

III.

FINAL REPORT ON THE BORNESS CAVE EXPLORATION. By
W. BRUCE CLARKE, M.A., M.B., F.S.A. SCOT. (PLATE XXXI.)

After a lapse of nearly three years the excavation in the Borness Cave has been again commenced, and was, after nearly two months' work, brought to a successful termination.

The mode of working, based as it originally was upon that which is employed at Kent's Hole, near Torquay,¹ has undergone considerable modification, not to say complete revolution. The hardness of the materials to be worked upon, their mode of formation, and the impossibility of accurately adhering to such minute subdivisions, coupled with the experience of the exigencies of this particular cave, may perhaps be considered as a sufficient excuse for the departure from so excellent a model.

Up to the year 1876 only 3 feet had been removed from the surface of the cave, and each square yard had been kept separate. But last summer, all that it was possible to ensure was that not more than a foot in depth should be removed at one time; in other words, that articles from different levels should not be placed together.

An additional layer, 1 foot in depth, was removed to start with. This, curiously enough, seemed to exhaust almost entirely the cave earth

¹ In the case of Kent's Hole, the mode of working by subdivisions was applied to the cave earth situated below the stalagmite, and not to the more recent soil above the stalagmite, which probably corresponds more nearly with that of the Borness Cave.

properly so called—that is to say, the dark mould which contained so large a proportion of organic matter.

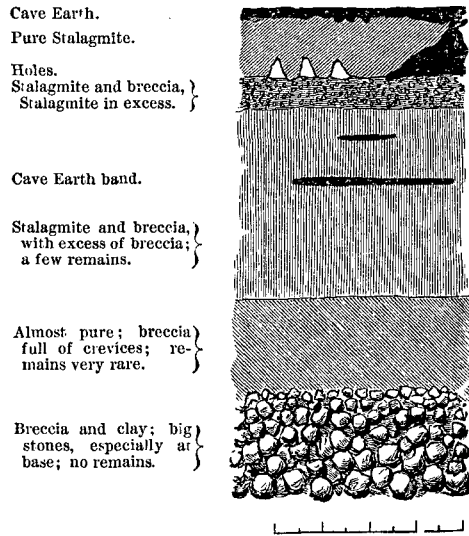
No sooner was this completed than all energies were immediately directed to the large rampart of breccia and stalagmite, which blocked up the mouth of the cave, and had before defied all efforts to remove it successfully. However changeable the rampart was in appearance, or varying in its mode of formation, in one point it remained unalterable, viz., in the difficulties which its removal presented. Here and there, it is true, occasional bones, pieces of charcoal, and even bands of cave earth an inch or more in thickness occurred, but by far the greater portion was composed of a most intractable stalagmite and breccia, and it was only after repeated blasting with dynamite and cotton gunpowder that it was able to be broken up.

In the cave earth, which was removed during the earlier excavations, several bands of stalagmite, varying in hardness, but usually soft and friable in character, had been noted; but it was only in the course of blasting the rampart and breccia that the significance of these bands was brought more forcibly into notice. In the rampart, this state of things was quite reversed; instead of cave earth with very thin intervening bands of soft stalagmite, the hard stalagmite was here and there separated by thin bands of cave earth usually very limited in their extent. The most remarkable, however, of these bands occurred at a depth of about 7 feet from the surface of the rampart; but inasmuch as this band was approximately horizontal, and as the cave earth originally sloped backwards from the mouth, it was only 5 feet from the original surface of the cave earth further in. It reached some 15 feet back into the cave, and was by far the most important of these layers which were encountered. Altogether about seven or eight of them were met with during last year's excavations, at intervals varying from about 4 to 18 inches apart.

As the work at the rampart was by no means rapid, and in order first to test the nature of the rampart, one-half was only attacked to begin with. Soon the level of the terrace in front of the rampart was reached, but the cave bottom showed no signs of an appearance, and so the excavation was continued further. Instead of finding, as was at first anticipated, that but 9 feet of rampart had to be removed, when the excavation had reached a depth of 20 feet still no bottom was discovered. Long before

this, however, all organic remains showing signs of previous inhabitation had ceased to be discovered. After passing below a depth of 7 feet, charcoal and other signs of human occupation became rare, and at length, when a depth of 14 feet was reached, not a trace of implement, bone, or charcoal was discovered. No implement has occurred at a greater depth than 5 feet.

