II.

A BRONZE AGE CEMETERY AT KNAPPERS, KILBOWIE, DUMBARTONSHIRE.

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Knappers Sand Quarry is in the parish of Old Kilpatrick, Dumbartonshire, rather more than half a mile south of the Antonine Wall, at a point between the forts of Castlehill and Duntocher. Some years ago a new highway, known as the Duntocher Boulevard, was constructed between Anniesland, on the western outskirts of Glasgow, and Duntocher, and this sand-pit lies on the east side of this main artery, about a quarter mile west of its intersection with the Drumry Road.

The surrounding country is gently undulating, the elevations varying from about 100 feet above sea-level at South Drumry to about 200 feet in many of the immediately surrounding hillocks. The name "Knappers" seems to suggest the Gaelic *knap-r* = a knob or knoll, and this drumlin through which the road was driven is typical of many in the neighbourhood. The elevation of the Boulevard at Knappers is about 150 feet above sea-level, and the knoll rises about 16 to 18 feet above this. The maximum height of the site lay along the line parallel to the Boulevard, from which it sloped gently down to the east and north-east towards Cleddans Burn, a hundred yards away.

While many of the surrounding hillocks are composed of boulder-clay, this is almost entirely absent on Knappers site, the composition being a fine regular sand with a comparative absence of shingle. The complete absence of anything like glacial boulders and the smallness of the stones composing the shingle, together with the apparent regularity of the layer upon layer of the deposition, would appear to indicate a laying down of the sand in calm-water times, the smallness of the pebbles being in inverse ratio to the turbidity of the stream flow.

Attention was first drawn to the site in December 1933, when workmen, in excavating sand, brought to light an earthenware vessel. Unfortunately it was broken into several pieces by a heavy fall of sand. This proved to be the forerunner of an important series of finds, and with the cordial co-operation of Mr Edward Millar the lessee, and the concurrence of Captain Robert Bush Black of Auchentoshan the proprietor, accompanied by my colleague Mr John Gentles, I visited

the site and was enabled to collect the information submitted in this report.

From the outset it was apparent that there was a variety of individual sites associated, though not definitely connected, one with another, and I numbered these as they came to light. The first four noted I did not see, and for the information about them and for all the subsequent assistance I received at his hands I am deeply indebted to Mr William Rogerson, the foreman on the site, who, by his enthusiasm and willing co-operation, ensured the preservation and exploration of the various deposits while not impeding the work of the quarry.

1. This was apparently a burial in a cist constructed of large stones, with a large undressed slab of micaceous schist measuring about 5 feet 9 inches long by 2 feet 9 inches wide and about 9 inches to 12 inches thick as the cover. The cist was entirely wrecked, but was said to have been formed of rounded boulders, which fell out of position owing to the removal of the sand. The long axis lay north and south. Within the structure was found a polished flint adze lying across the north end.

Fig. 1. Flint Adze.

The adze is intact and as perfect as if it had just left the maker's hands (fig. 1). It is wonderfully worked out of a piece of black flint with large grey patches, carefully flaked and finished by grinding and polishing. The sides narrow gradually and symmetrically in a concave curve, and both the cutting face and the butt are fashioned into crescentic form. The cutting edge is very sharp. The length is 5·2 inches, the breadth at the narrow waist 1·2 inch, and the thickness is ·5 inch.

No other relics were recovered or noted, but at a later date I re-examined the top slab and also some of the stones said to have come from the cist. On one of these, a grey sandstone slab, stated to have

been an end stone, I traced several markings recessed on the flat face towards the larger end (fig. 2). The stone is about 3 feet long and 21 inches broad at its widest part, being rather pear-shaped. The markings consist of a double elliptical ring about 7 inches long and 6 inches broad, the inner ring being roughly concentric and about 1 inch within the outer. The long axis is roughly parallel to the main centre line of the stone. A second similar set of oval rings is situated with their

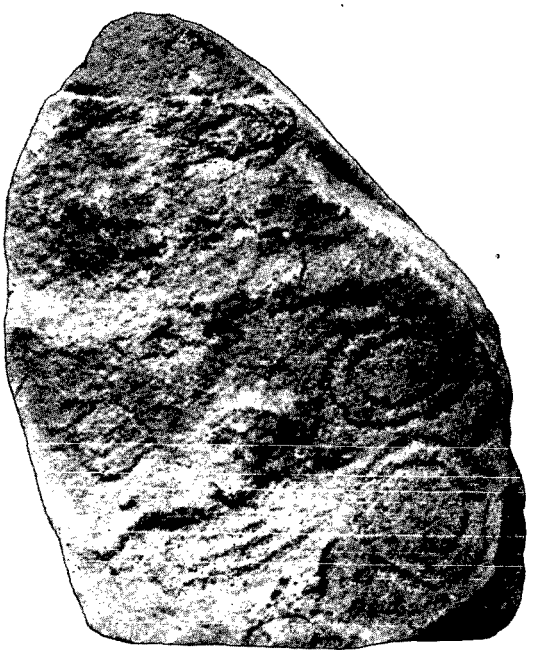


Fig. 2. Ring-marked Stone.

centres about 6½ inches from the first, but at right angles thereto and on the same parallel as the centre of the stone. Tangential to the outer ring of the upper ellipse is a groove running diagonally downwards to the central line of the stone and thence at right angles to form the bottom recess of a double U-shaped design on the opposite side of the central axis. A fourth carving, a single circle 3½ inches in diameter, on the same lateral centre as the upper ellipse, completes a fairly uniform and balanced geometrical layout. These markings are all picked, not incised.

Double oval rings, whilst rare, are not unknown on stones from Bronze Age cists (*Proc. S.A. Scot.*, vol. lviii, "The Stone Cover of the Catterline

Cist"), but the double elongated U-shaped design does not seem to have been recorded hitherto in Scottish Bronze Age sculpturings.

2. Two food-vessels, much broken, were found about 3 feet below the surface and about 16 feet 3 inches above the level of the Boulevard. One has been reconstructed with a fair degree of completeness (fig. 7). It is 5·6 inches wide at the rim and is decorated with incised line markings.

The second pottery find consisted solely of the bottom portion of a food-vessel, of a finely made, smooth-surfaced clay of pale brown colour (fig. 7). The pottery is described in detail at the end of this report.

3. This was reported to me as being a cairn burial, the stones lying in cruciform formation. The long axis lay north and south. The structure was composed of large stones, laid to form a rude paving about 18 inches wide and about 6 feet long. The cross members measured about 3 feet 6 inches over the arms. The top layer of stones was placed some 2 feet below the surface.

There were said to have been four burials in two layers. The under burials lay, one on each of the two cross-arms, on a stone foundation and covered by a layer of stones about 12 inches lower than the two top burials. The stones were, apparently, not definitely laid but had the appearance of having been mostly thrown in. The largest stones were rounded boulders of about 12 to 15 inches long, and the others varied down to about the size of the human fist. On many of them were black marks of discoloration as though by fire.

Bones only, apparently incinerated, were found, both layers of burials being marked by an entirely different appearance; the upper was solid and hard, while the lower was soft and decomposed. The bones were rather scattered, each in its layer.

Professor J. C. Brash, of the Department of Anatomy, Edinburgh University, very kindly agreed to undertake the examination of the human remains found on the site, and I acknowledge my indebtedness to him for the detailed report which he was good enough to prepare.

No other relics were found. This burial was again entirely disintegrated, the stones being thrown out of their position on to the grass above. The elevation was about 16 feet above the road level.

4. A bronze knife was found, lying on a stone of andesite (fig. 3, Nos. 10 and 11). Two rivets survived, but the handle had perished. The stone was water-rolled, but flat on its face, and was said to mark a burial, many traces of discoloured and much decomposed matter resembling bone having been found. The bronze blade is $4\frac{1}{4}$ inches long and about $1\frac{1}{2}$ inch wide at its maximum. The rivet holes are $\frac{7}{8}$ inch apart and appear to have been punched out with a square-pointed tool.

