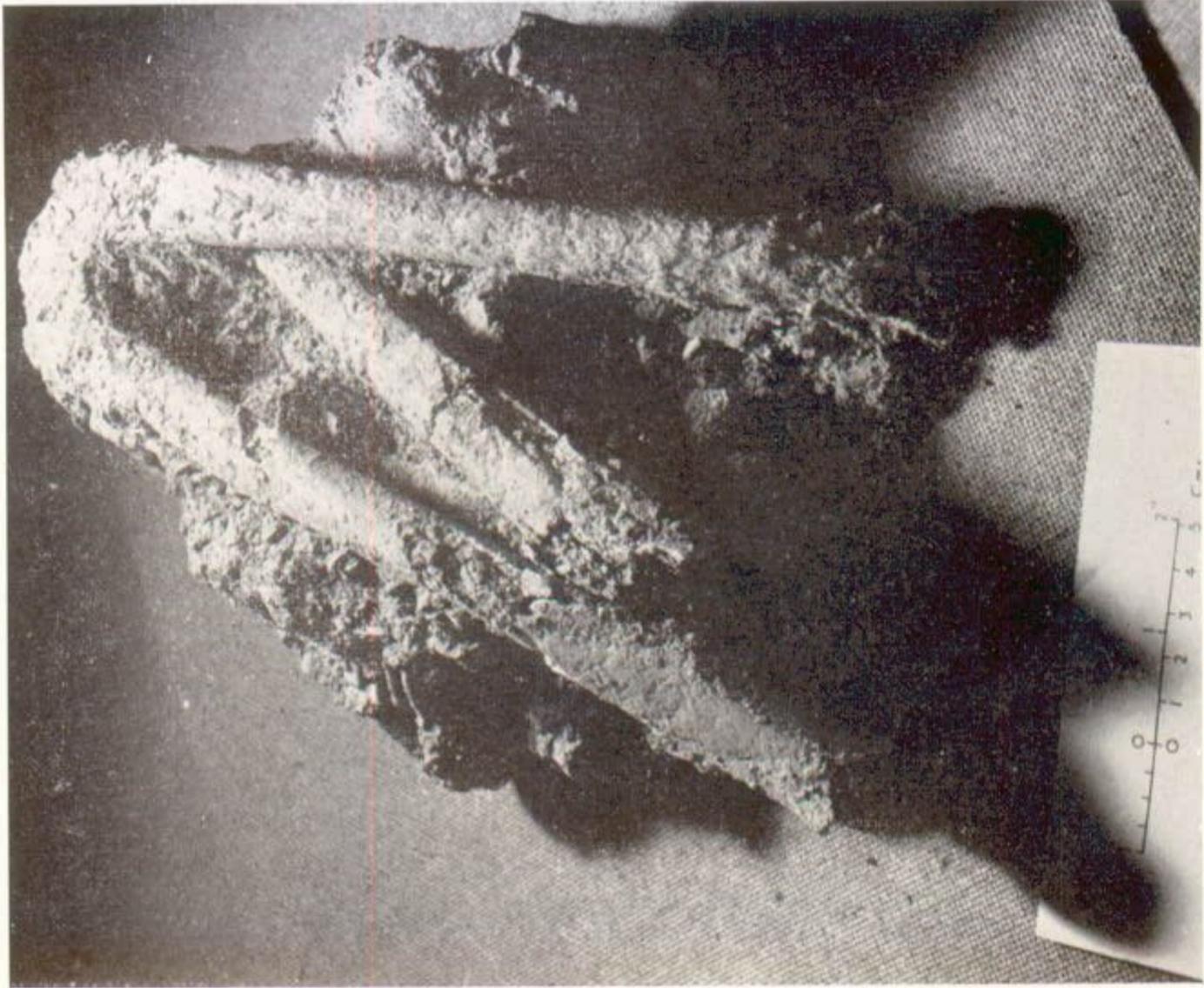
3. Tulloch of Assery A: burial deposits A and B



