II.

EXCAVATION OF RUDH' AN DUNAIN CAVE, SKYE.

By W. LINDSAY SCOTT, F.S.A.Scot., F.S.A.

In other papers[1] I have reported the excavation of the chambered tomb which lies near the apex of the now deserted promontory of Rudh' an Dunain, and have given some description of this isolated area lying to the west of the Cuillin Hills in Skye. The only evidences hitherto recorded of the ancient use of the peninsula are the tomb and the fine promontory broch or "galleried dun" which stands at the opposite end of Loch na h'Airde. On examination, however, the relatively fertile area in the neighbourhood of the loch shows other evidence of early habitation, namely, two cairns—one of moderate size, standing to a height of 5 feet, and one small—two groups of hut-circles, and the cave which is the subject of this paper.

Site of Cave.

The cave stands in lat. 57° 9′ 50″ N., long. 6° 18′ 5″ W., at a distance of about 500 yards east of the loch, and of about 100 yards south from the stream which runs into the loch from the east. It is cut in a vertical rock-face on the 100-foot beach level, and the ground falls sharply away from the front of it. It is a small and particularly shallow cave, the area covered by the roof being 15 feet in greatest width and 9 feet in greatest depth (Pls. III. and IV.), and, since it faces west, it is particularly exposed to driving rain. Water does not percolate through the roof, but it runs in quantity over the edge of the cliff above and works backward into the cave. A large slab (shown in Pls. III. and IV.) and some smaller blocks have fallen from the roof since the use of the cave described below; these rock-falls may have increased the runnels of water which find their way into the cave during rain.

Excavation.

With the kind consent of Macleod of Macleod and of the tenant of Glen Brittle, Mr Macrae, excavation was undertaken by my wife and myself in September 1932. A trench was cut through the centre of the opening from outside the cave, and the interior was entirely excavated save for the part covered by the large slab fallen from the roof. The

[1] *Proc. Soc. Ant. Scot.*, vol. lxvi. p. 183 ff., and vol. lxviii. p. 194 ff. A sketch plan of the area is given in the former of these papers.

material found was classified in four strata, A to D, as shown in Pl. IV. The material was also classified in a number of areas, which, upon ultimate examination of the objects, were amalgamated into five areas, named I. to V. in Pl. III. These five areas and four strata give twenty "regions" for the purposes of classification of the excavated material, but owing to the sloping up of the rock floor stratum D is not represented in area III. and the number of effective regions is therefore nineteen. In making statistical deductions from any such classification it is necessary to bear in mind that the regions are not of equal volume.

Filling of the Cave.

Apart from fallen roof blocks the filling of the cave consisted of finely divided peaty earth, and, at the bottom, of a thin layer of sea sand. The peat appeared to have filtered in with the runnels of water which descended from the cliff above; whether this process had commenced at the time of the earlier occupation of the cave, or only began later, cannot now be determined.[1] It is at any rate the fact that, above the sand, there was no visible differentiation in the character of the filling throughout its whole depth. Remains of human occupation were found at all depths in the peaty soil and in all areas, but not in the sand on the cave floor.

Sequence of Occupation.

It will be convenient to state at once, as a framework for the subsequent description, the successive uses to which the cave had been put. At the lowest level, immediately above the sandy floor, were found pottery fragments, including beaker, and such quantities of the refuse of stone-working occurred in this and the immediately superior stratum as to show that the cave had been used as a stone-knapper's workshop. The paucity of post-beaker pottery sherds makes it unlikely that this occupation continued without a break until the second definable period. This occurred in the Early Iron Age, when, as is shown by a smelting furnace and iron slag, the cave was used for iron-working. Subsequent occupation was probably only occasional; a few fragments of pottery may indicate casual use in the earlier centuries of the present era, and some modern use as the occasional shelter of a shepherd or a gipsy is shown by an iron nail, fragments of an iron pot, and the slight attempt at walling shown in Pl. III.

I do not think that the cave has ever been used as a permanent

[1] There is evidence from the neighbouring cairn that only a slight growth of peat had taken place in the peninsula before the tomb was built. As shown below, this event cannot have antedated the first occupation of the cave by more than a few centuries.

dwelling. No domestic hearth was found; pottery fragments and animal bones were relatively scarce; the worked-stone objects were in hardly any instances completed implements; and, despite the smelting furnace, there were no iron implements. The group of hut-circles at the foot of the slope above which the cave stands may well represent the hamlet whose successive generations of stone- and iron-workers came up to work in the cave. A modern story that, about a century ago, a widow brought up a large family there, supporting them by fishing and by gifts received from her neighbours, is, I fear, a myth.

Evidence of Disturbance.

It is inevitable that in a small cave the later occupiers should dig into the floors into which their predecessors' debris was trodden. In areas II. and IV. this type of disturbance had occurred on a large scale, since the smelting furnace had been dug through stratum C (*cf.* Pl. IV.).

Unhappily, however, there are other sources of disturbance to report. Starting in stratum C below the furnace, a burrow ran outwards and downwards and passed under the large block marked "Ancient fallen rock" on Pls. III. and IV. The burrow was circular in section and from 4 to 6 inches in diameter; its inner surface was smooth and hardened by water. It served as an excellent and much-needed drain for the cave. I do not think that there is any doubt that it was originally made by a rabbit, since rabbit bones were found near its inner end. Since rabbits are a mediæval importation into Britain the burrow must date from recent times. There were also short burrows running upwards from the region of the furnace through areas I., III., and IV., which are probably also due to rabbits.

Nor can recent disturbance by man be entirely disregarded. In region IV. A, 6 inches below the present surface, was found a modern iron nail imbedded in disintegrated wood. In region II. B were fragments of an iron pot which was probably not ancient, and, if this is so, some relatively recent user of the cave must have dug into the surface to a depth of 1 foot. There were no other objects which need be attributed to modern times, but considerable remains of a sheep in stratum A no doubt represent a more or less recent fatality of the moors.

In these difficult circumstances resort to statistical methods is clearly required, and, when the number of objects justified it, such methods are used below. The table on p. 208 giving the distribution of slag may be used as a test of the degree to which deposited objects are disturbed, since slag cannot antecede the smelting furnace which was in areas II. and IV., its floor being approximately in the plane of separation of strata B and C. Slag is, of course, less easily moved about than pottery

fragments or stone chips, but some of the pieces are extremely small and its distribution gives a rough guide to the degree of disturbance.

Study of the table shows that small quantities of slag (1·9 per cent. of the total) were found in stratum A in areas I. and II. This must be due to recent disturbance. The main mass of slag (73·3 per cent. of the total) is in stratum B, *i.e.* on and above the level of the floor of the furnace, but a substantial amount (23·4 per cent. of the total) was found in stratum C, into which the furnace had been dug. With the exception of a single small piece in region V. B, the whole of the slag in strata B and C was found in areas II., III., and IV., *i.e.* immediately around the site of the furnace. In stratum D a small quantity of slag (1·4 per cent. of the total) was found in areas II. and IV. below the furnace, but areas I. and V. each contained only one very small piece.

We can infer from these data that in areas II. and IV. objects belonging to strata B and C are completely mixed, and that stratum D is sufficiently disturbed to make reliance on stratification impossible. The evidence for vertical disturbance in areas I. and V. is negative. Only two small pieces of slag were found in these areas in stratum D and none in stratum C, but equally there was only one small piece in stratum B, showing, somewhat surprisingly, that the slag was not distributed horizontally in the cave when the industry was being carried on. All that can be said, therefore, is that the iron industry was not itself a cause of substantial disturbance in these areas. On the other hand, it can, I think, be inferred from the presence of only one piece of slag in area V. in strata C and D that the burrow-drain did not operate to carry down material from areas II. and IV. to an appreciable degree. A source of horizontal disturbance of area V., which might *prima facie* have been expected to be serious, can therefore be to a large degree disregarded.

Some light on the effect of other sources of vertical disturbance in areas I. and V. is thrown by the table of distribution of worked-stone objects on p. 204 below. Assuming for the moment that, as is argued below, the stone industry was confined to a period before the iron-smelting began, and therefore belongs to strata C and D, the figures in the table show that the degree to which objects were carried upwards in areas I. and V. was slight. Of forty-two worked-stone objects in these areas all but two were found in strata C and D, *i.e.* 96 per cent. were found at appropriate levels. This evidence does not show, of course, that objects were not carried downwards in these areas, since *ex hypothesi* there were no worked-stone objects originally in strata A and B.

