

## CHAPTER XI.

## LAKE-DWELLINGS.



EW archæological subjects have excited more general interest in the scientific world than the discovery of the remains of those strange habitations known as *Lake-dwellings*, the investigation of which has been steadily prosecuted throughout Europe for now close upon half a century. The comparative security afforded by natural islands could not fail to attract the notice of man from the very dawn of his reasoning faculties, and it is probable that he resorted to such means of protection as soon as he became acquainted with the buoyant properties of a log of wood, and utilised his experience by the invention of the dug-out canoe. From the natural to the artificial island was but a stage of transition which in course of time could be readily bridged over by his progress in mechanical skill. But whatever may have been the primary object of these structures, or the precise circumstances which led to their development, one thing is certain, that they continued for many centuries to be the characteristic abodes of the early inhabitants of Central Europe, in localities where the requisite conditions were

to be found. The remarkable development of the system in Central Europe, during the Stone and Bronze Ages, seems to have come to a sudden end within prehistoric times; and, indeed, so completely had the custom fallen into desuetude that scarcely a trace of it has survived in the traditions or annals of those very countries in which lake-dwellings were most abundant. To have rescued so singular a phase of human civilisation from oblivion is one of the greatest triumphs of prehistoric archæology.

### 1. *Sketch of Lake-dwelling Researches.*

The actual starting-point of lacustrine research may be dated to an incident which took place in Dublin upwards of half a century ago. It appears that early in the spring of 1839 curiosity was roused at the Museum of the Royal Irish Academy by the frequency of the visits of a local dealer offering for sale objects of a miscellaneous character, many of which were of rare antiquarian value. These objects were said to have been found in a peat-bog in the county of Meath, and their assortment in such a place seemed so strange to Dr Petrie that he resolved to visit the locality. Accordingly he and Surgeon Wilde (afterwards Sir W. Wilde) started in search of the mysterious find, and were conducted to the peat-bog of Lagore, near the village of Dunshaughlin. Here, within the boundaries of a drained lake and under a thick covering of peat, was an artificial mound then partially exposed by peat-cutters. This mound had been well known to bone collectors for upwards of ten years, during which time, it is said, they had dug out, and exported to a factory of bone-manure in Scotland, no less than 150 cart-loads of bones. The mound was of a circular shape, slightly raised above the surrounding plain, and measured 520 feet in cir-

cumference. Along its margin were "upright posts of black oak, measuring from 6 to 8 feet in height; these were mortised into beams of a similar material, laid flat upon the marl and sand beneath the bog, and nearly 16 feet below the present surface. The upright posts were held together by connecting cross-beams, and fastened by large iron nails."

That the nature of this mound was correctly interpreted by Irish archæologists may be gathered from the abstract of Sir William Wilde's paper on the Lagore lake-dwelling or crannog in the 'Proceedings of the Irish Academy' for 1840, from which the above extract is taken, as well as from the further discoveries which immediately followed on its publication—such as the crannogs in Roughan Lake, Lough Gur, Lake Monalty, Loch-na-Clack, Ballinderry, &c.

But the most important subsequent discoveries were due to the workings of the Commission for the Arterial Drainage and Inland Navigation of Ireland, which brought to light no less than twenty-two crannogs throughout the counties of Roscommon, Leitrim, Cavan, and Monaghan. Reports of these crannogs by the engineers of the Board of Works, along with plans, maps, sections, and a large assortment of relics, were deposited at the time in the Museum of the Royal Irish Academy.

While these crannog investigations were thus steadily progressing in Ireland, an independent discovery was announced in Switzerland, which not only gave a new significance to the Irish discoveries, but almost immediately opened up one of the most prolific fields of prehistoric research which has ever come under the cognisance of archæologists. This discovery was indirectly due to the exceptional cold of the winter of 1853-54, which caused the water in Lake Zurich to sink to a lower level than any previously on record—being one foot

lower than the celebrated mark on the stone of Stäfa, which preserves the record of a similar phenomenon in 1674. In these circumstances two of the inhabitants of Ober-Meilen, whose vineyards came close upon the shore of the Lake, began to extend them by enclosing portions of the exposed shore with a stone wall, and filling in the space with mud, so as to bring its surface above the ordinary level of the water. In the course of these operations the workmen observed, protruding through the mud in the bed of the lake, portions of rotten posts, together with stone axes, flint implements, and other worked objects, which excited their curiosity. Mr Aeppli, the village schoolmaster, heard through his scholars of the curious things turned up in these diggings, and as soon as his day's duties were over he went to see the place. After inspecting some of the objects which the workmen had laid aside, Mr Aeppli<sup>1</sup> thus expressed himself to the interested bystanders: "Hier hat die Menschenhand gearbeitet, das sind Werkzeuge und Geräthe, die der Mensch einst gebraucht hat; ihre Form gehört menschlicher Thätigkeit an."

He then wrote a short account of what he had seen, and sent it to the Antiquarian Society at Zurich. Within four hours of the despatch of his epistle three representatives of the Society arrived at Ober-Meilen, among them being the President, Dr Ferdinand Keller.

After careful consideration of the facts, Dr Keller came to the conclusion that the piles had supported a platform upon which huts had been erected, and that, after a long period of occupancy, the entire structures were destroyed by a conflagration.

This important deduction, strengthened by the traditional stories of submerged cities long current among the fishing com-

<sup>1</sup> F. Staub, Die Pfahlbauten in den Schweizer-Seen, p. 8.

munity, spread rapidly among the Swiss people, and produced an immediate army of explorers, who commenced a vigorous search for similar remains in this and the adjacent lakes. Guided partly by the recollection of previous finds, the significance of which became now apparent, and partly by the knowledge of local fishermen, who, from practical experience of disasters to their fishing-gear, could at once point to numberless fields of submerged woodwork, the efforts of these pioneer *lacustréurs* were speedily crowned with the greatest success. In the spring of the same year the famous station, known as the *Steinberg* at Nidau, was discovered, as well as many others in the Lakes of Biemme, Neuchâtel, and Geneva; so that before the report of the Ober-Meilen discovery could be published in the 'Transactions of the Antiquarian Society of Zurich,' Dr Keller had equally interesting materials from other stations to record. This report, which appeared towards the close of 1854, under the title "Die Keltischen Pfahlbauten in den Schweizerseen," at once attracted the attention of archæologists throughout Europe.

The immediate outcome of the publicity thus given to the existence of an ancient lacustrine civilisation in Switzerland was a systematic search for similar antiquities throughout Europe. Nor was this search in vain, for within a few years analogous remains were found in many of the lakes and turbaries of France, Germany, Austria, and Italy; and more recently the area of their development has been extended to Bosnia, Greece, and Asia Minor, and probably other localities.

The merit of being the first to direct attention to Scottish crannogs belongs to Dr Joseph Robertson, who brought the subject before the Fellows of the Society of Antiquaries of Scotland in a paper read on December 14, 1857. The facts adduced by Dr Robertson consisted chiefly of historic ref-

erences to island-forts, and submerged wooden structures exposed, in the course of the drainage of loch and marshes, during the last, and the early part of this, century. Although this kind of evidence conclusively proved the existence of crannogs, it gave little information as to their nature and function in the social organisation of the times. The first great discovery which brought them on the field of practical research was made in the Loch of Dowalton, Wigtownshire, about thirty-five years ago. In order to drain the extensive meadows occupying the western portion of the Dowalton valley, the proprietor, Sir William Maxwell, Bart., conceived and successfully carried out a project of draining the loch by cutting a new outlet through the narrow lip of rock which, at a certain portion of its margin, was the only barrier between its waters and the lower ground beyond. This excavation was completed during the summer of 1863, and, as the waters subsided, a group of five or six artificial islands gradually emerged, like a scene in fairyland, from the bosom of the lake. The antiquarian remains collected on these islands ultimately disclosed a picture of early Scottish civilisation hitherto unknown to historians or to archæologists. Sir Herbert Maxwell, to whom the event was especially exciting, on account of the bewilderment of the aquatic birds which were in the habit of frequenting the loch, and the tragic fate of its fish, gives the following reminiscence of the circumstances which led to the recognition of the true nature of the islands: "I remember when Lord Lovaine was taken down to see the drainage operations in 1863, that the islands were then appearing above the subsiding waters. His lordship had, I think, just returned from Switzerland, where he had visited the lake-dwellings there. My father told me that he exclaimed, 'Why, here are just the things I have been looking at in the Swiss lakes.'"

