II.

INVESTIGATION OF THE ARTIFICIAL ISLAND IN LOCH KINELLAN, STRATHPEFFER. By HUGH A. FRASER, M.A., Dingwall.

Introduction.

A Committee of the British Association was formed in 1910 to investigate, and ascertain the distribution of, artificial islands in the lochs of the Highlands of Scotland. The Committee consisted of Dr Robert Munro, the eminent Scottish authority on lake-dwellings, Professor G. L. Myres (Secretary), Professor T. H. Bryce, and Professor Boyd Dawkins.

The originator and chief promoter of the scheme for exploring the artificial islands in Highland lochs was the Rev. F. Odo Blundell, O.S.B., of St Benedict's Abbey, Fort Augustus.

Acting under Mr Blundell's directions, the British Association Committee decided that the first thing to be done was to obtain a preliminary survey of existing materials.

In response to informatory circulars sent to a large number of local antiquaries and others likely to be interested, a budget of replies was received containing valuable information culled from historical sources, local traditions, and personal observation, and conclusively proving that artificial islands were interspersed throughout almost all the lochs of the Highlands. In 1890 the list of localities in which crannogs were found, or in which their presence was indicated, amounted to 103.[1] The material obtained in response to Mr Blundell's circulars increased this number by 40 or 50 additional sites. All the information obtained is duly tabulated with all available details in three reports by Mr Blundell to the British Association for the years 1911, 1912, and 1913. In addition to these reports, Mr Blundell contributed valuable articles on the islands, with many photographic illustrations, to vols. xliii., xlv., and xlvii. of the *Proceedings of the Society of Antiquaries of Scotland.*

These papers completed the survey of the existing insular material, without taking into account the crannogs that are entirely submerged.

The next stage in the inquiry was to fix on an island for detailed investigation. After due deliberation, the crannog in Loch Kinellan, near Strathpeffer, Ross-shire, was decided upon. But practical archæology is an expensive business, and the British Association Committee could not face the proposed excavation with merely the sum received from the Association. This difficulty was temporarily overcome by a

[1] *Lake-Dwellings of Europe*, pp. 442–449.

small grant from the Carnegie Research Fund of 1913–1914, made to Dr Munro, Chairman of the Committee. Unfortunately, shortly after, Dr Munro retired from the Committee on account of the state of his health.

Owing to the lateness of the season and other causes, no action was taken in 1913 under the Carnegie Grant. In August 1914 Dr Munro received a communication from the Carnegie Research Fund that the grant would lapse unless operations were carried out that season. As neither the Chairman nor the Secretary of the British Association Committee could undertake the work, Dr Munro, as grantee of the fund, was placed in a dilemma. In the circumstances, he arranged with Mr Odo Blundell, who had all along been the active agent in the investigations, to start operations, while he himself, though not yet fully recovered from his illness, was to join him later on.

But the Great War had broken out, and Mr Blundell received orders to hold himself in readiness to join the Fleet as a Chaplain. He thereupon wrote to the present writer, who had already done research work on the crannogs in the Dingwall district, to assist him in the investigation and, if necessary, to take charge. When I joined Mr Blundell, his duties with the Fleet had already commenced, and the time he could give to the investigation of the island was uncertain. He accordingly asked me to undertake the supervision of the excavations from the outset. As I had to resume my scholastic duties almost immediately, I had to arrange to execute the work in the few days available.

A week later Dr Munro arrived, and by his directions further excavations were made with a view to obtaining relics that would give some clue to the age of the island. This part of the work I could supervise only after school hours.

A short interim report by Dr Munro on the work done was sent to the Secretary of the Carnegie Research Fund in October 1914. The report also appeared in the *Glasgow Herald* of 9th January 1915, as part of an interesting article by Dr Munro on Scottish crannogs. I am indebted to Dr Munro's article for most of the foregoing facts.

On examining the materials for a detailed report, and more particularly on revisiting the island, I was persuaded that more could be gleaned from the excavations than had yet been done, the latter part of the work especially having been but partly supervised. As only Saturdays were available to me, and as preparation had now to be made for coping with the lake water which had percolated into the excavations to a depth of several feet, I was ultimately forced, after having worked on the island in snow and frost, to abandon the completion of the investigation until the summer of 1915.

I resumed operations in July 1915, and obtained results which, I think, amply justified the postponement. Just as I was on the point of completing the work, having already arranged for the excavations to be filled in, I discovered a dug-out canoe as an underlying support of a portion of the woodwork in one of the pits. This I determined to attempt to recover.

But it was now winter, and, although I had for several Saturdays the assistance of a number of friends, who worked knee-deep in liquid mud, I was compelled once more to postpone the completion of the investigation.

In July 1916 the canoe was secured, and the work on the island, for the time being at any rate, brought to a close.

On the further work done on the island being brought to the notice of the Carnegie Trustees, they renewed their grant for two additional years, thus relieving the principal investigator of somewhat heavy incidental expenses.

Historical Notes.

Loch Kinellan is a small lake situated about a mile south-west of the village of Strathpeffer. But for its surroundings it might be described as a mountain tarn occupying a scooped-out hollow in a small glacial valley; the neighbouring scenery makes it a gem in a picturesque setting. The island which is the subject of this report, situated near the southern shore, adds to the beauty of the scene, and this is further enhanced in the summer and autumn months by a luxuriant growth of bulrushes at the west end of the lake, and in the lee of the island (fig. 1).

The crannog is of historical interest. It was for long a hunting-seat of the Earls of Ross. It was to Kinellan that William, fourth Earl of Ross, invited King Robert the Bruce "to kill a buck in his company," after the King and the Earl had adjusted their differences at Auldearn. In 1476 the Earldom of Ross was irrevocably annexed to the Crown. The "management of its rent" was entrusted by the King to the Earl of Sutherland, who transferred the trust to Alexander Mackenzie of Kintail, sixth chief of the Mackenzies. As this necessitated his being often "in the low countries," Alexander chose Kinellan, "a secure place," "ane island in ane loch," for his abode, with Brahan as a mains. He does not seem to have been long at Kinellan when his son Kenneth (Coinneach a' Bhlàir) contrived to quarrel with the Macdonalds. Trusting that the men of the Isles would be unwilling to invade Ross, Kenneth stayed at Kinellan, where his father "abod in the little ille, and Kenneth and such as he haid with him lay at the lochsyd, in a secure ground."

It turned out that the Macdonalds had no "unwillingness to invade Ross," and Kenneth had to make preparations to receive them. Fearing that the Macdonalds might besiege the island in Loch Kinellan, Kenneth persuaded his aged father to go for safety to the Raven's Rock, some miles to the north. Kenneth himself sallied forth with his men to meet the Macdonalds, on whom he inflicted thorough and condign punishment at the battle of Park close by, thereafter returning in triumph to Kinellan.

Alexander Mackenzie came to reside at Kinellan about 1485. He died there in 1488.

Fig. 1. Kinellan Island from south-west in summer.

Alexander was succeeded by his son Kenneth, who held sway as chief for only three years. He died at Kinellan in 1491.

Kenneth's eldest son and successor, "Kenneth the Younger," was a "man of great spirits and reckless habits." He was apprehended by order of James IV. in 1495, and kept in confinement in Edinburgh Castle. He escaped in 1497, and while making his way to the north was killed by the Laird of Buchannan.

"Kenneth the Younger's" mother seems to have continued to reside at Kinellan after her husband's death, for there is a reference to the lands of Kinellan in connection with a cattle raid on the "Lady of Seaforth" in 1494. Possibly to that event may be ascribed the tradition that the Lady of Seaforth was carried off from Kinellan by a party of Munros, who, however, were "overtaken near Castle Leod by the Mackenzies, and defeated with great slaughter."

Kenneth the Younger was succeeded by his half-brother John of Killin, a minor. His uncle Hector Roy, the progenitor of the Gairloch family, who had administered the estates during "Kenneth the Younger's" minority and captivity, seems to have been determined to retain possession of them. He objected to the legitimacy of John of Killin's claim, and "continued to possess Kinellan as a rentler as his father Alexander had done." This led to the battle of Bealach nan Còr (a pass to the south of the village of Strathpeffer), fought between the Mackenzies and Munros in, or shortly after, 1500. At that time the headquarters of the Mackenzies were at Kinellan, so that for fifteen years at least the island home was their principal place of residence.

How long, subsequent to the battle of Bealach nan Còr, Hector Roy continued to stay at Kinellan is difficult to determine, but when approached by his nephew in 1507 to give up his claim to the estates he was residing at Wester Fairburn.

There is no evidence that Kinellan was at any later period used by the Mackenzies of Kintail as a family seat. The property, which was held at first by them as "rentlers of the King," was feued by Sir Colin Mackenzie of Kintail, who became chief in 1568. In 1745 we find it in possession of Alexander Mackenzie of Ardloch and Kinellan, brother of the first Earl of Cromartie, and grandson of Sir Roderick Mackenzie, the famous Tutor of Kintail. Thereafter the property came into the possession of the Mackenzies of Coul, who still retain it.

In the nineteenth century the island was, under different tenants, used as a kitchen garden. A number of fruit trees still growing upon it are evidence of this somewhat ignoble use, while the rich crop of nettles that mantles its surface season after season is further eloquent of its departed glory.

The *New Statistical Account*[1] has the following references to the crannog:—

> "Loch Kinellan is also a pleasing object with its pretty little island (for many years a garden), and the fine arable fields on one side contrast strikingly with the wilder scenery on the other."
>
> "In Lake Kinellan stands an artificial island, resting upon logs of oak, in which the family of Seaforth had at one period a house of strength."[2]

It remains to be said that Loch Kinellan and its island figured largely in the traditions of the district, but it does not appear to have been a matter of common knowledge that the island was artificial.

[1] *New Statistical Account*, vol. xvi., Ross and Cromarty, Contin, p. 236.
[2] *Ibid.*, p. 237.

INVESTIGATION BY MR BLUNDELL AND MR FRASER.

The main aims of the investigation were to determine whether or not the island is really artificial, and, if possible, to determine its age.

The preliminary arrangements were made by the Rev. F. Odo Blundell, O.S.B., Fort Augustus, who spent a whole day in finding men for digging operations and in procuring a boat with which to gain access to the island.

The scarcity of labour consequent on the outbreak of war made men difficult to obtain, but Mr Blundell's enthusiasm brooks no denial,

Fig. 2. Kinellan Island from south in winter, showing barrier of stones.

and late in the evening two suitable men were got. A boat was kindly lent by Mr Wallace, managing director of the Spa Hotel, Strathpeffer.

When Mr Blundell and the present writer arrived at the island in the forenoon of Tuesday, 25th August, the men had already been busy laying low the exuberant growth of nettles which covered the crannog. The island we found to be irregularly elliptical in shape, its major and minor axes measuring respectively 70 yards and 47 yards (figs. 2 and 3). Along the whole of its perimeter is a barrier of stones which do not appear to have been laid down with any great care. There is no appearance of even the roughest form of masonry. The barrier is highest at the west end of the island; at the east end the stones are all but covered when the loch is at its maximum height. At the west

end of the island, and extending round for some distance along the northern side, is a second barrier of stones partly overgrown. This second barrier is at a distance of about 15 feet from the shore barrier, and may have been intended to shelter the island from the west winds, which are the prevailing winds in the district and those to which the island is most exposed. The surface of the island shows a gentle slope from west to east, the average height at the former end being 4 feet 6 inches above the mean level of the loch, and at the latter 2 feet 6 inches. A hoary ash tree grows near the northern shore; several graceful birch trees adorn the south-eastern part of the island; the fruit trees already referred to we found to be damson and plum trees. Along parts of the stony barrier currant bushes contrive to flourish.

We determined to begin the excavations by sinking a pit in the centre of the island (fig. 3). There was first encountered about 15 inches of black soil containing several bones very much decayed. Then followed about 9 inches of clayey gravel, which the workmen insisted was there since the beginning of time! Next came two bands of mould alternating with bands of clay each about an inch in thickness. Underneath was a layer of clay 12 inches in depth, in which were embedded large stones. Underlying this again were 4 inches of vegetable humus which was almost peaty in parts, and which contained pieces of hazel twigs and fragments of hazel nuts. Brushwood debris was next met with, and on its being carefully removed a layer was found of logs lying closely together in an east-and-west direction. The wood was exceedingly soft and decomposed. It was almost impossible to manipulate it with a spade without reducing it to a peaty mass. The logs were about 10 inches in diameter. Underneath the uncovered logs, and lying parallel with them, was a second layer. A crowbar forced vertically downwards appeared to travel through wood for 2 feet, and then through peat or soft humus until a solid foundation was got 4 feet 6 inches below the level of the logs.

Several pieces of pottery were found in course of the digging, one of them a piece of delft of probably seventeenth- or eighteenth-century manufacture. At a depth of 3 feet 6 inches was found a piece of iron so corroded that it was impossible to say what it had been used for.

It was next decided to dig trenches along the major and minor axes of the island (fig. 3).

