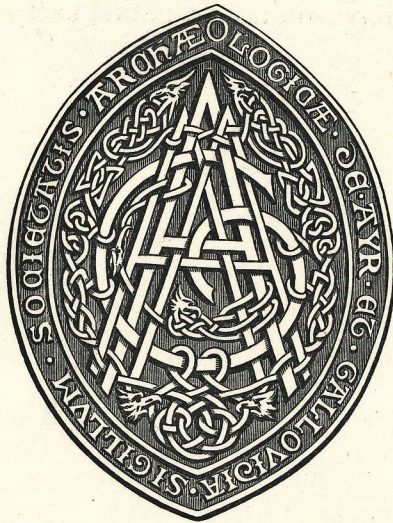


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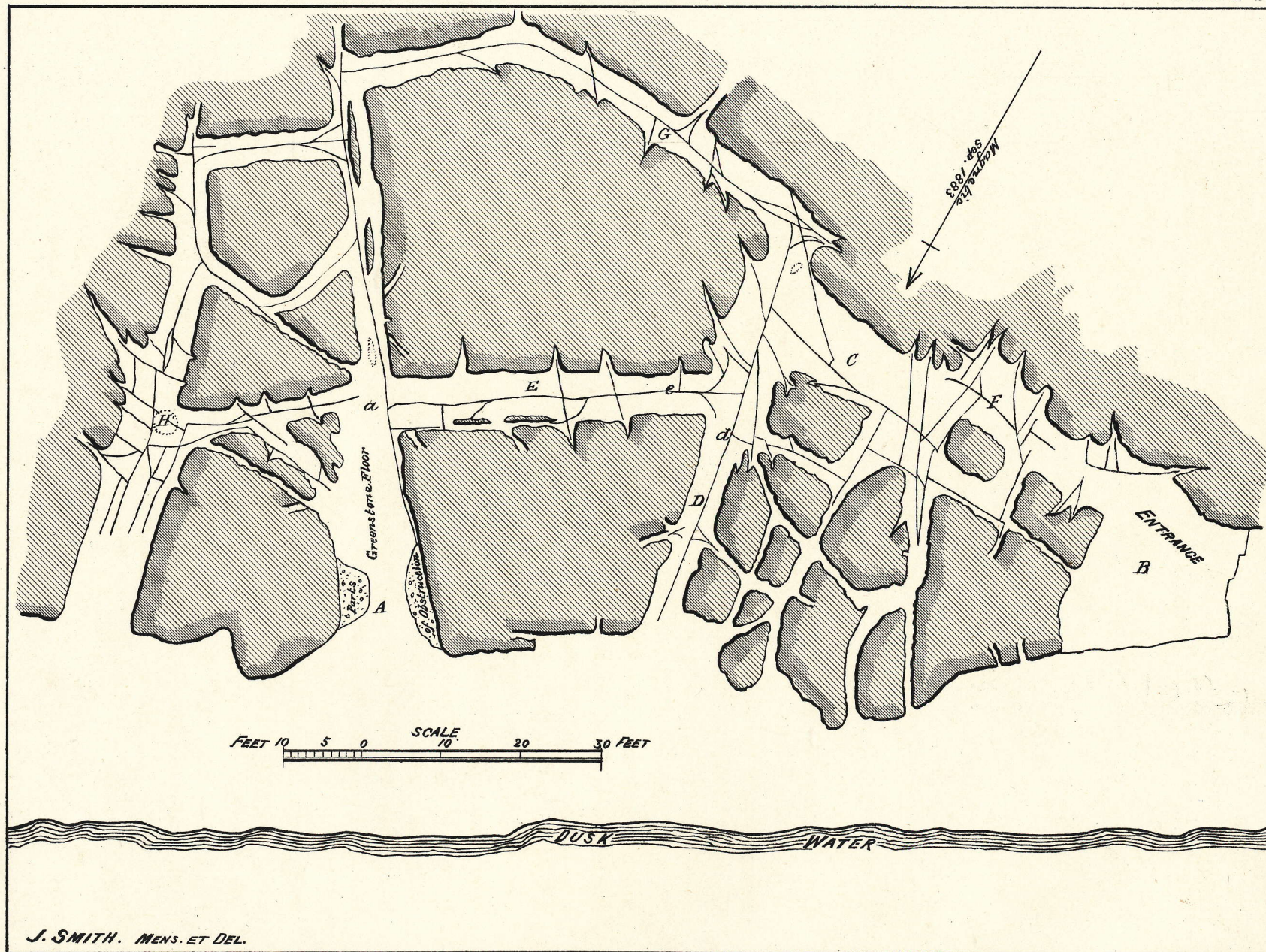
1889

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CLEAVES COVE, DALRY,

AYRSHIRE



PLAN OF CLEAVES COVE,
DALRY, AYRSHIRE.

G. Watson & Sons, Edin. Lith.

I.

CLEAVES COVE, DALRY, AYRSHIRE.

THE extensive and interesting Ayrshire cavern, long known as Cleaves Cove, is situated on the southern side of a romantic glen on the Dusk Water, about a mile and a half above the junction of that stream with the River Garnock at Dalgarnock, and a mile and three-quarters south-east from the Dalry station of the Glasgow and South-Western Railway. It is seven miles from the Ayrshire coast, and 170 feet above sea-level.