In August of that year the late Duke of Northumberland, then Lord Lovaine, read a descriptive account of these crannogs at the Newcastle-upon-Tyne meeting of the British Association.

A couple of years later, Dr Stuart, Secretary of the Society of Antiquaries, visited Dowalton, and, owing to the more complete drainage of the loch, was enabled to examine the islands under more favourable conditions. The result of his labours was an elaborate paper to the Society, in which he



Fig. 229.—Bronze patella ( $5\frac{1}{2}$  inches in height) with the letters  
C I P I P O L I E I stamped on handle, Dowalton.

gave a detailed account of their structure and of the relics found on them; and to which he added all the facts he could glean from historical and other sources, including some of the contents of the unpublished paper of Dr Robertson.

Among the industrial remains collected on and around these islands were canoes, bronze dishes of Roman origin (fig. 229), bracelets and beads of glass (fig. 230), bronze brooches and other ornaments, crucibles and iron slag, perforated axe-heads and hammers of iron, fragments of

Samian ware, querns, hammer-stones, a leather shoe stamped with a pattern (fig. 232), &c., &c. From the undoubted Roman element which characterised a considerable number of these relics, the habitable period of the Dowalton lake-



Fig. 230.—Beads of glass from Dowalton ( $\frac{1}{2}$ ).

dwellings must be relegated back to the early centuries of the Christian era.

After the publication of Dr Stuart's paper in 1866, little progress was made in the exploration of Scottish crannogs, although traces of them were occasionally noticed throughout the country, till the discovery and excavation of the Lochlee crannog in 1878-79. This was the commencement of a series of explorations, conducted under the auspices of the Ayr and Galloway Archæological Association, which culminated in the excavation of no less than six typical crannogs through-



Fig. 231.—Bronze penannular brooch, Dowalton ( $\frac{1}{2}$ ).

out the counties of Ayr and Wigtown. From a careful consideration of the relics thus collected, there can be no ambiguity as to the testimony they afford of the peaceful occupation of their owners. Indeed, among a very large and varied assortment of objects indicating the prosecution of various industries,



the warlike element is but feebly represented by a few iron daggers and spear-heads, one or two tips of the crossbow-bolt, and a quantity of so-called sling-stones. Among the rarer objects the following may be mentioned: Two spiral finger-rings of gold (fig. 233), and a crucible containing particles of



Fig. 232.—*Portion of leather shoe (length 7 inches), Dowalton.*

this metal; a gold coin of Saxon origin (fig. 234)—supposed to have been originally a forgery, as it was made up of two thin gold plates and a copper core; an amber-coloured bead of glass (fig. 235); two cup-marked stones, one of which has



Fig. 233.—*Two spiral finger-rings of gold, Buston (†).*

the cup surrounded by two concentric circles (fig. 237); a pendant of jet in the form of a cross inscribed in a circle and ornamented with small incised circles (fig. 238); a conical object of rock-crystal highly polished and having some resemblance to the settings on early book-covers (fig. 236); a

flat piece of ash-wood having both sides ornamented with an incised spiral pattern; a remarkable fringe-like apparatus made of the long stems of a moss (*Polytrichum commune*) (fig. 239); a bridle-bit, partly of iron and partly of bronze (fig. 240); several toilet combs (fig. 241); fibulæ of Romano-

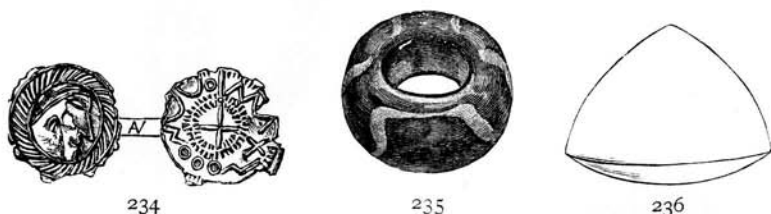


Fig. 234-236.—Gold coin (*Buston*), glass bead, and rock-crystal from *Lochspouts* (†).

British types (fig. 242); an ornament of bronze wire coiled into a double spiral (fig. 243), &c.

Since the reports on these various investigations appeared in the Collections of the Association, only three genuine



Fig. 237.—Stone with cup-and-ring markings, *Lochlee* (†).



Fig. 238.—Jet ornament, *Lochspouts* (†).

crannogs have been excavated in Scotland—viz., one in Lochan Dughail, Argyllshire; one at Hyndford, near the town of Lanark; and a third—a stone crannog—in Ashgrove Loch, near Stevenston, Ayrshire. As these crannogs were investigated subsequent to the publication of my books on

the Scottish crannogs (1882) and the Lake-dwellings of Europe (1890), I shall here give a short account of the archæ-



Fig. 239.—Fringe made from the stems of a moss (*Polytrichum commune*), Lochlee ( $\frac{1}{3}$ ).



Fig. 240.—Bridle-bit of bronze and iron, Lochlee ( $\frac{1}{2}$ ).

ological results, by way of supplementing the information already before the public.

The crannog of Lochan Dughail<sup>1</sup> is interesting, inasmuch as it revealed the foundation of a circular wooden house over

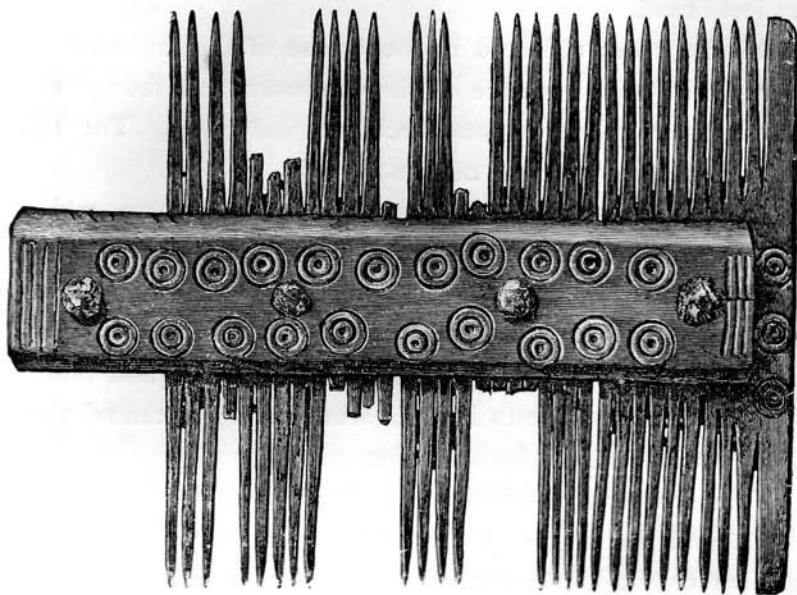


Fig. 241.—Bone comb, Buston ( $\frac{1}{2}$ ).