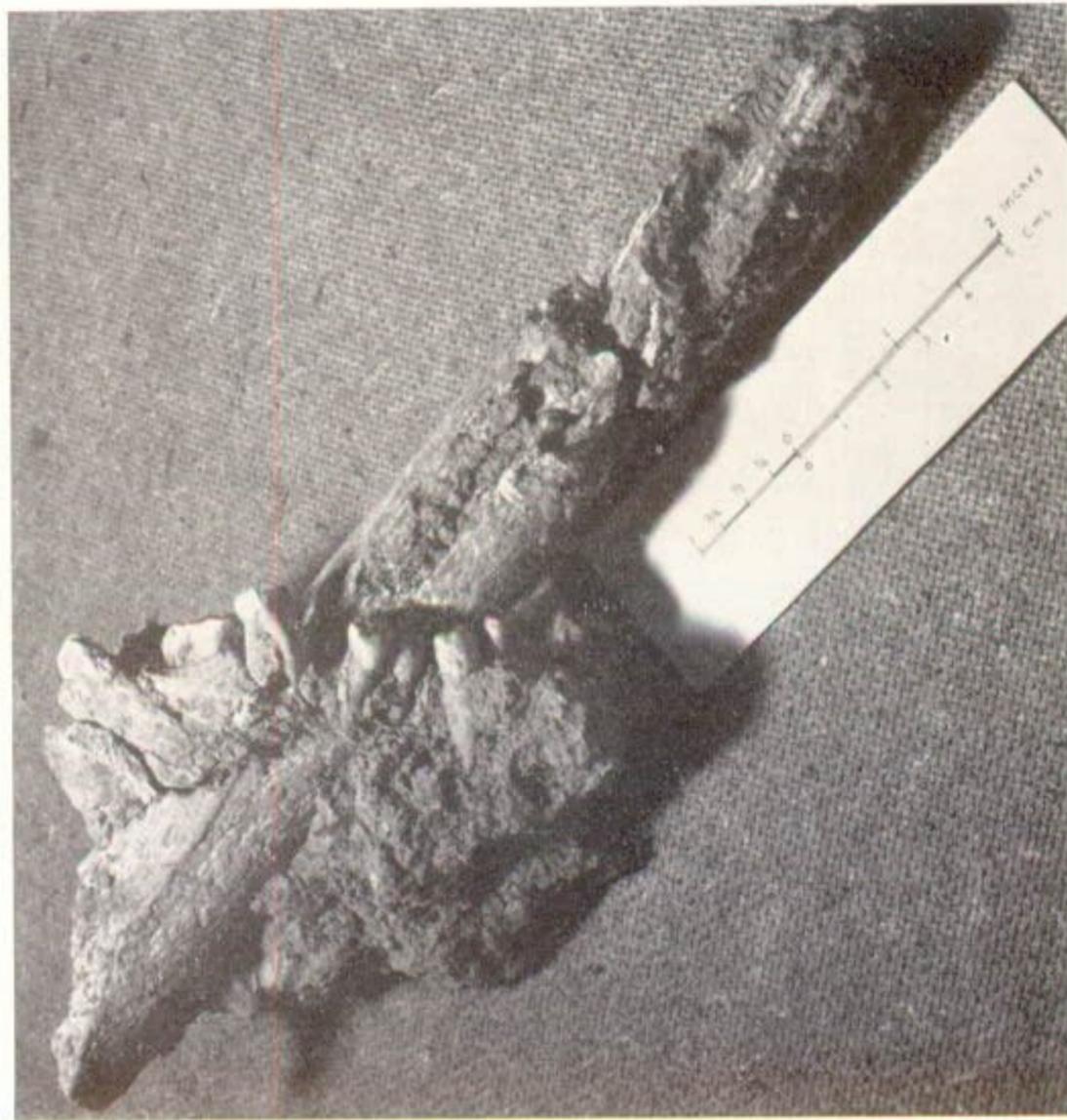
1. Tulloch of Assery A: burial deposit B *in situ*



