

XV.

EXCAVATIONS IN PASSAGE-GRAVES AND RING-CAIRNS
OF THE CLAVA GROUP, 1952-3.

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CONTENTS.

	PAGE		PAGE
INTRODUCTION	173	EXCAVATION OF RING-CAIRNS AND STONE CIRCLE AT CLAVA, 1953	188
EXCAVATION OF THE CORRIMONY PASSAGE-GRAVE, 1952	174	The Clava Group of Cairns	188
The Site before Excavation	174	The Ring-Cairn, Balnuaran of Clava	188
The Excavations of 1952	176	The Ring-Cairn, Culdoich	190
SUPPLEMENTARY EXCAVATIONS AT DRUIDTEMPLE, LEYS AND KINCHYLE OF DORES, 1952	184	The Clava Stone Circle	192
		DISCUSSION	192
		APPENDICES	199

INTRODUCTION.

In pursuance of the excavation policy outlined by the Society of Antiquaries of Scotland after the War, certain regional types of chambered tomb had been selected for excavation as representatives within areas where evidence for their date and culture was as yet lacking. The chambered long cairns of Galloway were investigated by means of excavations of two tombs at Cairnholy in 1949,¹ and the next group for consideration was that of the Clava Group of passage-graves and ring-cairns mainly centred on the valleys of the Ness, Spey and Nairn. Of the ten tombs of this group belonging to the passage-grave type rather than to the ring-cairn series, that at Corrimony in Glen Urquhart was chosen for excavation in view of its apparently untouched state and its accessibility. Excavations were therefore carried out on behalf of the Society of Antiquaries of Scotland at Corrimony for three weeks in the summer of 1952, and two small supplementary

¹ *P.S.A.S.*, LXXXIII (1948-9), 103.

excavations described below (p. 184) were also undertaken at the conclusion of the main task. In 1953 two of the nine ring-cairns, the Central Cairn at Balnuaran of Clava and the Culdoich Cairn nearby, were examined, and the small stone circle of the Clava Group also excavated.¹ Field-work and survey on the other sites within the Clava Group as a whole was also carried out, and the map (fig. 1) shows the distribution of both types of cairn so far as at present known, with indeterminate and badly ruined sites, of which only a stone or two remains, omitted. The sites are listed in Appendix I.

EXCAVATION OF THE CORRIMONY PASSAGE-GRAVE, 1952.

The Site before Excavation.

The Corrimony Cairn, locally known as the Druids' Circle, lies on the level flood-plain of the River Enrick at the head of Glen Urquhart between the 600- and 800-foot contours (Nat. Grid. Ref. NH (82)/381304). Its position in relation to other members of the Clava Group is shown on the map (fig. 1, No. 6), but in general it may be noted that it is an outlier of the main concentration of these passage-graves, which mainly lie to the SE. of Loch Ness. Owing to its comparatively remote position the cairn has received little attention in archaeological literature, and its importance was first appreciated by Professor Childe in 1943.²

In 1952 the cairn appeared as a roughly circular structure, some 5 by 60 ft. in diameter and 8 ft. high, consisting for the most part of water-worn stones with turf encroaching only round the edges for a foot or two. On top of the cairn was a large flat stone lying loose, with cup-marks on its upper surface (Pl. XXXVII), and free of the base stood a ring of eleven free-standing stones up to 6 ft. in height. Near the base of the cairn traces of kerbstones could be detected, and at the SW. these appeared to be interrupted so as to indicate the beginnings of an entrance to a passage-grave of Clava type. The whole site seemed untouched by previous excavation.

The results of the 1952 excavations, together with a collation of the earlier accounts of the site however, show that its recent history was more complicated and eventful than had been thought. The first accurately dated episode is the moving of the large cup-marked stone from the west

¹ The Corrimony excavations were carried out with the sanction of the Ancient Monuments Department of the Ministry of Works, by whom the site had been scheduled, and with the permission of the Forestry Commission, owners of the property, and of Mr Girvan of Corrimony Farm. We are most grateful to these bodies, and to their personal representatives, for their co-operation and help: the Forestry Commission further assisted the work by allowing an excavation camp to be established in two of their cottages near the site. The Clava excavations were similarly sanctioned by the Ancient Monuments Department and the tenant of Culdoich. The work was under the direction of the writer, assisted by Mr David Baird, Dr and Mrs Woodham, Mr Allard Johnson, and students from the Universities of Edinburgh and St Andrews.

² *P.S.A.S.*, LXXVIII (1943-4), 26; earlier references in *ibid.*, x (1873-4), 644; xvi (1881-2), 314.

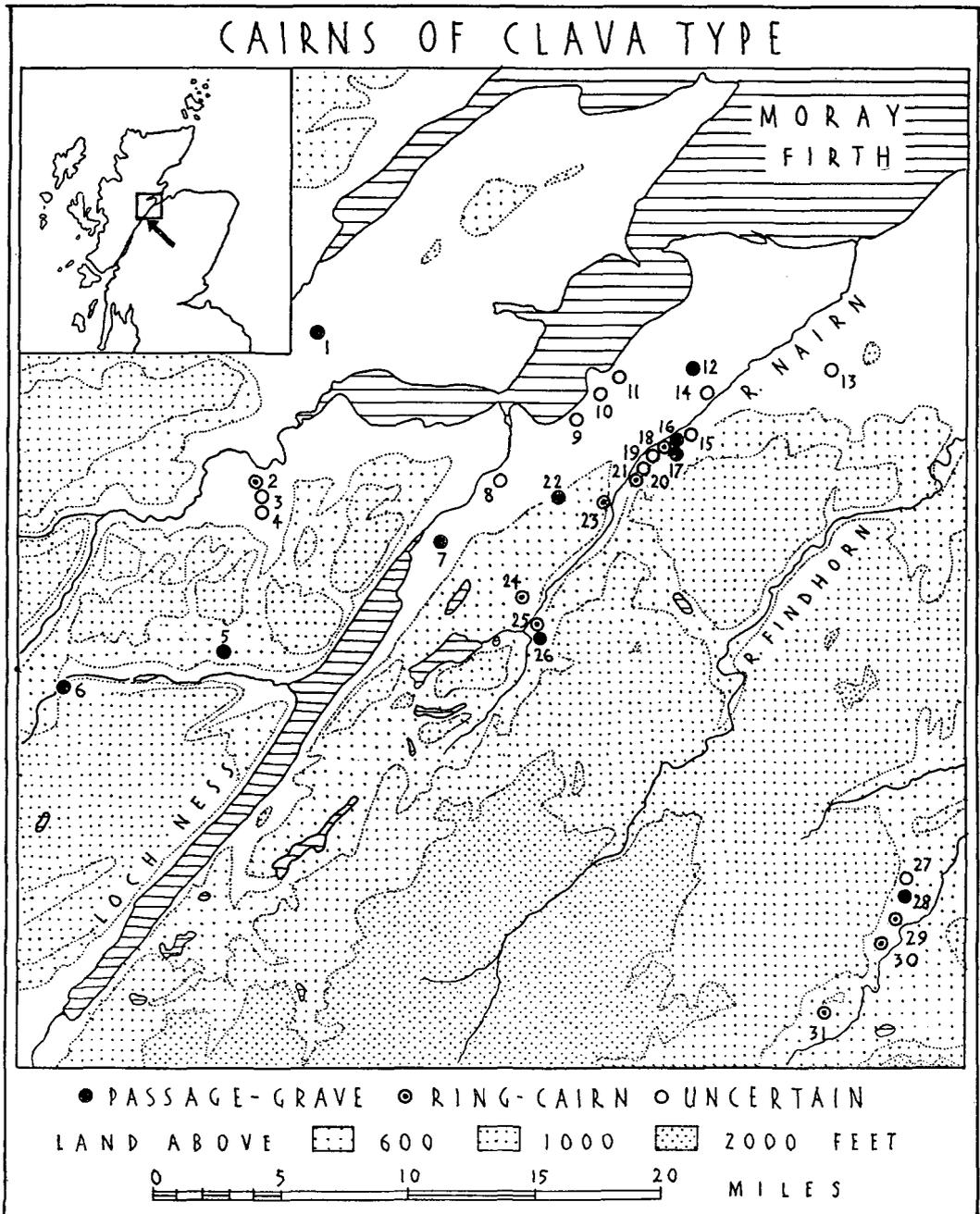


Fig. 1. For list of sites see Appendix I, p. 199.

side of the cairn to its present position on the summit in 1830,¹ and this raises the whole question of the original function of this stone, discussed in detail below (p. 181). To anticipate, however, we have reason to think that it originally formed the capstone of the burial chamber which, as our excavations showed, had either fallen in or been broken into, and then deliberately refilled at a date likely to be early in the 19th century, when the capstone would have been dragged to one side, and returned to a central position only after the refilling of the chamber.

The plans of 1874 and 1882, given in the early accounts of the cairn referred to above, both show nine stones only in the free-standing circle, and the later plan marks nos. 1 and 2 (fig. 2) as composite, as they are to-day. This was at first taken to be the result of frost fracture of the original stones, but closer examination showed that these two stones were made up, one of two and the other of three slabs of stone which had originally no connection with one another. They must be recent additions to the monument but set up before 1874, and there is a strong suspicion that their component slabs were in fact capstones robbed from the now roofless outer portion of the entrance passage (p. 180). Stones nos. 10 and 11 are clearly additions since 1882, and this was confirmed by their excavation, which also showed that nos. 8 and 9 had been reset in their present positions in the moved soil of the recent bank bounding a drain running along the side of the road which skirts the monument on the SE. The site, in fact, was by no means as intact as surface observations had suggested.

The Excavations of 1952.

The site was recognisably that of a chambered cairn of passage-grave type, and attention was directed to four main objectives: the clearance of the cairn kerb, the examination of the entrance area, the excavation of the passage and chamber with any contained burial deposits, and the examination of the stones of the free-standing circle. It is convenient to describe the excavations in this sequence.

(a) *The Cairn and Kerb* (figs. 2-4; Pls. XXXV-XXXVI).

All stones of the structure were local, the larger blocks being obtained from adjacent outcrops and the bulk of the cairn material consisting of water-worn boulders and large pebbles derived from the bed of the Enrick a few hundred yards away. The removal of these stones from the lower slopes of the cairn enabled the upper parts of the kerbstones which surrounded it to be exposed for the whole circuit, and excavation was carried down to old ground-level at the entrance and in a cutting opposite this on

¹ *P.S.A.S.*, xvi (1881-2), 314.

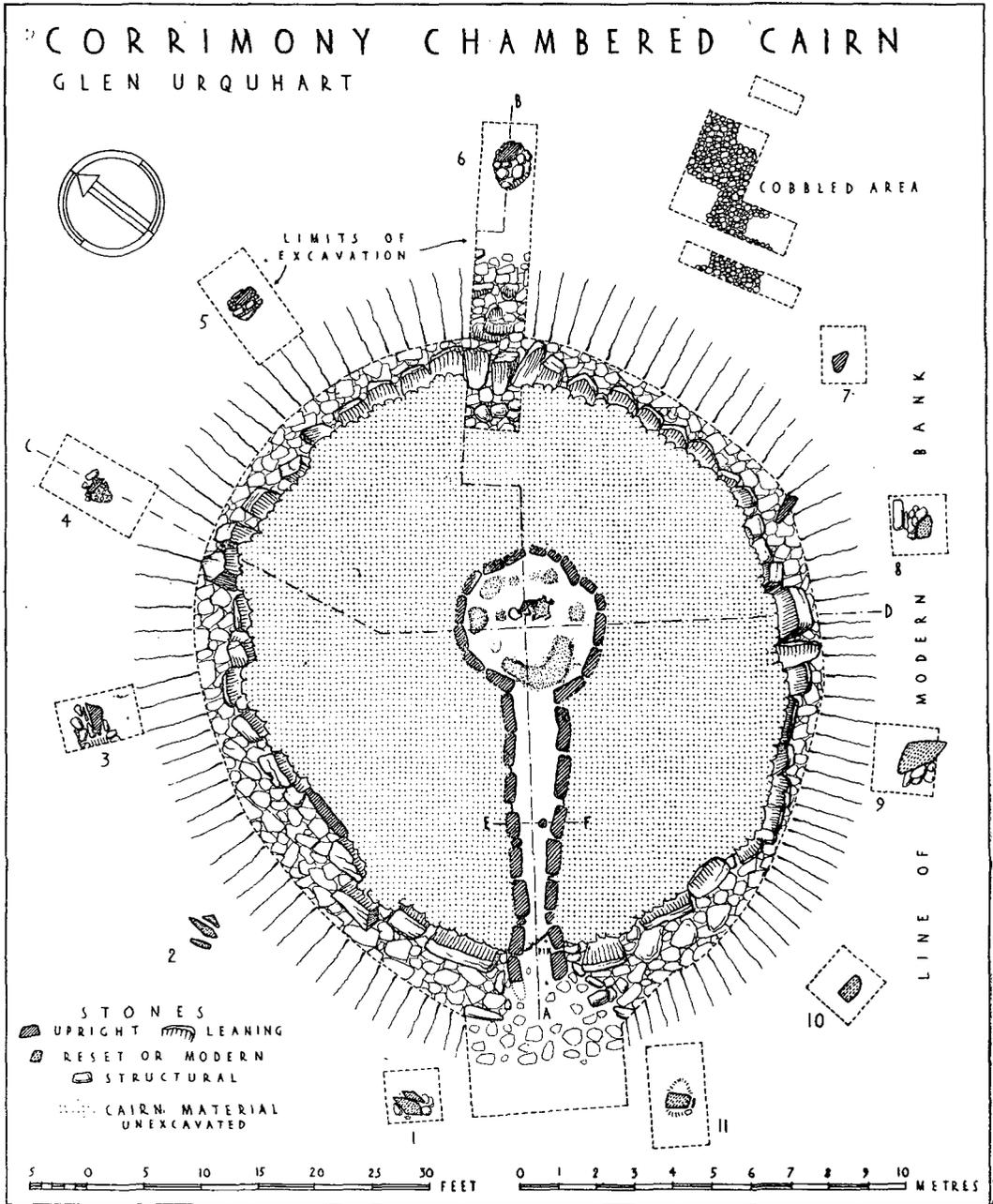


Fig. 2.

