

## I.

NOTE ON SOME EXCAVATIONS IN A ROCK SHELTER ON THE AYR-SHIRE COAST. By R. W. COCHRAN-PATRICK, Esq., B.A., LL.B., F.S.A. Scot. WITH A REPORT ON THE OSSEOUS REMAINS FROM THE ROCK SHELTER. By JOHN CLELAND, M.D., F.R.S., PROFESSOR OF ANATOMY IN THE UNIVERSITY OF GLASGOW.

The rock-shelter, or cave, in which the explorations were made, is situated in the parish of West Kilbride, and on the estate of Mr Hunter of Hunter. A range of sandstone cliffs commencing near Bregurd Point runs southwards towards the old tower of Portincross. About 300 yards from the northern end the cave is situated, close to a fine spring known as the "Wishing Well"—(Ordnance Survey, 1-inch, Sheet 21).

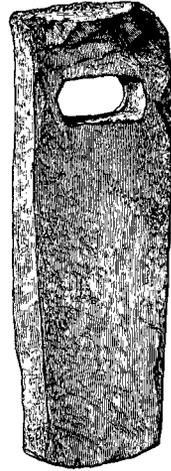
My attention was first directed to the spot by noticing a large number of shells amongst the earth thrown up at the mouths of the rabbit burrows. Some little time ago, while staying at Hunterston, I occupied a couple of days in opening up the ground, and more recently, in May last, along with Professor Cleland (who has kindly consented to report on the bones found) and Professor Young, a further excavation was made, showing more completely the nature of the deposit.

The extreme length of the cave from the entrance to the end is 27 feet. Till within 15 feet from the extremity the height is 6 feet or over, and the breadth about the same. The earth in this inner portion was very wet

with the moisture draining through the cave, and though showing traces of shells, bone, and charcoal, nothing sufficiently perfect to determine what it originally had been was found.

The outer portion was perfectly dry, and was excavated to an average depth of 6 feet and down to the level of the rock. Three floors were distinctly visible in the section. The highest was at an average depth of 18 inches from the present surface, the second about 12 inches below the first, and the lowest about 9 inches below the second. In each of these floors there appeared, in the section, first, layers of sea shells (chiefly whelk with a few cockle and mussel shells), then grey and red ashes, and then the ordinary trodden sand, till the floor below was reached.

The bones were chiefly found amongst the ash deposit, though a few were found among the shells. The only other objects found were—(1) a bone article, found at the level of the second floor; and (2) two stone objects, one of flint, found immediately above the lower floor, and another, apparently of slate, which was picked up amongst the debris thrown out, and the original position of which is uncertain. Besides these some specimens of slag and portions of broken pottery were also found. The pottery is of two sorts: one a coarse reddish kind without any glaze, the other thinner and better made with a green glaze. These are now deposited in the Museum.



Bone Object (actual size).

ACCOUNT OF OSSEOUS REMAINS FROM ROCK SHELTER AT HUNTERSTON.  
By Professor CLELAND, Glasgow.

After having made a preliminary examination of the osseous remains sent me by Mr Cochran-Patrick from the rock shelter discovered by him

at Hunterston, I found it desirable to know, if possible, something with regard to the depths at which the different kinds of bones were obtained; and Professor Young and I accepted an invitation from Mr Hunter of Hunterston to see some additional explorations made on that occasion. We took every possible precaution to preserve a record of the position of the remains in relation to the three floors of ashes which Mr Cochran-Patrick had found.

The result is that, setting aside rabbit bones to be accounted for by modern burrows, and a tibia of a well-grown young cat, and a part of a cat's skull found between the middle and lowest floors, probably belonging to some animal that had met its death while hunting the rabbits, I am in a position to say that remains of the pig, of a peculiar sheep, of *Bos longifrons*, and of deer, are found at all levels; that the principal if not the only site of horse bones is between the upper and second floors; that the dog is found between the middle and third floors; while there is only left one animal, the goat, of which a bone has been found as to whose position we have no information. The detection of characters has not been without difficulty, many fragments, especially of larger kinds of bones, being so very small that they could not be accurately determined.

*Sheep and Goat.*—Fragments belonging to the sheep or the goat occur at all depths from a position superficial to the uppermost floor of ashes down to the stratum between the third or lowest floor and the rock. The majority appear to have belonged to one kind of animal, an exceedingly slender, almost deer-like sheep; though at least one fragment, a portion of a tibia, is of a different kind, apparently a goat.

