

## IV.

REPORT ON THE EXCAVATION OF PREHISTORIC PILE-STRUCTURES  
IN PITS IN WIGTOWNSHIRE. BY LUDOVIC MACLELLAN MANN,  
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SECTION I.—GENERAL DESCRIPTION OF THE SITES BEFORE  
AND DURING EXCAVATION.

I have to report the discovery, by Mr A. Beckett, of some early inhabited sites at Stoneykirk, Wigtownshire.

In carrying out the exploration, great assistance has been given by Mr Beckett. The co-operation of Mr J. Graham Callander, F.S.A. Scot., has been invaluable. Mr Callander repeatedly inspected the sites. Dr David Murray and Dr Joseph Anderson have been kind enough to read proofs of this Report and to make valuable suggestions. I have been so fortunate as to secure the services of Mr Fred. R. Coles, who has put the original sketches and plans into suitable form for the illustrations, and the assistance of Mr Robert A. M'Gilvray, Glasgow, who has made casts in plaster of some of the wood-work which bore traces of axe-work. I am indebted to Mr Richard M'Kay, Glasgow, who examined some of the wood charcoal recovered, and to Mr H. F. Tagg, Edinburgh, who has reported upon the nature of the wood used in the building of the pile-structures.

Mr Beckett's attention was attracted by a row of depressions on the surface of a wooded area. If there had been one depression only, probably no notice would have been taken of the place. The depressions, however, are five in number. Some of them were dug into, and discovered to be the tops of silted pits containing relics of an early period and substructures of wood. Before excavation they were shallow, basin-shaped, slightly oval in outline, but not very clearly defined and scarcely noticeable. The greatest depth at the centre of any one was about 1 foot, and the greatest area about 10 feet by 8 feet.

The sites as shown in the plan (fig. 1) are situated on the edge of a plateau. The ground has apparently never been cultivated, and is covered by wild vegetation consisting of a few small trees of different kinds and a growth of fern. The row of depressions almost coincides with the 50-foot contour line. The area enclosed by the contour line does not at any point rise more than 2 or 3 feet above the 50-foot elevation. The sea at its nearest point is just 1000 yards distant

south-east from the sites, and the intervening stretch of country is flat and low-lying. While portions of the surrounding country were once marshy, the ancient settlement being on the higher portion of the plantation could not have been surrounded by water or swamp, nor could it have been on the edge of a water-covered area.

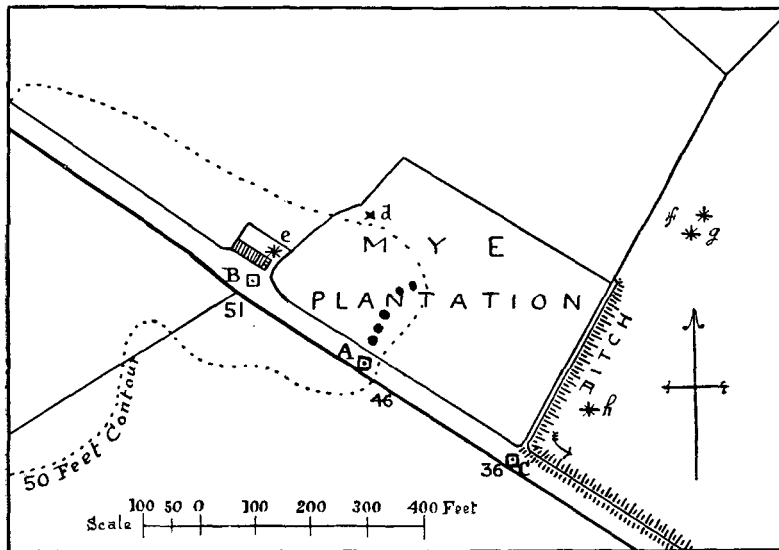


Fig. 1. Plan of the locality of the Piled Pits.

An enlarged plan showing the relative positions of the sites is given in fig. 2.

The sites have been numbered for convenience 1 to 5, beginning at the south-west end of the row. Only Nos. 1, 3, and 5 have been examined.

The row of depressions formed a slightly irregular crescent, with the concave side facing south-east. More exactly, a line from No. 1 to 3 (fig. 2) bore  $10^{\circ}$  south of south-west (mag.), and a line from 3 through 4 to 5 lay exactly north-east and south-west (mag.).

As shown in fig. 2, site No. 1 is 44 feet 2 inches from a point in the middle of the road marked A on the plan. The measurements taken

from the centre of one depression to that of its neighbour are:—No. 1 to No. 2, 16 feet; No. 2 to No. 3, 31 feet 8 inches; No. 3 to No. 4, 56 feet 7 inches; and No. 4 to No. 5, 19 feet. From A to B on the plan (fig. 1) is 226 feet, and from A to C is 324 feet.

The substructures revealed by the excavations at Sites Nos. 3 and 5 were oval in plan. The ovals had obtusely rounded ends; somewhat like rectangles with rounded corners.

The compass showed that in Site No. 1 the longer axis of the plan of the substructure bore  $30^\circ$  west of north; in Site No. 3,  $65^\circ$  west of

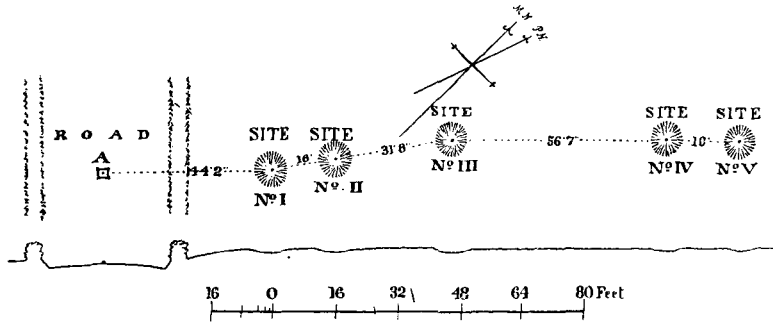


Fig. 2. Enlarged Plan of the sites of the Piled Pits.

north (or west north-west); and in Site No. 5,  $49^\circ$  west of north. The same trend—that is, north-west by south-east—seems to exist in the other and yet unexamined sites. For example, in No. 4 the longer axis appears to lie about  $18^\circ$  west of north.

#### THE EXCAVATION OF SITE NO. 3.

Dealing first with the excavation of Site No. 3, which proved to be the most important station, evidence was soon obtained that the depression on the surface was the top of a silted-up pit. The digging work consisted at the first stages in the extraction of the filled-in material, which was of dark vegetable matter mixed with a little sand.

The walls of the pit were not well defined, but in penetrating into them the soil was found to be more dense and almost entirely composed of sand.

The cutting revealed in the undisturbed soil round the pit a layer of superficial soil and leaf-mould which varied in thickness from about 1 to 2 feet ; below this was about  $1\frac{1}{2}$  feet of somewhat blackish, sandy, compact soil. Beneath this there was about 5 feet of hard sand, sometimes greyish and sometimes reddish-brown, which rested upon a deposit of about 6 inches of a wet mixture of blue clay and grey sand. The lowest bed was of wet tough blue clay of unascertained thickness. The reddish sand occurred in rather irregular patches, and its colour varied from a reddish-brown to a dark-brown. The deposit of superficial soil was found in various places which were tested throughout the plantation. It rests upon what seems to have been the surface of the ground at the time the sites were in use.

The material accumulated upon this prehistoric surface is not entirely of vegetable character, as it contains a very small quantity of sand. Probably a slight sprinkling of sand would be brought during gales from the sandy shore to the south, which would be caught by, and retained in, the coating of vegetation. A peculiarity in the stratification at the east side of the pit will be dealt with in the paragraph relating to supposed entrance passages.

In the pit at a depth of 7 feet were encountered the tops of spongy, much-decayed logs of round timber more or less vertically placed. Down to this depth in the digging the soil taken out was fairly dry and was largely vegetable mould. Water and sludge, however, began to ooze in at this depth, chiefly from the layer of mixed clay and sand. Well down in the silted material were got many chippings, cores, and implements of flint, and of other stones. Traces of a bed of charcoal containing fragments of pottery were also observed. After carefully working out the wet soil, which was still largely vegetable mould and was somewhat loosely deposited in the spaces between the logs—an arduous operation—the wooden substructure revealed itself more clearly. It was a longish oval in plan, and measured about 7 feet by  $4\frac{1}{2}$  feet. Traces of what was conjectured to be wattle-work occurred round the edges of the oval. Taking into account this marginal wood-work, the dimensions were about 9 feet by 7 feet.

At the north-west end of the substructure piles were placed in two somewhat irregular concentric rings which were in contact with each other. The piles of the inner ring slanted inwards and downwards, forming a hollow inverted cone. At the opposite end the piles occupied a somewhat circular space, but were upright. Connecting these two sets of circularly disposed piles were somewhat irregular parallel rows of logs. These pieces of timber, except at the periphery of the structure where they were perpendicularly set, had a bias inwards and downwards and in several cases towards the north-west end. The number of piles used was 72. Traces of what was thought to have been an entrance passage on the east side were observed.

#### THE EXCAVATION OF SITE NO. 5.

The excavation of Site No. 5 revealed features practically identical with those of Site No. 3, and strata of the subsoils were similar, but the traces of supposed flooring and wattle-work were indistinct. Several implements of stone and pieces of wood charcoal were recovered, but no vestiges of pottery were seen. At a depth of 7 feet moisture began to accumulate, and there was revealed a longish oval wooden substructure about  $7\frac{3}{4}$  feet by  $4\frac{1}{2}$  feet. The piles comprising the structure were in all respects similar to those found at Site No. 3, but were less tightly set together. At the north-west end they were disposed in a roughly circular manner in two concentric rings, the outer ring consisting of 15 and the inner ring of 12 stakes. The piles of the outer ring were almost all vertical, and were as a rule thicker than those of the inner ring. The members of the inner ring slanted inwards and downwards, forming an inverted hollow cone, the top inside diameter of which was 2 feet. The apex of the cone—that is, the point towards which the stakes of the ring converged—lay slightly to the south of the true centre of the circle.

One of the heaviest piles from this portion of the structure was 8 inches in thickness and 2 feet in length. Some of them, however, were 3 feet in length, but were of less diameter than 8 inches.