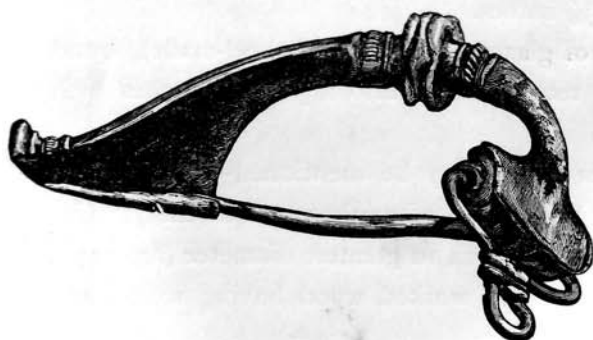


Fig. 242.—Bronze fibula, Lochlee ( $\frac{1}{2}$ ).



Fig. 243.—Bronze spiral ornament, Lochspouts ( $\frac{1}{2}$ ).

the artificial island, as already described (p. 334). The island consisted of timbers and brushwood, arranged in transverse

<sup>1</sup> Proc. Soc. A. Scot., vol. xxvii. p. 211.

layers to a depth of over 4 feet and surrounded by a circle of piles, whose surface formed an oval space, 49 feet long by 45 feet broad.

All the relics collected in the course of the investigation were found on the surface of the woodwork, and, though not numerous, they are of some archæological value. The following are the principal objects:—

A small flint scraper of prehistoric workmanship, which probably came from a grave of the Stone Age in the neighbourhood, was utilised by the crannog inhabitants as a strike-light (fig. 244).

A circular stone disc,  $3\frac{1}{2}$  inches in diameter, and rather more than an inch in thickness, having a central perforation half an inch in diameter.

Four sharpening stones made of a fine-grained sandstone, found in the primary rocks in the vicinity.

Five or six kidney-shaped polishers of a whitish quartz, 6 to 8 inches in length.

Half of a bracelet made of cannel coal, showing a diameter (internal) of  $2\frac{3}{4}$  inches.

Some fragments of glazed earthenware (wheel-made), found together, were reconstructed into a jar  $6\frac{1}{2}$  inches high (fig. 245).

Among the other relics may be mentioned—a projecting handle of the same kind of earthenware as the jar (fig. 246); a crucible  $1\frac{1}{2}$  inch in greatest diameter (fig. 247); and some portions of worked wood having round and square holes.

The Hyndford crannog, discovered and excavated by Mr Andrew Smith in 1898, is situated about two miles east of the town of Lanark. Some twenty years ago the site of this dwelling was a small wooded island, but immediately prior to the excavations only the stumps of trees were to be seen

dotting the surface of a grassy flat mound, some 70 or 80 feet in diameter. In winter, and during rainy weather, the mound was often completely surrounded by water, but in



Fig. 244.—*Flint scraper* ( $\frac{1}{2}$ ).



Fig. 245.—*Jar of glazed earthenware* ( $6\frac{1}{2}$  inches high).

summer-time there was only a large pond encompassing about three-fourths of its circumference, leaving a dry neck on the north-east side which connected it with the cultivated



Fig. 246.—*Handle of earthenware vessel.* (4 inches in length).

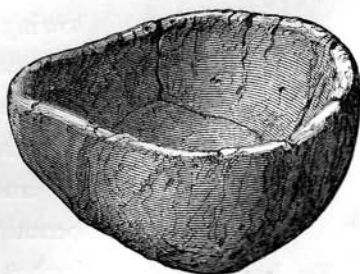


Fig. 247.—*A crucible of clay* (actual size).

land. The depth of the pond is very considerable close to the mound, and indeed it looks as if it had been intentionally deepened. The method of excavating adopted was to clear off the entire *débris* down to the original flooring of the

dwelling, a depth of from  $2\frac{1}{2}$  to 3 feet. Underneath this there was a layer of much decayed brushwood mixed with the clayey silt on which it was originally laid. A circle of piles, having a diameter of about 49 feet, was exposed in the interior, the stumps of which projected some 2 feet above the flooring. They were irregularly set, as if two or three rows had been placed together, and it is probable that they formed part of a wooden house. Towards the centre of the circle of piles there were three fireplaces separated from each other by an interval of a few yards, each of which contained several superimposed hearths one above the other.

A large quantity of ashes, charcoal, and bones of animals—broken and sometimes burnt—was found throughout the *débris*, more especially on the south side, where there was an accumulation, suggestive of a kitchen-midden, occupying a space partly inside and partly outside the circle of piles. The relics, which were not localised in any way but scattered

throughout the whole ruins, are of special interest on account of the number of Roman remains among them. The following are the most important up to this date:—

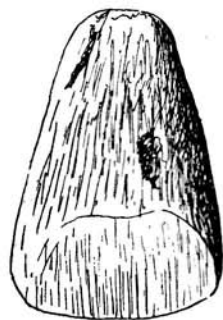


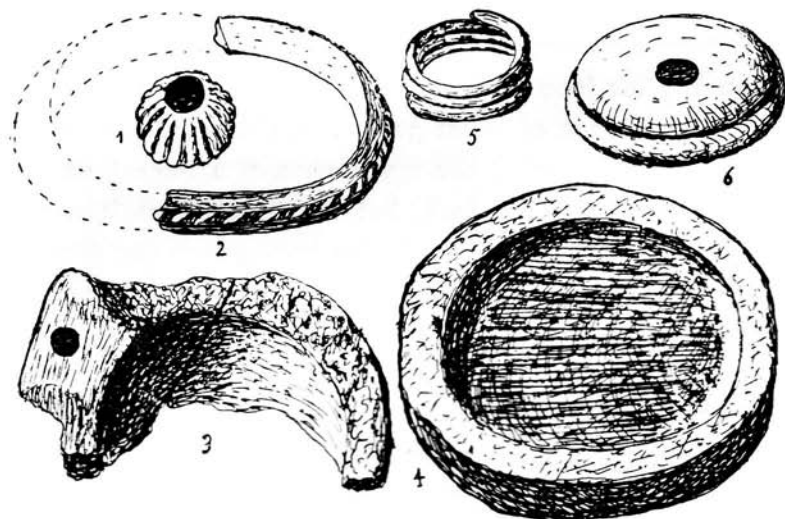
Fig. 248.—Stone axe from the Hyndford crannog ( $\frac{1}{2}$ ).

*Stone.*—A neatly formed polished celt, 3 inches long (fig. 248), and a fragment of another specimen; a circular disc beautifully polished on both sides, 3 inches in diameter, and rather more than a quarter of an inch thick; another stone, 3 by  $2\frac{1}{2}$  inches, had the same characters as the former, but differed in being of a rectangular shape; four small and neatly formed sharpening stones; one whorl made of sandstone,  $1\frac{7}{8}$  inch in diameter, and two of a light-yellowish shale, one of the latter having

a circular groove near its margin (fig. 254); several portions of querns; a small mortar with traces of gold in it (fig. 252); portion of a stone cup (steatite) with a perforated handle (fig. 251); hammer-stones, pestles, perforated pieces of shale, &c.

*Bronze.*—A spiral finger-ring of  $3\frac{1}{2}$  coils (fig. 253); two rings  $1\frac{5}{8}$  inch in diameter; portions of small tubing, and a square rod or wire, 9 inches long; portion of a beaded torque (fig. 154, p. 253).

*Glass.*—Three melon-shaped beads of different sizes (fig.



Figs. 249-254.—*Various objects found in the Hyndford crannog.*

1, Glass bead; 2, Glass bracelet; 3, Portion of steatite cup ( $\frac{3}{8}$ ); 4, Stone mortar; 5, Bronze finger-ring; 6, Spindle-whorl of shale (all  $\frac{3}{8}$  with the exception of No. 3).

249), an elongated drop, and fragments of glass vessels; portions of five bracelets of different patterns (fig. 250).

