

II.

CAVE EXCAVATIONS IN EAST FIFE. BY A. J. B. WACE AND PROFESSOR JEHU. WITH DESCRIPTIONS OF THE ANIMAL REMAINS BY PROFESSOR J. C. EWART, M.D., F.R.S., AND JAMES RITCHIE, M.A., D.Sc., ROYAL SCOTTISH MUSEUM.

The excavations described in this report form part of an attempt to explore the Fife coast from St Andrews to Crail. The Court of the University of St Andrews most generously made grants of money to defray the expenses incurred.

Two caves were explored, the Kinkell Cave, near St Andrews, and Constantine's Cave, near Fife Ness. Both have been eroded by the sea in the Calciferous Sandstone Formation prior to the emergence of land, evinced by the 25-foot raised beach on the upper margin of which they lie. This raised beach records an uplift of land after the appearance of Neolithic man in Britain.

I. THE KINKELL CAVE.

In the early summer of 1913 we examined this cave, and Mr Farmer, the owner, courteously gave us permission to excavate. Work began on May 20th and continued till June 12th. The obligation under which we were laid of conducting the work so as not to injure the amenities of the site, restricted somewhat the progress of the operations and rendered a complete examination impossible.

The cave lies on the cliffs about 2 miles S.E. of St Andrews and looks on to the sea facing N.E. (fig. 1). Some way in, the floor stands about 25 feet above high-water mark, but just at the entrance it is considerably higher owing to the fall of rock *débris* from above. The cave is about 15 feet wide and 80 feet long, but at the extreme end it tapers off along a bedding-plane in the sandstone. The floor has a double slope, one from north to south due to the pile of fallen rubbish at the entrance, the other from west to east due to the angle of dip of the sandstone beds. At the mouth the fallen *débris* is piled up so high on the west as almost to obliterate the entrance, but on the east it is considerably lower and thus affords access to the interior. Outside, the ground falls away steeply to the modern beach below. Within the pile of rubbish at the west end of the entrance we found a rough dry wall which had no solid foundation. This seems to be of modern date.

A trench was dug at the eastern, or low, side of the mouth, cutting into the cave from north to south. This trench was sunk to a depth of

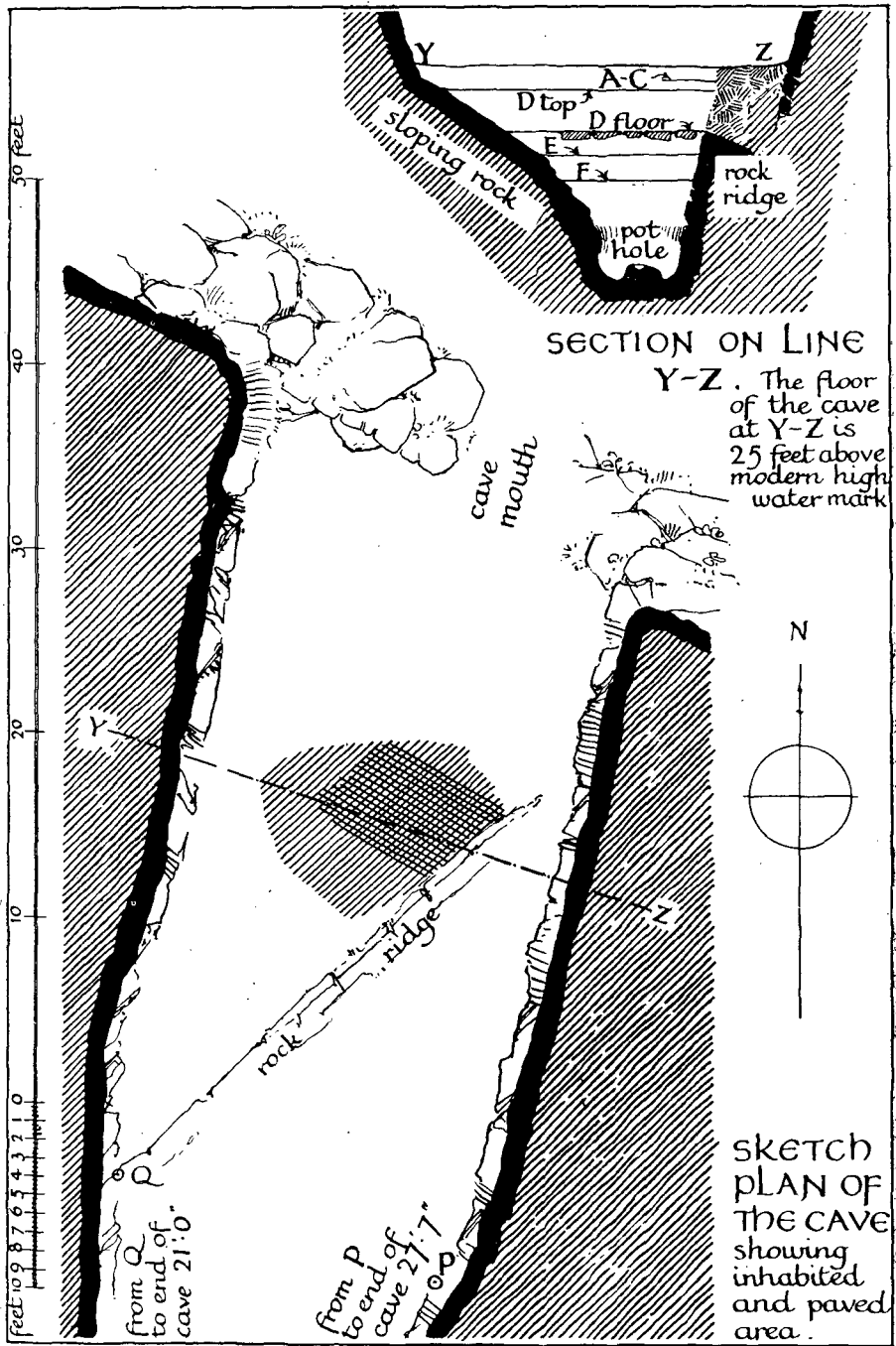


Fig. 1. Plan and section of Kinkell Cave.