Above the first or uppermost floor of ashes were found the lower three inches of a humerus, a right lower jaw, a small portion of rib, and an upper molar. Between the first and second floors were found a left last rib complete, and a portion of a right rib. Between the second and lowest floors was found a young metatarsal bone, the lower end of the shaft showing its surface of contact with the epiphysis; also an upper molar tooth and an adult first phalanx.

In the lowest stratum were found a left coronoid process of a lower jaw,

the lower end of the shaft of a left humerus, a young left nasal, and a small piece of the lower end of the shaft of a young metatarsal.

The depths at which the other specimens were found have not been noted.

Before forming a conclusion with regard to the bones excavated, it is necessary to compare them with both sheep and goat, and to have a definite idea of the distinctions by means of which the bones of the goat may be known from those of the sheep. The bones of the limbs are so similar that they are not easily distinguished; and it has even been alleged that they differ merely in size, the goat being the more slender. Neither of these allegations, however, is true. I compare the limbs of a goat's skeleton with those of a sheep's skeleton which has been in existence for a great number of years, and has probably been an ordinary black-faced sheep, and I find that the femur, tibia, and humerus of the sheep's limbs are shorter and thicker than those of the goat, while the metacarpals and metatarsals are longer and slenderer, and the radius also slender. The following measurements illustrate this. They are made in inches and tenths.

	Goat.		Sheep.		Hunterston.	
	Extreme length.	Smallest transverse breadth.	Extreme length.	Smallest transverse breadth.	Extreme length.	Smallest transverse breadth.
Femur, . . . . .	7·2	·6	6·5	·65	6·4	·55
Tibia, . . . . .	8·1	·6	7·6	·55	...	} ·55 ·6
Metatarsal, . . . . .	4·4	·5	4·9	·45	{ 5·1 4·7	·45 ·425
Humerus, . . . . .	6·3	·65	5·3	·6	...	·6
Radius, . . . . .	6·	·7	5·3	·6	...	...
Metacarpal, . . . . .	4·1	·6	4·6	·55	4·9	·5
Astragalus, . . . . .	1·2	·7	1·1	·625	1·05	·55

One nearly perfect left femur has been found, and as the table shows, it is similar to that of the goat. There is also another shaft of a left femur broken over below the smaller trochanter and above the condyles.

It is a shorter bone, measuring .65 in breadth, while the length corresponding to what measures 3.3 in it, is in the goat 3.4, and in the sheep 2.8. It has therefore proportions intermediate between those found in the sheep and goat used for comparison.

Two portions of tibia are among the fragments. The first consists of 6 inches of the left tibia, including the upper end. It has an anterior ridge more curved forward than the goat's, and to the same extent outwards as the goat's, but much less curved in either direction than it is in the sheep. The other portion of tibia consists of 5 inches from the lower end of a right bone; it is more slender and strongly marked at the lower end than the same parts in the goat and sheep used for comparison.

Of the humerus, besides the large portion in the superficial stratum, which agrees exactly with the modern sheep, only one fragment, namely that in the lowest stratum, has been found, consisting of the bifurcated lower end of the shaft of the left side. But small though the fragment is, it betrays resemblance to the sheep by the outer bifurcation which bounds the olecranon fossa externally being sloped more outwards than is the case in the goat.

Of the radius four fragments have been found. One consists of  $2\frac{1}{2}$  inches of the lower end of the left radius, and exactly corresponds with that of the sheep. It differs very much in character from another fragment 4 inches long from the lower end of a left radius; the latter corresponding exactly with the characters of a goat's radius slightly larger than that used for comparison. The shaft is wider, the lower extremity less expanded, and the whole less angular in the sheep than in the goat. The other two fragments are from the upper end of the radius; one consisting of 2 inches from a left bone, the other of 1 inch from a right bone. Both agree with the characters of the sheep, being distinguished not by mere size but by a more marked slope downwards and inwards of the outer margin than exists in the goat. They have a smaller prominence for the external lateral ligament, and a much finer make at that part than either sheep or goat.

Of metacarpals and metatarsals, there have been found one metacarpal,

two metatarsals, the shaft of a young metatarsal, and smaller fragments, all obviously belonging to one kind of animal. For measurements it is well to confine attention to the three adult specimens, and by reference to the table it will be noted that they are remarkably narrow for their length, and that the length is such as would be found in the large breeds of the present day. But the slender appearance resulting from those measurements is more striking on examining the bones than on comparing the figures.