Being desirous of exploring the cave some seven years ago, I made a few cuts here and there into the deposits in several of the passages, and the results were such as to show me that a careful and thorough exploration would be a matter of no small interest and value. To make this it was needful to obtain the permission of Capt. Blair, R.N., of Blair, on whose lands the cave is situated, which was readily granted. The work was begun in January 1883, and was carried on for five consecutive months at the rate of two and sometimes three nights a week. On my own part, and on that of the six volunteers who assisted me, night work was a necessity; but it was found to work well, and we were not in the smallest degree troubled by curious visitors.

The oldest account of Cleaves Cove which I have met with is that given by Timothy Pont, A.M., in his *Cunninghame Topographized*, 1604-1608, where he says:—"Dow-Visch-Banckes heir ther is a grate coue the inermost end quherof is not found it is by the vulgar named the Elffe housse being of a large bounds vithin."

In Forsyth's *Beauties of Scotland*, 1805, the cavern is noticed thus:—"In the Parish of Dalry, on the side of a limestone rock, is a remarkable natural cavern. It is 44 feet above the bed of rivulet, is covered with 30

feet of rock and earth, and crowned with wood. The entrance is adorned with a vast prominent rock 27 feet broad and 30 feet long, sloping a little upwards. The internal structure is like gothic arched work, supported with many columns and buttresses. Its width varies in different places from 5 feet to 10 feet, its height from 5 to 12 feet, and its length is about 183 feet. About the middle of it is a spacious opening, 35 feet broad, 12 feet wide, and 12 feet high. The whole internal surface is variously indented, its floor is nearly dry, its sides and corners run off into many crevices, and its roof is emblazoned by calcareous incrustations." The measurements given in this account, however, have evidently been taken "by the eye," as they are far from being accurate.

George Robertson, in his *Topographical Description of Ayrshire*, Irvine, 1820, notices the cave as follows:—"Singular Cave.—In the limestone rock on the bank of the Dusk, on the lands of Auchenskeith, there is a natural cave 185 feet in length, containing a number of rooms, some of them of large dimension. The inward structure is like gothic arched work, supported with many columns and buttresses. The roof is shining with calcareous incrustations, and in one side of the entry there is a vein of sulphate of barita ten inches in thickness." Probably stalagmite.

In the *New Statistical Account*, Ayrshire, Dalry Parish, p. 211, we find the following description of the cave:—"On the estate of Blair, in the romantic and beautifully wooded glen of the Dusk, there is a natural cave in a precipitous bank of limestone. It is about 40 feet above the bed of the stream, and is covered by about 30 feet of rock and earth. It has two entrances. The western or main entrance is situated below a vast overhanging rock, 30 feet long by 27 in breadth, the brow of which is covered by the mountain ash, hazel, and two large plane trees, which give it a picturesque appearance. Its interior resembles gothic arched work. Part of the roof is supported by two massy columns. Its length is about 183 feet, and breadth from 5 to 12. Near the middle it expands into a spacious chamber, 35 feet long by 12 broad and 12 high. Its internal surface is covered by calcareous incrustations, and numerous crevices branch off from its sides. In former times popular belief peopled it with elves. It consequently acquired the name of the 'Elfhouse.' In later days, during the tyrannical reign of Charles II., it afforded a hiding-place to the Covenanters of this parish from the violence of their infuriated persecutors."

In the first printed edition of Pont's *Cunninghame*, published by the

Maitland Club in 1853, a plan (a very imperfect one) of "Cleaves Cove" is given, "as explored by torchlight by E. W. S., E. J., and W. S., on Saturday, 24th August, 1833." After quoting Pont's original observation, given above, it is remarked that "this cove, which is no longer the retreat of the elves, nor without being explored to the 'innermost end,' is one of the greatest natural curiosities in Ayrshire." And after quoting the description given in the *New Statistical Account* (see above), "the accompanying drawing shows the extent and tortuosities of this remarkable cave, so well suited as a retreat for fairies and persecuted men, now fortunately equally rare inhabitants!"

Before beginning the work we laid down a rule of procedure to be strictly followed in taking out the deposits layer by layer as they had been laid down, so that a correct tally might be kept of everything found, and its exact relative position noted. Very soon this was found to be impracticable from the fact that the second layer, which was composed of a dark-coloured vegetable mud, was so soft, that barrows and men began to sink into it. We then took the whole depth of the deposits in one face, working from top to bottom, and this arrangement worked admirably. The large ribs of the ox could be drawn from the muddy deposit like swords from their sheaths. After some little experience we found that all the bones in the upper deposit were white, while those from the second bed were brown, and in some cases almost black.

At the end of this paper I have added lists of all the animal and vegetable remains found in the cave, as well as of the implements and ornaments. I may say that the smaller objects, such as mosses, seeds, insects, etc., were collected by taking carefully selected samples of the deposits, and subjecting them to a process of washing and sifting.