*Pottery.*—Portions of at least six different vessels of red "Samian" ware, one with a pattern and figures; handles and portions of four vessels of the grey Roman pottery; fragments of a very hard glazed ware of a bluish-green colour, indicating a vessel with a long wide neck, bulging in the middle, and ornamented with wavy lines.



*Lead.*—A large mass weighing 13 lb. 9 oz., showing cuts on its surface, and another small portion.

*Iron.*—Axe- and hammer-heads and picks—one axe has imbedded in its corroded mass the tooth of a large ruminant; an iron collar, 6 inches in diameter, made of a flat band 1 to 1½ inch broad; portions of iron slag.

*Miscellaneous.*—Portion of a remarkable mould like one found in Ayrshire;<sup>1</sup> a small hemispherical object of red enamel about the size of the half of a large hazel-nut, showing a check pattern on its inner side.

The stone crannog in Ashgrove Loch, which was partially excavated by Mr John Smith,<sup>2</sup> consisted of a circular stone wall enclosing a space of about 30 feet in diameter. Before its excavation it presented the appearance of a mound on the margin of the present loch, but in former times it would be within its boundaries. Trenches having been dug through the interior of this mound, Mr Smith came upon a built drain, covered with sandstone slabs, which he regarded as a water-tank. The wall, which on the land side had a thickness of 9 feet, but less than half this on the other, was placed upon a bed of brushwood, and built of “rough blocks of sandstone, and a few whinstones, laid in a mortar of *tough yellow clay.*”

A causeway of rough blocks of sandstone slabs leading from this wall to the land was discovered about 2 feet beneath the present surface. The kitchen-midden was piled up outside the wall, and in it were found the following relics:—

1. A large number of bones, both entire and split, of red-deer, ox, pig, sheep, and goat.

<sup>1</sup> Proc. Soc. A. Scot., vol. i. p. 45.

<sup>2</sup> Collections, Ayr and Gal. Arch. Association, vol. vii. p. 56; also ‘Prehistoric Man in Ayrshire,’ p. 48.

2. Several chisels and knife-like objects, a wedge, a large needle perforated in the centre, a spoon, and a narrow needle—all of bone.

3. Several hammer-stones and a few smooth stones.

4. Bit of gas-coal with a round hole bored through it.

5. A pair of steel sheep-shears.

6. Numerous specimens of *Littorina littorea*.

“From the details given above,” writes Mr Smith, “I think the history of the spot may be read thus: on top of a bluish clay-bed there had accumulated a bed of brown moss, possibly entirely from the decay of water-plants, 1 foot in thickness on the land side of the crannog, and 4 feet thick on the loch side. Then the position was occupied by man, who laid on top of the moss a layer of branches, and on this built a *stone* crannog, 43 feet in largest outside diameter, with a built water-tank under the floor, the interior of the dwelling being possibly divided into compartments, roughly paved, and carpeted with heather.

“All the deers’ horns got were divested of the tines, except the brow one, and look remarkably like picks, and have possibly been used as such. Some of them are pretty well coated with vivianite.

“There are possibly remains of five other crannogs in the loch, but nothing has been done to explore them, and the place, when in its ‘glory,’ must have formed a very quaint little lake-village, the loch being nearly completely surrounded by rising ground.”

The earlier evidence adduced in support of the existence of lake-dwellings south of the Scottish Border was in most instances too fragmentary to be of scientific value. Of this character were the structures in some of the *Meres* of Norfolk and Suffolk, described by Sir Charles Bunbury, Professor Newton, and the Rev. Harry Jones; also the reputed pile-

structure in Cold Ash Common, Berks, noticed by Dr S. Palmer.

In 1866 General Pitt-Rivers communicated to the Anthropological Society of London a paper entitled "A Description of Certain Piles found near London Wall and Southwark, possibly the remains of Pile-Buildings." The author began by observing that his attention was directed to the locality by a short paragraph in the 'Times' of the 20th October, stating that upwards of twenty cartloads of bones had been dug out of the excavations which were being made for the foundations of a wool warehouse. Here, in a bed of peat, 7 to 9 feet thick, intervening between the accumulated *débris* of modern London and a bed of gravel, the workmen came upon a number of wooden piles whose tips penetrated into the gravel. Scattered through this peat were numerous articles of human workmanship; also several kitchen-middens, containing the nondescript remains of human occupancy. The majority of the relics were of Roman origin, and included coins, tiles, pottery, and articles of dress. In addition to these there were others of ruder construction, made of bone and horn, such as knife-handles, spear-heads, a couple of bone skates, &c.

In 1870 a circular island, near the shore of the Lake of Llangorse, Wales, was shown by the Rev. Mr Dumbleton to have been constructed after the manner of the stockaded islands or crannogs. In the course of the excavations, remains of a log-flooring, charcoal, food-refuse, &c., were turned up, but among them there was no relic of sufficient character to give a clue to the period when the island was constructed or inhabited.

In 1880 the Drainage Commissioners of the Holderness found it necessary to deepen some of the drains in that low-lying district, and when this was being done Mr Thomas Boynton's attention was directed to some prepared woodwork,

and bones of animals found in the stuff thrown out, which he regarded as evidence of a lake-dwelling. Such remains were observed at five different localities, two of which have since been more or less explored, with the result that there could be no doubt that they were the sites of human habitations, having some structural resemblance to the fascine lake-dwellings of Switzerland. Some very curious implements made of the articulated ends of the long bones of some large bovine animals, a flint scraper, a stone axe, a bronze spear-head, and portions of two jet bracelets, are the chief relics recorded.

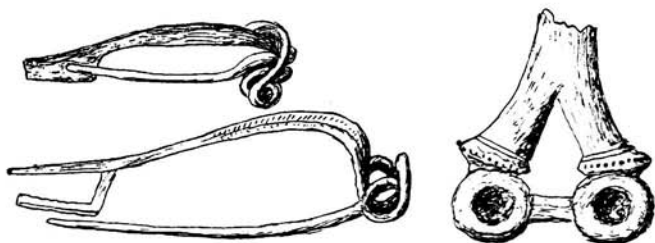
Indications of lake-dwellings, discovered on the banks of the Costa, near Pickering, Yorkshire, in 1893, by Mr James Mitchelson, have been recently described by the Hon. Cecil Duncombe, F.G.S., at a meeting of the Anthropological Institute (vol. i., New Series, p. 150). As only a partial exploration of the locality has been made, the author refrains from formulating any positive conclusions on these discoveries. The evidence adduced in support of lacustrine habitations consists of rows of piles, suggesting gangways converging to one point where "water always rested or flowed in ancient times."

A section of the ground showed—superficial soil, 8 or 10 inches; stiff blue clay, 2 feet 6 inches; peat, 6 feet, resting on the Kimmeridge clay. A hole, 12 feet by 9 and 6 to 7 feet deep, was dug round some piles, and, near the bottom of the peat, relics of human occupancy were found, consisting of a cartful of animal bones and a quantity of broken pottery.

The animals represented were—man (at least four individuals); horse (small variety), numerous; ox (*Bos longifrons*), numerous; sheep (straight-horned), numerous; goat, one skull; pig (both wild and domesticated); wolf, fox, otter, beaver (one skull), voles, and birds.

The huts were circular or oval, and varied in size from 20 to 35 feet in diameter. Each hut contained a central hearth, sometimes neatly made of flat stones embedded in the clay flooring, but as subsidence, due to the compression and decay of the under-structures, progressed, the occupants superadded new floorings. These, on being repeated several times, showed on section a stratified appearance. In this way several hearths, five or six being not uncommon, were observed superimposed one above the other, precisely in the same manner as has been observed on the Lochlee crannog.

