

CHAPTER III.

ALTERATIONS IN THE RELATIVE LEVEL OF SEA AND LAND
SUBSEQUENT TO THE APPEARANCE OF MAN IN SCOTLAND.



THAT there is a remarkable parallelism between the repeated land-submergences and the glacial epochs, as partially described in the last chapter, has been frequently pointed out by geologists. The most probable explanation of this coincidence of two apparently independent phenomena is that they were the effects of one common cause—viz., cosmic or astronomical cycles. But the operation of such causes would not destroy the effects of other agencies capable of altering the relative level of sea and land. The result of a local—*i.e.*, terrestrial—element coming into play, synchronously with a cosmic movement, would be either to intensify the action of the latter, if they were acting in one direction, or to counteract it, if in opposite directions. The 25-foot raised beach in Scotland may, therefore, be accounted for on the supposition that while the land was gradually rising in obedience to an astronomical cause, it became arrested by a terrestrial movement of depression, the apparent result being a cessation of all movement. But my object is not

to explain the physical causes of land oscillations, but to chronicle their existence and effects on the career of man. Without, therefore, taking into consideration local volcanic disturbances, such as Sir Charles Lyell describes as having occurred at Puzzuoli since the temple of Jupiter Serapis was built, there are other obscure land oscillations whose effects have to be investigated. The first evidence of this nature which falls to be discussed is that which proves that the shore-lands of Scotland have risen some 25 or 30 feet since Neolithic man appeared in Central Scotland. As the facts on which this conclusion is based are derived from sources of investigation which have little or no connection with each other, there is no necessity for marshalling them in any particular order. Accordingly, I begin with one of the most recent discoveries bearing on this subject, viz. :—

1. *The MacArthur Cave and Rock-Shelter at Oban.*

The MacArthur Cave was discovered in December 1894 by quarrymen while removing stones, for building purposes, from a cliff facing the bay of Oban, long regarded by geologists as marking the line of an old sea-beach. In the course of these operations a cavity was exposed in the rock which turned out to be a cave 25 feet long (north to south) and from 16 to 20 feet broad. This opening was made near the back of the cave, but its natural entrance, which had been most effectually concealed by an old talus of earth and stones, was at the other or north end. Before the discovery came under the notice of the Society of Antiquaries of Scotland, the whole of the roof had been removed by the quarrymen; but as the floor, already ascertained to be an accumulation of relic-bearing *débris*, remained practically undisturbed, it was decided by the Council of the Society to have it thoroughly

excavated. A full report of the investigation was read at a meeting of the Society—11th March 1895—by Dr Joseph Anderson, who, with the co-operation of a number of local gentlemen interested in the antiquities of their neighbourhood, superintended the excavations.

The contents of the cave consisted, first, of a layer of black earth, the presence of which was accounted for by a slanting shaft filled with a similar material, which extended from the wall of the cave to the surface of the ground above. This shaft was formerly an open-air passage, by means of which, it was conjectured, surface-soil had been washed into the interior of the cave. In this layer, besides the bones of various animals, the following human remains were found, the relative positions of which are thus stated: "Towards the back of the cave, and under a projecting part of the roof which remained on the east side, a human skull was found on the surface of the black earth. A few feet farther north, on the same side of the cave, another skull was found embedded in the black earth, almost on the top of the shell-bed underneath. Still farther north, and only a few feet distant, were a good many other bones of a human skeleton. Two lower jaws were also separately found near these remains on the same side of the cave."

Professor Sir William Turner gave a report on these human remains, but it is unnecessary here to dwell on their special characters, as, from their superficial position in the cave, their owners had probably no relationship with the cave-dwellers who left the implements and weapons among the subjacent deposits.

The next deposits in descending order are thus described: "It was found that underneath the layer of black earth there was a bed of shells, varying from 27 inches to about 3 feet in thickness, extending over the whole floor of the cave, and

showing little or no intermixture of black earth or gravel, but here and there patches of ashes mixed with wood-charcoal, and charred splinters of bone. Under this shell-bed was a bed of fine clean gravel, composed entirely of small water-rolled stones. In this gravel, at a depth of about 18 inches (where the section was first made), there was intercalated a deposit of shells, which we at first spoke of as the lower shell-bed, but which proved to be of partial extent and unequal thickness, thinning out towards the sides and towards the mouth of the cave, and in several places presenting an irregular or patchy appearance in the section, as if the shells had been deposited in heaps or pockets in the gravel. Underneath this intercalated layer of shells the gravel extended for about 4 feet or more to the cave bottom, where it was mixed with large and small fragments of loose rock. The whole thickness of the gravel-bed under the upper deposit of shells was thus about 6 feet, including the intercalated lower deposit of shells."

Both the upper and lower shell-beds were composed of the shells of edible species found on the neighbouring shores and of the bones of land and marine animals, the entire mass being a true refuse-heap, evidently the result of a lengthened occupation of the cave by people who fed on the fauna represented in it. The bones were, for the most part, broken into splinters both for the purpose of extracting the marrow and of manufacturing bone implements, of which a large number was collected.

All the implements recovered were made of bone or deer-horn, with the exception of three hammer-stones, and twenty flints (three being natural nodules), mostly flakes and chips, "a few of which show secondary working, though none are really implements in the sense of being fashioned and finished."

The bone and horn implements consist of three pins (fig. 5); three borers (fig. 6), together with a few bones of nondescript characters, being merely pointed or flattened at the end; 140 "round-nosed, chisel-ended implements having an extraordinary likeness to each other" (figs. 7, 8, 9, and 10); and seven harpoons (two being entire) made of deer-horn. The larger of the entire harpoons (fig. 11) (6 inches in length)

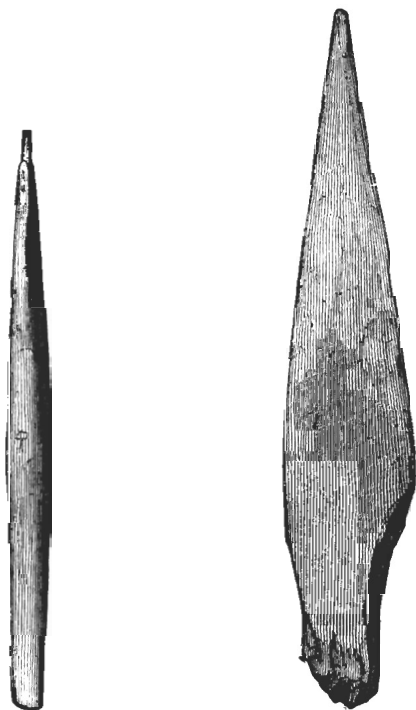


Fig. 5.—*Bone pin* ($\frac{1}{2}$).

Fig. 6.—*Bone borer* ($\frac{1}{2}$).

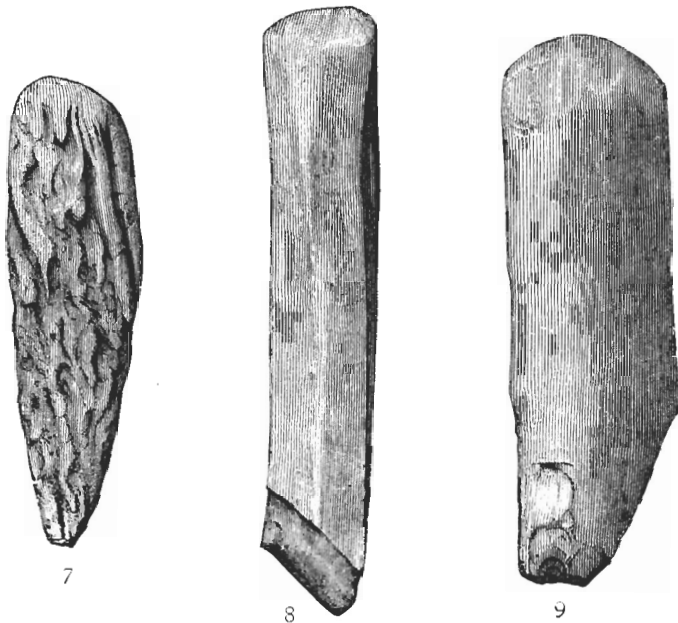
has four barbs on each side and a perforation at the butt-end. The other (fig. 12) differs from it only in being smaller ($4\frac{1}{4}$ inches in length) and having no perforation at the butt-end.