When the explorations were commenced, the entrance to the "Swinrick Room," marked A on the plan, was found to be closed by a mass of large stones and red earth, the whole being bound together by an infiltration of lime in the shape of stalagmite, and this obstruction was removed for the purpose of allowing the deposits in the higher reaches of the cave to be more easily taken out. Two of the entrances can be reached by climbing up the steep side of the glen. The "Grand Entrance," marked B on the plan, which is overhung by an immense mass of limestone rock bearing two goodly sycamore trees and a fine canopy of brushwood, is approached by the old quarry road, while the "Spy-hole Entrance," which is situated in

the cliff of the limestone overhanging the glen, can only be got at by means of a ladder. The fifth has been probably shut for ages, and still remains so.

This remarkable cavern, which has been excavated by the slow but continuous action of natural forces, is hollowed out in the thick bed of limestone known as the Auchenskeith bottom post. A small fault at the "Grand Entrance" has thrown up the limestone to the north for a distance of about twenty feet higher than its position in the old quarry. This limestone is of a bluish colour, and has been worked at Auchenskeith and Auchenmade in the Dalry district, and at Broadstone, Gateside, and other places near Beith. Its position in the geological scale is some twelve hundred feet below the Main coal of the Western Ayrshire coalfield. The large fault, known as the Dusk Valley fault, which passes only a short distance in front of the cave, has let down the strata to the north-west, so that the coal seam already spoken of has been thrown down to nearly the same level as the limestone in which the cave is excavated. At this place we have ample proof of the denudation of at least two hundred fathoms of limestone and coal measure strata; and, as the Upper Carboniferous measures come on in regular sequence farther to the south, it is not going beyond the province of fair geological deduction to say that at one time this limestone was buried beneath all the Upper Carboniferous strata of western Ayrshire, and possibly other higher strata, no traces of which now exist in the district.

It was only by an exhaustive examination of the deposits found in the passages of the Cove that I was enabled to come to the conclusion that the Dusk Water, which now runs in the glen far below the level of any of the entrances, had at one time run through the passages, and had been the means, in great measure, of scooping them out and of bearing in and leaving upon their floors the interesting deposits which enable us to read its history. These, in all the low-lying passages, with the exception of one, were distinctly in three beds. In the "Festive Hall," marked C on the plan, so called from the great number of bones we found in it, the deposits reached the thickness of 3 feet 2 inches. The bottom bed was 14 inches thick, and was composed of sand and gravel mixed with clay, the clay having resulted in great measure from the decomposition of the gravel. All through this bed, which extended from the "Grand Entrance" to the middle of the "Swinrick Room," but was absent from the greater part of the passages D and E, were large and small blocks of sandstone, whinstone,

limestone, ironstone, and shale, all well waterworn. In this bottom bed no traces of man or his works were found, the only organic remains got in it being a few small bones of mammalia and rolled pieces of branches of trees. The bed on top of this—15 inches thick—was made up of vegetable mud; thin layers of sand, large and small waterworn stones of whinstone, sandstone, etc., being freely scattered through it. Its great and interesting features were the amount of organic remains, and the abundant traces of man's occupation of the cave, which it contained. Branches of hazel, alder, hazel nuts in abundance, seeds of various plants, and mosses in a fine state of preservation, wing-cases of beetles, land and freshwater shells, freshwater ostracoda, hundreds of mammalian bones, teeth, and jaws, and, to crown all, traces of man in the shape of rude implements in bone and horn, and wood charcoal, the remains of fires he had lighted to cheer the winter nights or cook his food, were got in it. This middle bed extended from the "Grand Entrance," through the passages F, C, D and E, to about the middle of the "Swinrick Room" (A). Many of the bones from this bed have marks of some sharp instrument on them, and others have been broken and split longitudinally to get at the marrow. Many of them were gnawed as if by the teeth of animals. Many specimens of *Littorina littorea* were found in this bed, and a decayed fragment of *Pecten maximus*. It is noteworthy that no traces of any other edible shell-fish, nor any of the cereal grains, were found in this deposit. The examination of this cavern has shown me that the preservation of bones depends to a great extent on the material they have been lying in. Some of the bones on the surface of the dry passages, or a few inches below it, had apparently lost all their gelatine, for they were so light and porous that they adhered to the tongue and floated on water; whilst those preserved in the fine clayey vegetable mud were hard and strong and heavy. No split bones were got in the top deposit, and the only traces of man were fragments of a rude black pottery which had been made on a potter's wheel and milk glazed, an iron spearhead, a brass ring, and a silver ring, all found within a few inches of the surface, and possibly trampled into their position whilst the surface was in a soft state, as it was before the explorations were begun, and the water drained off by the passage D and the entrance B. This occupation of the cavern by man appears to have taken place when the waters of the Dusk no longer entered the Cove, when, in fact, the river had cut its bed too far below any of the entrances for even the highest floods to gain admittance to the

passages. Should it be asked why the Cove did not continue to be deepened as well as the glen, the chief reason appears to have been that the "Grand Entrance" (B), which was the exit for the stream from the Cove when the river ran through it, was worn down to the thick post of whinstone and burnt coal, which would offer great resistance to the action of the water. The removal of the deposits has shown us that the floors of the low-level passage and the passage F were actually worn about two feet lower than the "Grand Entrance" (B), owing to the inclination of the limestone, which dips from the river about three feet lower than the original level of the passage D, where the river last entered the Cove. Had the limestone been of greater thickness than it is, the waters of the Dusk would in all probability have still been running through the Cove, and the heights of some of the passages would possibly have been three times greater than they are; but the hard and tough whin and burnt coal at the "Grand Entrance" prevented its being excavated as rapidly as the bed of the river outside, and the stream no longer getting access, a stop was put to its further increase in size by river action.