The other, or south-east, portion of the wood-work and the middle portion formed a structure somewhat platform-like in character, and about 4 feet in length by 4 feet in breadth. The angles at which the piles lay were noteworthy.

Close to the rings already described, and all round the edge of the structure, the piles were perpendicularly placed. Beyond the rings to the south-east, with these exceptions, the piles lay at various angles, their tops being towards the south-east end, and their feet or tips in the opposite direction.

This position was accentuated the further the piles were situated from the rings. Some pieces of the wood-work at the platform-like end of Site No. 3 may have been gradually pressed in the course of time from the original positions by the superincumbent material.

Several small twigs were found lying across the ring portion of the structure. These may have been remains of a collapsed roof or floor, or of wattle-work fallen from the walls of the pit.

The platform portion consisted of 28 piles. Adding to these the 27 comprising the rings, the total number of piles employed in this site was 55. Measuring from a point which was reckoned to be the present normal surface of the plantation, that is, from a point 1 foot higher than the centre of the surface of the depressed area, to the lowest point of the substructure was 9 feet 4 inches.

#### THE EXCAVATION OF SITE NO. 1.

This site differed materially only in one respect from its neighbours which have been described. The wooden substructure consisted of only 23 piles (fig. 4), and appeared to have been left half finished. The pit had been anciently excavated in the same style as the others, and was a longish, rather square-ended oval. The soil at the bottom of the half which contained no substructure was darker than the surrounding soil, and had evidently been disturbed at some time.

The piles were not so securely placed in the soil as at Site No. 3. They occupied the north-west end of the oval, and were bluntly cut at

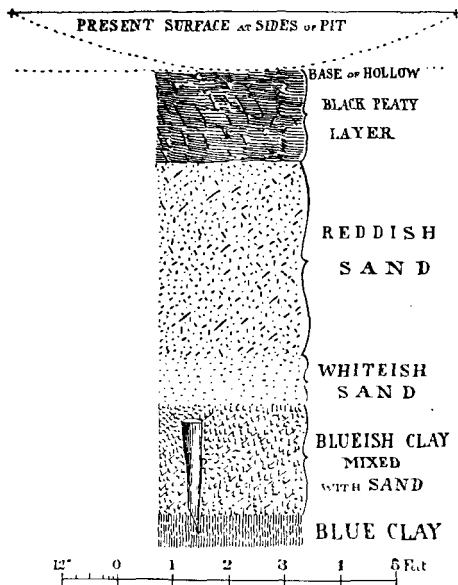


Fig. 3. Section of the subsoil of Pit No. 1.

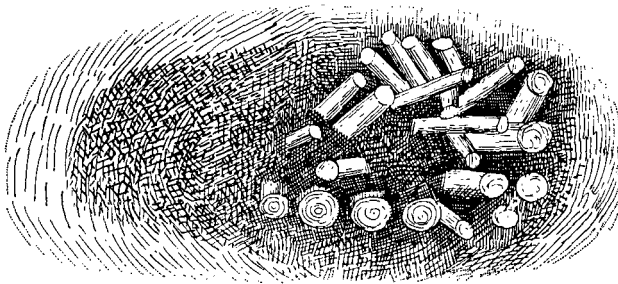


Fig. 4. Diagrammatic transverse section of Pit No. 1, showing positions of the piles.



the lower ends. At the west side of the structure they were less substantial than those at the east or opposite side, and were placed at various angles, while those at the east side were perpendicular. This site was drier than its neighbours, and the relics were scarce. The subsoils were much of the same character as those disclosed at the other sites.

#### SECTION II.—DETAILS OF THE RESULTS OF THE EXPLORATION, AND SUMMARIES.

Various kinds of timber were used, no doubt in an unseasoned condition, as the wood was probably placed in the structures not long after it had been cut. The fresh green appearance of the bark points to this conclusion. Moreover, old dried timber would not have given such a fine smooth uncracked surface as may be observed on the cut parts. The bark remained on the stems in many cases, and in the case of the birch wood it gave the timber a fresh and beautiful appearance.

The diameter of the piles was usually about 3 inches, but the diameters varied from 1 or 2 inches to 8 inches. Those of average diameter showed about 15 annual rings. The stems were usually straight and well grown. The wood had retained its shape, but was soft and spongy, and under pressure of the fingers gave way at once, exuding moisture.

It was not possible, owing to the decayed state of the timber, to ascertain at what time of the year the wood had been felled; in other words, whether it was Autumn or Spring felled—a piece of information which would have thrown light upon the question as to whether the structures were built at the beginning of the summer or of the winter season. Many of the logs in ancient pile-structures have a bias or lean, caused by long-continued pressure of the surrounding matter from above or from the side. Most of the Stoneykirk piles which were not perpendicular seemed, however, to have been originally set in a slanting position.

One of the most remarkable facts disclosed was that, in all the cases where the direction of the growth of the tree or branch was recognised, and this was detected in nearly every instance, the piles had been placed

upside down, or contrary to the direction in which the timber had grown. In other words, the top end of the branch had been pointed and dressed, and had been placed downwards in the clay. Now it is well understood that stakes inserted in the ground against the line of growth or "cap down," to use the technical term, last longer than those placed in the direction in which the timber has grown.

A knowledge of the obvious fact that the thinner end of a stake was more easily pointed than the thicker end, would not in this case be acted upon, for the simple reason that the logs were short and so finely grown that one end was not appreciably of less diameter than the other. Moreover, the craftsman had presumably to dress both ends of the logs, though the nature of the dressing at the upper ends is unknown, as the wood at the higher level has vanished by decay.

Again, the twigs and branches of the supposed wattle-work (described later), which required little, if any, sharpening, were also as a rule inserted upside down. It seems a fair inference that the inhabitants of Galloway at this early period had recognised a fact known to most present-day foresters and farmers—that stakes last longer when inserted in the ground upside down.

The piles seem to have been forced into the clay for only a short distance, but a great deal of the subsoil immediately above the clay must have been either dug out or loosened before they were inserted, as disturbed soil was found only a few inches above their lower ends. No pile point was recognised as having had the surface scratched. *Striae* would, of course, have been good evidence that the logs had been driven. The rarity of small pebbles and grit in the grey sand and clay may account for the absence of striation. Though the piles pierced the clay only a few inches, yet the substructure in each of the three explored stations was secure and immovable. This may be accounted for by the fact that each log was in contact with its immediate neighbour, and many were tightly jammed together. There was no packing of the piles by stones. The spaces between the rows had not been filled up, as the matter found there was quite loose, silted-in material largely of

a vegetable character—black mud and wet vegetable mould with an abundance of short lengths of small twigs. The outer surfaces of the logs round the periphery of the structure were in contact with the stiff blue clay and the mixture of sand and clay, which gave a steady support. These outside piles were nearly always perpendicular, except in the case of the west side of Site No. 1. The inner piles, on the other hand, were as a rule lying at an angle. At some places the structures were strengthened by running from the edge inwards rows of closely jammed piles, as at the south-east corner of Site No. 3. The result of this mode of construction would be a basis for a dry, solid, secure, but somewhat hollow flooring.

All the wood was round timber, no piece having been split, squared, or mortised—the sites thus differing from most other places from which anciently cut timber has been recorded. It was not observed that any charring of the wood had taken place before or after the preparation of the logs. The expedient of carbonising the outside of logs to assist the work of dressing them was presumably not practised, the cutting tool alone having been relied upon.

The logs which were allowed to be exposed to the air warped and cracked in the course of a few hours. Ten of them from Sites 1 and 3 were placed in water immediately after they had been dug out, and will be kept in a solution of alum and water until sufficiently “filled” to be able to retain their original shape in a dry environment.

By the favour of Professor Bayley Balfour, Mr H. F. Tagg, Museum Assistant in the Royal Botanic Gardens, Edinburgh, has kindly examined some of the logs, and reports that—

“Portions of seventeen separate logs have been examined, and of these seven prove to be birch, five are alder, and three are hazel. One of the pieces of wood submitted is either poplar or willow, I am not able to say which, and one small piece is oak. One is led to conclude that birch and alder were the timbers chiefly used in the formation of the pile-structure.

“Fungi and other putrefactive organisms have caused the partial dis-

solution of the wood elements, and this disintegration unfortunately renders it impossible to make deductions as to the time of year in which the timbers were felled."

The smoothness of the cut surfaces of the piles shows that the axe had a finely polished surface and a clean unbroken cutting edge. The impression on each facet of the cut areas being always similar in character, testifies that only one type of cutting tool has been used. The tool was probably fixed in a handle, as otherwise it could not have been wielded with sufficient force and swing to penetrate, as it has done, into the body of the wood. The facets are each of small area, and are all shallow concavities resembling the inner side of a flattish spoon. They are more numerous than would occur on surfaces of timber operated upon in modern times.

Three styles of cutting occur. There is the long acutely-pointed pile-end, cut away on all sides; and the obtusely ridged, the tool having been worked from two opposite sides until the portion of the log to be severed could be broken off at the ridge. The pile-end in this style has the outline of the roof of a house. The third kind of labouring was a cutting nearly straight across the log. The cut surfaces in all three styles show a large number of small ridges and facets, but this feature is specially prominent in the third class.

It is apparent that this ancient carpentry work has been carried out by means of a tool which had not been able to travel far at one stroke. When the tool was plied inwards and across the log, the length traversed at each blow was extremely small. Where knots have been encountered, there has been no slicing through the hard core, the tool having had to be worked round the knot. After this process the harder timber was wedged off, with the result that a good extent of the lower wood was splintered. There is occasionally a blunt "break off" at the place where the stroke has terminated, the tool when it ceased to penetrate having been used as a wedge, and pulled outwards or so manipulated that it left a splintered surface adjoining the cleanly cut area.

It would thus appear that there has been used an implement compara-

tively blunt, which possessed not one but two outwardly curving faces, the line of intersection of which formed a slightly curved edge. Now it is precisely this class of tool which is met with in the common polished stone axe.

It must not be overlooked, however, that the thick, socketed axe-head of bronze might leave somewhat similar markings. The bronze tool of this type would undoubtedly travel farther than the thicker stone axe, if for no other reason than that the metal tool, having a socketed handle, would be assisted (certainly in no way impeded) by such attachment, while the stone axe might be hindered from any long sweeping action by the necessarily bulging hafting with which the middle of the axe-head must have been covered.