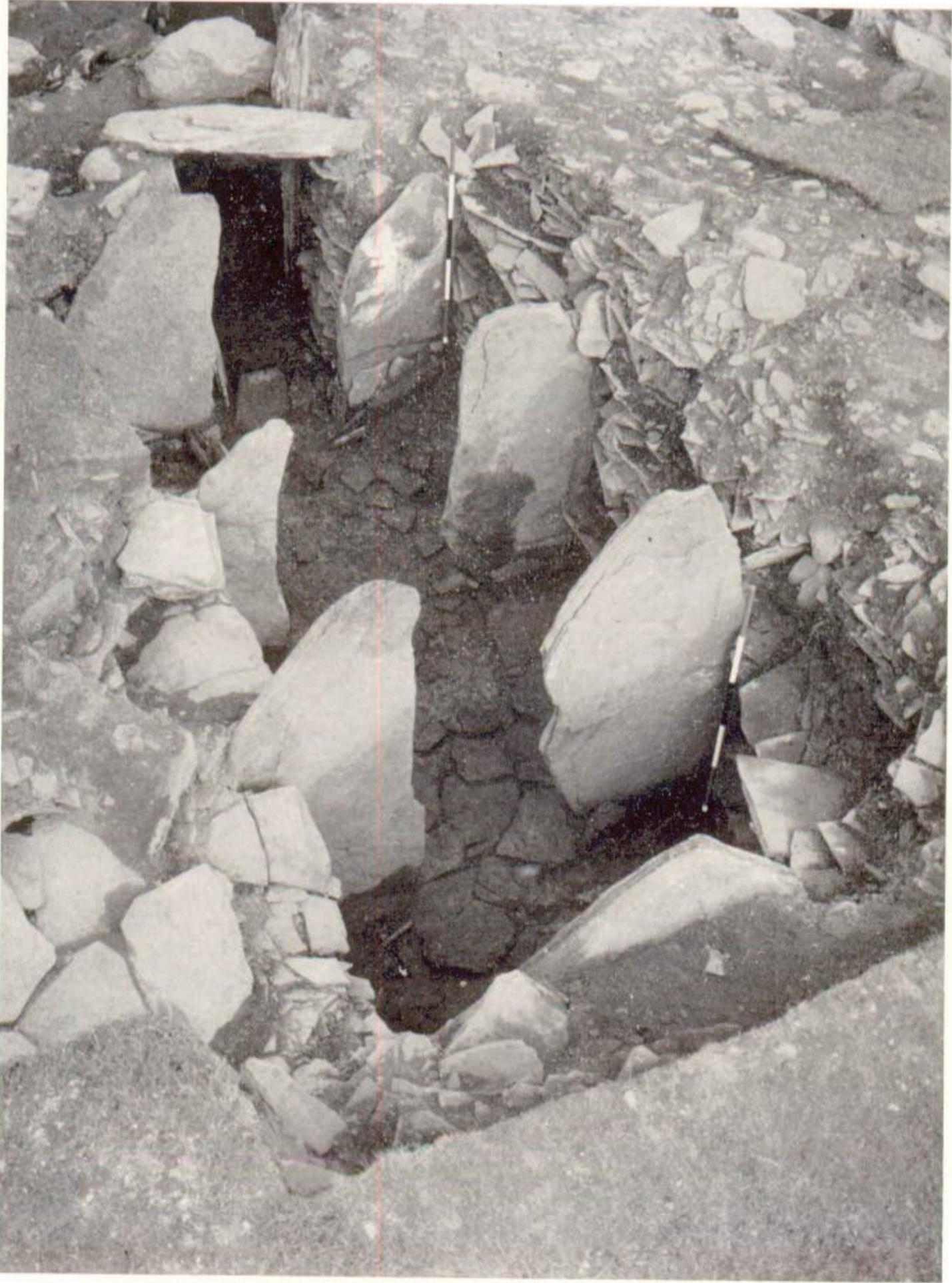
2. Tulloch of Assery A: burial deposit E