The evidence of the pottery in area I. is as follows:—Stratum D contained nine sherds—four of beaker, three of a vessel datable to the

same period, and two undecorated sherds which, on grounds of texture, are most likely to belong to the Iron Age. Stratum C contained three sherds—one belonging to the vessel last named, one indeterminate, and one of an Iron Age vessel of which three fragments occur in II. A. Stratum B contained two sherds—one of a beaker period vessel represented in stratum D and one of a typical Early Iron Age rim.

In area V. stratum D contains four small undecorated sherds—two probably of Bronze Age date, one probably of the Iron Age, and one indeterminate. Stratum C contains six sherds—four of beaker, one of a vessel which by analogy belongs to the same period or slightly earlier, and one rim fragment of Early Iron Age date. Stratum B contains one and stratum A two sherds of Iron Age type.

The pottery evidence, so far as it goes, indicates only a moderate degree of movement, whether up or down, in the two areas I. and V. In the other areas there are signs of much more disturbance.

Taking the evidence as a whole I think that we may conclude that, while stratification in areas II., III., and IV. is quite unreliable, in areas I. and V. a substantial majority at least of the objects are undisturbed. The expectation that any particular object found in these areas is in its original position is therefore a fairly large one. This is no doubt a modest conclusion, but it is, I think, all that the facts warrant.

Stone-knapping Industry.

I propose to describe the two industries carried on in the cave and then the other objects found. The earlier industry was stone-knapping, and this was represented by 219 implements, cores, and chips distributed as follows:—

Distribution of Worked-stone Objects.

Strata.		Areas.					All Areas.	
		I.	II.	III.	IV.	V.	Number.	Percentage.
A		1	8	5	...	...	14	6%
B		1	15	12	14	...	42	19%
C		7	3	9	63	1	83	38%
D		17	6	...	42	15	80	37%
All Strata.	Number.	26	32	26	119	16	219	100%
	Percentage.	12%	15%	12%	54%	7%	100%	...

Looking at the horizontal distribution it may safely be inferred from this table that the industry was mainly carried on in area IV., that is, in the centre of the front of the cave just within the shelter of the roof. From the vertical distribution considered over the whole area of the cave it might be concluded that the industry was carried on continuously from the first use of the cave till the time of its use as a smelting workshop and to a lesser degree after that. I do not think, however, that this would be a sound conclusion. Having regard to the disturbance proved by the evidence of the slag to have occurred in areas II., III., and IV., the presence of a substantial number of worked-stone objects in stratas A and B in these areas is sufficiently explained; it will be safer to rely on the data given by areas I. and V., where 96 per cent. of the objects come from strata C and D. I think, therefore, that the industry had ceased to be carried on when the iron-working started.

Whether the stone industry continued till then is uncertain. In areas I. and V. the number of objects from stratum D much exceeds the number from stratum C, but the numbers are relatively small. Much larger numbers exist in area IV., where we know from slag evidence that the disturbance made by the furnace affected stratum D only slightly. The large number of objects in stratum C in this area can best be explained by the assumption that the industry continued into the period of formation of this stratum, but whether up to the time when the iron industry began must remain doubtful. On the pottery evidence it is unlikely.

Dr Grahame Clark has been good enough to make a detailed examination of the worked stone, and I attach his report at Appendix I. He has also made drawings of the most interesting specimens, and these are reproduced in fig. 1. The industry gave no evidence of date and was an exceedingly poor one, a fact perhaps sufficiently explained by the inadequacy of the raw material available. Flint is only obtainable in the Hebrides in the form of beach pebbles, and the cherts used were probably similarly obtained. Quartz was pressed into service and even bloodstone, a substance which does not seem to be elsewhere on record as providing material for implements. Since this must have come from the island of Rum, ten miles to the south of Rudh' an Dunain, its presence is evidence of at least coastal navigation. Rum is not known to have been inhabited before the Middle Ages,[1] and we have therefore no reason to believe that the bloodstone was obtained by trading.

[1] No pre-mediæval structures and no surface finds are recorded in the Inventory of Rum in Roy. Com. Hist. Mon. (Scot.), *The Outer Hebrides, Skye, and the Small Isles.*

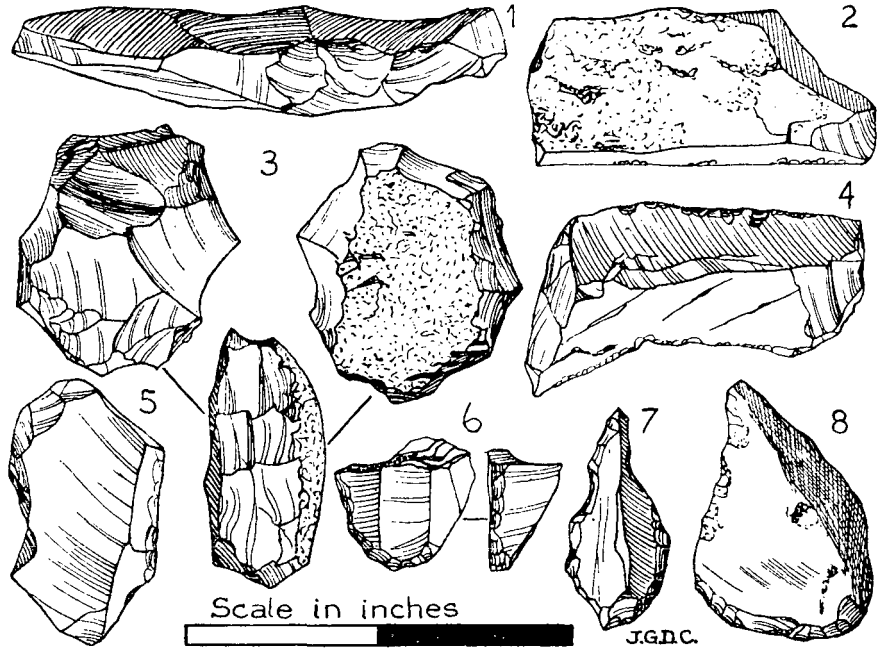


Fig. 1. Worked-stone Objects. (¼.) Nos. 1, 2, and 4 of Bloodstone; Nos. 3, 6, and 8 of Flint; No. 5 of Chert; No. 7 of Quartz.

Fig. 2. Iron Furnace from the north-east.

Iron-smelting Industry.

The stones now remaining of those which composed the smelting furnace are shown in plan and section in Pls. III. and IV., and photographs are reproduced in figs. 2 and 3. One vertical slab (L), and one horizontal slab (M) set at its foot, form the back of the furnace; the side walls are represented by blocks set on edge (N and P), which do not reach

Fig. 3. Iron Furnace from the south-east.

fully up to the back of the furnace; between these two stones a smaller block (Q) fills up most of the front. Smaller blocks lay on the south end of M and the east end of P. The furnace is set in the soft peaty earth, cutting through stratum C; the upper surface of M is in the plane of separation of strata B and C, and this, no doubt, represented the approximate level of the floor at the time the furnace was constructed. The space between these five stones measured 15 inches from front to back and 9 inches in width; it was unpaved.

In this space was found a mass of slag, and slag was also piled up

round the furnace, the greatest quantity being on the north side. The distribution of this slag was as follows:—

Distribution of Slag by Weight in Ounces.

Strata.		Areas.					All Areas.	
		I.	II.	III.	IV.	V.	Total Weight.	Percentage.
		oz.	oz.	oz.	oz.	oz.	oz.	
A		2	3	...	...	...	5	1·9%
B		....	17	4	176	Trace	197	73·3%
C		...	2	6	55	...	63	23·4%
D		Trace	1	...	3	Trace	4	1·4%
All Strata.	Total Weight.	2	23	10	234	Trace	269	100%
	Percentage.	·7%	8·6%	3·7%	87·0%	...	100%	...

In each of the regions I. D, V. B, and V. D, where "Trace" is recorded in the above table, one minute piece of slag was found weighing a fraction of an ounce.