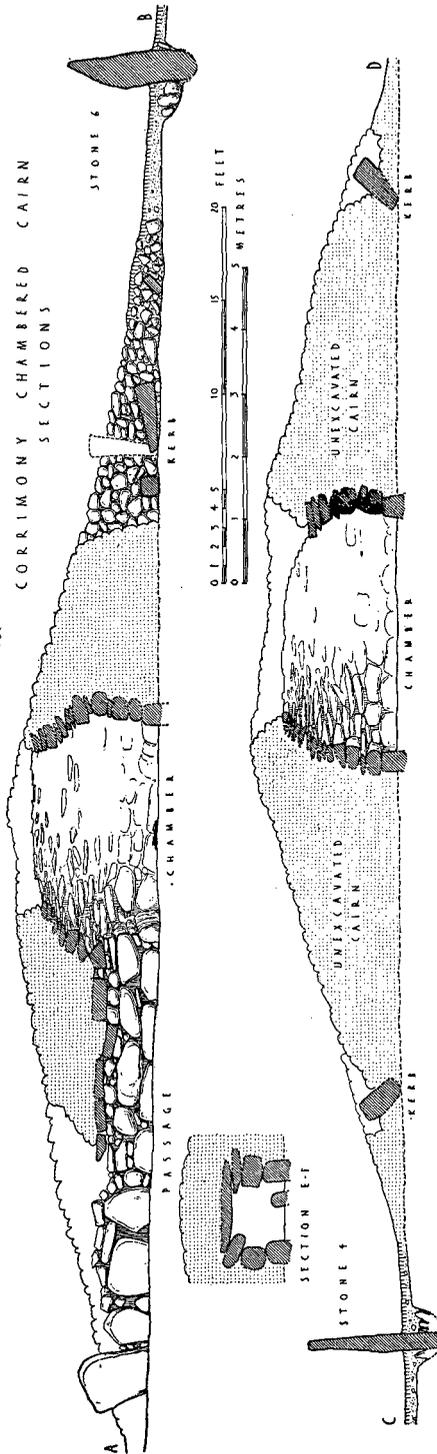


Fig. 3.

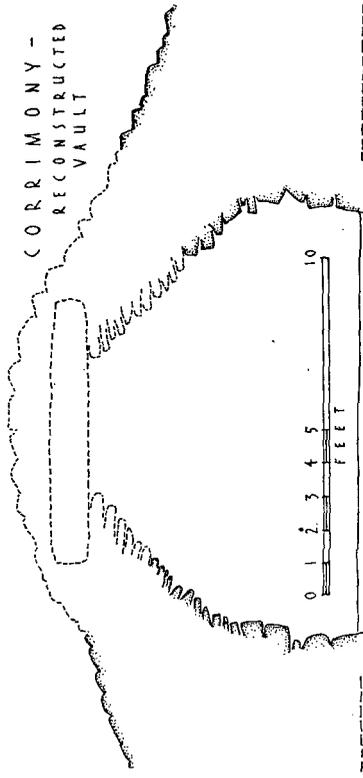


Fig. 4.

the NE., where a small area inside the kerb was also examined. Since the whole cairn was constructed of rounded boulders without any admixture of earth or other binding material, it was extremely unstable and could not be cut in section in the normal manner. Where it was possible to examine it, the lower part of the cairn appeared to be formed of larger boulders than the remainder, as might be expected.

The main structure of the kerb consisted of a setting of some 45 stone slabs originally set on edge but now all, with one exception, on the SW., forced outwards by the pressure of the loose cairn at all angles between a slight inclination and a completely recumbent position. It is difficult to estimate the original dimensions of this setting, but it must have been between 45 and 50 ft. in diameter, with a slight tendency to be elongated on the NE., SW. axis. Larger and longer slabs were used in the arc containing the entrance than elsewhere, but without formal symmetry on its axis.

Behind this main kerb there seems to have been a ring of large boulders forming grounders for the cairn construction. The kerb-slabs were not set up in stone-holes, but forward of them deliberately built cairn material, with large grounders, continued for a distance of 6 ft. It seems likely that the original appearance of the tomb after completion was that of a cairn rising from a ring of kerbstones held upright by an external platform or ramp 6 ft. wide and some 2 ft. high, above which the kerb-slabs would project for a foot or more. Had they been originally completely contained within cairn material it seems unlikely that they should have been forced outwards to such a uniform degree. At the entrance, it could be seen that this external ramp had been roughly finished off on each side, though this gap would afterwards have been covered by the material blocking the access to the passage.

At all points examined behind, between and in front of the kerbstones, broken fragments of white quartz were found in abundance, deliberately strewn during the construction of the monument. A rough count was made of fragments found in clearing the upper part of the western quadrant of the kerb, and these amounted to between 700 and 800 pieces, representing only a small proportion of the total likely to have been associated with this area alone.

(b) *The Entrance and Passage* (fig. 2; Pl. XXXV).

The area in front of the entrance was stripped to the old surface in a cutting 14 ft. square. Cairn material was found to cover the sand and loam subsoil, and there were no features or finds to suggest any forecourt ritual having taken place. Large grounders marked the roughly-built ends of the ramp outside the kerb, and two massive uprights at right angles to the kerb continued the line of the passage beyond it, with a space of 3 ft. between them.

The passage proper opened on the line of the kerb with a pair of side-stones set so as to form a slightly funnel-shaped entrance, reducing the width of the passage at their inner ends to 2 ft. Between them were the lower courses of what must have been original blocking material, obliquely crossing the passage, and in front of this on the southern side was the calcined and eroded remains of a rough bone pin, the sole artifact found during the excavations (fig. 5). The passage was roofless for a distance of 10 ft. inwards from the kerb, and it is probable that the lintels robbed from this stretch had been used in the 19th century to make the bogus standing-stones nos. 1 and 2 of the free-standing circle.

In plan, the passage widened beyond the constriction behind the blocking already mentioned to a maximum width of 4 ft., and its total length from

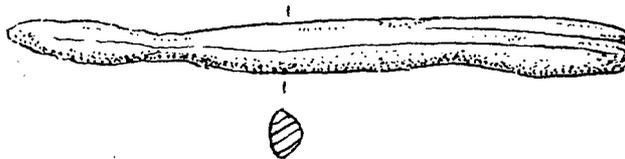


Fig. 5. Bone pin from entrance passage, Corrimony. (Full size.)

the entrance through the kerb to that into the chamber was 23 ft. The walls consisted of massive uprights, in many instances deeply sunk into the sand subsoil, with rough and heavy dry walling with a slight corbelling above, carrying the roofing lintels at a height of 3 ft. above the floor. At a point 11 ft. from the entrance, and towards the SE. side of the passage, a small rounded block had been firmly set in the floor, projecting 9 ins. above the surface. The passage floor was covered with small rounded boulders to a depth of some 18 ins., apparently deliberately placed there as a part of the final blocking of the tomb, and at the inner end merging with the recent in-filling of the chamber described below.

(c) *The Chamber* (Pl. XXXVIII).

It could be seen from the partly excavated passage that the chamber was filled with stones to a level above that of the lintel of its entrance, and it was therefore decided that it must be approached from above. This necessitated the removal of the large flat stone, with an estimated weight of some two tons, which since 1830 had lain on the summit of the cairn. When this had been done a slight depression was visible, and the removal of a very few cairn stones brought to light the upper edges of a circular corbelled vault completely filled with stones and earth.¹ As this filling was removed, it was seen that it was not the result of the collapse of the upper part of the

¹ The heavy and complex task of moving the stone and removing the chamber filling was taken over by Mr Thomas Fraser, contractor of Drumnadrochit. Mr Fraser's personal interest in the work contributed greatly to the success of the undertaking and we are most grateful to him for his co-operation.

vaulting so much as a deliberate tip of field stones and earth thrown into an empty chamber, and the inclusion of fragments of 19th-century china and glass in the debris showed that we were dealing with an unrecorded episode, involving the refilling of the chamber after it had been broken into by chance or as the result of antiquarian curiosity in the past. Fortunately, as will be seen below, the actual floor of the chamber had been left intact in this operation.

The chamber when excavated proved to be circular, with a diameter of 12 ft. Its lowest course consisted of fifteen massive but low blocks set in a ring and sunk deeply into the sand subsoil, probably partly as the result of the pressure of the superincumbent structure and cairn: some settlement from the same cause had broken the entrance lintel from the passage across its middle, and cracked other stones of the corbelling at this point. Above these low orthostats the walling was carried up in rough dry walling, over-sailing in its upper courses to form a corbelled vault, to a maximum extant height of 6 ft. 6 ins., where the overhang was some 2 ft. 6 ins. beyond the base of the orthostats. This corbelling did not begin immediately above the tops of the foundation stones, and there was in fact a perceptible backward inclination of the wall for over 3 ft. from the floor, so that at this point the diameter of the chamber was slightly greater than on ground-level: above this point the inward corbelling immediately began and continued for ten or a dozen irregular courses. Although rough in appearance, the work was most skilfully contrived to make use of the rather unsuitable stones available for the purpose.

No direct evidence remained for the original height of the corbelled structure, nor for the manner in which the vault was finally roofed. At one point five or six corbel stones had collapsed *in situ* over the modern filling, and suggest that at least another 18 ins. could be added to the extant height, and this, continuing the curve of the surviving corbelling, would reduce the diameter of the top of the chamber, at a height of about 8 ft. from the floor, to half that of its base. On analogy with other chambered tombs of the same type in Britain and on the Continent, the final roofing is likely to have taken the form of a flat slab, and the presence of the massive cup-marked slab on the cairn at Corrimony, some 8 by 5 ft. overall (Pl. XXXVII), suggests that it was in fact the capstone of the chamber, supported on a corbelled vault at a height of something slightly over 8 ft. (fig. 4). Its position on the side of the cairn before 1830 would suggest that it was moved from its original position, and the chamber broken into, during the first quarter of the 19th century, and the stone later replaced in what approximated to its primary site after the chamber had been filled in. The size and weight of the stone makes it very improbable that, as suggested in 1882, it had been a stone of the free-standing circle dragged up on to the cairn.¹

¹ *P.S.A.S.*, xvi (1881-2), 314.

(d) *The Chamber Floor and the Burial* (fig. 6; Pls. XXXVIII-XXXIX).

The lower part of the modern filling of the chamber merged into a layer of water-worn stones similar in all respects to those found covering the floor of the passage in its intact stretch, and can therefore be regarded as an

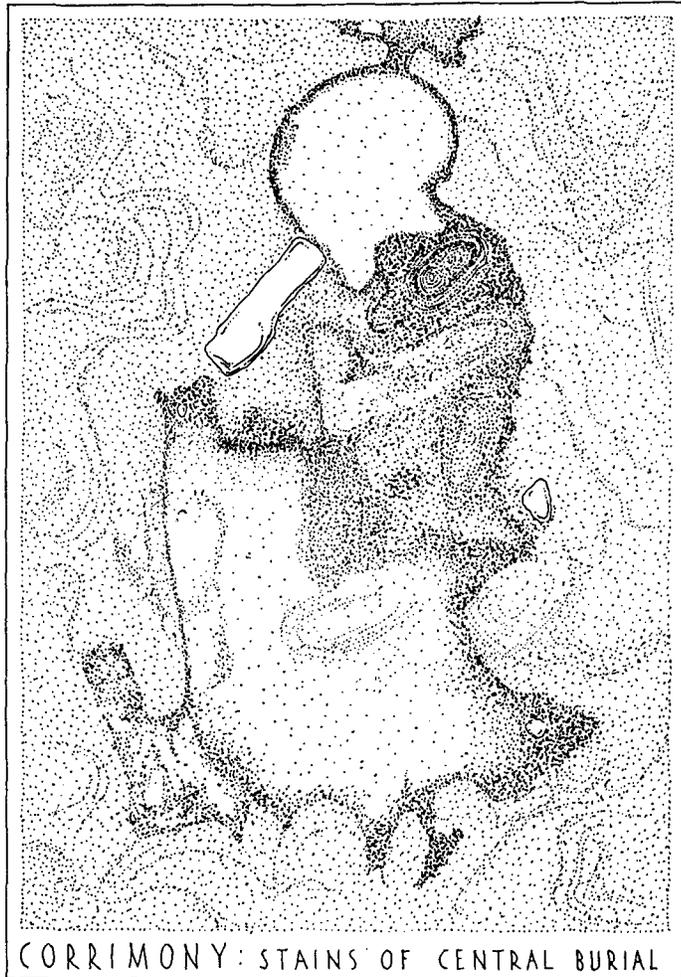


Fig. 6. (Scale $\frac{1}{2}$.)

original feature. The removal of these revealed a floor of yellow sand, stained with veins of red iron-pan and with patches of grey and white around the edge of the chamber. Approximately centrally, there was found an area of flat stone slabs, some 3 ft. 6 ins. by 2 ft. 6 ins., but with an indefinite and irregular outline, associated with charcoal fragments. In places the slabs formed a double layer, with charcoal between.

When the sand surface beneath these slabs was scraped clean, it was recognised that a series of strongly marked grey, purplish-black and white stains in this region formed identifiable outlines which could be interpreted as those of a crouched inhumation burial, with its skull particularly well defined, lying on its right side with its head towards the NW. Phosphate tests (p. 200) showed a marked enrichment in this area. Such stains formed by the decomposition of skeletons in acid sand soils have been frequently recorded in Holland and elsewhere in northern Europe though not hitherto identified in Britain. The matter is further discussed below (p. 198) and in Appendix II.