We naturally wonder where man found a place for the sole of his foot when the waters of the Dusk flowed through the cave at the period it was first inhabited by him. And the answer is—In some of the higher and therefore drier passages between the "Festive Hall" C and the glen, and possibly in others which have now been destroyed by the deepening of the glen; for it appears certain that the Cove was at one period much larger than it now is. We see this clearly by the manner in which four of the side passages are open to their full size on the bank of the glen. The north-eastern passages were possibly never inhabited by man, as he could only have entered them (after the deposits were laid down) on all fours, and the deposits taken from them showed no trace of man or his works. In fact, the deposits in all the high-level passages, which I consider to have been the oldest deposits in the cavern, showed no trace of man, and were composed throughout of reddish clay, mixed with large and small waterworn stones of sandstone, whinstone, ironstone, shale, etc., many of the stones being so much rotted and decomposed that, though preserving their shape, they could be crushed in the hand. The organic remains found in all the high-lying passages were either on or within a few inches of the surface, and were the remains of small animals which had probably been carried into the cave by foxes, etc., for food. The passage G, the most back-lying

of all, and one which had evidently never been entered by man, even on all fours, before the deposits which reached to the roof at its entrance were removed, is a low-level passage, with shelving sides and fissured roof, but, unlike all the rest of the low-level passages, the bed of vegetable *debris* containing bones and rude works of human art, which was found in all the others, was absent from it. The deposits in this passage were composed of layers of fine sand and mud mixed with small rolled stones foreign to the cavern, and in the very centre of it was found a valve of the large Swan Mussel, *Anodonta cygnea*, specimens of which were also found in the passages E and D. A large waterworn bone was got about the bottom of the deposits, near the centre of the passage. Blocks of decomposed or "sookit" limestone were found in all the passages, and in every part of the deposits were found large and small blocks of unrolled limestone, all composed of the rock through which the cave was worn, and having evidently fallen from the roof as the deposits were being laid down. They presented a decomposed or "sookit" appearance, as if they had undergone a process of digestion in the mouth of some ancient giant. Many such blocks had to be taken down from the roof during the process of exploration to ensure our personal safety. Is it too much to imagine that many of these blocks had been assisted to their resting-places among the deposits by the shocks of earthquakes in former ages?

Carboniferous Fossils.—In every part of the deposits, fossil forms belonging to the orders Spongidae, Foraminifera, Ostracoda, Polyzoa, etc., were sparingly found. These were true Carboniferous forms, which had fallen into the deposits from the decomposing limestone of the cavern, or which in some instances might have been washed in from Carboniferous strata farther up the river.

Stalactites and Stalagmites.—Every passage has or has had its stalactites. The roofs of some of the passages which were difficult to enter before the deposits were taken out were found to be bristling with them, and in many places conical stalagmites had grown from the floors of the passages, and had joined the stalactites growing downwards towards them from the roof. Some of these conical stalagmites told us a bit of the Cove's history. The interior of one was built up, layer upon layer, for two inches of its diameter, of the purest carbonate of lime. The outside half-inch was made up of thin layers of red earth and carbonate of lime alternately. The interpretation I put on this is, that at some period after the deposits

were laid down all the entrances to the Cove had got closed up by the clay and stones falling down over their mouths from the side of the glen. As I have already stated, two of the entrances were closed when we began operations, and one remains so still. During the period of closure the pure white interior of this stalagmite had been formed. But a time came when the river having washed away the base of the obstruction it slid down, and the entrance being once more opened, foxes or other animals gained admittance, and, passing and repassing this growing stalagmite, painted it with red earth, which in its turn was covered with the limestone solution from the roof. Owing to the strong current of water which has passed through all the passages, no sheet of stalagmite had been allowed to form on the floors of any of the passages, but sheets of stalagmite have formed on their sides, some of them being of very fantastic forms. The most considerable piece of solid sheet stalagmite is that to be seen in the "Swinrick Room," and, curiously enough, it had been formed over the inside slope of the obstruction which closed the entrance to this room. A small sheet of spongy stalagmite, about four inches thick, was got at the end of the passage D. This also had been formed on the top of the cave deposits. On a sketch plan of part of Cleaves Cove, which is given in the edition of Timothy Pont's *Cunninghame*, edited by Mr. Shedden Dobie in 1879, the stalagmite in the "Swinrick Room" (A), (there called the "Great Court"), is set down as glittering rock. In all the deposits were found small white conical stalactites which had fallen from the roof through some cause or other. I have observed that there is a vast difference between stalactites and stalagmites. The stalactite, in its first beginnings, is hollow, and is lined with minute crystals. The point always remains hollow, and the interior gets filled up as it grows down from the roof. The conical stalagmite, on the contrary, is always solid, and is broader or narrower according to the amount of lime-water solution falling on it and the distance it has to fall. Sheet stalagmites may be either solid and crystalline, or semi-crystalline, or spongy, the spaces being lined with minute crystals, but how this structure has come about is not so easily explained.