Plaster casts of the 10 pile-ends before referred to have been made. Photographs of eight of the casts are reproduced in fig. 5. A cast has also been taken of a bar of soap which has been sharpened at one end by a locally found stone axe-head simply held in the hand. A photograph of the cast of the bar of soap thus experimented upon is shown on the right-hand side in fig. 6. If this representation is compared with fig. 5, the aspect of the cuttings, ancient and modern, would seem to be identical.

A photograph of a cast of a bar of soap sliced with a thin flat axe of bronze which has a curved cutting edge (found in Wigtonshire) is shown on the left-hand side in fig. 6, and exhibits facets of an entirely different character.

The curved hollow adze (which occurs in iron) would give a much longer stroke than even the bulging bronze instrument, and would not leave such decidedly spoon-shaped impressions upon the wood as have been referred to. The bulging bronze axe has not to my knowledge been found in the neighbourhood, whereas many specimens of the type of stone axe described have been found there during the last twenty years.

As the same type of markings would have been left on the timber whether the axe were wielded radially or otherwise—that is, as an adze or as a hatchet—we have no clue as to the position of the handle relative to that of the blade.





Fig. 5. Casts of Pile-ends from the Piled Pits at Stoneykirk.



An inspection of the axe-work on the set of pile-ends which have been preserved, from Sites 1 and 3, shows that the axe has always been made to strike along the line of the length of the log. The breadth of the facets at the widest, it is further seen, does not exceed 2 inches.

It may be mentioned that the stone axe-head used to cut the bar of soap imprints facets not more than 2 inches wide. In this axe-head



Fig. 6. Casts of two Bars of Soap, one (to the left) cut with a bronze axe, and the other (to the right) cut with a stone axe.

the lengths across and round the cutting edge are respectively  $2\frac{1}{2}$  and  $2\frac{3}{4}$  inches.

These pile-ends embrace squarely cut ends and specimens of both the acutely pointed and the obtuse or roof-shaped end. The ridge in the last mentioned type is seldom centrally placed.

In the case of a log of the roof-shaped type,  $4\frac{1}{2}$  inches in diameter, but the ridge of which is centrally placed, there are traces of  $15^\circ$  facets

in the cut surface. The ridge does not run horizontally, and measures  $7\frac{1}{2}$  inches in length. In another pile-end,  $3\frac{1}{2}$  inches thick, there are marks of 5 cuts in a length of  $3\frac{3}{4}$  inches; and in another specimen,  $4\frac{1}{2}$  inches in diameter, on an oval area,  $4\frac{1}{2}$  inches by  $3\frac{3}{4}$  inches, 8 facets may be seen. Seven facets can be detected in a length of 4 inches on the cut surface of another pile 3 inches thick.

Some typical and instructive specimens of acutely pointed pile-ends have been secured. On one log, 3 facets which touch each other like links in a chain show that the blade has travelled against the wood during three successive blows at least 4,  $2\frac{3}{4}$ , and 4 inches at the first, second, and third strokes respectively. The length of each excision is comparatively great, but the cutting is shallow, the blade having been driven along just under the bark. On one of the acutely pointed logs there is an area 7 inches by 2 inches showing 10 cuts. The cut areas on some of these acutely pointed logs exhibit very clearly a succession of concavities and ridges resembling a "choppy" agitated sheet of water—a feature which characterises the carpentry work found on the sites. The sharpening extends in the cases of 2 piles a distance of 14 inches from the point, but the distance varies some inches on different sides of the same log. Indeed, the irregularity of the work and the lop-sidedness of the pointed ends are noteworthy.

It seems undeniable that the balance of the probabilities lies in favour of a smoothly ground and hafted stone axe with a convex edge having been used.

Prehistoric relics of wood are rare. They are often too much decayed to be of value in throwing light on ancient carpentry work. The objects, moreover, are usually allowed to dry up and get out of shape, which ancient moist timber does shortly after it becomes exposed to the air. The consequence is that references to the character of hatchet-work on anciently cut timber are not frequent. The marks of the axe roughly wielded on logs are perhaps more instructive as to the nature and manipulation of the blade used than the more delicate chipping-work on axe handles and utensils of timber. In the latter



class of work, the areas both of the facets and the cut surfaces are small, and in some instances the facets have disappeared through wear, or from the scraping and smoothing process which was at times applied as a finishing operation.

The following review of the few recorded descriptions of Prehistoric Axe-Work on Wood will make it apparent that from the aspect of the imprints of the cutting instrument much may be learned as to the nature of the tool used and the period of the relic:—

One ancient fragment of timber is described (*vide* Item I. in the annexed Table of References to Prehistoric Axe-Marks) as “sculptured into a series of projections and incisions, clearly showing that they have been made by the strokes of a hatchet of small power, doubtless of a stone celt.”

Again, a pile (Item II. in Table) is mentioned as having about 5 feet of its length “sloped into a point in a very regular manner; the blows of the celt or hatchet followed each other in the same direction, producing facets running nearly all along the point almost exactly in the same planes. The workmen evidently were clever carpenters. The facets are not more than  $1\frac{1}{2}$  inch wide. . . . The workmanship of the piles of the lake-dwelling at Moosedorf of the Stone Age is altogether different and much rougher, for every blow of the hatchet is on a different plane, and there is no appearance of any regular facets. The piles of the Bronze Age at La Crasaz are so regularly worked, that one would imagine they had been made, not by the bronze celt or hatchet, but by a strong steel tool used with both hands. The difference of the hatchet-work on the points of the piles of the Stone and the Bronze Age is as great as that between the point of a pencil cut by a child and one cut by a grown person with a firm hand and accustomed to the work.” In the case of another log (Item III.), “the tool used for sharpening it must have had a curved edge, for every cut had left a slight hollow.”

In another instance it is stated (Item IV.) that “the holes . . . prove that an instrument with a curved edge must have been used to cut them.”

The students of the relics from the Swiss Lake Dwellings state that not only can they discern whether the cutting has been done by a stone or a metal tool, but mention (Keller's 2nd English edition, vol. i. pp. 297-300) that the imprints of more than one type of bronze axe can be distinguished.

Turning from the Swiss remains, it is found that wooden axe handles discovered in the peat bogs of Denmark furnish two instances of the description of ancient axe-work of the later Stone Age of that country.

One handle (Item V.) is referred to as having been cut in parallel and longitudinal facets. The blows were dealt dexterously but obliquely, the *striae* indicating a somewhat notched cutting edge. Similar craftsmanship is exhibited on another handle (Item VI.).

From England and Ireland, like the Continent of Europe, the records are meagre. In a Cumberland axe handle (Item VII.) the whole surface “has been cut by repeated blows of a cutting instrument, showing cuts and ridges

$\frac{1}{8}$  inch apart in small concave facets. Between the celt and the hand these are arranged in a spiral manner round the wood, perhaps while turning the wood in the hand during the process of finishing."

Another example of carpentry from the same place (Item VIII.) shows a portion of the surface "carefully chiselled by successive long and short cuts with a sharp stone tool." A cut surface (Item IX.) is "neatly shaped with ten uniform straight longitudinal facets."

The famous Log House, discovered under many feet of peat in Donegal in 1833, is carefully described by Captain Mudge (Item X.). "The mortises were very roughly cut, as if they had been made with a kind of blunt instrument, the wood being more bruised than cut; and it may be inferred that a stone chisel, which was found lying on the floor of the house, was the identical tool by which the mortises were made. . . . The chisel is ground and polished. . . . By comparing the chisel with the cuts and marks of the tool used in forming the mortises and grooves, I found it to correspond exactly with them, even to the slight curved surface of the chisel; but the logs have evidently been hewn with a larger instrument in the shape of an axe, which I have no doubt was also of stone, as the marks, though larger than those the chisel would have made, are of the same character, being rather hollow and small cuts, and not presenting the smooth flat surface produced by our common iron axe."

During the thirty years' discussion in Danish archæological circles as to the division of the Premetallic Period of Denmark into two divisions—that of the Shell Mounds and of the Megalithic Monuments—one of the principal objections to the theory of Worsaae has always been that the simply flaked flint blades, characteristic of the earlier or Shell Mound Age, could not have been employed as hatchets, like the later polished stone axes.

The experiments of Mr G. V. Smith show, however, that green pine wood—which was common in Denmark during the earlier period—could easily and quickly be dressed to almost any shape by the primitive flaked flint blade hafted as in the ancient style.

The photographs accompanying the account of Mr Smith's experiments<sup>1</sup> show facets such as might be expected from the nature of the tool. The cuts are not of spoon-shaped form, and can be distinguished from those produced by the polished stone axe with curved edge which came into use at a later period.

<sup>1</sup> *Aarbogger*, 1891, pp. 383-396; and *Mém. de la Soc. des Ant. du Nord*, 1890-95, pp. 99-110.

TABLE OF REFERENCES MADE IN THE TEXT TO PREHISTORIC AXE-MARKS.

Item.	Locality.	Nature and Supposed Age of Relic.	Reference.
I.	Robenhausen, Lake of Pfaeffikon.	Fragment of an Implement of Oakwood—Premetallic.	Keller's <i>Lake Dwellings</i> , English (2nd) ed., vol. i. p. 55, and figured vol. ii. pl. xiii. fig. 2.
II.	Le Crasaz, Lake of Neuchâtel.	Log from Pile-structure—Bronze Age.	<i>Ib.</i> , vol. i. p. 264.
III.	Peat Moor of Mercurago, Arona.	Log from Pile-structure—Early Bronze Age.	<i>Ib.</i> , vol. i. p. 349.
IV.	Peat Moor of Mercurago, Arona.	Wooden Wheel — Early Bronze Age.	<i>Ib.</i> , vol. i. p. 351, and figured vol. ii. pl. ex. fig. 19.
V.	Peat Bog, Sigerslev, Zealand, Denmark.	Flint Axe-head in Ashwood Handle —Premetallic.	<i>Aarboeger for Nordisk Oldkyndighed og Historie</i> , 1898, pp. 125-158; and <i>Mém. de la Soc. des Ant. du Nord</i> , 1898, p. 171.
VI.	Peat Bog, Storemose, Gjentofte, Zealand, Denmark.	Stone Axe-head in Handle of Birchwood—Premetallic.	<i>Aarboeger for Nordisk Oldkyndighed og Historie</i> , 1898, pp. 125-158; and <i>Mém. de la Soc. des Ant. du Nord</i> , 1898, p. 178.
VII.	Tarn near Egremont, Cumberland.	Stone Axe-head in Handle of Beechwood—Neolithic or Bronze Age.	<i>Archaeologia</i> , vol. xlv. pl. viii. fig. 3.; and Evans' <i>Ancient Stone Implements</i> , 2nd ed., p. 153.
VIII.	Tarn near Egremont, Cumberland.	Club of Beechwood—Neolithic or Bronze Age.	<i>Archaeologia</i> , vol. xlv. p. 288, and beautifully figured, pl. ix. fig. 1.
IX.	Tarn near Egremont, Cumberland.	Fragment of Handle-end of Wooden Shaft or Club — Neolithic or Bronze Age.	<i>Archaeologia</i> , vol. xlv. p. 289.
X.	Peat Bog at Drumkelin, Donegal.	Timber used in a Peat-submerged Loghouse—Before the Christian Era.	<i>Archaeologia</i> , vol. xxvi. p. 363; and Wilde's <i>Catalogue</i> , p. 235.