Dr H. H. Thomas has been kind enough to examine the slag, and reports that it is "iron slag of the typical magnetite-fayalite variety." In addition to the great quantity of this dark slag a very small quantity of another slag, paler in colour, was found in I. D, II. A, II. B, and III. B. Regarding this, Dr Thomas reports as follows:—"This seems to be a glass-furnace product. A section was cut from a piece from II. B, and it shows a turbid glass full of small yellow prisms of a monoclinic pyroxene, with clear patches occupied by spherules and crystal-groups of the colourless lime silicate pseudowollastonite." This slag, he tells me, could be produced if sand were fused with lime, *e.g.* if a limestone slab were used as a wall to the furnace and the packing of the structure were of sand. Limestone is available at least as near as Strathaird, eight miles by sea from Rudh' an Dunain.

Animal Bones.

A number of animal bones were found, most of them fragmentary, and Dr Wilfrid Jackson has been good enough to examine them. Their distribution was as follows (where no description is given the fragments were not capable of identification):—

Distribution of Animal Bones and Fragments of Bone.

Strata.	Areas.				
	I.	II.	III.	IV.	V.
A	2	11 ? sheep.	20 of small sheep, not adult, including skull, lower jaw, and scapula. 1 lower molar of small ox.	...	...
B	...	5 of sheep of small breed, including 1 tooth. 18 others.	2, including 1 calcined bone.	1	1 skull fragment, ? sheep.
C	4	1 scapula of sheep. 3 rabbit bones. 4 others.	2 sheep. 4 others.	1 lower molar of sheep. 1 lower premolar of small ox.	1 vertebra of codfish.
D	2 teeth of ox. 9 others (calcined).	1 skull of field vole. 1 femur of rabbit. 3 others.	...	1 vertebra of sheep. 6 others.	2 (calcined).

The sheep bones in stratum A represent, no doubt, a natural fatality, and the same may be true of the bones in stratum B, except the calcined one in area III. The rabbit bones in II. C and II. D have already been discussed and the field vole's skull in II. D requires no explanation. The calcined but unidentifiable fragments in stratum D, areas I. and V.—regions which it has been argued above were relatively undisturbed —may be assumed to represent bones dropped by the pre-Iron Age users of the cave. The codfish vertebra in V. C has in all probability a similar origin. The other bones in strata C and D may be brought

by man, but may equally be natural casualties at some stage when the cave was not in occupation. I fear, therefore, that the conclusions to be drawn from the bones found are meagre. The water-logged peaty soil of the cave had no doubt dissolved the great part of the bones originally deposited.

Sea-shells were found in considerable quantity at all depths and only specimens were kept. The shellfish represented were the common limpet, the common periwinkle, and the purple dog-whelk. Dr Jackson notes that a shell of the latter from II. B was broken as if to extract the dye. While the presence of sea-shells might be due to natural causes, an easily accessible cave away from the sea and affording no protection for nesting is not a place where the larger birds are likely to be found. It is fair to suppose that the shells represent the refuse of successive human occupants' meals.

Wood and Charcoal.

A few fragments of wood were found preserved in the peaty soil. Charcoal was present in quantity in the neighbourhood of the furnace and isolated fragments were found throughout the excavations. I am indebted to the Regius Keeper of the Royal Botanic Garden, Edinburgh, and to Mr M. Y. Orr for identifying specimens from a number of regions. These identifications are given in the following table:—

Distribution of Wood (W) and Charcoal (C).

Strata.	Areas.				
	I.	II.	III.	IV.	V.
A	...	(W) Pine. (C) Willow or Poplar.	...	...	...
B	...	(C) Birch.	(W) Hawthorn.	(C) Willow.	...
C	(C) Oak.	(W) Pine.	...	(C) Birch.	...
D	...	(W & C) Pine. (C) Willow or Poplar.	...	...	(C) Birch.

Mr Orr comments: "All the trees mentioned are native in the island of Skye, although the pine is said to be only doubtfully so by Druce in his *Comital Flora of the British Isles.* The advanced state of carbonisation of A II. (charcoal) and D II. (charcoal) make it impossible to distinguish between willow and poplar."

It is to be noted that quantities of driftwood are thrown up in Camas a'Mhurain, half a mile from the cave. This provides the only modern source of timber, the nearest trees, mainly birch and alder, being two miles to the east. No doubt ancient woods have been destroyed by the growth of peat, but it is probable that the ancient as well as the more recent inhabitants of Rudh' an Dunain collected driftwood from the shore. I am afraid, therefore, that the table given above, even if extended to include a much greater number of specimens, would not give any reliable index to the successive flora of the peninsula.

Description of Artifacts.[1]

Pottery.—(1) Beaker (figs. 4 and 5). Three rim fragments (two from I. D and one, contiguous with one of the latter, from II. D) of a beaker of A/C type. The vessel has had an almost straight neck sloping slightly outwards; at 1½ inch below the rim it begins to bulge outwards. The thickness is ¼ inch but decreases at the rim, which is rounded and slightly bevelled internally. The clay is fine, mixed with small crushed stone grits, and is dark grey internally and on the inner surface; the outer surface is buff, verging in places into dark grey. The decoration is impressed with a moderately fine comb.

(2) Beaker (fig. 5). Fragments from I. D of paste and thickness similar to (1) and probably part of the same vessel.

(3) Beaker (fig. 5). Fragment from I. D of paste and thickness similar to (1); possibly part of the belly of the same vessel. In addition to the comb decoration, and partly destroying it, there are lines of horizontal stabs made with a fine point.

(4) Beaker (fig. 5). Four fragments from V. C of paste similar to (1) and of $\frac{3}{16}$ to ¼ inch thickness. In addition to comb decoration there are lines of horizontal stabs similar to those on (3), partly destroying the comb decoration.

(5) ? Food-vessel (figs. 4 and 6). Five fragments (three from I. D, one from IV. D, and one from I. B) of a vessel which should probably be classed as a food-vessel. The one rim fragment shows that the rim was thickened and bevelled internally, the diameter being about 5 inches. The wall fragments show a slight curve in profile. The

[1] The vessels represented are numbered 1 to 15 in the description below, and are similarly numbered in figs. 4 to 7.