While the workmen were clearing away the surface soil for a trench that was to lead southwards from the centre pit, I thought I detected part of the foundation of a wall some 6 feet thick. I immediately set the men to dig at each side of it, and asked each of them to make a pit about 6 feet square. I observed that in the trial pit, water had

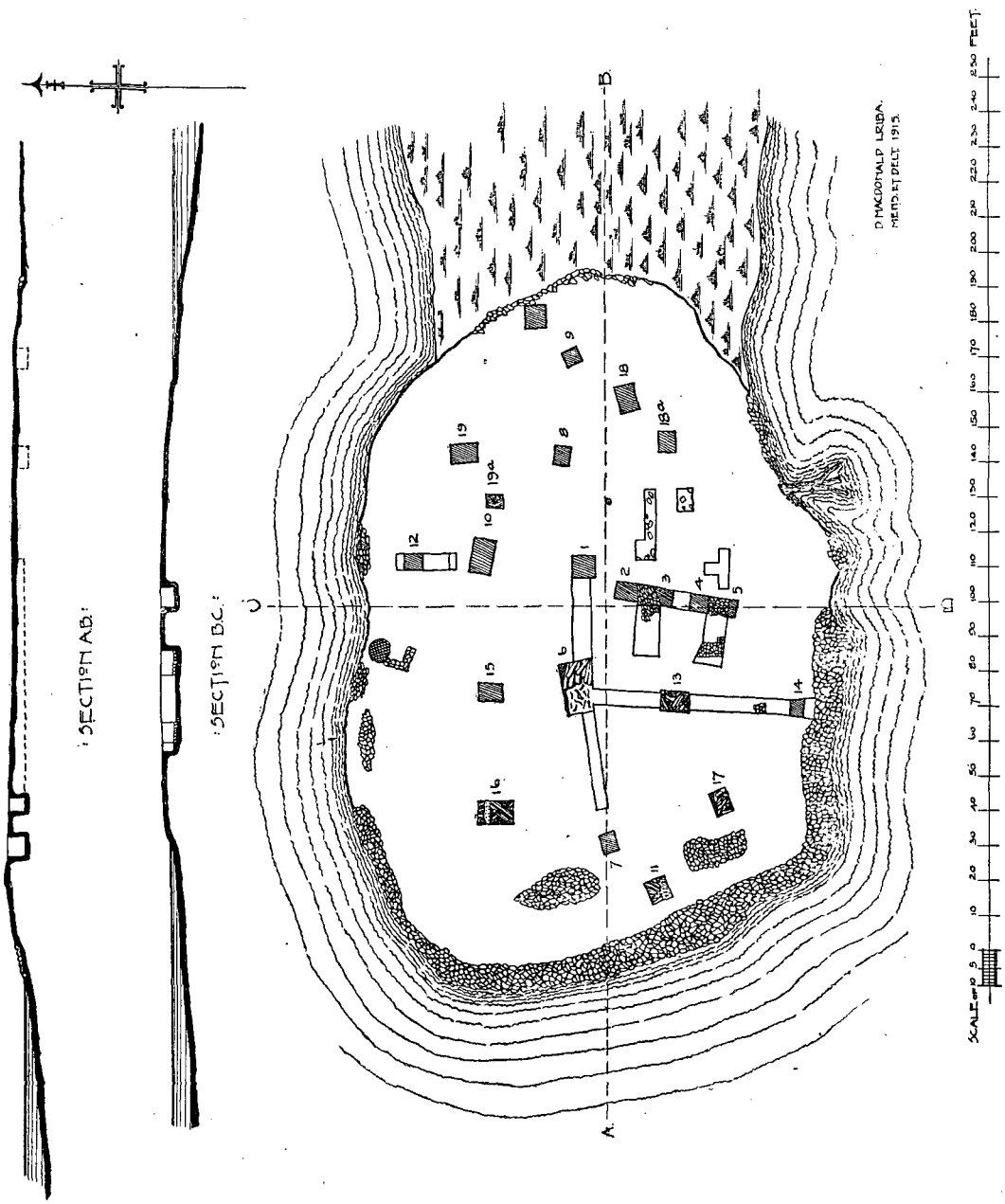


Fig. 3. Plan and sections of Island, showing trenches and pits.

oozed in from the surrounding soil and now filled the pit to a depth of several inches. As the same thing happened in the case of the second and third pits, I decided to abandon the idea of cross trenches and to sink pits instead. Without pumping appliances it would be impossible to control the water in long trenches. The scheme of pits I decided on consisted of those marked 1 to 11 in the plan (fig. 3).

Pit No. 2.—This pit gave a section corresponding roughly to No. 1—black earth, clay, boulders and clay, and peaty soil with wood underneath. The wood in the pit was of the nature of brushwood, and did not show any definite arrangement.

Underneath the boulder layer and overlying the peaty soil was a seam of about 1 inch of reddish material. On examination it appeared to consist of baked clay, with which were intermingled pieces of pottery.

Shards of pottery were got in quantity, particularly at the level of the baked-clay seam. At a depth of three feet was found a brown fragment beautifully glazed, which could easily pass for a piece of a twentieth-century teapot.

The pit yielded a number of bones.

In the course of the digging was got, 18 inches down, one of the two examples of dressed stone found in the course of the excavations —a piece of gneiss, a fragment of either a checked jamb or of a stone through which a square hole had been bored. The only part which shows tool-working is the checking or hole. If it was a jamb, the stone was not placed on its natural bedding (fig. 4).

Pit No. 3.—When the surface soil for this pit was cleared away, there was found the second portion of dressed stone just referred to. It is a rectangular piece of sandstone 19 inches by 7 inches by 4 inches, and is evidently part of a larger stone. The upper surface and one end are carefully chiselled, different tools having been used for each. On the upper surface is part of what was probably a hexagonal recess, which from its rough finish was almost certainly covered. It may have been the base of a hexagonal pillar (fig. 4).

The surface soil was followed by a layer of brittle puddled clay, which the workmen dubbed "pan." Underneath was a further layer of fairly compact clay with which were associated a blackish, sooty-looking powder, and reddish, ashy-looking stuff. Next came 12 inches of hard, compact clay overlying a layer of boulders. Below the boulders was a seam of baked clay similar to that obtained in Pit No. 2. Beneath this again were 9 inches of peaty soil unmistakably mossy in character. Wood was met with at a depth of 4 feet.

A large number of fragments of pottery were got, for the most part associated with the seam of baked clay.

Pits 2 and 3 having been dug out, there was little doubt that the foundation of a wall was exposed between them. It consisted of unhewn stones of varying sizes embedded in clay, and measured 6 feet across. I immediately set the men to look for a foundation to correspond with the one exposed. This was found 14 feet to the south, the distance being measured from the inner sides. Pits were sunk on each side of this foundation also (fig. 3).

Pit No. 4.—As a measured section of this pit will be fully described in a later portion of the report, it will suffice at this stage to say that the layers encountered corresponded generally to those met with in Pit 3. The peat at the bottom of the pit was well formed. It exuded

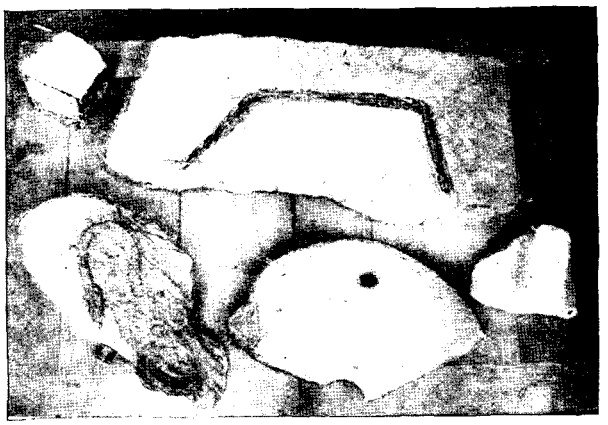


Fig. 4. Finds: Worked Stone (including a portion of a quern) and Iron Staple.

the characteristic smell of the peat bog. The substances that went to form the peat seemed to be mainly heather, moss, and brushwood debris.

The pit yielded its quota of bones and pottery shards. Three feet down was found a knob-like piece of bone, probably the head of a femur, with a hole $\frac{3}{10}$ inch in diameter through the centre (fig. 7). A portion of a wooden vessel was got at a depth of 4 feet. It showed part of the bottom and of the sloping side. The surface was very finely finished. It looked like a fragment of a bowl or trencher. It was exceedingly soft, and despite every care defied preservation.

Pit No. 5.—The surface soil was followed by about 2 feet 6 inches of blackish earth and clay. Timber was encountered at a depth of 3 feet 6 inches, and for the first time a pile was seen. It was cylindrical in shape and about 6 inches in diameter.

A number of pieces of pointed wood were found at a depth of 2 feet.

The workmen considered them roes' horns, a description that gives a fair idea of their size and shape. On a slice being cut off one of them it was found to smell strongly of pine. When dried it burnt readily with a lurid hydro-carbon flame and with the emission of dense volumes of smoke. These pieces of hard, highly resinous wood are undoubtedly fir nodules, obtained most probably in some neighbouring peat bog, and used perhaps as prongs for some purpose or other, or quite conceivably as thatch pegs (fig. 5).

Perhaps the most interesting find of all from the relic-hunter's point of view was made in this pit at a depth of 3 feet 6 inches—a piece of carved ivory, cylindrical in form, $1\frac{1}{5}$ inch high and $\frac{4}{5}$ inch in diameter. It carries a shield with a cross engrailled, probably the arms of the

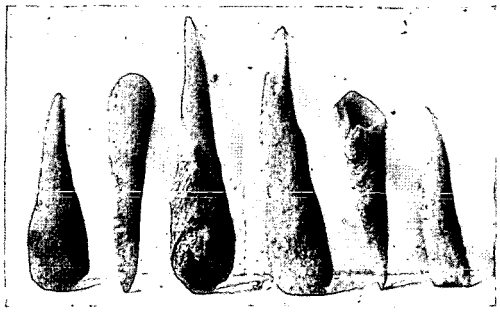


Fig. 5. Fir Nodules found at a depth of 2 feet.

Fig. 6. Piece of Carved Ivory, probably a Playing Piece.

Sinclair family. It may have been used as a playing piece for chess or backgammon (fig. 6).

Pit 5 yielded but one bone and three shards of pottery. The seam of baked clay met with in Pits 2, 3, and 4 was found in this pit also, and is most probably the same seam as was discovered by Mr Corbet of Kinellan, tenant of the island, in a trial pit he made in 1910, situated in line with the foregoing pits, and about 20 feet from the water-line. Mr Corbet describes it as a "layer of sand consisting mainly of white sand and broken pottery."[1]

Pit No. 6.—In the pits dug so far, water oozed in more or less rapidly before the woodwork could be properly exposed. In No. 6 the timber was well above the water-level, and the logs could be examined with ease. There were three oak beams of rectangular section and with clean-cut ends lying in an east-and-west direction, an inch or two apart from each other. They had a downward tilt to the east, and

[1] *Proceedings of the Society of Antiquaries of Scotland*, vol. xlvii. p. 274.

were overlaid by one or two pieces of timber lying in a north-and-south direction. On passing the hand down between the beams a second set was encountered lying at right angles to those exposed. The beams measured 10 inches in width and 4 in thickness (figs. 9 and 13).

The section of No. 6 gave 18 inches of black earth followed by 1 foot of dark loam and 9 inches of peat.

In the pit were found a piece of diorite so decomposed by the surrounding humus as to be easily powdered, and one or two pieces of peaty soil covered with a whitish accretion resembling tallow.

Pit No. 7.—This pit, dug near the ridge of stones that lies parallel to the western shore, at a distance from it of about 30 feet, proved unique in that continued efforts failed to locate any wood. At a depth of 6 feet some traces of wood were found, but nothing to indicate a platform of logs or of brushwood, as met with in all the other pits. Below the surface soil, stones were encountered the whole way down, with black earth interspersed in places. The digging of the pit had ultimately to be abandoned. Not only did percolating water become troublesome, but it was found impossible to negotiate the large stones without suitable tackle.

About 18 inches from the top some pieces of lime mortar were found. Two fragments of pottery were got at a depth of 2 feet. About 30 inches down several pieces of charcoal and of calcined bone were obtained, while at 4 feet below the surface wood cinders were met with in quantity.

A hone-shaped piece of sandstone, 5 inches by $1\frac{1}{4}$ inch, got at 3 feet, and a kidney-shaped piece of quartzite, measuring $3\frac{1}{2}$ inches by 3 inches, with a thickness of 1 inch, found at a depth of 4 feet, show unmistakable signs of having been used as polishers. Two stones found by Dr Munro in Lochan Dughaill near Kintyre appear to be very similar (fig. 7).[1]

Pit No. 8.—One side of No. 8 yielded black earth nearly all the way down, while the opposite side gave, under the surface soil, clay with many large boulders. At a depth of about 3 feet 6 inches a rich black loam was encountered which was declared by the workmen to be "fat." Underneath it was a band of soft blue clay overlying a layer of peat. The peat on being cleared away exposed brushwood at a depth of 4 feet, with a small pile at one end.

The pit yielded 15 shards of pottery and 25 bones. Both pottery and bones were found throughout. At one part, about 3 feet down, the bones had so decayed as to form fine bone-dust. A small quantity of lime mortar was got at 2 feet 6 inches. Charcoal was met with at 30 inches, and again in quantity at 4 feet, associated with ashes and

[1] *Proceedings of the Society of Antiquaries of Scotland*, vol. xxvii. p. 218.

pieces of bark. Two iron nails, very much oxidised, were got immediately over the large stones above the clay and peat bands.

Pit No. 9.—The pit gave a section that, in view of the latter part of the investigations of the crannog, is full of significance—1 foot 3 inches of black earth, 1 foot of clay with large stones, 2 feet of peat, 6 inches of clay, 2 inches of peat, 3 inches of bluish clay, and 4 inches of peat with brushwood underlying it at a depth of 3 feet 8 inches from the surface. In this pit also a small pile was seen.