The rivets themselves are $\frac{1}{8}$ inch in section and measure $\frac{3}{8}$ inch in length. They have, apparently, been hammered into square section, the surfaces

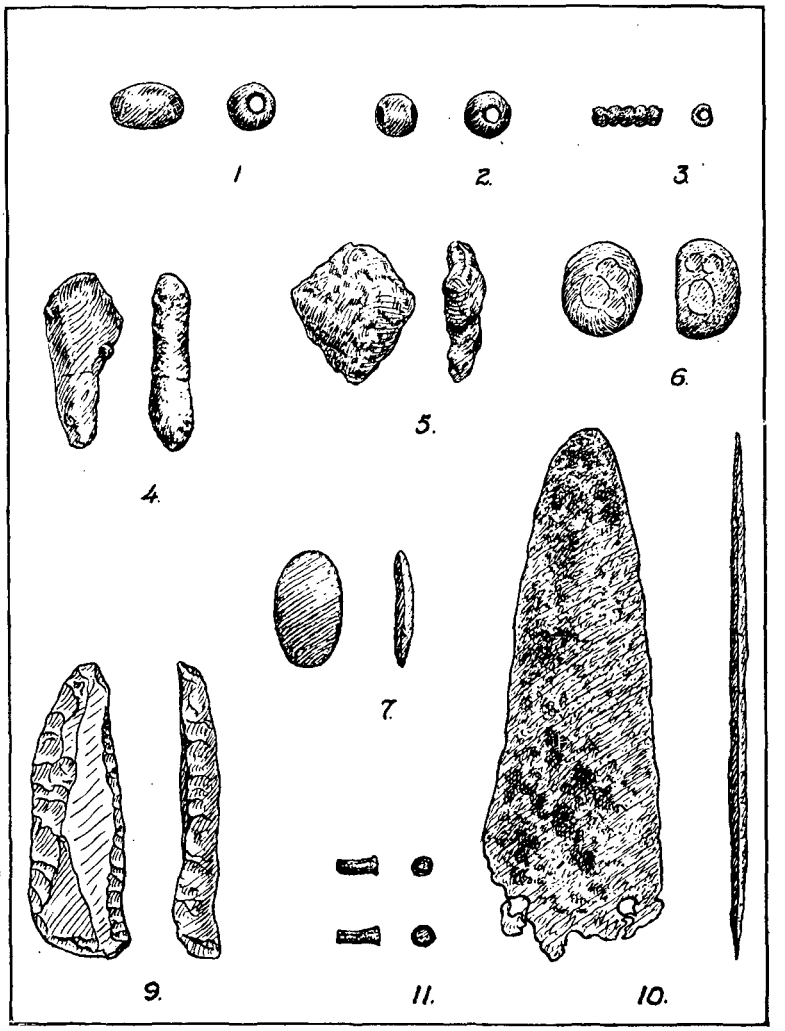


Fig. 3. Objects of Bronze, Flint, Lignite, etc. ($\frac{2}{3}$.)

being flat, and eventually they were made hexagonal by flattening the corners of the square. The riveting has not been severe, as the swelling of the head is small and the body of the rivet is not distorted to any extent in its section.

Probably the nearest occurrence of a knife of this description was at Glenboig, 9 miles east of Glasgow, the blade being found still in its sheath of ox-hide.

5. This was a stone setting of pear shape approximately 6 feet 7 inches in length and 4 feet 5 inches at its maximum width. It was built of eight large stones, set end to end, making an almost complete enclosure. The sand contained in it was sifted but nothing was found.

At a lower level, 6 inches down, the structure was further closed by an under layer of stones, leaving a small gap at the south-eastern side. Riddling failed to reveal any relics.

At the north end of the periphery of the structure the rim of a food-vessel was encountered below the corner of one stone and wedged between two others. All the parts of the vessel were subsequently recovered (fig. 8). It lay pointing northwards and inclined with its rim at an angle of 30 degrees to the horizontal. The stone over it was lifted, and the vessel, badly squeezed by pressure and extremely friable, was removed as it lay, filled with sand. It was not at that time examined either inside or outside. The remainder of the structure was then explored, and the gap referred to was found to be bridged by a stone at a lower level. Towards the south-east of the outside an intrusion of black humus was observed. No other relics were encountered.

6. A fragment of the rim of another food-vessel was recovered, but much sand had been removed by the contractors before its presence was noted. No stones or other associated relics were observed.

The fragment shows a highly ornamented vessel (fig. 9). The rim is blackened as by fire, but the pottery exhibits a fine texture, being of a light brown inside, fired to a deeper reddish brown on the outside.

7. A protruding stone drew our attention to the possibility of another structure just adjacent. In clearing the surroundings, a small stone structure, almost cruciform in shape and very obviously humanly fashioned, was disclosed. In order, however, to determine its relation to another large block, we cleared the ground, and on tracing the lie of the stones to the east there was seen its connection with this large end one. The two on the wings were highly set, and after the removal of the sand a complete crescentic setting was laid bare.

From the left wing the stones descend in crescent form round the bottom of the horse-shoe to the lowest point at the back, the eastern end of the large one continuing the crescentic formation upwards to its peak level at the outer edge of the right wing. A definite horse-shoe structure, open to the north, was thus uncovered. The greatest

width at the outside was 3 feet 6 inches, the greatest depth 30 inches, and the interior size of the horse-shoe 18 inches.

The sand in front was undisturbed, proving that no part of the structure was missing, and nothing had been removed prior to my uncovering it. The two outer stones were the largest and were of a fine blue-grey whinstone. The sand in the interior was sifted, and at the back about 9 inches below the level of the stone structure the rim of a complete urn of the food-vessel type was encountered (fig. 10). The vessel was tilted at an angle of 46 degrees from the horizontal. It was not quite centrally placed at the back of the horse-shoe, but rather to the north with the south side of the vessel coincident with the centre of the structure. The urn was facing out of the horse-shoe in a line 5 degrees farther east than the lie of the stone setting. We did not disturb the contents, so that they could be examined later on. Both the outside and the inside of the structure were examined, but no further relics were discovered.

The vessel with its contents was kept intact for some months. It was then emptied with a spoon before five witnesses. The material consisted largely of fine sand with an occasional pebble. Within the side on which the vessel was lying a small amount of sand of darker colour was encountered, this being, apparently, the remains of some food material carbonised and mixed with intruded sand. The amount of space occupied by the black material as compared with the remainder of the vessel was about one-tenth. From this one might infer that the food had shrunk very considerably and that it may have been in liquid form when placed in the vessel. It may have been of the consistency of a thin porridge. The proportion of one-tenth of black infilling to the total oddly resembles the proportion left over by quick roasting, as shown by experiment, of certain food products.

A sample of the black material was submitted to Mr Douglas A. MacCallum, F.I.C., F.C.S., who examined it microscopically and analytically. I am greatly indebted to him for his careful investigation. In his report appended, he considers that the content of the vessel suggests the possibility of a cereal, which may have been wheat or oats, the greater probability being oats. This result compares with the analysis of the contents of the Mount Vernon food-vessels which were submitted to him in 1928, by Mr Ludovic M'L. Mann, for examination, and which in contrast to the Knappers food-vessel suggested a more definite wheat content.

8. A small stone-built structure about 18 inches square and 15 inches high was laid bare by the removal of the surface material. The highest

part was level with the top of the sand, which at this point was 15 inches below the turf.

The western side consisted of one large sandstone slab set on edge, the top of which formed the west side of the altar-like summit and occupied about one-third of its area. At the lower west side this was reinforced by several smaller stones. The remainder of the pile was composed of smaller though substantial blocks of stone, chiefly whin, loosely kept together by sand, the small interspaces being filled with chips.

Nothing being observed from the outside, the sand was removed from the interstices, and the whole was scrutinised. Eventually the stones were removed, and on lifting the large slab it was found to be sitting on a block of white sandstone, dressed above and measuring 15 inches north and south, $9\frac{1}{2}$ inches wide at the north end, $11\frac{1}{2}$ inches at the centre, and 6 inches at the south end. The top of this foundation slab was not quite level, being 1 inch lower at the south end. No relic of any description was found within or without the structure.