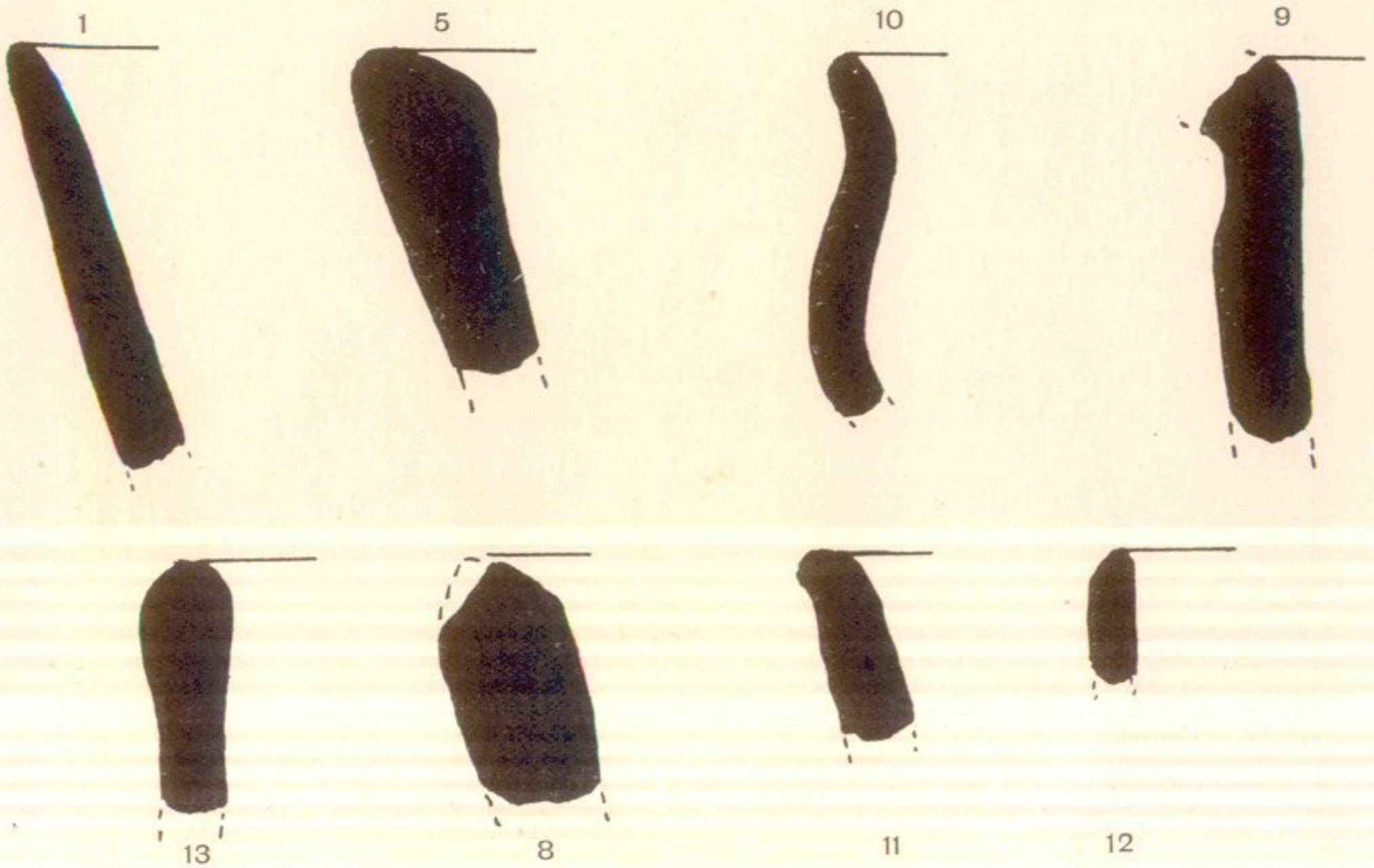


Fig. 4. Rim Sections of Pottery. (¼.)

Fig. 5. Fragments of Beaker Pottery. (¼.)

thickness of the vessel below the rim is $\frac{3}{8}$ inch. The clay is moderately fine, mixed with fairly small crushed stone grits; the surfaces, except where now disintegrated, are smooth. The pottery is black throughout, though the exterior surface in one fragment verges in places to brown. The decoration is mainly impressed with a very coarse comb, the pattern being erratically formed of horizontal and diagonal lines, possibly forming chevrons in places. There are, however, finely scratched horizontal lines below the rim and signs of more deeply incised vertical lines elsewhere. The internal bevel of the rim is decorated with diagonal comb-impressed lines.

(6) ? Food-vessel (fig. 6). Fragments from IV. C of vessel decorated similarly to (5) and of the same thickness. The clay is generally like that of (5), but the surfaces are less smooth and the colour throughout is buff. It is just possible that it is part of the same vessel; it is certainly decorated with the same comb.

(7) ? Beaker Period Vessel (fig. 6). Fragment from V. C of vessel $\frac{5}{16}$ inch thick of moderately fine clay mixed with coarse crushed quartz grits, dark grey internally and on inner surface, reddish buff on outer surface. It is decorated with regularly spaced tube impressions, $\frac{1}{8}$ inch in diameter, pressed into the clay at right angles.

(8) ? Early Bronze Age Vessel (fig. 4). Small and damaged fragment of a thickened and internally bevelled rim from V. D. The clay is fairly coarse with moderately large crushed stone grits, dark grey internally and on inner surface, buff on outer surface.

(9) Early Iron Age Vessel (figs. 4 and 7). Damaged rim fragment from V. C, and body fragment from II. B of a vessel with a slightly hollowed neck and a rim roughly turned over to the exterior and flattened. The thickness is $\frac{5}{16}$ inch. The clay is fine and sandy in texture, the grit remaining is fine, but there have been large grits which have dissolved and left pits in the surface. The interior is brown to grey and the inner and outer surfaces brick red to dark brown.

(10) Early Iron Age Vessel (figs. 4 and 7). Fragment from I. B of a slightly hollowed neck irregularly made with everted rim plainly rounded over. The thickness varies from $\frac{3}{16}$ to $\frac{1}{4}$ of an inch. The clay is fine with a few large grits, and pock marks representing grits which have dissolved. It is red buff internally, and the inner and outer surfaces vary from a reddish to a greyish buff.

(11) Early Iron Age Vessel (figs. 4 and 7). Small fragment from II. C of a rim flattened on the top and pressed outwards. The thickness below the rim is $\frac{5}{16}$ inch. The clay is fine with few grits; the interior is grey, the inner surface grey buff and the outer one red buff.

(12) Early Iron Age Vessel (figs. 4 and 7). Small fragments from

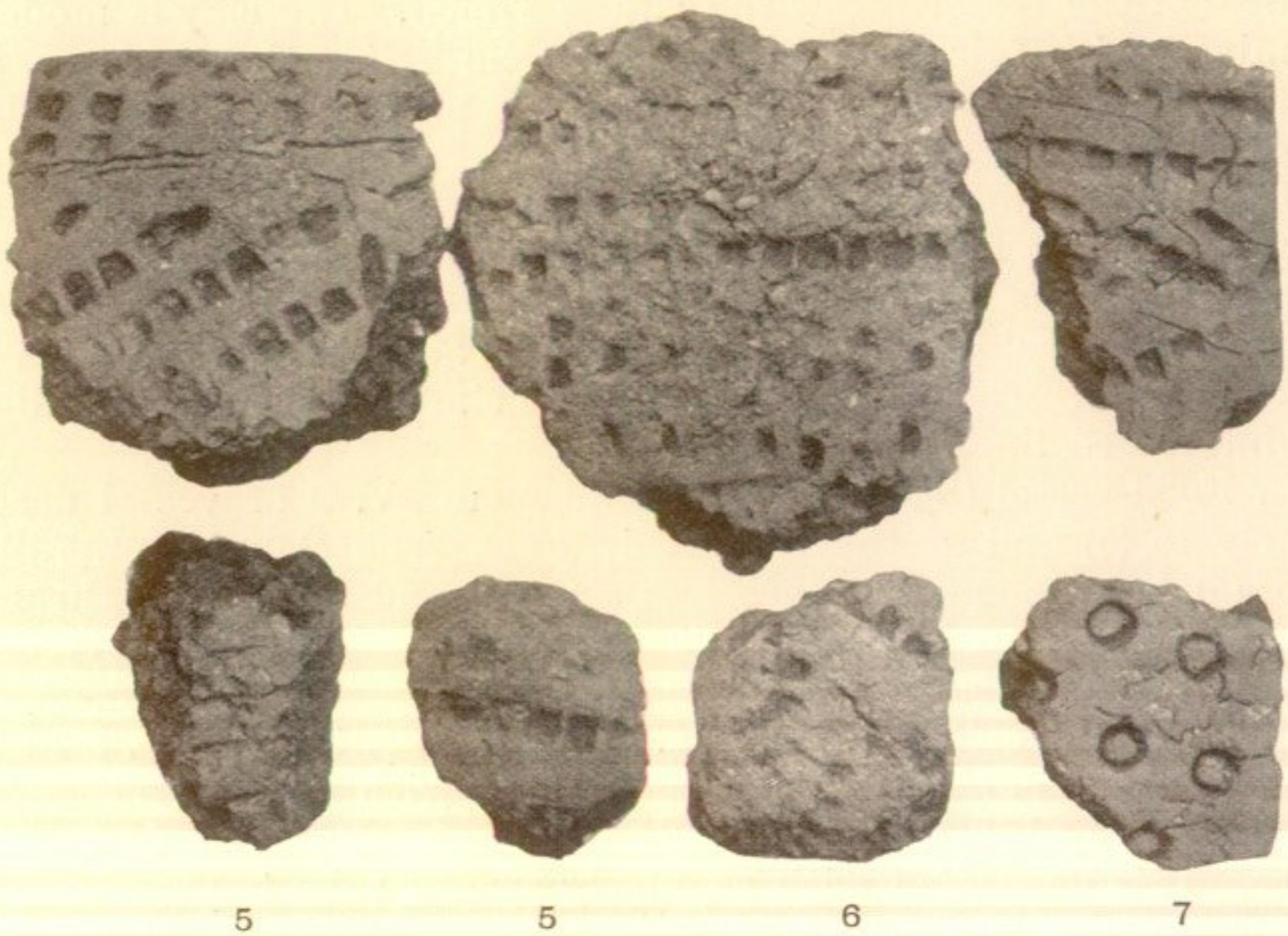


Fig. 6. Pottery of Beaker Period. ($\frac{1}{1}$.)