The animal remains from the respective deposits were identified by Mr James Simpson, assistant to Sir William Turner, as follows:—

“(1) In the upper layer of black earth were bones or teeth

of the red-deer and of a species of ox, also of the pig, dog, and badger (*Meles taxus*). Some bones of birds, fish, claws of crabs, and shells of patella, solen, and whelk were recognised.

“(2) In the shell-bed underneath the black earth, in addition to bones of badger, red-deer, and ox, a part of the jaw of a roe-deer (*C. capreolus*) was recognised; also bones of small



Figs. 7, 8, 9.—*Implements of bone and deer-horn* ($\frac{1}{2}$).

birds and of fish, claws of crabs, and shells of patella, pecten, and solen.

“(3) In the deeper shell-bed and pockets underneath the gravel below No. 2 were portions of two frontal bones of an ox, probably *Bos longifrons*, antlers, and bones of red-deer, one of which had been a large stag, the burr being 80 mm. (about 3 inches) in diameter, bones of roe-deer, the humerus of an otter (*Lutra vulgaris*), the humerus of a cat, the lower jaw of a young pig, the upper jaw of a badger; also bones of small birds, jaw and vertebræ of fish, crabs' claws, and shells of

molluscs. Some of the bones were blackened and calcined from the action of fire."

It is fortunate that the record of archæological phenomena

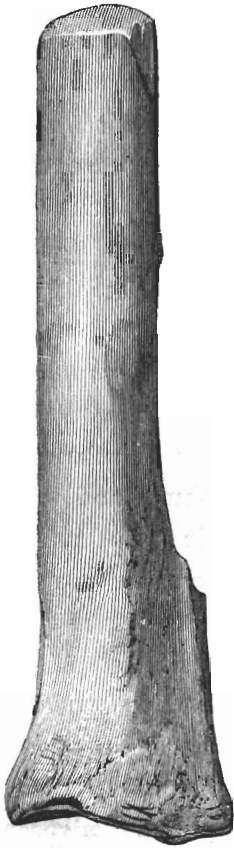


Fig. 10.—Bone implement made of the leg-bone of a deer ($\frac{3}{4}$).



Fig. 11.—Harpoon of deer-horn ($\frac{3}{4}$).



Fig. 12.—Harpoon of deer-horn ($\frac{3}{4}$).

found in this cave fell to be described by such experienced and accurate observers as Sir William Turner, Dr Anderson,

and Mr J. H. Cunningham, C.E. (the last having made a plan of the cave and determined its height above the Ordnance datum line), as the conclusions arrived at with regard to the relative level of sea and land, then and now, are of exceptional importance.

Dr Anderson, after discussing with great clearness and precision the possibilities as to how the upper and lower shell-beds became separated by a layer of sea-gravel, leaves it undecided whether it was deposited by the action of the waves after man had taken up his abode in the cave, or, as he suggests, was due to that of man himself incidentally treading down the gravel previously heaped up in it. "There is," he writes, "no absolutely decisive evidence for either of these suppositions: and even though my objection be found to have little value, there is no escape from the conclusion that, if the upper gravel was washed into the cave after its occupation by men, it must have been during or subsequent to Neolithic times, for archæologically the fauna and implements of the cave must be classed as Neolithic at the earliest." I need hardly observe that the acceptance of Dr Anderson's hypothesis, as an adequate explanation of the phenomena in question, would entirely eliminate the chronological problem from the field of discussion. But in my opinion this hypothesis is untenable, for the very cogent reason that it fails to explain the facts. Moreover, the alternative view, so forcibly described by Dr Anderson that in reality he is its advocate, is not only consistent with archæological deductions derived from other sources, but offers a natural and probable explanation of the entire set of phenomena.

With respect to the inadequacy of the treading-down process to account for the presence of the upper layer of gravel, it is only necessary to make an effort to picture to the mind's eye any conceivable *modus operandi* by which this could be

effected to be convinced that the hypothesis must be abandoned as unpracticable. When the upper shell-bed was cleared off we are told that there was exposed beneath it "a layer of clean washed gravel or small-sized pebbles extending over the whole floor of the cave," underneath which, at a depth of from 6 to 18 inches, was embedded a lower shell-bed. Now is it probable, or indeed possible, that this intermediate layer of clean washed gravel had been so placed by the tread of the people who from day to day frequented the cave, and here cooked and ate their food, throwing the refuse anywhere around them? This treading process must have gone on, even to a greater degree, from the very beginning of the occupancy of the cave, and consequently the gravel would become mixed more or less uniformly with the shells; but we have no evidence to show that any intermingling of this kind had taken place in the upper gravel. Again, while we would expect to find the gravel largely mixed with the shells at the bottom, and becoming less so as the accumulation increased, it is inconceivable that any unintentional treading would spread over the whole shell-heap a clear bed of gravel, nowhere less than 6 inches in depth. Besides, we must bear in mind that this lower shell-bed "was mixed with broken bones of animals," and contained "the same shells and bones of the same animals," as well as "the same varieties of bone implements," as the upper shell-bed. The only distinction between them was that the shells and bones of the former "were more decomposed and friable" than those of the latter. Also the "patches of shells intercalated in the gravel still retained among them the smaller and lighter shells as well as the heavier, and occasional deposits of charcoal and ashes."

To me it seems obvious that this layer of clean washed gravel, which so completely separated these two shell-beds,

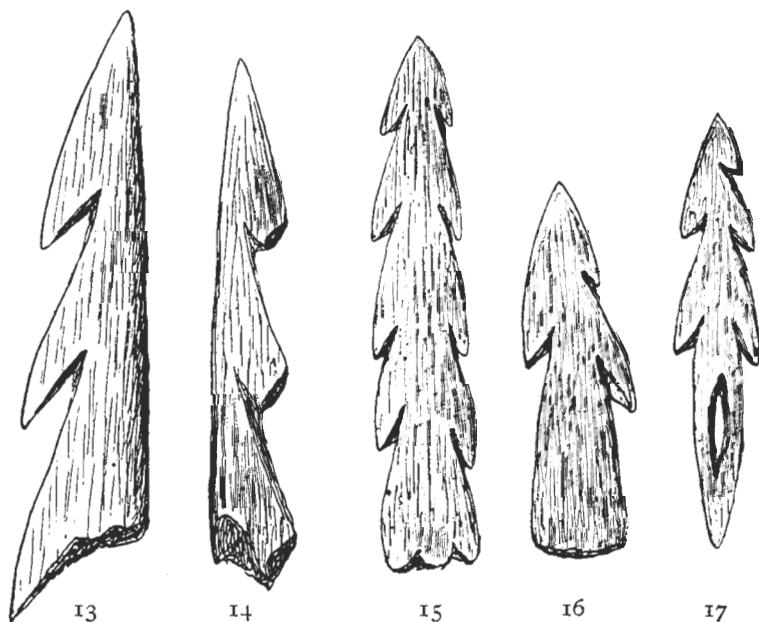
was the result of some sudden *coup*, some specific action, which came into operation a considerable time after the people had taken possession of the cave. The facts would be quite consistent with the idea that the Troglodytes abandoned the cave for a time, and that, on coming back, they purposely spread this layer of gravel over the former refuse-heap, so as to start, as it were, with a clean floor and hearth. There is, however, no natural process which, to my mind, accounts for it more satisfactorily than the supposition that during a severe storm the waves were forced into the cave, carrying with them a certain amount of shingle, which henceforth became the floor of the cave, and over which the cave-dwellers, after the abatement of the storm, again took up their quarters as formerly.