The foundation slab of the understructure was then examined, but nothing was revealed. The bottom of the stone was embedded about 5 inches to 6 inches deep. After being lifted clear, a fine soft sand was noted, whitened in places and suggesting the presence of decomposed matter. This was cleaned off and collected. Below this the sand was sifted, but no relics were obtained, the only feature noted being the presence of many small quartz and whin pebbles, all of which were collected. The foundation was thereafter excavated, but nothing further was met with till about 12 inches down, when the undisturbed sand was reached.

The foundation slab was neatly dressed, the top being uniformly cut, leaving a raised strip about $1\frac{1}{4}$ inch wide round the edges, and the inside chipped about $\frac{1}{4}$ inch lower, giving the appearance of a definite panel. On this panel there appear certain incised lines or scores, which almost suggest the framework of a boat with masts.

9. This burial was entirely unmarked by stone or other means. The remains were collected and comprised a great number of bones and several teeth. The bones were hard and in a better state of preservation than those found in the upper layer of No. 3. On some of them was a green stain which might have been caused by contact with some small bronze article, which had subsequently entirely disintegrated.

Along with the bones was found a circular bead of lignite about $\frac{3}{8}$ inch in diameter, polished and pierced with a hole drilled from both sides (fig. 3, No. 2). The bead is of a squat barrel-shape, and the hole being drilled somewhat eccentrically, and rather larger at one end than the other, gives it an unbalanced appearance; the outer surface is marked with small

flat facets. After further riddling another bead of lignite was found. It is barrel-shaped, beautifully polished, and about $\frac{1}{2}$ inch long. The perforation is rather larger than in a modern bead. Later on there was recovered a small fragment of pottery about 1 inch square. It appeared to be a part of a vessel of considerable size. No other relics were unearthed despite careful riddling of the site.

10. A pocket about 6 feet in diameter and slightly saucer-shaped, appearing in the sand after the turf, 21 inches above, had been stripped off and the humus removed, attracted attention. Within this pocket the ground seemed to have been disturbed, and the sand was much discoloured with black matter having the appearance of being much decomposed. The depression was scooped out and riddled, and in the centre were discovered traces of red pottery of a crude type. Many small, broken, detached fragments were picked up, together with a tiny piece of white flint. About 9 inches down and lessening out to the sides the natural undisturbed sand was reached.

11. On 17th February the foreman reported that bodies were becoming apparent in the sand to the west of No. 8. On uncovering, the outlined skeleton of an extended figure was disclosed rather faintly in the sand, but by careful dusting the form was more readily perceived. The feet were towards the altar-like structure No. 8, and the body was lying 278° east of north mag. The remains lay about 6 inches below the top of the sand at this point, and about 24 inches below the grass. The head was not visible and appeared to have been severed. The top of the head would have been on the actual sand-loading face at the top of about 14 to 15 feet of sand. As the burial dried, the outline became more visible, and what had all the appearance of the shape of the natural body, with the framework of the bones showing prominently, remained damp. Between the legs the sand dried, throwing up the bones into an apparent relief in much the same manner as an X-ray photograph reveals the structure of the human body. The bones as a rule were very decomposed and soft and would not bear handling, but some of the larger were comparatively solid. To the north side there appeared to be another burial, but on examination this proved to be what we took to be the skull of the other. A piece of burnt flint, showing a breakage across as well as some evidence of human fashioning, was removed.

The skeleton was left undisturbed, as Captain Black had expressed a desire to see it *in situ* and because of the extreme difficulty of handling the osseous remains, which would require to be solidified in some way. Despite the fact that the burial was protected from the weather and from outside interference, it was noted to be gradually deteriorating, and on

gusty days it was in imminent danger of being blown entirely away. On again uncovering, the bones to the north side which we took to be the skull were blown about and scattered. The skeleton was, therefore, laid bare, and a strong solution of gum damaar in benzine was applied together with a binding of paraffin wax to assist in keeping it together on removal. Gear was prepared and, in the presence of the Dumbartonshire Police, a wooden box was constructed round the remains as they lay in the sand. A steel sheet with a serrated edge was sawn through the sand below the box, which now contained the burial, and the whole was removed for examination. The skull was lifted in a separate receptacle.

Further examination has not elucidated the mystery of this burial. Professor Brash reports that the head or skull is incinerated and that the body is not. He examined the remains minutely to determine whether the skull was possibly a separate burial from the inhumed one, and he quite definitely reports that no part of the incinerated remains is duplicated in the inhumed, and that, moreover, nothing but skull bones are present in the incinerated burial. It would appear, therefore, that either the skull was burned and buried beside the body, or, alternately, that a headless body was buried and a trunkless skull was burned and buried alongside it. The former would appear to be the more probable, but such a practice does not seem to have been noted elsewhere.

12. To the north-east of No. 8 there appeared, on removal of the soil, a stone which we investigated to see whether it might be part of another cairn. It proved so, and later stripping exposed a neat little cairn of elongated oval shape, consisting of eight stones, and measuring 27 inches long and 12 inches wide. It was 23 inches below the turf, and the top was 2 inches below the level of the sand. The lie of the structure was practically identical with the alignment of the skeleton, the direction pointing to the detached skull. The cairn was very compact and solid, and after careful uncovering, the stones remained in position, even when the foundation was slightly undercut in probing for pottery as in No. 7.

The sand between and below the stones was sifted, and a tooth was found in an excellent state of preservation but with the root cleanly sawn off, leaving the top about $\frac{3}{8}$ inch cube. Some other small objects were also brought to light, viz.: (*a*) another tooth, a first lower molar, sawn off similar to the last, but the inside was decomposing and only the shell, which was fragile, remained; (*b*) a fragment of the shell of another tooth; (*c*) some pieces of charcoal; (*d*) two pieces of bone; (*e*) a small pointed and worked flint.

13. On the high ground at the topmost part of the ridge, where the sand was only 10 inches below the grass, an urn was uncovered. The

workmen reported it as having been broken by the plough, but my impression did not bear out that opinion. The shards were in contact with a heap of bones quite compact and unscattered. Some of the pieces of the side of the urn were in adhesion, but the whole was in such a friable condition that nothing could possibly save it.

In the loose sand within the urn was found a small segmented bead of five conjoined sections of a total length of about $\frac{1}{2}$ inch and a diameter of $\frac{3}{16}$ inch (fig. 3, No. 3). The material is a greenish vitreous paste, but it has now become grey by chemical action. Two similar beads were found within one of the Stevenston [1] urns in association with one of a star shape, and all three had assumed a greyish aspect through the action of the phosphates in the incinerated bones.

All the fragments were collected and the surrounding material riddled, but beyond tiny shards and small pieces of incinerated bone and burnt wood nothing further was revealed.

On examining the main bulk of the sand structure on which this burial was superimposed, and which was quite hard, many small fragments of pottery were encountered. None of these had apparently any markings. The consolidated mass was not separated, but brought away intact.

15. A few days later another urn, again much broken, was unearthed. The fragments were extremely fragile, and disintegrated very easily. The urn was found 9 inches below the sand-level which, at this point, was 12 inches below the grass. The vessel is flat-bottomed and apparently about $6\frac{1}{2}$ inches in diameter at the base. The ware is of reddish-brown appearance on the outside and of fine texture. It is much discoloured and blackened on its inner side and in the core. In the largest fragment —that of the base—there was a solid mass of black material adhering to it. This was also submitted to Mr MacCallum, who reported: "This is a rough hand-made vessel made from red pebbly clay lightly burned. The bottom was covered with sandy soil containing rootlets like those of grass, and embedded therein were three pieces of charcoal about $\frac{1}{4}$-inch cube each. The charcoal is very light in specific gravity and very soft, suggesting alder or other pithy wood, rather than the hard woods like birch, beech, or oak." These pieces of carbonised wood are more probably the result of slow firing or eremacausis rather than that of quick firing, and cannot, therefore, be taken as evidence of a cremation burial. The aspect of the material being soft and non-gritty bears out that these pieces of wood were in normal condition when deposited in the sand.