6 feet. The material composing the floor consisted of a rubble of sandstone blocks and fragments which had fallen from the roof above. At a distance of about 12 feet from the entrance traces of human habitation were detected by the presence of a thin black layer lying at a depth of from $1\frac{1}{2}$ to 3 feet below the present floor. From this point inward a pit was sunk covering approximately the hatched area seen on the plan. The section revealed in the pit showed interesting stratifica-

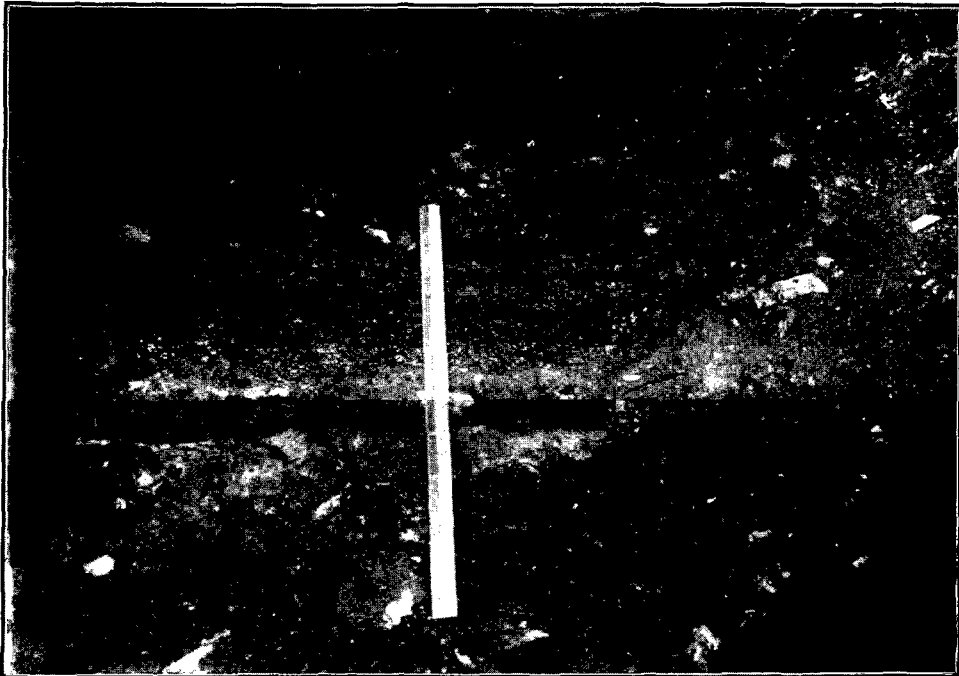


Fig. 2. Kinkell Cave floor, and deposit above it.

tion of such a nature as to prove that the cave had been inhabited at several periods, and a rich find of bones was obtained. The stratification is shown on the section accompanying the plan. At a depth varying from 1 to 3 feet below the modern floor lay the thin black layer already mentioned. It covered but a small area and yielded only a few bones and shells. $1\frac{1}{2}$ feet below this another black layer was seen, nearly 3 feet thick and extending over the whole of the hatched area. This deposit was full of decomposed organic matter indicating human occupation, and it rested on a roughly made floor of sandstone slabs laid side by side (fig. 2), covering the space shown on the plan by the cross-hatching. Here quantities of bones were obtained which are fully described

below. It may, however, be mentioned at this point that amongst them we found several fragments of boars' tusks—a fact interesting in view of the historic evidence that wild boars were once plentiful in Fife. Shell remains of periwinkles, whelks, and limpets were extraordinarily abundant. Fragments of pottery were scarce, only three pieces being found, but these are important. Two of these are fragments of ordinary reddish and rather thin Romano-British ware. The third is a piece of *terra sigillata* (Samian ware), and evidently is the centre of the bottom of a bowl. It shows a minute portion of a letter, perhaps an M, at the end of the potter's stamp. These potsherds date the inhabitation of the cave to the period of the Roman occupation of Britain and may safely be assigned to the second century A.D.—a time when Southern Scotland was in Roman hands. But since the sherd was found in the middle of the deposit, the floor may possibly be of somewhat earlier date. Other finds in this stratum (D on the plan) include the handle of a bronze jug and a quantity of iron nails.

Lying on the top of this stratum we found a slab of red sandstone on which some curious incisions can be seen (fig. 3). The slab appears to be derived from the Old Red Sandstone Formation, which does not occur *in situ* anywhere near the cave. It must have attracted attention by its colour and may have been brought in from some distance. On the right is a human figure, shown full face, which may possibly represent a monk or hermit. At his side, and just below the left hand, a small cross has been incised. On the right side of the figure are four more crosses, two above and two below. One of the uppermost is a St Andrew's cross, and the other an ordinary cross with a pyramidal base. The two crosses below are of an elaborated type with decorated centres, and near one of them is an obscure incision that may be intended for some kind of monogram. The two lower crosses are obviously somewhat like those seen on the second class of sculptured stones of the Celtic Period, as for instance those at Meikle.¹

The crosses mentioned by Stuart² as visible on the wall of the cave are probably of the same period. One of the crosses is still to be seen, and also a "holdfast" like those at Caiplic,³ and at one place the figure of an animal, possibly a red deer, has been incised on the roof.

Below the paved floor was another layer of sandstone rubble, and in this at two levels (E and F in the section) were thin black streaks indicating two short periods of human occupation. These yielded only a few bones and shells, and are so close below the paved floor that they cannot have been very much anterior in date to it. Solid rock was met around

¹ Romilly Allen, *Early Christian Monuments of Scotland*, p. 296, No. I., fig. 310.

² *Sculptured Stones*, ii. p. lxxxviii.

³ Stuart, *op. cit.*, ii. p. lxxxix, pl. 29.

the margin of the paved floor, forming a steep face on the east side and a sloping face in the direction of the dip of the beds on the western side. A short distance below the lowest black layer we reached the rocky floor of the cave in the form of a pot-hole, 3 feet deep at the centre, and filled with shingle. This rocky floor lies about 14 feet above the present high-water mark.



Fig. 3. Red sandstone slab with incised figures.

Trial pits dug in the back of the cave revealed little depth of soil and yielded nothing of interest.

The data lead us to the conclusion that the cave was inhabited in the Roman Period, and again during the Celtic Early Christian Period. Later, according to local tradition, it served as a place of refuge for Covenanters.

II. CONSTANTINE'S CAVE.

This cave (figs. 4 and 5) lies a little to the north of Fife Ness, and its mouth is but a few yards above high-water mark, facing a little east of north. It was eroded by the sea in a promontory of sandstone



Fig. 4. Mouth of Constantine's Cave.