How the rampart varied in structure is best seen by the annexed vertical section.



Scale, eight feet to an inch.

It is perhaps remarkable that the transitions of structure are in most cases so sudden. This is most markedly so where the pure stalagmite at the top gives place to a mixed form of stalagmite and breccia, but to a less extent where the stalagmite passes into the pure breccia.

At this part of the deposit, viz., at a depth of about 12 feet, holes were of frequent occurrence, the rampart was anything but homogeneous in structure, so much so that once a broom handle could be passed downwards to a depth of over 3 feet.

It may be well to bear this fact in mind, since it is quite possible that some of the scanty remains which occurred at these levels may have found their way down by the aid of these crevices. Below a depth of 7 feet only some thirty or forty pieces of bone have been discovered, and not one of them varies in any degree from the forms which occur at the higher levels. That they have not found their way to the situation in which they were discovered during the course of the actual excavation is shown by the fact that they form part and parcel of the breccia itself, and were found without any exception cemented in their places; but this fact does not militate against their having dropped into the crevices during the period of cave occupation.

With a view to determine as far as possible the origin of the cave earth, and to throw further light upon the deposit, some analyses of the cave walls and stalagmite have been made, of the former by Mr W. Keep, and of the latter by Mr E. Smith, F.C.S.

Analysis of the Cave Walls.

Specimen A contained—

- (1.) A large proportion of CaCo^3 . (This occurred chiefly as a white efflorescence.)
- (2.) Silicates of alumina, lime, and magnesia (chiefly, if not entirely, from fragments of the wall attached to the specimen in question).
- (3.) FeO and Fe_2O_3 . (Protoxide in great excess.)
- (4.) Traces of P_2O_5 and SO_3 , probably in combination with Ca and Mg and a considerable quantity of free SiO_2 .

Specimen B contained—

- (1.) Silicates of alumina, lime, magnesia, potash, and soda.
- (2.) A large quantity of Fe_2O_3 .
- (3.) A trace of P_2O_5 , and a considerable quantity of free silica.

N.B.—This specimen was yellow and ochreous in colour, and crumbled up readily.

Specimen C.—A soft, grey, clayey substance, greasy to the touch, very similar in composition to the walls of the vein, and probably nothing but a decomposed clay slate. It contained—

Silicates of Al_2O_3 , MgO , &c.

Specimen D.—A dark, red, brown crumbling substance, the powder of which was of a buff colour, and had a slight coating of crystalline matter.

It contained—

- (1.) A trace of CaCO_3 .
- (2.) Silicates of Al_2O_3 , CaO , MgO , &c.
- (3.) A large proportion of oxides of iron.
- (4.) A considerable quantity of MgO (as silicate).
- (5.) Considerable quantities of SO_3 , P_2O_5 , and SiO_2 (free).
- (6.) Arsenic (responded readily to Marsh's test).

Specimen E.—An undecomposed clay slate, hard and compact. It contained—

- (1.) Silicates of Al_2O_3 , MgO , CaO , K_2O , Na_2O .
- (2.) A small proportion of Fe_2O_3 .
- (3.) P_2O_5 not in large quantity.

The Fe_2O_3 here present is contained *in* the specimen and is not adherent.

(Signed) WILLIAM KEEP.

Analysis of Stalagmite.

	α .	β .
Carbonate of lime,	94·80	99·10
Water,	2·50	...
Carbonate of iron,	·85	...
„ magnesia,	·34	·36
Chloride of sodium,	·15	...
Silica,	·50	·54
Organic matter and loss,	·86	...
	100·00	100·00

The organic matter is quite amorphous.

(Signed) EDWARD SMITH, F.C.S.

From the analysis of the stalagmite, it appears that it does not differ essentially from ordinary stalagmite. It may well have had its origin in the veins of the rock which were alluded to in a former paper.

Several of the rock specimens, it will be seen, were in a crumbling condition, that is to say, they were already in an advanced stage of decom-

position, and on their way to form the cave earth, which so largely owes its origin to similar decompositions.¹

In a previous paper the suggestion was thrown out that the Borneess Cave was situated on the 25 feet beach line. This was based upon the supposition that the cave earth reached only to a depth of 9 feet. But as has been shown by last year's work, the cave floor is far deeper. Instead of being reached at a depth of 9 feet, when the excavations were carried to a depth of 20 feet, and that on the side of the cave where from the dip of the strata the bottom would be soonest discovered, the native rock was not struck.² At this level the stones and rocks were just such as would be washed into a cave exposed to the full violence of the waves. It appears, then, that the age of the formation of the cave is more recent than was originally supposed.