The whole site comprising this find was methodically riddled, and besides many more fragments of the vessel there were found two small

[1] *Proc. Soc. Ant. Scot.*, 14th May 1906.

scraper-like flints and about six very diminutive flint flakes together with a smooth lignite object (fig. 3, No. 7), oval in shape, $\frac{7}{8}$ inch long by $\frac{9}{16}$ inch wide and $\frac{1}{8}$ inch thick. From its appearance it suggests a tool or instrument utilised in the making of the incisions seen on the pottery found on the site. When drawn across a piece of soap, incised lines identical with those found on the food-vessel were formed. There were also found a tiny fragment of shell, a substantial lump of slag-like material, two small objects of greenstone, and a considerable quantity of charcoal.

16. Only 3 feet away from No. 13 and unassociated with any urn, cairn, or other structure, another burial was encountered. It lay at a depth of 9 inches below the sand and comprised a compact mass of bones. All those were collected, and after their removal we searched the surrounding sand until we reached the undisturbed material below, but nothing further came to light.

17. On the western face of the sand-pit, on the slope cut away by the formation of the Boulevard and near the top, there appeared a substantial stone which at first suggested the possibility of its having been placed upright there to prevent the sand moving down the slope to the roadway. I, therefore, approached the site with a considerable degree of scepticism. Excavation, however, proved it to be another cairn, a well-built circular structure, open in the centre, with a large slab of micaceous schist on the north side.

The cairn consisted of thirty stones symmetrically built together. The structure was 5 feet 5 inches along its east to west axis and about 5 feet across. Round the outer periphery it measured 17 feet 2 inches and round the inner 7 feet 9 inches. The whole was cleared on the outside and inside, and the sand put through a very fine riddle. Only a small piece of pottery, a few isolated and minute scraps of bone, and one or two of rather more substance, probably fragments of a skull were found. Some very small pieces of charcoal were also recovered with these relics.

After the removal of the smaller stones of the structure a particularly fine piece of constructive work on the south side was noted; on its outer edge the stones were carefully set, overlapping one another round the periphery.

By removing the most accessible stones a new formation became evident, and eventually a well-proportioned stone cist, constructed of the larger elements forming the ring cairn, was revealed. The north and east walls were 1 foot 5 inches high, the south was 1 foot 6 inches, and the west 1 foot 4 inches. The inside of the cist from north to south measured 2 feet and from east to west 2 feet 5 inches. The north slab

measured 2 feet 8 inches long by 17 inches deep and 5 inches thick. The axis of the cairn lay in the direction of the main slab, 90 degrees east of north magnetic.

The structure, therefore, might almost appear to belong to two periods, that of the short cist with an urn burial, of which the only surviving feature, other than the primary cist formation, is the fragment of pottery with markings resembling those described by Dr Callander in his paper on "Scottish Neolithic Pottery,"[1] fig. 55, No. 8, and that of the later period of the ring structure with the few fragmentary

Fig. 4. Grave Deposit, No. 17.

remains of another burial. This ring construction, impressive though it be, is not unique in Bronze Age burials, another with similar features having been found in the same parish, within the Roman fort at Old Kilpatrick, by Mr S. N. Miller, when excavating the fort in 1923. This was reported on at a later date by Dr Callander.[2]

18. The finding of another urn was reported to me by Mr Rogerson. It was about 9 inches below the sand and 18 inches below the grass. This vessel was also in a very fragmentary condition. There were about fourteen pieces, the largest of which is about 4 inches square and about $\frac{1}{2}$ inch thick. The pottery is coarse, and from the outline of the fragments it would appear to be a vessel of about 12 inches in diameter.

[1] *Proc. Soc. Ant. Scot.*, vol. lxiii. [2] *Trans. Glas. Arch. Soc.*, vol. viii. p. 55.

The markings of maggot design with which it is decorated are very pronounced. Very little of the vessel remains.

Sticking to the inner surface, in addition to the adhesive sand, was a fine bone-like dust, probably indicating incineration. Only one fragment of bone and a tiny flake of flint were found, though a substantial piece of smooth shale $2\frac{1}{2}$ inches by $1\frac{1}{4}$ inch by $\frac{3}{8}$ inch was recovered from the same site.

19. Another stone structure of altar-like appearance was unearthed. The uncovering of the sand proved to be more difficult at this point, as it appeared to have been formed into a large saucer-shaped depression about 30 feet in diameter and about 2 feet deep towards the centre. Many similar depressions had been noticed, but none of this magnitude. Towards the centre of this hollow the structure had been built. It consisted of one large stone of oval section with a flat top standing up 14 inches from a flat stone lying horizontally to the west of it. Both of these were erected on what appeared like a foundation of small rounded stones.

The whole of the circular hollow was cleared and was found to have a solid bottom or floor of a hard scale-like substance which flaked off like iron rust. It swept up quite clean, but vigorous brushing caused the scale to flake away. A sample of this material was submitted to Mr Robert Allan, Metallurgist of Gartsherrie Iron Works, Coatbridge, for analysis, and he was good enough to report as follows:—

2nd May 1934.

ANALYSIS OF MATERIAL FROM KNAPPERS SAND QUARRY.

Oxide of iron	10·71 per cent.
Silica	73·70 ,, ,,
Alumina	7·42 ,, ,,
Oxide of manganese	0·70 ,, ,,
Lime	0·84 ,, ,,
Magnesia	0·83 ,, ,,
Sulphuric anhydride	0·04 ,, ,,
Phosphoric anhydride	0·73 ,, ,,
Loss on ignition	4·90 ,, ,,

After brushing, the area of the depression occupied by this flooring appeared to be about 10 feet in diameter, with a cut-away at the north-east. The structure occupied the east side of the depression.

The altar-like foundation was then cleared, and the pavement of

stones was found to point towards the west. Taking the upright stone as the base, it formed a triangle with a base 4 feet and sides 5 feet long. On this foundation being removed, other stones appeared below with no definite arrangement. On removal of the two main stones the eastern end appeared to be curved, giving the whole plan a kite-like shape. No relics were found, and the stones of the foundation were set on the hard scale-like flooring already noted.

20. About 18 inches below the grass there appeared on the surface of the sand the top of a rounded boulder which had a depression picked out on its surface. The stone is approximately 12 inches in diameter and appears to have served as an anvil stone.

21. Another large stone appearing below the level of the sand, which at this point is 2 feet 9 inches below the turf, suggested another burial. On excavation, this looked like another minor cairn, consisting of only three stones. The general lie was due north and south mag. The stones were uncovered, but except for minute pieces of bone and decomposed matter, and a small triangular green flint of pyramid shape with one smooth side, nothing was discovered. The two east stones proved to be parts of one block.

22. This structure was noted by the presence of a fairly large boulder appearing 4 inches below the level of the sand. It consisted of four stones only, rather disconnected. They lay in line, the axis 5° east of north mag., the two outermost being the larger. The structure measured $34\frac{1}{2}$ inches along its major axis. The stone to the north was the largest and measured 13 inches by 9 inches by 6 inches. The second was a small fire-blackened sandstone. Number three, of red sandstone with quartz veins, was cubical and angular. The fourth was a rough whin and measured 10 inches by 6 inches by 7 inches deep. The structure was less impressive than any hitherto noted, and would hardly have been recognised but for the absence generally of isolated stones of any size in this sand-pit, and because of a burial with which it appeared to be associated.

Directly on the north-south axis of the structure and at a distance of 7 inches from number four stone (south) were three molars, one incisor, and a fragment of an upper jawbone containing four teeth. A little matter almost wholly decomposed was observed amongst the sand; probably it was part of the jawbone but it was not adhesive enough to permit of its being lifted. Below this was found a perfect specimen of a lower jawbone with a set of sixteen teeth, 3 feet under the turf. The front teeth seemed worn, and the back tooth at each side of the jaw was set at a distinctly lower level than the others. The teeth were

very fragile, and as it appeared to be impossible to touch them without injuring them, Mr J. H. Russell, Dentist, Charing Cross, Glasgow, accompanied me to the site and made a cast of them *in situ*. I am indebted to him for the accompanying report and also for the cast.

From the position of the jawbone the apparent lie of the body in the sand could be detected, there being a definite marking like the section of a trench. The bottom of this trench or grave, which was only 12 inches wide, was 3 feet 1 inch from the turf. Some 7 inches from the bottom to the right it widened out to about 15 inches from the

Fig. 5. Grave Deposit, No. 24.

centre, and on the left at 9 inches up it contracted to about 11 inches and widened out to about 18 inches from the centre.

