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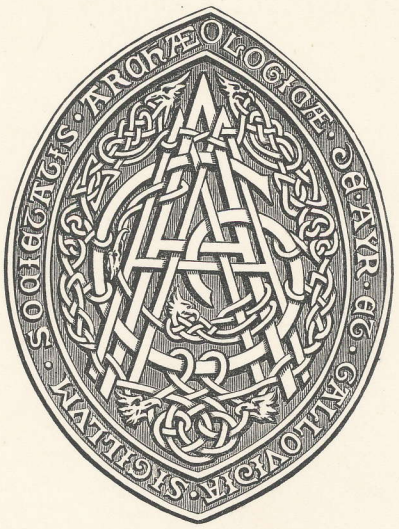

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CONTENTS

V.

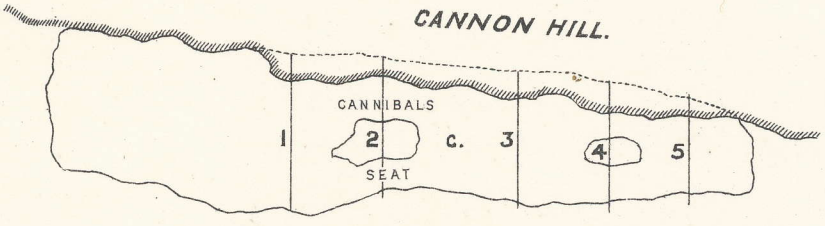
THE ARDROSSAN SHELL-MOUND, WITH AN ACCOUNT OF ITS EXCAVATION.[1]

In various parts of the world, notably along the Baltic coasts of the Danish islands, the eastern coasts of America, and near the shores of many of the Western Islands of Scotland, are found mounds of varied size, composed for the most part of shells of the edible species of molluscs, such as limpets, periwinkles, cockles, and oysters. Interspersed with these are found the bones of many mammals and birds; also weapons and tools of flint, dolerite, horn, bone, and wood, including celts, scrapers, chisels, arrow-heads, sling-stones, anchor stones, and other articles which had been made and used by a prehistoric race of men.

In Denmark these mounds, which are called kjökken mödding, reach the dimensions of from 100 to 1000 feet in length and from 3 to 10 feet high. They have yielded many implements made of similar materials to those above mentioned; but no articles manufactured from any kind of *metal* have ever been found in them. From this circumstance these shell-mounds have been referred by archæologists to the neolithic division of the Stone age. The shell-mounds of the American coasts have a great resemblance to the Danish ones, also containing implements, bones, etc., and are supposed to have been formed by the aboriginal inhabitants previous to the occupation of America by the "white man."

The Scottish shell-mounds are, generally speaking, smaller than any of

[1] The following paper was communicated to the Geological Society of Glasgow, and is now reprinted by their kind permission.



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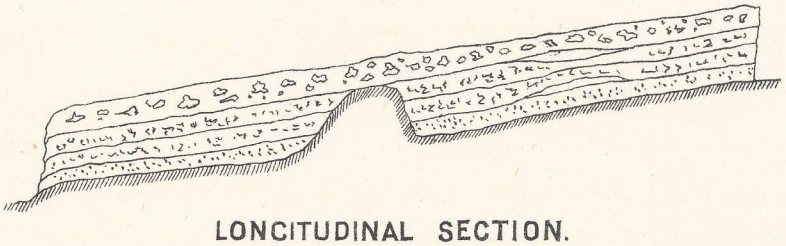