With the recognition of this burial, the sand surface of the chamber floor was re-examined in detail by study in plan and section. It was found that the original surface of the ground within the chamber area had been irregular, and the old surface-line could be identified by a grey humic layer formed over the whitish-yellow natural sand. The central burial had lain directly on this layer, and its stains merged imperceptibly into it, being nowhere more than a few centimetres thick. The status of the grey patches around the edges of the chamber, and one immediately above the head of the central stain, is difficult to establish. By analogy they might have been regarded as organic material deposited upon the original ground surface, and those by the chamber walls could have been the result of the redistribution of earlier burials in the chamber to make way for the last body, represented by the central deposit beneath the flat slabs.¹ But no identifiable shapes could be recognised in these areas, despite careful scraping and sectioning, and the low phosphate content (p. 204), contrasting with the values obtained from the undoubted burial and the object above its head, show that this view cannot be maintained. The available evidence implies a single crouched burial alone in the centre of the chamber. No grave-goods or other artifacts were found.

The yellow sand floor between and partly covering the grey sand stains (except in the central area) could be seen, when cut in section, to contain thin layers of red iron staining, up to three or four in number, separated one from another by a centimetre or so. This deposition of iron oxide, forming incipient "iron-pan," is normally the result of consolidated surfaces within a permeable layer, and in the instance of the chamber floor at Corrimony strongly suggests that fresh sand had been strewn over the area at intervals, and consolidated by trampling.

(e) *The Free-standing Stone Circle* (Pl. XXXVI).

On level ground beyond the outer edge of the cairn an approximately circular setting of upright stones with somewhat irregular spacing surrounds

¹ For a discussion of the evidence for such a sequence in chambered tomb burials, cf. *P.P.S.*, iv (1938), 129-31; Daniel, *Prehist. Chamber Tombs* (1950), *passim*.

the site: where a diameter can be measured between stones in their original position it is about 75 ft. As we have seen, of the 11 stones now standing 4 are modern additions (nos. 1 and 2, 10 and 11) and of the remaining 7, 2 (nos. 8 and 9) have been reset in recent times. Excavations were made round the base of all stones except no. 2 in order that the stone-holes could be examined and any ritual deposits recovered, and a further area was stripped between stones 6 and 7, separated by an unusually large interval, to search for an intermediate stone-hole. No artifacts were found, nor any burials or similar deposits.

Stones 3 to 6 form a consecutive series with intervals of 20 ft. between nos. 3 and 4 and 4 and 5, but 25 ft. between nos. 5 and 6. All are in stone-holes similar in type to those at, for instance, the Henge Monument on Cairnpapple Hill in Phase II, and the stones vary in height from 5 to 5 ft. 6 ins. above the old surface. The stone-holes contained packing-stones in the form of water-worn boulders and large pebbles from the river.

Between stones 6 and 7 was an interval of 34 ft., and excavations were made to search for an intermediate hole. None was found, but an irregular area of cobbles laid on the sand subsoil was found approximately midway between the two stones. Excavation to old surface level outside the cairn kerb opposite the point where this cobbled area occurred showed that it did not continue under the cairn material. Its purpose is obscure, but it does appear to be an original feature occupying the central part of the wider interval between stones 6 and 7.

Of the remaining stones, averaging some 5 ft. high but with no. 9 being 7 ft. high above the ground-level of its present setting, little can be said. No. 7 appeared to be *in situ*, though loose in its unpacked socket, but nos. 8 and 9 were set in the material of a modern bank bounding a small stream or drain skirting the circle at this point. On analogy with the other passage-graves of the Clava Group, the Corrimony setting should have consisted of a more or less regular circle enclosing the tomb, but it is unfortunate that modern interference with the setting on its western side should have deprived us of evidence of the precise original planning of this part of the monument.

SUPPLEMENTARY EXCAVATIONS AT DRUIDTEMPLE, LEYS AND KINCHYLE OF DORES, 1952.

In an attempt to supplement the very inadequate evidence provided by the Corrimony excavations, it was decided to make small trial excavations within the chamber area of two completely denuded passage-graves of the Clava Group, at Druidtemple, Leys and Kinchyle of Dores, Scaniport. In both sites all the cairn-stones had been removed, leaving only the massive

stones of the free-standing circle and the cairn kerb and passage, with a few stones of the chamber in each instance.¹

(a) *Druidtemple, Leys Castle* (fig. 7).

The remains of the chambered cairn lie behind the present farm of Druidtemple, nearly one mile NNE. from Leys Castle.² It lies on a low hill within the 400-foot contour, with a notable view northwards over the mouth of the Ness and the Beaully Firth (Nat. Grid Ref. NH (82)/684420). All the stones are massive rounded or columnar boulders: the kerb is almost complete, with 28 stones surviving on a diameter of about 40 ft. and an average height of some 4 ft. Of the surrounding free-standing circle, 85 ft. in diameter, 5 stones still stand upright and another 5 are fallen or leaning. The standing-stones average 5 ft. high except for that on the W. of the entrance to the cairn, which is a huge block 9 ft. in height.

Most of the stones of the passage are fallen or leaning, but its line is clear, and 2 stones forming the entrance pair to the chamber remain *in situ*. An area was stripped beyond these stones on the site of the destroyed chamber, and it was found that the old surface had been dug over, and was now covered with 2 ft. of stony debris, among which flat slabs of a type suitable for corbels were relatively abundant, and rounded white quartz pebbles were common. A few small scraps of cremated bone scattered through this disturbed soil were the only finds made.

(b) *Kinchyle of Dores, Scaniport* (fig. 8).

This site, very similar to Druidtemple in its present denuded condition, lies on a small hill-crest between Scaniport and Dores on the SE. side of Loch Ness³ (Nat. Grid Ref. NH (82)/623386.) Here 5 stones are standing and 3 recumbent in the outer circle, 66 ft. in diameter: the highest stone (5 ft. 9 ins.) is again on the western side of the entrance to the cairn. The kerb is reasonably complete, with 19 stones upright or fallen, on a diameter of 30 ft., and the passage is clearly visible. Three stones of the chamber remain, 2 *in situ*, and excavations were made eastwards of these over the original chamber area. There was little stone debris and the old surface was within a foot of the present turf.

A small bowl-shaped pit was found cut into the boulder clay, 18 ins. in diameter and 10 ins. deep, filled with dark soil, and near this to the SW. was a scatter of cremated bones with dark earth on the old surface and under a few flattish stones. No other finds were made.

¹ Permission for these excavations to be carried out were most kindly given, at short notice, by Mr John MacBean, of Messrs Davidson, Scott & Co., on behalf of the Raigmore Estates, on which the Druidtemple sites lies, and by the Baroness Burton of Dochfour, owner of the Kinchyle of Dores Monument.

² *Arch. Scot.*, III (1831), 211; *P.S.A.S.*, XVIII (1883-4), 354. There are good photographs of the site in G. F. Browne, *Antiqs. in the Neighbourhood of Dunecht* (1921).

³ *Arch. Scot.*, III (1831), 211; *P.S.A.S.*, XVIII (1883-4), 356.

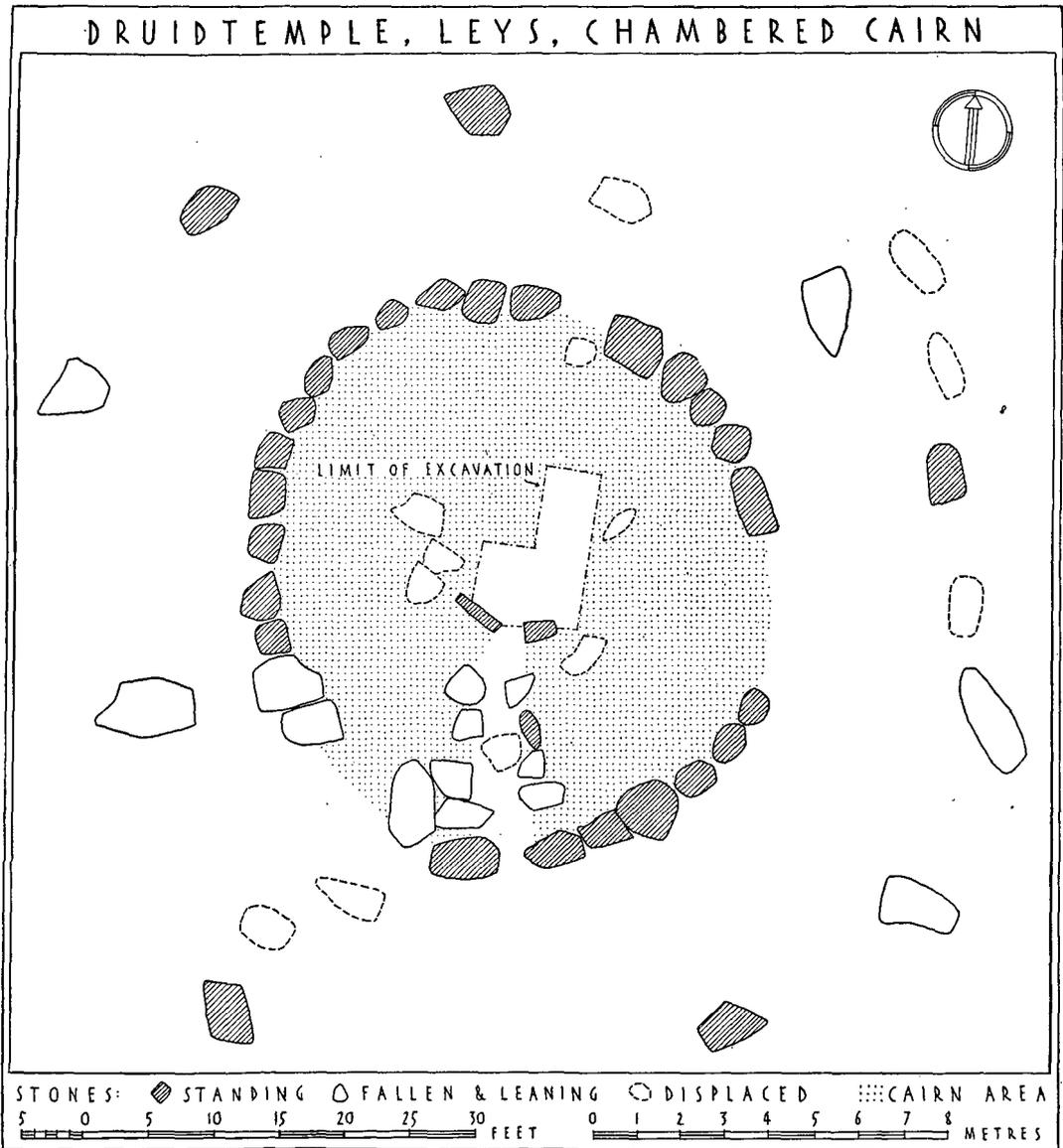


Fig. 7.

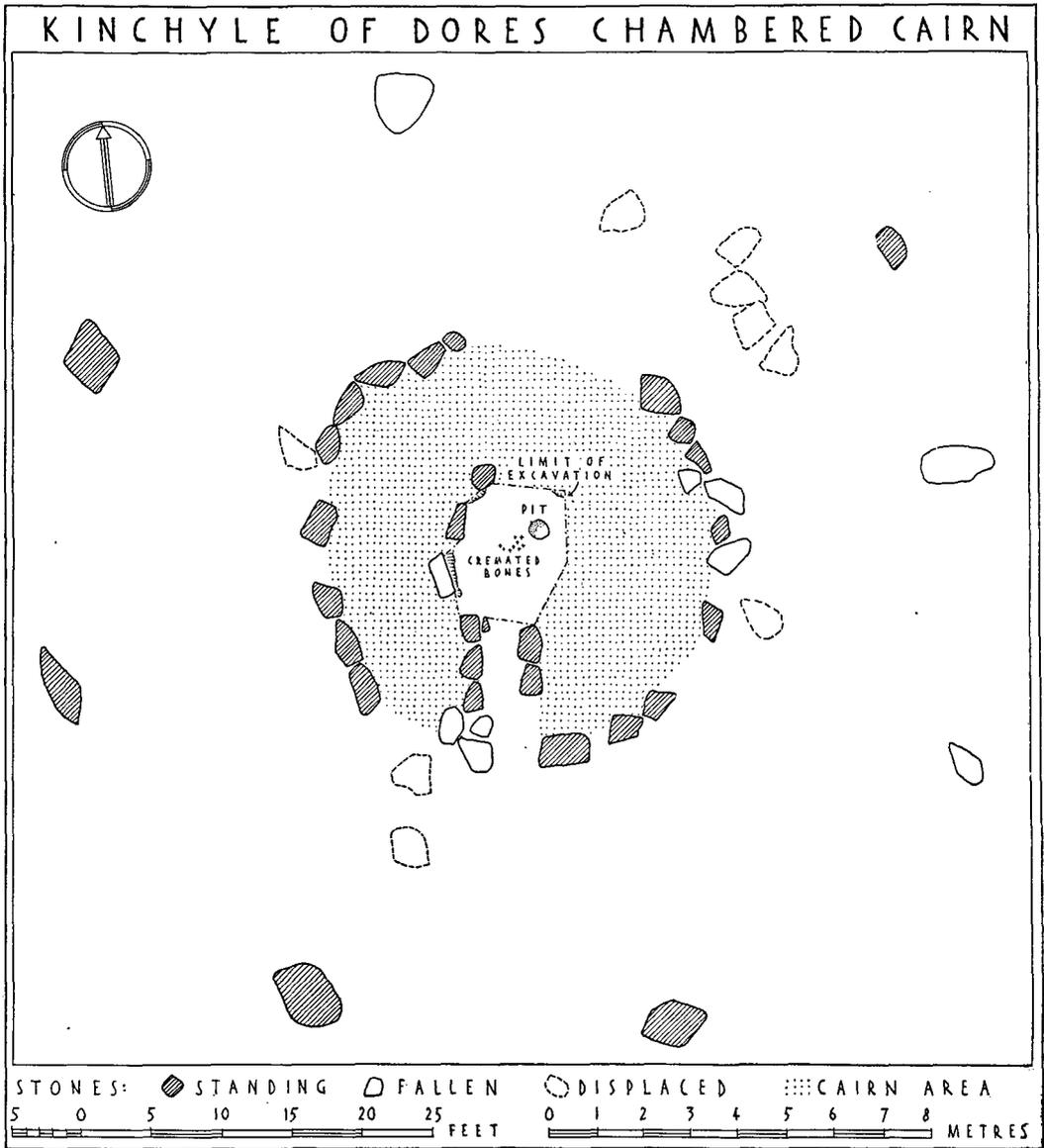


Fig. 8.