If this opinion be correct, the importance of the Oban cave cannot be exaggerated, as it proves that man was an inhabitant of the district when the opening to the cave was on the sea-beach, and sufficiently near the water to permit the waves to enter it during a storm. But the beach of to-day is 100 yards distant, and the lower shell-bed lay fully 30 feet above the present high-water mark.¹

At the beginning of May 1898 another discovery was made at Oban which yielded similar remains of human industry, associated with a refuse-heap of shells and broken bones precisely analogous to those from the MacArthur Cave. This was a rock-shelter, situated at the base of a steep rock called Druimvargie, and overlooking a marsh in which, some years ago, the remains of a lake-dwelling were found. The area of the shelter was some 10 feet square, and the *débris* which lay in it had been covered over for ages by a deep talus. It was while clearing away this talus, preparatory to laying the

¹ In addition to Dr Anderson's Report, see 'Proc. Soc. A. Lond.,' May 21, 1896.

foundations of a house, that the shell-heap became exposed. Among the relics were a few stone implements of water-worn pebbles of an elongated shape and slantingly abraded at one end, two or three bone borers, a portion of a deer-horn broken across a circular perforation, a number of "round-nosed" chisels of bone, and the front portions of two harpoons (figs. 13 and 14) made of deer-horn, and of the same



Figs. 13-17.—*Harpoons from Druimvargie, Caisteal-nan-Gillean, and Newcastle-upon-Tyne* ($\frac{2}{3}$).

character as those found in the MacArthur Cave, differing from them only in having the barbs—three in each case—on one side. M. Piette also records unilateral barbed harpoons from the cave of Mas-d'Azil in France. Hence the discovery of this variety at Oban only strengthens the remarkable analogy between these relics in the French and Scottish caves, the significance of which I have elsewhere fully discussed.¹

¹ Prehistoric Problems, pp. 60-77.

Bone harpoons and implements of bone and stone, similar to those from the MacArthur Cave and the rock-shelter of Druimvargie, have also been found at *Caisteal-nan-Gillean*, Oronsay, explored by Mr Symington Grieve and the late Mr William Galloway. These investigations have been described by Mr Grieve in his work on 'The Great Auk or Garefowl,' and recently by Dr Joseph Anderson in the Proceedings of the Society of Antiquaries of Scotland, vol. xxxii. *Caisteal-nan-Gillean* is a sand-hill, about 150 feet in diameter, with an average height of 25 feet. Its surface was covered with grassy turf, having blown sand underneath to a depth of from 1 to 5 feet. "Below this covering," writes Dr Anderson, "an accumulation of shells and bones, in a series of layers mingled with sand and ashes, extended downwards for a total depth of about 8 feet. Underneath this refuse-heap the substance of the mound consisted of blown sand in layers, the upper part of each layer defined by a thin line of dark mould, with a few sea and land shells intermixed, but no implements or other remains of human occupancy." The bone and horn implements found in this shell-heap consisted of eleven harpoon-heads (*figs. 15 and 16*), three bone awls, and 150 "round-nosed," chisel-like implements, similar to those from the caves at Oban. The stone implements, which numbered over 200, were elongated water-worn pebbles worked at one end into "round-nosed" endings precisely similar to the bone chisels. They are supposed to have been utilised by the people who formed this midden as "limpet-hammers." Besides the above-named objects there were eight fragments of perforated implements of deer-horn, and others roughly cut round the circumference and then broken across; two small anvil-stones measuring about 4 by 3 inches and 1½ inch thick; fifty chips and splinters of flint, but none which can be characterised as a worked implement. With the exception of bones

of the Great Auk, the organic remains were those of the existing fauna of the West Coast.

Two other shell-heaps in Oronsay were excavated by Mr Galloway, whose contents were apparently similar to those of Caisteal-nan-Gillean. Also Dr T. B. Sprague exhibited at a meeting of the Scottish Natural History Society, in 1898, a large quantity of broken bones found in a shell-heap or kitchen-midden on the island of Inchkeith, among which I observed a few round-nosed chisels similar to those of Oban and Oronsay.

Recently, when on a visit to the Antiquarian Museum at Newcastle - upon - Tyne, I saw a bone harpoon labelled as having been picked up on the shore at Whitburn in 1852. As will be seen from figure 17, it is very similar to the Oban specimens. Another of the same class of weapon was found in the Victoria Cave, Yorkshire,¹ which has the peculiarity of having two reverse barbs, one at each side, for the purpose of fastening the string, instead of a hole as in the Whitburn specimen.

2. *Implements of Deer-horn associated with the Skeletons of Whales in the Carse of Stirling.*

On the 17th September 1889 Professor Sir William Turner read a paper at the British Association, then held at Newcastle-upon-Tyne, "On Implements of Stag's horn associated with Whales' Skeletons found in the Carse of Stirling." In this paper the author describes a perforated horn implement shaped like a hammer-axe head, 11 inches long and 6½ inches in its greatest girth (fig. 18). It was found in 1877, resting on the skull of the skeleton of a Balænoptera exposed in the course of drainage operations on the estate of Meikle-

¹ Cave Hunting, p. 112.

wood, a few miles west of Stirling. In 1819 and 1824 it is recorded that implements of deer-horn, two of which are described as being perforated with a round hole about an inch in diameter, were found also associated with whales' skeletons, but they appear to have been lost.¹

In his introductory remarks Sir William writes as follows: "Those who are acquainted with the valley of the Forth know that the river Forth winds for many miles through an extensive plain called the Carse of Stirling. This plain is a raised sea-beach, which reaches from 5 or 10 to 30 feet above the present level of high-water. Geologists regard this beach

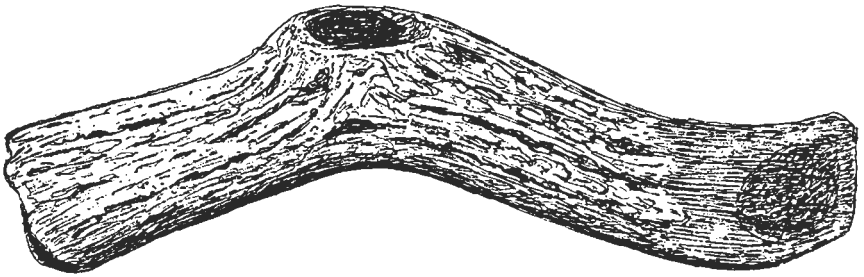


Fig. 18.—*Hammer-axe head of stag's horn found with a whale's skeleton at Meiklewood, near Stirling* ($\frac{1}{3}$).

as a post-glacial accumulation of marine origin, for the shells which it contains are not Arctic but those of molluscs now extant in the seas of Scotland. In the subsoil of the raised beach the skeletons of large whales have from time to time been found, and as many as seven well authenticated specimens have been recorded. They were all got under almost similar conditions imbedded in a blue silt which underlay a former peat moss, at a depth of usually 3 to 5 feet below the present surface of the ground, and at levels varying, it is said, from 5 feet to 25 feet above the present high-water mark. At the time when those whales were stranded the estuary of the Forth would have extended some 8 or 10 miles to the

¹ See Mem. Wern. Soc., vol. v. pp. 437-441.

west of the site of the town of Stirling, and there must have been a sufficient depth of sea to permit, with a flowing tide, large whales to swim many miles farther west than is now possible, with the risk, however, of becoming stranded as the tide receded. It has been customary to speak of these whales as Greenland whales; by which term, I presume, has been meant the right whale — *Balæna mysticetus* — which is an Arctic species. But the skeletons which I have examined did not belong to the genus *Balæna*, but to the genus *Balænoptera*, or the Finner whales, several species of which now frequent the British seas. I have identified one skeleton as that of *Balænoptera musculus*.”