From the study of these instances of Prehistoric Axe-Work it becomes clear that not only can the type of bronze instrument employed be discerned, but the kind of stone axe and the size of the tool may be determined with some exactness.

POTTERY.

As already mentioned, vestiges of pottery were observed at Site No. 3 only. The fragments are in a poor condition, and are portions of hand-made, non-glazed vessels of darkish coarse paste. The paste has been

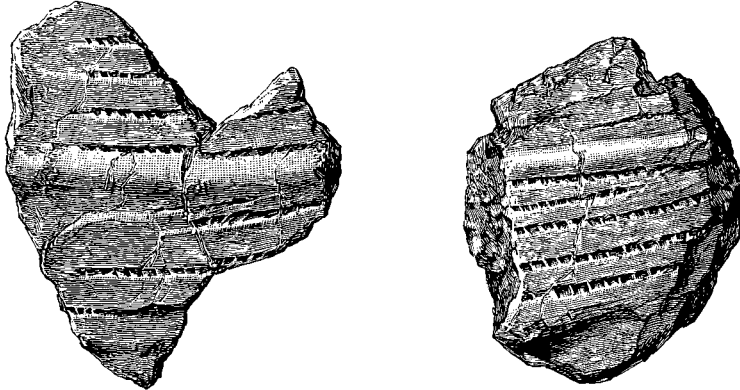


Fig. 7. Fragments of Pottery from north end of Site No. 3. (Scale  $\frac{3}{8}$ .)

mixed with pounded-up fragments of some whitish sandy stone. When extracted, the pieces were scarcely recognisable as pottery, being coated with soil; but after slow natural drying the crust of soil was picked off, and by the application of a soft brush the particles of charcoal, loam, and sand which filled the interstices were got rid of, disclosing the original skin of the ware. The ornamentation upon the skin is quite distinct. The fragments consist of more than one set, representing more than one vessel. One set was found at the north end, and the other at the south end.

*North End.*—So far as can be guessed from the appearance of the few fragments, the feature of the vessel (or vessels) from the north end (fig. 7) was that the pottery had rounded, plain, raised ridges of varying breadth which ran, more or less parallel, horizontally round the exterior of the ware. The walls were  $\frac{1}{8}$  inch in thickness, and where mouldings occur the thickness was about  $\frac{1}{8}$  inch greater. The average breadth of the mouldings was about  $\frac{1}{8}$  inch. The intervening space between the ridges varied from 1 to 2 inches, and had (lying approximately parallel to the mouldings) rows of little closely-set, indented, squarish punctulations, impressed as with a comb-shaped implement before

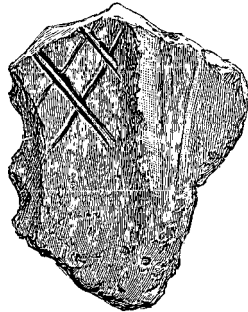


Fig. 8. Fragment of Pottery from north end of Site No. 3. (Scale  $\frac{2}{3}$ .)

the clay was fired, and resembling the surface-work on some modern granolithic pavements. It is probable that the number of these rows in a panel varied from one to four, and some of the intervening panels may have been quite plain. In one panel where the rows are absent plain lines have been incised diagonally and across each other. The curvature of one piece indicates an inside diameter at the rim of about 8 inches. Another small fragment (fig. 8), ornamented with parallel lines crossing each other diagonally, has a ridge on the exterior apparently running vertically.

Neither the style of the rim nor the shape of the base can be determined from the recovered fragments.

*South End.*—The pieces from this end (fig. 9) show the presence of similar lines of small, closely-set, squarish indentations as if made by the

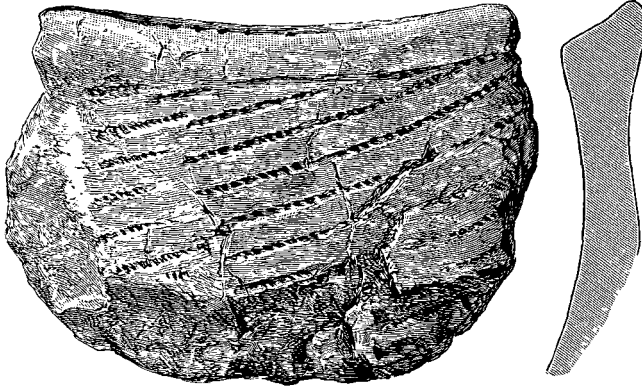


Fig. 9. Fragment of Pottery from south end of Site No. 3, showing rim and exterior ornamentation. (Scale  $\frac{2}{3}$ .)

teeth of a comb-like implement, but the system of decorating by raised ridges has not been adopted. The lines have been set more or less parallel

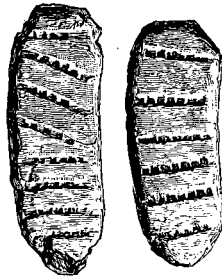


Fig. 10. Two portions of rim of Vessel from south end of Site No. 3, showing ornamentation on the bevel of the rim. (Scale  $\frac{2}{3}$ .)

to each other, and diagonally to the horizontal lip of the vessel. Fortunately in this group of fragments some portions of the rim were recovered. The rim was about  $\frac{3}{4}$  inch broad with an inwardly slanting bevel, and

was ornamented by the same kind of rows of small indentations. The rows on the rim were arranged almost parallel to each other, at right angles to the edge, and equidistantly about four rows in the space of an inch. The thickness of the sides decreased from 1 inch at the rim to  $\frac{1}{2}$  inch at a point about 2 inches down. This and other rim portions (fig. 10) betray an affinity in shape and ornamentation to the type of rim to be seen in some of the vessels of the Scottish Stone Age. The interior surface of the pieces is unadorned. The curvature shows an inside diameter at the rim of about 8 inches. The shape of the lower portion of the vessels is not determinable.

Eleven fragments are not illustrated, being too much wasted for useful description.

#### OBJECTS OF FLINT.

*Site No. 1.*—Only two pieces of flint were got at this site. They are ordinary flakes.

*Site No. 5.*—From this place were obtained two nodules slightly chipped, half of a nodule from which three flakes have been struck, and two roughly fractured fragments.

*Site No. 3.*—This site yielded a profusion of flint relics, over 230 fragments, nearly all simple chips, having been recovered. While flint may not have been wrought at the other sites, it is clearly proved that this industry was carried on at No. 3. The best evidence of this is the presence of minute chippings. Some of these small flakes measure not more than  $\frac{1}{4}$  inch in extreme length. Some of the smaller as well as the larger flint fragments have been fractured.

There are several flint nodules, entire and showing no chipping. They may have been portion of a stock of the raw material brought into the settlement. Other nodules have lost only one or two flakes. These are of a somewhat irregular and awkward shape, and were probably discarded as unsuitable after one or more blows had been struck, or less probably they were lost before they were finished with. Two

nodules of this type, respectively  $1\frac{1}{4}$  and  $1\frac{1}{2}$  inches in height, are shown in fig. 11.

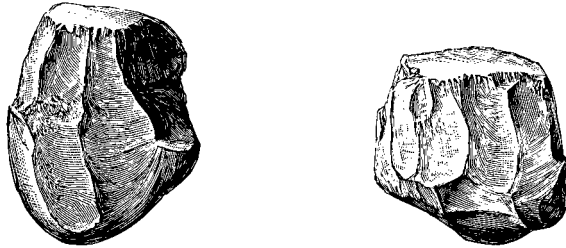


Fig. 11. Nodules of Flint showing flaking from Site No. 3. (Scale  $\frac{3}{4}$ .)

Some complete cores were found denuded of their original surface on all sides. Two small regularly formed cores, each only 1 inch in height, are shown in fig. 12.

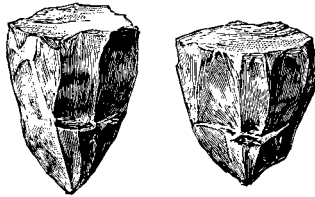


Fig. 12. Cores of Flint from Site No. 3. (Scale  $\frac{3}{4}$ .)

Six small scrapers were found. They are oval, and in each specimen one of the long edges has been secondarily wrought. Two of these are shown in fig. 13.

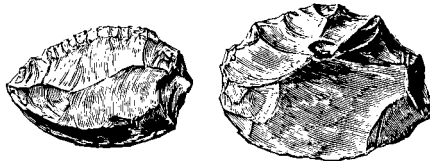


Fig. 13. Small Flint Scrapers from Site No. 3. (Scale  $\frac{3}{4}$ .)