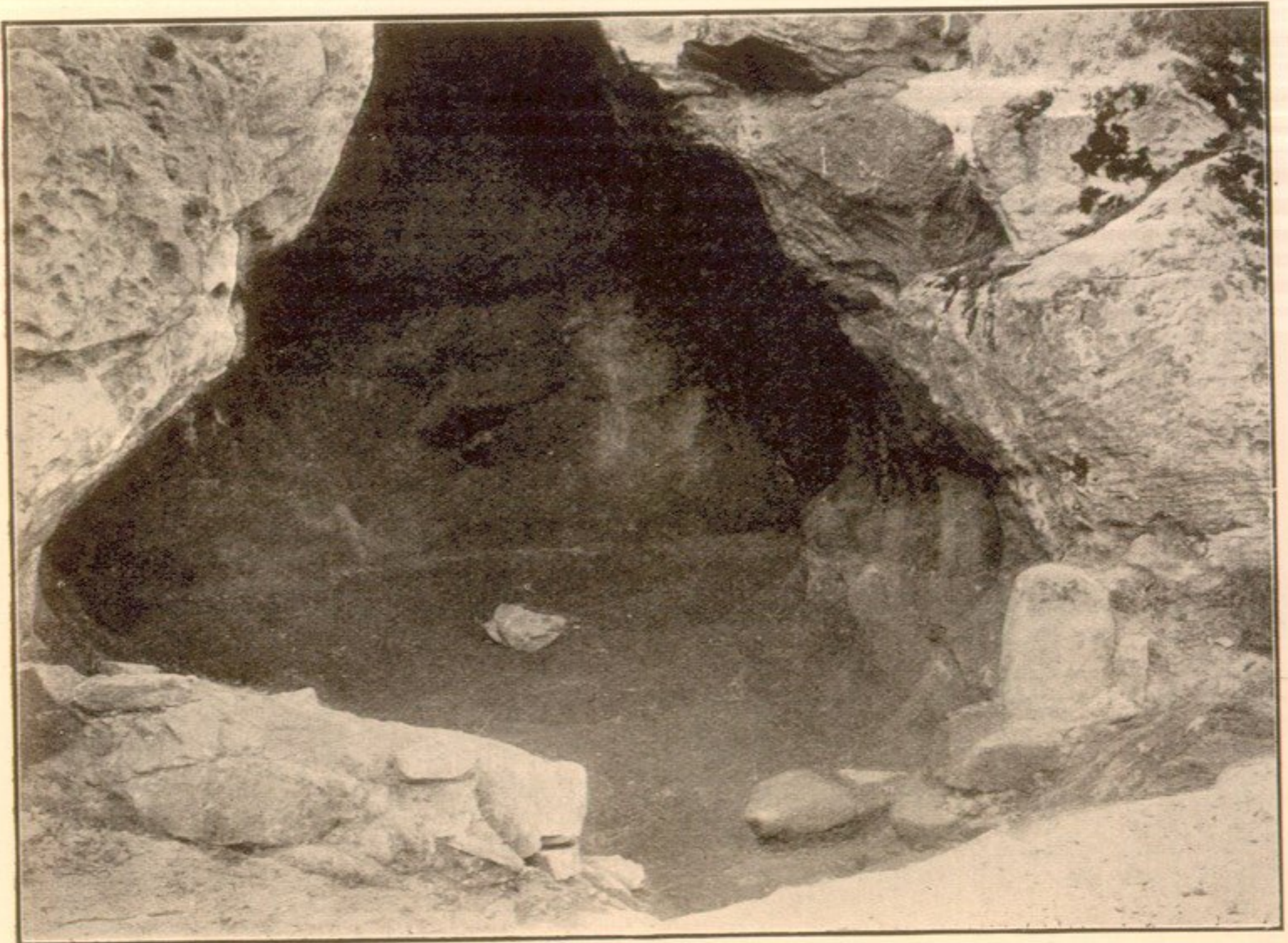


Fig. 5. Constantine's Cave.

projecting from the old cliff which marks the upper limit of the 25-foot raised beach. Mr Guthrie, the factor of Pitmilly, readily granted us permission to excavate. The operations extended from June 22nd to June 27th, 1914.

Traces of a mortar-built wall were found running across the mouth of the cave. The wall was apparently not a continuous one, but was interrupted by a narrow entrance facing almost due north. There is evidence to show that the whole front of the cave was at one time walled and roofed in where the natural rocky roof fails. Traces of mortar can still be seen at many places along the face of the rock bounding the mouth of the cave. Thus the cave was once enclosed to be used probably as a habitation or a chapel. On the west side the wall is founded on the rock, but on the east it rests on sand (fig. 6, R in the section). Below the sand, in the bottom of a shallow pot-hole, was a little black earth containing bones, limpet-shells, and other refuse. Just within the entrance between the two portions of the wall there was a thin layer of sand (P in the section) a little below the surface. Below this layer of sand was a thick deposit of black earth (Q in the section) containing bones, shells, fragments of pottery, and other refuse from human habitation. This layer was found all over the cave except in the higher parts at the back. In general, the stratification as revealed by pits and trenches was as follows:—The surface humus, nowhere much over 6 inches deep, contained objects of comparatively modern times—wedges, bolts, hooks, nails, and other implements of iron, possibly part of the spoil of a wreck, together with fragments of common china ware and glass bottles. Below this, and about the level of the layer of sand already mentioned, was another thin stratum, again at its deepest about 6 inches thick, which yielded little except the broken bowl and broken stems of clay pipes of the well-known early type, and a small wooden disc. Below this again, and extending all over the rocky floor of the cave, came the layer of black earth containing shells, bones, potsherds, and other refuse from human habitation. This layer varied in thickness from about 2½ feet near the entrance, a foot to 6 inches near the middle of the cave, thinning rapidly further in. The shells are those of limpets, mussels, and periwinkles, all species common on the shore to-day. The bones from this deposit are described in the report annexed below. The other finds are:—

- (1) Part of the shoulder and the ribbed end of the handle of a rounded glass bottle.¹
- (2) Two small and one large fragment of fairly fine red-surfaced Romano-British ware.

¹ Like that shown in Curle, *A Roman Frontier Post*, p. 272, fig. 36.