23. In examining the sand-face the presence of bone was noted, and it was necessary to cut a landing on the vertical face to investigate it. A quantity of bones indicated a complete burial, so layers were stripped from the top and riddled. The burial was placed 12 inches below the sand, without a mark of any kind. A number of the bones, which were much broken, showed signs of green staining. No teeth were discovered. One small fragment of flint and many fragments of charcoal were found amongst the bones.

24. A stone protruding above the sand attracted attention to this burial. On excavating, a well-built structure was exposed. Sometimes the stones were laid in courses, but in places single large stones occurred.

The structure was mainly crescentic but had a central S-shaped division dividing the crescent into two almost equal parts, which were not unlike mushroom shape. The building comprised eighteen stones and measured 3 feet across the wings. The depth over all was about the same, and the central division projected about 9 inches beyond the ends of the walls. The stones were, for the most part, naturally rounded boulders. Inside, near the top, a small flint was found along with comparatively large quantities of charcoal. About 2 feet lower much discoloured sand and decomposed matter were encountered. Only one fragment of bone and three more tiny flints were discovered.

25. A wind-blown tooth induced the search for another burial, which was located west of No. 22. A number of teeth in position were found, but owing to a high wind they were being rapidly scattered. As they could not possibly survive, the whole was lifted bodily. There was no other sign of the burial. From the site of the skull two small pointed flints were recovered.

26. About 10 yards west of No. 22 another burial became evident on the sand-face at the highest part of the ground and about 1 foot below the sand. A skull in a fair state of preservation, and later part of the jaw containing several teeth in place and another part with three more were recovered. They were very fragile. A number of other teeth were found, together with several lumps of charcoal and two fragments of the shell of a hazel nut.

27. This burial was marked by a single stone, ovoid in shape, dressed and cut towards the south. The long axis lay 305° east of north mag. The top of the stone was 21 inches below the turf, the sand here being 15 inches below it. The stone seemed to be centrally placed over the burial as the marks of the human remains in the sand showed evenly round. Two small flints were found, and much decomposed matter extended for 3 feet to the south of the stone. A considerable quantity of charcoal was encountered, together with a fair amount of red oxide-like matter and some tiny fragments of bone.

28. The tops of stones beginning to appear above the sand led us to another formation of diamond shape. It consisted of about twenty-four stones, four of which were much larger than the others. The upper stone was 21 inches below the grass and 3 inches below the sand. The layout was symmetrical in form, the long axis being 215° east of north mag. The dimensions were 5 feet 3 inches long and 3 feet 7 inches broad.

Riddling the sand around and below the stones failed to reveal any relics other than some fragments of bone, a considerable quantity of wood charcoal, one flint chip, a little round grit-stone pebble, and a small smooth

black stone like a Molucca bean. A number of the smaller stones of the structure appeared to be fire-blackened.

29. This burial produced nothing more than a considerable portion of a skull. The lower jaw appears to be complete, but the teeth are absent. With the skull so comparatively well preserved we searched for the body, but only one small piece of bone, which might be part of the skull itself; some few fragments of charcoal were recovered.

30. Only a few teeth and a fine specimen of black flint, finely shaped, were found.

31. Another skull was reported to have been found in position, but on removing some teeth which appeared to be in danger of dispersal, the whole collapsed. A large portion of the skull and a fragment of jawbone with three much-worn teeth in place were recovered. The jaw was in good condition. Some teeth were fragmentary and fragile. We riddled the site, but came across little except some fragments of bone and a small white flint.

32. Some pieces of bone and teeth led us to this further burial. The teeth, unlike many already found, appear to be unworn. From the locus of the skull there was taken a rough-pointed piece of white flint, somewhat shaped like a spear-head with no apparent work on it. We riddled the whole site, but got only much-decomposed matter, some fragments of teeth, and some pieces of bone.

33. Searching along the edge of the sand-face we came across distinct signs of another burial which seemed to indicate more fully than we had previously ascertained how bodies were placed in the sand. The bony material forming the skull was quite obvious, as was the outline of the trench for the burial. This lay below 18 inches of turf and loam, and the trench forming the grave extended downwards a farther 18 inches. In general it was 18 inches wide, but on the right side at 13 inches from the bottom it spread out sharply to 2 feet 3 inches higher up. The bone, which was much decomposed, formed a fairly compact mass at the bottom of the trench. We had a sleeper staging built to photograph this site, and on trimming up the sand-face the oval form of a small skull appeared quite plainly. It measured 5 inches horizontally and $4\frac{1}{4}$ inches vertically. The trench showed up well.

Adjacent to this burial the sand gave every indication of having been disturbed, and two more graves were located. The centre one was the largest, measuring 23 inches wide, and lay at a distance of 23 inches from the middle of the last. The sand was 20 inches below the turf at this point, and the burial extended 22 inches farther down into the sand. The third was 18 inches wide and was 30 inches from the centre of the

middle one. The soil here was 22 inches deep and the burial penetrated a farther 18 inches into the sand.

After photographing these, we uncovered them, but except in the case of the first, where we got a substantial piece of bone, we found nothing more, as the skull and teeth were too much decomposed to lift.

34. Burials unmarked by stone or cairn had been the feature for some time, but the appearance of stones level with the sand again suggested the possibility of further burials associated with structures. On stripping this site a setting of two upright stones set parallel with a single outlying stone in line at right angles was seen. The main block was neat, consisting of two large rounded stones on end with two smaller stones between them. The west stone was a roughly rounded boulder of white sandstone, and the parallel stone at a distance of 3 inches therefrom was a smoothly rounded whinstone with marks of striations or chippings. The side facing into the structure was quite flat. Between was a chipped red sandstone, the outer edge of which coincided with the outer edge of the two main stones. To the north was also a smaller stone of red sandstone. This and one of the main larger stones were both much blackened as if by fire. The measurement over the two stones was 14 inches, and the distance to the outlying stone was 2 feet $8\frac{1}{2}$ inches.

In the direction of the lie of the stones and centrally placed was clearly seen a burial marked in the sand, but there were no tangible remains, the matter having entirely decomposed. The main setting of the stones appeared to cover the head, and the outlying stone to mark the lower part of the body. In riddling we came across signs of bone, tiny fragments of the enamel of teeth, and much black decomposed matter.

In the course of the work of removal of the sand a number of objects were found not definitely associated with any particular site.

Objects of Stone.

(*a*) Stone for grinding stone axes (fig. 6). This is a large block of grey sandstone measuring 12 inches by $7\frac{1}{2}$ inches by 9 inches deep. The top is smoothed into a concave surface by the action of grinding, the centre being hollowed out to about $\frac{3}{4}$ inch deep.

(*b*) Hammer-stone of brown sandstone $2\frac{3}{4}$ inches in diameter and $3\frac{1}{2}$ inches long. The ends are rounded, and much pitted and abraded by use.

(*c*) Stone ball $1\frac{1}{2}$ inch in diameter, smooth on the surface and pitted with marks where the surface has been scaled off.

(*d*) Knife of brown flint with a beaked point, about $2\frac{1}{4}$ inches long and $\frac{3}{4}$ inch broad. One side only is chipped in three main planes. Along the edge there is a continuous retouched edging extending from the nose to the butt end. This redressing has been done at a much later date than the making of the tool (fig. 3, No. 9).

(*e*) A small finger-like flint object of dark green colour $1\frac{3}{4}$ inch long and $\frac{5}{8}$ inch in greatest diameter. It tapers to a rounded point. The butt end has been cut off half-way across, and at the corner thus formed there is a small hole as though drilling had been attempted.

Fig. 6. Stone for grinding Stone Axes.

(*f*) Triangular flint $2\frac{1}{4}$ inches along each side and $\frac{7}{8}$ inch thick. It appears to be definitely worked, as each of the three sides is flaked or chamfered off. It is very smooth, water-rolled, and is highly patinated a deep dark brown colour all over, except at the bottom which bears the impress of the nodule and is almost black.

Objects of Fired Clay.