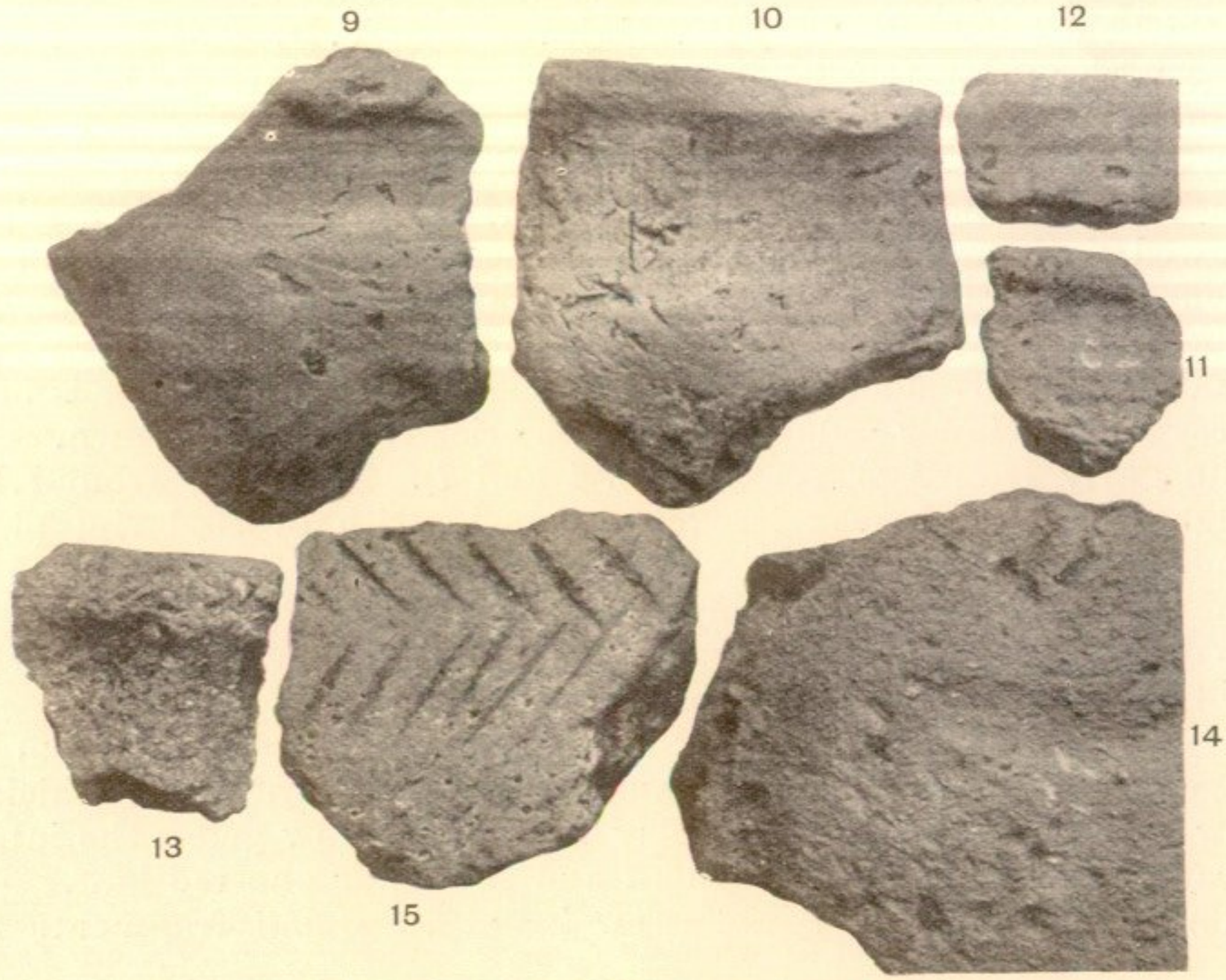


Fig. 7. Early Iron Age and Sandhill Type Pottery.

II. B of an upright rim simply rounded over. The thickness is $\frac{3}{16}$ of an inch. The clay is fine with few grits; the interior is a dull brick red; the inner and outer surfaces are brick red to grey.

(13) ? Early Iron Age Vessel (figs. 4 and 7). Small fragment from II. A of a thickened and rounded rim. The thickness below the rim is $\frac{5}{16}$ inch. The paste is coarse, mixed with much grit; the interior and the inner and outer surfaces are yellowish buff.

(14) Sandhill Type Vessel (fig. 7). Fragment from V. A of a vessel of a coarse sandy texture, $\frac{3}{8}$ to $\frac{5}{16}$ inch thick, dark grey internally, grey buff to dark grey on inner surface, reddish buff on outer surface. There is a shallow groove, 1 inch long, made with the finger-tip on the outer surface.

(15) Sandhill Type Vessel (fig. 7). Fragment II. A of the carination of a vessel of fairly fine clay, pinkish grey internally and on the inner surface, and pink on the outer surface. The thickness at the carination is $\frac{3}{8}$ inch; above and below it is $\frac{5}{16}$ inch. A herring-bone pattern is incised horizontally, straddling the carination.

Daub.—Two small fragments of clay burned brick red were found in I. C. From a rounded groove through one and fine grooves on the surface of both they seem likely to have been part of a wattle and daub structure.

Wood.—The implement of pine wood, 1 foot 6 inches long by $5\frac{1}{2}$ inches wide by $\frac{3}{4}$ inch thick, illustrated at fig. 8, was found lying on its edge at a distance of 6 inches from, and parallel to, the inner (eastern) side of the furnace. Its upper edge was level with the upper surface of the east wall of the furnace. One corner has rotted away and part of its surface, but it has otherwise been completely preserved in the peaty soil. From its position it is reasonable to connect it with the iron industry, but its condition gives no indication of its use. Its surface is unburned and has no trace of adhering metal, though no doubt any metallic iron would have disappeared long since by oxidisation.

Pumice.—Two lumps of pumice were found in I. D. The larger has a facet considerably ground away by rubbing some flat surface. The smaller has also a ground facet, though this is not quite flat.

Flint Pebble.—A silicious pebble found in I. D has approximately flat facets, and also a number of irregular, smooth hollows of various sizes. No convincing explanation in terms of human agency presents itself and the shape of the stone may be due to natural causes.

Comments.

Pottery.—(The several vessels are referred to by the numbers used on the preceding pages and in figs. 4 to 7.) The study of the pottery is of special importance, since it provides the only means of dating the

sequence of occupations of the cave. The earliest certainly datable sherds are the beaker fragments (1) to (4). As these are all of fine thin ware with typical comb decoration arranged in horizontal bands, one fragment showing a plain band, there is no reason to regard the vessel or vessels as late. Some sherds have stab in addition to comb decoration. This type of decoration is not recorded by Abercromby, but in the Cambridge Museum of Archæology there is a fragment, dredged with Peterborough sherds out of the River Wissey, on which this motive is used, and in a manner closely similar to its use at Rudh' an Dunain. Stab decoration is found on some Scottish Windmill Hill pottery, notably at Unstan in the Orkneys, and is exemplified in the Hebrides at Eilean an Tighe, North Uist;[1] it is also found on Peterborough ware.[2] Its presence on beakers at Rudh' an Dunain and in Cambridgeshire may therefore be interpreted as a reminiscence of a local neolithic tradition.[3]

It may be noted that here the stab decoration has been made after the comb impressions and that in places it interferes with them. It has been pointed out by Rosenberg that cord-ornamented pottery stretching from the Black Sea to the Baltic and from the Baltic to Britain often has an additional decoration in the shape of a line of pits below the rim, and that in Europe, but not in Britain, these pits frequently interfere with the cord ornament.[4] He has argued that this phenomenon proves a superimposition of two traditions. At Rudh' an Dunain the motive derived from the earlier culture is the intrusive one, and appears to represent a harking back by beaker makers of neolithic stock to their old native tradition. There is evidence from burial practice that beaker people were absorbed in the Hebrides into the neolithic population without break in the cultural tradition.[5]

The vessel numbered (5) appears to approach the food-vessel more closely than it does any other recognised type. The thickened rim with a decorated internal bevel is typical of the food-vessel, and comb decoration is not rare on this class of pottery in Scotland. It has been argued that the food-vessel in its most characteristic forms (vessels

[1] J. G. Callander, *Proc. Soc. Ant. Scot.*, vol. lxiii. pp. 93 and 94.