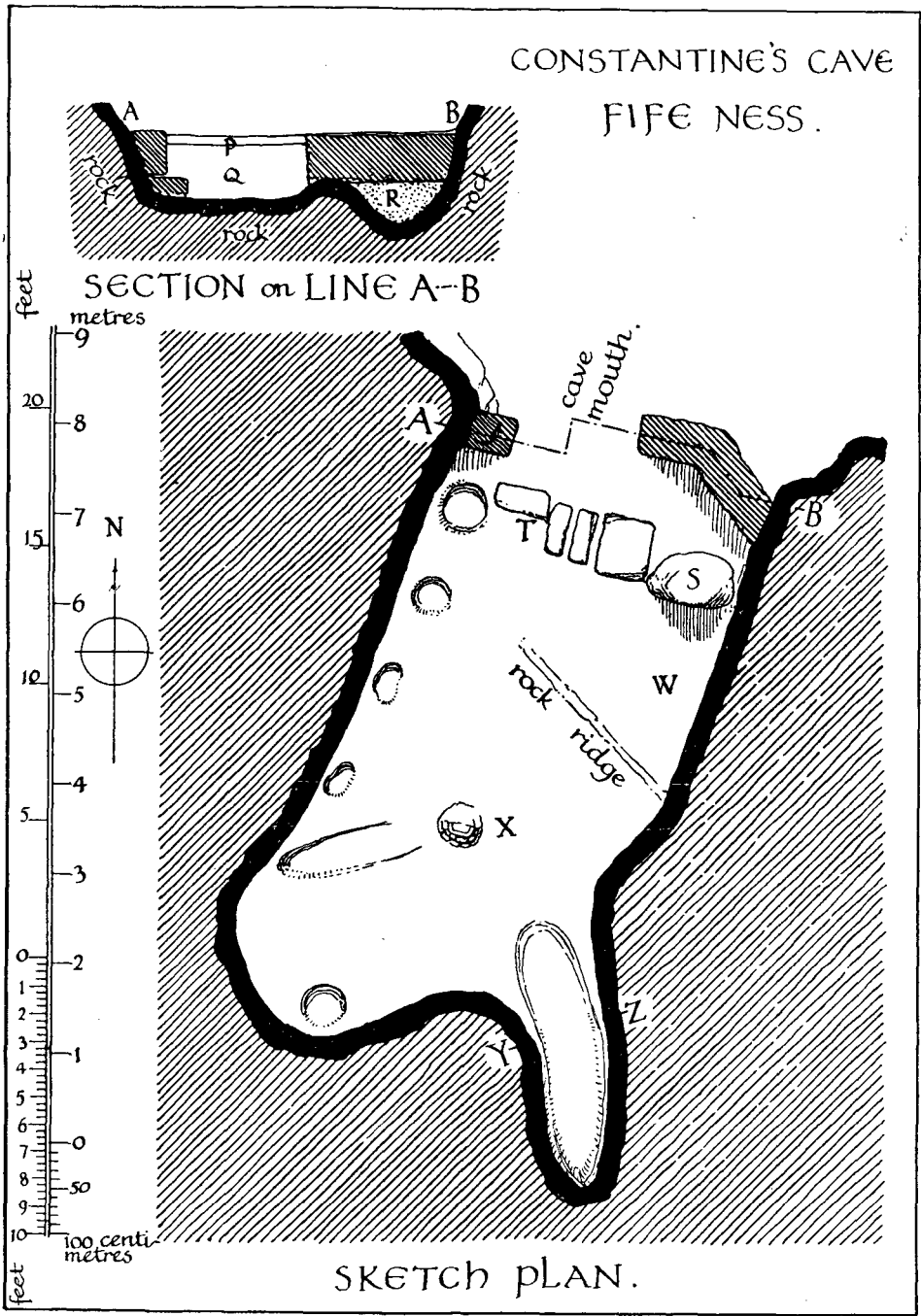


Fig. 6. Plan and section of Constantine's Cave.

(3) A great number of fragments of large earthenware Roman jars. These jars, when complete, must have stood about $2\frac{1}{2}$ to 3 feet high and were about 1 foot 8 inches in diameter. Each jar had a small neck with a broad lip, and running from the neck to the shoulder were two round vertical handles. The body was very wide and curved in sharply to a narrow base. The clay of which they are composed is coarse and not well baked. On the outside the jars are covered with a creamy slip. Only two jars could be partially restored with any certainty. The great majority of the sherds are so disintegrated as to make any attempt at restoration very difficult, but there would seem to have been at least three more such jars. On the handle of one of them is the stamp P M S A,¹ and another has V D incised on the surface near the bottom. This seems to have been done before the application of the slip. Such jars, or amphoræ, are not of Romano-British ware but were made in Spain, Italy, France, or Africa, and were carried all over the Roman Empire filled with wine, oil, or other southern produce.²

(4) A whetstone, 5 inches long; one flake and two small chips of flint; a triangular stone ($3\frac{1}{2}$ inches long) bored through the apex, perhaps a net-sinker; a small iron nail, $2\frac{1}{2}$ inches long.

Some of the deer horns and bones show traces of having been cut, worked, and used as implements.

Within the mortar-built wall, but at a lower level and resting on the rocky floor, was a large boulder (S on the plan) lying against the eastern wall of the cave with a row of four slabs (T on the plan) running west across the mouth. This appears to have formed the front wall of the cave during the period of its first habitation. Between the rock-ridge depicted in the plan and the boulder is a depression (W in the figure) in the floor where traces of fire were found. This hollow probably marks the site of the hearth. The inhabitants could sit on the rock-ridge, roast their food over the fire, and throw the refuse towards the outer wall, for it was here that the deposit of shells and bones was thickest.

To the south of the ridge the rocky floor gradually rises and the surface-deposit thins. In this region fragments of iron slag were very common. They centred about the spot marked X on the plan. In addition, at this place part of a hearth for smelting ironstone was found *in situ*. This consisted of half a stone basin made of whinstone, 3 inches deep, 4 inches thick, and 15 inches in diameter, set in the centre of two rough stone circles the interval between which was filled with clay. In addition to the slag, a large mass of metal was found beneath the broken basin mixed with slag and clay. Many fragments of burnt clay,

¹ Cf. the stamps P M S C and P M in *C. I. L.*, xii. 5683, Nos. 170, 171, 181, and xiii. Pt. 3, 10002, No. 331.

² Cf. Curle, *A Roman Frontier Post*, p. 268 and pl. lii.

partially coated with slag, were scattered around. Some of these are circular in section, with a kind of splayed foot which fits well over the lid of the stone basin. Thus they seem to have formed part of a circular superstructure, perhaps a cone of clay, erected on the stone basin so as to increase the draught and make a kind of primitive blast furnace. Such arrangements are known in primitive iron workings in India, Africa, and elsewhere. A cleft in the roof would form a natural chimney and free the cave from the smoke and fumes. The ore smelted may have been obtained from the ironstone found in the neighbourhood. Professor Irvine, who has kindly examined the slag and other specimens, reports as follows:—

“The specimens appear to be iron slags and resemble those produced in primitive attempts to prepare wrought iron. From the fact that they only display signs of fusion on the edges, while the fresh fractured faces are not characteristic of a fused slag, it would appear that the ‘bloom’ of spongy iron had been separated by hammering or squeezing. The appearance of the slags is strongly reminiscent of those obtained in primitive iron-working in Spain.” “From the shape of the specimen found beneath the hearth it is evident that the mass had originally been fused. The upper surface in particular is metallic in appearance and shows a bright metallic lustre when polished with a file. The under surface is considerably weathered and is easily detached. The specific gravity is notably high. Thus the specimen is not a genuine iron slag, but seems to consist, especially on the upper surface, essentially of reduced iron mixed with clay, which would naturally become attached to semi-fused iron.” A fragment of what seems to have been a stone hammer for treating the metal as suggested by Professor Irvine was found. The rough wrought iron thus made was possibly not worked on the spot, but traded with the Romano-British stations to the south. It is clear that the first inhabitants of the cave and the iron-working then carried on are dated by the pottery to the Roman period, probably the second century A.D.