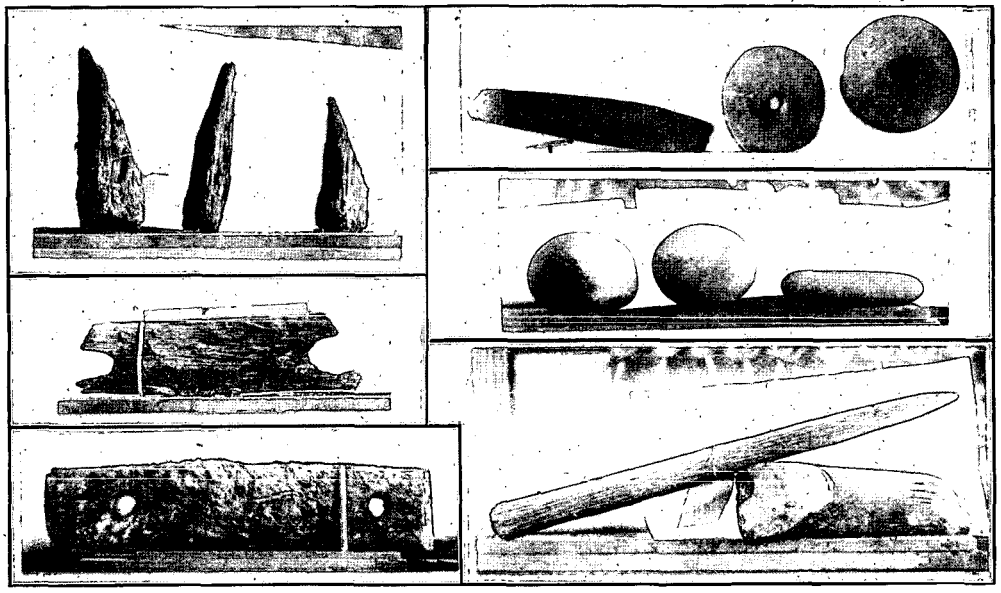


Fig. 7. Finds.

Rough Wedges—Pit 13.
Tie-piece—Pit 13.
Tie-piece—Pit 10.
Slick-stone, Whorl of Shale, Bone Whorl.
Pot-boiler, Kidney-shaped Polisher, Hone-shaped Polisher.
Pegs.

An interesting find consisted of lumps of half-baked clay. The soft clay interbedded with the two bands of peat at the bottom contained charcoal.

Pit No. 10.—In this pit habitation refuse was found in such profusion that it was christened the kitchen midden.

The foot or so of surface soil was followed by a foot of clay with large stones, beneath which were found red baked clay in lumps, charcoal, and cinders. Next came about a foot of dark soil rich in humus. At a depth of 3 feet the workmen came upon a layer of brush-

wood, which was followed by layers of occupation refuse with clay interbedded. Matted straw; compressed reeds, brackens, and moss; brushwood and wood chips; hazel twigs, leaves and bark; heather; peat, yellow and black, formed and forming; bones of animals, whole and split, with some of them bleached by the surrounding peat; bones of fish and of fowls; and hazel-nut shells, were thrown up in profusion. This seemingly heterogeneous mass was obtained until the workmen had to desist at a depth of over 6 feet, owing to the incoming water.

Sixteen shards of pottery were got. Three of them, found comparatively near the surface, and a fourth piece, obtained in Pit 2, 40 feet away, fitted together to form a handle that materially assisted Mr Curle, Director of the Scottish National Museum of Antiquities, in making the restoration illustrated in fig. 8.

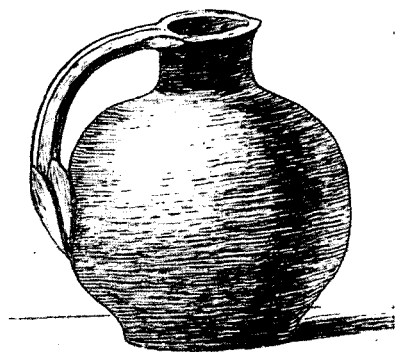


Fig. 8. Diagrammatic restoration of the type of vessel in use. About $\frac{1}{6}$ actual size.

Part of a tree stool, much decayed, lay horizontally at a depth of 3 feet, a depth corresponding to that at which timber was found in the "beam" pits. Slightly lower, and in an upright position, was the end of a post or pile, finely pointed and with a diameter of 6 inches. A piece of oak board 2 feet 3 inches by 6 inches by $1\frac{1}{2}$ inch lay at a depth of 3 feet, and appeared to have been carefully placed in a horizontal position (fig. 7). The upper surface is bevelled along one side and both ends. This board has cut in it two irregularly circular holes of about $1\frac{1}{2}$ inch in diameter, one near each end, and inclined towards each other. In it are three smithy-made nails, square in section, with flat heads 1 inch across. One of them had evidently been short for its purpose, for a rough triangular recess had been cut in the board to enable the nail to be driven further home. A fourth nail which is missing had split the wood; the hole gives a square section of $\frac{3}{16}$ inch side. At a depth of 3 feet 6 inches, in peaty soil, was got a piece of well-squared oak, the end of which shows neat saw-work. It is evidently a portion which was split off from the end of a post in driving it. At that part at any rate the post was not shaped with the grain of the wood. A runnel-like piece of elder about 3 inches long was found at a depth of 3 feet. It had quite manifestly been fashioned for some purpose. A pointed hazel peg which had been hardened in the fire was got at 5 feet 6 inches. Two shreds of sacking were got well down in the pit.

A small piece of undressed leather found at 3 feet 6 inches belonged probably to horse harness. A piece from a depth of 5 feet looked like either a holster or sporran flap, or a portion of the upper part of a brogue. It is made of fine thin leather, backed with stouter undressed leather. The edges of the surface leather are scalloped, the indentations being at regular intervals. The stitching was of the "half-through" variety. It contains a buttonhole, the signs of friction on which show the button to have been spherical in shape. A piece of iron which had been subjected to prolonged heating, and was now practically a lump of hæmatite, was got at 2 feet beneath a layer of clay, 9 inches deep, underlying the surface soil, while a piece of much corroded iron was found in a pocket of sand 2 feet below the surface.

A number of calcined bones were got in the pit. About 27 inches down was a layer of a conglomerate of clay, ashes, and wood cinders.

At a depth of 5 feet there was exposed the tail end of the backbone of a large fish, a splendid instance of a fossil in the making. At 3 feet and again at 5 feet a number of oyster shells were found.

Pit No. 11 was not nearly so difficult to dig as its neighbour No. 7. Stones and earth were encountered for about 2 feet 6 inches, and then a soft clayey loam. Logs were got at 4 feet 6 inches with a thin seam of peat overlying them. An iron bar which looked like a window weight was got at a depth of 1 foot, and at the same depth some bones were found. A piece of a stag's antler was obtained 4 feet below the surface. From the appearance of the fragment, the antler must have been a large and handsome one.

This finished the work I had mapped out for the time at my disposal. As, however, Dr Munro was expected north in a few days' time, I delayed filling in the pits again until his arrival.

Investigation by Mr Fraser and Dr Munro.

On visiting the island, Dr Munro, while approving generally of the work done, expressed a desire to have the men re-engaged (1) to trace out the foundations, of which only two parts were so far exposed; (2) to run surface trenches across the island to see whether the foundations of other buildings were to be met with; (3) to dig more pits with a view to finding relics that would give some authoritative clue to the age of the island.

The tracing of the foundations revealed a rectangular building 18 feet by 28 feet with some indication of wings (see plan, fig. 3, p. 55). The foundations were less than a foot below the surface, and were constructed of unhewn stones and clay. In the course of the digging the

workmen found a number of pegs similar to those obtained in Pit 5 (fig. 5). At the north-west corner of the rectangular site, and just underneath the black earth, a seam of fired clay was exposed. Pieces of baked clay were got at the extreme east end of the foundation trenches, along with lumps of clay of a bluish colour. A number of shards of pottery were got, several of them made of indifferent clay, and showing rough glazing.

The surface trenches yielded little evidence of any importance, and the digging of them was abandoned. In one of the trenches near Pit No. 14 was exposed a peculiar arrangement of large stones (fig. 3). The space enclosed by the stones contained pieces of charcoal. Near the north end of the same trench was found part of the upper stone of a quern made of micaceous schist (fig. 4). Near by was got a quantity of charcoal in large pieces. More charcoal, also in large pieces, was found in the trench running westwards from Pit 6, and also a bone button which was obviously of quite modern manufacture. The trenches yielded a quantity of small pieces of pottery similar to those found at lower depths, and one or two pieces of modern make.

The additional pits dug were those marked 12 to 19 on the plan (fig. 3). It is unnecessary to go minutely into the sections of these pits; they correspond generally to those already described.

Timber was exposed in Nos. 13, 15, 16, 17, at an average depth of 5 feet, Pits 6 and 16 giving particularly good exposures (figs. 9 and 10), while brushwood such as was encountered in Pits 8 and 9 was met with in Nos. 18 and 19.

In Pit 18 quantities of moss associated with brushwood and habitation debris were thrown out from a depth of 3 feet downwards. Some of the moss looked almost fresh in appearance, and retained much of its original colour. Pit 15 yielded at a depth of 4 feet masses of brushwood packed with pulled heather and moss, the whole forming a layer from 4 to 6 inches in thickness. When dry the junks were quite like turfs of partly formed peat containing much wood. The heather and moss forming the "packing" crumbled readily to the touch, yielding a fine powder and masses of fibre. In a corner of the pit the end of a pile 9 inches square was found. In Pit 17 there was met, to begin with, a mass of stones similar to those in Pit 7. In this case, however, the stones overlay bands of clay and peat. Charcoal was got at 2 feet 6 inches, and a seam of red burnt clay at 3 feet. The woodwork at the bottom consisted of sapling stems of a few inches diameter, one or two of the stems being split (figs. 12, 15 XVI., and 23).

In Pit 19 was found a nicely shaped oak peg, 18 inches long and neatly pointed (fig. 7); and a portion of a strap, $\frac{7}{10}$ inch wide, of thin

leather, with punched holes. Two small pieces of board were got, one of which, showing signs of a circular hole, was probably part of a stave. One or two fragments of oyster shells were obtained, and a spherical stone with a flat base, which may have been used as a pot-boiler (fig. 7).

No. 18 yielded a profusion of brushwood and axe debris. Wood-chips and pieces of bark were thrown up in abundance, gaining for the pit the sobriquet of "the backyard." A block of oak, 18 inches by

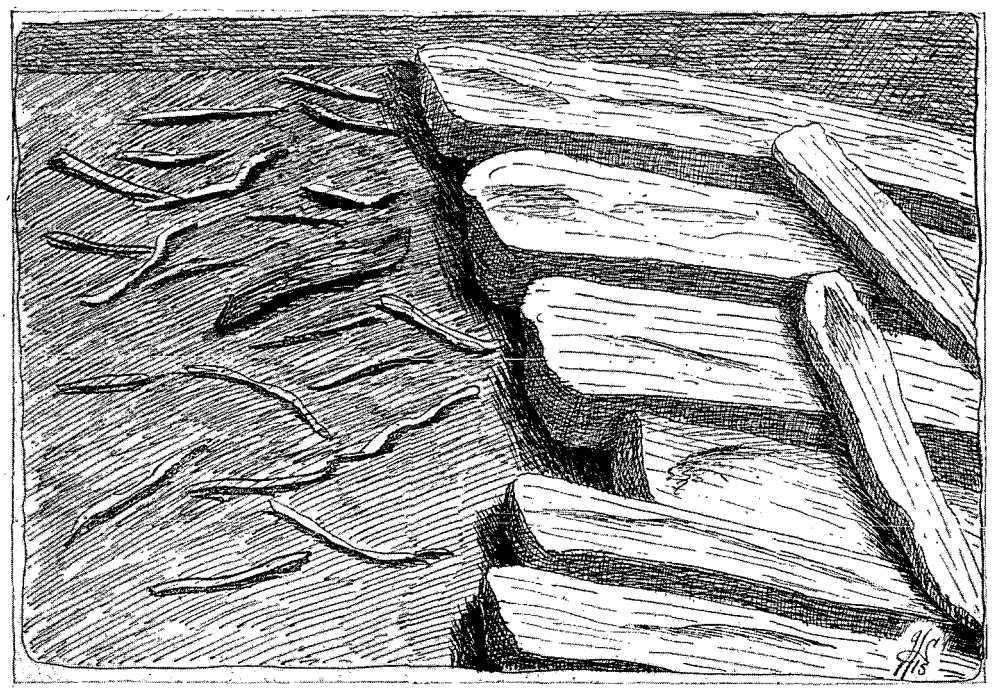


Fig. 9. Pit 6: Diagrammatic Sketch of Woodwork.

6 inches by 4½ inches, bore evidence in one of its faces of having been split from a larger beam. In the split face was a scooped-out hollow, part of what had been a hole of 1½ inch diameter sunk into the wood to a depth of 4 inches. The sides of the hole were smooth and the bottom hemispherical in section. A piece of board 15 inches by 6 inches by ¾ inch, tapering at one end, and with one edge thicker than the other, was in all likelihood a stave. Another piece, 15 inches by 5 inches by 1¼ inch had a peculiar indentation in the centre, which, however, may have been the result of pressure on the soft decaying wood. A further piece, 14 inches by 3 inches by 1½ inch was, from

its weight and state of decay, evidently formed of light wood of loose texture. Two oak pegs were got—one, unpointed, measuring 15 inches by $1\frac{1}{4}$ inch by $\frac{3}{4}$ inch, and the other, thin and wedge-shaped, measuring 13 inches in length. The pit contained a number of large chips showing clear evidence of saw and hatchet work.