The most interesting find in flint is a massive horseshoe-shaped, tortoise-backed scraper of bluish-grey flint (two views of which are



shown in fig. 14),  $2\frac{3}{4}$  inches in length by 2 inches in breadth, and  $1\frac{1}{8}$  inches in thickness in the centre. The surface of one face is smooth, unridged and without the bulb of percussion, and indicates that it has been made from a broad flat flake. The other face retains nearly 2 square inches of the crust or original skin of the nodule. The sides, as well as the semicircular bevelled scraping edge, have been carefully trimmed, and the secondarily wrought periphery measures  $4\frac{7}{8}$  inches in length. The outline of the tool is symmetrical, the sides being so

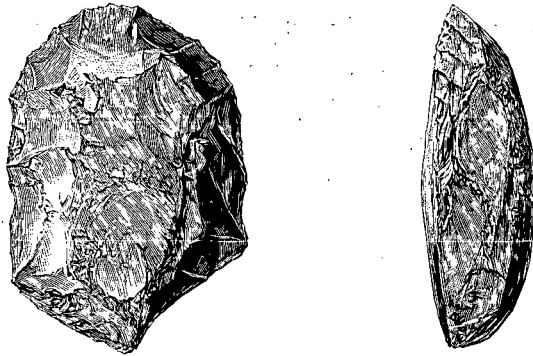


Fig. 14. Flint Scraper from Site No. 3, back and side views. (Scale  $\frac{3}{8}$ .)

trimmed that they run parallel for a considerable distance before they round off to form the semicircular end.

Most of the flaked surfaces of the flints have a greyish-white patina.

It is interesting to note that very small cores (indicating the fabrication of minute flint flakes and utensils) have been found in close association with a very large flint scraper.

#### OBJECTS OF STONE OTHER THAN FLINT FROM NO. 1.

Fragment, comprising about one half, of a grey, coarse-grained quartzite pebble which has been used as an anvil-stone, probably before it was

broken. A hollow has been worn by use on each of the four sides. The dimensions are  $2\frac{1}{4}$  inches by  $1\frac{3}{4}$  inches by  $1\frac{3}{4}$  inches.

Flattish oval anvil-stone of greywacke. One end is broken off. Near the centre of each of the two flat faces is a small artificially roughened area. The dimensions are  $5\frac{1}{2}$  inches by  $4\frac{1}{16}$  inches by  $1\frac{1}{2}$  inches.

Portion of a flattish oval pebble of dark-coloured stone. The narrower end has been abraded by its employment as a hammer-stone. The length is  $2\frac{3}{4}$  inches, the greatest breadth 2 inches, and the greatest thickness  $1\frac{1}{8}$  inches.

#### OBJECTS OF STONE OTHER THAN FLINT FROM SITE NO. 3.

A finger-shaped, smooth, greyish pebble with end broken,  $2\frac{1}{2}$  inches by 1 inch by  $1\frac{1}{2}$  inches. It has served as either a hammer-stone or an anvil-stone, as there is a small abraded area on the surface of one side near the intact end.

Flattish pebble,  $2\frac{1}{4}$  inches long, of dark quartzite, with four corners abraded by use.

Oblong, flat, close-grained, waterworn sandstone pebble,  $4\frac{1}{2}$  inches by  $3\frac{1}{4}$  inches by 1 inch, with roughened surface at two ends, three very smoothly-ground facets at different edges, and a smooth, somewhat concave surface on one of the flat faces.

Fragment of a rubbing-stone of sandstone, 5 inches by  $4\frac{1}{2}$  inches by 2 inches, with smooth concave face.

Flattish pear-shaped pebble of greywacke, 8 inches by  $3\frac{3}{4}$  inches by 1 inch, one entire side ground perfectly flat.

Long thick pebble of very hard greenish sandstone,  $6\frac{1}{4}$  inches by  $3\frac{1}{4}$  inches by  $2\frac{3}{4}$  inches, both ends very much worn and fractured by use as a pounder or pestle. Portions of the sides have been knocked away.

Four complete white quartz pebbles, all bearing traces of use as hammer-stones, viz. :—a roundish stone, 2 inches thick, with two portions of the surface worn hollow ; a longish irregular stone,  $2\frac{1}{4}$  inches in length, two ends of which are similarly worn ; a flattish egg-shaped stone,  $2\frac{1}{4}$  inches in length, one end of which is very slightly abraded ;

and a small pear-shaped stone (fig. 15),  $1\frac{1}{2}$  inches in length, the narrow end of which is abraded.

Irregular pear-shaped pebble of quartz, 3 inches by 3 inches by  $2\frac{1}{4}$  inches, the apex abraded by use.

Two fragments of white quartz; one piece, 2 inches in length, shows a portion of a deep hollow worn on each of two of the sides by use of the original pebble when complete; the other piece,  $1\frac{3}{4}$  inches in length, possibly part of the same pebble, shows a portion of a similar hollow on one side.

Rectangular fragment, about 4 inches by 4 inches by  $2\frac{1}{2}$  inches, of a stone which has been used for some grinding purpose, as one face is ground concave.

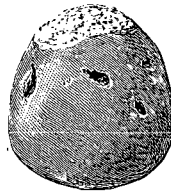


Fig. 15. Small Quartz Pebble with abraded end from Site No. 3. (Scale  $\frac{2}{3}$ .)

Long, somewhat irregular stone, 8 inches by 4 inches by 6 inches. One end is much abraded, and shows the stone has been used as a pounder or pestle.

Small, flattish, oval, waterworn pebble of sandstone, about 2 inches by  $1\frac{1}{2}$  inches by  $1\frac{1}{4}$  inches, pitted on the two flat faces by use either as an anvil-stone or hammer-stone.

Flattish, somewhat irregularly-shaped stone, 10 inches by 7 inches by 3 inches. The surface of one of the flat sides is very smooth—so smooth as to suggest that it has been ground to a fine and even surface, and consists of two different facets, the plane of each differing slightly. The stone has probably been used in some rubbing or polishing process.

Flattish egg-shaped pebble of hard brownish-grey sandstone,  $2\frac{1}{4}$  inches long. Two of the flat faces have been abraded by use.

## OBJECTS OF STONE OTHER THAN FLINT FROM SITE No. 5.

At Site No. 5 a large number of white quartz pebbles averaging about the size of a marble were found in eight nests or pockets round the margin at the south-east end of the pit and above the wood-work. They seemed to have been gathered and deposited by human agency.

The other objects of stone recovered at this site are as follows:—

Flattish round pebble of very tough whitish quartzose sandstone,  $1\frac{1}{2}$  inches in thickness and  $2\frac{1}{2}$  inches in breadth, the most of the periphery

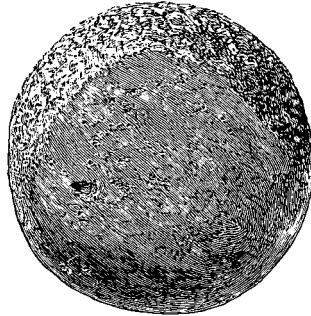


Fig. 16. Flattish circular Pebble of Quartzose Sandstone, with the periphery abraded by use. (Scale  $\frac{3}{8}$ .)

much worn away by use as a hammer. It is shown in fig. 16.

Another pebble of the same shape, but of quartzite, with periphery abraded in two places by use as a hammer-stone.

A large flattish oval pebble of greywacke,  $9\frac{1}{2}$  inches in length by  $6\frac{1}{2}$  inches in breadth, and  $3\frac{1}{2}$  inches in thickness, with a small roughly chipped-out area in the centre of one of the flat faces. The markings on this face seem to show that the stone, when this side was uppermost, has been used as an anvil. Nearly the whole of the surface on the opposite side has been artificially roughened over a well-defined area by

means of some picking-out process. The punctulations run into one another, and are evenly distributed and shallow.

A representation of this side is given from a photograph in fig. 17.

In the National Scottish Collection is a stone of the same shape, 8 inches in length,  $4\frac{1}{2}$  inches in breadth, and  $2\frac{3}{4}$  inches in thickness, with one side roughened in the identical manner, but with the opposite

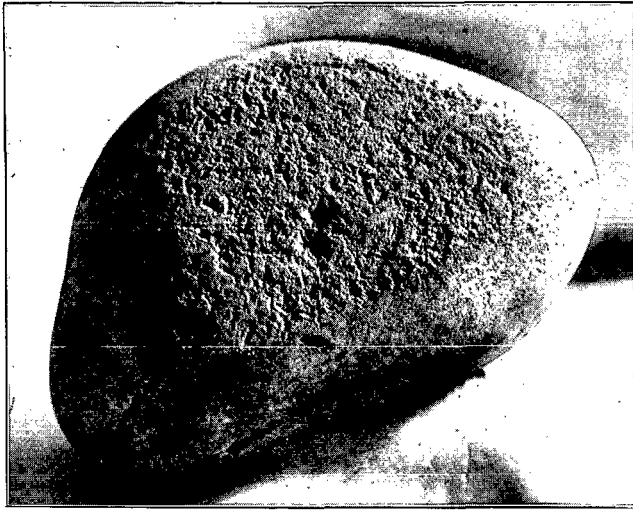


Fig. 17. Flattish oval Pebble of Greywacke with an artificially roughened surface. (Scale  $\frac{1}{4}$ .)

face plain. It was found some years ago within a mile or two of the sites under description. No associated objects have been recorded.

In the writer's collection is a third stone of this type, recently discovered at Lodney in the same district. It is, like the others, an oval, flattish, water-worn stone. It measures  $6\frac{1}{2}$  inches by  $4\frac{3}{4}$  inches by  $1\frac{3}{4}$  inches, and is of hard sandstone. A flake has been struck from one end. Practically its entire surface bears traces of shallow punctulations. On the periphery the markings are fine and minute. On each face closely-set pittings somewhat more pronounced occupy a well-defined area. One

face appears as if it had been used in some grating or smoothing operation, as the roughened surface is slightly worn. This rare type of stone implement, now for the first time dealt with, has fortunately in two out of the three cases been found in association with other relics. The specimen got at Lodney was in apparently close association with charcoal, sand discoloured by fire, some broken flints, several flint scrapers of ordinary size, some complete flint nodules, fire-fractured stones, and with fragments of a somewhat thick hand-made vessel of black coarse ware, the surface of which was decorated by the use of some blunt-pointed tool impressed before the clay was fired.

These deposits were situated about 17 feet 4 inches distant from the middle of a human skeleton, and to the south-south-west, or, more exactly,  $35^{\circ}$  west of south (mag.). The skeleton was in a state of extreme decay and was that of an adult, and was uncistid, unburned, and extended. The skull fragments and the lines of the limbs were recognisable, but on being fingered the remains went into powder. The head lay to the south, and the longer axis of the body bore  $20^{\circ}$  east of north (mag.). The half of a bead of what was thought to be some hard wood was got about 2 feet from the body.