The next inhabitation of the cave is marked by the mortar-built wall, numerous crosses¹ incised on the upper parts of the rocky walls, and the “Celtic” animals (fig. 7) cut in the rock at the points marked Y and Z on the plan. These rough attempts at animal representation are similar to those that occur at East Wemyss,² where they are found in conjunction with symbols that are common on the second class of the early sculptured monuments of Scotland. Thus they can be dated to the Celtic Period, or roughly to 800–1000 A.D.³ At this time the cave was perhaps used as

¹ Cf. Stuart, *Sculptured Stones*, ii. p. lxxxviii. pl. 29.

² Stuart, *op. cit.*, ii. p. xci, pls. 30–35; Romilly Allen, *op. cit.*, pp. 370–373, figs. 389, 390.

³ See Romilly Allen, *op. cit.*, p. cix.

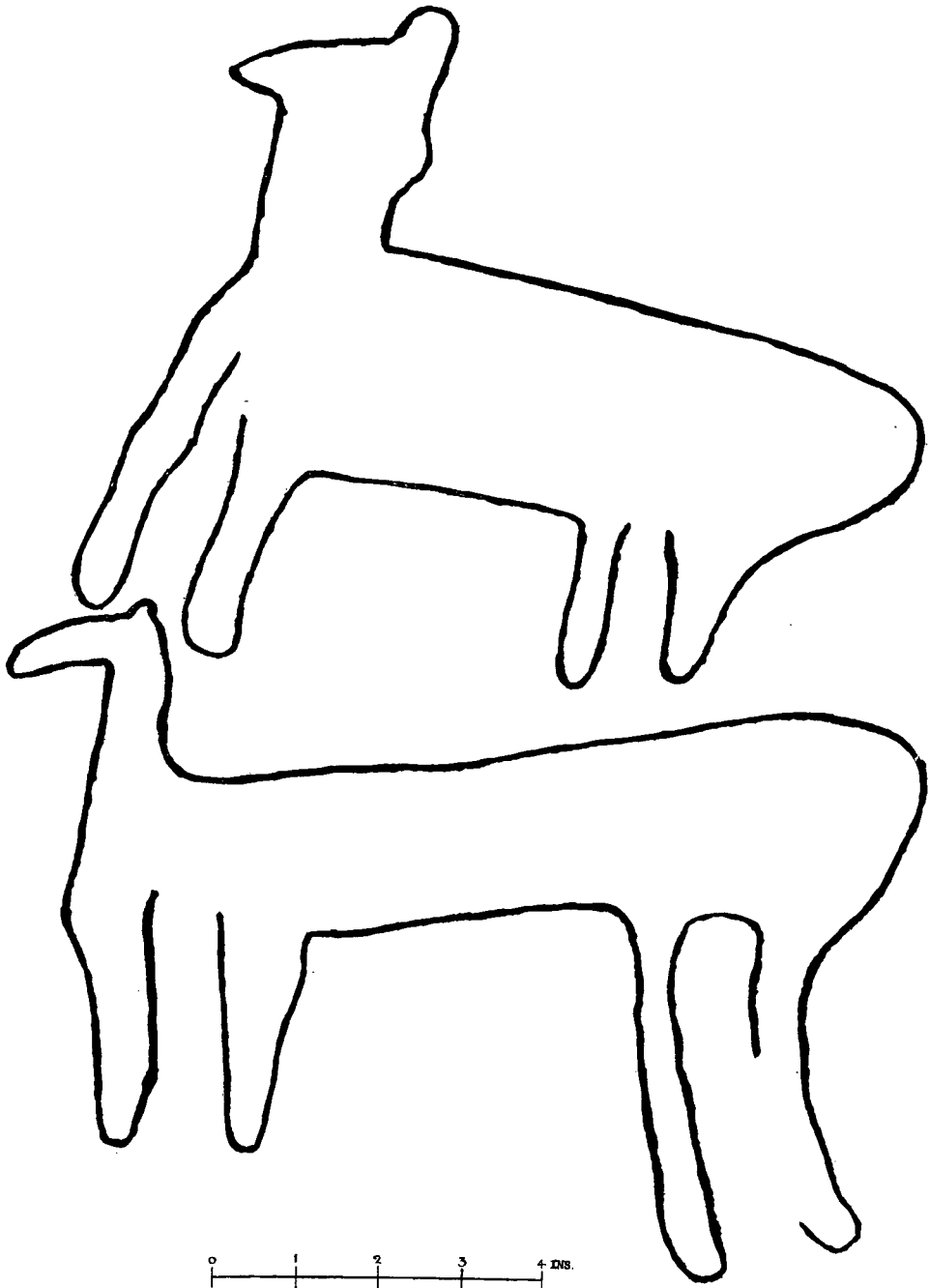


Fig. 7. Celtic animals incised in the rock.

a chapel or hermitage, as apparently was the case with the caves at Caiplic,¹ near Crail. Since that time the cave does not seem to have been regularly inhabited, though it was used for storing wreckage, for picnics, and as a shelter for tramps.

ARCHÆOLOGICAL RESULTS.

The excavation of these two caves, coupled with that of the caves at Archerfield in Haddington,² shows that during the Roman occupation the natives were dwelling in sea-worn caves lying on the 25-foot raised beach, which marks an emergence of land after the advent of Neolithic man in the country.

The remains of Roman pottery and the similarity of other finds, especially the bones, point to a uniformity of culture and date amongst the inhabitants of these caves. The occurrence of Roman pottery in Fife is interesting as showing how Roman influence spread in remote districts beyond the Antonine Wall, and away from the roads and camps in Perthshire and Forfarshire. The iron-working in Constantine's Cave, together with the abundance of Roman pottery there, suggests that the natives exchanged their local iron for pottery, glass, and other trade goods, for the local pottery of Scotland at that time was a very coarse, unrefined, hand-made ware.

After the Roman Period both the caves seem to have been inhabited in the Early Christian Period. The likeness of the crosses on the stone from Kinkell Cave to those on the sculptured stones, and the connection of the "Celtic" animal representation in Constantine's Cave with the symbols of the second class of sculptured stones, again show a uniformity in date and culture.

The East Neuk of Fife is closely connected with the earliest Christian legends of Scotland. There are the caves of St Regulus at St Andrews and of St Adrian at Caiplic, and the hermitage of St Adrian on the Isle of May. We may safely conclude that the two caves under consideration were used as chapels or hermitages by the early Christian missionaries who first reached the coast of Fife before Christianity had spread into the interior. It is unfortunate that the traditional cave of St Regulus, at St Andrews, is so much destroyed that there is nothing left to explore, but it is probable that if any other caves along the Fife coast are examined in the future the results will be found to agree with those obtained at the Kinkell Cave and Constantine's Cave, and that in like manner they will reveal two periods of occupation, one of the Roman and the other of the Early Christian Period.

¹ Stuart, *op. cit.*, ii. p. lxxxix, pl. 29.

² *Proc. Soc. Ant. Scot.*, 1908-1909, p. 243.