Implements.

The implements which the excavations of the past year have brought to light differ but little from those which have already been described in their general character, though a few display individual peculiarities. One point must be laid special stress upon.

During the first year's excavations in the A layer, half a bone implement³ was discovered; this year in the D layer, close under the right hand wall of the cave, the other half of the same implement was turned out. It fitted the previously found half exactly. In reference to this fact the following note was made at the time of the discovery, and is quoted verbatim from the working note-book: "It must be borne in mind that this part of the right wall of the cave is somewhat fissured, and that possibly the separation of the two halves of this implement is to be accounted for by this, the second half, having slipped down into the crevices at the side of the cave." However, be the explanation what it may, the fact is a certainty.

¹ For further information on this subject consult Bischof's "Chemical Geology" (translated by the Cavendish Society), vol. i. p. 53 *et passim*.

² The excavation on this side of the cave was so barren in its results that it was not considered necessary to carry the operations any further.

Vide "Proc. Soc. Ant. Scot." vol. x. pl. xxi. fig. 6.

Explanation of Plate.

- Fig. 178. Net weight of brown sandstone.
,, 188. Link or handle (so-called).
,, 190. Implement. Use ?
,, 196. Perforated bone. Use ?
,, 198. Perforated head of femur.
,, 208. Cut and rubbed piece of antler.
,, 209. Polished bone.

Bones.

The bones, too, present no peculiar features. They are much the same as those already described. It is, however, worthy of remark that no pig bones were found in the lower levels, those of ox and sheep being the principal ones.

Another portion of human skull has been discovered about 4 feet under the original surface of the cave floor, and almost vertically under the datum peg, consisting of the parietal bone of a child. The bone evidently belonged to a child differing little if at all in age from that to whom the previous skull bone belonged. The previous portions, it will be remembered, were found at a depth of 3 feet 8 inches and 4 feet 2 inches respectively, and within a few feet of the same spot. They all three are undoubtedly contemporaneous with the stalagmite, and could by no possibility have fallen through cracks and crevices into the positions in which they were found.¹

¹ It may be well to mention here that there are several caves along the shores of Kirkcudbrightshire analogous in many respects to the Borness Cave. Some of them are far finer in dimensions and far grander in their situation than this. In every one of some six or seven along the Muncraig shore some sheep or ox bones similar to those from the Borness Cave have been found. It needs but five minutes' examination to assure oneself that they, like the Borness Cave, were formerly the home or refuge of some ancient Scottish family. These remarks are made in the hope that some one may perhaps be induced to make further investigations in them, and so throw more light on the cave inhabitants of the south-west of Scotland.

Charcoal.

Several more species of wood have been identified by Professor Carruthers, F.R.S., of the British Museum. They are here appended :—

Quercus Robur.	Corylus Avellana.
Salix (sp. ?).	Fagus sylvatica.
Pinus sylvestris.	Erica vulgaris.
	Fraxinus excelsior.

It remains, now, to consider more in detail the facts that have been elicited during the Bournemouth Cave explorations.

Since the excavations have been carried to a depth of 20 feet, it is evident that the bottom of the cave cannot be situated much above the level of the present high-water mark, and may perhaps be far below it, so that no great antiquity can necessarily be inferred from its position.

But there are some caves along the shore into which the sea at present finds a ready access, and others also in process of formation. The circumstances which have led to the filling up of this cave, and to its subsequent habitation, are undoubtedly due to the local peculiarities of its position.

Situated at the extremity of a shore ravine, which is bounded at one end by the cave itself and at the other by the sea, this cave enjoyed advantages which have ensured the perpetuation of its remains. The fragments of rock which have from time to time fallen from the sides of the ravine have by degrees blocked it up and formed a breakwater, which has protected the cave from further inroads of the sea.