The deer-horn implement is here figured from a drawing kindly made for the author by Miss Turner. It consists of a portion of the beam, 11 inches in length and $6\frac{1}{2}$ inches in greatest girth. It is perforated by a hole, oval on one side and round on the other, the former orifice measuring $1\frac{3}{4}$ by $\frac{3}{4}$ inch, and the latter $\frac{3}{4}$ inch in diameter. When found there was a portion of a wooden handle in the hole. The implement is truncated at one end and bevelled into a flat cutting edge at the other, and the perforation is not in the middle but about 2 inches nearer the truncated extremity than the cutting edge. Sir William sums up his report of these discoveries as follows: “The discovery of those horn implements proves that, when the fertile land now forming the Carse of Stirling was submerged below the sea-level, the surrounding highlands were inhabited by a hardy Caledonian race, who manufactured from the antlers of the red-deer useful tools and weapons. I have already stated that there is nothing in the form of these implements to lead one to suppose that they could be used in the chase of the whale as lances or harpoons. It is probable that the whales, by the side of which they were found, had been stranded during the ebb of

the tide, and that the people had descended from the adjacent heights, and, with the aid of their chisels of horn, had spoiled the carcass of its load of flesh and blubber. In support of this view, I may state that the three skeletons along with which the implements were found were lying in proximity to the edge of the Carse-land, where it approached the adjacent high ground."

One of the previously recorded whale skeletons was found in July 1819 immediately adjoining the east gate to Airthrey Castle. The following account of this discovery was given at the time by Mr Robert Bald in the 'Edinburgh Philosophical Journal' for 1819 (vol. i. p. 393): "The skeleton is evidently that of a whale, and the animal appears to have been about 72 feet in length. The greater part of the bones were found at the depth of about $4\frac{1}{2}$ feet, but some were nearer the surface. The head was lying across the march ditch, the jawbones projecting a few feet over Sir Robert Abercromby's march-line into the estate of Powis. The tail lay in a westerly direction from the head. Though the bones were a little disjoined, yet they lay, upon the whole, in a regular position. The bones which have been preserved consist of the cranium, numerous vertebræ, several ribs, the jawbones, and the bones of the swimming paws, with some smaller bones; likewise some bones of the ear, particularly the mastoid process, which is remarkably hard, and somewhat of the shape of a large shell of the genus *Cypræa*, for which it was at first mistaken. Some of the ribs are 10 feet in length; and it is remarkable that one of them had been broken and healed again, being, as usual, much thicker at the place of fracture. The bones are in general firm, and in a state of good preservation, excepting the jawbones. These last were immured chiefly in the dry bank upon the side of the ditch, and upon exposure to the air the cellular

structure speedily fell to powder. Bones of equally open structure which lay in the sludge remain very entire. There were found close by the skeleton two pieces of stag's horn, one perforated. The lovers of natural history are under great obligations to Sir Robert Abercromby for the attention he paid in searching for and securing the bones of the skeleton. It may be added that he has in the most polite and handsome manner presented the whole to the Museum of the University of Edinburgh, where they are now deposited."

The other recorded¹ whale skeleton, which had associated with it perforated implements of stag's horn, was unearthed in 1824 in the barony of Burnbank, about three-quarters of a mile from Kincardine Church. The ground was originally covered with peat, which had been artificially removed for improving the land, and it was while digging a ditch in the underlying clay that the bones were encountered. The clay here was only 4 feet thick, and beneath it there was a stratum of peat, which cropped up to the surface at the edge of the carse. It was *on this peat layer*, but imbedded in the clay above, that the skeleton lay. "It is a very singular circumstance that, along with these bones," says the writer (Mr H. H. Drummond), "there should have been found a fragment of a stag's horn similar to that found along with the Airthrey whale, and having a similar round hole bored through it. This piece of horn is also deposited in the Museum [of the College of Edinburgh]. The peat stratum was 6 feet thick, and contained wood, particularly alder, and various water-plants."

The limits of this work prevent me from continuing the history of these stranded whales further; but to those who have a desire to do so I heartily recommend an article by

¹ Mem. Wern. Soc., vol. v. p. 440.

Mr David B. Morris on the subject,¹ in which he gives the records of ten other well authenticated whale remains, in addition to the three above described. To the writings of Mr Morris² I am indebted for the following facts in regard to a recent discovery, in these Carse-lands, of whale remains associated with at least one primitive implement.

It appears that in May and June 1897 the County Council of Stirlingshire carried out a scheme of drainage for the village of Causewayhead. A drain track leading from the village to the river Forth was cut into the clays of the Carse to a depth of 13 or 14 feet, and in it the following relics were found:—

1. Portion of a rib of a whale, 3 feet long, which was unfortunately broken into three pieces after being found.

2. Several bones, which are in the possession of Mr Morris Stirling at Gogar. These have not been identified, but they are probably bones of a whale.

3. Portion of a rib of a whale, measuring $29\frac{1}{2}$ inches along its convexity, and split in two in the greater part of its length.

4. Fragment of a rib of a whale, $6\frac{1}{2}$ inches long, and the same in circumference, which corresponds to the whole thickness of the rib. This is an interesting specimen, as it is supposed to show traces of human workmanship.

5. Portion of horn of red-deer (*Cervus elaphus*), which had been used by man as an implement for boring (fig. 19).

6. Right horn core attached to fragment of the frontal bone of a small ox of an extinct species, *Bos longifrons*.

7. Similar right horn core of a smaller animal of the same species.

8. Numerous marine shells, of which a selection is placed in the Smith Institute.

¹ Stirling Nat. Hist. and Arch. Soc., 1892.

² *Ibid.*, 1897.

In the course of cutting the drain the following sections were noted, the first by Mr Morris and the second by Mr

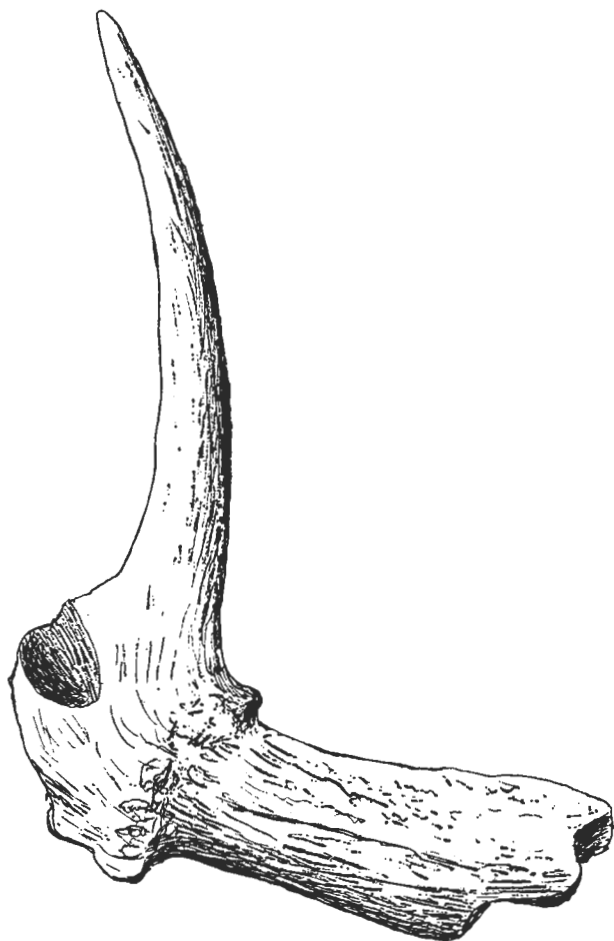


Fig. 19.—Implement of deer-horn associated with whale remains in Carse of Stirling ($\frac{2}{3}$).