THE ANIMAL REMAINS FROM THE KINKELL CAVE, ST ANDREWS.

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The animal remains were discovered in fairly distinct layers associated with signs of human habitation, of which they themselves are plain witnesses. These layers were separated by varying thickness of earth and rubble from the roof of the cave, indicating intervening periods of non-occupation of different lengths. As each layer was reached in the downward process of excavation the material was collected, and, unsorted, was sent to us, so that a tolerably complete examination of the kind and condition of the animal remains was made possible. We shall give here a summary of the material found in each layer from above downwards, drawing attention to any feature of interest, and shall follow this summary by a few general remarks on the collection as a whole.

SUMMARY OF ANIMAL REMAINS.

LAYER A:—Modern surface. No animal remains.

LAYER B:—Portion of a thin black layer varying from $1\frac{1}{2}$ to 3 feet below the modern floor. From this was obtained a very small quantity of bones and shells. The shells were not seen by us, but the bones represented:—

- (1) ROE DEER, *Capreolus capreolus* (Linn.). A single, much-weathered portion of a metatarsal bone.
- (2) OX, *Bos taurus* Linnæus. Three premolar teeth and an upper jaw bearing milk teeth.
- (3) HADDOCK, *Gadus æglefinus* Linn. Fragmentary bones of the skull.

LAYER C:—Portion of a very thin black band $1\frac{1}{2}$ to 3 feet below the floor of the cave. This contained only:—

- (1) RED DEER, *Cervus elaphus* Linn. A single spine of a dorsal vertebra.
- (2) OX. The splintered surface fragment of a femur.
- (3) PERIWINKLES, *Littorina littorea* (Linn.). Eight specimens.
- (4) DOG WHELK, *Purpura lapillus* (Linn.) (1).

LAYER D:—A layer 3 feet thick, the upper surface of which lay $1\frac{1}{2}$ feet below layer C. From this layer the majority of the animal remains were recovered. Owing to the depth of the layer it was divided into three sections—upper D, mid D, and lower D.

Upper D.—The collection consisted in the main of a multitude of small

fragments of bones. Thus there were great numbers of unidentifiable portions of ribs, vertebral processes, splinters of canon bones, and the like. Many of the bones showed signs of artificial splitting, and almost all the ribs, limb bones, and even jaws were broken across. The animals represented were:—

- (1) RED DEER. The os calcis of a large specimen.
- (2) SHORT-HORNED CELTIC OX, *Bos taurus, longifrons* of Owen. Many bones, most striking amongst them being the large proportion of remains of young animals. Two lower jaws, artificially broken across, bore milk teeth, and one milk-dentition molar was present; while several limb bones were those of foetal animals.
- (3) TURBARY SHEEP, *Ovis aries* var. *palustris* Rüttimeyer. Eight recognisable bones, including a metatarsal, the length and slenderness of which indicated the above variety of sheep.
- (4) (?) GOAT. A single broken mandible indicates somewhat doubtfully the presence of this species.

Mid D.—A large number of bones were found here, practically all of which were broken across or split. Broken ribs and splintered canon bones were particularly common; and that the fracturing was due to human agency was shown by the presence of many blow-marks made by a sharp-edged tool, as well as by the occurrence of a possible implement. Amongst the bones were two charred fragments of pine branches.

- (1) PIG, *Sus scrofa* Linn. Three lower jaws, one of a very young animal.
- (2) RED DEER. Amongst the recognisable bones was a phalanx artificially split, and the upper portion of an ulna, the olecranon process of which had been so split as to form an "awl"-like instrument (fig. 8, No. 1).
- (3) CELTIC SHORT-HORNED OX. Most of the bones were those of young animals; one lower jaw contained milk teeth; one adult canon bone bore tool marks close to where it was split, and four limb bones had the ends chewed off, probably by a dog or wolf.
- (4) TURBARY SHEEP. A dozen recognisable bones.

Lower D.—A large number of bones, representing greater diversity of species than those from any other layer.

- (1) DOG OR WOLF, *Canis* sp. Represented by a complete femur badly dented in the middle, and the proximal end of a humerus. The complete bone is rather longer than that of a normal wolf, and from this fact and certain details of structure we are

inclined to think it must have belonged to a moderately large dog.



Fig. 8. Bone implements from Kinkell Cave and Constantine's Cave.

No. 1. Red Deer. Olecranon process of ulna with shaft split into awl-like shape. *Kinkell Cave.*

Nos. 2 and 3. Scoop-like "diggers" formed from lateral processes of lumbar vertebrae of Short-horned Celtic Ox. *Kinkell Cave.*

No. 4. Limb-bone of Red Deer, split, and worn at the point as if used chisel-wise. *Constantine's Cave.*

- (2) WILD BOAR. Part of a lower jaw with incisor and two fragments of a large boar's tusk, as well as four lower jaws and one upper jaw all bearing milk teeth.
- (3) RED DEER. Fragments of ribs probably of this species.

- (4) ROE DEER. A fragmentary metatarsal obviously used as a chisel-like implement (fig. 9, No. 1), a description of which will be given in the "General Remarks" following.

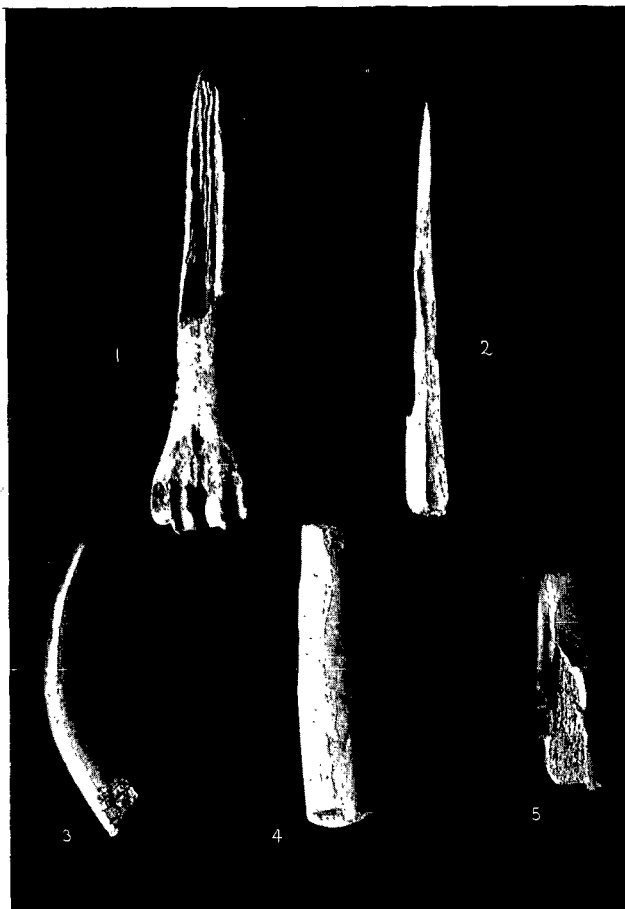


Fig. 9. Bone implements from Kinkell Cave and Constantine's Cave.