Pit 14 yielded habitation debris in the shape of fired clay and a piece

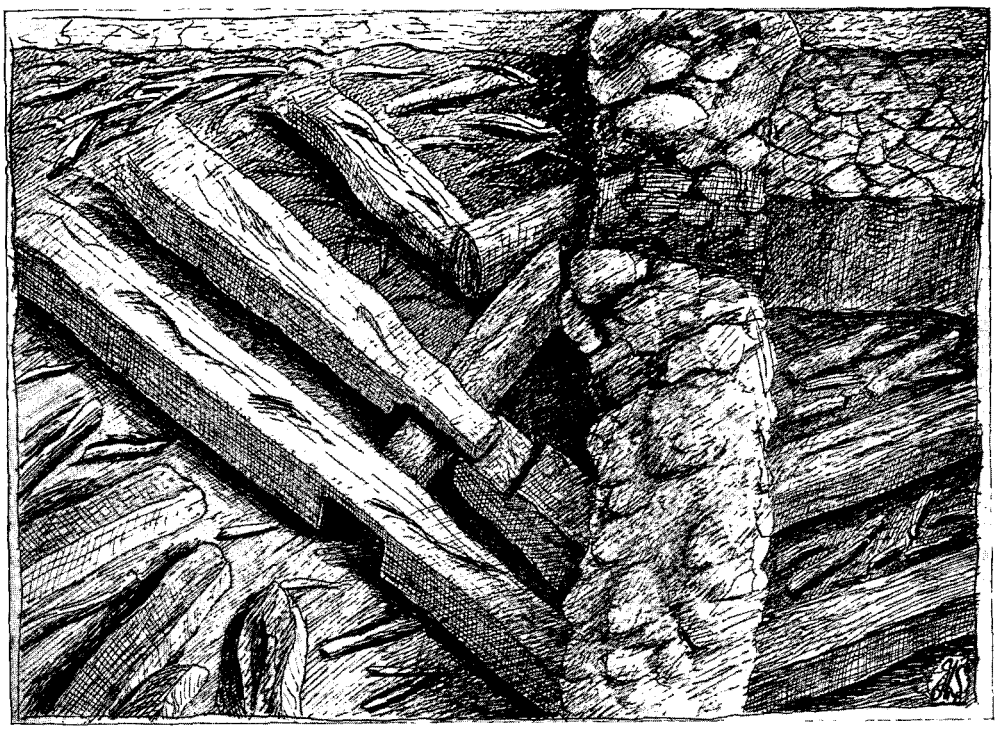


Fig. 10. Pit 16: Diagrammatic sketch showing Woodwork, base of Stone Wall, and portion of rough Causeway.

of sandstone with slight signs of vitrification; hazel nuts, whole and broken; calcined bones and charcoal; wood chips, pieces of bark, and leaves. There were also got an oak peg 10 inches long, four-sided, tapering towards one end, which was sharpened in chisel-edge fashion, the other end being rounded; and two stone implements. One of the latter is a slick-stone of quartzite beautifully shaped, and very finely finished; the other is an irregularly circular piece of local shale perforated in the centre, and measuring $1\frac{3}{10}$ inch across, with a thickness of $\frac{1}{5}$ inch (fig. 7).

Pit 15 contained a small seam of whitish material which looked like run lime or white ashes. It felt smooth to the touch, distinctly like fuller's earth. On being treated with hydrochloric acid it effervesced with a brisk evolution of carbon dioxide gas.

In Pit 16 were got three iron nails similar to those contained in the board described on p. 61. They are 3 inches in length.

Bones were found in Pits 14, 15, 16, 18, and 19, and pottery shards in Pits 15, 16, 18, and 19. One piece of pottery from Pit 18 showed the appearance and texture of the pieces of glazed pottery got in the foundation trench (see p. 63), and the shape of shoulder and neck figured in Mr Curle's restoration (fig. 8). A piece of handle found in Pit 16 shows the same type as the handle in the same restoration. Several of the pieces from Pit 19 were of very modern manufacture.

Investigation by Mr Fraser.

Before filling in the pits I decided to examine the bottoms of some of them carefully to see whether anything could be ascertained regarding the structure of the woodwork. Pits 6, 11, 13, 16, and 17 were selected for this purpose (fig. 3).

The bottoms of the pits were in every case below the loch level. Much difficulty was thereby experienced in emptying them of liquid mud, and in keeping them clear of water. By dint of continual baling, however, I was able to get sufficient material for diagrammatic drawings, of which figs. 9 and 10 are examples. These did not show any uniformity or definite plan in the arrangement of the logs in the different pits.

The logs in Pit 16 showed signs of checks and mortise-holes, and I spent a day in enlarging the pit (fig. 11). Below the usual 4 feet or so of earth, clay, and boulders, with pockets of sandy gravel, a layer of peaty material was met overlying a layer of logs. Immediately under the peat, and overlying the logs, was a quantity of charcoal and wood ashes. One of the logs showed distinct signs of having been scorched by fire.

On examining carefully between the logs, matted masses of reeds or straw, mixed with clay, were obtained. These had all the appearance of having been closely packed among the logs.

An interesting find just over the logs and resting on the clay was about a pint of hazel nuts.

Close by I pulled up a cylindrical ash peg or pile about 11 inches long, with a diameter of 2 inches. The lower end was neatly wedge-shaped. It bore clean-cut axe marks which had quite a fresh appearance (fig. 7).

When enlarging the pit, what looked like the base of a stone wall

was encountered 3 feet from the surface (fig. 11). It consisted of undressed stones of medium size embedded in a clayey matrix. Alongside this wall-base, and extending the length of the pit, was a carpet of stones which seemed to have been intended for a rough causeway (figs. 10 and 11).

The finds in the additional digging included, besides those enumerated, a piece of pottery in dry clayey soil below the surface earth, several bones from 2 feet 6 inches to 3 feet, and at 2 feet 6 inches an iron nail embedded in clay overlying a layer of peat.

Fig. 11. Pit 16: Woodwork.

The matted straw found jammed among the logs in this pit, and the peg with wedge-shaped end pulled up from among the logs, along with a piece of board (evidently a tie-piece) 10 inches by $2\frac{2}{3}$ inches by $1\frac{1}{4}$ inch, having a roughly cut semicircular hole at each end (fig. 7), and a few rough wedges (fig. 7), found when groping underneath the logs in Pit 13, led me to clean out the debris from among the logs in the selected pits. I hoped thereby to get more definite knowledge of the manner in which the logs had been laid down, and at the same time to get photographs of the pit bottoms.

To cope with the water I procured a suction pump, which I rigged up by means of brackets to an old railway sleeper. For delivery hose, I used old bicycle tyre tubes connected by tin canisters. In actual practice the pump did not prove as serviceable as I had expected. The

muddy water frequently choked it, and the provision of a rose at the end of the suction tube proved only a partial remedy, as it required continual cleaning. The iron suction tube itself was a hindrance, as it could not be accommodated to the varying depths of the pits and to depressions in them. The rate of delivery, too, was little more than the rate at which the water percolated into the pits, so that the emptying of them proved a laborious task. A more powerful pump would be too heavy to be easily portable. A rotary pump, with a length of armoured hose as suction pipe, was tried at a later date and proved more serviceable, but even it delivered at too slow a rate. There was no remedy but to have recourse to baling with buckets and hawsers.

To crown all, winter had set in, and work had to be abandoned when but two photographs had been obtained. These were only got after a way to the island for the boat had been made through ice an inch thick, and the pits had been emptied of 2 feet of ice-covered water. The results, however, were sufficiently encouraging to cause me to resume work the following summer.

On returning to the island in July 1915, I determined to examine, in the same manner as in the case of Pit 16, the bottoms of the other pits of the woodwork of which diagrammatic sketches had been made. This necessitated, as preliminary work, the clearing out of the pits of a large amount of loose material which the rains and frosts had caused to fall from the sides and to accumulate in the pit bottoms. With the water it formed a liquid paste that proved very troublesome to remove. On the bottoms of the pits being thoroughly cleaned out, and the woodwork carefully exposed and photographed, it was found that the partly diagrammatic sketches made previously were more misleading than useful (*cf.* figs. 9 and 13). The sketch of Pit 11 at the western apex of the island showed the woodwork arranged in a radial manner as if to correspond with the curve of the perimeter of the island at that point; an actual photograph of the logs when cleared of debris showed no such arrangement. The peat overlying the logs in this pit was of a mossy texture. Associated with it were hazel-nut fragments and charcoal.

When the bottom of Pit 17 was cleared, it was found that the logs had been laid with care (fig. 12). The smaller logs seemed to rest on a larger beam, and stones and pieces of wood appeared to have been used as wedges to level the logs and give a horizontal surface. Pegs were observed seemingly keeping the pieces of timber in position. One of these appeared to pass through a check in one of the blocks. On removing a piece of timber about 4 feet long, it was found to be half of a tree stem, 6 inches in diameter, which had been split down the centre (figs. 15 XVI. and 23). Underneath it was a quantity of scorched barley

associated with cinders. A considerable amount of charcoal was found overlying the woodwork in this pit. Among the logs moss was got closely packed and peatifying.

The loch was now at its lowest level for the year. Pit 16, being situated at the most elevated portion of the island, was almost clear of water, thus rendering the exposure of the woodwork a comparatively

Fig. 12. Pit 17: Woodwork.

easy task (figs. 10 and 11). The presence of scorched logs was confirmed, and also the presence of charcoal and matted reeds and straw. The remains of the hoard of nuts found the previous year were got, resting on a mass of matted straw. On clearing away the foundation left *in situ* last season a good 6 inches of peat was found underneath, resting on the logs. The beams which are shown as checked in the diagrammatic sketch in fig. 10 were now found to be mortised, the holes being neatly and carefully made (figs. 11, and 14 XI(*a*), XI(*b*), XII(*a*), XII(*b*)). While the mortise holes had been utilised to hold a cross beam in

position, a careful examination showed the cross beam to fit badly and made it obvious that the holes had not been primarily made to serve their present use. This view was confirmed by a vertical side-check at the end of one of the mortised beams which served no manifest purpose. Advantage was taken of its presence to drive a neatly shaped peg into the underlying material with the upper end resting in the check. It was quite clear, however, that the check and the peg had not been made to fit each other. A block at the end of the same beam had every

Fig. 13. Pit 6: Woodwork.

appearance of having been a waste block which was utilised to fill this empty space (fig. 11).

In Pit 6, three layers of logs were got (fig. 13). Over the logs at the west end of the pit was a layer of brushwood very much decayed. Charcoal, ashes, brushwood debris, bones with some of them split and others calcined, and fragments of hazel-nut shells were obtained among the logs. Traces of vivianite were seen. The decaying mass smelt like a peat bog.

Some of the logs had the appearance of having been levelled up with wooden and stone wedges. Under the upper logs was a quantity of bracken very much compressed and decayed. Brushwood was closely packed between the various layers of logs.

Immediately over the woodwork a roughly ovoid stone was got

weighing about four pounds. It was of mica schist, and had been subjected to strong heat.

On the bottom of Pit 13 being cleared up, three layers of logs were visible, evidently placed in alternate rows. The material among the logs yielded moss, charcoal, wood-chips, and organic debris.

On cutting away portions of the logs it was found that two of them had recessed holes in the under surface, 3½ inches square and dome-shaped (fig. 16, and fig. 14 VIII(*a*), VIII(*b*), XIII(*a*), XIII(*b*)). In a side of one of the holes was a notch which was filled with an accurately fitting piece of wood. There was no evidence whatsoever of the holes having been utilised in the structure of the island. Another log had a peculiar forked end with a curved check at the back (fig. 16, and fig. 15 XV(*a*), XV(*b*), XV(*c*)). No primary use for this could be seen. These finds determined me to deepen the pit further, mainly to see whether more worked wood could be got, and particularly to see whether such wood had been so worked in connection with the purpose it served in the structure of the island.

The logs encountered were mainly oak. The outer coating was brown in colour, and quite soft, but the centre was exceedingly hard, and black as jet.

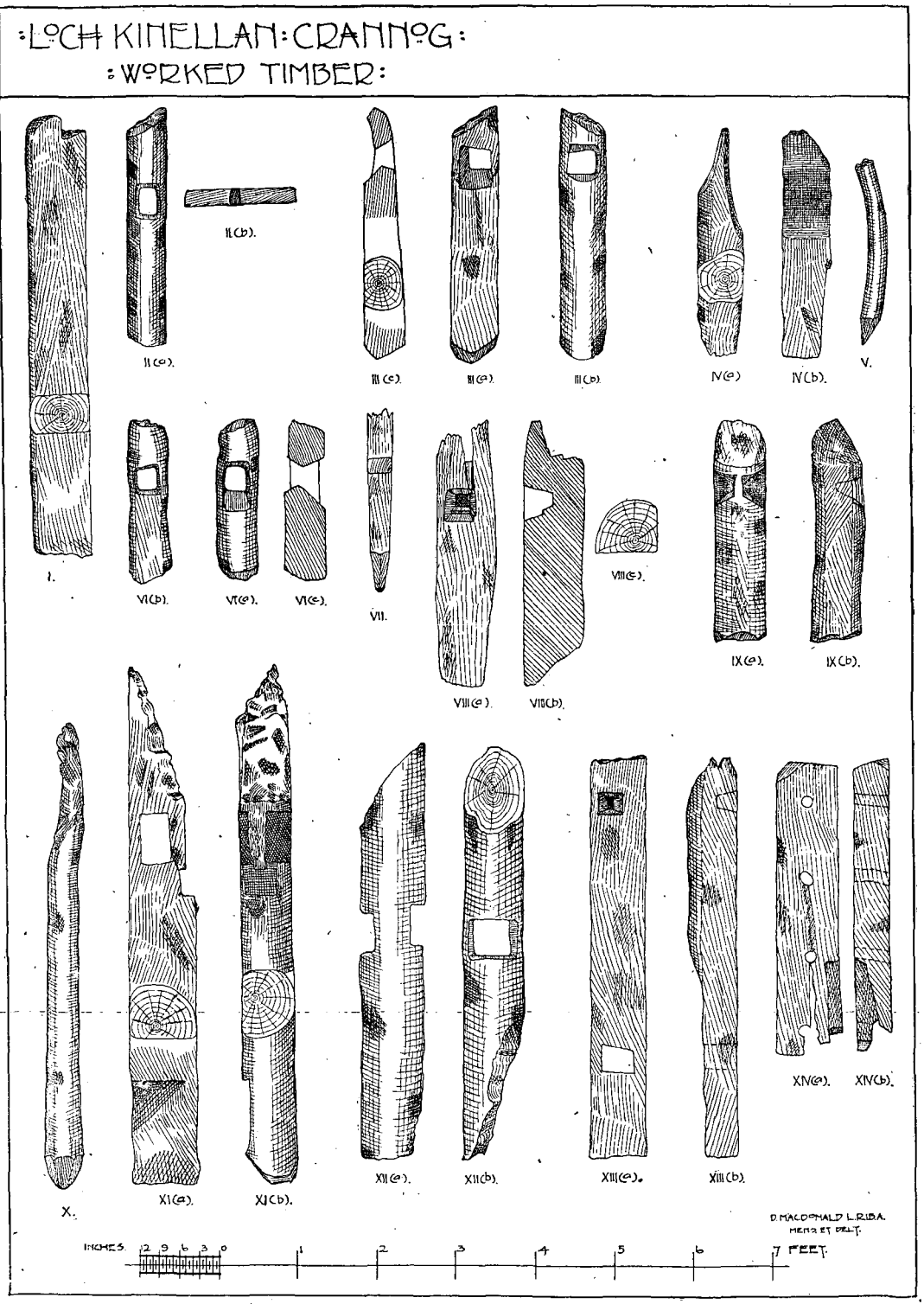
Four successive layers of logs were encountered to begin with. Below these, accurate observation was rendered difficult owing to the pit being too large to enable the water to be successfully coped with. The original lake bottom was reached at a depth of 8 feet, or 5 feet below the surface of the logs.