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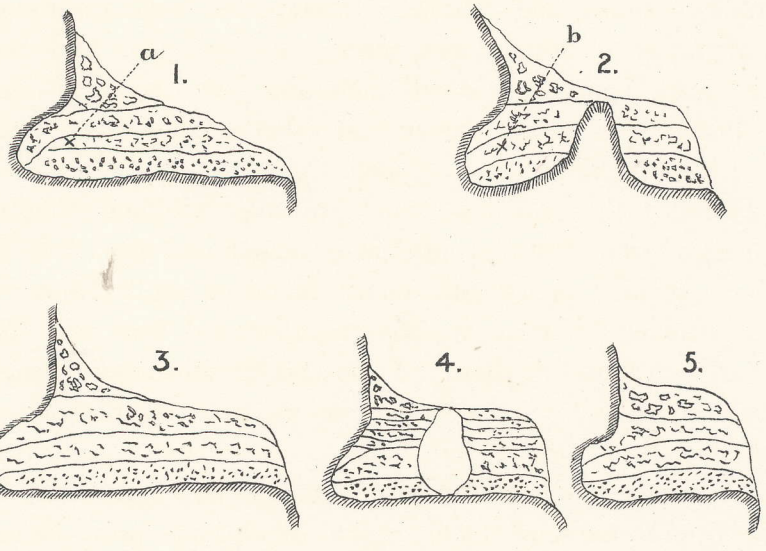


CROSS SECTIONS.

J. Smith, del.

ARDROSSAN SHELL MOUND.

AYR & GALLOWAY, ARCH^L ASSOC^N 1894.

the others, but, like them, contain the bones of animals, and stone, horn, and bone weapons and implements. In the Western Islands of Scotland the shell-mounds often contain a kind of stone implement still used by the islanders, and called "Orst Barnach," or limpet-hammer. In some mounds on the Island of Oronsay, which I examined in company with Mr. Galloway, these limpet-hammers were rather common. They were simply, in this case, selected pieces of clay-slate suitable for holding in the hand, which by constant use in shoving the limpets from the rocks, had assumed, at the ends, somewhat the appearance of a blunted "jumper." Amongst the implements there was another type, which puzzled us to understand what it had been used for. Only about the size of a finger (some examples not half so big), it was sharpened in the manner of a polished celt, although the body of the implement had not been worked or polished, but had simply been selected for its natural shape. The great peculiarity about these Oronsay shell-mounds is the distance they are from the present shore-line, which strongly suggests the idea that there has been a considerable rise of the land since their formation. As will be seen further on, the evidence furnished by the Ardrossan shell-mound is in the same direction, almost demonstrating, in fact, that there has been a rise of a good many feet since the first occupation of this part of the Ayrshire coast by the shell-mound builders. It is this part of the subject which gives the mound its peculiar geological interest.

The Ardrossan shell-mound is situated on the south-west side of the Cannon Hill, close to the Ardrossan station of the Glasgow and South-Western Railway, the whole length of its north-east side lying against and under the rocky side of the hill. It measures 102 feet in length, with an average breadth of about 16 feet, but it has been broader before the station was formed, a considerable portion having been removed, and a complete longitudinal section exposed, by the railway works. Its length, which appears to have been at one time somewhat greater, is mostly overhung by a few feet by the rock-face; and facing the south-west, as it does, the place must have formed a snug shelter for its human occupants. Its formation appears to have been a slow process, and, as will be presently seen, it has been deserted at intervals for considerable periods of time. By their practice of always throwing the castaway shells and bones on the floor, the inhabitants seem to have gradually shut themselves out of the best part of the shelter, which had become more or less filled by the debris of their

repasts and feasts. For its whole length the mound rests on a surface sloping upwards, as will be seen from the longitudinal section given in Plate III. Having had the contents turned bodily over, with the exception of a few feet at the upper end where it would have been risky to do so, I found that underneath the whole of it, and resting on the rock, there was a bed of Raised-beach sand and gravel, about a foot in thickness, and containing rolled shells.

That this place had been occupied by man shortly after the waves left it was clearly evident, as there had only been time sufficient for a layer of earth, little more than *half-an-inch* in thickness, to form on the top of the gravel, nor had there been time for any talus of fragments from the rock-face to gather upon the gravel before the inhabitants began to throw down the shells and other debris upon it. In fact the talus of rock-splinters was formed *on the top of the mound*, as will be seen from the cross-sections (Plate III. Figs. 1 to 5), demonstrating at once its antiquity, and affording some guidance to the time of its commencement. Another point in favour of its antiquity is the fact that many specimens of a spiral mollusc, *Trochus lineatus*, were got in the mound, and must have been common on the then existing shore. This mollusc is now extinct in the Clyde and in the West of Scotland, and has only been found in the Clyde district before as a *fossil*, Mr. David Robertson having got it in the Raised-beach strata of Millport.