- No. 1. Chisel formed by the split and sharpened canon bone of Roe Deer. *Kinkell Cave.*
- No. 2. Unworn splint of bone, probably a borer in the making. *Constantine's Cave.*
- No. 3. Worked tip of Red Deer antler tine. *Constantine's Cave.*
- No. 4. Cylindrical dressed section of tine of Red Deer antler, so-called "knife-handle." *Constantine's Cave.*
- No. 5. Similar to No. 4, but showing traces of burning. *Constantine's Cave.*

- (5) **SHORT-HORNED CELTIC OX.** Very many bones both of adult and young (milk dentition) animals. Particular interest attaches to the core of a short conical horn typical of this variety of ox, and two lateral processes which have been artificially detached from lumbar vertebræ, and may have been used as spuds or trowels for digging burrowing mollusca from sand (fig. 8, Nos. 2 and 3).
- (6) **TURBARY SHEEP.** Many bones of adults, and young with milk dentition.
- (7) **WATER VOLE, *Arvicola amphibius* (Linn.).** A single right incisor from a lower jaw, which appears to have belonged to this species.

Several skull bones of fishes were found. They represented:—

- (8) **COD-FISH, *Gadus morrhua*,** and
 (9) **LING, *Molva vulgaris*.**

Invertebrates were represented by the following Mollusca and Crustacea:—

- (10) **LIMPETS, *Patella vulgata*,** many (27).
 (11) **PERIWINKLES, *Littorina littorea*,** very many (124).
 (12) ***Cyprina islandica*** (1).
 (13) A single chela of the **EDIBLE CRAB, *Cancer pagurus*.**

LAYER E:—A thin layer a short distance below the base of layer D contained only:—

- (1) **WILD BOAR.** Mandible and fragment of tusk.
 (2) **TURBARY SHEEP.** Two limb bones.

LAYER F:—A thin layer a short distance below layer E contained only:—

- (1) **WILD BOAR.** Fragment of tusk.
 (2) An undeterminable fragment of a bird's tibiotarsus.
 (3) Many **LIMPETS, *Patella vulgata*** (38), and several **PERIWINKLES, *Littorina littorea*** (5).

GENERAL REMARKS.

As compared with most of the early Scottish cave settlements found near the seashore, Kinkell Cave shows a scarcity of fish remains. Apparently the settlers depended rather on their hunting than on their fishing for food supply. From the preponderance of the bones of the Celtic Short-horned Ox and of the Turbary Sheep, neither indigenous to the country, it is plain that their staple supply was derived from a domesticated stock. But the animals seem to have been more or less wild, for a large proportion of the remains are those of young animals bearing milk dentition, which would naturally fall more readily to the

hunter than wary and more active adults. That the hunters were possessed of some skill, however, is shown by the presence of remains of Red and Roe Deer and of the Wild Boar. Apart from the occurrence of a couple of bones, the presence of Dogs or Wolves is evidenced by the considerable number of limb bones the succulent ends of which have been chewed off.

As regards the distribution of the bones in the various layers it is curious that the Wild Boar is represented only in the lower strata; and it is certainly remarkable that in the Kinkell Cave no remains of the horse have been found, although in Roman times, as the Newstead relics



Fig. 10. Bone "limpet" wedge (nat. size), Kinkell Cave.

show, that animal was abundant in South Scotland. From the actual number of bones obtained, layer D marks the main period of settlement.

The cave has furnished few examples of implements, and yet the intense fracturing of the bones, too minute to be accounted for by efforts to obtain marrow, suggests endeavours to obtain splints of bone which could be utilised as borers or points for various purposes. The most definite implement is a Roe Deer metatarsal bone cut into a chisel-shape (fig. 9, No. 1). The distal articular end of this bone is complete, but the shank has been split slantwise and the end has been cut or rubbed down into a broad edge which appears to have been hardened by fire. The instrument has been smoothed by much usage. It bears a close resemblance to the "bone chisel," found in a crannog at Lochspouts and figured in Munro's *Ancient Scottish Lake Dwellings*, fig. 172, p. 175. Two lateral processes artificially cut from lumbar vertebræ of an Ox bear striæ (fig. 8, Nos. 2 and 3), and closely resemble a similar instrument which we (J. R.) have recently described from a supposed Romano-British settle-

ment in Bute.¹ Such flattened and sharp-edged implements may have been used as spuds or trowels for the capture of molluscs, such as *Mya arenaria*, which burrow in sand, and which usually formed a goodly proportion of the food supply. Another possible instrument is the ulna of a Red Deer (fig. 8, No. 1), the shaft of which has been split so as to form an exceedingly sharp point. It suggests an awl-like implement, somewhat like that from a crannog at Lockie figured by Munro (*op. cit.* fig. 79, p. 113), but shows no definite signs of use.

Lastly, an unidentifiable fragment of bone from layer D bears clear marks of cutting, the resulting form being a well-shaped wedge, the scoop end of which is rounded (fig. 10). The use of such a fragment is conjectural, but its shape suggests the stone and bone limpet-wedges or scoops which were described by Mr Bishop in the last volume of the *Proceedings* of this Society, from the prehistoric shell-mounds at Oronsay. The fact that limpets were common in the Kinkell Cave lends strength to the suggestion, and at any rate attention may be drawn to the similarity of a definite implement found on the west and east coasts of Scotland.

THE ANIMAL REMAINS FROM CONSTANTINE'S CAVE, FIFE NESS.

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Traces of the animal life of early times were found in two areas of Constantine's Cave. A few "bones, limpet shells, and other refuse" lay amongst a little black earth at the bottom of a pot-hole, underneath a thick layer of sand near the mouth of the cave. This small collection I have not seen. The main mass of material, however, was associated with many relics of human habitation in a definite stratum, 2½ feet thick at the entrance of the cave and gradually tailing out towards the innermost recesses. The top of the stratum lay about a foot beneath the modern surface. The layer represents a settlement which must have extended over a considerable period of time, and, as the following summary shows, reveals a much greater variety of animal life than do the various strata of the neighbouring Kinkell Cave. Further, Professor Jehu informs me that a quantity of more fragmentary bones have not been submitted to me, so that some species may yet have to be added to the list.

Following the plan adopted in discussing the Kinkell animals, I shall give first a summary of the actual finds, pointing out their more interesting features, and shall add thereafter some general remarks on the collection and the bone implements it contains. I ought to add that if

¹ See *Trans. Buteshire Nat. Hist. Soc. for 1915*.

some of the scientific designations in the following list appear unfamiliar it is because I have followed the nomenclature of G. S. Miller's British Museum *Catalogue of the Land Mammals of Western Europe*, 1912, the most recent authoritative work.