2. *Tulloch of Assery A*: burial deposit B in laboratory



1. *Tulloch of Assery A*: burial deposit B in laboratory



*Tulloch of Assery B: chamber and inner end of passage*



1. *Tulloch of Assery B*: south side of chamber



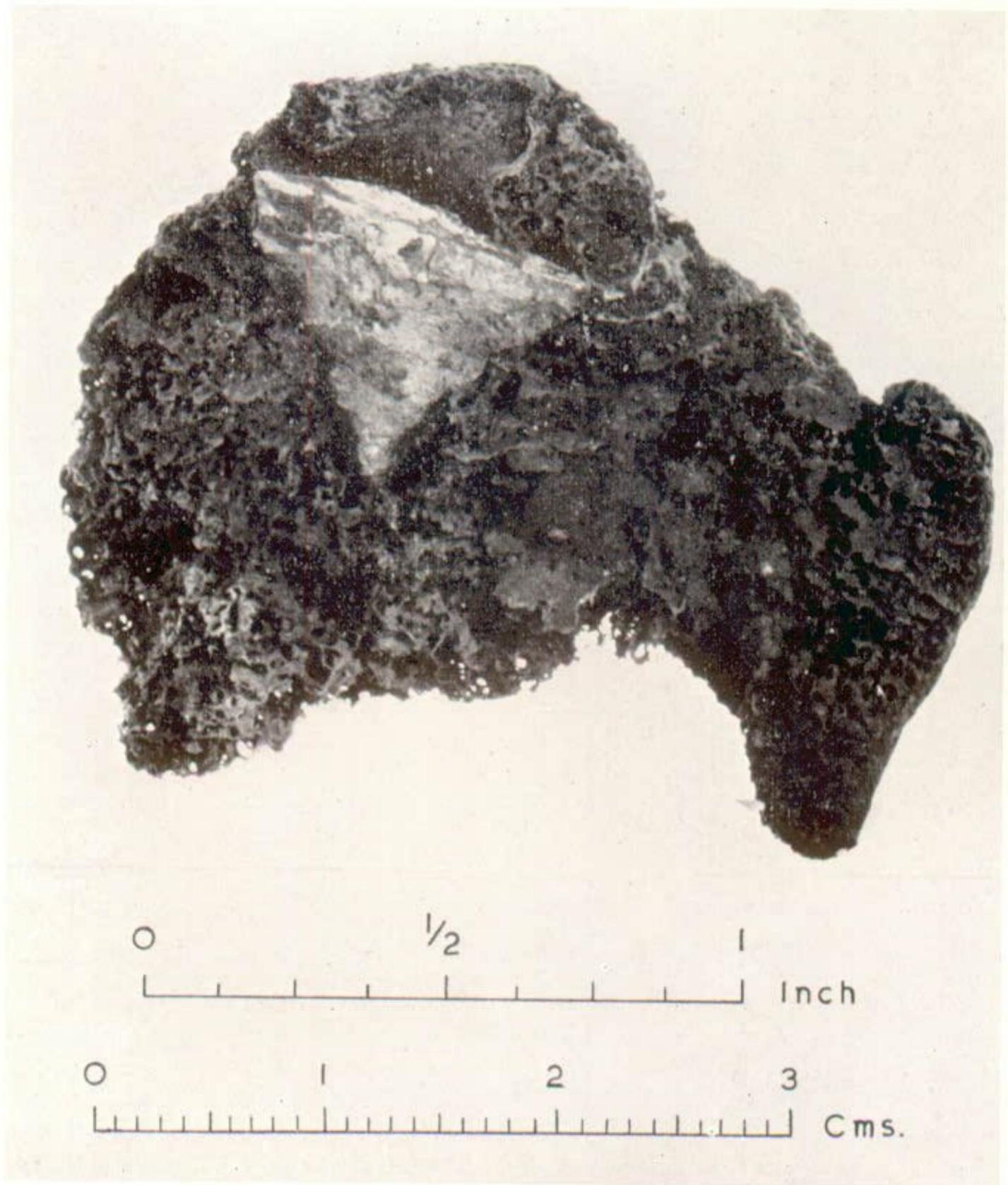
2. *Tulloch of Assery B*: view of chamber from the passage



1. *Tulloch of Assery B*: packing of orthostat



2. *Tulloch of Assery B*: core and outer revetment



*Tulloch of Assery B: part of flint arrowhead embedded in vertebra*