[2] Stuart Piggott, *Arch. Journ.*, vol. lxxxviii. p. 116. Mr Piggott suggests that its presence at Unstan is to be explained by Peterborough influence. The point cannot be argued here, but I personally regard this as an element in a group of decorative motives, mainly geometric, which distinguish a type of Orkney and Hebridean pottery deriving from a source other than English neolithic wares.

[3] Some caution is desirable, however, about the Cambridgeshire specimen. There seems some reason to think that certain beakers of apparently composite decorative tradition from this area derive in fact directly from a Netherlands type.

[4] G. Rosenberg, *Kulturströmungen in Europa zur Steinzeit*, p. 93.

[5] *Proc. Soc. Ant. Scot.*, lxvi. p. 207. For similar evidence regarding Anglesey, see *Arch. Camb.* (December 1933), p. 223.

with hollow shoulder-grooves bridged by lugs, footed bowls and shallow bowls decorated on their round bottoms) represents traditions derived, possibly through Ireland, from Sardinia, Pyrennean France, and Portugal,[1] and the vessel here in question may represent the impact of those traditions on the Hebridean neolithic culture. That the internal bevel, which is not characteristic of Windmill Hill pottery anywhere, did in fact impose itself on that ware in the Hebrides is shown by two vessels from the chambered tomb of Clettraval, North Uist;[2] of these one is pure West Highland Windmill Hill, while the other, found at a higher level, and stratified with fragments of beaker type, is almost identical with it, but shows a decorated, steep, internal bevel. The decoration of the vessel (5)—very coarse comb-impressed lines arranged diagonally and more or less at random—suggests Hebridean Windmill Hill ideas carried out with the new implement, the comb. It may fairly be inferred that the vessel represents local neolithic tradition under the impact of food-vessel influence, and therefore dates from food-vessel times. A virtually identical rim fragment, found in a pit dwelling at Mye Plantation, Wigtownshire, has, however, been provisionally classified by the excavator and by Dr Callander as neolithic.[3] It may be noted, since food-vessels are still generally regarded as a purely funerary pottery type, that a fragment considered to be food-vessel, though possibly late beaker, was associated with Peterborough and beaker pottery in Rowbarrow Cavern, near Bristol.[4]

The fragment of vessel (7) shows a type of decoration consisting of equally spaced small circles impressed at right angles to the surface with a hollow tube. Identical decoration is found on a fragment from the divided ditch habitation site at Abingdon,[5] which is classified as relatively late in the Windmill Hill series, and on a fragment from a hut-circle at Muirkirk, Ayrshire,[6] where it was associated with beaker. Generally but not identically similar decoration is found on sherds from Glenluce and Hedderwick,[7] on beakers from Wiltshire and Berkshire,[8] and on an unpublished sherd, probably of a beaker, from High Wheeldon cave, near Buxton.[9] The pottery referred to on p. 216 above,

[1] Cf. *Proc. International Prehistoric Congress*, 1932, pp. 133–4.

[2] I hope to make a report on this tomb in vol. lxix. of these *Proceedings*.

[3] Ludovic Mann, *Proc. Soc. Ant. Scot.*, vol. xxxvii. p. 391, and J. G. Callander, *op. cit.* p. 55.

[4] H. Taylor, *Proc. Spæleological Society*, 1925, p. 206. From the illustration given I should personally regard the description of the sherd as food-vessel as distinctly doubtful.

[5] E. T. Leeds, *Ant. Journ.*, vol. viii. pl. lxiv. fig. 2*j*, and *Antiquity*, vol. iii. pl. ix.

[6] A. Fairbairn, *Proc. Soc. Ant. Scot.*, vol. lxi. p. 272, and J. G. Callander, *op. cit.* p. 95.

[7] J. G. Callander, *op. cit.* p. 90.

[8] Abercromby, *Bronze Age Pottery*, vol. i. Nos. 3 and 7.

[9] Information from Mr Stuart Piggott, to whom I am also indebted for calling my attention to the Abingdon parallel.

which was dredged from the River Wissey in the Fens and shows distinct interaction of Peterborough and beaker traditions, includes a sherd with impressed circles. This type of decoration appears, therefore, to be primarily a neolithic form, though it appears rarely on beakers.

The vessels mentioned above undoubtedly date the earliest use of the cave. No vessels of Windmill Hill type were found, and the first occupation may be taken to belong to the period when beakers were being introduced and the native neolithic pottery was being modified under their influence and that of food-vessels. All this group of vessels may be relatively early in the beaker period. The chambered tomb of Rudh' an Dunain, which was built in Windmill Hill times, was being used at that period for the burial of beaker-using people, one of them broad-headed, who may be assumed to have been the first users of the cave.

There is no pottery assignable with certainty to the period between the beakers and the Early Iron Age. A few fragments can plausibly be regarded as Bronze Age from their texture, and one minute and damaged rim fragment with an internal bevel (8) may be relatively early. From the paucity of the sherds which can even conjecturally be placed in that period it is probable that the cave was not then continuously in use.

Of the Early Iron Age pottery (9) to (13) it is not possible to speak in detail or with much confidence, since the sequence of Scottish wares of this period has not yet been studied with the same thoroughness as that of the corresponding English wares. Mr Christopher Hawkes, who has been good enough to examine the fragments, expresses the opinion that some of them definitely represent the Scottish analogue to English Iron Age A. The fort which overlies in part the chambered tomb in North Uist mentioned on p. 217 above has produced a number of sherds of well-defined type which give much clearer evidence of the existence of a Hebridean Iron Age A. When this culture reached the Hebrides and how long it flourished there we do not at present know. We can at least be sure that it has disappeared by the period of the broch and sandhill cultures with their entirely different pottery, and these begin, at any rate, in the Roman period.[1] The broch of Dun an Iardhard, Dunvegan, Skye, produced a terra-cotta object apparently representing a bale of merchandise;[2] the earth-house of Bac Mhic Connain, Vallay, North Uist, produced a Samian sherd.[3] The Iron Age A culture of

[1] No sharp cleavage appears. Iron Age A pottery does appear in brochs, though it is not typical.

[2] F. T. Macleod, *Proc. Soc. Ant. Scot.*, vol. xlix. p. 66; and J. Curle, *Proc. Soc. Ant. Scot.*, vol. lxvi. p. 395.

[3] E. Beveridge and J. G. Callander, *Proc. Soc. Ant. Scot.*, vol. lxvi. p. 61.

Rudh' an Dunain may be expected to have been displaced by the time that the promontory broch was built a short distance away from the cave which is the subject of this paper.

To the period of the promontory broch I would hesitantly assign the two sherds (14) and (15) from stratum A. The texture and the finger-tip decoration of the former strongly suggest sandhill-broch pottery. The incised chevron pattern on the latter might suggest the Bronze Age, but this attribution would not be supported by the texture and colour of the sherd. Chevron patterns occur on pottery from the broch of Dun an Iardhard, Skye[1] and from sandhill sites in Coll and Tiree,[2] and it is probably to this period that the fragment is to be assigned.

There was no trace of Romano-British pottery in the cave.

Iron-working.—The iron furnace may be assigned to the Iron Age A occupation of the cave, since its floor was, as already stated, in the plane of separation of strata B and C. Whatever the precise date of this occupation, the type of furnace may be taken to represent that in use by Iron Age A invaders of Britain, and this is of some importance, since no pre-Roman iron furnaces have hitherto been found either in Scotland or in England.[3]

It is reasonably clear that the Rudh' an Dunain furnace is of the primitive Western European type which has survived into modern times under the name of the Catalan forge. Charcoal and ore would be piled against the back wall and a blast from a skin bellows would be applied through a channel leading round the base of the back wall. The contents of the furnace would be gradually stirred together from the front and would agglomerate into a spongy mass. When the ore was sufficiently reduced the loose cinder would be raked away and the bloom of iron levered out. It would then be hammered into a compact mass and left to cool.[4]

An artificial blast is not essential to iron-smelting though it greatly accelerates the process. I do not think, however, that the operation would have been carried out in a cave if a natural draught had been used; there would have been too much back draught. How much the

[1] F. T. Macleod, *op. cit.* p. 67.