The Cove still getting larger.—To look at the Cove in its present state one would at first glance think that all further development of the passages had ceased; but this is not the case. A small run of water has always been issuing from the cave, and this has been doing its work slowly, but surely and steadily, since the deposits were laid down in the passages.

Some of the cracks or natural jointings of the rock were found to be open in the floors as much as two inches in width. Had they been open before the deposits were laid down they could not have failed to be filled up by the fine sand and mud carried in by the river. The joints in the roofs of the passages have also been widened, and this has possibly been going on since the Cove first began to exist; but it has proceeded at a very slow rate, the widest roof joint observed, where a stalactite was broken off, being only one-eighth of an inch across. To see this cavern in its present state of natural grandeur and solidity, hollowed in a great and strong post of solid rock, one would think it was destined to endure for ever. The elements—water and carbonic acid—which have made it, and furnished it with all its beauty of sculpturing, will assuredly some day sweep it from the face of the earth.

The principal opening into the cavern at B is overhung by a large mass of limestone rock, 18 feet long, 14 feet broad at the outside, and 25 feet broad at the inside, and its thickness, including the Boulder-clay above, 17 feet. After a depth of about 3 feet of rubbish which partly closed it was removed, the original floor of the cave was reached, and was found to be composed of a very tough mixture of greenstone and burnt coal, which had to be blasted out to a depth of 18 inches to allow the accumulation of water to drain from this part of the cave. The dip of the rock at B is 1 in 10 in the direction $61\frac{1}{2}^{\circ}$ S.E.,¹ and before the floor was lowered it was 25 feet above the bed of the Dusk Water in the glen beside it.

The bearing of this passage F is $75\frac{1}{4}^{\circ}$ S.E. The length is 25 feet, and the width next the "Grand Entrance" B, 8 feet 6 inches, height at same place 10 feet 2 inches, tapering to 7 feet 3 inches at the farther end. The roof of this passage is for the first half rather flat, the rest being cut into with a deep fissure. The deposits found in this passage were—

Reddish earth, with a few small <i>white</i> bones	10"
Dark vegetable muddy clay, with many large <i>brown</i> bones and wood charcoal	1' 2"
Gravel	9"
	<hr/>
	2' 9"

A fragment of *Pecten maximus* and a finely made bone chisel were got in the middle deposit, and large rolled and well-rounded pebbles of sandstone,

¹ All the bearings are magnetic. September 1883.

dolerite, clayband ironstone, shale, etc., were common throughout every part of it. All the large bones were broken and split for the marrow, many of them having knife-like marks, and some of them being considerably gnawed.

In C a bed of calcareous shale 8 inches thick is seen at one foot below the roof, and several thin reefs of *Lithodendron* occur in this passage. The middle part of the deposits here contained an immense quantity of large brown and blackish bones, and a large tine of a deer's horn, which had been sawn on both sides and broken off in the middle, its surface being roughly polished. The section of the deposits in C was similar to that in F, and only 1 inch less in depth. For a few feet in breadth along the south wall the deposits were composed of very fine mud intermixed with branches, nuts, and bones. This mud is easily accounted for, as from the width of the passage this portion of it would be out of the current of the water, and so would give a quiet settling place for the muddy water. Some of the large stones in the centre of the passage, on the other hand, were over 2 cwts. in weight.

The deposits at the south end of D were similar to and continuous with those in the "Festive Hall." A large bone, with a nick formed all round it near one end, and roughly polished, and the butt end of a deer's horn, which had been sawn across and roughly polished, were got in the middle portion of this part of the passage, and opposite to the "Blair Corridor." An iron spear-head was also found a few inches below the surface, having possibly sunk or been trampled into its position. Another iron or steel spear-head was got from the *debris* which has been removed from this passage, but, of course, it was impossible to say from what part of the deposit it had come. Next the inner end a large valve of the Swan Mussel *Anodonta cygnea*, was got in the middle part of the deposit, along with large bones, and specimens of *Buccinum undatum*. The deposits gradually thinned away towards the stream, which for a few feet was free from them, the only place in the Cove where the floor was bare when I commenced explorations. In the middle of the passage, and opposite D, the section of the deposits was—

Yellowish tough clay	.	.	.	.	.	8"
Vegetable <i>debris</i> and mud with large bones	.	.	.	.	.	4"
Yellowish tough clay	.	.	.	.	.	3"
						<hr/>
						1' 3"

The deposits at passage E were only 9 inches deep, but they gradually deepened towards A, where the section was as follows:—

Yellowish tough clay	.	.	.	9"
Dark clay, with large bones and branches	.	.	.	8"
Gravelly clay, with a few rotted sticks	.	.	.	8"
				<hr/>
				2' 1"

The middle part of the deposit here was very tough, and difficult to detach. A second valve of *Anodonta* was got in it. After the deposits were removed, and the passage was being swept, a rude bone ring was found. The last 10 feet of the floor towards A dipped 6 inches, and in this part water lay, but was let off, as will be seen in the description of the next passage.