Below the logs three piles were got. One of these had the lower end pointed. It measured 6 feet in length, and may have been longer, as the upper end appeared to have been broken off. It was 6 inches in diameter (fig. 14 X.). A second pile which sloped at an angle of 45° had two peculiar recesses at the lower end inclining towards each other (fig. 17, and fig. 14 IX(*a*), IX(*b*)). There was nothing to show that these had been utilised in any way in the structure of the island. A third small pile 2 feet 4 inches long with a diameter of 3 inches, was pulled out of the drift material composing the lake floor (fig. 14 V.).

Three to four feet below the overlying earth was found a log which was partly burnt, and which could evidently have been used for nothing else but firewood. Near it were a number of pieces of charcoal.

Among the upper layers of logs were found moss, charcoal, wood-chips, heather, and other organic material, the whole forming a compact, peaty-looking substance.

The spaces between the layers of logs were jammed tight with decayed brushwood and vegetable mould.


:LOCH KINELLAN:CRANNOG:
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I.
II(a).
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V.
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D. MACDONALD L.R.I.B.A.
DEL.
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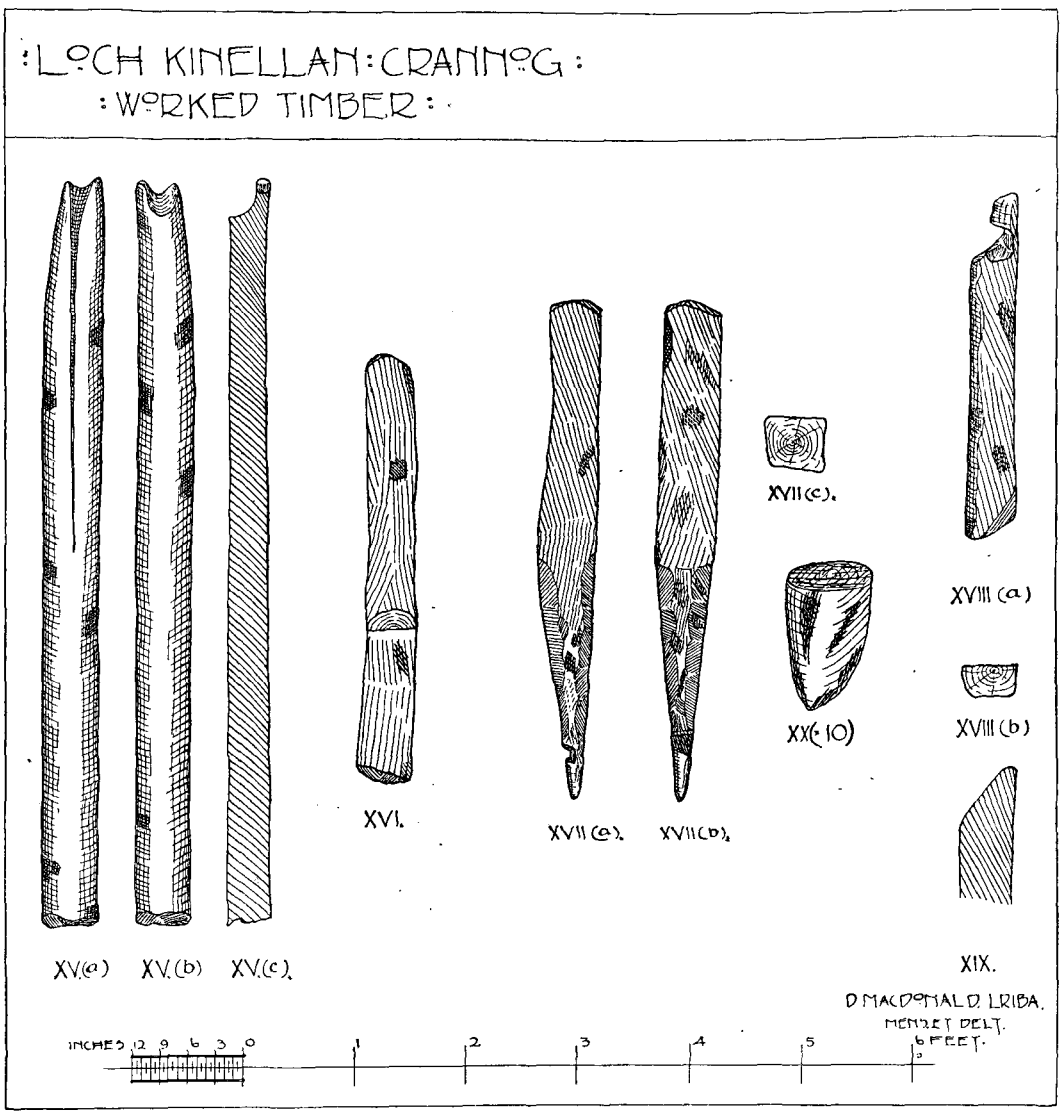
Fig. 14.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XV.(a)
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Fig. 15.

Under the logs were masses of brushwood debris, much decayed, and containing nuts and leaves. These latter were quite green in appearance, but quickly darkened and shrivelled up on being exposed to the atmosphere.

Peaty material, yellow in colour, was found to contain compressed wood, leaves, and twigs.

Below the brushwood, right down to the lake bottom, there was continuous organic material. There were found mould with charcoal, wood-chips, and bracken stems; brushwood debris with compressed wood,

Fig. 16. Pit 13: Worked Timber.

pieces of bark—for the most part birch and hazel—and charcoal; earthy-looking seams containing charcoal and calcined bones, wood-chips and pieces of bark, reed stems and root fibres; and a seam with clay, moss still green, reeds, charcoal, fragments of hazel-nut shells, and bracken stems. Quite near the bottom were got charcoal, wood debris including chips, bracken stems, and broken shells of hazel nuts.

Clear water kept welling into the bottom of the pit. It appeared to flow from between the base of the island and the original floor of the lake.

The compact drift material at the base was dug into for some distance to make sure that it was not part of the structure of the island.

I was now convinced of what I had suspected for some time, that

the part of the island structure underlying the woodwork was at least as interesting as the overlying mass. I was particularly anxious to ascertain whether the organic material was stratified.

I accordingly decided to dig a further pit and to pay particular attention to the various layers. I selected a spot near Pits 10 and 19 which when being dug proved particularly rich in organic material, and made the pit of small area, 5 feet by 4 feet, in order the more easily to cope with percolating water (figs. 3 and 18).

Fig. 17. Worked Log used as pile.

On digging through a layer of about 2 feet in thickness of black earth and boulders (section, fig. 19), containing a number of lumps of baked clay, pieces of calcined bone, and two pieces of iron —evidently nails—covered with a thick incrustation of rust and ashes, there was encountered a bed of clayey material with a pocket of sand. On examination it was found to contain charcoal and patches of a sooty substance, with streaks of ashy material running through it.

Below the clayey seam was a mass of brushwood much decayed, the under portion being very peaty. It contained axe-chips and pieces of bark and bone.

Immediately following was a seam of compact organic material consisting of matted straw or grass and reeds, with bracken and heather. It was impregnated with charcoal, wood-chips, pieces of bark, hazel nuts entire and in fragments, bones —some whole, some split, some calcined,—and fragments of pottery. Some small pieces of the seam had a great similarity to heather divots. The layer bore such unmistakable evidence of being accumulated debris of human occupation that it was at once described as flooring. As similar layers were found subsequently, in this and in other pits, far below the water-level, the term "habitation stratum" was substituted for flooring.

In all, to the level of the first habitation stratum, eighteen pieces of pottery and twenty-eight bones were obtained. Of the pottery, three fragments were got in the black earth, eight pieces between the black earth and the first habitation stratum, and eight in the stratum; while of the bones, two were got in the black earth, fourteen between the black earth and the first habitation stratum, and twelve in the stratum.

Fig. 18. Pit 19 (*a*): Surface view, and view showing Pit dug to original floor of Lake.

With the exception of two bones of the red deer, all the bones got were bovine.

On the habitation layer being cleared away, a large beam was exposed crossing the pit obliquely at one corner.

Underneath the first habitation stratum was a layer of clay similar to the one noted above, but thinner. Following was a seam of peat 4 inches in thickness, and below it was a layer of heterogeneous organic material composed largely of brushwood. It was termed "occupation debris." A second habitation stratum was then encountered very much thicker than the first, but practically identical with it in composition. Embedded in it was a quantity of small black pupa cases, probably of the water beetle.

Twenty bones were obtained, all bovine with the exception of one pig bone and one red-deer bone. Nuts, whole and in fragments, wood-chips, and pieces of charcoal were found in profusion, but neither the occupation stratum nor the overlying peat and brushwood yielded any pottery fragments.

Level with the top of the occupation stratum a piece of roughly dressed oak was discovered which proved to be a pivot door, 12 inches long by 6 inches wide and $\frac{1}{2}$ an inch thick. One pivot was wanting; the other was grooved by friction on the under surface and projected $\frac{3}{4}$ of an inch from the side. Adhering to the door was a conglomerate mass of brushwood debris, axe-chips, pieces of bark, nuts, bones, and charcoal. This mass was part of the overlying occupation debris.

The second habitation stratum also was succeeded by a band of clay, about 2 inches thick. Following it were brushwood, occupation debris, and at least one habitation stratum, the whole forming a section 18 inches thick. These layers showed the same general characteristics as those noted above. They were, however, much more difficult to differentiate, the difficulty being increased by incoming water.

Even at the base of this section large axe-chips were obtained. Material got from below the bottom of the section—that is, from a greater depth than 6 feet—yielded a peaty substance, composed seemingly of heather, with hazel roots, water reeds, and a thin layer of sand. It yielded further a decayed organic matrix containing bones and masses of wood-chips and charcoal.

Eighteen bones were got in the foot and a half represented by the section. One bone was of some bird species, the others were ox bones. Hazel nuts and hazel-nut shells were found throughout.

Six well-shaped pegs were found, the largest of them at the base of the section. Three were of oak, rectangular and measuring 6 inches, $5\frac{1}{2}$ inches, and 3 inches in length respectively. Two were of hazel. One

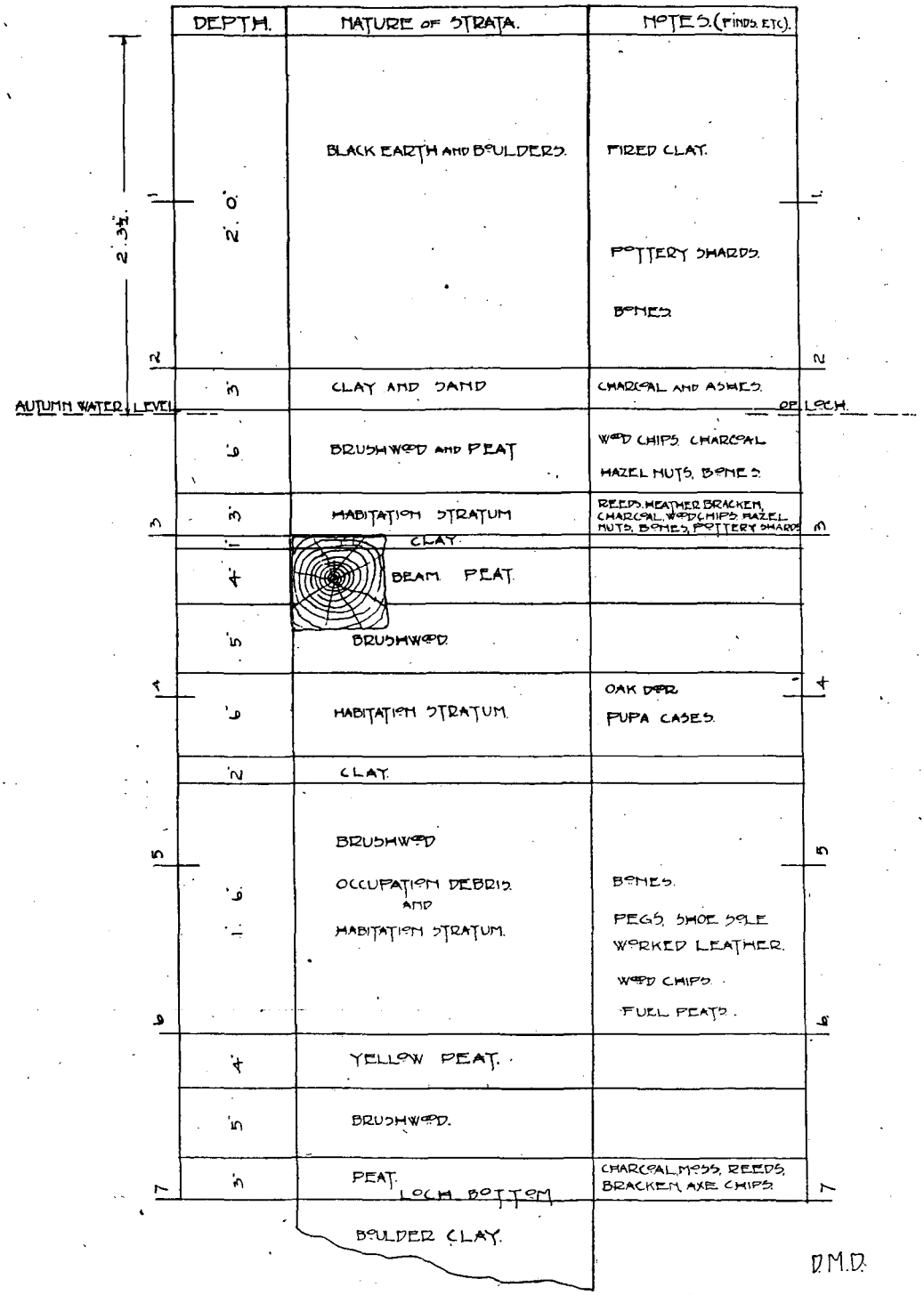

Fig. 19. Pit 19 (*a*): Section.

of these was 4 inches long, and conical in shape, with a rounded top; the other was but the end portion of what was originally a larger peg. It was a flattened ellipse in section, and seemed to have been fire-hardened. The head end of the sixth and largest peg appeared to have been driven by a mallet; the pointed end was broken off.

