

## Preliminary Report on Investigations at Goatchurch Cavern, Burrington Combe, Somerset.

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Goatchurch Cavern<sup>1</sup> is situated on the right bank of the lower of two ravines which branch into Burrington Combe. The upper part of Burrington Combe is a valley formed by a stream (whether a surface or subterranean one) flowing in a westerly direction along the strike of the rocks which form the Mendip anticline. At the point where the Goatchurch Ravine debouches the Combe takes a sharp turn to the right, its lower portion running in a northerly direction. The Goatchurch Ravine is a transverse valley descending in a northerly direction from that part of the Mendip anticline known as Blackdown, the rocks being shown dipping along the sides of the ravine at a steep angle. It is a comparatively modern feature of the landscape, and is apparently a true valley of erosion, formed by the Goatchurch stream. Its upper part lies far above the base level of erosion, and the stream, had it not been deprived of most of its power by a dam in its upper reaches for water works purposes, would still be continuing its work as a formidable agent of mechanical erosion. In all probability the lower part of the ravine first made a comparatively sudden appearance with the collapse of a series of caves of which the Goatchurch cave is a remnant.

The entrance to Goatchurch Cavern is a small opening at a height of 40 feet above the bottom of the ravine at this point, and leads into the uppermost portion of the cave. The lowest part of the cave has been found by barometer to be 170 feet below the entrance. The cave is formed in the Z beds of the Carboniferous limestone series, and consists of a number of east and west galleries opened in the bedding planes at various levels. In general, the western ends of the galleries lie at higher levels than do their eastern extremities, the floor of each gallery showing a more or less rapid and continuous fall from west to east, that is, their higher extremities are those adjacent to the ravine. The galleries are intersected and communicate with one another by fissures formed for the most part by the widening of the joints in the limestone, running in planes approximately at right angles to the bedding planes.

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<sup>1</sup> For general description of Goatchurch Cavern see *Proc.*, Vol. I, No. 3, p. 144 (contains plan); and A. E. Baker and H. E. Balch—*Netherworld of Mendip*.

Upon the floors of the galleries lie deposits of earth or gravel of variable thickness, in some places sealed down by a variable thickness of stalagmite. Similar deposits choke portions of the intersecting fissures. It is quite possible that the deposits in some of the galleries are of great depth, in some cases extending downwards perhaps as far as the roofs of the corresponding galleries at lower levels between the same bedding planes. The existing deposits are the final result of a long sequence of changes in the course and power of the subterranean stream, due chiefly to the gradual lowering of the stream's bed, the enlargement of its drainage basin, and to changes in climate conditions; the changes, no doubt, being to some extent dependent on the oscillations in the relative levels of land and sea, which are known to have characterized the Pleistocene period. Deposits which could not have been formed by percolating water are found in niches in the roof, and indicate that at some time in their respective histories some of the passages have been entirely choked. At some points stalagmite is found intercalated between successive deposits of earth or gravel, which points to local pauses in the flow of water and deposition of sediment. The remains of stalagmitic floors projecting from the walls, evidently untouched by earlier excavators, indicate that deposits have been washed out after remaining undisturbed for long periods. Other evidence relating to the sequence of events is afforded by the state of the sides of the galleries characterized by projecting fossils in various states of preservation, stalagmitic coatings of variable thickness, water-worn stalagmite and so on.

The local pauses which are shown to have taken place have been due, perhaps more than to anything else, to the stream having deserted its subterranean course owing to the lowering of the stream's bed below the point of entry, and having made a way at a later period into the lower portions of this subterranean course from a lower point of entry. As a result of activity after a long pause a comparatively recent deposit might be found resting upon a much older one.

The Goatchurch stream disappears into a swallet at a point 165 feet farther down its course than that vertically below the entrance to the cave. A stream is met with in the lower chambers of the cave, and the position of the swallet with respect to this part of the cave would lead to the supposition that this is the same water as that of the Goatchurch stream. It has been noticed, however, that the volume of these two streams is not always the same, the greater volume being at times inside the cave, and at others in the stream outside it.

## PREVIOUS EXCAVATIONS.

There is evidence in the cave of a considerable amount of previous excavation. This, however, has been confined chiefly to the second long gallery, known as the Traverse. A considerable length of this passage was at one time covered with a sheet of stalagmite gradually thickening towards its higher end. The stalagmite has been broken through, and in some places the deposit beneath has been excavated to a depth of over 3 feet. At the point where the stalagmite becomes too thick to be easily broken the excavations cease. Rutter,<sup>2</sup> writing in 1829, states that Williams was carrying on excavations in the cave, and had discovered "some fine specimens of bones of bear, deer, etc., on and beneath the coatings of stalagmite, and intermingled with immense quantities of pebbles, diluvium, etc." In 1864 Sir William Boyd Dawkins explored the cave, and, during subsequent excavations, found remains of cave bear, and hyæna.<sup>3</sup> He states<sup>4</sup> that a molar of bear and a fragment of flint were found imbedded in red earth under a thickness of about two inches of stalagmite, at the point where "Mr. Beard, of Banwell, obtained a fine tusk of mammoth."