Cockles appear to have been very rare in the sands of the neighbourhood, as only two valves were obtained from the mound, and of spout-fish only one small valve, while the "hugger-fish," *Tapes decussatus*, the "horse mussel," *Mytilus modiolus*, and the "clabbydoo," *Mya*, of various species, were totally unrepresented. The horse mussel is rare as a fossil and diminutive in size in the Raised-beach beds of Ayrshire, as is also the hugger-fish, and the clabbydoo is apparently absent from them. The species of the latter shell-fish most frequent in this district at the present day is *Mya arenaria*. In the lower estuary of the Garnock it was very abundant, in muddy and gravelly sand, twenty years ago. To discover their whereabouts one had nothing to do when the tide was out but to stamp on the wet sand, when numbers of small squirts of water would rise, at once revealing the exact position of their holes. But this species has been almost exterminated in this locality by the people carrying them off for food. A boy whom I met with a cargo one day spoke highly in their

praise, declaring that they were "better than beef." The other species, *Mya truncata*, which was abundant during the Glacial period, is not found in the Raised-beaches of this locality, but appears at the present time, though very rarely, in this district of the Clyde.

The two principal shell-fish which had been used for food by the shell-mound builders were the periwinkle and the limpet, occasional specimens, especially of the latter, being large and ponderous. A few specimens of the small shore variety of the whelk, which is still common under stones on the North Ardrossan shore, were got in the mound; but of the larger variety, which lives on a sandy bottom and is frequently thrown ashore during storms, not a single specimen was obtained; mussels were not very common, and oysters were scarce. The edible crab was represented by a single claw, and the lobster was totally absent. Of fish remains only a few bones of the cod and conger eel were obtained, so that these ancient people evidently did not belong to an eminently ichthyophagous tribe. On the contrary, they had been great flesh-eaters, as is evidenced by the remains of the land animals upon which they fed. Although, like their contemporaries in the Western Islands, they lived largely on limpets, not a single "Orst Barnach" was found in the Ardrossan mound. There is evidence that they ventured out to sea, probably in small canoes, for a stone anchor with a groove cut round it, for the purpose of fastening it with some kind of rope, was got.

I commenced the exploration of the mound at the lower and wider end, and worked up hill, keeping, as far as possible, the full breadth and depth of the face before me, and testing the depth and quality of the underlying Raised-beach gravel now and then. Amongst the first articles turned up were a few fragments of very rude hand-made pottery of exceedingly coarse quality and badly burned. This kind of pottery is very rare on the Ayrshire sands, the reason evidently being that such imperfectly put-together material could not withstand the disintegrating influences of the weather for any length of time. The pieces got in the mound probably owe their preservation to their having been well covered up from exposure.

Having got a proper working-face formed, I measured the first section as follows, in descending order:—

1. Talus, on top of mound and lying against rock-face.

2. Shell bed	6 to 18 inches.
3. Reddish soil	½ inch.
4. Raised-beach bed	4 to 12 inches.

No. 2 bed was, for the greater part, composed of *Littorina littorea* and *Patella vulgata*, with a few *Buccinum undatum* (small variety), *Ostrea edulis*, *Mytilus edulis*, *Littorina obtusata*, and *Nassa reticulata*. The last two are not now considered edible species, and possibly may have been carried up by the children to play with, or perhaps gathered with the others and thrown out.