The results of these supplementary excavations add little to our understanding of the Clava passage-graves, but they do show that cremation was a burial rite alternative to inhumation among the builders of these tombs. The total absence of grave-goods in all sites is consistent, if unsatisfactory from the archæological point of view.

EXCAVATION OF RING-CAIRNS AND STONE CIRCLE AT
CLAVA, 1953.

The Clava Group of Cairns.

The well-known cairns on the flood-plain of the River Nairn at Clava (map, fig. 1, nos. 15-21) form a remarkable group of at least seven chambered and ring-cairns spaced over a distance of about a mile between the 350- and 400-foot contours (Nat. Grid. Ref. NH (82)/752438-760447). Two of the group, at Balnuaran of Clava, are the classic passage-graves from which the type-name is derived; three sites (nos. 15, 19, 20) are ruined and of uncertain type, though one (Mains of Clava, no. 15) may have been a ring-cairn rather than a passage-grave. The remaining two cairns, however, Balnuaran Centre (18) and Culdoich (21), are good examples of the ring-cairn type within the Clava Group at large, of which nine certain examples are known (see map, fig. 1, and list in Appendix I, p. 199).

The writer, in a recent study, classified the Clava tombs into passage-graves or the Balnuaran type, and ring-cairns or the Gask type.¹ Both types share the feature of being surrounded by free-standing stone circles, but in the Gask type ring-cairns we are not dealing with passage-graves at all, but cairns with a massive boulder peristalith within which is a circular area enclosed by a kerb of stones, and averaging some 20 ft. in diameter. There is no entrance passage, nor any evidence of the manner of roofing the inner area.

No recorded excavations had taken place in any of these ring-cairns, but the fact of their close association with the passage-graves of the Balnuaran type, both in distribution and in the common feature of the enclosing free-standing stone circle, made it desirable to obtain further evidence if possible. Excavations were therefore carried out in 1953 in the Central Cairn at Balnuaran of Clava and in that of Culdoich.

The Ring-Cairn, Balnuaran of Clava.

This monument stands between the two well-known passage-graves at Clava, and in its present condition consists of a slightly oval cairn 70 by 64 ft. overall, within which a massive boulder kerb 60 by 52 ft. contains the main bulk of the structure (fig. 9). Roughly centrally within this is an area open

¹ *Neolithic Cultures of the British Isles* (1954), 257-62.

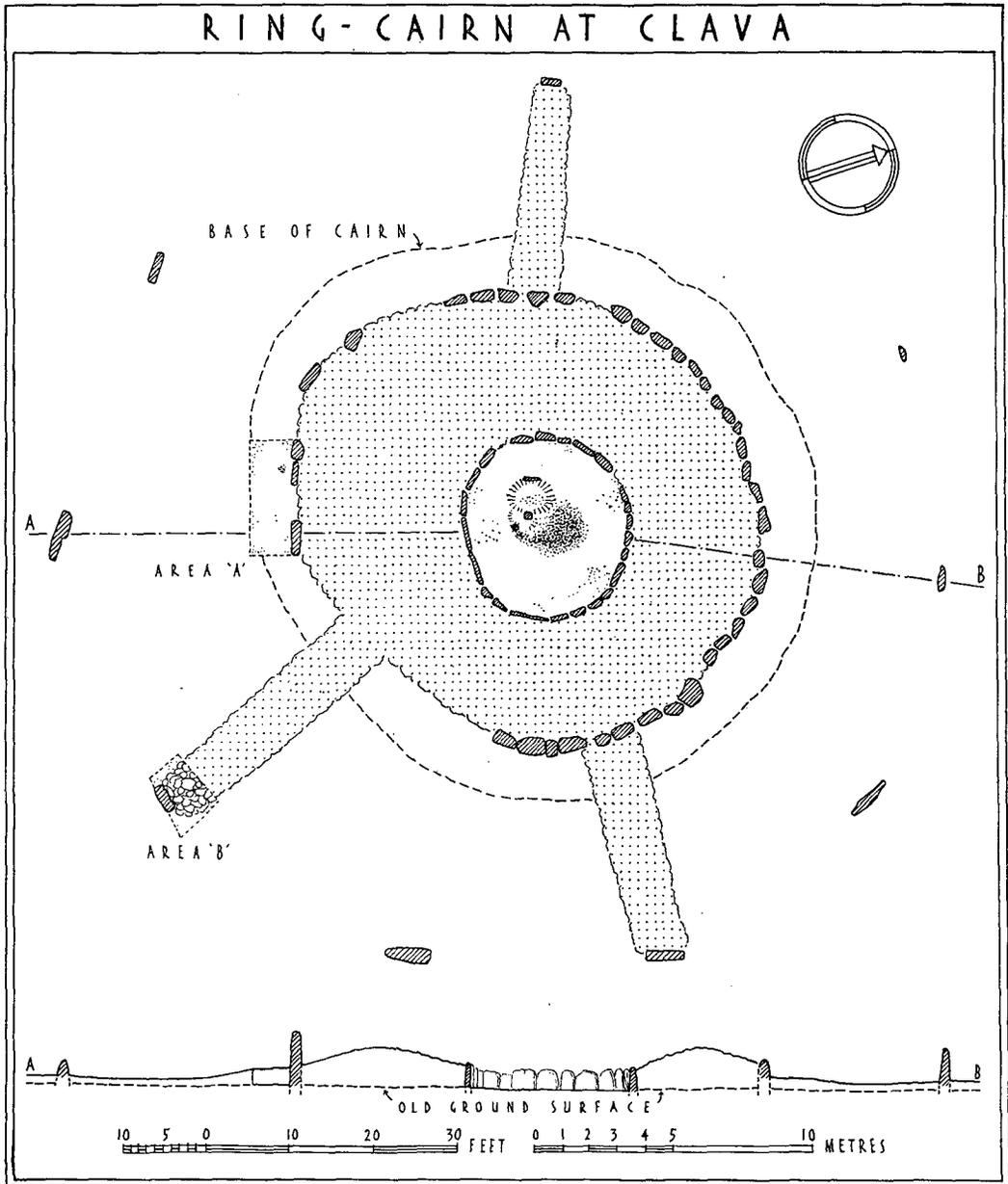


Fig. 9.

to the natural ground surface and enclosed by a nearly circular setting of stone slabs 21 by 18 ft. across. The whole cairn stands within a circle of standing-stones with an approximate diameter of 100 ft. These stones vary in height from 7 ft. 6 ins. to less than 1 ft., and to three of them, on the W., E. and SSE., narrow "causeways" of small pitched stones, from 6 to 8 ft. wide, run from the boulder kerb of the cairn. These causeways are a unique feature among the Clava ring-cairns, no trace existing at the other surviving sites.

Excavation was carried out at three points. The central area was completely cleared; an area ("A") against the cairn kerb, and an area ("B") at the junction of the SSE. causeway with the standing-stone of the circle.

The central area had evidently been disturbed. The natural soil lay immediately beneath the present rough turf, and west of the centre a shallow pit appeared to represent a recent digging. Two stones on its edge suggested that some form of cist or stone setting had been destroyed, but nothing could be said with any certainty. The central area was blackened by charcoal, and there was a sparse scatter of cremated human bone. No artifacts were found except some small rough flakes of pebble flint (Pl. XL).

Area "A" was excavated because at this point of the cairn kerb there was a slight flattening, and three larger and flatter stones suggested the possibility of a feature comparable with a "false portal." Were such in fact intended, it would be a likely place for ritual offerings. Nothing was, however, found except for a small patch of charcoal on the old surface.

Area "B" was dug to examine the construction of the "causeway" at this point: it consisted of small boulders carefully packed to form a slightly convex strip.

The Ring-Cairn, Culdoich.

After the negative results of the foregoing excavation, attention was turned to the ring-cairn at Culdoich, at the other end of the Clava cemetery. Within its boulder kerb this cairn was about 57 ft. in diameter, and 27 ft. away from this on the SW. stood the sole survivor of the original stone circle, a massive slab 12 ft. high. Within the cairn upright slabs delimited an area some 22 ft. in diameter and containing infilling to some height above the natural ground-level, and so giving promise of an undisturbed deposit (fig. 10 and Pl. XL).

Excavation of the greater part of this inner area showed that this was in fact the case. The surrounding stone slabs were found to have stood to a height of up to 5 ft., and the old ground surface was covered by 2-3 ft. of stones and earth. The original clay surface itself had, in the centre, a roughly circular area of about 7 ft. diameter heavily impregnated with charcoal and scattered cremated human bones. Other more sparsely

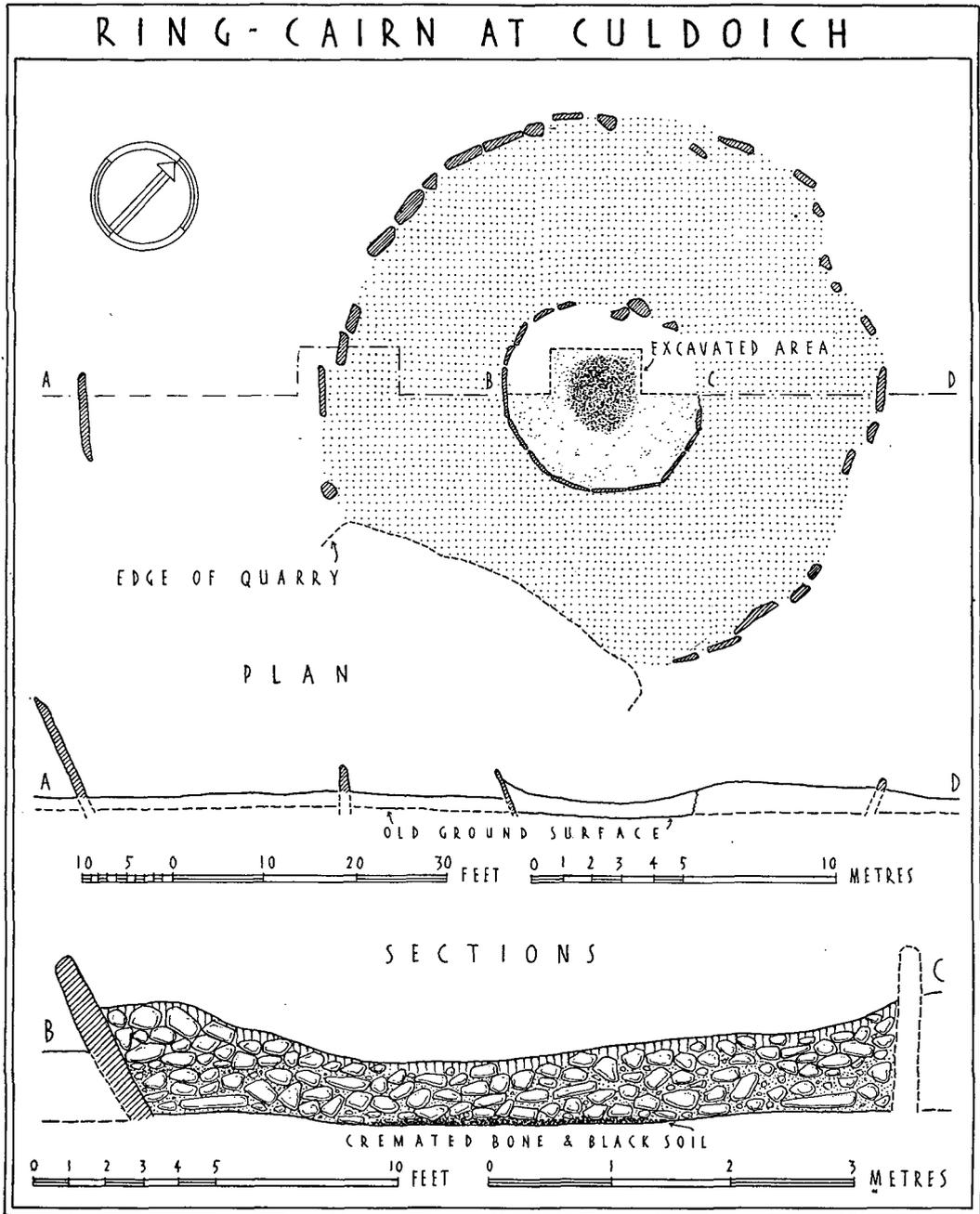


Fig. 10.

scattered cremated bone fragments, unaccompanied by charcoal, extended out to the enclosing stones. The impression given was that charcoal and cremations had been scattered on the surface, from which apparently the turf would have been removed, and then allowed to percolate and impregnate the clay under wet conditions. No artifacts were found.

The excavation of both the ring-cairns described above was singularly uninformative, beyond establishing the fact that the cremation burial rite was used at both, in a manner comparable to the less abundant evidence at Dores and Leys.

The Clava Stone Circle.

West of the three main cairns at Balnuaran of Clava lies a small circle of contiguous recumbent stones, approximately 12 ft. in internal diameter, with one of the stones on the ESE. bearing cup-and-ring and simple cup carvings (fig. 11). Excavation of the interior revealed what appears to have been a shallow grave for a now vanished inhumation, 5 ft. 6 ins. by 2 ft. 6 ins. Over the filling of this near its western end was a scatter of white quartz pebbles. No artifacts were found beyond a scrap or two of pebble flint.

DISCUSSION.