The greenstone floor of A is partly covered with a patch of burnt coal 3 inches thick, and above the coal a band of soft calcareous shale, with *Productus* and other fossils, is seen cropping out on the east side. Portions of the obstruction on each side of the entrance still remain. In mining through it some exquisite specimens of stalactites and stalagmites were found amongst the large blocks of limestone, and several specimens of *Helix nemoralis* were got embedded in the stalagmites. We were here reminded of the strongly disintegrating powers ascribed to roots. Had any strong advocate of the root theory been with us when making this cut he would have been quite as favourably impressed with their preservative qualities. Many tons of loose earth are held together on the steep bank of the glen by the roots, the finer fibres forming quite a network which holds together the finest particles of soil. In fact, if it were not for them all the soil of the bank would be swept into the river below by the rains of a single season, leaving the bare rocks below to be acted on, and more rapidly disintegrated, by the sun, air, frost, and rain. No doubt roots act as powerful disintegrating agents in breaking up rocks, but, on the other hand, we are convinced their preservative qualities are greatly in excess of their destructive ones. The deposits of the S.E. part of A were continuous with those of E, and measured as follows:—

Reddish earth, mixed with yellowish clay	.	.	.	1' 0"
Dark mud, with large brown bones and branches	.	.	.	1' 3"
Stones and gravel	.	.	.	0' 3"
				<hr/>
				2' 6"

A brass finger ring of rude workmanship was got three inches below the surface in this passage.

This finishes the description of the passages in which the large bones carried into the cavern by man, and covered by the deposits of mud and rolled stones laid down by the waters of the Dusk, which now flow so many feet below its lowest entrance, and the rude implements of bone, horn, and stone, used by him, were found. The deposits of mud and vegetable *debris* in which these remains have been so well preserved are absent, as I shall show, from all the other passages.

Turning to the left, at the south end of the passage G, we enter a passage of which the width varies from 3 feet 9 inches to 5 feet 6 inches. The heights at these respective places are 4 feet 7 inches and 4 feet 3 inches. The roof is deeply fissured, the opening in two places passing above as an upper passage. In this fissure and upper passage some splendid conical stalagmites, with their overhanging stalactites in some places joined to them, were got, and many are still to be seen. Owing to the thin beds of impure limestone and shale which dip from the roof of the passage E, and crop out in the sides of this passage, the sides bulge out so that it is difficult to pass along it. The sculpturing of the sides and roof is extremely rugged and irregular, but the floor, on the other hand, is smooth and polished. The section of deposits at the N.W. end was—

Yellowish clay and rolled stones	.	.	.	.	.	2"
Spongy stalagmites	.	.	.	.	.	4"
Dark mud and rolled stones	.	.	.	.	.	9"
						<hr/>
						1' 3"

Near the middle of the passage the deposits measured 3 feet deep, and were made up of yellowish, reddish, and dark-reddish mud, with thin layers of pure white sand and waterworn stones foreign to the Cove, and the usual blocks of rotted limestone which are common to the deposits of all the passages. Right in the centre of the deposits was a valve of *Anodonta cygnea*, the calcareous part being in a very soft state, but the epidermis still pliable. A wasted fragment of a pretty large bone was got near the bottom of deposit, and on the surface were numerous small white bones and many conical stalagmites. Under the shelvings of the impure limestone in some parts, and on the top of the river deposits,

were exceedingly bright vermilion and blackish layers of impalpable mud, which were nowhere else seen in the Cove.

At the passage from A to H the deposits were—

Reddish clay, with small stones and limestone blocks	1' 2"
Dark reddish gravel mixed with clay, rolled blocks of dolerite, sandstone, etc., the surfaces of many of them being much rotted	2' 3"
	<hr/> 3' 5"

A silver ring was found here a few inches below the surface.

LISTS OF THE VARIOUS OBJECTS OF INTEREST FOUND IN CLEAVES COVE.

In the identification of many of the organic remains found in the Cove I have been kindly assisted by the gentlemen whose names I have appended to the separate lists, and to them my thanks are therefore heartily rendered.

IMPLEMENTS, WEAPONS, AND ORNAMENTS.

From surface deposit :—

- Silver ring. Fig. 1a.
- Finely cut glass bead of an emerald colour. Fig. 1b.
- Bronze (?) finger ring. Fig. 1c.
- Iron spear-head. Fig. 2.

From second deposit :—

- Tine of red deer's horn, $10\frac{1}{2}$ inches long ; had been sawn on opposite sides to a small depth and then broken off ; roughly polished all over the surface. Fig. 3.
- Part of base of red deer's horn formed into an implement, and polished all over the surface. Fig. 4.
- Small bone implement, chisel-pointed. Fig. 5.

Of unknown position :—

- Two bronze (?) finger spiral rings of three twists each. Fig. 1d.
- Finely made bone spoon with circular bowl, shaft broken. Fig. 6.
- Peculiar implement, $3\frac{1}{2}$ inches long, with oblong hole in centre and circular hole running through it lengthwise. Made of endogenous wood. Fig. 7.
- Rude bone ring, possibly from second deposit. Fig. 1e.
- Bones with traces of working. Figs. 8, 9.
- Iron object. Fig. 10.