A great many jaws with teeth, and bones were obtained, all the latter which had contained marrow having been split open. Under the ledge of rock at point *a* (see Plate III. section 1), and imbedded in the mass of shells, was a human upper jaw without teeth, which had evidently been knocked out with a stone, splinters of the jaw having been broken off in the process. On finding this grim relic my first impression was that the people who lived here had been cannibals, the jaw having evidently been thrown in the most matter-of-fact way on the general shell-heap, while, probably, the teeth had been kept to make a necklace or other ornament. Further evidence, however, obtained during the exploration, showed that, although the mound-men had feasted, probably during "hard times," on their own species, they were not habitual cannibals, for the whole human remains obtained seemed to show that not more than two human beings had been devoured.

My next cut was up to a boss of rock 10 feet long by 5 feet wide, which I have named the *Cannibal's Seat* (2 on plan). Working in between this boss and the overhanging rock-face, the section was found to be as follows :—

	ft.	in.
1. Talus of rock debris.		
2. Rock debris, mixed mostly with periwinkles . .	1	6
3. Black layer	0	1
4. Shell and bone bed (with a bone implement) . .	1	6
5. Earth	0	0½
6. Raised-beach gravel, with rolled shells . . .	1	3

Besides the shells already mentioned, a valve of *Mactra subtruncata* was got in this cut. In the bottom layer of shells, but not touching the Raised-beach bed, occurred a well-rounded boulder about 2 cwt. in weight, having probably been used as a seat. The black layer (3) had evidently resulted from this narrow pass between the boss and the ledge having been used by the occu-

pants as a pathway to the higher reaches of the mound. Next the boss in this bed the shells were mostly periwinkles, whilst under the ledge they were principally limpets. Had the limpets been thrown under the ledge to keep their sharp cutting edges away from the bare feet of the occupants? Under the ledge of rock, both above and below this spot, the shells and bones were cemented together into a solid mass by stalagmite, the lime having been derived partly from the overhanging rock and partly from the decomposition of the shells by rain-water. Part of a human lower jaw was got in the mass of shells (at *b*, Plate III. section 2), and about a foot above the Raised-beach bed; it had three well-preserved teeth. Near the top of the same bed a well-made diamond-pointed bone chisel, a rude implement made of a human bone, and several human vertebræ, were obtained. Having worked up

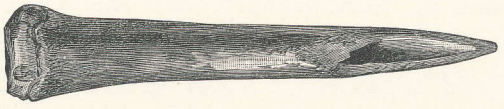


Fig. 1.—Diamond-pointed Chisel. Shell-Mound, Ardrossan. Scale $\frac{2}{3}$.

round the "Cannibal's Seat," an open face was again made, and here (at *c*, Plate III. plan) the remains of a fire were come across. It had been kindled on the Raised-beach some 30 feet above present tide-mark, and showed that from the first occupation these people had been acquainted with the use of fire. Evidently, however, they had not roasted any of their meat, as none of the bones showed the touch of fire. In this cut the sandstone anchor already referred to was got. It measured 7 inches in length by $6\frac{1}{2}$ inches at one end and 8 at the other; the groove round it having apparently been chiselled out with a stone. The first valve of the edible cockle, *Cardium edule*, was obtained here, as also three specimens of the dog winkle, *Purpura lapilis*.

The section (Plate III. No. 3) at this part of the mound measured—

	ft.	in.
1. Talus.		
2. Shell and bone layer	1	8
3. Shell-meal	0	2
4. Shell and bone layer	1	8
5. Earth	0	$0\frac{1}{2}$
6. Raised-beach bed	1	0

The layer in this section of what I have called shell-meal (3) was composed

of thoroughly decomposed shells and bones, and showed that the mound, or at least this part of it, had been deserted for a period long enough to allow the exposed organisms to become completely rotted away; but to this point I shall refer more fully again. In this cut was got a fragment of one of those curious perforated stones which Mr. James Bennie found in the Clyde sandbeds at Glasgow, see *Transactions of the Geological Society of Glasgow* (vol. ii. p. 114), and which he supposed to have been used as "sinkers" for the fishing-lines or nets of the old Clyde canoe-men.