A fragment of flint in the Traverse, which is undoubtedly the part of the cave referred to, probably does not point to actual human occupation unless the gallery was at the time of deposition of the flint more easily accessible than at present. This may have been so, since an entrance from the outside may have existed at the upper extremity of this gallery. The present evidence, however, points to a greater likelihood of this object having been washed in by the stream.

The present locality of the above mentioned finds has not been traced.

Later excavations were due to a former owner of the manor, who commenced work with the intention of opening the cave to the public. The entrance, which was formerly a low brow of rock, under which the explorer had to crawl on hands and knees, was enlarged. Steps were cut in the thick stalagmite which covers the greater portion of the first gallery; and a trench about 4 feet wide and 12 feet long was excavated, for some reason, next to the right hand wall just inside the entrance, to an average depth of about 3 feet, the excavated material being taken outside the cave. The project did

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<sup>2</sup> Rutter, *Delineations of N.W. Somerset*, 1829.

<sup>3</sup> Boyd Dawkins, *Quart. Journ. of the Geological Society*, May, 1869.

<sup>4</sup> Boyd Dawkins, *Cave Hunting*, 1874, pp. 31-34.

not materialize, and very soon afterwards most of the more delicate calcite formations were removed by visitors to the cave.

#### WORK BY THE SOCIETY.

Work was commenced by this Society in August 1923, and since then about 16 tons of material from an area within 20 feet of the entrance, excavated to a depth of 3 feet, have been taken outside the cave and sorted. The material, as would be expected at this point, is very much disturbed, and contains remains of the older Pleistocene period at the same levels as those of the present day. The horizontal ramus of the left mandible of a young Cave Bear containing the canine tooth, the 4th pre-molar, and the 1st and 2nd molars was found. Other teeth of cave bear, a lower incisor of Brown Bear, a lower jaw of Wild Cat, and remains of Horse, Boar and Badger coated with stalagmite were also found.

At the eastern extremity of the first gallery, a layer of hard stalagmite, covering a slab of stone about 4 sq. feet in area at the foot of a stalagmite flow, was broken up. Resting on this stone was a very thin layer of fine earth and gravel, containing remains of small rodents indicating the late Pleistocene period, together with 3 upper incisors, a lower incisor, and 2 upper pre-molars of Cave Bear, probably all belonging to the same individual. These remains were found on the outer edge of the slab, where the stalagmite was only one half of an inch thick, the upper surface of the largest incisor being but just covered. Another upper incisor from the other side of the jaw had fallen over the slab and was found a foot away on the surface of some loose earth. Some more rodent remains of Pleistocene age were found on the surface of some stalagmite covering the floor of a niche in the Traverse. The stalagmite in this niche is a remnant of the stalagmite floor which was broken through by previous excavators.

#### METHOD OF WORK.

Owing to the complicated arrangement of the various deposits in the cave, it is impossible, except where one deposit rests directly upon another, to come to any conclusions as to their relative ages, or the relation of one to another without resorting to actual excavation and examination of their contents. With this point in view a trench was dug in the Traverse to a depth of 5 feet, and five samples were taken from various depths. These samples, each consisting of about  $\frac{1}{2}$  cwt. of material, were taken out of the cave and washed through canvas, over buckets of water. During this operation the large



pebbles were picked out by hand, the material of intermediate size remained on the canvas, and the matrix or fine material passed through the canvas to settle as sediment on the bottom of the bucket. These three components of each sample have been kept and carefully labelled with the exact locality from which the respective sample was taken. The intermediate component will be searched for teeth, bones, shells and other Pleistocene or more recent remains. The three components of the sample are being examined with a view to determining as far as possible the precise origin of the various ingredients of the deposit. If favourable results are obtained on the completion of this trench, all the other deposits will be tested at chosen points in the same way. The age of the deposits, and those which are likely best to repay excavation, will be fixed by the Pleistocene or recent fossils. Also, in conjunction with a knowledge of the origin of the deposits it is hoped to be able to make some progress in the unravelling of the sequence of events which have gone on in the cave, and the respective external changes which have accompanied them.

I am very much indebted to Mr. M. A. C. Hinton of the British Museum, under whose guidance the excavations in this cave are now being carried on, for valuable suggestions as to the correct method of work, and for identifying all the animal remains which have been found.

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