Kidston, but, unfortunately, the position of the relics in the different layers is only occasionally given:—

Section I.—About 300 yards east from Causewayhead Inn.

	Feet.
Soil	1
Yellow "brick clay"	4
Blue mud or "sleech"	9
Sand	depth unknown

Section II.—*In the village.*

	Feet.
Road metal	1
Soil	2
Yellow clay	4
Blue clay	4
Sand with shells	2
Clay	depth unknown

“Sir William Turner states that the ribs are thicker than the ribs of *Balænoptera rostrata* and *B. borealis*, and are more of the size of *B. musculus* or *B. Sibbaldii*, which had not reached full growth. The whale remains were not all found together, but were scattered over a distance of 100 yards. The locality is on the public road, from 300 to 400 yards east of the inn. This is just at the old coast-line of the 50-foot raised beach, where a whale would readily become stranded in the shallows. The carcass would in time be broken up by the prehistoric men who inhabited the shore, and by the beating of the waves, and so the bones, being scattered over a space and cast up on the beach, would be left in just such a position as that in which we have found them now.”

The deer-horn borer was found “within a short distance of the fragments of the whale’s ribs, and at the junction of the blue clay and the subjacent sand. It is the right frontal process broken off from the frontal bone, with the burr and nearly two inches of the beam of the antler continuous with it. Springing from the beam, close to the burr, is the curved pointed tine of the brow antler, five inches long, following the convexity.”

With regard to a portion of a whale rib, Sir William Turner, to whom these interesting relics were submitted for examination, writes as follows: “One end of this fragment showed an irregular fractured surface; the opposite end was cleft, and the lateral boundaries or lips of the cleft were formed by the

inner and outer surfaces of the rib. The surface of bone forming each lip was smooth as if from rubbing. When the clay was picked out of the cleft, its depth varied from 12 to 26 mm., and in its deepest part the cancellated tissue of the bone was exposed. The appearance presented by this end of the bone was not natural to the rib, but was obviously due to some artificial process. "It is difficult to account for it on the supposition that it was produced by accidental friction in the soft mud or blue carse clay in which the bone was found; rather it gives one the impression that it had been artificially fashioned into shape by the hand of man, so as to adapt it for use as a rude bone implement."

Such are the main points of interest in the Causewayhead discoveries, as described by Mr Morris and Sir William Turner. I have seen the larger portion of the relics, and find no reason to differ from the opinion of these two experienced observers that the stag-horn was used as an implement by the whale-hunters of the period; but as to the portion of the whale-rib the evidence of human workmanship seems to me more doubtful. The position of the former, at the junction of the blue clay and subjacent sand, points to a time long before the tidal waters ceased to flow over the Carse-lands.

3. Other Relics of Man in Carse-Lands and alluvial Deposits.

But the association of implements with cetaceous remains is not the only evidence we have that prehistoric man wandered about the shores of these old inland seas. Accumulations of sea-shells in conjunction with fireplaces have been observed along the bluff of the old coast-line on both sides of the Avon, just where it enters the Carse—a locality which, singularly enough, is still called Inveravon, although the present mouth of the river is several miles distant. The following extract from

the Memoirs of the Geological Survey (sheet 31) is quite explicit on this point. "A section," writes Mr Peach, F.R.S., "across a heap 50 yards long by 20 wide was exposed in a road cutting, and showed many successive layers of shells—principally oysters—to a depth of 3 feet without the bottom being visible. The remains of fireplaces were plentiful among the shells. Oysters seemed to have been preferred by the makers of the midden, though they had also used the *Anomia*, the big 'horse-mussel' (*Modiola*), the common mussel (*Mytilus edulis*), the whelk (*Buccinum undatum*), and periwinkle (*Littorina littorea*). Fragments of the large edible crab (*Cancer Pagurus*) were also present. All the valves of the oysters were separate except such as had been empty, and which still had barnacles or zoophytes in their interior. The mussel and other shells were found in separate nests, and not indiscriminately throughout the mound. Layers of sand were also found among the shells. All the middens observed occur on the bluff itself or just at its base, as if, when it was the limit of high water, the people who formed the middens, after searching the shores during low water, had retreated thither to enjoy their feast while the tide covered their hunting-ground. Few or no oysters are now found in the Forth above Borrowstounness."

The finding of canoes in the Carse-lands is well authenticated. Sir John Clerk in 'Reliquiæ Galeanæ'¹ informs his correspondent that "a very ancient curiosity" was found in the Carse of Falkirk in the month of May 1726. "The washings of the river Carron discovered a boat, 13 or 14 feet underground; it is 36 feet in length and 4½ in breadth, all of one piece of oak. There were several strata above it, such as loam, clay, shells, moss, sand, and gravel; these strata demonstrate it to have been an antediluvian boat.

¹ Bib. Top. Brit., No. II., p. 24.

The tree of which it was made was, no doubt, very big, but still no bigger than one which is yet alive not far from that place, which is about 12 or 13 feet in diameter." To this he adds a cutting from a contemporary newspaper, in which the boat is described as finely polished and having a pointed stem and a square stern. At a later period another writer¹ mentions that a canoe was found near Falkirk, 5 fathoms deep in the clay, and that anchors were dug up in the ground between Alloa and Stirling. These instances are given as a proof, in the opinion of the writer, that these lands were formerly under sea.

Professor James Geikie gives a description of a canoe made of pine-wood found in a brick clay-pit at Friarton, Perth. It lay on its bottom over a bed of peat, underneath 10 or 11 feet of clay, and measured 15 feet in length, 3½ in breadth, and 3 feet in depth. This clay, according to the Professor, belongs to the second series of terraces forming the raised beaches in the carse-lands of the valley of the Tay, rising from 25 to 45 feet above mean-tide mark.²

Another locality which has yielded evidence of the same nature is Lochar Moss, in Dumfriesshire, long utilised as a storehouse of fuel for the neighbouring inhabitants. This moss extends to the Solway, over an area of twelve miles in length and in some places three miles in breadth, with a fall of only about 30 feet. A couplet from an old rhyme, quoted by Sir Daniel Wilson,³—

“ First a wood, next a sea,
Now a moss, and ever will be,”—

reveals the facts, as they appeared to the unsophisticated

¹ Beauties of Scotland, vol. iii. p. 419.

² Scot. Naturalist, vol. v. p. 167.

³ Prehistoric Annals of Scotland, vol. i. p. 44.

peat-cutter's mind, long before they became the subject of geological investigation.

The Rev. James Laurie, writing in Sinclair's 'Statistical Account' (vol. i. p. 160), thus describes the opinion current about this moss in the end of last century: "There is a tradition universally credited, that the tide flowed up this whole tract above the highest bridge in the neighbourhood. In the bottom of the moss sea-mud is found; and the banks are evidently composed of sea-sand. A few years ago a canoe of considerable size, and in perfect preservation, was found by a farmer when cutting peats, 4 or 5 feet below the surface, about four miles above the present flood-mark; but it was destroyed before any antiquarian had heard of it. Near the same part of the moss, and about the same depth, a gentleman found a vessel of mixed metal, containing about an English quart. . . . Antiquities of various kinds are found in every part of this moss where peats are dug, even near its head, such as anchors, oars, &c.; so that there is no doubt of its having been navigable near a mile above the highest bridge, and fully twelve miles above the present flood-mark. Near the manse there is a narrow gut, between two sandy hillocks, called *Collyveat*, supposed to be a corruption of Collin's boat, where it is thought there was a ferry, which indeed would be very necessary, on the supposition of the tide flowing there."