Thus protected, the rock remains and beach pebbles, such as have been found at the lower levels, accumulated at its mouth, *débris* fell from the roof, and a soil was formed, the natural resultant of such material. When this was partially cemented together by the drippings from the roof, man first selected it as a place of habitation, as is shown by the layers of charcoal and bones which occur even in the middle of the rampart. A period of cessation from habitation then occurred, during which time more rampart was formed and more soil was accumulating. And this process was several times repeated, until at length man took it up as a fixed place of residence. Before this, however, the majority of the present rampart was formed, and stood out above the rest of the cave

floor. The cave then remained inhabited for a considerable period of time, long enough to accumulate three or four feet of cave earth, with its necessary accompaniments, in which soil the bulk of the remains have been found. And this, be it remembered, is darker and more like peat in character ; it owes its origin only to a very small extent to cave roof *débris*. Stones found in its middle were evidently used to make a fire, and their shape and form proclaims that they were brought in from the neighbouring beach.

But what age can be assigned to these materials is the next question for inquiry.

The bones themselves afford no great indications of age. They might, so far as the animals go, have been deposited certainly within the last hundred years. The sheep which occurs in the cave was probably a native of the Lowlands a hundred years ago, as it certainly was of the greater part of the Highlands so late as 1820 or 1830.¹

The ox is almost identical with the Galloway cow of the present day. The pig, though hardly the domestic pig of the present, does not necessarily imply any great antiquity ; and similar remarks apply to the other animals.

The graphic descriptions of the smuggling in the Scottish caves in "Guy Mannering" might tempt one to place a date as late as the last century for such remains, more especially as Brighthouse Bay, but a mile off, was a noted smugglers' rendezvous ; but the rest of the remains tell a different tale. Nor can the Covenanters, little more than a century further back, lay claim to the accumulation of any large share of the cave remains, if indeed they can to any.

To the argument of antiquity, derived from the accumulation² of

¹ I state this on the authority of a Perthshire shepherd, from whom I gained much information as to the Scotch sheep breeds. I am at present engaged in further investigations on the same subject.—W. B. C.

² It must here, however, be added that Mr Hunt, after a most careful examination of the case, has come to the conclusion that the amount of stalagmite is an evidence of considerable antiquity ; and that it is so, because there is not sufficient lime in the rock of the district to account for the rapid formation of the stalagmite. That this is a difficulty I admit ; but the occurrence of stalagmite in nearly all the caves of the neighbourhood affords, I think, evidence of lime sufficient for its rapid formation.

stalagmite, I attach no great importance. Whatever value may be attached to depth of deposit over large areas as a test of age, but little reliance can be placed on deposits over small spaces of ground. The phenomena observable at numerous so-called dropping wells should place us on our guard against any such error. Sticks at such places are coated an eighth of an inch in thickness in a few months. And, as tending to show that the deposit of stalagmite in this instance was not of slow growth, the occurrence of a cast¹ of a piece of stick in its centre may be mentioned. Had the deposit been a slow one, the stick not submerged in water, but exposed alternately to wet and dry, damp and cold, must have rotted long before it could become embedded. As it was, it became rapidly covered over, and by the subsequent percolation of the water through the porous stalagmite, was gradually dissolved out, leaving only a cast to mark its former situation.

The argument for antiquity rests on other grounds than these.

The analogy with the remains of the Settle caves has been pointed out in an earlier paper.

The enamels of which the Borness Cave shows but a trace have been shown to have their nearest analogy in the Irish illuminated gospels;² and this, coupled with the remarks of Philostratus, to the effect that such enamels were made by barbarians living near the ocean, forces us to place the bulk of the remains in no very recent times. And the same remark applies equally to the Samian ware.

But though an analogy exists with the Settle cave remains, it is only with the deposits of the upper part, those to which Professor Boyd Dawkins has given the name of Brit-Welch, and which afford evidence as to a considerable amount of civilization. The Neolithic and Paleolithic periods are here unrepresented; because, as has just been pointed out, the cave itself, which is among the later remains of the post-Glacial period, is not old enough for such deposits.

It remains, then, only to examine the historical evidence of civilization.

The resumé of the early history of Britain given by Professor Boyd Dawkins³ is almost as applicable to the history of Scotland as it is to

¹ This specimen is sent to the Museum.

² *Vide* "Cave Hunting," p. 103 *et seq.*

³ *Vide* "Cave Hunting," 1874, p. 103 *et seq.*

that of England, with this exception only, that the further north we go the less is the mark of Roman civilization to be seen.

Let us briefly survey the history of Scotland¹ of this period.