The objects collected form a large and varied assortment, made of stone, bone, horn, wood, bronze, iron, lead, glass,



Figs. 255, 256.—*Two fibulæ and portion of handle of bronze mirror from Glastonbury lake-village* ( $\frac{2}{3}$ ).

amber, and pottery, besides the osseous remains of man and the ordinary domestic and wild animals. These remains illustrate, with rare and singular completeness, the life-history of the community—its social industries, culture, and civilisation. Many of the relics exhibit the special characteristics of Late Celtic art; nor does it appear that they have been influenced in any way by Roman civilisation, so that this feature alone gives to the Glastonbury lake-village an exceptional importance among the lacustrine researches hitherto prosecuted within the British Isles.

Among the bronze objects are many fibulæ of La Tène types (fig. 255), spiral finger-rings, penannular brooches,

portions of mirrors (fig. 256), and an elegant bowl. Of bone or horn we have needles, pins, handles of instruments, long-handled combs, some of the latter being decorated. The pottery consists of various vases and dishes, some showing devices of unmistakably Late Celtic character; iron weapons and implements, generally much corroded; a fine specimen of a saw, still retaining its wooden handle, is of the same character as that found on Hunsbury camp, and figured on page 273. A leaden weight, shaped like a cheese, and weighing 4 ounces 229 grains, is the only thing which betrays a suspicion of Roman origin. Among the objects of wood are—a canoe, the framework of a loom, a decorated stave of a bucket, part of the axle and nave of a wheel with a couple of spokes in their place, and a ladder; querns, loom weights, crucibles, thousands of sling-bolts, made of clay both burnt and unburnt, &c.

### 2. *Structure of Lake-dwellings.*

The preliminary problem which had to be solved before lacustrine habitation became possible was to construct a level platform, sufficiently elevated above the water to be beyond the action of the waves, on which dwelling-huts could be erected. This had been effected in one or other of the three following ways:—

1. By driving long piles of wood into the bed of the lake, leaving their tops projecting at a uniform height above the water, and placing over them transverse beams, so as to form a platform capable of supporting such buildings as were considered necessary for the domestic comfort of their inhabitants. The dwellings so constructed are called *Pile-structures* or *Pile-dwellings*, *Pfahlbauten*, *Palafittes*, &c. This was the method most commonly adopted in Switzerland, Austria, Savoy, and North Italy.

2. A second method was to construct a series of rectangular basements of wood in close proximity to each other, each basement having its sides formed by a succession of horizontal beams lying one above the other like the logs in a Swiss *châlet*, and overlapping at the four corners. These compartments measured only a few yards in diameter. Their lowest beams rested on the bed of the lake, and when the requisite height above the water was attained, the usual platform was laid across, and so the empty spaces underneath became covered over. This plan, selected probably with the object of saving material, is analogous to the columnar and vaulted foundations of modern buildings. It appears to have been adopted chiefly by the founders of the sporadic lake-dwellings of the Iron Age. Characteristic examples have been investigated in Lake Paladru, France, and in the lakes of Persanzig, Arys, Daber, and others, in Germany.

3. The third method was by constructing an artificial island of timbers, laid in layers transversely to each other, and generally mixed with stones and earth, so as to afford a substantial basis for a building which could be used as a habitation, or as a fort. This was the method almost invariably practised by the inhabitants of the British Isles, and the ruins of such habitations are now frequently met with in the form of submerged, or partially submerged, islands known as *crannogs*.

As regards the pile-structures proper, everything—huts, platforms, and piles, except their submerged lower ends—has disappeared ages ago, either by natural decay or by the accident of a conflagration. Such a catastrophe was by no means an uncommon occurrence among the Swiss lacustrine villages; but, strange to say, it was, from an archæological point of view, the most fortunate termination these structures could have had. In the hurry and scrimmage of a conflagration not only did many articles of value drop into the

lake, but some of the most perishable commodities—such as grain, fruits, bread, cloth, &c.—and, what is not the least interesting, portions of the clay mouldings of the hut walls, were first charred before they dropped into the subjacent mud, and thus became less liable to decomposition.

When we consider the number and extent of the lake-villages which formerly clustered along the sheltered bays in the larger lakes of Switzerland, we begin to realise the labour involved in their construction. One of the Bronze-Age stations at Morges, in the Lake of Geneva, was 1200 feet long by 150 feet broad; and the whole of this area was thickly studded with the stumps of the piles which had supported the huts. Mr Löhle, the explorer of Wangen, a station of the pure Stone Age in Lake Constance, estimated the number of piles used in its construction at 40,000 or 50,000. Dr von Fellenberg calculated, by counting the number of piles in one or two selected spots, that the entire number required for the Bronze-Age settlement at Möringen could not have been less than 10,000. A more striking and realistic phenomenon has rarely come before archæologists than that which the stations of Möringen and Lattringen presented, shortly after the Lake of Biemme became affected by the results of the *Correction des eaux du Jura*—an operation which lowered its surface from 6 to 8 feet. Photographic illustrations of their sites, taken in 1876, show quite a forest of black-looking stumps rising a few feet above the muddy bottom, which then for the first time became exposed to view. A similar sight was witnessed a few years later (the autumn of 1884), at Cortaillod, in Lake Neuchâtel, and it made such an impression on the minds of the country-people that they flocked in crowds to behold the novel spectacle. The recently emerged piles, as positive evidence of human habitation, could not be gainsaid, more especially as relic-hunters



were finding a rich harvest among the *débris* in the surrounding mud. The pile-structures which became embedded in peat are, however, still better preserved, as may be seen from the accompanying illustration (fig. 257), taken from a freshly excavated portion of the celebrated station of Robenhausen.

Contemporary with these pile-dwellings there existed throughout the same regions of Central Europe other lake-dwellings

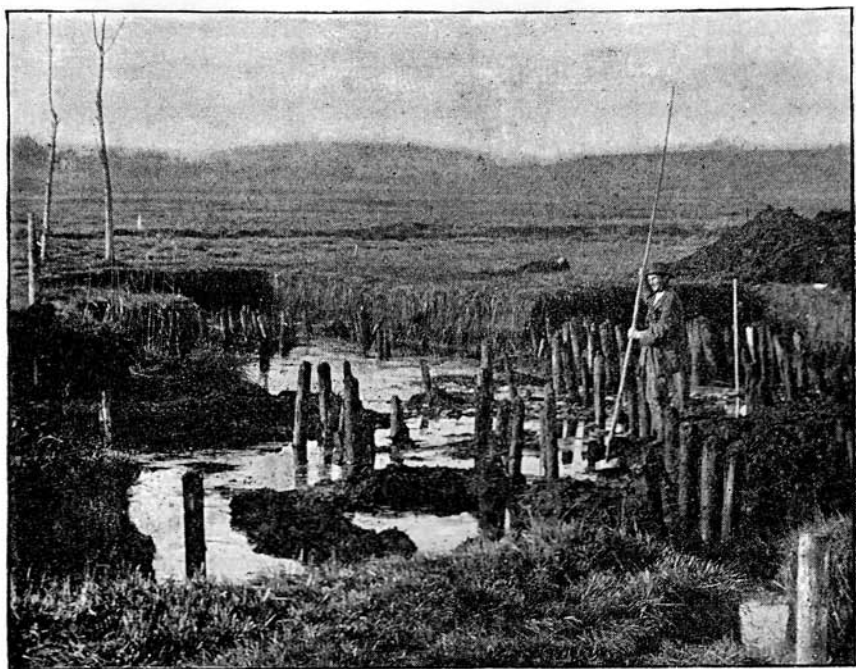


Fig. 257.—View of piles exposed on peat at Robenhausen, Switzerland.

which, instead of platforms on tall piles, had solid substructures composed of layers of timbers alternating with beds of clay. Such structures are commonly met with in the smaller lakes, and their remains are now generally buried in peat. Characteristic specimens of this class have been investigated at Wauwyl, Niederwyl, and Schussenried. Examples of the artificial island or crannog have also occasionally

been met with on the Continent. In this category are to be reckoned a prettily wooded island in the Lake of Inkwyl, near Soleure; also one in Lake of Nussbaumen, which measured 110 by 60 feet, and a third in the Arrasch See, in Livonia, which belonged to the Iron Age.