From the Ayrshire sands I have gathered several of these perforated stones, and, like this one, the holes have always been made from both sides, meeting in the centre. They are of two kinds: those made of stone, which appear to have been real sinkers, and those made of gas-coal, which are of the rudest description of workmanship, and the use of which is not so evident. My idea of these latter is that they were kept as charms, or perhaps reverenced and regarded as a sort of sleeping *fire-god* or *sun-god*, seeing that they were composed of a substance that would burn and flame. Of course any beach pebble would have been more effectual as a sinker than one of these light pieces of gas-coal.

At the top of this section was got a piece of wheel-turned glazed pottery. This was the first indication of a substantial advance in the arts, but, as we shall see further on, it belonged to a period posterior to that of the shell-mound. In the lower part of this cut were several fragments of a human skull; it had not parted by the sutures, but had evidently been smashed up to get at the savoury intellectual morsel within. One single valve of *Cardium edule* turned up here.

The next cut gave the following section:—

	ft.	in.
1. Talus.		
2. Shell and bone layer	2	0
3. Reddish soil	0	6
4. Shell and bone layer	1	0
5. Earth	0	0½
6. Raised-beach gravel, with large rolled stones . .	1	0

After working round between a mass of fallen rock and the rock-face, the next section was as follows:—

	ft.	in.
1. Talus.		
2. Sandy soil, with pottery and slag	0	6

	ft.	in.
3. Shell and bone layer	1	0
4. Shell-meal	0	2
5. Shell and bone layer	1	0
6. Earth	0	0½
7. Raised-beach gravel, with large rolled stones . .	1	0

This last section gave us a new deposit—the sandy soil (2) with pottery and slag—which threw much-needed light on the relationship between the pottery and the slag, and showed very distinctly that their period was posterior to that of the shell-mound. All the pottery was of the wheel-turned description, and glazed; the slag was very dark in colour, and heavy. Both the slag and the pottery were of the same description as those I have often found on the Ayrshire sands, and introduced us to a period when man was acquainted with metal and the use of the potter's wheel. The "bill of fare," as indicated by this bed, was not so rich and rare as it had been during the shell-mound period; with the pottery and slag were only got a few periwinkles and the bones of rabbits and hares.

It is interesting thus to be able to compare this later period with the shell-mound period; this never before could be done with data supplied by the shifting Ayrshire sands, which mix all the remains of the various ancient periods together. But I am inclined to think that there is still another period, if not two, wanting, viz. the flint period and the bronze period, and the time they occupied may be represented better by the next section, where 9 inches of *earth* come in between the pottery and slag-bed and the top of the shell-mound. Not a trace of flint was found in the shell-mound, nor in the pottery and slag deposit. The flint and bronze periods are well represented in Ayrshire, and it appears to me that these ancient periods should read thus:—

1. Slag and wheel-turned pottery period (the most recent).
2. Bronze period.
3. Flint period, with arrow-heads, scrapers, &c.
4. Shell-mound period, with hand-made pottery.
5. Period of the 20 to 40 feet Raised-beaches.

The old hand-made urns, with burnt bones, flints, polished celts and hammers, should probably be correlated with the flint period.

The last section (Plate III. No. 5), at 12 feet from the upper end of the mound, was as follows:—

	ft.	in.
1. Talus, earth and large pieces of sandstone.		
2. Decomposed shells, bones, and earth, with wheel-turned pottery and slag	1	2
3. Earth and bones	0	9
4. Decomposed shells	0	3
5. Shell-meal	0	3
6. Earth	0	0½
7. Raised-beach of sand and gravel	1	0

This section was near the upper end of the mound, and the shells and bones were all in a decomposed state.

The last bit of the mound to be excavated was the part outside of the fallen rock (Plate III. section 4), as follows:—

	ft.	in.
1. Earth and shells	0	4
2. Shell-meal	0	4
3. Shell and bone layer	0	2
4. Shell-meal	0	4
5. Earth and shell layer	0	6
6. Shell-meal	0	2
7. Dark band	0	0½
8. Earth and shell layer	0	6
9. Shell and bone layer	0	5
10. Earth	0	1
11. Raised-beach bed of sand and gravel	1	0

This was by far the most interesting section of the whole, and afforded evidence that the mound had been deserted, for considerable periods, at least *three* times during its accumulation.