In the habitation stratum was found a cylindrical oak stopper $1\frac{1}{2}$ inch long and $\frac{9}{10}$ inch in diameter (fig. 15 XX.).

In the same stratum was got part of the inside sole of a boot or shoe. It was of tanned leather, and was stitched with "half-seam" stitching. When traced out, the sole proved to be $10\frac{1}{2}$ inches long and $3\frac{1}{2}$ inches in greatest width. Several pieces of leather looked like welting; the stitching, however, was not like that of present-day welting. A piece of half-dressed leather appeared to be part of the upper portion of a shoe. If so, it would point to a sandal-shaped brogue. The edges showed "half-seam" and "split-and-lift" stitching. A "dog's ear" on one edge had a button hole at the end. On an adjoining edge was a leather button formed from a single thong, which passed through a punched hole in the leather and was retained on the other side by two pieces of twisted thong. The dressed surface of the buttonhole had a friction-worn depression in which the thong button fitted.

At the base of the section were a number of sun-dried cast peats. These must have been somewhat smaller than the peats cast for fuel at the present day, being from 2 inches to 3 inches wide and from 1 inch to 2 inches thick.

Immediately below the foregoing strata was a layer of yellow peat 4 inches thick. On exposure to the air it became indistinguishable from the overlying material. Underneath it was a layer of brushwood 5 inches thick, overlying a peaty seam of 3 inches. Then came the lake bottom, 4 feet 9 inches below the present-day autumn level of the lake, and 7 feet below the surface of the island.

As indicated already, the peat and brushwood layers at the bottom of the pit differed little in character from the corresponding layers higher up, with the exception of the layer at the extreme base. This was a peaty-looking material consisting of fine mud with an organic matrix, and containing the roots of large water-plants. It was quite evidently the mud of the original lake bottom; the line of demarcation between it and the overlying strata was quite clear. The peat immediately overlying it contained wood-chips, charcoal, moss, reeds, and bracken, while the debris within a few inches of the bottom contained two peg-like chips showing clean axe-cuts.

The glacial drift at the base of the pit was dug into for about 6 inches.

Water trickled into the pit from between the base of the island and the overlying clay. Unlike the muddy water that oozed into the pit at higher levels, this water was clear except for a slightly yellow tinge. It smelt strongly of sulphuretted hydrogen. After twelve months it was still clear, retained its yellowish tinge, had deposited very little sediment, and continued to smell of the gas.

The location of three finds was uncertain. One of them was an oak peg 9 inches long, rectangular in section, with a chisel-shaped end. The second was a small piece of soft wood, semicircular in section, with a checked and tenoned end. The curved surface was finely finished; the flat surface was the result of a fracture. The original section was evidently elliptical. Both of these probably came from the third habitation stratum shown in fig. 19. An iron hunting spear-head was unfortunately overlooked in the course of the digging. It has a pointed prong end, 3½ inches long, with a square section of ½-inch side, and a socket end 2¼ inches long, also pointed and square in section, the breadth of the side at the base being two-fifths of an inch. It had a thick covering of rust and vivianite.

It was now evident that a more or less definite stratification of the organic mass underlying the surface earth and boulders could be distinguished. I was not satisfied, however, that we succeeded in distinguishing all the strata. The material between the clay at 4 feet 6 inches and the yellow peat at 6 feet, in particular, was difficult to differentiate. A sample of earthy peat got underneath the habitation stratum at 4 feet has no place assigned to it in the section.

Some of the seams were so thin that it was an exceedingly difficult task for a man working in so confined a space to dig them out separately. Small as the pit was, too, water interfered greatly with both the digging and the observation, below the level of the water in the lake. The obvious method of getting a section by clean-cutting one of the sides of the pit was tried, but proved unsatisfactory. The material was so soft that the pressure of the spade in cutting through it flattened and plastered the exposed section, and obliterated the boundaries of the strata. The whole material, too, soon turned to a uniform jet-black colour, which still further increased the difficulty of identifying the seams. It was only by exercising some care that the tape could be employed to check the measurements already got in course of the digging.

With the experience now gained in identifying strata, I thought another pit dug with care might possibly yield a finer differentiation. I selected a spot near Pit 18 (fig. 3) which, in last year's digging, yielded a wealth of wood debris.

Again the pit was kept within the narrowest possible limits. Even so,

half only of the pit could be continued below lake-water level if baling were to be possible.

About 15 inches of black earth were followed by a thick layer of whitish ashes containing pieces of a black, sooty-looking substance. Lumps of baked clay were got, particularly in the base of the black earth and associated with the ashes (fig. 20).

Below the ashes was a thin layer of peat with heather entering largely into its composition. It was followed by a habitation stratum similar to those described in connection with Pit 19*a*—compressed bracken and grasses, with charcoal and wood-chips, bones, and hazel nuts.

In all, up to a depth of 6 feet there were distinguished five different habitation strata in addition to the layer of ashes and burnt clay at the top. They were got at 2 feet, 3 feet, 3 feet 7 inches, 4 feet 6 inches, and 6 feet.

The habitation stratum at 3 feet contained a quantity of charcoal and ashes, with earthy material and decayed organic matter. The stratum at 3 feet 7 inches consisted of compact peaty-looking stuff containing fragments of bones and charcoal, and showing traces of vivianite. From the fourth stratum at 4 feet 6 inches were obtained lumps of charcoal and ashes with organic debris. The stratum itself consisted of matted material, very much compressed, containing wood-chips in quantity, charcoal, nuts, and bones. The peat from the fifth occupation stratum was of heather and moss, with mud interbedded in thin layers. The "occupation" portion of it showed traces of straw and reeds, with the usual fire and food refuse. At the base of the stratum were found a number of fragments of oyster shells.

The clay underlying the second occupation stratum contained a large number of stones. It showed no signs of puddling, nor did it contain any charcoal or ashes.

Underlying the fourth occupation stratum was an inch of very earthy peat interbanded with silted mud. Beneath it was a layer of what *in situ* appeared to be fine sand, but on examination was found to be gritty material mixed with ashes, charcoal, and calcined bones.

Succeeding the fifth occupation stratum was a mass of brushwood debris and peat, which it was found impossible to differentiate into distinct layers. A sample from a depth of 7 feet 6 inches proved to be peat formed from heather and moss, containing the familiar assortment of axe-chips, charcoal, and bones. Material from a depth of 7 feet 9 inches contained bracken fronds, charcoal, and sand grains. A large wood-chip got at this depth showed clean axe-cuts, while a rib bone had three cross cuts made with a cleaver or similar sharp instrument. Water now gushed into the pit in such volume as to stop further digging.

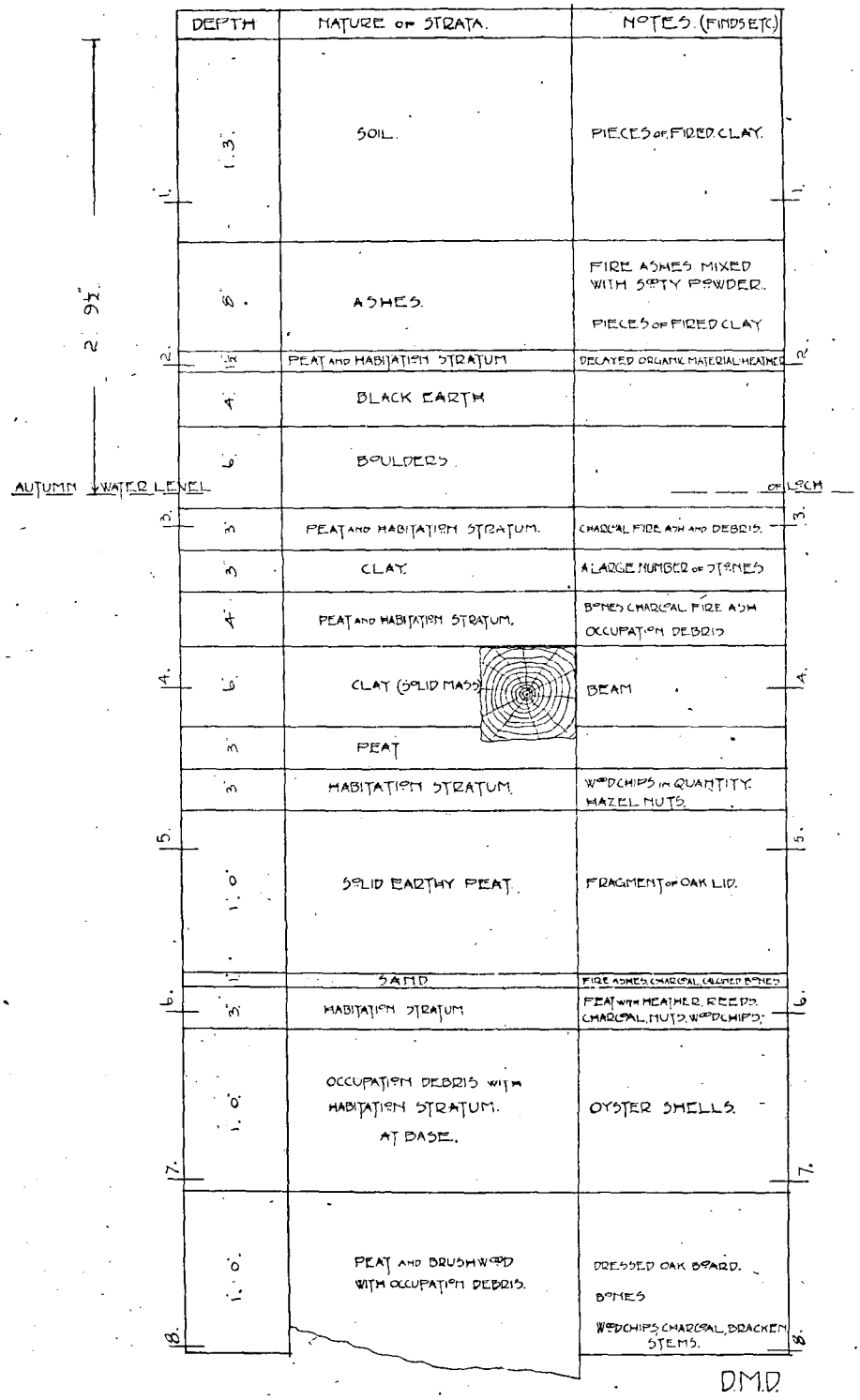

Fig. 20. Pit 18 (*a*): Section.

Two fragments only of pottery were obtained, both from a depth of 4 feet.

Twenty-seven bones were got. The distribution of these was—five in the first occupation stratum, two in the second, thirteen in the third, two in the fourth, two in the fifth, and three at the base of the pit (7 feet 9 inches). They were again all ox bones with the exception of one bone of a bird species in the first occupation stratum, a sheep bone in the third, and a red-deer bone at the base.

A beam got at a depth of 4 feet proved to be a well-dressed rectangular piece of oak, measuring 3 feet 8 inches by 9½ inches by 5½ inches (fig. 14 XIV(*a*), XIV(*b*), and fig. 23). One end was semicircular, while the other was half-checked and bevelled. Through the logs were three holes elliptical in section, with the major axis vertical in each case. On the lower side at one end they showed signs of wear by friction.

In the earthy peat underlying the fourth occupation stratum was found what was evidently part of a circular oak lid 6½ inches in diameter, with a circular hole 1½ inch in diameter in the centre. The circular edge was slightly bevelled, while the back showed clearly that it was a split-off fragment.

A small piece of oak board got near the base of the pit was ¼ inch in thickness, had a well-made edge, and showed rough dressing on both faces.

A feature in the case of this pit was the marked amount of vivianite observed after the organic material had been exposed to the sunlight for some time.

It was also noticed that peaty material which dried rapidly in the sun formed solid masses hard as stone, whereas portions of the same peat which had been wrapped up and preserved for laboratory examination fell to powder on being handled, much of the finer organic matrix having crumbled away as the result of bacterial action.

It will be seen by referring to figs. 15 and 16 that the surmise, that a new pit dug with the accumulated experience already gained would yield a more numerous and varied assortment of layers, turned out to be correct. If allowance be made for the greater differentiation in the case of Pit 18*a*, a comparison of the two sections shows a marked resemblance in their broad sequence, though the resemblance is by no means marked when the sections are examined in detail. While it would be unwise to generalise from sections of such limited area, the probability is strong that the various layers do not extend over any great extent of area. Even in the same pit, a layer at one side was often very difficult to trace at the opposite side. This was particularly true of the layers of sand and mud, which were more of the nature of pockets than of strata.