It remains briefly to discuss the implications arising out of the excavations described above, and the field-work on cairns of the Clava type carried out at the same time. In 1884 James Fraser published in these *Proceedings* a valuable study of the monuments of this type in the region of Inverness and Strathnairn, with a catalogue of 29 sites; other surveys were made by Beaton, Jolly, Cash and Childe between 1882 and 1944.¹ Practically all recorded sites were visited in 1952-3, and as a result a minimum of 31 are included in the map (fig. 1) and list in Appendix I (p. 199). That this represents a minimum must be stressed, for in addition to the dozen "uncertain" sites, in which it is not possible to determine with certainty whether the surviving stones represent a passage-grave or a ring-cairn, others recorded by earlier authors and now vanished have not been mapped or listed. Certain of Fraser's sites, included by him in his lists among cairns of Clava type, were found on examination to be cairns or stone circles of differing types, and are therefore omitted here.

A total of ten passage-graves of the Balnuaran type have been recognised, one of which, that at Dalcross (fig. 12), is here planned for the first time. The opportunity was also taken of making new plans of the two fine passage-graves at Balnuaran of Clava itself (fig. 13), and to publish, with the sanction

¹ Discussion with references in Piggott, *Neolithic Cultures of British Isles*, pp. 257 ff. To the references should be added G. Anderson, "On some of the Stone Circles and Cairns in the Neighbourhood of Inverness," *Arch. Scot.*, III (1831), 211-22.

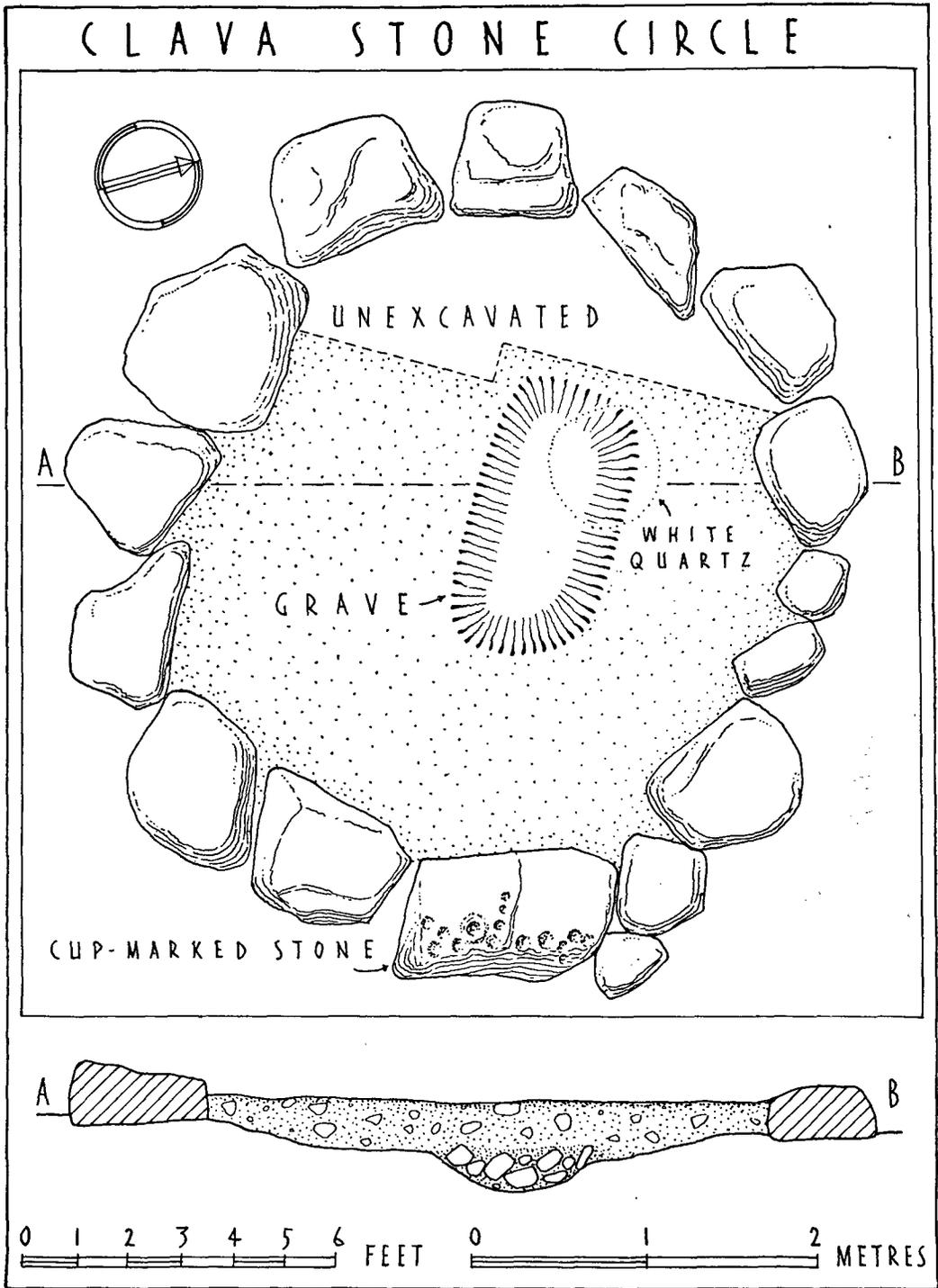


Fig. 11.

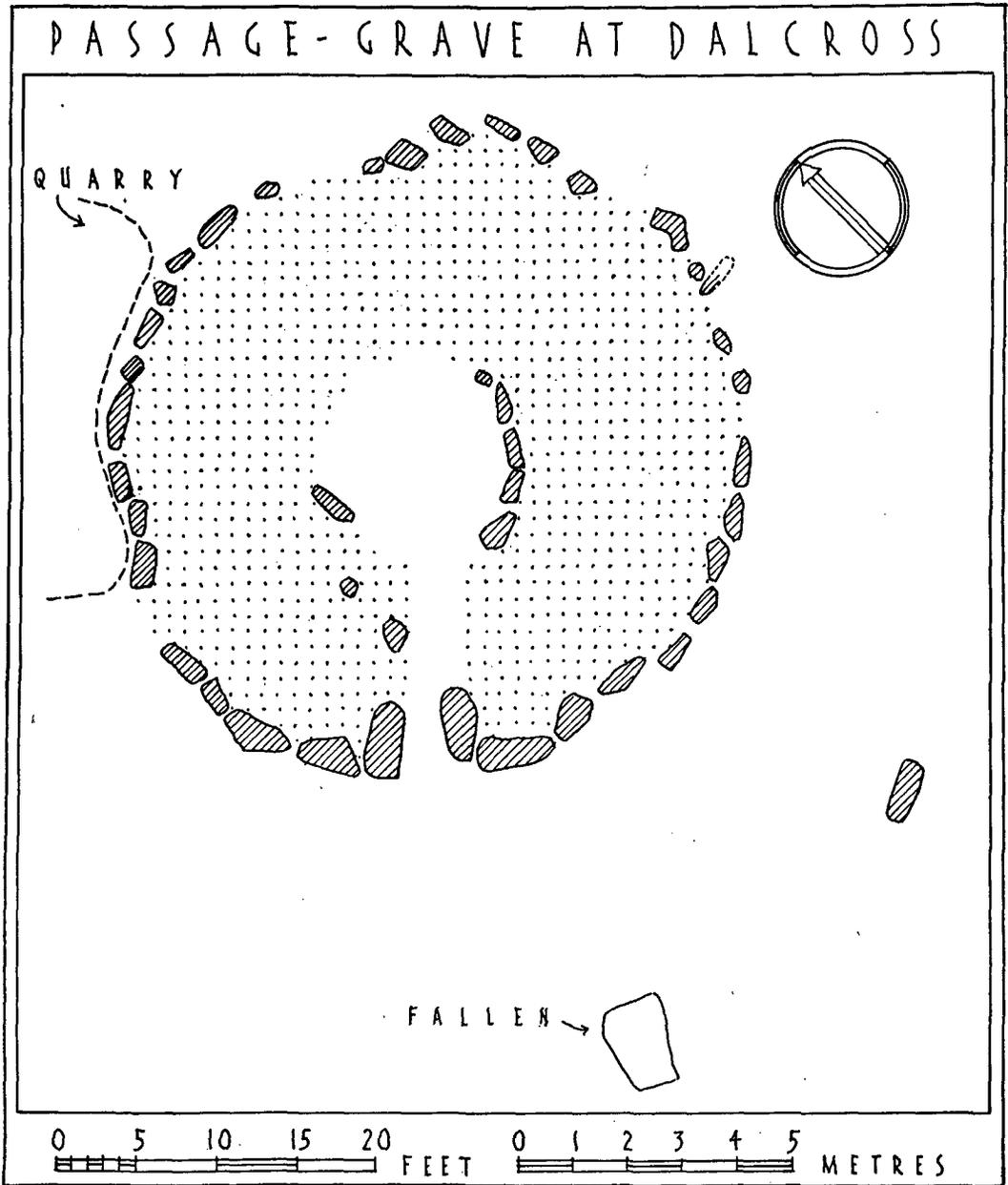


Fig. 12.

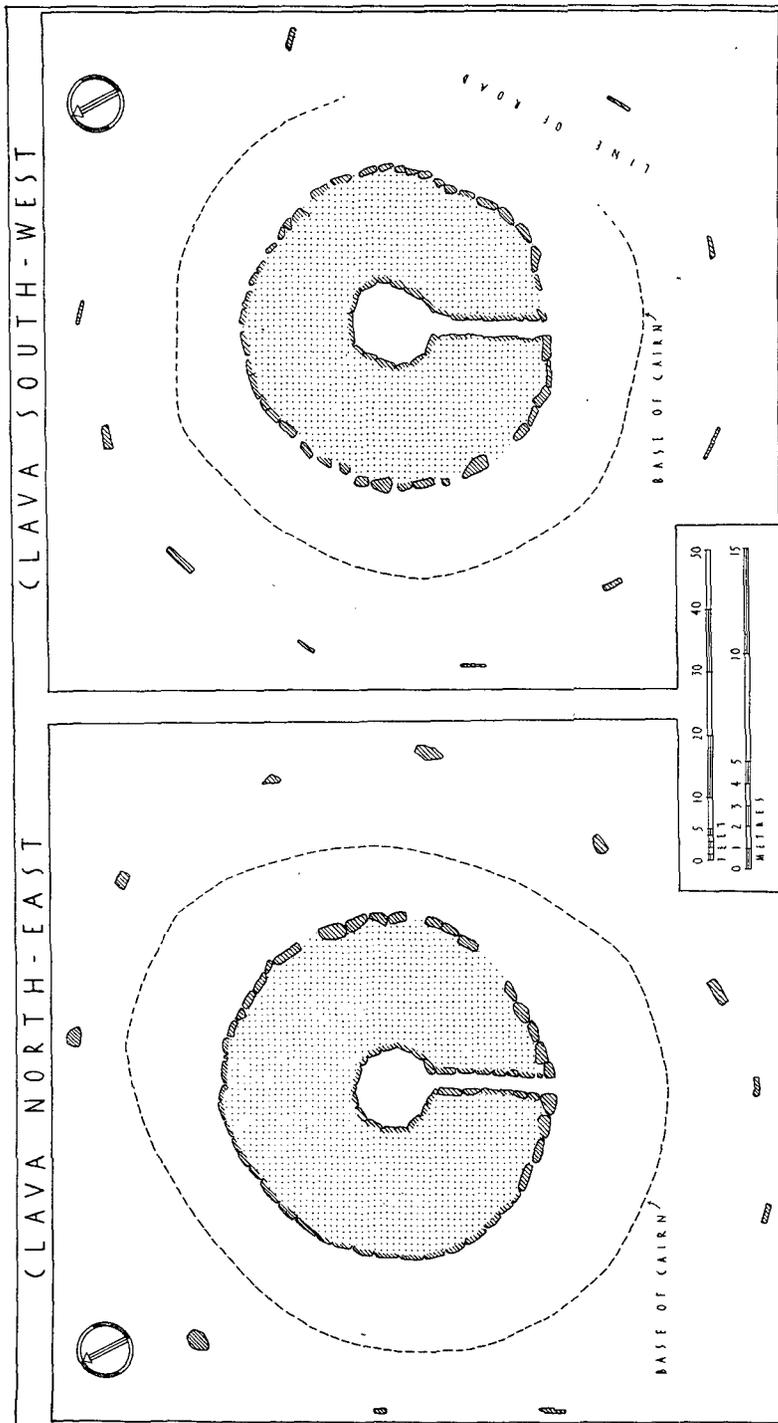


Fig. 13.

of the Ancient Monuments Department of the Ministry of Works, a photograph, taken during conservation work some years ago, of a cup-and-ring decorated kerbstone of the NE. cairn (Pl. XLI).

The distribution of both passage-graves and ring-cairns of the Clava types is, as can be seen from the map (fig. 1), consistent; both types are present, though widely scattered, in the Black Isle-Beaully Firth-Glen Urquhart region, and in more concentration in the valleys of the Nairn and Spey. Surviving examples suggest a rough equality in numbers (ten passage-graves to nine ring-cairns), and the sequence formerly put forward by more than one writer whereby the ring-cairn was a local "degeneration" from the passage-grave seems hard to sustain. Their close association in, for instance, the Clava group itself suggests that we are dealing with two tomb-types which were current at the same time: one is reminded of the association of bell-barrows with disc-barrows in the Wessex Culture Bronze Age cemeteries in southern England. Unfortunately, the recent excavations have given us no help here, except to show that although inhumation (and that of a single individual) was the rite at Corrimony, cremation was practiced at Kinchyle of Dores and Leys among the passage-graves, as well as Balnuaran Central and Culdoich among the ring-cairns.

The Culdoich evidence suggests that the central area of the ring-cairns was at least partly filled up in antiquity. It is difficult to imagine them, in the original state, as cairns in which neither kerb nor interior setting was visible. The most plausible suggestion would seem to be that after the final ritual performances had taken place in the open central area it was filled just short of the tops of the enclosing stones, so that the cairns would be more or less flat-topped structures in which both interior setting and retaining kerb would be visible. Of the roofing of the central area, unless by a wholly hypothetical wooden structure, there is no evidence whatever.