Throughout the extent of the mound were found a number of hammer-stones, a few very much worn, but the bulk of them had been little used.

All through the mound were found limpets having a hole perforated in the apex. Some were so much decayed that it was impossible to say whether these holes had been made artificially or by decay. Many had undoubtedly been made artificially, and it is most likely that they were strung like beads, possibly on to a strip of hide, of which they would have a good supply, and used as ornamental shell-belts or

wampum, after the manner of the Red Indians, for savage tribes, as well as more civilised ones, like to be "braw."

To Mr. E. T. Newton, palæontologist to the Geological Survey of England and Wales, I am indebted for the following list of animals, the bones of which were identified by him from a selection of 261, which I made from the whole mass of those found in the shell-mound, and which I sent up for his inspection :—

1. Man, *Homo sapiens.*

First rib, one.	Fragments of skull, four.
Second left rib, one.	Right radius, one.
Cervical vertebræ, six.	Left ramus with 4 teeth, fragment of one.
Dorsal „ two.	
Lumbar „ one.	Upper maxillaries, toothless.
Right mastoid, one.	Teeth, a few loose.

2. Long-faced ox, *Bos taurus*, var. *longifrons.* Mr. Newton thinks that the ox bones probably all belong to this species. Abundant.[1]
3. Goat, *Caper hircus.* Common.
4. Dog or Wolf, *Canis lupus (?)* „
5. Sheep, slender-legged. „
6. Red Deer, *Cervus elaphus.* „
7. Pig, *Sus scrofa.* „
8. Badger, *Meles taxus.* Frequent.
9. Rabbit, *Lepus cuniculus.* „
10. Roebuck, *Capreolus caprea.* Scarce
11. Hare, *Lepus timidus.* „
12. Fox, *Canis vulpes.* „
13. Horse, *Equus*, sp. ? „
14. Otter, *Lutra vulgaris.* „
15. Cat, *Felis catus.* „
16. Beaver, *Castor fiber.* Rare.
17. Weasel, *Mustela vulgaris.* „
18. Seal, *Phoca*, sp. ? „
19. Grey Goose, *Anser cinereus.*
20. Pheasant, *Phasianus (?)* One doubtful bone.
21. Oyster Catcher, *Hæmatopus ostralegus.*
22. Red Grouse, *Lagopus Scoticus.*
23. Herring Gull, *Larus argentatus.*
24. Razorbill, *Alca torda.*

[1] From No. 2 onwards the species are given in the order of their abundance.

25. Puffin, *Fratercula arctica.*
26. Guillemot, *Uria troile.*
27. Conger Eel, *Conger vulgaris.*
28. Cod, *Gadus morrhua.*
29. Edible Crab, *Cancer pagurus.*

From the above list it will be seen that the Ardrossan shell-mound builders were no ordinary mortals, but a race of noble savages, monarchs of all they surveyed, hunters of the mountain bull, the stag, and wild boar, clothed during the winter months with the skins of some of the larger animals, and probably having their own tattooed. But they certainly were not the poor painted savages, grubbing up and feeding on roots and herbs, that certain authors, evolving "unwritten history" from their imaginations only, love to depict the ancient Briton. Their occasional diet of shell-fish may have been partly from necessity, partly to give a relish to their more substantial food, which, by all the evidence we can gather from the mound, must have been eaten raw; although we have seen that they were certainly acquainted with the use of fire.

On showing the list to a friend, he remarked that probably no "mixen" of the present day in the United Kingdom could show evidence of a greater variety of food, but we certainly could beat them in old tin cans.