Broadly, however, Pit 18*a* in conjunction with Pit 19*a*, and both in

comparison with the neighbouring pits, showed that—under a surface mass of earth and stones corresponding to that found above the peat overlying the logs in the wooded pits at the west end of the island—there is a succession of layers of organic material in which habitation strata and occupation debris can be distinguished down to a depth corresponding with the lowest layer of logs in the wooded pits. Below that level there seemed to be, both in the wooded pits at the west end of the island and in the non-wooded pits at the east end, a heterogeneous mass of brushwood, occupation debris, and habitation strata right down to the lake bottom.

It is worthy of note, too, that in the pits at both ends of the island there were signs, in the upper strata of earth and stones, of successive eras or periods of occupation, and that in both Pit 18*a* and Pit 19*a* an isolated log was got at approximately the level of the beams in the western half of the island.

The centre of interest having now definitely passed from the upper to the lower strata, I decided to excavate still another pit to test the conclusions arrived at. To save labour in digging I decided to deepen one of the existing pits, and selected Pit 4 as being centrally situated between the west and east ends of the island (fig. 3). I enlarged the pit by a foot on three sides, thus giving a fresh exposure of the upper strata and affording a platform to receive the material from the deepened portion. This latter I restricted considerably in area, so that the workman was confined by a high bank on one side only.

Previous to starting the actual digging, I employed the workman for some odd time in cleaning out Pit 8 (fig. 3). On removing the loose material which had fallen from the sides in the course of the winter, there was met with the layer of brushwood which was encountered in the former year. When it was removed, a layer of peat was exposed overlying a habitation stratum containing the usual axe-chips, charcoal, and food refuse. As the pit gave every evidence of being a virtual repetition of Pits 18*a* and 19*a*, digging was discontinued.

On proceeding with the enlargement of Pit 4 (fig. 21) there was found, underneath 18 inches of black earth, a thin seam of charcoal overlying about an inch and a half of puddled clay. This consisted of very fine blue clay in lumps and laminæ, which were covered with a thin coating of a brownish, rusty-looking substance.

The puddled clay was followed by about 2 feet of clayey material with a large number of stones. The base of it in particular contained large boulders.

Underneath the boulders was encountered the baked-clay seam referred to in connection with Pits 2, 3, and 5 (see p. 58). A sample in

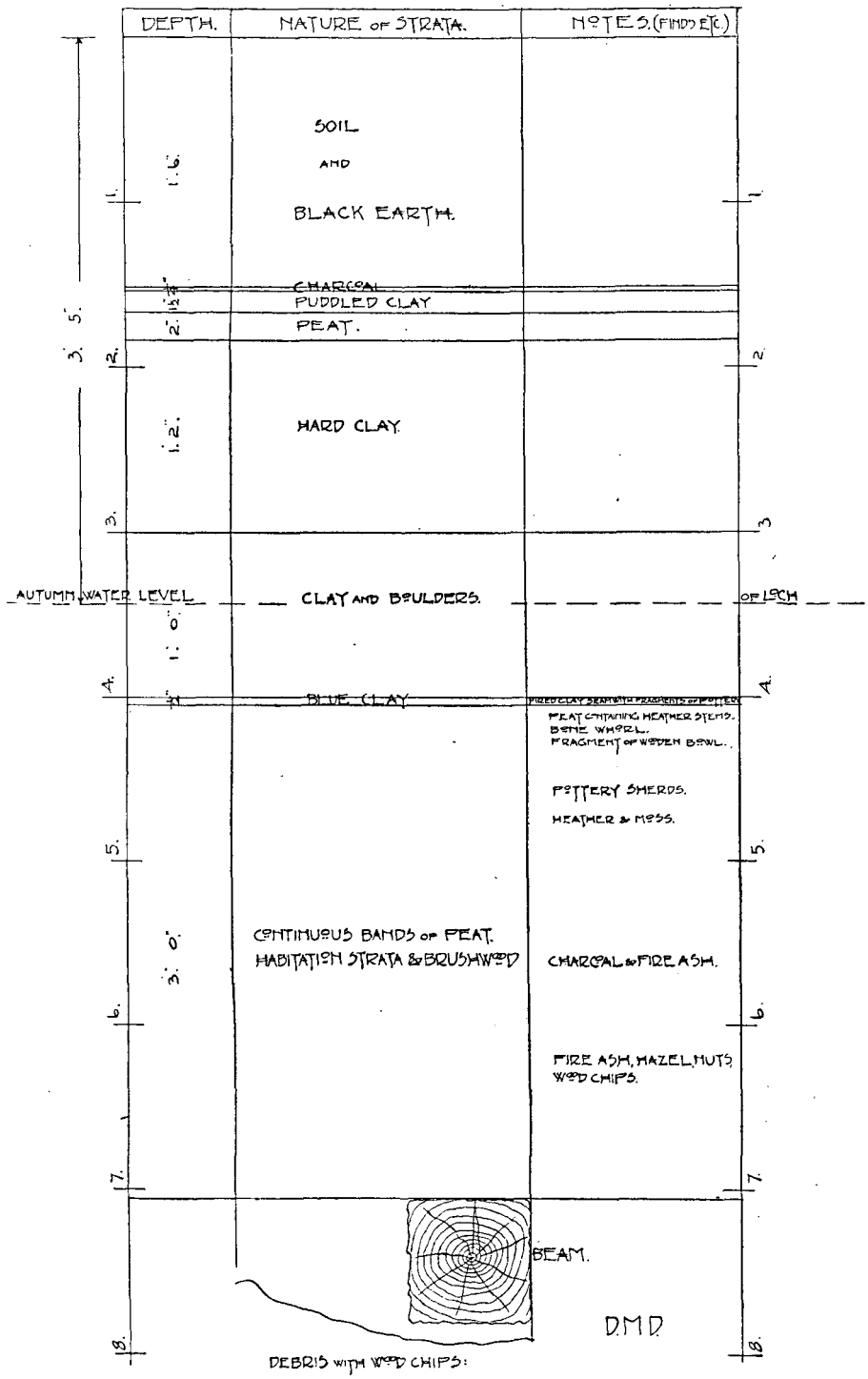

Fig. 21. Pit 4: Section.

which is seen the junction of the baked-clay seam with the underlying peat shows earthy material interspersed with pieces of fired clay, some of them minute, others a quarter of an inch or more in diameter. This earthy stuff contains traces of sooty-looking ashes, and overlies hard peat which also contains fired-clay fragments. Other portions of the seam consist of earthy sand intermixed with fired clay containing small fragments of pottery. Still further portions are of bluish clay containing pieces of shale, stones, and traces of soot. Small lumps of baked clay are to be seen in them, and they also contain traces of vivianite.

From this depth downwards there were continuous layers of peat, brushwood debris, and good solid habitation strata, all more or less running into each other, and frequently yielding wood-chips, bones, and compressed heather.

At 7 feet a squared oak beam barred further progress, as it could not be removed owing to the small area of the pit.

Over the beam was a thick, matted, occupation stratum containing wood debris, bones, charcoal, chips, pieces of bark, and nuts. It underlay a layer of debris containing wood-chips, bracken fronds, and brushwood refuse. A small pocket of deposited mud in the stratum contained a number of fragments of hazel nuts.

Underneath this habitation stratum was a mass of brushwood debris and chips, similar to that found at the base of Pit 18*a*.

A portion of peaty material from a depth of 4 feet 3 inches, composed mainly of moss and heather, and cut in turf form, was, on drying, indistinguishable from an ordinary fuel peat.

Material from a depth of 4 feet 6 inches, consisting chiefly of heather and moss with earthy peat, might, from appearance, have been thin divots.

From a depth of 5 feet 6 inches was got a quantity of charcoal overlying peaty stuff, with fine mud underneath. Associated with the charcoal were whitish ashes, probably peat ashes, and sooty-looking material. At 6 feet was found, in quantity, what appeared to be hearth stuff, with a large amount of ashes and charcoal. With it was associated a mass of wood-chips and hazel-nut fragments.

A number of shards of rough pottery were obtained at a depth of from 4 feet to 5 feet.

Of twenty-four bones in the organic debris from 4 feet to 7 feet, thirteen were ox bones, nine pig bones, and two sheep bones.

The general result of the digging of this pit was to confirm the conclusions arrived at from the digging of Pits 18*a* and 19*a*.

The east end of Pit 6 in the centre of the island next received attention (fig. 13). The logs appeared to rest on, and to slope down from, a

ridge beam. On the short logs on one side being cleared away, there was seen on their under surface a distinct notch, the result of pressure or friction on the part that had been resting on the "ridge." One of them had an elaborate mortise hole, one edge of which was bevelled from both sides (fig. 14 VI(*a*), VI(*b*), VI(*c*). It served no purpose that could be ascertained.

On removing the rest of the beams resting on the "ridge," I was struck by the peculiar shape of the latter. I accordingly cleared away

Fig. 22. Pit 6, showing second layer of Logs, with Gunwale of Canoe resting against small piles.

all the logs from its vicinity, and found that the "ridge" was a gunwale of a dug-out canoe (fig. 22).

As, from a purely archæological point of view, this was perhaps the most interesting find on the island, I resolved to recover it if possible. The task proved a formidable one. With the additional digging the water became all but unmanageable, and with fine material from the pit sides and bottom formed a liquid mud that was most unpleasant to work in, and almost impossible to get rid of. After several Saturdays' work the length of the canoe exposed was increased from 9 feet to 20 feet. At this stage winter storms compelled the cessation of work for the season. Even before the rise in level of the loch water, the emptying of the pit took two men nearly two hours!

When in the summer of 1916 a further attempt was made to unearth the canoe, the dearth of labour consequent on the war threatened to

Fig. 23. Worked Timber.

Fig. 24. North end of Canoe Trench showing a pointed post or pile in position as a horizontal log, and another post or pile *in situ* with sharpened end upwards.

present an insuperable obstacle. A number of navy men became interested in the find, however, and with their assistance it was at length raised. It proved to be 24 feet 9 inches in length, with a beam of probably 30 inches. It seemed to have been considerably damaged before

having been used as a log in the platform structure. Placed and propped up, as it was, on one edge, it appeared to have been warped to some extent in course of the long time it must have occupied its position in the island structure.

Three layers of logs overlay the canoe, the uppermost of which seemed to form a floor, while the lowest consisted of short logs that appeared to act as props. A number of the logs were worked timber, the employment of which again seemed to be entirely fortuitous (fig. 23). A number of odd pieces of wood, utilised to fill up gaps, may well have been waste blocks from a woodyard. A well-pointed pile, evidently formed from a piece of second-hand wood—witness the notch near the end—served the purpose of a horizontal log (fig. 23, and fig. 15 XVII(*a*), XVII(*b*)). A similar pile or post is seen *in situ* lying horizontally, in a photograph of the northern end of the canoe trench (fig. 24). In the same photograph a further pile is seen in a vertical position, with the pointed end up.

While enlarging the canoe trench at the north end, a thick layer of fire ash was got about 15 inches from the surface. Above the logs was a deep seam of well-formed peat, with two inches of charcoal underlying it immediately over the beams.

The debris among the logs included wood-chips in quantity, moss in masses, and leaves, fresh and green, but soon turning to yellow on being exposed to the air. In the vicinity of the canoe were brushwood, axe debris, reeds, and hazel nuts. Near the lower edge was a quantity of stones.

Beside the canoe were found a large number of bones.

The only flint implement found on the island was got while the canoe was being dug out—a very fine flint flake. It was discovered among some debris immediately overlying the canoe.

Results of the Investigation.

The results of the investigation of the island may be summed up under two heads—structure and age.

Structurally the island appears to consist of three main series of layers:—

1. The upper structure of earth, clay, and boulders, with local seams of peat, charcoal, and burnt clay.
2. The strata represented in the west half of the island by the platforms of timber with the intervening occupation debris, and in the east half by the stratified layers of brushwood, clay, peat, and habitation refuse.
3. The mass of organic material at the base of the island.

The uppermost series can be accounted for as having been superimposed on the wood platforms or the stratified layers corresponding to them. The wood platforms, with associated and corresponding strata, can be accounted for by supposing them to have been laid down on what is now the organic mass at the base. The difficulty is how to account for that mass. It cannot have fallen through the existing wood platforms, for these show no evidence of having been rafted, while the spaces between the logs do show evidence of having been tightly packed with material.

The mass at the base may be accounted for if we suppose super-water structures to have existed on the site of the island to begin with, and the wood platforms and corresponding layers to have been laid down when the detritus from these structures reached water-level.

Such over-water structures might account for the worked timber which was found in abundance among the logs, the use of which appeared to be entirely fortuitous, and which everything pointed to as having been previously employed structurally (figs. 14, 15, 23, 24, and Appendix III.). If so, the structure of which they formed part must have been on the site of the island, or in the vicinity. It would not have been worth while to carry the wood any distance. Tree stems from close at hand would have served the same purpose equally well.

A further point bearing on the structure of the island is that along the perimeter there appears to be a palisade of beautifully pointed stakes, some 2 feet 6 inches long, which slope outwards. Such stakes were found by one of the workmen when cleaning out Pit 14, near the southern edge of the island (fig. 14 VII.). Their general appearance and situation would seem to confirm the conclusion arrived at by Mr Corbett of Kinellan when digging a trial pit on the island in 1911. He writes: "Piercing the sand vertically, and also at an angle of 30°, we found long and sharp-pointed stakes driven in groups evidently with the intention of 'containing' an earlier island than that now existing, and this probably was the basis of the present island."[1] If for "an earlier island" there be substituted "accumulated habitation refuse," Mr Corbett's conclusion is the same as that arrived at from the present much more elaborate and prolonged investigation.