It has long been recognised that the passage-graves of the Clava Group were among the best examples in the British Isles of what Daniel and Powell have called "primary passage-graves," in which architecture, planning and ritual arrangements are closely related to the *tholos* with corbelled roof as seen in classic form in the Los Millares cemetery in Almeria.¹ The same authors also drew attention for the first time to the resemblance between the Clava ring-cairns and analogous structures again in Almeria, consisting usually of a shallow circular excavation in the ground set round with stone slabs, but sometimes contained with a cairn. Such tombs, which contain collective burials and grave-goods of early type, are normally only half the diameter of the Clava series, but on occasion equal them in size.²

Outside the Clava area itself, comparable ring-cairns seem known only in one area, at Raedykes near Stonehaven in Kincardineshire, and here the

¹ *P.P.S.*, xv (1949), 169-87.

² G. and V. Leisner, *Die Megalithgräber der Iberischen Halbinsel I—Der Sudan* (1943), pls. 1-7.

cairns are about half the size of the normal Clava series. They do however share the feature with Clava of standing, in some instances at least, within a free-standing stone circle.¹

The derivation of the north-east Scottish "recumbent stone" circles from the Clava tombs has, in general terms, been suggested more than once.² In such arguments, the ring-cairns have taken their place as an intermediate stage in the degeneration series from the primary passage-grave. While some connection presumably does exist between recumbent stone circles and the circle-surrounded cairns of both Clava types, the relationship is hardly one which can be expressed in direct or simple form. With the exception of the New Grange passage-grave, the Clava tombs are the only examples in the British Isles of such a free-standing stone circle around the cairn; continental examples (such as Kercado in Brittany) are equally few. So far as the British tombs are concerned, one may perhaps suggest that in the free-standing stone circle we have an element which can be related to the Late (or Secondary) Neolithic traditions of "Henge Monuments" in general, and that in the compound monument of passage-grave or ring-cairn within a stone circle one may have a fusion of traditions paralleled by the encircling of the Maes Howe or Bookan passage-graves with a ditch, or by the inclusion of a miniature burial-chamber of passage-grave type within the circle and avenues of Callernish. The recumbent stone circle may be a parallel, rather than a derivative form resulting from a similar set of circumstances.

The presence of cup-marks on the Corrimony stone (p. 181) and both cups and cup-and-ring carvings at Clava (p. 192) calls for comment. As is well known, artificially made cup-marks are known among so many primitive communities widely separated in time and space that their significance as a distinctive cultural trait may be very small. However, the large group of cup-marks on the stone at Corrimony which we have seen was likely to have been the capstone of the corbelled chamber (Pl. XXXVII), may be compared with the relatively frequent occurrence of such "decoration" on the capstones of megalithic burial chambers elsewhere in western Europe. In Britain, examples are known in Wales, the Isle of Man and a possible site in Cornwall;³ in Ireland as a component of the Boyne art-style and probably elsewhere;⁴ in Portugal in the Evora region;⁵ in Scandinavia⁶ and North Germany.⁷ In the two Balnuaran of Clava passage-graves cup-marks are to be found on the uprights of the passages and chambers and on the kerb; here parallels could be found in Portugal again⁸ and mixed with other designs in

¹ *P.S.A.S.*, LVII (1922-3), 20.

² *E.g.* by Childe, *Prehist. Scot.* (1935), 52.

³ Daniel, *Prehist. Chamber Tombs* (1950), 117.

⁴ Piggott, *Neo. Cultures*, 211 ff.; Borlase, *Dolmens of Ireland* (1897), *passim*.

⁵ G. and V. Leisner, *Antas dos Arredores de Évora* (1949).

⁶ *E.g.* Brønsted, *Danmarks Oldtid*, I (1938), 194.

⁷ Sprockhoff, *Nord. Megalithkultur* (1938), 141.

⁸ G. and V. Leisner, *Antas . . . no Concelho de Estremoz* (1955); *Biblos*, xx (Coimbra 1944).

the Breton chambered tombs.¹ One kerbstone of the north-east tomb at Clava is decorated not only with cup-marks but with wavy channels, in one instance forming a ring round the cup in a manner comparable with the decorated stone in the Clava small stone circle described above (p. 192). Both would come within the general class of cup-and-ring carvings which on MacWhite's showing seem in the British Isles to belong to an art tradition outside that of the Boyne tombs, and probably ultimately linked with northern Spain.²

It remains to comment on the technical aspects of the stains representing the decayed skeleton in the centre of the floor of the Corrimony chamber. Such "silhouettes" or "ghosts" of human (and on occasion animal) remains are best known from Holland, where the acid soils render the survival of actual bone unlikely, and where the fine sands and loams have proved peculiarly favourable to the uncovering of such stains with the high degree of technical skill in excavation developed by van Giffen and others in that country. The character of the Corrimony stains—their greasy texture and blackish-purple colour in particular—conforms exactly to the circumstances of the Dutch finds.³ One point that should be noticed is that at Corrimony the skull, while preserving an entirely characteristic profile, has in the process of dissolution into a stain become symmetrically enlarged on both horizontal axes, so that measurements of its outline exceed the normal range of human skulls. As the process of stain-formation involves the transformation of a three-dimensional body into a virtually two-dimensional area of discoloration, distortion is not to be wondered at.

We were fortunate in having a soil scientist working as a member of the excavation team, and Mr Allard Johnson's report on the results of his analyses (Appendix II, p. 200) carries the investigation of these "silhouette" phenomena a stage further than that of our continental colleagues. His demonstration that significantly high phosphate percentages were obtained only from the area of the assumed crouched burial and the amorphous object above its head, and that these were of an order to be expected from the former presence of organic remains, go far to confirm the observations made in the first instance from analogy. It is to be hoped that opportunities will present themselves, in this country and abroad, for further work of this kind to be undertaken.

¹ Péquart and le Rouzic, *Corpus des Signes gravés* . . . (1927), *passim*.

² *J.R.S.A.I.*, LXXVI (1946), 59-80.

³ Examples have been frequently illustrated: e.g. *Antiquity*, VII (1933), 470, pls. i-ii; Clark, *Arch. and Soc.* (1939), pl. xvii; van Gelder *et al.*, ed., *Oudheidkundig Bodemonderzoek in Nederland* (1947), pl. 9.

EXCAVATIONS IN PASSAGE-GRAVES AND RING-CAIRNS. 199

APPENDIX I.

LIST OF SITES ON MAP (Fig. 1).

Abbreviations: PG, Passage-Grave; RC, Ring-Cairn; U, Uncertain.

References are to volumes of *P.S.A.S.*

No.	TYPE.	SITE.	REFERENCES.
1	PG	Carn Urnan, Black Isle	xvi (1881-2), 478; LXXVIII (1943-4), 37.
2	RC	Culburnie, Kiltarlity	xvi, 316; LXXVIII, 38.
3	U	Belladrum, Kiltarlity	LXXVIII, 38.
4	U	Bruaich, Kiltarlity	xvi, 326; LXXVIII, 38.
5	PG	Carn Daly, Balnagrantach	LXXVIII, 38.
6	PG	Corrimony, Glen Urquhart	Present paper.
7	PG	Kinchyle of Dores	<i>Ibid.</i>
8	U	Stoneyfield, Raigmore	xviii (1883-4), 361, no. 31.
9	U	Culloden	<i>Ibid.</i> , no. 32 or 33.
10	U	Cullearnie	<i>Ibid.</i> , no. 34.
11	U	Newton of Petty	<i>Ibid.</i> , no. 35.
12	PG	Dalcross Mains	<i>Ibid.</i> , no. 36; present paper, fig. 12.
13	U	Urchany	<i>Ibid.</i> , no. 21.
14	U	Cantraybruich	<i>Ibid.</i> , no. 17.
15	U	Mains of Clava	<i>Ibid.</i> , 360, no. 14.
16	PG	Balnuaran of Clava NW.	<i>Ibid.</i> , no. 10; present paper, fig. 13.
17	PG	Balnuaran of Clava SE.	<i>Ibid.</i> , no. 12; present paper, fig. 13.
18	RC	Balnuaran of Clava Centre	<i>Ibid.</i> , no. 11; present paper.
19	U	Milltown of Clava NE.	<i>Ibid.</i> , no. 8.
20	U	Milltown of Clava SW.	<i>Ibid.</i> , no. 9.
21	RC	Culdoich	<i>Ibid.</i> , no. 7; present paper.
22	PG	Leys	<i>Ibid.</i> , no. 30; present paper.
23	RC	Daviot	<i>Ibid.</i> , no. 6.
24	RC	Gask	<i>Ibid.</i> , no. 4.
25	RC	Tordarroch	<i>Ibid.</i> , no. 2.
26	PG	Crofteroy	<i>Ibid.</i> , no. 3.
27	U	Avielochan E.	XLIV (1909-10), 197.
28	PG	Avielochan W.	<i>Ibid.</i>
29	RC	Grenish	XL (1905-6), 245.
30	RC	Aviemore	<i>Ibid.</i>
31	RC	Delfour	<i>Ibid.</i>

APPENDIX II.

Examination of Soil from Corrimony Chambered Cairn, Glenurquhart, Inverness-shire, with special reference to Phosphate Content.

BY ALLARD H. JOHNSON, B.Sc., A.R.I.C.,

Department of Chemistry, West of Scotland Agricultural College, Glasgow.

Methods of Sampling and Analysis.

Soil samples were taken from the exposed surfaces when the excavation was completed, with the primary object of obtaining chemical evidence as to the nature of the central stain. "Large samples" 3 ins. in diameter by 3 ins. deep were taken with a trowel. These comprised a series along the axis of the passage and chamber; several taken within the chamber, selected for their variation in colour; and three from surfaces outside the passage or chamber but previously covered by cairn material. In three cases, similar samples were taken at the same places to a further 3 ins. depth; these are distinguished by the numeral II in the tables of results. The large samples provided enough material for varied or replicate analyses. The more numerous "small samples" were cores 4 ins. long and approximately 1 in. in diameter taken with a piece of metal tubing and recorded by reference to a tape laid across the chamber intersecting the central stain. They were used mainly for phosphate determinations.

The locations of both series of samples are shown in fig. 14, which is based on Professor Piggott's plans. It will be convenient to identify the small samples by means of the axes OX, OY drawn from an imaginary origin outside the chamber. The figure also shows the concentrations of total "phosphoric acid" (P_2O_5) at the various points, expressed in milligrams per 100 g. of air-dry soil.

The soils were air-dried at room temperature and passed through a 2 mm. sieve. No inclusions were noted, except small pebbles in some cases. All were similar in texture, and the mechanical analysis of a single sample gives an adequate idea of it. Such an analysis was performed in duplicate by the method of G. W. Robinson,¹ clay and silt being determined by pipette sampling. Apparent and true densities of two samples were determined, using a density bottle. The true or particle densities agreed closely. Hygroscopic moisture by drying at 100° C., and loss on ignition by heating to constant weight in a silica crucible, were determined on a series representative of the various colour-types encountered. (Loss on ignition is a measure of the amount of organic matter present. Knowledge of the moisture content allows quantities determined on an "air-dry" basis to be recalculated to an "oven dry" basis if desired. The differences would be small in the present instance. Incidentally, hygroscopic moisture and loss on ignition were found to be approximately in direct proportion; this confirms that the soils were of uniform mechanical composition.) Representative pH values were determined electrometrically, using a glass electrode. Strong acidity was indicated (pH below 5).

Total "phosphoric acid" (P_2O_5) was determined on the large samples, and, in view of the variation encountered, subsequently on all samples, by the method of A. J. McGregor.² Soil is digested with a mixture of concentrated nitric and

¹ As described by C. H. Wright, *Soil Analysis*, 2nd ed. (1939), 39-44.

² McGregor, *Journal of the Science of Food and Agriculture*, 1 (1950), 107-9.

EXCAVATIONS IN PASSAGE-GRAVES AND RING-CAIRNS. 201

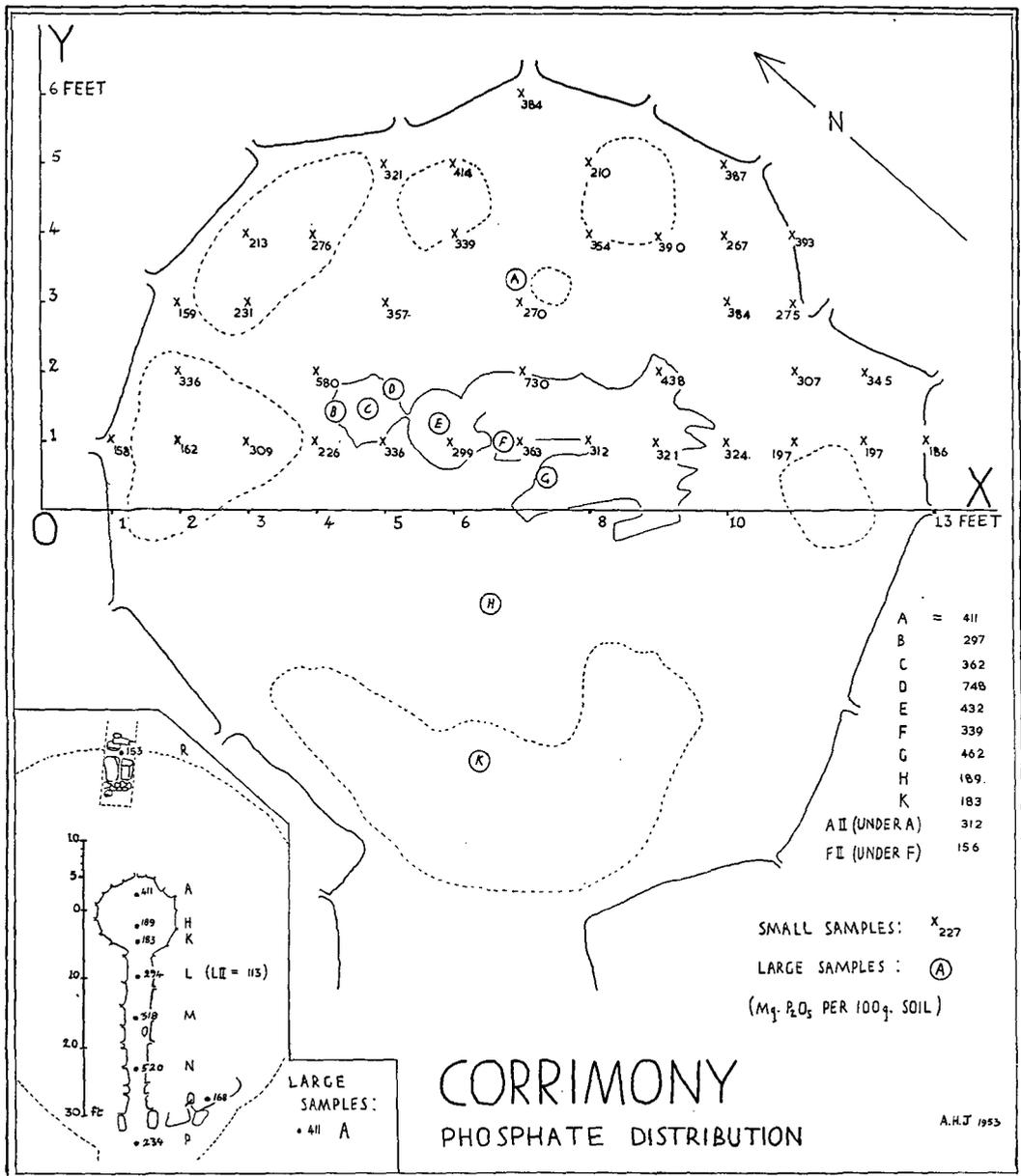


Fig. 14.

sulphuric acids, and, after dilution, phosphate is estimated colorimetrically as "molybdenum blue" in an aliquot part. It was found possible to simplify some details of the technique without serious loss of precision. One gram of soil, *i.e.* a smaller amount than that usually recommended, weighed without further trituration after air-drying and sifting, was transferred to a small Kjeldahl flask graduated in the neck at one mark (150 ml.). This flask served both the acid digestion and the subsequent dilution to standard volume.