But it was within the British Isles that the artificial islands acquired their greatest development, some 300 having been recorded and more or less investigated, of which considerably more than two-thirds are in Ireland. The most precise information as regards their structure, however, has been furnished by one or two of the Scottish examples, notably those of Lochlee and Buston, in the county of Ayr.

The construction of a crannog must have been a gigantic piece of work, requiring in many cases the services of the whole village community. In a lake containing soft and yielding sediment it is manifest that any heavy substances, such as stones or earth, would be inadmissible, owing to their weight, so that logs of wood, provided there was an abundant supply at hand, would be the best and cheapest material that could be used. The plan adopted seems to have been to make first a floating raft of stems of trees, brushwood, bracken, heather, &c., mingled with stones and earth, until the mass grounded. When this was effected the entire mass was pinned together and surrounded by circles of piles, firmly united by horizontal beams with mortise-holes to receive the uprights. These horizontal beams were arranged in two ways. One set ran along the circumference, and bound together all the uprights in the same circle, while others took a radial direction and connected each circle together. Sometimes the latter were long enough to embrace three circles. The external ends of the radial beams were occasionally observed to be continuous, with additional strengthening materials — wooden

props, large stones, &c.—which appeared also to act as a breakwater. On one side of the Lochlee crannog there was a large accumulation of brushwood outside the stockade. The mechanical skill displayed in the construction was specially directed to give stability to the island, and to prevent superincumbent pressure from causing the general mass to bulge outwards.

The internal composition of the Lochlee island was carefully ascertained by cutting a large rectangular hole near its centre, which was carried down till the original silt of the lake was reached—a depth of 10 feet from the primary floor of the dwelling-house, or about 16 feet from the surface of the mound. The result of this was to show that the solid mass was composed of the unbarked stems of various kinds of trees, from 6 to 12 inches in diameter, laid in transverse layers over each other. At the very bottom a large trunk, 14 inches in diameter, was encountered, between which and the lake sediment there were only a few hazel twigs. Interspersed among this woodwork, and stretching beyond the limits of the cutting, were prepared oak-beams pinned at their ends to others of the same kind, as well as, here and there, to the ordinary rough logs. This arrangement probably extended to the marginal stockades, and so formed a strong binding framework to the whole island. One pin, some 3 or 4 inches in diameter, penetrated through no less than four beams in successive layers, and terminated ultimately in a large trunk, 13 inches in diameter. One of these oak-beams measured 8 feet 3 inches in length and 10 inches in breadth; and the holes in it were 5 feet apart. Another terminated in a small round projection or tenon, which evidently fitted into a mortised hole in an adjacent beam.

Some of the artificial islands have been constructed of dry

stones with, or without, a wooden foundation, and numerous examples of them have been recorded both in Ireland and in Scotland. According to Mr Kinahan, the largest and most characteristic stone crannog in Ireland is Hag's Castle, Lough Mask, county Mayo. In Scotland, a specimen in the White Loch of Ravenstone, Wigtownshire, explored some years ago by the late Lord Borthwick, under my supervision, had the appearance of a mound of stones with a level surface 80 feet square. On the surface there were ruins of stone buildings, but on excavating a hole near the centre, to a depth of 6 or 7 feet, we came on a foundation of large beams and trunks of trees.<sup>1</sup>

Many, if not all, of the lacustrine villages of Central Europe were connected with the shore by means of one or more gangways, supported by a double row of piles, and varying in length and breadth according to the situation and requirements of each village. Dr Gross informs us that the bridge leading to the Bronze-Age settlement at Möringen was about 200 yards in length, and from 10 to 12 feet in width; while that to the Stone-Age station in the same locality was considerably shorter, and only 5 to 8 feet wide. The extent of the space occupied by piles at Robenhausen was about 3 acres, and the nearest point of the old lake-shore was some 2000 paces distant; but yet it would seem, from traces of piles found in the peat, that a bridge at one time traversed the whole of this distance. Remains of similar approaches have been frequently observed in connection with the sporadic dwellings in the outlying districts of Europe. Dr Conwentz<sup>2</sup> has recently shown that, in prehistoric and early medieval times, wooden roads and bridges had been constructed in North Germany across bogs and marshes, the

<sup>1</sup> Collections of Ayr and Gal. Arch. Association, vol. v. p. 121.

<sup>2</sup> Die Moorbrücken im Thal der Sorge, 1897.

remains of which are at the present time occasionally met with buried in peat and other superficial accumulations.

Access was had to the Scottish and Irish crannogs by various means. Some had moles or stone-causeways, the existence of which in some instances only became known upon the drainage of the lake. Hence it has been conjectured that these approaches might have been always submerged, and so supplied, on emergencies, a secret means of communication with the shore. This idea was suggested by the tortuous direction which many of them assumed, as, for example, the causeway discovered after the drainage of the Loch of Sanquhar, which had a zigzag direction, and so could only be waded by persons intimately acquainted with its windings. Others were approached by a wooden gangway, the evidence of which in some cases still exists in the form of a double row of piles. Both at Lochlee and Lochspouts it was ascertained that these piles were tightly embraced at their lower extremities by a curiously constructed network of horizontal beams, spreading from one line of uprights to the other. As these structures were buried from 3 to 7 feet beneath the lake-bed, my first impression was that they might have been used, like the submerged stone causeways, as a concealed means of communicating with the shore. To test this suggestion, I caused a special excavation to be made along the line of a gangway at the Miller's Cairn, in Loch Dowalton. After digging through 3 feet of hardened mud we came upon a stratum of fine, blue, and extremely tenacious clay. The pointed stakes, which penetrated into this clay only a few inches, here met with a firm resistance. It then occurred to me that the ingenious arrangement of the wooden beams at the crannogs of Lochlee and Lochspouts served merely the same end as the blue clay at the Miller's Cairn, and that they were to be found only

in localities where there was a great depth of mud incapable of affording a sufficient basis of resistance to the piles. It is curious to note the ingenuity and variety of means by which such difficulties were overcome.

In addition to the ordinary lake-dwellings, or *palafittes*, there is to be found, in the eastern part of the Po Valley, another class of ancient habitations known as *terremare*, which are so closely allied to the former that they may be regarded as land *palafittes*. They date from the Bronze Age, being apparently a development of the lacustrine system; and although long known as the source of many interesting antiquities, it was only after the lake-dwelling researches came into vogue that their real nature was recognised. Nearly one hundred of these mounds have now been more or less investigated, with the result that there can no longer be any doubt that they are the sites of ancient villages constructed on piles, and fortified by an earthen dyke and a ditch. In their construction one uniform plan was adopted. Having selected a suitable site, always four-sided and orientated, but of course varying in size according to the requirements of the community, the constructors proceeded to surround it with a ditch, the excavated material being thrown up in the form of a dyke on the inner side. The area thus enclosed was then thickly planted with stakes, the tops of which were brought to a common level, and over them a wooden platform was laid. On this platform cottages made of light timbers and clay were erected. Thus, in a very simple manner, was constructed a fortified village, access to which was secured by one or more wooden bridges spanning the surrounding ditch. The vacant space beneath the common platform became a convenient receptacle for all sorts of refuse, including lost and worn-out objects of industry. When in the course of time this space became filled up, the *terramaricoli*, in order to avoid the labour of having to remove

the *débris* which would otherwise accumulate around them, adopted the ingenious method of constructing a brand-new platform above the former. It seems that a preliminary step to the carrying out of this project was to set fire to the entire village, thus at one *coup* getting clear of all sanitary difficulties as well as of a number of uninvited guests. Having thus started with a clean bill of health, they elevated the dyke to the requisite height, and planted stakes, as formerly, for the support of the new platform and huts—the stakes in this case penetrating only into the accumulated rubbish of the former village. This mode of procedure appears to have been repeated over and over again, until in the course of ages the successive deposits accumulated to a height of 15 or 20 feet.