A small spatulate object of clay, mingled with small, rough, gravelly material and fired to a light brown. The relic is $1\frac{1}{2}$ inch long and $\frac{5}{8}$ inch wide about $\frac{1}{2}$ inch from the butt end, which is diamond pointed, the other end, $\frac{3}{8}$ inch in diameter, being roughly rounded (fig. 3, No. 4). The texture of the clay does not suggest a prehistoric origin.

A diamond-shaped object slightly concave on its inside as though for superimposing on the exterior of a pottery vessel (fig. 3, No. 5). The sides are each about $\frac{3}{4}$ inch long and its thickness at the centre is about $\frac{3}{8}$ inch.

A small globular object of fine red clay about $\frac{3}{4}$ inch in diameter, with flattened base. The surface is smooth but not regular, having all over it a great number of minute flattenings (fig. 3, No. 6).

Pottery found at Knappers Sand Quarry.

The fictilia falls into six classes. The historical group consists of casual finds, of accidentally intruded fragments, encountered during the sand digging. It consists of three sets:—

(i) A few unmarked wall fragments of a green glazed mediæval ware.

(ii) Two small, unglazed, reddish-brown shards. They have horizontal rows of small, closely set discs in relief, bordered on either side by a raised moulding.

(iii) A very small rim fragment of a thin, compact, grey-black ware, of fine plain surface, probably Roman.

The balance of the pottery collected belongs to the earlier phases of the Bronze Age, the bulk of the specimens being food-vessels. No traces were found of the coarse ware of the Early Iron Age, nor of beakers nor Neolithic round-based vessels. With regard to the fictilian industry in the Glasgow district in the Early Bronze Age, it may perhaps be noted that beakers are very scarce, while food-vessels are markedly numerous.

The maggot design is frequently found on the round-based ware, resembling the food-vessel. It began in the latest Neolithic phase and was carried over to the transition period between that and the Bronze Age, during which the bases still retained their rounded form. The design still continued during the earliest Bronze Age when the round base fell out of fashion and the flat base came into vogue. The Knappers specimen seems to belong to this last-mentioned phase of culture.

The maggot pattern on round-based ware with thick walls seems to have been first noted during excavation at Glenluce, Wigtownshire, by Mr Ludovic M'L. Mann. The specimens were shown in Glasgow at the Exhibition in 1911,[1] and have since then been on view in the Kelvingrove Museum there.

The final class seems to be more in the style of the large cinerary ware which entered the field in the middle and later Bronze Age, but the fragments are very scrappy.

To summarise, the vestiges of pottery seem to congregate round the beginning of the Bronze Age.

Main Dimensions of Food-vessels.

No.	Dia. at Rim.	Dia. at Shoulder.	Dia. at Base.	Height.	Depth of Shoulder.	Thickness of Walls.	Thickness of Base.	Width of Rim.	Angle of Rim to Horizontal.
	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Degrees.
2	6	6	3·2	5·2	2	·4	·6	·5	44
2A	...	...	2·2	...	...	·4	·6	...	...
5	5·6	6	2·5	5·2	1·7	·3	·3	·7	40
6	6	6·2	...	...	1·4	·3	...	·7	29
7	5	5·4	3·2	4·1	1·5	·7	·9	·7	curved

[1] See p. 875 of the *Scottish Historical Exhibition Official Catalogue.*

Description of the Pottery.

2. The contour of the wall of this vessel consists of an upper zone, slightly curved from the rim to a shoulder, from which it tapers to a flat base, the outline curving near the base so as to become vertical at about 1 inch above it (fig. 7).

The rim is in two parts, an inward sloping surface bearing two concentric lines of impressed twisted cord markings, while there is a slight

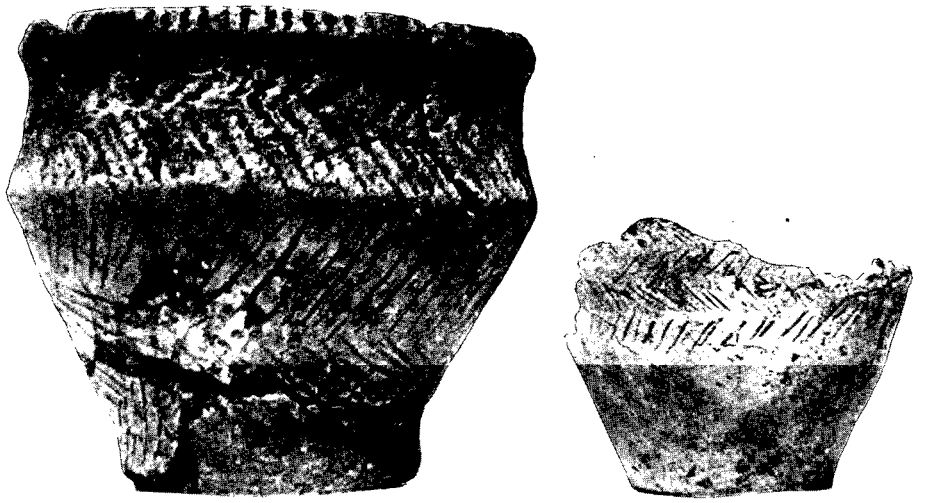


Fig. 7. Food-vessel and base of another.

bevel sloping outwards on the outside of the lip bearing a series of vertical, twisted cord impressions.

The decoration of the upper zone consists of string markings in the form of vertical chevrons.

The vessel, below the shoulder, is ornamented over its entire surface by vertical zigzags in three zones, incised with a sharp-pointed instrument. These lines very rarely cross one another at the limits of each section.

The food-vessels do not show any variation in their make-up from a clay, hand-made and kiln-fired. The clay was apparently reinforced with an admixture of crushed stony fragments, which resulted in yellow-coloured vessels, slightly reddish, with dark interiors.

2A. This is a fragment of about one-half of a food-vessel, the flat base and the wall remaining to a maximum height of some 3 inches

(fig. 7). About $1\frac{3}{4}$ inch from the base the wall is decorated by two horizontal rows, each consisting of herring-bone incisions, scraped out with a sharp-pointed instrument.

5. This food-vessel, while of the same contour as its companions, has a more distinguished and attractive aspect (fig. 8). The upper zone is more deeply curved in vertical section, the tapering of the lower part has more character and decision, the wall in this part being straighter and more obliquely set, while the ridge dividing the upper from the lower parts has a deep furrow horizontally set in its middle crossed by imperforate lugs.

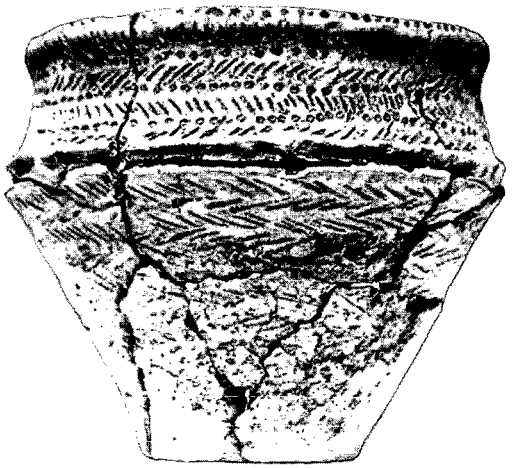


Fig. 8. Food-vessel.

The rim in its inner side slopes downwards, and this portion comprises three sections in three concentric circles, the innermost bearing a succession of impressions made by a round-pointed tool pressed from the interior upwards and obliquely set, all in one direction. In the contrary direction a set of similar markings is worked by pressure from the top of the rim downwards. Between these two rows are a succession of depressions made by a rounded hollow reed. On the outer side of the rim is an assemblage of markings like the last described.

The ornamentation of the upper zone is of the same character as that of the rim. There are four rows of short lines made by the dabbing of a pointed instrument, each row being at a different angle from that of its neighbour. Between these rows are three series of circular impressions made by the end of a hollow tube.

The tapering portion of the vessel is decorated with impressions made by the same blunt-pointed instrument used in the upper section. The lines are much longer and set in a rough zigzag manner so as to cover the whole area of this zone and yet give the aspect of four bands of decorations.