The mean difference between duplicates, in the case of nine samples, was 2.3 per cent., the range being 1.0 to 5.8 per cent.

Since determination of readily soluble or "available" phosphoric acid has found application to archæology,¹ a comparison of this with total phosphoric acid was made. Five g. of soil which had been ground in an agate mortar were shaken mechanically for two hours with 200 ml. of half-Normal acetic acid, and P_2O_5 was determined colorimetrically in an aliquot of the extract. In seven cases the readily soluble P_2O_5 was near 2 per cent. of the total P_2O_5 , but in the other six examined it varied from 1.3 to 11.9 per cent. Readily soluble P_2O_5 , considered alone might suggest a maximum phosphate concentration under the skirts of the cairn, behind the burial chamber! In view of these and other results,² it is questionable whether this particular analytical tool, applied to the predominantly acid soils of Highland Britain, will contribute much to archæology, except perhaps in so far as soil fertility studies are of interest in that connection.

Evidence for Phosphate Enrichment in the Centre of the Chamber.

It is clear, from the high local concentrations of phosphate that were recorded, and the sharp concentration gradients, sometimes amounting to a doubling of the figure within a matter of inches, that the soil has received increments of some concentrated phosphate source. The highest concentrations (750, 730 mg. per 100 g. soil) were on the central stain, which is defined for the present purpose as the area within the continuous line on the diagram. It includes the polygonal area from which samples B, C, D were taken. Values below 200 occurred only outside the stain. Mean concentrations for the stain and for the north-eastern half of the chamber outside it were calculated, and the difference between the means was found to be significant when examined by "Student's" *t*-test. The test is not rigorous unless applied to a uniform series of samples distributed at random within the areas they represent;³ in the present instance it indicates odds of about 300 to 1 against the observed distribution arising by chance, if the central area were not in reality richer in phosphates on the average than the peripheral area. For the reason just given that figure may be in error, but it gives qualitative support to the finding that the principal phosphate deposit is central.

Although a pattern of high and low phosphate areas seems to be discernible in various parts of the chamber, contour lines cannot be drawn with any confidence. However, high values on the edge of the stain suggest that an area of enrichment rather larger than the stain itself may exist, and there is in fact no reason why the phosphate-rich area and the organic matter should coincide exactly, since the processes determining their preservation or migration are different. For the purpose of calculations described below, such an area has been

¹ Reviewed by Dauncey, *The Advancement of Science*, IX (1952), 33-36.

² Johnson, in Piggott and Powell, *P.S.A.S.*, LXXXIII (1948-9), 161 (at Cairnholy, Kirkcudbright); Johnson, unpublished (at Glenluce Sands, Wigtownshire); and various authors in the literature of soil science.

³ Cf. D. J. Finney, *Introduction to Statistical Science in Agriculture* (1953), 146-8.

EXCAVATIONS IN PASSAGE-GRAVES AND RING-CAIRNS. 203

postulated, defined as the area within a line enclosing the central stain, 6 ins. from it. This takes in three further values (580, 226, 324). The mean is little affected. There is a gain in statistical significance over that found above, when the area thus defined is compared with the north-eastern half of the chamber outside it. Such an area has been drawn on graph paper and its size estimated, but it has not been inserted in the diagram since there is no evidence of a definite boundary to it.

The possible presence of recent bones, excreta or other sources of phosphates must always be considered in an investigation such as this, but in view of the relatively intact state of the monument and the undisturbed character of the chamber floor it will be assumed that they are absent. We have then a structure, typologically a burial-chamber, in which phosphates were deposited in antiquity, notably in one area. The presence of bones is a reasonable conclusion, although no recognisable fragment remains; and although the visible central stain was the starting-point of the investigation, the same conclusion could have been drawn in its absence.

Estimation of the Quantity of Phosphorus deposited.

The weight of P_2O_5 in a given block of soil may be calculated as the product of volume, density and concentration. The density of the soil at two places has been recorded. The pore space of the sandy soil, in a compacted condition, was probably 33 per cent. or less; assuming this figure, the bulk density is 1.73. Of more interest than the total amount of P_2O_5 in the soil is the amount added above that naturally present. Samples from under the cairn outside the burial-chamber or passage provide an estimate of the latter. The sample Q from under the peristalith to the SE. of the entrance gave a value of 168, and the sample R at the rear of the cairn gave 150 and 155 in two analyses on different occasions. More such results would be desirable, but the agreement of these figures with the lowest values in the chamber is satisfactory and suggestive. One hundred and sixty will be accepted as the basal or natural level for purposes of calculation.

For the present purpose the north-eastern half of the chamber may be defined as the area above the X-axis in the diagram, and other areas as follows:

- (i) The central area of enrichment, enclosed by a line 6 ins. outside the central stain.
- (ii) The half-chamber outside (i).

Alternatively one may calculate on the basis of:

- (iii) The central stain.
- (iv) The half-chamber outside it.

Estimates of the total quantity of P_2O_5 , and the corresponding increments of phosphorus above that natural to the soil, have been calculated for a layer of soil 4 ins. deep. The large samples do not strictly represent a 4-in. layer, but the error introduced by grouping them with the others is not large enough to matter for the present purpose. Any increment below 4 ins. cannot be estimated numerically, but is probably small. The expected falling off of concentration with depth was shown by samples A II and L II.

The body of a 70 kg. (11 stone) man contains about 630 g. of phosphorus,¹ 80 per cent. of which is in the skeleton. Taking a round figure of 600 g., and regarding this as a "man unit," one-fifth unit is found directly under the central

¹ W. R. Fearon, *Introduction to Biochemistry*, 3rd ed. (1948), 43.

stain; nearly half a unit under the stain or within 6 ins. of it—on the assumptions indicated above in defining the central area of enrichment; and about two-thirds of a unit elsewhere in the north-eastern half of the chamber. Numerous burials, simultaneous or consecutive, in the chamber thus appear very unlikely, unless the bones were subsequently removed. As regards a burial in the centre subsequently undisturbed, the detection of an appreciable fraction, less than the whole, of its phosphate content would be expected. (Some phosphorus-rich soil would have been removed in exposing the stain and levelling its surface.) The findings are quite consistent with, and lend support to, the view that such a burial existed. The polygonal figure "above the head" was similar in appearance and phosphate content to the rest of the central stain and most likely represents human or animal remains also.

Distribution of Phosphates Outside the Central Area.

The phosphatic distribution over the chamber floor could have occurred, on the evidence available, before, during or after the construction of the monument. There is no reason to derive it all from the central burial. Mechanical scattering would have to be assumed if the latter were the case, but the quantity involved seems too large.

There is no definite association of phosphate with the peripheral stains. They probably represent a horizontal section through the humic upper layer of a slightly undulating soil surface.

The low phosphate content of samples G and H does not establish, with statistical significance, that the south-western or passageward half of the chamber differs from the north-eastern half. Of the three samples from the passage, N was from a roofless and disturbed area, so little can be said about it. Rabbit bones were found not far away. L and M were sealed under cobble-stones and suggest a general condition in the passage similar to that in the chamber, *i.e.* a scatter of phosphates. The lowest value anywhere on the site was LII, 3-6 ins. deep under the passage floor. It was 16 per cent. lower than the figure assumed above for the natural topsoil of the site, and lower, also, than A II or F II from the chamber. Was topsoil removed in constructing the passage?

General Note on the Site.

Without assuming that the pH, under vegetation, was identical with that under the cairn to-day, it can be said that this has always been an acid soil. Although deep, level and easily worked, it was probably unsuited to wheat and barley and, to a lesser degree, oats; most suited to rye if the choice were available. The artificial embankment of the river, and the large modern ditch very near the cairn, indicate that the site is liable to be flooded. It is surprising to find a chambered tomb on such a site. However, possible climatic changes apart, the changes in the river-level would be less violent if its catchment area were densely wooded.

EXCAVATIONS IN PASSAGE-GRAVES AND RING-CAIRNS. 205

TABLE I.—APPEARANCE OF SOIL SAMPLES AS AT THE TIME OF SAMPLING. MOISTURE, LOSS ON IGNITION, AND pH OF SELECTED SAMPLES.

Sample.	pH.	Hygroscopic moisture.	Loss on ignition.
		As percentages of oven-dry soil.	
A. Slightly brown-stained at surface	4.5	1.7	2.8
A II. Light grey-brown	4.65	..	..
B. Grey-black at surface, fading with depth. Slightly greasy character before drying . . . . .	..	..	..
C. Pale, greyish, bleached . . . . .	..	1.2	2.1
D. Like B . . . . .	..	2.9	5.2
E. Like C	4.42	1.3	1.8
F. Top half-inch stained black	4.64	..	..
F II. Light grey-brown	4.82	..	..
G. Dark brown, fading with depth, mottlings of iron . . . . .	..	..	..
H. Brown stain just under surface . . . . .	..	..	..
K. Shallow dark brown band at surface, iron band 2 ins. down . . . . .	..	..	..
L. Slight surface mottling, iron at about 1 in. . . . .	..	1.2	2.2
L II. Light grey-brown, iron stained at 6 ins. . . . .	..	..	..
M. Light brown stain at surface, strong iron stain at 1 in. . . . .	..	..	..
N. Like M	4.66	2.2	3.5
P. Brown, especially at surface. No separate iron stain . . . . .	..	..	..
Q. Mottled by iron . . . . .	..	..	..
R. Light brown	4.78	1.1	2.1
($x=1, y=1$) . . . . .	..	1.1	1.9

pH values were determined by Mr E. K. Schofield-Palmer, to whom thanks are due.

TABLE II.—COMPARISON OF TOTAL AND READILY SOLUBLE PHOSPHATE.
Small samples designated by distance OX, OY in feet; large samples by letters.

Sample.	Total P ₂ O ₅ (mg./100 g.).	Readily soluble P ₂ O ₅ (mg./100 g.).
D	748	16.5
7, 2	730	5.2
4, 2	580	10.0
G	462	10.1
9, 2	438	5.5
7, 1	363	8.5
2, 2	336	6.4
9, 1	321	7.2
4, 1	226	6.7
12, 1	197	4.4
H	189	11.8
13, 1	186	5.7
1, 1	158	9.1
R	153	18.2

TABLE III.—MECHANICAL ANALYSIS AND DENSITY.

Sample R. Constituents as percentages of oven-dry soil;
loss on ignition, 2.1 per cent.

Coarse sand, 2.0-0.2 mm.	29.1
Fine sand, 0.2-0.02 mm.	52.45
Silt, 0.02-0.002 mm.	12.85
Clay, under 0.002 mm.	3.4
Sesquioxides (loss by solution)	1.15

Difference from 100 1.5

The sand fractions were partly composed of mica platelets.

Sample.	Apparent, or bulk density (g. per ml.).	True, or particle density (g. per ml.).	Pore space per cent.
R	1.403	2.582	45.7
K	1.214	2.575	52.9

Calculated bulk density, at 33 per cent. pore space and true density 2.578 = 1.73.

TABLE IV.—MEAN P_2O_5 CONCENTRATIONS OF DIFFERENT AREAS AND ESTIMATED PHOSPHORUS INCREMENTS.

Area.	No. of samples.	Mean $P_2O_5 \pm$ standard error (mg. per 100 g.).
i. Central stain and 6-in. surround	16	410.7 ± 12.1
ii. Elsewhere in NE. half-chamber	28	294.0 ± 15.9
iii. Central stain	13	416.2 ± 13.7
iv. Elsewhere in NE. half-chamber	31	302.0 ± 15.4

Area (sq. ft.).	Wt. per inch layer (kg.).	Mean P_2O_5 minus 160 (mg. per 100 g.).	Phosphorus (P) increment in 4-in. layer (g.).
i. 15.4	62.85	251	280
ii. 38.9	158.8	142	390
iii. 6.5	26.53	256	120
iv. 46.0	187.8	134	440

Note.—Phosphorus (P) = $P_2O_5 \times 0.437$.

ADDENDUM.

Since the above paper was set up in proof, a report has been received from Dr F. P. Lisowski, of the Department of Anatomy, University of Birmingham, on the cremations from Leys, Dores and Culdoich. The remains from the first two sites each represented a single individual, while at Culdoich one male and one female, both of middle age, were represented. Dr Lisowski's full report will be published in the next volume of the *Proceedings*.