Previous to this Pennant (1772), while passing through the country, took notice of these boats, which he thus describes: "Near a place called Kilblain I met with one of the ancient canoes of the primeval inhabitants of the country, when it was probably in the same state of nature as Virginia when first discovered by Captain Philip Amidas. The length of this little vessel was 8 feet 8 inches, of the cavity 6 feet 7 inches, the breadth 2 feet, depth 11 inches,

and at one end were the remains of three pegs for the paddle. The hollow was made with fire in the very manner that the Indians of America formed their canoes. Another was found in 1736 with its paddle, in the same morass. The last was 7 feet long, and dilated to a considerable breadth at one end; so that in early ages necessity dictated the same inventions to the most remote regions.”¹

Sir Arthur Mitchell² has put on record some interesting observations on the ancient forest of Cree, in Galloway. According to him the mosses of Cree, Carsegown, and Borrow, cannot cover less than 1500 to 2000 acres, and average 7 to 8 feet in depth. The peat lies immediately over the clay, the line of separation being sharply defined. But I cannot do better than quote Sir Arthur’s own words:—

“These trees, which, as far as I know, are all oak, are found in two distinct positions—first, in the channel of the Cree, or projecting into its channel from the banks at the side, many of these last having 10 to 15 feet of sandy clay above those parts of them which are on the bank, and an unknown number of feet of clay below; and secondly, under the peat, on the surface of the clay.

“The existence of this ancient Cree forest does not rest on our finding some half-dozen trunks. You may count them by the hundred, exposed in the bed of the river, between Newton-Stewart and Barsalloch; and you may reckon roots by the score where the moss has been cleared away, near the mouth of the Lorne Burn. I say roots in this case, because such *trunks* as are discovered in peat-casting are carted off at once.”

These trees are described as of great size, and specimens measuring 15 feet in girth and 50 feet in length are not uncommon. The objects which are found with them, or

¹ Tour, vol. ii. p. 107.

² Proc. Soc. A. Scot., vol. v. pp. 20-29.

“in such positions as lead to the possible conclusion that they are coeval with the trees,” are the following: Two canoes, a quern, a Roman battle-axe, a couple of stone celts, and one bronze celt, together with horns of deer and several heads of the extinct Urus. A very large deer-horn was found under 12 feet of clay, along with “some human bones said to have been of great dimensions.” Unfortunately the precise localities where the heads of the Urus were found, whether in the clay or in or beneath the moss, are not given. In commenting on these discoveries Sir Arthur makes the following remarks: “It thus appears that very interesting remains are found in close association with the vestiges of this forest. The country appears to have been peopled when these trees were living. On the margins of this forest man paddled in his canoe, and under the shade of these mighty trees he pursued the red-deer and the Urus. He cultivated corn in the neighbourhood, and ground it; he was of goodly stature, and carried formidable weapons of war. These things at least are possible, if not probable, inferences from the facts I have detailed.”

4. *Canoes found in the Basin of the Clyde.*

It would be too great an encroachment on my space to describe the number of old canoes, and the circumstances in connection with their discovery, which have been disinterred from the basin of the Clyde, in localities now far from the sea and at elevations considerably above its present level.

Mr John Buchanan describes the finding of not less than eighteen in the environs of Glasgow prior to 1854.¹ The first recorded specimen, dating as far back as 1780, was

¹ See Appendix to Smith's *Newer Pliocene Geology*, 1862.

found, in the course of digging the foundations of old St Enoch's Church, lying in a horizontal position and at a depth of 25 feet from the surface. In its interior lay a polished stone celt, figured in Wilson's 'Prehistoric Annals' (vol. i. p. 53). Since 1854 seven additional canoes have been recorded from the bed of the Clyde, five before the 2nd of February 1869, as we find Mr Buchanan referring to them in an address to the Archæological Society of Glasgow of that date (vol. ii. pp. 77 and 121). In this address he said: "The last of the five canoes was found also last summer, a little below Milton Island, near Douglas. It is 22 feet in length and about 2 feet 10 inches in breadth. The interior is well scooped out. Some interesting relics were got inside. These consist of six stone celts, an oaken war-club, and a considerable piece of deer's horn."

In discussing the chronological problems suggested by these Clyde canoes, we must bear in mind that, as boats may be submerged in any depth and become afterwards silted up, their positions afford no reliable data for determining the relative level of sea and land at that time. It is only when they are found deposited in marine beds, now above high-water mark, that they have a bearing on this problem. The "dug-out" does not necessarily carry us back to prehistoric times, as canoes are invariably found associated with crannogs and other medieval remains, so that it is quite probable that some of those found in the Clyde basin may be comparatively modern.¹ But after discounting all such objections, there is no escape from the conclusion that some of them foundered when the sea was 20 or 30 feet higher than it is at present. This was the opinion of Mr Buchanan and other geologists, who had better opportunities than we have of examining the exact details of each discovery.

¹ See notice of the Dumbuck "Crannog" and Canoe, p. 438.

In 1848 Mr Robert Chambers¹ makes the following pertinent observations on the evidence to be derived from the canoes discovered in the Clyde basin up to that time :—

“The situation of the boats found under the Tontine and Trades’ Lands (places within a pistol-shot of each other) is 21 or 22 feet above high-water in the river. It forms part of that extensive plain which rises from the river’s brink to the height of 26 feet above tide-mark, forming the site of the Trongate and Argyle Street, and the numerous streets to the north and south of that line. This plain is composed of sand, as appears whenever the foundation of an old house is dug up. . . .

“The question arises, Are the deposits such as the river, while pursuing in general its present level, could have laid down? The situation, be it remembered, is a quarter of a mile from the river; its superficies is 21 feet above tide-mark, while Mr Robert Stevenson has determined the greatest recorded river floods as only 15. The laminated sands do not, moreover, appear such a deposit as a river flood would bring to the spot, even if it could reach it. It therefore appears that we scarcely have an alternative to the supposition that, when these vessels foundered, and were deposited where in modern times they have been found, the Firth of Clyde was a sea several miles wide at Glasgow, covering the site of the lower districts of the city, and receiving the waters of the river not lower than Bothwell Bridge. We must suppose this to have been a time when already a people instructed to some degree in the arts of life occupied that part of the island. Taken in connection with the whales’ bones and perforated deers’ horns of the Carse of Stirling, the boat and other relics said to have been found near

¹ Ancient Sea-Margins, p. 206.

Falkirk, the human skull at Grangemouth, and the various particulars already cited with respect to the Carse of Gowrie, those Glasgow canoes are objects of much greater interest than any one seems yet to have thought of attaching to them."

5. *Evidence from Raised Beaches, Sand-Dunes, Caves, Rock-Shelters, &c.*

Important information bearing on the problem we are now discussing is occasionally derived from a careful inspection of the sand-dunes, raised beaches, &c., along our shores, which yield flint implements of Neolithic types. I am informed by experienced collectors that such relics are not found on or near the present sea-level, but always at some distance inland, which, in flat districts, may be far from the actual shore. Certainly this is in accordance with the little practical experience I have gained by a few visits to the sand-hills of Irvine in Ayrshire, and Glenluce in Wigtownshire. At the former locality the flint-bearing ground is several hundred yards from the shore, and at the latter the distance is still greater.

Mr Alexander Gray has communicated to the Society of Antiquaries of Scotland (vol. xxviii. p. 263) some notes on a discovery of urns and flint implements in sand-pits within the town of Campbeltown, in Argyllshire, which I claim as strong evidence in favour of the theory of land elevation within the Neolithic period. This town, it appears, is built on deposits of sand and gravel which gradually rise to the old 50-foot beach, and sand for building purposes is continually being excavated at about 30 feet above present sea-level. Reports of finding urns and other relics in these pits induced Mr Gray to keep an eye on the excavations. In the beginning of 1894 a new pit was opened in which an

urn containing some bones was found, without being protected by any cist. While he and others were collecting the fragments of the urn they discovered that the finely stratified gravel, beneath the position in which the urn stood, contained numbers of worked flints, cores, and splinters; from which they concluded it had been the site of an old flint factory.