[2] E. Beveridge, *Coll and Tiree.*

[3] British Museum, *Early Iron Age Guide*, 1925, p. 2. A curious furnace was found by Mr E. T. Leeds at Chun Castle (near Land's End), which was an Iron Age B fortress, though it continued in some sort of occupation into Romano-British times. Iron and tin slag were found near the furnace, which Mr Leeds suggests "may have been used for smelting rather than cooking" (*Archaeologia*, vol. lxxvi. pp. 216 and 217). From the size of the furnace (10 feet by 5 feet) and from the description given it seems unlikely that it can have been used for iron-smelting.

[4] For a description of analogous processes, see Sir William Gowland, *Archaeologia*, vol. lvi. p. 309 ff., and *J.R.A.I.*, vol. xlii. p. 276 ff.; see also *Ency. Brit.*, 9th ed., *s.v.* "Iron."

draught was improved by enclosing the fire we cannot now tell, but the presence of slag formed by the fusing of sand with limestone suggests that the sides were built up with slabs and packed outside with a covering of sand. The front might be similarly treated and broken down only when the smelting was nearly completed. No clay appears to have been used either to pack up the slabs of the furnace or to provide a nozzle for the air channel; the fragments of burnt clay mentioned on p. 215 above are more reasonably interpreted as part of a wattle and daub structure.

This furnace is much more primitive than the Early Iron Age furnaces in the form of a vertical shaft which are found on the Upper Danube and in the Jura,[1] and resembles in shape and size the copper-smelting furnaces found at Mitterberg in Austria.[2] These are square hearths built up at the back and sides, but open, or at least not permanently closed, at the front. They are built into the side of a hill, however, and the blast can hardly have been applied from the back, as it probably was at Rudh' an Dunain.

The latter is, of course, a much cruder affair than the Roman iron furnace recently found at Colsterworth in Lincolnshire,[3] but it does not differ from it in principle. The Lincolnshire example was a box-shaped structure of clay set in the ground with a clay roof pierced with holes, and with holes in the side to admit the blast; it was fed from one end. On the other hand, Rudh' an Dunain is considerably more advanced than an iron furnace in Constantine's Cave, Fifeshire, which was associated with amphoræ dated to the second century A.D.[4] This furnace was no more than a flat hearth with a low kerb of stones round it, and the blast must have been fed in across the top. No simpler form of iron-working than this exists anywhere, yet its users must have been in trading relations with Romanised Britons south of the Antonine Wall.

The wooden implement described on p. 215 above and illustrated in fig. 8 may probably, from its position, have been used in connection with the iron-working. There are no parallels to it among the numerous wooden implements recovered at Mitterberg.[5] So simple an article might be turned to many purposes, and would probably be used to shovel the ore and charcoal into the furnace and to pack the exterior of the walls with sand.

Pumice.—The pumice found with beaker fragments in I. D is of

[1] Sir William Gowland, *Archaeologia*, vol. lvi. p. 315 ff.
[2] J. Andree, *Bergbau in der Vorzeit*, pp. 34 and 35; and in Ebert, *Reallexicon*, *s.v.* "Bergbau.
[3] J. C. Hannah, *Ant. Journ.*, vol. xii. p. 262 ff.
[4] A. J. B. Wace and Prof. Jehu, *Proc. Soc. Ant. Scot.*, vol. xlix. p. 241 ff.
[5] J. Andree, *op. cit. supra.*

similar, probably West Indian, origin to that found in the beaker stratum of the chambered tomb,[1] and may well have been used by the same people. The use of pumice picked up from the shore can, however, be traced back to neolithic times in the Hebrides[2] and continued into Romano-British times, and probably later.

General.—The excavation of the cave was undertaken in the hope of throwing light on the domestic life of the Rudh' an Dunain peninsula during the two thousand years which separated its two great monuments, the chambered tomb and the promontory broch. Actually the use of the cave has been shown not to begin until the

Fig. 8. Wooden Implement. (1 foot 6 inches in length.)

later stage of the employment of the tomb, when beakers had ousted Windmill Hill ware, and it has been shown virtually to have ended by the time the broch was built. Within these extreme limits the excavations have served to illustrate the occupations, if not the domestic life, of the inhabitants of this isolated area. At the beginning of the period they were carrying on a stone-knapping industry, which carried them as far as Rum in the search for raw material. At the end of the period they were engaged in iron-smelting, and were the possessors of a furnace which, primitive as it is, is considerably more advanced than one in use in Fife in the Roman period by people who traded with Romanised Britons.

The stone-working began with beaker-using people, who, on the evidence of the tomb, included broad-headed invaders who mixed with the native population. There is no conclusive reason for thinking that the use of the cave was continuous, and, so far as the evidence of the cave goes, the peninsula may have experienced no Bronze Age. The iron-workers were the bringers of a new culture analogous to that of the English Iron Age A. We do not know whether the iron-

[1] See Dr H. H. Thomas's report at App. II. to my paper on the tomb in *Proc. Soc. Ant. Scot.*, vol. lxvi. p. 212.

[2] A piece was found in a neolithic stratum in the chambered tomb in North Uist mentioned on p. 217 above.

smelters worked their metal up themselves or whether they traded it by sea; there are no iron implements as evidence of the former and no obviously traded objects to show the latter. The North Uist fort mentioned on p. 218 above shows that the Hebrides had a quite vigorous Iron Age A culture of their own, and Rudh' an Dunain had some share in this. No doubt, however, this period was not comparable with the abundant activity of the succeeding one, which gave to the peninsula its magnificently built promontory broch. But by this time the use of the cave had virtually ceased.

I should like in conclusion to express my gratitude to Dr J. Grahame Clark of Peterhouse, Cambridge, for his report on the stone industry and for his drawings of the implements; to Dr H. H. Thomas of the Geological Survey for his work upon the slag; to Dr J. Wilfrid Jackson of Manchester University for his examination of the animal bones; to the Regius Keeper and Mr M. Y. Orr of the Royal Botanic Gardens, Edinburgh, for the identification of the wood and charcoal; and finally to Dr H. J. Plenderleith of the British Museum for his most successful preservative treatment of the wooden implement.

APPENDIX I.

REPORT ON THE WORKED-STONE INDUSTRY.

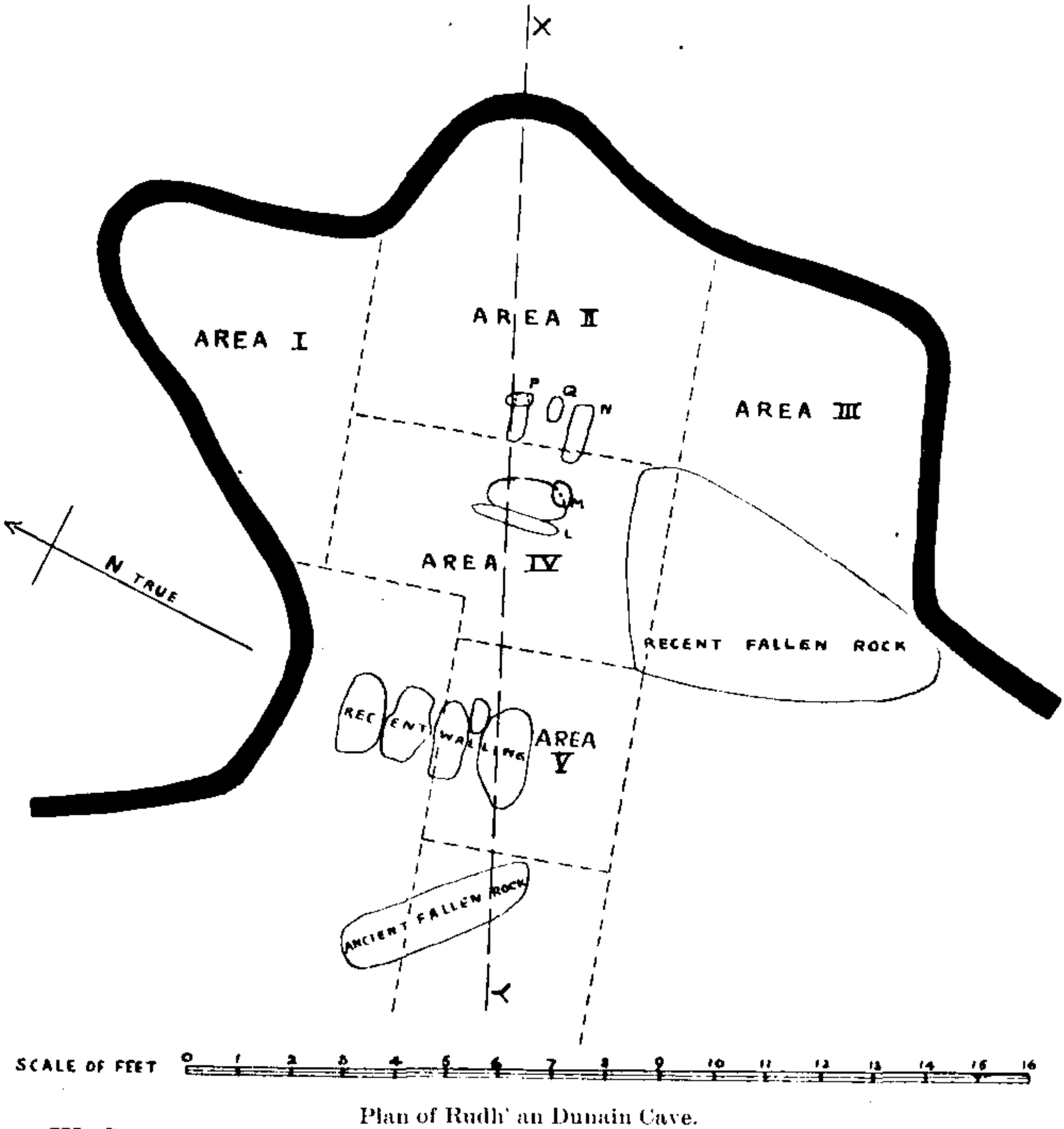
By J. G. D. Clark, Ph.D., M.A., F.S.A.