### 3. *Marine Dwellings.*

Before the construction of the great sea-dykes in Holland, nearly the whole of West Friesland would have been in that hybrid condition described by Pliny, in which it was difficult to say whether it belonged to sea or land (“*dubiumque terræ sit, an pars maris*”). “Here,” says this writer, “a wretched race is found, inhabiting either the more elevated spots of land, or else eminences artificially constructed, and of a height to which they know by experience that the highest tides will never reach. Here they pitch their cabins; and when the waves cover the surrounding country far and wide, like so many mariners on board ship are they,” &c. At the present time this region is richly cultivated, and looks as if it were a dead level, and it is only on close inspection that certain elevations of considerable extent, called *terpen*, scattered irregularly over the country, can be detected. It is on such elevations that villages and churches are generally built, and, till they accidentally attracted the attention of agriculturists within

recent years, no one seemed to have thought anything about their origin. They are now proved to have been originally constructed as pile-dwellings, precisely similar to the *terremare*, and are probably the actual mounds seen and described by Pliny. They might therefore be more appropriately designated as marine dwellings.

Like the *terremare* of Italy, the *terpen* are largely excavated on account of their rich ammoniacal deposits, which are used by agriculturists as guano. The industrial remains found in the course of these operations are of a very miscellaneous character, and give a vivid picture of the civilisation of their inhabitants from Roman times down to the twelfth century. Among the relics I noticed such objects as the shells of eggs (hen and goose), some of which were unbroken, a flute made of the shank-bone of an animal, large casks, canoes, loom-weights, toilet-combs, iron bridle-bits, beads of glass and amber, Anglo-Saxon, Byzantine, and Roman coins, bronze pots, pottery, &c., &c.

Traces of marine pile-structures are also said to have been found in the Bay of Wismar, North Germany.<sup>1</sup>

The only remains suggestive of ancient habitations known to me within the tidal shores of the British Isles are—(1) a cairn of stones on a substratum of wood near the island of Eriska, at the mouth of Loch Crerar; (2) the Black Cairn, in the Beaully Firth; (3) some stumps of piles in Ardmore Bay, county Waterford; and (4) a curious wooden structure recently discovered at Dumbuck within the tidal area of the Clyde.

The Eriska mound, which was dry at low water but submerged at spring-tides to the extent of 5 feet, was found on examination to be composed of clay and stones resting on a foundation of logs of wood. The mound was circular in form,

<sup>1</sup> Lake-Dwellings of Europe, p. 311.



about 60 feet in diameter, and in digging a trench through it, ashes, charcoal, and the broken bones of domestic animals (ox and sheep) were turned up as evidence of human occupancy.<sup>1</sup>

The Black Cairn, which is situated about 400 yards within the flood-mark of the Beaully Firth, and nearly opposite to Red Castle, is also said to be constructed on a foundation of large beams. Miss C. Maclagan<sup>2</sup> thus refers to it: "We visited it at low water of the lowest tide of the year, and believe it to be a crannog greatly resembling one in the neighbouring 'Loch of the Clans,' but resting on larger, stronger piles. Our boatmen declared they had often drawn out of it beams 9 or 10 feet long and 3 feet broad, fresh and fit for use. They had great difficulty in pulling them out, which they did by fixing their anchors in a log or pile. Tradition says that as late as 1745 the place was an island, and a refuge to which some of Prince Charles Edward's defeated adherents fled after the battle of Culloden."

The "submarine crannog" at Ardmore, discovered by Mr R. J. Ussher,<sup>3</sup> covers an oval space about 100 feet in diameter, and contains piles in a stratum of peat. The present submarine position of these remains may be reasonably accounted for on the strength of the evidence that a submergence of the land, since Neolithic times, has taken place along the southern shores of England and Ireland, while, during the corresponding period, the very opposite change has been proved to have occurred in Scotland and the north of Ireland.<sup>4</sup> For further references to marine dwellings see 'Lake-Dwellings of Europe,' pp. 311, 389, 443, 573, and 574.

The so-called crannog at Dumbuck is situated between high- and low-water marks, and at full tide its site is covered to a depth of at least 3 feet. Before it was subjected to the

<sup>1</sup> Proc. Soc. A. Scot., vol. xix. p. 192.

<sup>3</sup> Proc. R. I. Acad., vol. ii., 2nd series.

<sup>2</sup> Hill Forts, &c., p. 89.

<sup>4</sup> Arch. Journal, Sept. 1898.

recent excavations conducted by Mr W. A. Donnelly, its discoverer, I counted the tops of twenty-seven piles of oak, some 5 or 8 inches in diameter, cropping up through the mud in the form of a circle 56 feet in diameter. The area thus defined was occupied by three layers of timbers—apparently the trunks of small trees from the forest—laid transversely one above the other. The surface of this log-pavement was not lower than that of the surrounding mud, so that a little scraping with a small hand-shovel was sufficient to reveal its extension over the entire area of the circle, with the exception of a few yards in the centre, which were then occupied by a heap of stones. On the removal of these stones it was ascertained that the woodwork did not extend over the entire area, but left a circular portion, about 2 yards in diameter, in the centre free. Another unique feature of this structure was a ring of horizontal woodwork, some 8 or 10 feet outside the circle of piles, the intervening space being destitute of wood; so that this zone, when cleared of the mud, looked like a canal separating the circle of piles, with its enclosed wooden flooring, from the outer ring of woodwork. In short, the woodwork was arranged in two concentric rings, the inner being, however, much broader than the outer. The south-east portion of this unpaved zone contained a refuse-heap of ashes, charcoal, and broken bones, some of the latter being calcined. Among the bones, Dr Traquair, F.R.S., has identified those of the ox, sheep, pig, deer, and roe, also some teeth of the horse. Several portions of the antlers of deer had marks of cutting and sawing implements on them.