SUMMARY OF ANIMAL REMAINS.

MAMMALS.

- (1) WILD CAT, *Felis silvestris* Schreber. Two limb bones, a radius and fragmentary tibia. Whether or not this early individual belonged to the present race of British Wild Cat, known as *Felis silvestris grampia* Miller, it is impossible from these bones to say.
- (2) BADGER, *Meles meles* (Linnæus). A single ulna.
- (3) GREY SEAL, *Halichoerus gryphus* (Fab.). Two lumbar vertebræ of this large Seal were found. The species, which is common in the Outer Hebrides and among the Orkney and Shetland Islands, is, at the present day, a rare straggler to the east coast of Scotland. Many examples, however, were recorded from the mouth of the Tay in the 'sixties of last century.
- (4) WHALE, perhaps PILOT WHALE,¹ *Globiocephalus melas* (Trail). The centrum of a large dorsal vertebra which most likely belonged to the above species. Some surfaces show artificial dints made by an edged instrument.
- (5) WILD BOAR, *Sus scrofa* Linnæus. Four mandibles and one maxilla of large size, and part of a pelvic girdle.
- (6) RED DEER, *Cervus elaphus* Linnæus. A large number of bones representing Red Deer considerably larger than the Scottish Red Deer of to-day. One limb bone (tibia) shows traces of teeth or implements. There is a large proportion of the tips and tines of antlers and a single base 5 inches in circumference. Most of the fourteen antler fragments bear marks of artificial cutting and dressing, and a few definite implements (fig. 8, No. 4, and fig. 9, Nos. 2-4) shall be described in the general remarks following.
- (7) SHORT-HORNED CELTIC OX, *Bos taurus longifrons* Owen. Many bones partly of adults and partly of young with milk dentition. The shank of one young ulna has been split so as to form a point, and may have been used as borer similar to that in fig. 8, No. 1.

¹ The bone was identified by Mr E. T. Newton, F.R.S., whose kindly assistance has added considerably to the value of this list.

- (8) TURBARY SHEEP, *Ovis aries palustris* Rütimeyer. Many bones.
- (9) HORSE. Two molar teeth which Professor J. Cossar Ewart has identified as the "4th upper molar and 1st lower molar of a pony of the 'Forest' type, about 12 hands high." Also part of a pelvic girdle.
- (10) RABBIT, *Oryctolagus cuniculus* (Linnæus). Many bones, some of adult and some of young individuals. The adult bones seem to indicate specimens of a smaller size than is usual to-day.

BIRDS.

- (11) SHAG, *Phalacrocorax graculus* Linn. Many bones forming the greater portions of the skeletons of at least two specimens.
- (12) GOOSE,¹ *Anser* sp. A single "merrythought" (united clavicles).
- (13) GULL, *Larus ? argentatus*. A single tibia larger than that of Common Gull and slightly less than that of Herring Gull, possibly representing an immature specimen of the latter species.
- (14) RED-THROATED DIVER,¹ *Colymbus septentrionalis*+. A single radius.

FISH.

- (15) GADOID FISH, probably Haddock, *Gadus aeglefinus* Linn. Many bones of the skull of a specimen about 4 feet long.

CRUSTACEA.

- (16) EDIBLE CRAB, *Cancer pagurus* Linn. Many "pincers" from the large claws.

MOLLUSCA.

- (17) LIMPETS, *Patella vulgata* Linn. Many large specimens.
- (18) PERIWINKLES, *Littorina littorea* (Linn.). More numerous than the limpets.
- (19) MUSSELS, *Mytilus edulis* Linn. Two fragments.
- (20) *Cyprina islandica* (Linn.). One fragment.
- (21) *Lutraria elliptica* Lamarck. One fragment.

GENERAL REMARKS.

Of the many species of animals represented in Constantine's Cave two—the Wild Cat and Badger—may be dismissed as chance wanderers which possibly sought shelter there during some period when the cave was forsaken by its human inhabitants. The remainder of the bones

¹ Determined by Mr E. T. Newton, F.R.S.

tell clearly of human occupation, for they not only represent animals which lived in the open, and must have been brought thither by outside agency, but they also bear cuts and dints evidently the work of man's implements. They show that the Constantine Cave dwellers enjoyed much greater variety of fare than did the inhabitants of the Kinkell Cave; but that they also depended for their main food supply on their semi-domesticated stock. Judging from the numbers of bones, the Short-horned Celtic Ox, the Red Deer, and the Turbary Sheep were the most frequent victims, the Red Deer being a specially desirable prey on account of the facility with which its bones and antlers could be manufactured into simple and durable implements. That when opportunity offered Whales and Seals were used as food is shown not only by the occurrence of their remains in Constantine's Cave, but by the evidences of the brochs and by the association of deer-horn implements with whales' skeletons in the Carse of Stirling. We have already pointed out in discussing the Kinkell Cave that in Roman times Horses were common in South Scotland, but the presence here of only a few bones, in all likelihood belonging to a single individual, and the absence of any trace in Kinkell Cave, would indicate that horses, even of the native "forest" type, seldom found their way into the possession of such as the cave-dwellers.

The remains of many Edible Crabs were found, and, since this species does not as a rule occur in tidal areas but frequents deeper water, we must assume that the settlers possessed some means of trapping or hooking marine animals beyond the reach of unaided man. It may be that they employed the simple method of irritating the crabs with a long pole. This the crustaceans would at once seize with their pincers and, holding fast, would be drawn by it to the surface—a primitive method still in use during last century in the Firth of Clyde.

IMPLEMENTS.

Sparse but clear evidence of the manufacture of implements from animal remains is afforded by Constantine's Cave. Red Deer antlers appear to have been the favourite material. Most of the many fragments of antlers recovered bear marks of cutting. Sometimes the sharp tip of a tine was cut off to act as a borer (fig. 9, No. 3), or again a segment about 2 or 3 inches long was excised from a tine by cutting off both ends. The latter implements show careful dressing, the truncated ends of the cylinder being neatly squared off, and the body showing in one case traces of burning and in the other many marks of external trimming with a sharp instrument (fig. 9, Nos. 4 and 5). These cylinders exactly

resemble in appearance the "knife-handle" found in a lake-dwelling at Buston in Ayrshire, and figured in Munro's *Ancient Scottish Lake Dwellings* (fig. 222, p. 220); but in the present case they can scarcely have been used as knife-handles, since one is quite solid and the other is penetrated by a hole only sufficiently large to allow of the passage of a thin wire.

Other possible implements are a long, fine, and exceedingly sharp-pointed splint probably of a canon bone (fig. 9, No. 2); the pointed ulna of a young Ox, which may have been used as a borer; and a split length of limb bone of Red Deer (fig. 8, No. 4), worn at the point, which appears to have been used as a chisel or some such instrument.