Subsequently, at Millknowe, in another part of this old sea-beach, and 300 or 400 yards south-west of the sand-pit, similar flint implements were discovered in the beach shingle which was being cleared away to make room for a new bonded warehouse at Albyn Distillery.

“The section,” writes Mr Gray, “as exposed at present, consists of about 3 feet of rich black loam; beach shingle, with a very little sand, 2 feet; a thin dark-coloured band which extends along the face of the section for about 7 yards, and is from 3 to 6 inches thick, thinning out and disappearing on both sides. Below this is about 2 feet of shingle similar to that above. The dark seam is not a former land-surface, as might at first be supposed, but the site of the old flint-working encampment. It is in reality a dirt-band, composed of litter and refuse of all sorts, such as bits of charred sticks, burnt bones, and innumerable chips and splinters of flint, the latter all quite sharp and unworn. In some spots the dirt has actually a greyish, pepper-and-salt appearance, from the great number of minute bone fragments which exist in it, in the last stages of decay. To separate them from the other material is generally quite impossible, as they are mostly so small and so far gone that a good lens is necessary to convince one that they really are bone. From this dirt-band I took the full of a large zinc bucket, not selected, but filled with the shovel, and carefully washed it out. I found that at least 80 per cent of the total bulk was made up of

the ordinary shingle, and from the remainder I picked out 498 pieces of flint, mostly very small chips and scales, such as fly off during the process of breaking. A few were between 1 and 2 inches long, and seemed to be broken or spoiled arrow-points, knives, or flakes which had been rejected. Besides the flints, I succeeded in finding about eighty fragments of bones, in a sufficiently sound condition to stand washing, among them being two of what I took to be the vertebræ of a small fish. The others seemed to be the bones of larger animals, but are, I am afraid, too small for recognition. The better-preserved fragments look as if they had been burned; the mouldering bits which fall away on being touched have no such appearance. Of small bits of burnt sticks I picked out 104, but a great deal of this material went to mud in the washing, so that the quantity found bears an insignificant proportion to the total amount which must have been present. A number of those picked out seem to be parts of very small twigs or branches. The evidence here adduced, together with the fact that the dirt-band is not continuous—as it would be were it a former land-surface—but a mere isolated though large patch, in the midst of the ancient beach, proves beyond a doubt that this is the spot on which the Palæolithic (*sic*) men camped for a time, and dressed the flints, the refuse of which still remains mixed up with the general camp *débris* to attest their presence there. The flint-bearing gravel above the dirt-band shows that the site was probably that of a summer encampment, over which the storms of winter had washed the layer of flint-strewn gravel, and thus preserved to us the old camp-floor, which otherwise might have been entirely obliterated. All through the beach which has been cleared away, and at frequent intervals, the workmen found little nests of a similar black material, generally with a few larger stones lying in

and around them. A good many of these stones were angular lumps of the ordinary vein quartz from the schist of the neighbourhood, which have lost their natural glassy semi-transparency, and taken on that opaque dull-white appearance, with all their natural seams opened up, and of that peculiar rusty-red colour, which indicates severe burning. It is quite evident that they had been built up to form the backs and sides to the old camp-fires, of which the black sooty material in which they now lie is the only remains. The total absence of even the smallest bit of pottery is very remarkable; and still more remarkable is the absence of shells, of which not a fragment has yet turned up, and no recognised article of human manufacture except the flints has yet been found."

It is impossible not to recognise the force of Mr Gray's arguments in support of his opinion, that this was an encampment of people of the Stone Age, who here congregated for the purpose of manufacturing such implements and weapons as were required in their various social or warlike duties.

Evidence of similar encampments—fireplaces, flint chips, and other refuse of occupancy—has been observed on Shewalton Moor, freshly exposed by the shifting sands.¹

After discussing the various theories to account for the presence of flint nodules in the gravels of the district, Mr Gray comes to the conclusion that these flints could not have been obtained from local sources, and that consequently they must have been imported in canoe-loads.

But the significant feature of Mr Gray's discovery as regards this inquiry is that, while the settlement was in existence, the waters of the Campbeltown bay washed the

¹ Annals of Kilmarnock Glenfield Ramblers, 1893-94; and Ayr and Gal. Arch. Assoc., vol. vi. p. 77.

surrounding shores some 30 feet higher than they do at the present time.

In 1883 I contributed to the collections of the Ayr and Galloway Archæological Association (vol. iv. p. 1) notes on the discovery of five bronze celts, of an early type (fig. 20), found in an excavation near the shore of a little bay called the “Maidens,” in the vicinity of Culzean Castle, Ayrshire. While clearing out

the foundations for building a shipyard the workmen had to slice away a portion of a whinstone rock which projected into the area of the proposed building, and at the lowest part of the trench they came upon the celts and a bronze ring which had apparently bound them together. They had been inserted into a cleft in the rock facing the sea; and this cleft had been subsequently covered by 2 feet of sea-gravel, apparently thrown up against the rock by the action of the waves. Over this gravel there was a deposit of surface-earth also 2 feet thick.

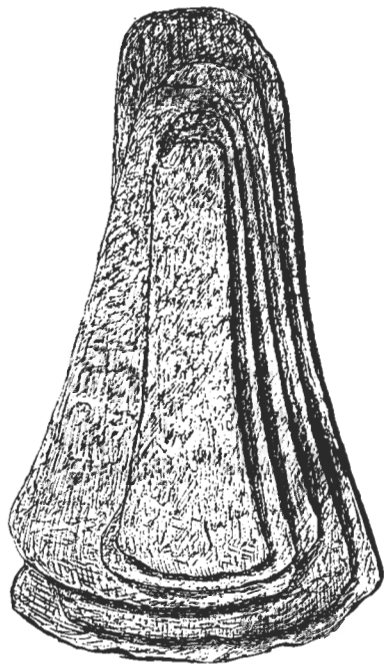


Fig. 20.—Five bronze celts found together at the “Maidens,” Ayrshire ($\frac{1}{2}$).

The present high-water mark was ascertained by measurements to be 100 yards distant from the spot where the bronze implements had been concealed, and 25 feet lower in level. I visited the locality along with the Marquis of Ailsa and Mr Smith, his factor, a few days after the discovery; but before this, and indeed before the implements were found, the soil and gravel in front of the rock, as well

as a portion of the rock itself, had been removed. After a careful inspection of the spot and inquiries of the workmen into all the circumstances, the conclusion to which we came was thus recorded: "Unless, therefore, there had been a vertical slit in the rock, of which there was no indication whatever, it is difficult to form any other opinion than that the ledge of rock under which the celts were concealed was, at the time of their deposition, open towards the shore; and that the waves subsequently dashed against it with sufficient violence to cover up the opening of the crevice with a portion of this coarse gravel. Since then, however, the tide has gradually receded, either in consequence of the accumulation of detritus or of a general rising of the sea-beach. Curiously enough, the position of this find coincides with the latest and best-defined of the ancient sea-margins or raised beaches, the remains of which are so conspicuous in the south-western districts of Scotland."

The interpretation of the phenomena of raised beaches is, however, so liable to error, owing to the number and variety of minor details which have to be considered, that great caution is necessary in accepting such conclusions as evidence of alteration in the relative level of sea and land.

To the caves along our shores, ascertained to have been occupied by man, we naturally look for some additional scraps of information on this subject. We know, however, of very few caves which have been so used, at least as early as Neolithic times. A cave becomes habitable by man only after the retreat of the sea, and such an incident as a storm causing the waves to enter it synchronously with man's occupation, as was the case in the MacArthur cave at Oban, must of necessity be a most unusual occurrence. Most of those which have hitherto been examined prove by their relics that they became inhabited in post-Roman times.