At a point 39 feet from the middle of the body to the south-south-east, or, more exactly,  $10^{\circ}$  east of south (mag.), was found a small fragment of a hand-made vessel of black ware, the wall of which was about  $\frac{1}{8}$  inch thick.

Twenty-one feet from the middle of the body to the south-south-east, or, more exactly, in a direction  $35^{\circ}$  east of south (mag.), the half of a perforated flattish oval stone of red sandstone was found. The fragment, which has been broken at the perforation, is  $2\frac{1}{2}$  inches in breadth, 2 inches in length, and  $\frac{3}{4}$  inch in thickness. The perforation had narrowed towards the interior from each face, and had a diameter which varied from  $\frac{1}{2}$  inch to 2 inches. No particles of cremated bones were anywhere noticed.

During the Bronze Age extended burials were rare. Not one appears to have been recorded from Scotland, while very few have been found in

England.<sup>1</sup> The Lodney burial is therefore not likely to be of the Bronze Age. Judging from the apparently associated relics, it cannot, without much difficulty, be assigned to the Early Iron Age. It is thus to be inferred that the burial took place during some premetallic stage of culture, an inference which leads to the belief that the 'grating' stones, three specimens of which have been described, and the Stoneykirk piled pits, may belong to the Stone Age.

#### OTHER RELICS OF STONE.

Very few stones were got on any of the sites. Any which were not quite clearly implements almost invariably showed scratchings, traces of rubbing, or were fractured. These are not described, and would not perhaps have attracted attention unless they had been found at an anciently inhabited place. Some perhaps should, however, be referred to.

At Site No. 5 was found a flattish, oval, water-worn pebble of hard sandstone,  $3\frac{1}{2}$  inches by 2 inches by 1 inch. One of the flat sides is covered by shallow scratchings. The *striae* are in two sets. The component *striae* of a set are parallel to themselves; but the two sets, which cover different portions of the surface, run at slightly differing angles, and both are obliquely placed to the longer axis of the pebble.

Another stone from No. 5, whether humanly wrought or not it is difficult to say, is a symmetrical fragment of a white quartz pebble in the form of a flattish cone  $1\frac{1}{3}$  inches high. The base is the natural water-worn convex surface of the pebble, and is  $1\frac{1}{2}$  inches in diameter. The other surfaces of the cone are rough.

No search has yet been made for a refuse heap. Possibly one may exist, but no remains of food refuse have so far been met with. Many of the stones, but none of the implements, have been acted upon by fire.

A few flint scrapers of ordinary type have been found in the garden at the cottage shown at *e* on the plan (fig. 1), and several grinding and

<sup>1</sup> The Hon. John Abercromby refers to this subject in the *P.S.A. Scot.*, vol. xii., 3rd series, p. 201.

polishing stones, some of peculiar types, have been picked up in the field to the east of the plantation at *f*, *g*, and *h*.

The following TABLE OF THE WORKED OBJECTS FOUND IN THE PITS brings into prominence the importance of Site No. 3.

Site . . . . .	No. 1.	No. 3.	No. 5.
Number of Logs in Substructure . . . . .	23	72	55
Implements of Flint . . . . .	...	7	...
Nodules, Cores, and Chippings of Flint . . . . .	2	over 230	5
Implements of other Stone, fragmentary or whole . . . . .	3	18	3
Pottery . . . . .	...	Pieces of several vessels	...

SECTION III.—INFERENCES AND CONCLUSIONS.

By considering all the purposes for which it might appear possible that these places have been constructed, the probabilities of the case may be arrived at. There is no trace of any interments having taken place in them; and it is not a feature of early graves that they are marked by a *hollow* on the surface. A barrow at Ganton Wold,<sup>1</sup> examined by Canon Greenwell, covered a cist made of planks, which contained an inhumed burial, and was supported on eleven stakes, but is not analogous to the sites under discussion. There is no evidence that these places have been graves. It is improbable that they have been refuse pits. They were apparently not holes such as were excavated during early times for the extraction of clay for pottery-making, or such as were mined in the chalk districts of England and France to obtain flint nodules and chalk. The under-structures of timber appear to put all these suggestions out of court. Flint nodules, moreover, do not occur in this particular forma-

<sup>1</sup> *British Barrows*, p. 170.



tion, but are to be found not far distant, and in various other parts of Western Wigtownshire, but only in the stratified gravels, at points from 30 to 200 feet above sea-level.

If the sites have been wells, why should there be more than one, and why hearths? If they have been pitfalls to entrap wild animals, or shelters for huntsmen, or if they have merely been stores or crematories, how account for the presence of workshop utensils?

More probably they have served as workshops of some kind, and certainly for some grinding and polishing operations and the manufacture of flint implements. They may have been cooking places also.

While probably stores, workshops, and cooking places, these curious sites, bearing traces of human activity and distinct domestic associations, may, nevertheless, have been dwellings, or cellars beneath dwellings.

The theory, then, of dwellings is by far the most plausible. From the dimensions of the places it may be that they were more in the nature of shelters or sleeping places than dwellings in the modern sense.

#### FLOORING.

At each end of Site No. 3 traces of what was supposed to be flooring were noticed. It was at these points only that the fragments of pottery were obtained. No doubt any pottery on other and central portions of the floor would be carried down to the lower and very much wetter layer on the collapse of the floor, and the ware, being soft and non-glazed, would soon resolve itself into its original clay and pounded pebbles. At the south end a portion of a layer of charcoal about 2 inches thick was associated with the fragments of pottery.

Mr Richard M'Kay has kindly examined some pieces of the charcoal microscopically, and reports that it is of coniferous wood, probably pine.

The heavier stone utensils were found at all the sites lying far down between the piles. They had perhaps once rested on the floor, and as the floor decayed they had fallen through it into the lower zone.

The layer of charcoal and the pottery bed on the end margin of No. 3 gave a valuable clue as to the height of the flooring relative to the pre-

historic surface and to the level at which the tops of the piles appeared during the examination of the site.

Assuming, as may quite safely be done, a floor 6 inches thick and a layer of charcoal 2 inches in depth, the floor level must have been between  $1\frac{1}{2}$  feet and 2 feet above the tops of the piles—that is, the tops as discovered in the diggings.

This indicates that owing to the comparative dryness of the layer immediately underneath the flooring, the timber in that zone had so decayed as to be unrecognisable among the silted and other vegetable matter.

In other words, the logs as extracted had 18 to 24 inches of their top portions decayed.

The perishing of the timber of the flooring, and the wood immediately beneath the flooring, would set in no doubt rapidly after desertion of the settlement, owing to the comparative dryness and openness of the soil in that part. But this did not take place in the still lower zones, where the wetness, the presence of clay, and the depth from the surface would all tend practically to seal hermetically the contents, thus ensuring the preservation of the shape and contour of all the pieces of timber.

#### SUPPOSED WATTLE-WORK AT SITE NO. 3.

Round the walls of the pit at No. 3 Site, on the margin of the area in which the piles occurred, and imbedded in the sand and clay, were found twigs and small branches, some set vertically and others at angles. Some modern tree-roots were encountered, but were not confused with the ancient wood. In no instance were the twigs seen to be horizontally placed, but they occasionally crossed each other. The thickness of the twigs varied from  $\frac{1}{2}$  inch to 2 inches. Some of them were placed immediately outside the wooden substructure, while others were found  $1\frac{1}{2}$  feet from it. They were detected in different conditions of decay according to the stratum at all the levels, except in the layer of vegetable matter at the modern surface. Considering first their condition in the deepest zone—the stratum in which the piles were encountered—the

twigs were in the same state of preservation as the piles, spongy but unaltered in shape. In the zone immediately above, the same pieces of wood were traced; but the timber was dark-brown, moist, and stringy. The greater amount of air and the less amount of moisture in this zone account for the difference in the condition. At a still higher level the same twigs were visible, but the remains were in a different state of decomposition. The decayed matter resembled soft, moist, brownish-black soot mixed with sand, and was in contrast with the surrounding lighter coloured sandy soil. It would not have been recognised as the remains of much decayed timber unless the lines of the branches had been traced continuously from the lower levels. The rotundity of the twigs and their forking at some places were also useful clues in the identification. In the still higher stratum, and in channels which were observed rising upwards in the same lines as the remains just mentioned, faint traces of slightly dark-coloured sand were detected, and this was considered to be the vestiges of the branches which had thus been traced from point to point through the various levels. It was the detection of well-preserved wood in the lowest zone which led to the recognition of the identical branches, though in different conditions, at the higher levels. It is remarkable that these branches had been placed upside down, a position in which the logs forming the under-structure were also found. It is conjectured that the branches were remains of basket- or wattle-work, which may have lined the walls of the pit. As mentioned, horizontal twigs were not seen, but these may have fallen down, leaving the vertical standards only as survivors. As the surviving twigs were not very numerous, nor set very closely together, it is probable that the exploration revealed a portion only of the wattle-work—probably the branches which were farthest removed from the pit and in the least disturbed soil. The lining facing the inside of the pit would, no doubt, be more exposed, and would more readily decay and fall into the pit after abandonment of the place.

It was only by the careful use of a penknife that the continuity of individual stakes was traced from one level to another, and the presence

of the supposed wattle-work in the upper levels established. It seems indeed probable that the walls of the pit were strengthened and protected by a lining of this description which reached from the floor level to the prehistoric surface, if not higher. At the south end, but at the higher levels only, were observed interesting vestiges of what appeared to have been unusually large branches. One piece had many of the branches forking upwards from it for a distance of 2 or 3 feet. They had been placed vertically and in the direction of the growth of the tree—a direction, it will be remembered, contrary to that of the other wood-work of the walls and of the logs of the under-structure. As none of these larger branches were found at the level of the piles, the nature of the wood was not determinable. At the higher levels the interior of the branches had vanished, leaving a vacancy which was surrounded and protected by a rather hard crust of black matter.

At this end of the site the sand has been discoloured red and brown and hardened by the presence of ferruginous matter, and in the vacant interiors of the branches there was a slight sprinkling of light coloured sand not so discoloured. Probably the white sand in the interiors gained admission through cracks at a time when the interior had become much decayed or had vanished, but before the *eremacausis* of the bark or crust, or the hardening and discoloration of the outside sand, had taken full effect.