Any consideration of the structure of the island must take into account the loch level.

The autumn level of the loch at the present day is 18 inches lower than the winter level. The great difference that makes to the area of the loch and to the appearance of the island can be seen on reference to figs. 25 and 26.

[1] *Proceedings of the Society of Antiquaries of Scotland*, vol. xlvii. p. 274.

The outlet of the lake is a channel, 50 yards long by 4 to 5 feet wide and 7 feet deep, through strata of soft crumpled shale. It has every

Fig. 25. Kinellan Island from north-east in summer.

Fig. 26. Kinellan Island from north-east in winter.

appearance of being at least partly artificial. It is known to have been lowered in recent years to increase the summer grazings round the loch.

It was in all probability lowered previously, as the water of the lake has for long provided the motive power for mills.

Whether the outlet was artificially lowered by the makers of the island cannot, perhaps, be ascertained now. There is nothing inherently impossible in the idea. Workmen who possessed the tools which, from direct evidence, must have been possessed by the earliest occupants of the island site would have no difficulty in lowering the loch outlet through soft shale. There is strong presumptive evidence that they did so. A terrace to the south of the present shore marks probably the glacial level of the lake. The amount of erosion which the comparatively small outflow from Loch Kinellan, practically unassisted by gravity, could make in post-glacial times in flowing over beds of shale, which, if rotten, are at one part of the channel in particular almost vertical, would leave the level of the loch higher by several feet than the present level. A rise of two feet in the level of the loch would submerge all but the western portion of the island, as it stands. That the level of the island now is substantially what it was when occupied is seen from the stone barrier surrounding it. At the east end, the lowest part of the island, the barrier is at, approximately, the level of the island surface. The barrier is not likely to have sunk, for, where there is a clear exposure, it is seen to rest on the floor of the lake, which in course of the excavations was found to consist of compact drift material overlaid by but a few inches of black mud.

While the general level of the surface of the island is now probably what it always was, there must have been a long period, during which the organic material of the island was settling down, when the surface had to be heightened to compensate for subsidence. Two-thirds of the structure of the island consist of organic material which, in course of time, became much carbonised, and in consequence compressed. Brushwood being largely employed in the structure, would in itself lead to compression.

In the canoe pit we found means of applying a rough test to the amount of sinking that has taken place, in the fact that the logs with one end resting on the canoe sloped downwards towards the other end, showing that the unsupported end sank at a faster rate than the long canoe. While the canoe itself undoubtedly sank with the island as a whole, that such sinking was not great was shown by the south end of the canoe. This rested on a pile and was thereby dented upwards, but to the extent of a few inches only.

The material available here for accurate measurement made the temptation strong to ascertain the amount of sinking with mathematical precision. The various elements entering into the sinking of the island

are, however, too complex to enable any such attempt to do otherwise than defeat its own ends. Still, the evidence would amply justify the conclusion that the sinking since the superposition of the material overlying the canoe did not amount to more than 18 inches to 2 feet at the outside, that being the extent to which the unsupported ends of the logs had sunk below the ends resting on the canoe. Indeed, the cumulative evidence of the investigation would indicate that it is very easy to exaggerate the amount of sinking that islands such as this have undergone.

It need not be pointed out that the foregoing remarks on the sinking of the island only emphasise the conclusions already arrived at, from the direct evidence of the digging, as to the source of the basal strata of the crannog. The debris of human occupation at the base of the island either must have been deposited in the water of the lake, or it must have accumulated on a structure that was able to support human occupancy above water-level. The only feasible material for such a structure is brushwood, and the supposition means that a mass of brushwood at least 7 feet deep (allowing the then level of the lake to have been 2 feet higher than the present level), and sufficiently compact to support human habitations, has been compressed into the few inches of detritus at the base of the island that underlie the lowest evidence of human occupancy. That could only be possible if the brushwood were entirely pulverised, whereas such brushwood as there is at the base of the island shows branch stems that exhibit no signs of having been crushed.

Little direct evidence of the age of the crannog was obtained in course of the investigation. That wood-chips, cut with a sharp iron instrument, exist at the base of the island, is helpful only in a general way.

The bones included portions of the skull of a shorthorn ox, which Professor T. H. Bryce considers may be the Celtic shorthorn, *Bos longifrons*. Bones of a small type of horse were got, and of a small breed of sheep. The bones included also larger types of oxen and sheep, and a domestic breed of pig (Appendix I.). By far the largest number of bones were ox bones. Pig bones made a bad second, with sheep bones nearly as numerous. Red-deer bones were comparatively few in number. All the foregoing bones were represented in the large number found near the canoe.

As regards the animals used for food, therefore, there does not appear to be much difference between Kinellan crannog and similar islands that have been investigated in the south of Scotland.

From the fragments of pottery obtained, Mr Curle, Director of the Royal Scottish Museum, has, as already indicated, drawn a restoration of the general type of vessel in use (fig. 8 and Appendix II.). It would point to pottery of the fourteenth and fifteenth centuries. It is note-

worthy, however, that the pottery was confined entirely to the uppermost strata. None was found below the level of the first wood platform, or the corresponding level at the east end of the island.

The piece of carved ivory (fig. 6) found in Pit 4 (see p. 58) may yet afford a clue to the age of the stratum of the crannog in which it was discovered—just underneath the upper strata of earth, clay, and boulders.

The evidence of the canoe is less helpful in fixing the age of the crannog than would appear. It was certainly used in the structure as a log. That is no reason to conclude that canoes had then ceased to be used on the loch, for the canoe found was very much damaged, and may have been discarded on that account. On the other hand, the presence of a dug-out in such a position is not necessarily evidence of any great antiquity.

The historical evidence of the occupation of the island has already been given.

The facts that the organic material forming all but the uppermost layers of the island would seem to have consolidated before the canoe was placed in position, that the bones found near the canoe represent earlier and later types, and that pottery fragments appear to be confined to the surface layers above the level of the canoe, point to an interval of time between the period of occupancy represented by the surface structure and the occupancy or occupancies represented by the lower layers. From the evidence of the pottery, the surface strata may well represent the occupancy of the island by the Earls of Ross and the Mackenzies.

The large amount of leaves, bracken, and hazel nuts found in the various strata containing occupation debris would seem to indicate that the island was occupied mainly in the autumn—the hunting season. Against that view must be placed the facts that the amount of charcoal found in these strata appears greater than would result from autumn occupation only, when fires would be used almost solely for cooking; and that the food refuse contains but little evidence of animals of the chase.

The prominent features of the crannog are its great size; the large amount of organic material forming the main structure of the island, and the large amount of soil, earth, and stones overlying it; the stratification of the upper portion of the organic material and the seemingly heterogeneous nature of the lower portion; the patches and seams of burnt clay in the surface layers overlying the logs; the large amount of peat of ascertainable texture underlying the surface layers and overlying the logs; the presence of charcoal, often in large layers, at all depths down to the lake floor; the abundance of wood-chips; the profusion of bones; and the large number of pottery shards. Special mention may be made

of the extensive and seemingly fortuitous use of worked timber, and the comparative dearth of relics of a spectacular kind.

The account of the excavations with the various finds (see pp. 53–89) embodies not only careful notes and measurements made at the time, but also the results of laboratory examination of samples and relics which extended over many months.

I wish to express my indebtedness to Dr Robert Munro for permission to make use of an article by him on the crannog; to Professor Bryce for his report on the bones; to Mr Curle for his examination of and remarks on the pottery; to the Rev. F. Odo Blundell, O.S.B., for invaluable assistance and advice; to Dr Galbraith, Dingwall, for placing at my disposal his extensive knowledge of the history and antiquities of the district, and for rendering valuable aid in the excavations and in photographing relics; to Dr Maclean, of the Seaforth Sanatorium, Dingwall, for assistance in identifying relics and specimens; to Colonel Warrand of Bught and Professor W. J. Watson, LL.D., for historical references; to Mr D. Macdonald, architect, Dingwall, for executing a plan of the island, sections of pits, and drawings of worked timber; to Mr John Shaw, Dingwall, for drawings of the woodwork in the pit bottoms, and for very great assistance in investigating the pits; to Miss Ledingham, art mistress, Dingwall Academy, for drawings; to Lieut.-Commander Hamblin, R.N., for photographs; and to Mr John Macfarquhar, Dingwall, and Mr Ronald D. J. Fraser, Strathpeffer, for strenuous assistance in the excavations. Special thanks are due to the proprietor of the island, Sir Arthur Mackenzie, Bart., of Coul, and to the tenant, Mr Corbett of Kinellan, for giving permission for the excavations; and to Mr Wallace, managing director of the Spa Hotel, Strathpeffer, for giving the use of a boat, without which the investigation of the island would have been impossible.

Appendix I.

REPORT ON THE BONES FOUND IN LOCH KINELLAN CRANNOG.

By Dr T. H. Bryce, Professor of Anatomy, Glasgow University.

The bones from Kinellan crannog submitted to me for identification by Mr Fraser include the following species—ox, horse, pig, sheep, and red deer.

The bones are much broken, and the long bones have evidently been split for the marrow.

The bones are mostly those of a small ox. Every part of the skeleton is represented, but unfortunately only fragments of the skull have been

recovered; two horn bones, however, prove that the variety was a short-horned variety. In the absence of the characteristic frontal region it is not possible to say positively that the horns are those of *Bos longifrons*, the "Celtic shorthorn," which is so common on early sites, but there is a strong probability in favour of this identification. That a larger breed is also represented is indicated by the distal end of a humerus, which is distinctly larger than the other specimens.

The horse is represented by a molar tooth and two bones, the talus and calcaneum. The bones are of small size, somewhat heavier than those of a donkey, and prove that the inhabitants of the site possessed a breed of pony.

The pig bones include fragments of skulls, jaws, and limb-bones, as well as some separate teeth. The size of the jaws and of the canines indicates a domestic breed of pig. They are not massive enough for the wild boar.

The sheep bones are few in number, comprising fragments of vertebræ, skull, jaw, and limb-bones. The size of the bones suggests a small and light breed, but the metacarpals and metatarsals are not of the specially slender proportions characteristic of the slender-legged variety of sheep.

The red deer is represented by a fragment of antler, and some broken limb-bones.

A few bones of birds occur in the deposit. They include two portions of skulls of a species of small bird which I am unable to identify owing to the absence of distinctive parts; also the premaxillæ of a water bird, probably duck.

Two fragments further represent a fairly large teleostean fish, but are too imperfect for identification. One of the pieces is a broken clavicular section of the pectoral girdle, and may possibly represent the salmon.

Appendix II.

REPORT ON THE POTTERY FOUND ON THE ARTIFICIAL ISLAND IN LOCH KINELLAN. By Alex. O. Curle, Esq., Director of the National Museum of Antiquities, Edinburgh.

I now have had time to give some attention to the shards of pottery which you sent me from the lake-dwelling at Kinellan. With the exception of some quite modern fragments of pottery and a piece of delft which is probably seventeenth or eighteenth century, they all appear to be pieces of vessels of contemporary make. As far as it is possible to tell, the form appears to have been that of a globular rather than a quasi-cylindrical pitcher, and this feature leads me to believe that the date of

manufacture lies somewhere between the end of the fourteenth and the end of the fifteenth century.

I have found four pieces of a handle which join, and I am putting them together for you, so I shall be able approximately to draw you out a sketch of the form of vessel which they represent. The piece of a neck and shoulder 2.18 also shows the type.

A characteristic feature of the pottery of this time is a deep, impressed thumb-marking at the junction of the handle to neck and bulge.

As a rule, in pottery of this date one finds around the base struts produced by pressing down the clay from the sides so as to counteract the marked convexity of the bottom such as is shown on 2.19 and 18.1, but this feature is here absent.

There appear to be only two pieces which show any signs of ornamentation, but these do not give me any further information as to the period of manufacture.

Appendix III.

Worked timber illustrated in Figs. 14 and 15.

I. Shaped log, Pit 16 (*v.* fig. 23).
II(*a*). Mortised log, Pit 6 (*v.* fig. 23).
II(*b*). Spar found in mortise hole of II(*a*) (*v.* fig. 23).
III(*a*), III(*b*), III(*c*) } Mortised log, Pit 6.
IV(*a*), IV(*b*) } Log, with end double curve-checked, Pit 6.
V. Pile pulled out of floor of lake, Pit 13.
VI(*a*), VI(*b*), VI(*c*) } Mortised log found resting on gunwale of canoe, Pit 6 (*v.* fig. 22).
VII. Stake from Pit 14.
VIII(*a*), VIII(*b*) } Log, with dome-shaped recess on under surface, Pit 13 (*v.* fig. 16).
IX(*a*), IX(*b*) } Found in Pit 13. Was evidently used as a pile (*v.* fig. 17).
X. Pointed pile, Pit 13.
XI(*a*), XI(*b*) } Mortised log, Pit 16 (*v.* figs. 10 and 11).
XII(*a*), XII(*b*) } Mortised log, Pit 16 (*v.* figs. 10 and 11).

XIII(*a*), XIII(*b*). Log with dome-shaped recess, Pit 13 (*v.* fig. 16).

XIV(*a*), XIV(*b*), XIV(*c*). Found in Pit 18 (*a*) (*v.* fig. 23).

XV(*a*), XV(*b*). Log with forked end and curved check, Pit 13 (*v.* fig. 16).

XVI. Split tree-stem, Pit 17 (*v.* figs. 12, 23).

XVII(*a*), XVII(*b*), XVII(*c*). Found used as a horizontal log in Pit 6. Note the notch near point (*v.* fig. 23).

XVIII(*a*), XVIII(*b*). Found in Pit 6 (*v.* fig. 23).

XIX(*a*). Section of gunwale of canoe (fig. 22).

XX. Oak stopper, Pit 19 (*a*) (scale magnified 10 times).