MINERALS.

Vivianite.—In small blue patches on the bones, and in small masses in the interior of rotted branches.

Arragonite.—Crystallised on the surfaces of the bones in small radiating patches.

Rock Milk.—A layer three inches thick was got beneath the deposits in "Napoleon's Passage," and in several of the other passages this substance was found surrounding blocks of limestone in the deposits. In "Bennie's Passage" and "Silver Ring Passage" small isolated pieces about an inch or less in diameter were got, and many of the fallen stalactites dug from the deposits were partly converted into this substance.

MOSSES.

For this list of Mosses from the middle deposit I am indebted to the kindness of the Rev. J. Ferguson, Fern, Brechin :—

Thamnium alopecurum.
Hylocomium splendens.
 " *triquetrum.*
Aulitrichia curtipendula.
Eurhynchium Swartzii.
 " *myosuroides.*
 " *striatum.*
Brachythecium rivulare.
 " *velutinum.*
 " *pluviosum.*
Thuidium tamariscinum.
Neckera complanata.
Ulotia crispa.
Aulacomnium palustre.
Sphagnum cymbifolium.

A few species remain undetermined.

SEEDS.

For the following list of Seeds from the middle deposit I am indebted to Mr. Thomas King :—

<i>Ranunculaceæ</i>	.	.	.	One species	.	Frequent.
<i>Papaveraceæ</i>	.	.	.	" "	.	"
<i>Polygonaceæ</i>	.	.	.	" "	.	"
<i>Labiata</i>	.	.	.	Two species	.	Rare.

<i>Caryophyllaceæ</i>	.	.	.	Two species	.	Rare.
<i>Leguminaceæ</i>	.	.	.	One species	.	„
<i>Compositæ</i>	.	.	.	„	„	„
<i>Cyperaceæ</i> , seeds and fruit	.	.	.	Two species	.	Frequent.
<i>Graminaceæ</i>	.	.	.	One species	.	„
Three species undetermined	.	.	.			Rare.

SHELLS.

Mr. David Robertson, F.L.S., F.G.S., has kindly sent me the following lists of Shells from the middle deposit:—

OSTRACODA.

Candona candida.

MOLLUSCA.

<i>Sphaerium corneum</i> , Lin.	Frequent.
<i>Pisidium fontinale</i> , Drap.	Rare.
<i>Planorbis glabra</i> .	Frequent.
<i>Zonites fulvus</i> , Mul.	Rare.

The following were also got:—

<i>Anodonta cygnea</i> , Lin.	Three specimens.	
<i>Helix nemoralis</i> , Lin.		Frequent.
<i>Pecten maximus</i> , Lin.	One valve.	
<i>Littorina littorea</i> , Lin.		Frequent.

The last two were taken in by man.

INSECTS.

Mr. James J. King has furnished me with the following information as to the remains of Coleoptera found in the Cove:—

Geotrupes. | *Curcules.*

Remains of about a dozen other species.

Mr. King remarks that the beetles to which the fragmentary remains belong are very difficult to make out even when one has the complete insect to work from.

Two kinds of sand-built cases, probably of dipterous larvæ, were found in the middle deposit, one straight, the other tapering and curved like a small *dentalium*.

Dipterous cocoons were frequent.

MAMMALIA AND BIRDS.

For this list I am indebted to the kindness of Dr. John Cleland, Professor of Anatomy in the University of Glasgow:—

BONES FROM SURFACE DEPOSIT.

<i>Sheep</i>	.	.	.	.	Both slender-legged and modern varieties.
<i>Hare</i>	.	.	.	.	Left pelvis, left tibia, and right femur only.
<i>Rabbit</i>	.	.	.	.	Frequent.
<i>Rat.</i>					
<i>Cat</i>	.	.	.	.	A few bones.
<i>Dog</i>	.	.	.	.	Small size, a few bones.
<i>Weasel</i>	.	.	.	.	A few bones.
<i>Pheasant</i>	.	.	.	.	A few bones.
<i>Partridge</i>	.	.	.	.	A few bones.
<i>Duck</i>	.	.	.	.	A few bones.
<i>Common fowl</i>	.	.	.	.	A few bones.
<i>Goose</i>	.	.	.	.	A few bones.
<i>Gallinaceous bird.</i>					

BONES FROM MIDDLE DEPOSIT.

<i>Ox.</i>	(<i>Bos longifrons</i>)	.	.	.	Very plentiful. A number of the ox bones have belonged to very small individuals.
<i>Calf</i>	.	.	.	.	Frequent.
<i>Red deer</i>	.	.	.	.	Tine of horn and case of horn only. Both specimens as implements.
<i>Sheep</i>	.	.	.	.	Very plentiful. The majority of the bones have belonged to the slender-legged variety.
<i>Goat</i>	.	.	.	.	Few bones of the goat found.
<i>Pig</i>	.	.	.	.	Numerous bones of pigs.
<i>Beaver</i>	.	.	.	.	Left lower jaw only.
<i>Badger</i>	.	.	.	.	Left humerus only.
<i>Cat</i>	.	.	.	.	A few bones got.
<i>Hare</i>	.	.	.	.	Left humerus only.
<i>Goose</i>	.	.	.	.	Left ulna only.
<i>Cetacean (?)</i>	.	.	.	.	Right rib.