During the years A.D. 43 to A.D. 79 the subjugation of England, as we now understand the term, was advancing. The Brigantes, Silures, and OrdoVICES were each in their turn brought under subjection; but it was not until the summer of 79 A.D., in the second campaign of Agricola, that Scotland was entered. Agricola then entered the south-west parts of Scotland by the way of the Solway Firth, the expression of Tacitus, "oestuaria ac silvas ipse proentare," undoubtedly referring, as Mr Skene remarks, to these shores. But this passage has a peculiar interest in connection with these shores, as the nature probably of these woods has been elucidated by an examination of the charcoal from the cave. Further than this, the numerous camps and stations of Galloway, both Roman and British, testify to the struggle which was then being fought out.

By A.D. 81 Agricola had fortified the line from the Forth to the Clyde. In A.D. 86 he was recalled, and from this time till the time of Hadrian, in A.D. 120, no serious attempt was made upon Scotland. It was in that year that Hadrian constructed his wall between the Tyne and the Solway. Thus up to this time Galloway had tasted but little of Roman civilization.

In A.D. 139 the wall of Antonine was constructed from the Forth to the Clyde, and Galloway was placed once more under Roman rule. No sooner was this wall constructed than it was again broken through by the incursions of the Picts.

In A.D. 208 the wall of Severus was constructed; but, notwithstanding its prodigious dimensions, the Scottish lowlands were often ravaged by their northern neighbours.

In 409 A.D. the Roman legions were finally withdrawn, so that it must have been mainly during the two centuries comprised between 208 A.D. and 409 A.D. that the inhabitants of Galloway were imbued with the Roman civilization.

But it was most probably, as Professor Boyd Dawkins has shown in the

¹ For this account of Scotland I have made frequent use of "Celtic Scotland: a History of Ancient Alban," by W. F. Skene, vol. i. 1876, p. 33 *et seq.*

case of England, about the early part of the fifth century that the inhabitants of the country, which was evacuated by the Romans, had to betake themselves to caves to escape from their enemies; and the peculiar advantages of the Borness Cave for such a purpose, invisible as it is alike by sea or land, have before been alluded to. It is at this period, as Mr Skene¹ remarks, that "deserted almost entirely by continental historians, and deprived of the clue which any connection with European events could afford, we are left for the history of this interval to the uncertain guide of tradition," &c.

Four nations at this time vied for the possession of Britain,—the Britons, the Picts, the Scots, and the Saxons. Of these the two latter were foreign settlers. The Saxons, or Angles, broke in upon England from the Continent; and the Scoti came from Ireland, assailing Scotland from the north-west, *i.e.*, Ulster, which at that time went by the name of Dalriada. For the fact that the Scoti were not the original inhabitants of Scotland we are indebted to the chronicles and memorials of Scotland.²

But other facts speak to an Hiberno-Scottish invasion; it will be remembered that the flint flake which was found in the cave was suggested by Professor Geikie to be probably of Irish origin. And, in addition to this, the undying testimony of language speaks in the same direction. The Dalriadae have left the name Dalry to testify to their former presence in south-west Scotland.

In 606 A.D. Bede informs us that Galloway was inhabited by the Niduari Picts; and, according to the same authority, it was about the year 650 A.D. that Osuin, king of the Angles, defeated the Picts and Scots, and possessed himself of what is now Kirkcudbrightshire.

In 672 A.D. the Picts revolted with some success in the more northern parts, but Galloway remained in the possession of the Saxons.

It appears, then, that we must fix the date of occupation of this cave as most probably between the year 409 A.D., the withdrawal of the