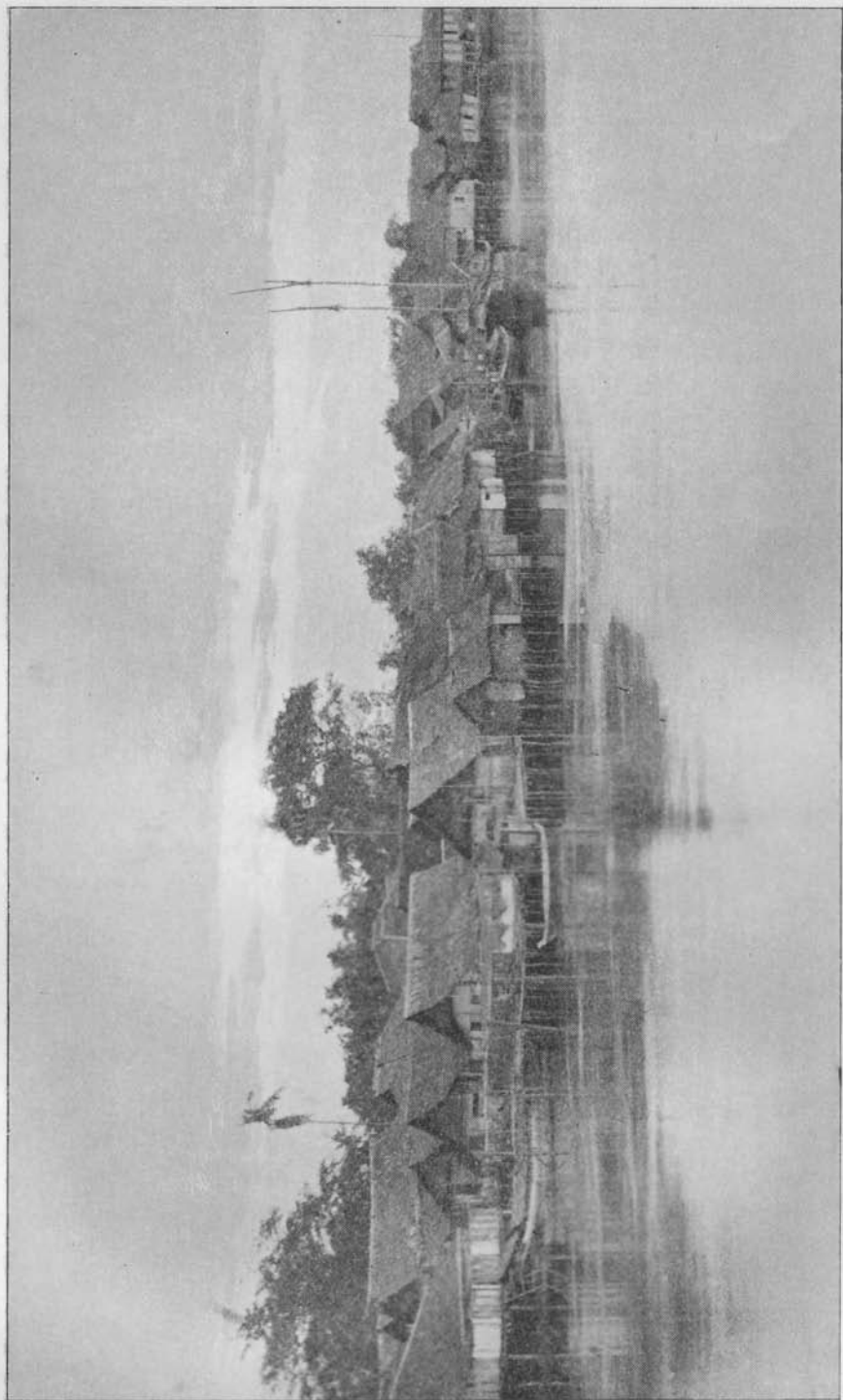
Near the outer margin of the outer ring of woodwork, on its north-east side, there was found a single-tree canoe, 33 feet long, 4 feet wide, and about  $1\frac{1}{2}$  foot deep, embedded in mud just of sufficient depth to cover it. On the north-west border of the central ring of woodwork there was exposed a

massive beam of oak, some 15 feet long, which contained in its middle two-thirds 5 slanting apertures, cut out of the solid, like the steps of a stair.

The whole area occupied with these wooden structures was strewn over with stones which, judging from their localised grouping and the entire absence of stones in the surrounding muddy deposits, must have been carried there by the hand of man. One thing is quite evident, that the surface of the exposed woodwork was not at any time the habitable level, as it is covered every twelve hours by upwards of 3 feet of water. Nor was there any evidence whatever to suggest that it was a habitation supported on piles, analogous to the pile-structures (*Pfahlbauten*) of the Stone and Bronze Ages of Central Europe. The most probable explanation of the curious set of phenomena here disclosed is, that the woodwork was the foundation of a superstructure of stones, built sufficiently high to be above the action of the tides and waves, over which there had been placed some kind of habitation; but whether it was a crannog, fort, or watch-tower, still remains *sub judice*. The unique arrangement of the woodwork at once suggests that the central building was in the form of a round, hollow tower, with very thick walls, like the brochs, and that outside this there had been a circular wall or breakwater which had the outer ring of woodwork for its foundation. Why, when, or by whom the stones were removed there is no evidence to show; but were I to make a suggestion it would be that the stone causeway, now laid along the bank of the recently made canal which stretches from a point close to the "crannog" to the railway, accounts for a large number of them. The site of the building and its substructures of wood now alone remain to puzzle antiquaries. Similar wooden basements are very common among the stone-crannogs of Scotland and Ireland, as already explained.

The most mysterious outcome of the Dumbuck investigations is that relics, entirely new to Scottish archæology, but almost identical with those recorded as having been found on the adjoining hill-fort of Dunbuie, have also been found among the *débris* of this marine site—some in the refuse-heap, some in the canoe, and others in the empty central space. The account of the Dunbuie fort and its extraordinary relics having already been published as evidence of a Neolithic and pre-Celtic civilisation<sup>1</sup> (not, however, without a protest on the part of a few antiquaries), the same theories have appeared in current literature with regard to the Dumbuck crannog. In dissociating myself from these theories, which I regard as utterly untenable, I have elsewhere given expression<sup>2</sup> to the opinion that these strange-looking objects, both from Dumbuck and Dunbuie, do not belong to any known phase of Scottish civilisation, and most certainly not to the Neolithic period. The statement that a wooden structure—unquestionably showing the marks of metal tools, and exposed on the surface of recent river deposits—is a Neolithic monument, is a palpable contradiction in terms. To look for Neolithic remains in this locality, one would not go to the superficial deposits within the present tidal area of the Clyde, but rather to those which formed its shelving shore in those earlier times. On the supposition that a crannog, or any other analogous structure, had been constructed in the Stone Age, near the line of low-water mark, its site would be now, doubtless, many hundreds of yards inland, and buried some 8 to 12 feet beneath the cultivated land of the present day. The section of the sedimentary deposits on this site, so far as I can gather from Mr Donnelly's statements, shows "a bed of loam on which the timbers of the structure rest; then a bed of silt which is filled up with brushwood under the

<sup>1</sup> Proc. Soc. A. Scot., vol. xxx. p. 291.      <sup>2</sup> Glasgow Herald, 7th Jan. 1899.



*From a Photo by Camphong Buggis, Singapore.*

PLATE XVIII.—PILE-DWELLINGS NEAR SINGAPORE.

timbers"; then layers of sand and gravel; and finally the blue glacial clay into which the tips of the piles penetrated. These facts are probably correct, and harmonise with the geological phenomena of the locality. The alluvial deposits which have accumulated during, and since, Neolithic times in the shallows of Dumbuck, have encroached on the water in the form of a wedge, the thin edge being next low-water mark. The increase of mud around the wooden structure, since it was laid, is probably less than a foot in depth.

Among the genuine relics found at Dumbuck may be mentioned portions of deer-horn sawn across, a quern, some pointed implements of bone like those found in the Lochlee crannog, and illustrated by fig. 79 in 'Ancient Scottish Lake-Dwellings,' and a few polishers of stone—all of which unmistakably indicate the medieval character of this curious structure. The quern, or hand-mill, was not known in Europe, either in the Stone or Bronze Age, and none prior to Roman times has been found in North Britain. The shale and slate images and weapons, the perforated stone-pendants, oyster-shells, and other objects, ornamented with cup-marks, concentric circles, &c., would be as much out of place as surviving remnants of the prehistoric civilisation of Scotland in Romano-British times, as they are now.

Pile-dwellings are still common in many parts of the world, as in the Gulf of Venezuela, in South America, and on the shores of nearly all the islands in the East Indies—Borneo, New Guinea, Celebes, &c. At Singapore I saw several pile-villages situated on the charming little bays which are to be met with in that neighbourhood. When the tide is full no more picturesque sight could be imagined than one of these villages, as may be seen from the accompanying photographic view of one of them. (Pl. XVIII.)