6. This consists of a rim fragment of a food-vessel with incised lines obliquely set with unusual compactness (fig. 9). The upper zone, in horizontal sections, is entirely occupied with such markings. In the upper and lower sections the lines lie at the same oblique angle about

12 to the inch; the middle section is very narrow, and the incised lines run in the opposite direction. Beneath the shoulder a small section survives on which obliquely set cord-markings may be discerned. On the lower slope of the ridge at the shoulder the vessel is ornamented with a row of short obliquely set lines made by twisted cord. The angle of these lines is contrary to those in the sections immediately above and below it.

Fig. 9. Fragment of Food-vessel.

The rim is broad and inwardly sloping, and upon it is set a row of sloping lines closely situated together, made by impressions of twisted cord, now rather faint. These occupy three-quarters of the inner area of the rim, which is completed by a panel, on the outer portion, of like markings set at an opposing angle.

7. This food-vessel was the most perfect found on the site and is

Fig. 10. Food-vessel.

in marked contrast in contour and decoration to the others mentioned (fig. 10). Its height is less, and the double shouldering divides the walling into three horizontal panels of equal depth. The inward sloping rim is slightly curved convexly.

The rim is decorated with V-shaped incisions fairly broadly spread out and emphatically impressed.

The decoration on the upper zone consists, in its lower section, of a chain of connected diamond designs made by a pointed tool. The upper portion is occupied by obliquely drawn incised lines apparently by the same instrument. These lines are set sloping at opposite angles and are intermixed by overlapping. The middle zone is decorated by similarly worked incised lines forming irregular horizontal zigzags. On the lower zone the same tool has again been used for the incisions, which consist of vertical zigzags of four parts.

9. These are very small unornamented fragments of fine-surfaced Bronze Age ware, the largest of which is about 1 inch square and $\frac{1}{2}$ inch in thickness. Neither the shape nor the size of the vessel can be determined.

10. This is a group of small crumbled fragments of similar aspect.

13. Urn with incinerated bones. About twenty-four fragments of this vessel were recovered, the largest being rather more than 2 inches square. None of the pieces were ornamented. The vessel appears to have been about 5 inches in diameter. The wall is $\frac{1}{2}$ inch thick.

The pottery is a light brown clay, smooth on the outside and rather rough on the inside.

15. This is a set of nineteen fragments found close together representing a flat-based pot apparently about $6\frac{1}{2}$ inches diameter at the base. The largest surviving portion is that of a segment of the base about 4 inches along the arc and with about 1 inch of the wall standing, which is about $\frac{3}{8}$ inch thick. The bottom portion is $\frac{1}{2}$ inch thick.

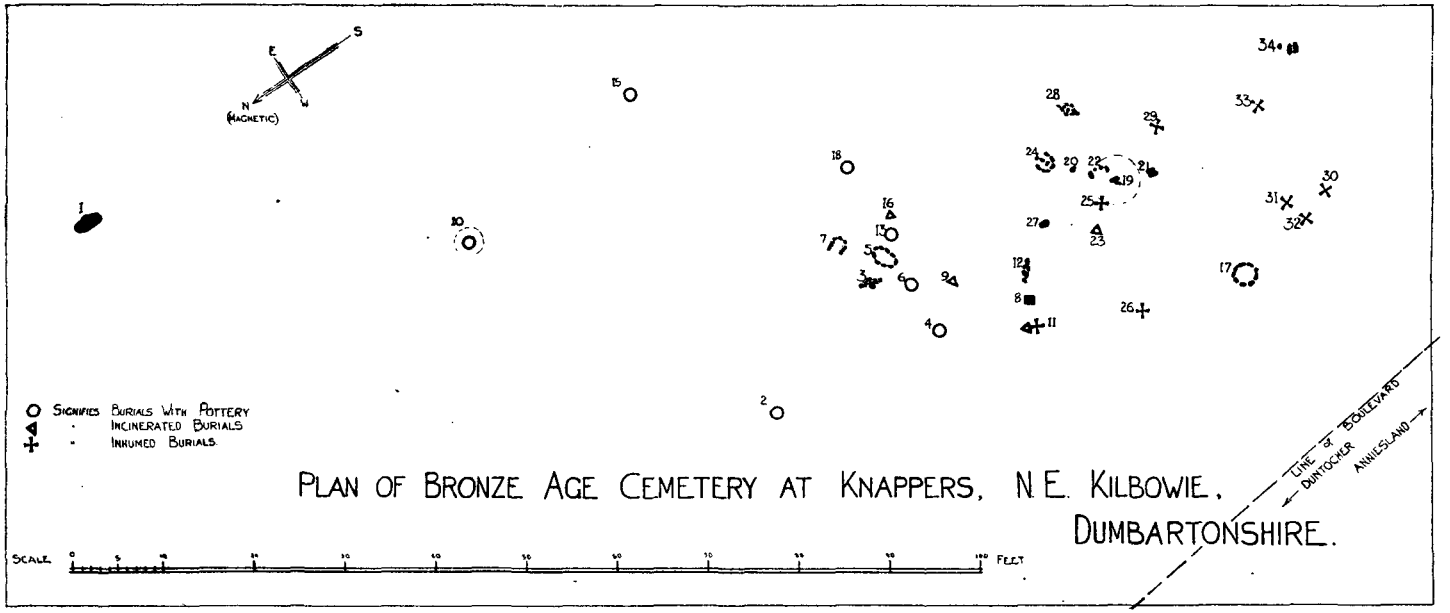
The aspect of this vessel is darker than the food-vessels just noted and the texture is harder and more compact, while the contained crushed pebbly material is of larger units. It is perhaps of somewhat later period though still within an early portion of the Bronze Age.

17. This is a very small fragment of Bronze Age ware with impressions made by a blunt-pointed tool. It does not appear to belong to any of the other groups and was found isolated.

18. Fourteen fragments comprise this group. The vessel is of somewhat coarse ware and in crumbling condition. It is of a very pale red material with black interior.

It is difficult to make out the exact contour of the wall, but it has had three sections: An upper zone, almost vertical, the curvature being very slight and bordered by a rather broad shoulder ridge. The middle ridge is again almost vertical and terminates with a rather prominent ridge at its lower edge, from which the wall slopes inward rather sharply in the lower section to a base now indeterminable.

The upper zone is nicely decorated with two horizontal rows of short,



Plan of Bronze Age Cemetery at Knappers

[PLATE I.

[*To face page* 376.

vertical impressions, made probably by a rough cord wound round a core.

The shoulder border in the upper section is decorated along each of its sides with horizontally placed plain dab markings, the point of the tool being rather triangular in shape. In the panel beneath there are two rows at least of rather badly defined impressions, as if made by an instrument having two points at its end. The surface of the inwardly sloping rim shows again dab markings of somewhat the same character, the point of the tool being broad and triangular.

Pottery Unassociated with any Definite Site.

1. This group of fragments contains a large piece showing a portion of a rim and an undecorated upper wall. The rim consists of an inward sloping side and projects prominently outwards. There is another small fragment of rim of the same aspect. These shards resemble No. 15 in texture and are probably contemporary.

To all the experts who have rendered me professional assistance in the analysis of the materials gathered during the course of this work, I acknowledge my indebtedness, and, in addition to those whose reports are appended hereto, I desire to record my grateful thanks to Mr Ludovic M'L. Mann, F.S.A.Scot., who has, during the period of his own incapacity through illness, guided and advised me in many phases of this work. To Mr George Jamieson I am indebted for his assistance in preparing the photographic record of the discoveries. To my friend Mr John Gentles, F.S.A.Scot., who has, during the fourteen months of our work on the site, been my constant and valued assistant, and who has, moreover, rendered material assistance in the preparation of the plans and sketches, I desire to express my appreciation of his services so freely rendered.

APPENDIX I.

REPORT ON THE HUMAN REMAINS. By Professor J. C. Brash, University of Edinburgh.

No. 3. "Skull bones from two top cross burials." Fragments of skull cap and facial bones. Young adult.

"General bones of two top burials of cross site." Small quantity of fragmentary bones of limbs and trunk.

"Bones together with skull bones of bottom burial of cross site." Small quantity fragmentary limb bones. All these bones appear to have been incinerated (?).