Two adult first phalanges agree completely in size and appearance with those of the sheep. The only other limb bones found are a left os calcis and a right astragalus, both of them small and narrow, but especially the astragalus, which is sufficient of itself to show that the animal had an exceedingly slender limb.

Turning now to the bones of the trunk; there are only four somewhat mutilated vertebræ, one complete rib, and some fragments of ribs in the collection. But the four vertebræ, which are completely ossified, and therefore thoroughly adult, are exceedingly striking. They are a last lumbar, a dorsal (probably the 6th), a 4th cervical, and an axis. In the modern goat the lumbar transverse processes are broader and differently shaped from what they are in the sheep; also the dorsal transverse processes have a stronger and less shapely character, supporting ribs the majority of which are stronger. The lumbar vertebra from the excavation is precisely similar to the last lumbar of the sheep used for comparison, while the others are more slender than those of the sheep, and the axis in particular strikes the eye as resembling much more that of a roe-deer. The following are measurements of the length of the inferior margins and breadth of the posterior surfaces of bodies of vertebræ:—

	Goat.		Sheep.		Hunterston.	
	Length.	Breadth.	Length.	Breadth.	Length.	Breadth.
Axis, . . . . .	1·9	·1	1·7	·9	1·7	·75
Sixth dorsal, . . . . .	·8	·95	·7	·95	·7	·8

The characters of the last rib answer exactly to those of the sheep; and, although I do not know that it is a constant character, it is striking that the corresponding bone in the goat before me is more slender, and fails to widen near the lower end, although the ribs in the middle of the series are much stronger and become wider than the corresponding bones in the sheep.

Belonging to the head, the only parts found are teeth, lower jaw, and nasals. I much doubt that it is possible to tell the teeth of a sheep from a goat; though the following remarks of Gastaldi are to the opposite effect:—"It is difficult, if not impossible, to distinguish the bones of the sheep from those of the goat; the limbs of the latter are certainly more slender. . . . It is an easier matter to discover the difference between the teeth of one and the other, as we are taught by Rüttimeyer that when the greatest molars are found fixed together in the jaw, those of the goat are more serrated one with the other, and the internal part of one covers the next to it, like a tile."<sup>1</sup>

The right lower jaw, found in the upper stratum, is very strongly marked, shrunk with old age. It has three true molars worn much down; and the other teeth have dropped out.

I thought it worth while to measure the length of the lower jaw and the height from the top of the coronoid process to below the angle in two sheep skulls and two goats'; and the following is the result:—

Goat.		Sheep.		Hunterston.	
Length.	Breadth.	Length.	Breadth.	Length.	Breadth.
7·	3·9	6·4	3·5	6·6	3·5
6·7	3·6	7·	4·2		

The remaining cranial bones, namely, two left nasals, are more satisfactory. The nasals of the sheep are flat or uniformly convex from behind

<sup>1</sup> Gastaldi, "Lake Habitations and Prehistoric Remains in Northern and Central Italy," translated by Anthropol. Soc. Lond., p. 63.

forwards, and come to a point in front by the outer margin approaching the inner, whereas the nasals of the goat have a slight dorsal concavity and an anterior margin very distinct from the outer. Those excavated have the characters of sheep's nasals. That from the lowest stratum has belonged to a young animal, while the other is strong and evidently adult, and its length in inches is 2·4, which seems to show that the head was small.

Altogether the evidence of the osseous remains is that the sheep was used for food by the earliest occupants of this rock shelter, and that, at least in the earlier days of that occupation, the sheep which existed was an animal at least as tall as an ordinary black-faced sheep of modern Scotland, but very greatly more slender both in limb and in body. Whether it was identical with the *Ovis aries palustris* of Rüttimeyer is another question.

*Ox.*—The remains of the ox seem all to have belonged to a small variety, doubtless the *Bos longifrons*, and they have been found at all levels. Only small pieces of bones have been found, besides the teeth and three phalanges, but a few of the pieces are characteristic, and the others may all have belonged to the same variety.

From above the uppermost floor of ashes were obtained a small piece of tibia, some pieces of dorsal spine, and the lower half of a right first rib belonging to a small animal.

