Second Report on Goatchurch Cavern.

By E. C. Browne.

The method of work in Goatchurch Cavern was described in the last Report (Proc. II, No. 1, page 60), and, as stated there, the work has consisted mainly of taking samples at suitable levels, and of sieving and examining them from a geological point of view. The intermediate material was also examined for shells and rodent remains, but, on the whole, this examination has not been very fruitful.

The method of work has necessitated numerous excavations at widely removed localities, and for this reason a large party was required to work at all places at once. In pursuance of the scheme explorations have been made in the hope of disclosing fresh undisturbed deposits. The main result of this has been the discovery of a chamber above the First Gallery, which, it is hoped, will prove to be a new gallery, older in deposits than the present First Gallery. Blasting has been in progress some time to admit of entrance to the Chamber.

FINDS.

The finds in this Cave have not been very numerous, and most of them were mentioned briefly in the last report. They consist of the following:—

Cave Bear. Four right upper incisors, $\underline{1^1}$, $\underline{1^2}$, $\underline{1^2}$, $\underline{1^3}$, and two upper first premolars, all from the Swirl.

$\underline{1^3\ 1^2}$, $\overline{C, PM_4, M_1, M_2, \text{ and } C}$ from the Vestibule.

Brown Bear (?) $\underline{1^2}$

Wild Cat. Lower jaw.

Pig. Part of left Humerus.

Horse. Proximal Metacarpal.

Badger. Fragments, with teeth, of two skulls.

Rodent remains have also been found, but are awaiting identification.

FIRST GALLERY.

A. Work in the First Gallery has been carried on in two places, excluding the Swirl and the New Chamber. The first, known as the Vestibule, is immediately within the entrance, and has yielded remains of Cave Bear, Brown Bear, Badger and Rodents. In all,

19½ tons of earth, and 2½ tons of large boulders have been removed from the Vestibule.

B. In August 1924 work was commenced in the First Gallery at a spot about 60 feet from the entrance in a recess on the right looking in. This was not fruitful in results though in it Mr. M. A. C. Hinton, of the British Museum, identified a first upper molar of Arvicola (Abbotti ?). The stratification here was as follows :

1. *Surface Débris.* This contained recent remains. Thickness variable.
2. *Coarse, rapidly-formed, soft Stalagmite.* 3-ins. This was deposited in a series of layers of varying thickness, and within it both vertically and between successive layers, occurred earth " pockets " containing several rodent remains (as yet unidentified).
3. *Extremely Solid Stalagmite.* 9-ins. to 1-ft. This was laid down in about five thick layers, now very firmly held together forming a compact block, apparently barren. Between this layer and the superimposed layer of soft stalagmite was a thin film of earth in which was found a first upper molar of Arvicola.
4. *Cave Earth.* This was of the characteristic reddish colour and dry. As yet nothing has been found in it. It is similar to the Cave Earth found below the stalagmite shelf in the Swirl.

C. No extensive excavation was carried out in the Swirl, as the stalagmite was soon removed, exposing the natural limestone. The stalagmite shelf, however, produced remains of Cave Bear and Rodents.

TRAVERSE.

In the preliminary examination of the Traverse rodent remains were found on the floor of a ledge or " pocket " in the north wall close to the spot where Sir William Boyd Dawkins is said to have sunk a trench and found Cave Hyaena and Cave Bear.

The main work in the Traverse, however, has been done in the " Trench," immediately east of the first " joint," proceeding westward, the maximum depth of the trench being 6-ft. 12 tons of earth and stones in all have been removed from the Trench, and samples taken at every foot. The greatest obstacle to work in the Traverse has been the difficulty of disposing of the excavated débris. This has, up to the present, been deposited at the foot of the Giant's

Stairs. The samples were sieved in the usual way and examined for shells and rodent remains, in which they have been singularly barren. The geological analysis, carried out by Mr. F. B. A. Welch, is given below :—

ANALYSIS OF SAMPLES FROM TRENCH IN TRAVERSE.[1]

(*Figures given in columns represent percentages.*)

	1st ft.	2nd ft.	3rd ft.	4th ft.	5th ft.
A. Rounded (mainly qtz. pebbles)	8.0	3.4	3.2	2.5	2.6
Subangular	67.5	82.6	80.6	75.2	44.4
Angular (including pieces of stalagmite and fossils ...	24.5	14.0	16.2	22.3	53.0
B. Sizes. Grade I. max. meas. approx. > 2″	6.4	2.8	7.6	6.4	3.2
Grade II. max. meas. approx. > 1″ & < 2″ ...	8.6	8.7	11.5	16.8	15.2
Grade III. max. meas. approx < 1″	85.0	88.5	80.9	76.8	81.6
C. Constituents.					
Old Red Sandstone	86.4	94.8	81.5	67.0	52.7
Quartz pebbles from O.R.S.	6.0	2.0	3.5	2.2	2.2
K-shales	4.0	2.0	1.8	0.3	1.2
Chert	0.4	0.3	—	—	—
Limonite	0.4	—	—	—	0.2
Cave-breccia & stalagmite...	1.0	0.6	11.0	19.5	19.9
Carboniferous Limestone (Z)	1.0	—	1.2	11.0	23.6
Silicified Fossils (Z)	0.8	0.3	1.0	—	0.2

REMARKS.

SAMPLE FROM 3RD FOOT.

In this sample the pebbles appear to be much larger than those encountered in Samples I and II.

The fragments of O.R.S. and Carb. L/st are frequently 3 by 2 by 2-ins. This fact points to a stream with much greater velocity than that which carried in the previous samples.

As the Goatchurch Stream cut lower towards its present bed less and less water would enter the cave, and consequently the transporting powers would be diminished.

SAMPLE FROM 4TH FOOT.

The rocks show a larger percentage of angular blocks than hitherto encountered. There is also a greater amount of Carb. L/st.

Cave breccia and stalagmite reaches a high proportion.

1 The large pebbles only have so far been reported upon.

The very low percentage of K-shale is noteworthy, though this may be due to loss in washing the sample.

SAMPLE FROM 5TH FOOT.

This sample differs from the others in that the average size of constituent pebble greatly exceeds that in previous samples.

A great deal of the components are fragments of angular Carb. L/st. from the cave, whilst cave breccia and stalagmite occur abundantly.

In none of the samples has been observed any rock that is not now exposed in the valley of the Goatchurch Stream.

SUMMARY.

The work taken on by the Society in excavating Goatchurch Cavern has proved to be enormous. As mentioned before, not only is a large party required to excavate the cave thoroughly, but the difficulties are greatly increased by the fact that the distances from the cave mouth at which the work must be carried out demand much labour in transporting the debris outside the entrance. However, schemes are now in progress for installing bucket-ways which will greatly simplify the task.

I am very much indebted to Mr. F. B. A. Welch for his analysis of the samples in the Trench which appear in this report.