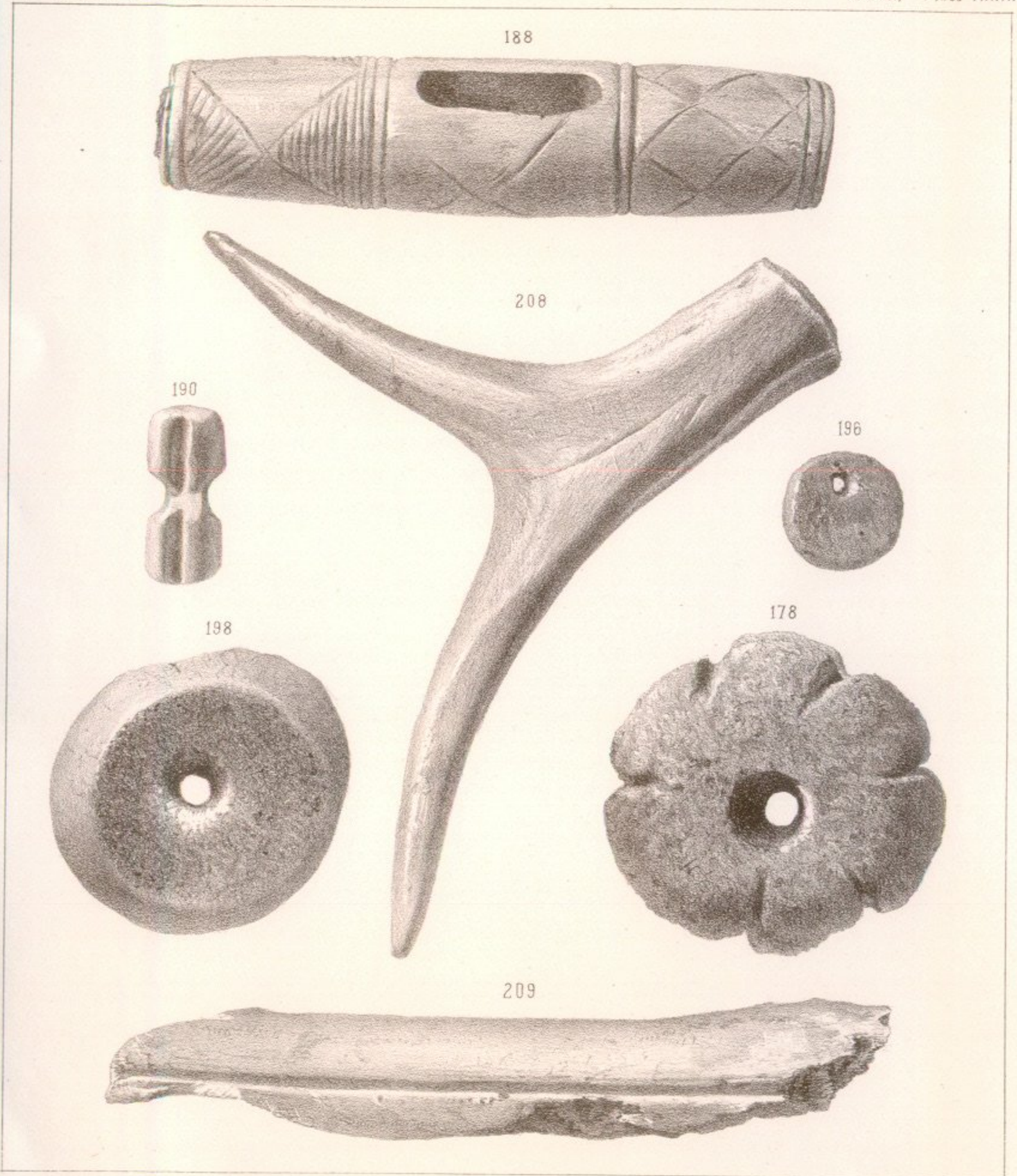
¹ *Post cit.*

² "Legimus in historiis et in cronicis antiquorum Britonum, et in gestis et annalibus antiquis Scottorum et Pictorum, quod illa regio, que nunc corrupte vocatur Scotia, antiquitus appellabatur Albania," &c. *Comp.* "Chronicles and Memorials of Scotland," by W. F. Skene, p. 135; "Description of Scotland," MCLXV.

Roman legions, and 650 A.D., the Saxon conquest of these parts, since the former date was the latest at which Roman civilization could have been introduced, and the latter date must most probably have witnessed its final overthrow and destruction.

To such a conclusion, too, as we have just seen, the remains point as well. Coins are not present to aid us as in the Settle cave. The enamels are scarce, and present but the barest trace of any such substance; and of bronze inlaid with silver there is none. Of iron, merely rusted fragments have been discovered, which have lost all trace of their original shape. But the Samian ware, though one piece only has been found, affords a world of evidence: it undoubtedly places the date as Roman, or shortly post-Roman, and to a similar conclusion the bone implements and enamels also lend testimony.

The paucity of such remains need not be a cause of surprise, if the frequent incursions of the Picts, even throughout the Roman occupation, be recalled; we shall rather be surprised that so much has survived as to enable us to form even an approximate estimate of the cave date, when we reflect on the Pictish ravages and the subsequent occupation of Galloway by the Saxons.



IMPLEMENTS of BONE & STONE From the BORNESS CAVE.
(Actual Size.)