JOHN SMITH.

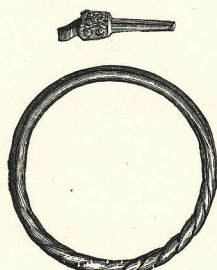


FIG. 1a.

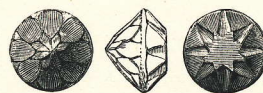


FIG. 1b.



FIG. 1c.

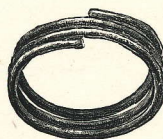


FIG. 1d.

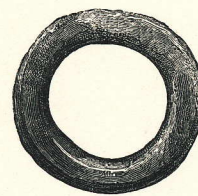


FIG. 1e.

All the above natural size.



FIG. 2. Scale $\frac{2}{3}$.

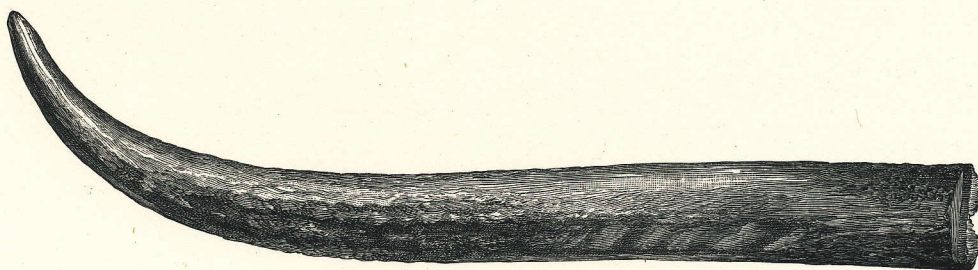


FIG. 3. Scale $\frac{1}{2}$.

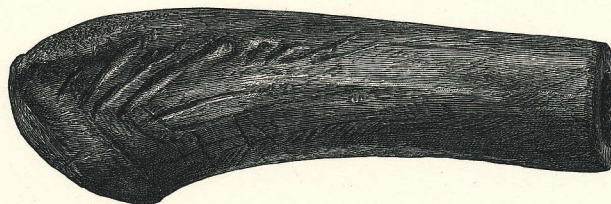


FIG. 4. Scale $\frac{1}{2}$.

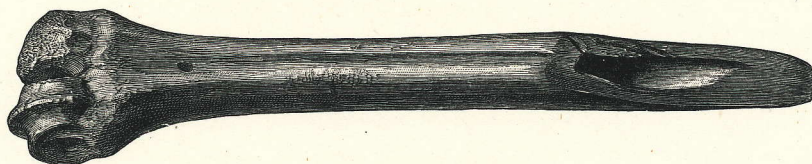


FIG. 5. Natural size.

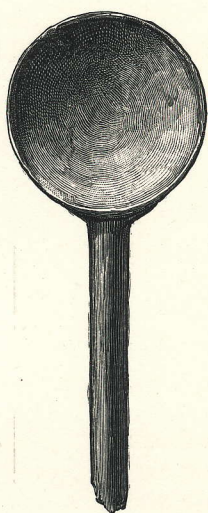


FIG. 6. Natural size.

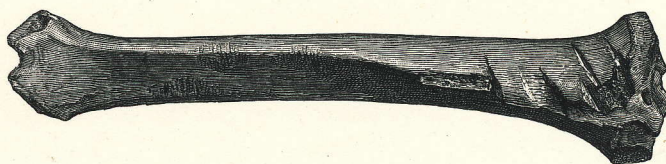


FIG. 8. Scale $\frac{1}{2}$.

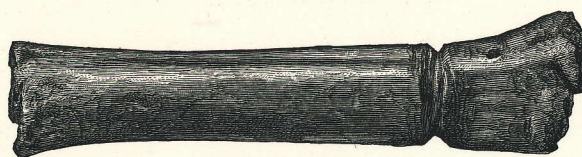


FIG. 9. Scale $\frac{1}{2}$.

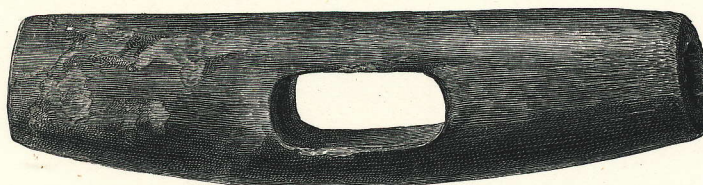


FIG. 7. Natural size.

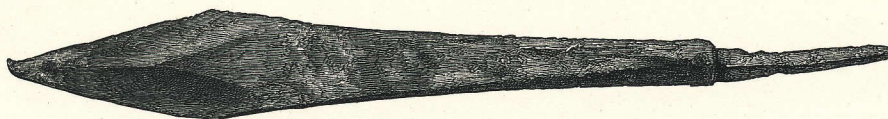


FIG. 10. Natural size.