S. P.



Corrimony chambered cairn: general view from SW. during excavation.



(a) Corrimony: cutting on axis behind chamber.



(b) Corrimony: cobbled area.

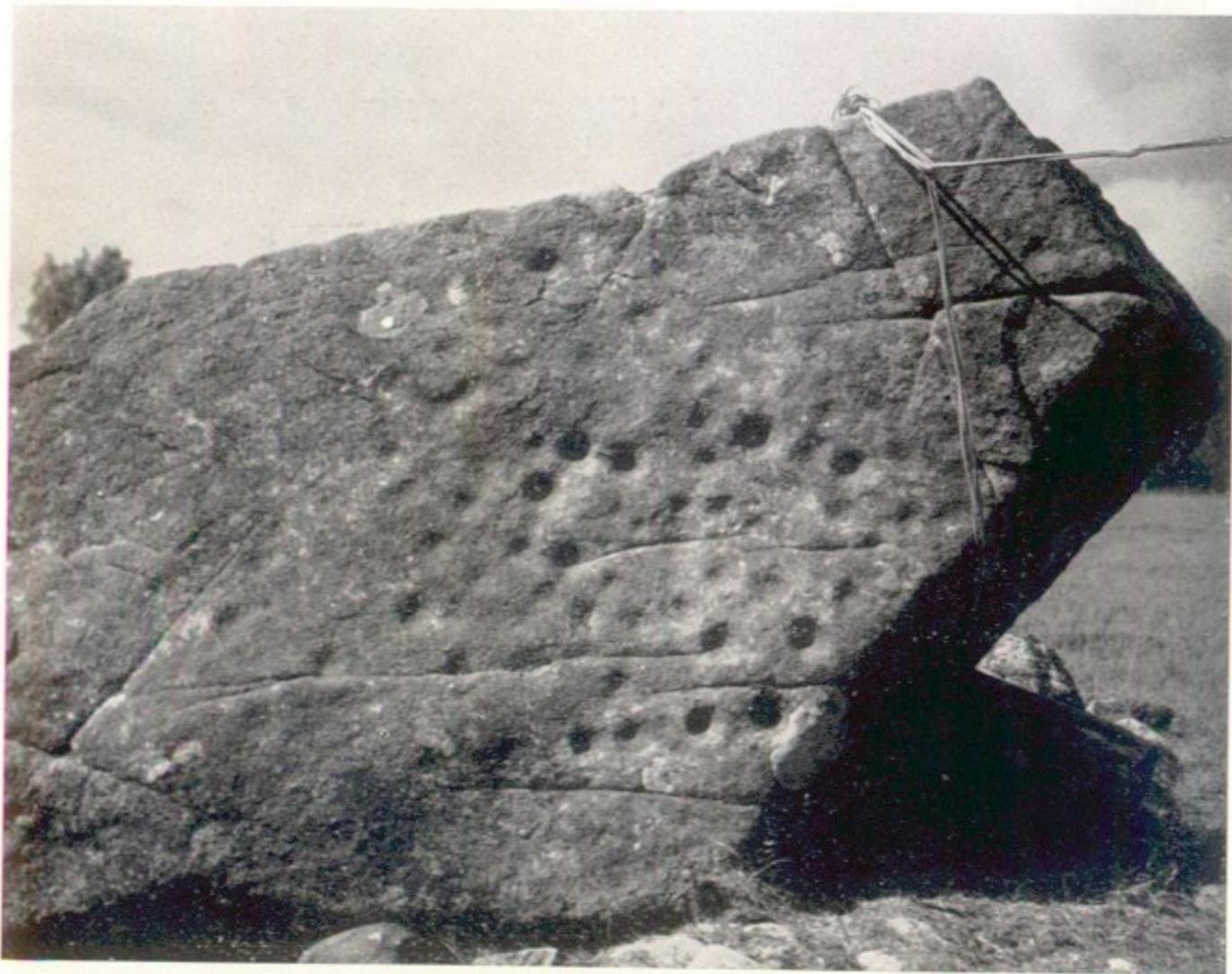


(c) Corrimony: entrance blocking.

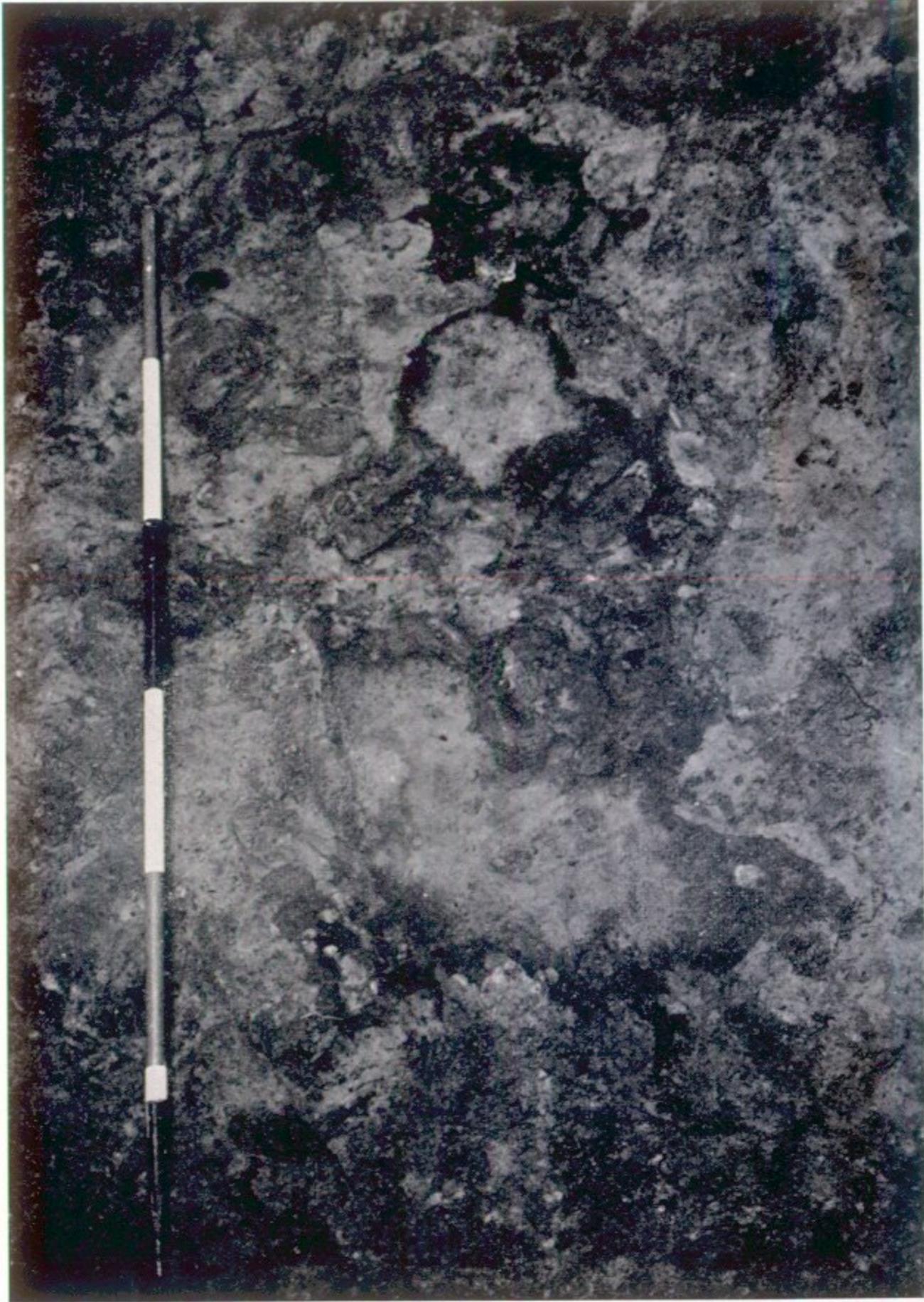
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(a) Corrimony: chamber and passage.



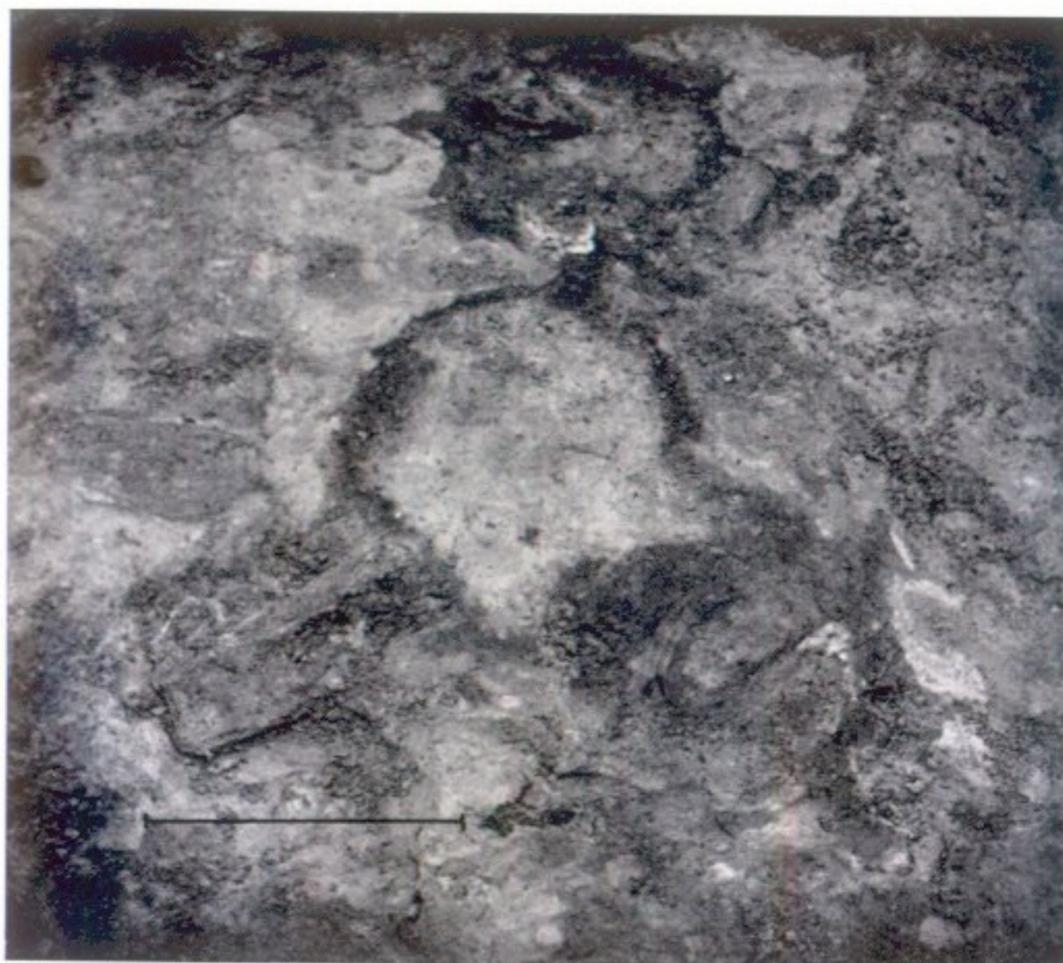
(b) Corrimony: cup-marked stone.



[Photo: Allard Johnson.]

Corrimony: stains of central burial.

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(a) (Scale of one foot.) Corrimony: detail of stains representing skull of central burial.



(b) Corrimony: general view of stains representing central burial.

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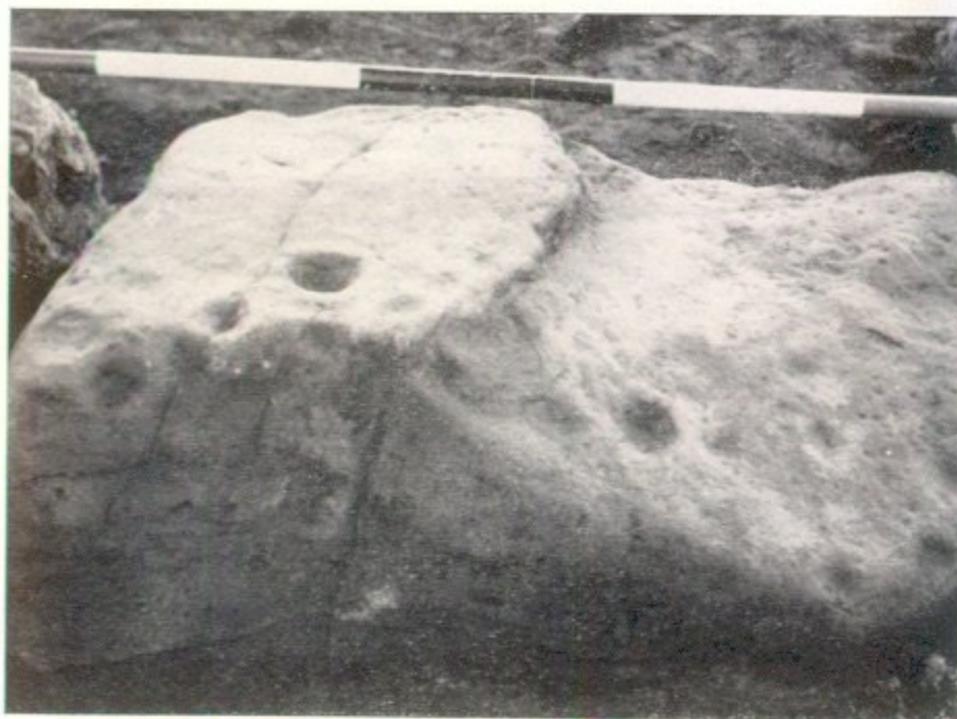
(a) Culdoich: excavated portion of central area.



(b) Central ring-cairn, Balnuaran: central area excavated.



(a) Cup-marked kerb-stone, north-east cairn, Balnuaran of Clava.



(b) Cup-marked stone, Clava small circle.

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