Between the uppermost and second floor were obtained a couple of inches of the upper part of a left radius and ulna, in which the transverse diameter of the radial articular surface measured only 2·5; the neck and ridge of a right scapula, much destroyed by damp, but of a short stout make; portion of a small left ilium, and a mere fragment of left ischium.

Between the middle and lowest floors were a small left astragalus, probably young, portions of a dorsal spine, and a considerable splinter from the upper and outer part of a metacarpal, besides a molar and an incisor tooth.

Below the lowest floor, the only fragment known to have been found

consists of a couple of inches from the inner side of the back of the shaft of a tibia, exactly corresponding with a small tibia obtained from the Crannog at Lochlee.

In the case of other fragments the depth was unnoted. The collection contains four incisor and seven molar and premolar teeth; of which one unused last lower molar is certainly large, measuring 1·7 inches from before backwards, while another corresponding tooth measures only 1·3. Besides these there are portions of the lower jaw including condyle and angle, and one of them marked with a double score from some instrument; an inch from the point of a nasal bone broader outside the notch than in the ordinary modern ox; a stout horn-core 4 inches long on the convex side and 5·4 in circumference, made rough looking by the presence of deep grooves; a right astragalus with maximum length 2·4 inches and minimum breadth 1·3, while in a specimen of the *Bos scoticus* of Cadzow the measurements are 2·5 and 1·4; the shin ridge of a left tibia; lower end of a right scapula; outer boundary of the olecranon fossa of a right humerus; a couple of inches of the upper part of a radius and ulna; two first phalanges and a second phalanx; and several broken dorsal spines and portions of ribs.

There is thus not a great deal to dogmatise from. But the horn-core agrees with the measurements, descriptions and figures of Nillson,<sup>1</sup> J. A. Smith,<sup>2</sup> and Boyd Dawkins,<sup>3</sup> and with a skull presented by Dr Smith to the Hunterian Museum. The upper ends of radius and ulna also correspond exactly with small radii obtained from the Crannog of Lochlee, while they are smaller than the corresponding part in modern cattle and in *Bos scoticus*; one of them, that of which the depth is unnoted, is different from the other, and from all specimens which have come under my notice, in having strong harsh ridges and markings; but possibly this may be a peculiarity dependent on sex.

The first phalanges are rather long compared with the modern ox and

<sup>1</sup> "Annals of Natural History," 2d series, vol. iv. p. 349.

<sup>2</sup> "Proc. Soc. Antiq. Scot.," vol. ix. p. 587.

<sup>3</sup> "Geological Journal," vol. xxiii. p. 176.

with *Bos scoticus* in the Natural History Museum of the University of Glasgow.

	Hind Phalanx.		Fore Phalanx.	
	Greatest length.	Narrowest breadth.	Greatest length.	Narrowest breadth.
Hunterston Cave, . . . .	2·3	·95	2·3	1·
<i>Bos scoticus</i> , . . . .	2·2	1·	2·15	1·05
A modern specimen, . . . .	2·1	1·	2·	1·

A first phalanx from Lochlee is ·95 in breadth and only 1·9 in length.

*Deer*.—The remains of deer found furnish more meagre materials for precise determination than do those of the ox.

Above the highest floor of ashes were obtained a left calcaneum in good preservation, about a cubic inch of the inner side of the upper articular extremity of a right tibia, and a portion of a lumbar spine cut across with an instrument. All these may have belonged to the common red-deer (*Cervus elaphus*).

Between the upper and middle floor were found the spine and anterior border of a right scapula, similar to that of the red-deer; and the lower end of a young right radius, too large to belong to a roe-deer, and recognised to belong to a deer and not to a goat or sheep by this character—that in the sheep and goat the outer ridge of the broad groove in front is the more prominent; while in deer the inner is more prominent, and the surface internal to that ridge looks more directly inwards.

Between the middle and lowest floor were found a left astragalus 2 inches long and 1 inch narrowest breadth, and a right astragalus 1·8 long and ·9 broad; also a portion of a head of a femur, and a piece of a right occipital condyle, both from animals of considerable size.

Beneath the lowest floor of ashes were found 2½ inches of a left rib, and a fragment of splintered horn about 2 inches long and one broad, probably rein-deer; but to this I shall return.