The raw material shows considerable diversity, consisting of various kinds of flint and chert,[1] quartz and bloodstone. The flints and chert seem to derive from the beach much of the flint showing traces of pebbled cortex (*e.g.* Nos. 3 and 8). The bloodstone is of some interest as it seems to indicate a certain amount of local trade, or at least contact. We may quote Mr A. G. Brighton of the Sedgwick Museum, Cambridge, who kindly submitted specimens to Mr Harker: "The greenish specimens with red-brown spots are undoubtedly bloodstone, and Mr Harker, to whom I have submitted them, is quite certain that they must have come from 'Bloodstone Hill' (Creag nan Stairdean) in Rum."[2]

Typologically the industry is too poor to be culturally informative. The great bulk of the material consists of waste chips and rather formless cores. Some quite good flakes were, however, obtained from

[1] Thus in addition to flint of normal appearance there is a considerable amount of black material patinated a yellowish grey colour, which Dr Thomas of the Geological Survey regards as "either flint or chert from the Mesozoic deposits." Another variety is dark red, and this Dr Thomas regards as "chert possibly from pebbles out of the Triassic conglomerates." All could be obtained locally from the beaches in Dr Thomas's view.

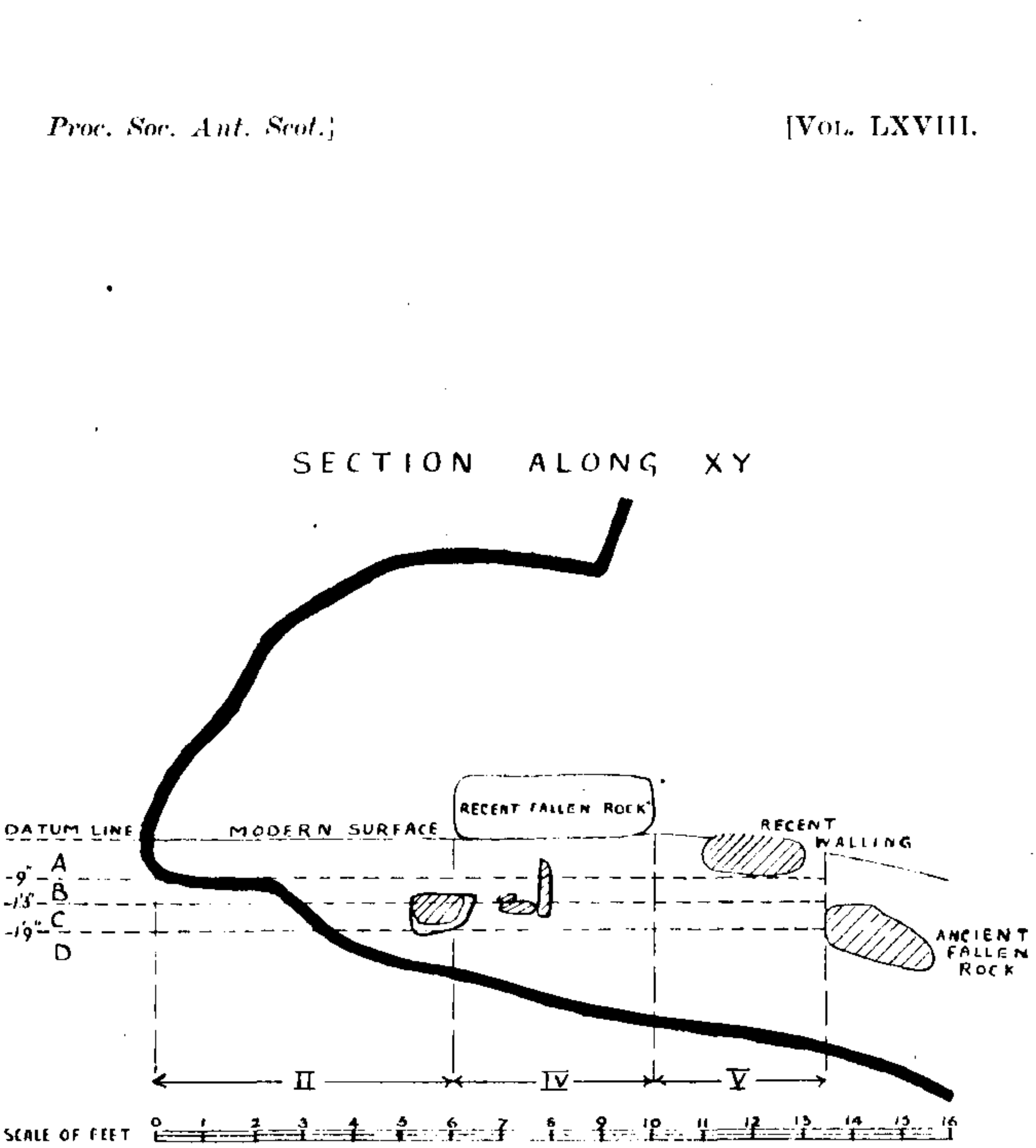
[2] *Vide* also Harker, 1908, *Mem. Geol. Survey, Scotland, Geology of the Small Islands in Inverness-shire*, p. 134.



Plan of Rudh' an Dunain Cave.

W. LINDSAY SCOTT. PLATE III.

[*To face page* 222.



Section of Rudh' an Dunain Cave.

W. Lindsay Scott. Plate IV.

[*To face page* 222.

the bloodstone, *e.g.* No. 1 (from IV. D), a flake of triangular section with a partially battered keel, and Nos. 2 and 4 (from I. A), both of which show signs of use for cutting or sawing. It is interesting to note that No. 2 shows a narrow band of very faint lustre of the type produced by sawing into some hard object.[1] No. 3 (from III. B) is a shaped lump of flint with pebbled cortex; if regarded as a core one can only say that the flakes struck from it cannot have been of much use owing to their small size. A few poor scrapers occur (Nos. 5 to 8 from II. D, V. C, II. B, II. B respectively). No. 6 of flint must have been difficult to use with much effect. It is possible that Nos. 7 and 8, especially the former, which is of quartz, were hafted in some kind of handle. The pointed part of No. 7 shows no signs of use as a borer and may be regarded as a tang. A flake of red chert has been trimmed round the edge from both faces. It is broken and is of no special form.

Seventy-five per cent. of the worked-stone fragments came from layers C and D, which yielded beaker sherds, while the remainder came from layers A and B, with Early Iron Age sherds. There is no noticeable difference between the specimens from the two horizons. It should be noted that the cave has been subject to some disturbance.

[1] This lustre may only be seen in the right light. On flint it is very easy to see. Possibly the material explains this difference.