#### SUPPOSED ENTRANCE PASSAGES.

In testing the ground at various points in the immediate vicinity of the pits, it was found that the superficial black layer was of almost uniform thickness. Beneath it was sand somewhat dark in colour. At some places, though not in all, near the foot of the black layer was observed a very thin layer—a mere sprinkling—of whitish sand.

From a careful inspection of this sprinkling it was conjectured that the sand composing it had been carried by a gale from the shore region, where great quantities of white sand occur, and, as can be proved, did also occur during the later prehistoric periods.

The drifting sand had been deposited in varying degrees of thickness, like a slight fall of snow which has drifted over somewhat uneven ground, and in some spots it was absent.

A section of the soil at the east wall of the pit at Site No. 3 revealed the presence of the same sprinkling of white sand. It occurred under the black layer and was several inches thick, thinning out on each side. It was not so white nor so readily recognisable as the sprinkling disclosed by the test diggings in the vicinity, yet no one present failed to detect it. While the black layer appeared horizontal at its top, its base dipped considerably in the middle of the east wall, reaching to within  $1\frac{1}{4}$  feet of the floor level. At the lower part of the east wall, and in a curvature coinciding with the dip of the black layer, lay the white sand to a maximum depth of over 12 inches.

Slicing away the soil of the east wall, the dip of the strata became less until it disappeared, and the presence of the white sand became gradually less noticeable.

No similar feature was observed at the other side of the pit. It is conjectured that the vestiges of some kind of entrance passage or doorway had thus made themselves evident. Similar but less pronounced traces were also seen at the east wall of Site No. 1.

No matter what type of hut may have been in vogue at these places, the function of the wooden substructure is an interesting problem.

The reasons for primitive man having lived in a sunken or earth-hidden dwelling are obvious. Whether the under-surface habitation was of stone or wood, or whether half or wholly subterranean, it was warmer and less exposed to adverse weather conditions than the ordinary surface hut, and—an important consideration—it was not readily liable to detection by an enemy.

The sunken flooring might, however, be a serious drawback and act merely as a hollow in which rain and ground water would accumulate. If the subsoil were gravelly, chalky, or of pure sand, the dwelling would be dry and comfortable. Should the subsoil be moisture-retaining, or

overlie a bed of clay, the great discomfort of a damp floor would arise. Now the excavations revealed the presence of a bed of moist blue clay, and, what in these circumstances might be expected, a wet stratum immediately above it. A likely hypothesis then is that the moisture in and above the layer of clay rendered the earthen floor uninhabitable, and, as a means to prevent a wet floor, the prehistoric architect hit upon the ingenious expedient of a structure of wooden piling, more or less upright, under and supporting a horizontal flooring. The flooring would thus be insulated against direct contact with the moisture-laden strata, and thus render the dwelling comparatively dry and comfortable.

The same expedient is recorded by Canon Greenwell as having apparently been practised to a modified extent in the endeavour to insulate against wet a corpse in a barrow at Ganton Wold.<sup>1</sup>

The position selected for these pit-dwellings, if such they were, seems to have been chosen because of its comparative dryness, the place being not lower than any of the surrounding stretches of country, yet we find the constructors had to face the difficulty of under-surface moisture. It has been seen how desirable a half or wholly hidden under-surface dwelling would be in primitive times, and that where the climate and the subsoil are wet, a damp floor would result in this class of house unless special measures were taken to overcome the difficulty. What these measures were is now perhaps elucidated.

A common feature of prehistoric exploratory work is the disclosure of pits. A review of some of these discoveries which have a certain, though usually a remote, similarity to the sites at Stoneykirk may perhaps be appropriate in connection with the phenomena under discussion.

In England during the Pre-Roman and Romano-British periods pits were sometimes dug in the search at these times for chalk for top-dressing soil,<sup>2</sup> or for the disposal of refuse in and around village sites. Many were used later as graves. Evidence in some cases points to the pits having been cellars underneath surface-dwellings. The recent explorations

<sup>1</sup> *British Barrows*, p. 170.

<sup>2</sup> *Excavations in Cranborne Chase*, vol. i. pp. 4-5 and p. 25; and vol. iv. p. 43.

on the Antonine Wall have disclosed at Castlecary a deep circular pit probably used for the disposal of rubbish, and at Roughcastle "military pits." Many of the cases described by General Pitt-Rivers seem, however, to have been actual pit-dwellings.<sup>1</sup> In no instance was wooden flooring observed, but the situations were usually dry, being on a chalky formation. General Pitt-Rivers<sup>2</sup> examined a pit situated on the slope of a hill near South Lodge Camp, Rushmore Park, 23 feet in diameter and 7 feet 4 inches in greatest depth. The sides were abrupt, except that on the west, where there was a ramp of undisturbed chalk communicating with the interior from the surface. The ramp was notched as if there had originally been steps on it. The bottom of the pit was not level but smooth, and it fell towards one side, as if to admit of the rain-water accumulating there. Fragments of a human skeleton were found on one of the steps. Nearly on the same level as the skeleton was found a chipped flint celt. Pieces of coarse hand-made pottery were got about two-thirds down in the silting, and sixteen pieces of what has been termed Romano-British ware were found in the surface mould.

The explorer sums up the probable history of this pit as follows:—"that it was dug originally as a dwelling during the Bronze Age, and the flint celt may be of that date or subsequent. After having silted up to a certain height, the skeleton may have been buried in a grave dug in the silting . . .," and suggests that the coarse pottery may belong to the original pit, and the Romano-British ware to the age of the interment or a more recent time.

In another instance<sup>3</sup> the same investigator noticed during his excavations at the ancient Winkelbury Camp, South Wiltshire, immediately below the eastern rampart and outside the ditch, a basin-shaped pit about 24 feet in diameter and 18 feet deep. This was seen to be bounded by a bank on the lower side, and was the site of what the explorer considered was probably a pit-dwelling, 12 feet 6 inches by 11 feet 3 inches, squared at the bottom, with an entrance to it on the lower or eastern side. The entrance was "1 foot wide at the bottom, and had a wooden step consisting of a plank 1½ inches thick, the blackened remains of which were found in the silting near the narrowest part of the opening at the bottom, with the remains of uprights forming probably a door to the dwelling. The floor of the pit was quite flat, and was covered for about 1 inch thick with the blackened remains of the roof which had fallen."

Marks of fire were seen on the chalk sides, which were smoothly cut.

<sup>1</sup> *Excavations in Cranborne Chase*, vol. ii. p. 222; and *Archæologia*, vol. xlii. p. 45, vol. xlvi. p. 427.

<sup>2</sup> *Excavations*, vol. iv. pp. 42-43.

<sup>3</sup> *Excavations* vol. ii. p. 243.

The entrance passage sloped slightly towards the pit. The floor of the pit had originally been 7 feet beneath the surface, and had silted up to a height of 5·88 feet in the centre. The deposits of the lowest part of the silting consisted in the centre of 0·7 foot of turf mould, then 1·9 feet of black earth, below which was 3·0 feet of chalk rubble.

The relics in the silting were a small thin piece of iron band at a depth of 2 feet at the bottom of the black earth, two flint flakes with bulbs of percussion in the black earth, and fragments of red burnt clay, perhaps daubing of wattle-work. In the chalk rubble beneath were found a fragment of sandstone hollowed by rubbing, and a fragment of a bronze pin. Coarse hand-made pottery was got in the black earth.

The explorer states that the pit was probably earlier than the camp, and may have been partly filled up from the excavations from the ditch of the camp.

In the drift gravel or chalk at Highfield, near Salisbury, circular pit-dwellings of bee-hive form have been found singly and in groups (*Flint Chips*, p. 57).

The diameter at base ranged from 5½ to 14 feet, and the depth of the floor from 7 to 10 feet.

Pits which were probably ancient dwellings have been noticed near Whitby (Young's *Hist. of Whitby*, vol. ii. pp. 666-683), and near Crich, Derbyshire (Bateman's *Vestiges of the Antiquities of Derbyshire*, p. 126). Others much larger than the Stoneykirk remains occur at Gallibury, Rowborough, and elsewhere in the Isle of Wight, and have been described by the Rev. Edmund Bell (*Journ. Brit. Arch. Assoc.*, 1855, vol. xi. pp. 305-313). At one site was found a human skeleton, but what is specially noteworthy is that the majority of the sites were oval and, to use Mr Bell's words, were "not in that advanced stage of construction of British houses described in some of the settlements of the Romanised Britons by R. C. Hoare (*Ancient Wiltshire*, "part i. pp. 37 and 84) and by Saull (*Notitiæ Britannicæ*, p. 9)." The Isle of Wight sites revealed apparently no relics useful in indicating the period of occupation.

There is a reference in *Scottish Notes and Queries* (Sept. 1887, p. 60; and Nov. 1887, p. 92) to a series of supposed pits still unexplored at Boddam, Aberdeenshire, where flint chippings and stone implements have been picked up.

At Spiennes, Belgium, in the vicinity of prehistoric flint mines, the sites of supposed Neolithic dwelling-huts were indicated by circular depressions 2 to 5 paces in diameter, but of no great depth.<sup>1</sup> In the huts were found beds of charcoal, various kinds of implements of stone, bone, and

<sup>1</sup> *Congrès International d'Anthrop. et d'Arch. Préhist.*, 1889, p. 578.



horn, and remains of food refuse. No doubt these sites, being on a chalky formation, were always quite dry. At Campigny, Seine Inférieure, France, sites have been found which belong probably to a much earlier time than the examples at Spiennes (Munro's *Prehistoric Scotland*, p. 332, quoted from *Revue Mensuelle*, pp. 366-408). They were circular pits excavated in quaternary gravels, and measured a few yards in diameter and about 4 feet in depth. The gravelly subsoil would here again be dry and would not necessitate a damp insulating floor. The industrial remains in the pits at Campigny consisted of hearths, a coarse pottery, and non-polished stone utensils; and the sites have supplied to French investigators a name to the period of transition between the Palæolithic and Neolithic periods. Vestiges of extinct dwarf pit-dwellers in Sakhalia have been recorded by Mr C. H. Hawes (*Brit. Assocn. Rep.*, 1902, p. 684).

Many primitive tribes at the present day have the flooring of their huts sunk under the surface. Underground dwellings, for example, are in use at Unyoro, Africa (Stanley's *Through the Dark Continent*, vol. i, p. 432), but the Siberian Yourts, described by Lord Avebury (*Prehistoric Times*, pp. 134 and 493), much more closely resemble the type of hut which was probably in use at Stoneykirk.