Such was the case with the Borness cave in Kirkcudbrightshire.¹ The floor of this cave stands 19 feet above the present high-water mark, but we have no means of associating the work of man with that of the sea.

In 1847 a cave near the mouth of the North Esk, in Kincardineshire, was discovered and reported on, first by Mr A. Bryson,² then by Mr W. Beattie,³ and lastly by Dr Howden, in 1866.⁴ According to Dr Howden the entrance to the cave, which faces the south, is about half a mile from the estuary of the river, and 15 feet above high-water mark. It contained a mass of *débris*, including bones of various animals, as well as some relics of man. Among the latter were an amulet formed of the leg-bone of an ox, four chain plate bolts, "evidently belonging to a small craft of about 100 tons," and the remains of an iron harpoon or spear. An inner compartment of this cave contained only remains of marine mollusca—a fact which, says Mr Bryson, "seems certainly to indicate the presence of the German Ocean 12 feet above its present highest spring-tide." Notwithstanding the preciseness of this statement, it is more probable that these shells were merely a portion of the refuse-heap from the outer cave, so that no conclusion can be drawn from the facts as regards land elevation.

Mr J. W. Laidlay, in describing an early habitation and kitchen-midden on the "Ghegan Rock," near Seacliff, East Lothian, which yielded a few relics of late-Roman times, concludes by observing that this discovery goes against the supposed rise of the neighbouring coasts within the historical period. "Against this theory," Mr Laidlay writes, "the

¹ Proc. Soc. A. Scot., vol. x. p. 483.

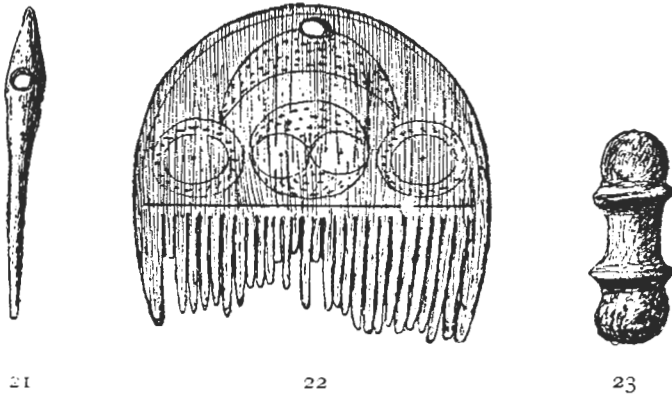
² Edin. New Phil. Journal, vol. 49, p. 253.

³ Brit. Assoc., Aberdeen, 1859, p. 99.

⁴ Proc. R. Phy. Soc., vol. iii. p. 368.

dwelling on the Ghegan seems to me a cogent protest; a very inconsiderable depression of the rock would render habitation there simply impossible." The foundation of the dwelling stood 22 or 23 feet above sea-level, and the author assumed the relics to be of "an age not later than the Roman, possibly before it, but extending to it, as the large vase would seem to show."¹

The site of this habitation is interesting as showing the foundation of a rude rectangular building of undressed stones without mortar. It presented a front 39 feet long, and a breadth of 26 feet at one end—the other corner being



Figs. 21-23.—1 needle, a comb, and an ornament of bone found on Ghegan Rock (3).

demolished. From its position at the base of the slanting side of the rock, it became covered up in the course of time with 3 to 4 feet of soil. The relics are of the kind usually found on Romano-British sites, comprising fragments of a large Roman jar, and of other pottery; a bone needle (fig. 21), and some bone pins and implements; fragments of toilet combs, one double-edged made of plates fixed with iron rivets, and another highly ornamented (fig. 22); a curious ornament of dark bone (fig. 23); a small crucible; a polished

¹ Proc. Soc. A. Scot., vol. viii. p. 377.

disc of serpentine, one inch in diameter ; the upper and lower stones of a quern-mill made of gneiss, &c. Also teeth and bones of ox, horse, sheep, goat, pig, deer, dog, &c., and a variety of sea-shells of the edible species.

Mr John Smith¹ has excavated the *débris* of human occupancy in a rock-shelter close to the Ardrossan Railway Station, the result of which, he thinks, "demonstrates" a rise of "many feet" in the Ayrshire coast since the rock-shelter was first frequented by man. The shell-heap rested on a raised beach of sand and gravel containing rolled shells. The evidence of alteration in the relative level of sea and land is thus stated by the investigator : "That this place had been occupied by man shortly after the waves left it was clearly evident, as there had only been time sufficient for a layer of earth, little more than *half an inch* in thickness, to form on the top of the gravel, nor had there been time for any talus of fragments from the rock-face to gather upon the gravel before the inhabitants began to throw down the shells and other *débris* upon it. In fact, the talus of rock-splinters was formed *on the top of the mound*, as will be seen from the cross-sections, demonstrating at once its antiquity, and affording some guidance to the time of its commencement. Another point in favour of its antiquity is the fact that many specimens of a spiral mollusc, *Trochus lineatus*, were got in the mound, and must have been common on the then existing shore. This mollusc is now extinct in the Clyde and in the West of Scotland, and has only been found in the Clyde district before as a *fossil*, Mr David Robertson having got it in the Raised-beach strata of Millport."

The land animals represented in the food-refuse, all of which belong to the ordinary Neolithic fauna, are of no special interest beyond the fact that they include the beaver.

¹ Ayr and Gal. Arch. Assoc., vol. vii. p. 60.

It is somewhat startling to find that these people were not only cannibals but made implements of human bones. "A great many jaws with teeth," writes Mr Smith, "and bones were obtained, all the latter which had contained marrow having been split open. Under the ledge of rock at a point *a*, and imbedded in the mass of shells, was a human upper jaw without teeth, which had evidently been knocked out with a stone, splinters of the jaw having been broken off in the process. On finding this grim relic my first impression was that the people who lived here had been cannibals, the jaw having evidently been thrown in the most matter-of-fact way on the general shell-heap, while, probably, the teeth had been kept to make a necklace or other ornament. Further evidence, however, obtained during the exploration, showed that, although the mound-men had feasted, probably during 'hard times,' on their own species, they were not habitual cannibals, for the whole human remains obtained seemed to show that not more than two human beings had been devoured." Part of a human lower jaw was got in a mass of shells cemented together into a stalagmite "about a foot above the Raised-beach bed; it had three well-preserved teeth. Near the top of the same bed a well-made diamond-pointed bone chisel, a rude implement made of a human bone, and several human vertebræ, were obtained." Of implements only a few bone pointers or awls are recorded.

From these and other considerations it is manifest that in attempting to account for land oscillations we have to deal with a complicated series of phenomena, probably due both to astronomical and terrestrial causes. It is therefore not impossible that while a submergence followed by a re-elevation of the land has occurred over an extensive area corresponding with the glacial and interglacial epochs, other local disturbances may have been going on which would

considerably modify the effects of the former. The hypothesis that the 50-feet raised-beach was contemporaneous with the last glacial epoch (an event which, according to the astronomical theory, occurred about 11,000 years ago) admirably harmonises with the recent chronological deductions founded on the archæological remains in the rock-shelter of the Schweizersbild in Switzerland.¹ We have no means as yet, so far as I know, of dating the first appearance of Neolithic man in Britain. It is, however, a significant fact that the remains of his handiworks have been found in the submerged forests of the south of England (Quart. Jour. Geo. Soc., 1865; *Early Man in Britain*, p. 248) and in the raised beaches of Scotland; but, although it was probably the same land oscillation which depressed the one and elevated the other, we cannot at present identify this earth movement with any archæological phenomena which have been dated.

¹ See *Journal of the R. Arch. Institute*, vol. lv. pp. 259-285.