The only extinct Scottish animal, the remains of which were found in the mound, is the beaver. The two species of deer—the red deer and the roebuck—would also probably have been extinct by this time had they not been protected. A number of the bones of the dog (or wolf, for anatomically it is impossible to draw a distinction between these animals) indicated individuals of large size. If they are bones of the wolf, of course this is another extinct animal; but if of the dog, it shows that these people had a powerful race of dogs, as well as horses (which, like the Tartars, they seem to have eaten, probably when they were done with them), with which to hunt their larger game.

It is astonishing to see the dog (or wolf) named amongst the more common species. Can the shell-mound men have eaten these animals? It is well known that some savage tribes at the present day feed their dogs on vegetable substances, so that during times of scarcity they may be used for food, their flesh by such feeding becoming palatable and wholesome, although while dieted on flesh it is rank and nauseous. In the present instance it is not within our knowledge what kind of vegetable matter they

could have fed their dogs upon, there being no evidence in the mound that they were acquainted with any of the cultivated cereals.

The following is a list of the shell-fish found in the mound :—

Limpet, *Patella vulgata.* Abundant.
Periwinkle, *Littorina littorea.* „
„ „ *obtusata.* Frequent.
„ „ *rudis.* Rare.
Trochus lineatus, now extinct in Clyde. Frequent.
Silver Buckie, *Trochus umbilicatus.* Frequent.
The Groat, *Cyprœa Europœa.* One Specimen.
Dog Whelk, *Nassa reticulata.* Frequent.
Roaring buckie, *Buccinum undatum,* small shore variety. Frequent.
Dog winkle, *Purpura lapilis.* Frequent.
Spindle Shell, *Fusus,* sp. ? A fragment.
Edible Mussel, *Mytilus edulis.* Scarce.
Spout-fish, *Solen siliqua,* of small size. A fragment.
Aitken, *Mactra subtruncata.* A few valves.
Oyster, *Ostrea edulis.* Scarce.
Edible Cockle, *Cardium edule.* Two valves.

From the above list it will be seen that in the matter of shell-fish the *pièce de resistance* was certainly furnished by the two species the limpet and the periwinkle; the former, generally speaking, prevailing in the bottom part of the mound, and the latter in the upper. The other edible species are conspicuous by their scarcity, and two good edible ones, the "hugger-fish" and the "clabbydoo," are not represented. It will be observed that the rare or absent species are such as live in holes or under sand. Was the ancient Briton not acquainted with this fact, or were these molluscs scarce or absent from the district? From what has been already said I am inclined to hold the latter view. Two land shells were also obtained, *Helix nemoralis* and *H. nemoralis,* var. *hortensis.*

After the mound had been turned over, and the rain had washed the surface of the debris, I obtained a pair of bone needles or "aulds" which

Fig. 2.—Broad Bone Needle, Shell-Mound, Ardrossan. Full size.

doubtless did good service at one time in sewing fur garments for the ancient Briton.

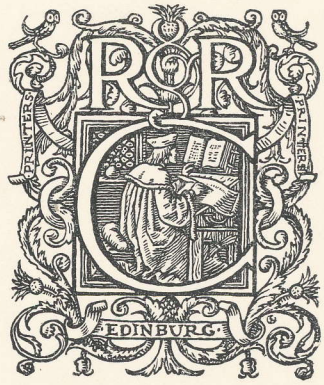
There is a considerable similarity between the jaw of a pig and that of the genus *Homo*. During the exploration, a person who assisted me picked up a bone, and observing him standing and looking at it with a mixture of curiosity and dread depicted on his countenance, I said, "What is this you have got hold of now?" His diagnosis was decided, as he at once replied, "A tremendous man's jaw." It was that of a pig!

I have heard it said that Professor Huxley at one time described a number of bones from a shell-mound somewhere in the north of Scotland, but I do not know in what publication his remarks on the subject are to be found.[1]

JOHN SMITH.

MONKREDDING.

[1] Since the above was written I have had a note from Professor Huxley to say that he is not personally responsible for the cannibalistic theory mentioned in the paper referred to.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