In the whole range of these instances there is no case, however, which exhibits the outstanding peculiarities of the Stoneykirk remains.

#### CHRONOLOGY.

Estimates of the age of the settlement may be based on the shape of the hut, and on the character of the relics recovered.

The long or oval hut would scarcely have been in extensive use in the same region and at the same period as the round hut. In any case, in the Scottish area one type probably originated before the other. Was then the oval hut anterior to the round hut? It is natural to consider the oval hut the more primitive, as it was more easily constructed. The round hut, when it reached a diameter of 20 or more feet, seems to have had the roof centrally supported, as in the Glastonbury examples. There are good grounds for believing two theories often propounded—that the construction of the early grave-chambers was in imitation of the architecture of dwellings, and that the long barrow of Britain belonged to the Age of Stone, and the round barrow to the Age of

Bronze. It may be taken, therefore, as probable that the long or oval type of dwelling is the earlier.

The presence of pottery is, of course, of great value in any effort to fix the chronological horizon of the sites. It is, unfortunately, impossible to tell whether the bases of the vessels were rounded, or flat; but further exploration may throw light upon this point. The ornamentation on the ware, and the shape of the rims, is more characteristic of the Stone Age than the Bronze Age.

While the pottery and utensils are all archaic, yet the absence of relics characteristic of Mediæval times or of the early Iron Age, such as objects of glass and vitreous paste or of any of the metals, does not allow us positively to assign the remains to a time earlier than these periods, though at present the evidence is strongly in favour of the sites having been anterior to the brochs, earth-houses, and the usual type of crannogs in Scotland. The character of the axe-marks points to the same conclusion. No vestiges of horn or lignite were noticed. Early wrought objects in horn are extremely rare in Wigtownshire, but not so relics of lignite, which have very frequently been found in Wigtownshire on sites of the Bronze Age, and of later times. While the type of oval hut in Stoneykirk has yielded no relics definitely characteristic of the Bronze Period or of any later age, the various pieces of evidence seem to point to the Stone Age as the period during which the sites were in use; yet the evidence is still too meagre to justify more than the offer of a suggestion as to the archæological horizon to which this class of early dwelling may belong.

The situation of the settlement was well chosen, as the inhabitants could see a long distance in all directions, while the houses could, only with difficulty, be detected from afar, more especially as they were partly sunk under the surface and doubtless mound-like above.

The direction of the row of huts was also selected intelligently. The row follows the crest of the plateau and is on its sunny side.

The position of the individual houses is also noteworthy. It would seem that the entrance passage was preferred not at the end but in the

middle of one of the sides. As shown by the excavations, the east side seems to have been chosen. It is natural to expect the door to be placed there, as it would be protected from the prevailing rains and winds from the south and west.<sup>1</sup>

Guided apparently by some such requirements, the prehistoric architect laid down the plan of the oval foundation in each case, so that the longer axis bore approximately north-west and south-east, and, it would appear, arranged that the entrance passage ran at right angles to that direction and was situated on the east side.

The inhabitants of this group of sites were workers in the wood of the birch, hazel, and alder, and had well shaped domestic pottery ornamented with incised and impressed work and work in relief. They lighted fires of some coniferous wood, and had a variety of implements of stone—scrapers, polishers, rubbing-stones, pounders, hammers, and anvils. They had an effective form of axe, with a smooth surface and a finely made edge. They carried on the manufacture of large and small flint implements from the rough nodules. The fact that they spent considerable time and labour in the construction of their houses tells that the method of life was at least in some measure settled, and not purely nomadic, and the occurrence of a group of sites may signify that a system of village life was in vogue.

The individuals who lived there did not follow the architectural methods of the Terremare men of prehistoric North Italy, or the Terpen dwellers of ancient Holland. They do not appear to have been like the crannog-builders who built their dwellings so as to have them more or less surrounded by water or marsh. They did not construct their

<sup>1</sup> General Pitt-Rivers, in his *Excavations*, vol. ii. p. 243, in noting that the opening to a pit-dwelling ran 2° north of east, remarks that the "eastern aspect of the entrance to this pit will . . . strike those who have observed a similar occurrence elsewhere, and have supposed it to be an arrangement adapted for the worship of the rising sun by the people from the interior of the houses; but, on the other hand, it must not escape notice that the eastern side in this case is the down-hill side, and, therefore, the only side available for an entrance, unless it were constructed on a great slope."

houses of stones half-underground or wholly subterranean like the earth-houses or weems, nor did they follow the methods of the hut-circle men who lived in circular wood and wattle huts built on the surface of the ground.

While the bottom of each pit was at some depth under the surface, it should not be forgotten that the supposed flooring was sufficiently near the prehistoric surface to make it necessary to have a good proportion of the cubical contents of the chamber above the level of the surface if the chamber were to be habitable. There is no reason to believe that the huts were open to the heavens, or that the excavated soil was removed from the spot. It then follows that the upper part of the dwellings was more or less mound-like in character, the heaped-up earth from the original excavation having assisted towards this appearance. It seems difficult to escape from such a conclusion.

The shape of the mound would naturally follow the plan, whether round or oval, of the structure covered by the mound. Again the structure would be in harmony necessarily with the plan of the foundations, the flooring, and the walls, all of which were apparently in the shape of a longish oval. It would appear then that the mounds were somewhat long in shape, though perhaps not so pronouncedly so as the plan of the wooden substructures.

In considering this peculiarity of the Stoneykirk remains, it is interesting to consider that most of the ancient British dwellings, built of wood and wattle, which have been examined and recorded, are round, and, further, that they belong to the Bronze, the Early Iron, and later periods. The huts which comprised the marsh village at Glastonbury, occupied a few years before the Romans arrived in that district, were roughly circular and about 20 feet in diameter. With the exception of the Isle of Wight specimens, the pit-dwellings found in England appear to have been circular, as were also the crannogs and hut-circles.

No stones were used in the Stoneykirk structures, and stones sufficiently large for building walls are rare in the locality. It seems safe to say that the walls were of turf and wood and wattle. If the places were

roofed, it is safe to assume further that at least a small amount of some covering of vegetable fibre, or even of soil or turf, rested upon the roof. A stoneless structure, however, could not bear the weight of a large amount of superincumbent matter; and the fact that a depression, and not a mound, marked each site indicates that a light form of roofing was employed. This roofing, after desertion of the settlement, would fall in, and the hollow would gradually become silted up.

As has been seen, the flooring arrangements were ingeniously, laboriously, and substantially contrived, and admirably adapted to the end in view. It is natural to believe that the less difficult matter of walling and roofing should also have been successfully met by the same men. Doubtless the whole place of abode, while very small, would be well suited to protect the inhabitants against the discomfort of too much sun, rain, wind, or cold.

It would be hazardous, nevertheless, to conjecture what exactly was the nature and appearance of the structures when entire. They were probably single-chambered wooden dwellings partly sunk under the surface level, and wholly, or in part, hidden by a mound of turf and earth.

Dwellings presenting the external appearance of mounds survived in Scotland to recent times.<sup>1</sup> This type of house seems to have existed at a very early period, and to have been copied, though perhaps on a smaller scale, but naturally in a more substantial style, in the architecture of graves.<sup>2</sup> There are thus cairns with internal sepulchral chambers.

<sup>1</sup> David MacRitchie's *Fians, Fairies, and Picts*, p. 44; Sir Arthur Mitchell's *Past in the Present*, p. 59; *P. S. A. Scot.*, vol. vii. pp. 164-8.

<sup>2</sup> The affinity between resting-places for the dead and dwellings for the living is referred to by General Pitt-Rivers, who appears to have had a difficulty at times in ascertaining whether graves had been solely used as graves, or had previously been in use as pit-dwellings (*Excavations in Cranborne Chase*, vol. ii. p. 65). Mr W. J. Knowles (*Proc. Roy. Irish Acad.*, 3rd ser., vol. vi., No. 3, p. 334) has described a Neolithic hut-site at Whitepark Bay, County Antrim, which had been used as a grave. Prof. Nilsson, writing in 1843, was probably the first investigator to call attention to this subject (*The Primitive Inhabitants of Scandinavia*, pp. 124-168), by pointing out the striking similarity between Esquimaux huts and the Neolithic Scandinavian sepulchral structures. Modern instances of hut-burial have been cited by Lord Avebury (*Prehistoric Times*, p. 134).

Houses and graves of this type were usually of stone, but it is reasonable to believe that wood might take the place of stone in districts where stones of the size required for building purposes were not plentiful. Now, if it can be shown that grave-mounds with internal constructions of timber once existed, it is a fair inference that there may have been dwelling-mounds with timber-built chambers, the roof protected by turf or simply earth-covered. This link in the chain of evidence is fortunately forthcoming, for at least two cases in Britain have been carefully recorded of what appeared to be grave-mounds or barrows containing timber constructions in the interior—the Dalry mound, Ayrshire, which probably dated from the Bronze Age<sup>1</sup>; and the Wor Barrow, Dorset, assigned to the Stone Age.<sup>2</sup> In the Wor Barrow district building-stones are scarce, and in the vicinity of the Wigtownshire sites building-stones are so difficult to procure that the fields are not bounded by stone walls, but are either fenced, hedged, or enclosed by earthen dykes.

As we have thus earth-hidden, stone-lined, sepulchral chambers constructed apparently in imitation of earth-hidden, stone-built dwellings, and also sepulchral constructions of timber within mounds, it is an easy deduction that wood-built chambers for the living once existed wholly or partly earth-hidden. Perhaps the evidence for such wood-built, earth-hidden dwellings is not only presumptive, but has become direct testimony, through the discoveries in Stoneykirk; but this point may be left for the decision of others.

In the Scottish area many unique non-historic and proto-historic archæological phenomena have been observed, especially in the domains of art and architecture. May not the "piled pit" of Stoneykirk be another example of the ingenuity and perseverance in overcoming difficulties which seem to have characterised the prehistoric craftsman of North Britain?

<sup>1</sup> Described by the late R. W. Cochran-Patrick in the *Arch. and Hist. Collns. of Ayr and Wigton*, vol. i. p. 55.

<sup>2</sup> *Excavations in Cranborne Chase*, vol. iv. p. 59.