No. 9. "General bones of burial from lignite bead site." Fragmentary limb and trunk bones.

"Skull from lignite bead burial." Fragmentary skull-cap bones. Young adult (?). All these bones appear to have been incinerated (?).

No. 11. Very fragile portions of upper and lower limb bones. Male adult. Few fragments of skull including fairly complete right temporal bone.

No. 12. Crowns of two molar teeth.

No. 13. Quantity of very fragmentary incinerated (?) bones.

No. 16. Quantity of very fragmentary incinerated (?) bones, probably young person or female.

No. 17. Few small fragments of skull bones, incinerated (?).

No. 22. Few skull fragments and number of teeth, mostly crowns. Adult. Plaster cast dental arch of mandible. All teeth present. See Report by Mr J. H. Russell. The impaction of the third molar teeth is a very interesting feature.

No. 23. Quantity of incinerated (?) fragments.

No. 25. Five teeth, crowns only.

No. 26. Fragments of skull cap. Adult. Mature. Several loose fragile teeth. Portion of base of skull with attached portion of right maxilla. Three molar teeth *in situ*. Third molar small and unworn. Portion of body and right ramus mandible with two upper molar and three molar teeth *in situ*. Third molar unworn, others moderately worn.

No. 29. Skull. Left parietal. Portion of right parietal. Occipital bone. No apparent union of sutures. Young mature adult. Portions base of skull including two temporal bones; several cervical vertebræ, including broken atlas and axis. Fragmentary portion symphysis region of mandible. No teeth.

No. 31. Few fragments limb bones. Portion left parietal, probably young adult. Portion left side of body of mandible. Three molars *in situ* moderately worn. Fragments of temporal bones and atlas and axis. Seven or eight broken crowns of teeth.

No. 32. Fragments of bones of skull including both temporals; fragments of atlas and axis. Six broken crowns of teeth.

No. 33. Portion left temporal bone.

The condition of all the bones is such that no conclusions of any value can be based upon them, other than the tentative suggestions regarding age.

APPENDIX II.

REPORT ON MANDIBLE (Site No. 22). By J. H. RUSSELL, Dentist, Glasgow.

I was invited by Mr J. M. Davidson to examine the teeth of a Bronze Age burial, found at Knappers Sand Quarry, Clydebank. I visited the site, and found a complete mandible exposed in the sand on the high ground of the quarry, about 3 feet below the grass. The teeth were extremely fragile, and as they would not stand removal without complete disintegration, I examined them *in situ* and took all notes and measurements before making a plaster cast of the mandible.

The distances apart of the teeth are:

The wisdom molars	58 mm.
The 12-year-old molars from medial sulci	50 ,,
The 6-year-old molars	48 ,,
Bicuspids	40 ,,
First premolars	35 ,,

The wisdom teeth are impacted. The occlusal surface of the teeth is good. The 6-year-old molars and the bicuspids on each side are almost devoid of sulci, signifying much wear. On the contrary, the sulci of the 12-year-old molars is deep, which may be accounted for by the want of an antagonistic tooth in the maxilla. The general type of arch is V-shaped, the laterals lying slightly irregular to the lingual side, the centrals being slightly protruding. The outer incisal edge of the canines has a tendency to lean with a lingual aspect. The maxilla, or upper jaw, would be slightly broader than the lower.

The teeth are too far decomposed to allow of a definite opinion as to disease. On drawing the reverse or original impression, however, I found the dentine to be almost perfect, as far as the eye could judge, but complete decalcification had taken place. The pulp chambers were perfect in shape, showing good root canals.

The enamel had stood the ravages of time better than the cementum and dentine, the teeth being free from caries. The most interesting point of view is the elevated lingual line of the bicuspids and molars on both sides. Those elevated lingual lines have a tendency to prove that the maxilla was broader than the mandible, and that the mandible would

be tighter at the angle than is found at present in man. The interior aspect of the mandible from the angle to the canine ridge must have been very heavy to withstand the masticating action of the jaws.

With regard to the type of face to which this mandible would belong, my impression is that the lips would protrude beyond the chin; that the angle of the jaw would appear to be narrow and the lower part of the face short, with the jaw merging in general into the neck. There is no great width, but no want of strength, as witness the perfect occlusal line of the bicuspids and molars, with the internal line strong to take up all strain.

APPENDIX III.

REPORT ON CONTENTS OF FOOD-VESSEL.

By DOUGLAS A. MACCALLUM, F.I.C., F.C.S.

SAMPLES FROM BURIAL URN AT BRONZE AGE SITE AT KILBOWIE, FROM J. M. DAVIDSON, ESQ.

Site.—Knappers Sand Pit, Kilbowie Road.
Discovered early in 1934 by J. M. Davidson and Wm. Rogerson.
Food-vessel found in a crescent-shaped cairn.
Vessel opened 27/8/34.

Material to be examined: suggested food remains found within food-vessel.
Total weight, 88 gm.

Consisting of 1 large pebble	12 gm.
1 smaller pebble	7 ,,
on $\frac{1}{16}$-inch mesh small gravel	8 ,,
,, $\frac{1}{32}$-inch mesh coarse sand	4 ,,
,, $\frac{1}{64}$-inch mesh fine sand	28 ,,
through $\frac{1}{64}$-inch mesh fine material	29 ,, [1]
	88 ,,

One-half of this last material, *i.e.* through $\frac{1}{64}$-inch mesh sieve, was next separated by float and sink test at 1·4 specific gravity, *i.e.* that of sand, washed and dried.

Heavy, *i.e.* fine sand	13·70 gm.
Light (?)	0·37 ,,
Moisture	0·43 ,,
	14·50 ,,

[1] On examination under the microscope this shows quartz grains, *i.e.* sand and black peaty-like particles.

	Analysis.					Calculated.					Per cent.	Standard Ashes of		
	Sink 13·70 gm.		Float ·37 gm.		Clean Sand.	Per cent.		Per cent.						
	1 gm.	Per cent.	·37 gm.	Per cent.	Per cent.									
		A.		B.	C.	Deduct Sand and Organic Matter from B.	Leaves Food Ash?		Deduct Extra Iron, Lime, Magnesia.*	Leaves Food Ash?		Wheat.	Oats.	Barley.
Loss on ignition .	·0583	5·83	·0726	19·60	1·32	19·60	..	..	..	..	..	..	..	..
Insoluble silica (sand)	·8742	87·42	·2550	68·63	95·72	68·63	..	..	..	..	..	..	..	..
Soluble silica .	·0015	·15	·0010	·27	·07	..	·27	3·44	..	3·44	19·1	1–10	1–49	17–33
Iron and alumina	·0445	4·45	·0207	5·59	1·58	1·58	4·01	51·22	51·00	·22	1·2	0–3	·1–5	·1–2
Lime . .	·0063	·63	·0063	1·70	·33	·33	1·37	17·50	17·00	·50	2·8	1–8	1–10	1–4
Magnesia . .	·0081	·81	·0063	1·70	·57	·57	1·13	14·43	14·00	·43	2·4	9–14	1–10	3–11
Sulphates (SO_3) .	·0039	·39	·0039	1·05	nil	..	..	..	..	..	..	0–2	0–4	0–3
Phosphates (P_2O_5)	·0035	·35	·0038	1·03	·10	·10	·93	11·88	..	11·88	66·0	34–50	14–50	25–39
Alkalies, etc. .	..	..	·0004	·43	·31	·31	·12	1·53	..	1·53	8·5	26–35	13–21	20–32
	1·0003	100·03	·3700	100·00	100·00	91·12	7·83	100·00	82·00	18·00	100·0			

* These can only be deducted arbitrarily.

The foregoing analysis and calculations show the original matter in the vessel to have been very heavily contaminated, not only by the intrusion of the surrounding sand, but by water charged with silica, iron, lime, etc., making it impossible to calculate the analysis of the original ash even approximately accurately.

This flow of water also appears to have washed away some of the more readily soluble magnesium and alkaline salts. With the above points taken into consideration, the final calculation, when compared with the standard analysis of the ash of wheat, oats, and barley, suggests the possibility that the contents have been cereal and probably wheat or oats, with oats the more probable.