The remains of deer obtained at depths not noted include the following:—

A left molar belonging to a large animal and with a flat ridge running beneath the orbit, such as exists in a female skull in the Natural History Museum of the Glasgow University, and contrasting with the sharp edge exhibited by a male skull. A portion of a right squamous bone, including the root of the zygoma, which differs from the two red-deer skulls with which I have compared it, and agrees with a rein-deer in respect of the deep fossæ into which the upper surface of the root of the zygoma is thrown; a small piece of the roof of the skull, also liker rein-deer than red-deer specimens in the upward direction of the occipital crest; the upper end of a right metacarpal,  $1\frac{1}{2}$  inch wide at the articular extremity; four splinters of metatarsals, one of them from a bone .9 broad in the shaft; two splinters of large metacarpal bone; a calcined chip from the lower end of a tibia; a small piece of the head of a femur; a portion of dorsal spine; three incisor teeth; a part of a right lower jaw with a first milk molar, second premolar, and a first true molar coming up, all *in situ*, and belonging probably to the red-deer; a considerable part of the lower end of a left humerus of large size, being 2.1 broad; a complete first phalanx, 2.2 long and .55 broad; and lastly two splinters of horn, each presenting a surface less than 2 square inches.

There is every possibility that a number of these remains have belonged to the red-deer, and there are only two little bits of skull and three chips of horn to found the suggestion of the presence of rein-deer on. The rein-deer skull is noted for variability (Van der Hoeven, "Handbook of Zoology," vol. ii. p. 648). The chips of horn are very small to found on. They are all three smooth and grooved, and one of them with a small projection sloping up from the side of the plane of flattening, but so as not to lie in that plane. They are not from the fallow-deer, and the question is whether they are from an upper tyne of a red-deer rubbed perfectly smooth or from a rein-deer. I cannot find any example of a projection from a tyne in the same fashion as occurs in one of those fragments, nor such uniform smoothness of surface so completely like the smoothness of the rein-deer horn; yet I should like further evidence before pronouncing a decided opinion.

*Pig.*—The remains of the pig are few, but characteristic, and found below the lowest ash-floor as well as above the highest.

In the lowest stratum were found a calcaneum and lower half of a metacarpal or metatarsal, both belonging to a good-sized adult.

From between the upper and the second ash-floor were got the upper half of a strong right radius, a molar tooth, and a left lower canine. The canine, when entire, must have measured at least 3 inches in length along its convex border, and half an inch in breadth at the base of its outer surface.

Above the uppermost floor was found an upper incisor and  $3\frac{1}{2}$  inches of a strong old ulna; while at a depth not noted were obtained a lower incisor with an enamel surface  $1\frac{1}{10}$  inch in length; an atlas 2·9 in breadth, with distinct muscular markings; 3 inches of the lower end of a strong and large left tibia, part of a pelvic bone, and two imperfect left fibulae. One of the fibulae was the only one of these porcine remains which gave evidence of tenderness in years or otherwise, its lower epiphysis not having been united to the shaft.

*Horse.*—Remains of a horse of good size have been obtained, principally between the upper and middle floor of ashes. There are eight lower molars very much worn down, found most of them certainly together, with portions of the jaw; two lower molars not begun to wear, and a right calcaneum of good size; more superficially a chip of the shaft of a right humerus; and from unnoted depths, an articular process of a cervical vertebra, another of a lumbar, a tip of a transverse process of a dorsal vertebra, and a posterior epiphysis of the body of a dorsal vertebra. The last-named fragment, being a beautifully heart-shaped piece of bone, suggests the possibility of its having been kept for ornament, especially as no large pieces of vertebra have been found; but it is not marked artificially.

*Dog.*—Only a few remains of the dog have been detected. They may all have belonged to one individual as large as a shepherd's dog. They are, a portion of the left lower jaw with the large molar in its place, the corresponding tooth of the opposite side, an inch of the outer side of the upper part of the shaft of the left humerus, a portion from the upper and

another from the lower end of a left radius and part of the corresponding ulna, the lower end of the metacarpal of a thumb, and a piece from the upper half of the shaft of a right femur. The portion of femur was in good condition and from a depth unnoted; all the rest were acted on by damp, and came from between the middle and lowest floors.

NOTE.—Since writing the above a further supply of osseous remains has been sent me by Mr Cochran-Patrick. Of these I can only say at present that they do not throw further light on the presence of the reindeer, that there is a portion of a cervine metacarpal of large size, some large and strong thoroughly adult porcine remains, and a lower epiphysis of a radius of a young horse.