

Derbyshire Caves—Creswell Crags.

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Twelfth Interim Report of Committee appointed to co-operate with a Committee of the Royal Anthropological Institute in the exploration of caves in the Derbyshire district (Mr. M. C. BURKITT, *Chairman*; Dr. R. V. FAVELL, *Secretary*; Mr. A. LESLIE ARMSTRONG, Prof. H. J. FLEURE, Miss D. A. E. GARROD, Dr. J. WILFRID JACKSON, Prof. L. S. PALMER, Mr. H. J. E. PEAKE).

NO new excavation work has been undertaken by Committee during the current year, but the excavation of the Pin Hole Cave, Creswell Crags, has been steadily advanced by Mr. Leslie Armstrong, F.S.A., and it is anticipated that this work will be completed during the coming autumn.

Mr. Armstrong reports as follows:

‘Subsequently to the presentation of my last report, the section in the rear of the main chamber, then under examination, was completely excavated to the base level just prior to the Leicester Meeting of the Association, thereby enabling the complete stratification of the cave deposits, 17 ft. in thickness, to be exposed for examination by Section H during the visit to the cave on September 9, 1933. After inspecting the section the Chairman and members of the Committee present agreed that the excavation of a further portion of the rear passage was desirable before closing down the work, and that ultimately a typical section of the deposits, similar to that

exposed on this occasion, should be permanently preserved. The examination of an additional 15 ft. was therefore commenced during October, 1933, and, at the time of writing, one-third of this length has been excavated to the base level, a total depth of 18 ft.; a further one-third down to the 12-ft. level; and the remainder to the depth of 6 ft. Though the width of this portion of the cave nowhere exceeds 5 ft., and in places is only 2 ft., progress has been slow and the work somewhat laborious on account of the layer of hard crystalline stalagmite, 9 ins. to 12 ins. in thickness, which crowned the deposit, and the numerous slabs and masses of fallen limestone which were cemented into it. Jumbled rocks, of large size, have also been unusually numerous within the cave earth and, in places, completely blocked the passage. The stratification, however, has been well defined throughout, and the two layers of fallen slabs which throughout the cave have so consistently separated the Mousterian (1) and (2) and Mousterian (2) and (3) levels have been equally well marked in this portion also. Having regard to the fact that the presence of so many fallen blocks must have always rendered this part of the cave unsuitable for occupation, it was anticipated that artifacts would be few, but that the chance of discovering human remains was promising. Unfortunately, the latter has not been realised, but artifacts, in all levels, have been more numerous than was expected. A cavity in the upper surface of the stalagmite, filled with slightly brecciated black earth, yielded pins of medieval type and a small Saxon brooch, in bronze, of cruciform pattern. A sherd of Iron Age pottery occurred in a similar cavity. The upper cave-earth yielded several artifacts of flint, including a fine battered-back knife from the Font Robert level, tools of limestone, and pieces of worked bone and reindeer antler.

‘ Fish scales and portions of a large egg, probably duck;

occurred in the same level, also pot boilers of stone and fragments of charcoal around a possible but not well-defined hearth.

' Tools of quartzite, crystalline stalagmite and limestone, similar to specimens previously found, have occurred in each of the three Mousterian levels. Two finds of special interest have been made in the 12-ft. layer, Mousterian (2) in age. The first of these is a bone tool 2 ins. long, roughly triangular in form, with a base $\frac{1}{2}$ in. wide, cut into the form of two prongs, each 1 in. long. The second appears to be a bone "bull roarer." It is $3\frac{1}{2}$ ins. long, $\frac{7}{8}$ in. wide, and of pointed oval form, perforated near one end and having an extreme thickness of about $\frac{1}{8}$ in.

' In comparison with other portions of the cave, animal remains have been less numerous, and no additions have been made to the fauna already recorded. During the spring a number of flies were collected, infested with fungi. These I submitted to Mr. T. Petch, F.R.M.S., who has kindly supplied the accompanying report, from which it will be observed that the specimens include new species of fungi and others of special interest. A report by Dr. J. W. Jackson, on the remains of small mammals collected, is also attached.

' I anticipate that the excavation will be completed early in the coming autumn, and I propose to leave an entire cross-section of the deposit exposed to view. This will form the most complete and representative stratified section of the Upper and Lower Palæolithic cave deposits of Britain, and it is earnestly hoped the Committee will take the necessary steps to preserve it intact as a British type section, adequately protected against unauthorised interference.

' *Future Work.*—An unexpected opportunity has presented itself for the immediate excavation of the Boat House Cave, on the southern side of the gorge and at its

eastern extremity through the draining of the lake which has hitherto occupied the bed of the gorge and prevented any examination of this cave.

'It will be necessary to undertake the work without undue delay. A trial section has yielded promising indications and proved that the deposits are entirely undisturbed.

'I propose, subject to the sanction of the Duke of Portland, to commence this work immediately upon the completion of the Pin Hole excavations.'

REPORT ON FUNGI OCCURRING ON FLIES COLLECTED IN PIN HOLE CAVE.

By T. PETCH, F.R.M.S.

Five species of fungi have been identified on the flies collected by Mr. Leslie Armstrong in Pin Hole Cave. These are:

- (1) *Hirsutella*, new species, parasitic on *Blepharoptera*.
- (2) *Stilbella Kervillei* (Quel.) Lingelsh., parasitic on the *Hirsutella*.
- (3) *Spicaria (Isaria) farinosa* (Holms) Fr., parasitic on gnats.
- (4) *Sporotrichum Isariæ* Petch, parasitic on *Spicaria (Isaria) farinosa*.
- (5) *Beauveria Bassiana* (Bals.) Vuill., parasitic on a fly.

Hirsutella sp. nov.—This fungus first forms discontinuous brown patches of mycelium on the body of the insect, and subsequently, erect fuscous clavæ, up to 8 mm. long and 0.2 mm. diameter. In this condition the fungus is fertile and identifiable.

Very frequently, however, the *Hirsutella* develops into long hair-like strands, 8 cm. or more long, frequently

branched. In that state the strands are usually sterile. A similar phenomenon occurs in the case of the common tropical *Hirsutella* on *Hymenoptera*, *Hirsutella Saussurei*, in which small clavæ, a few millimetres long, are fertile, but the conspicuous long black clavæ, 5 cm. or more long, are sterile. Several of these abnormal sterile forms of the new British species have been collected by Mr. Armstrong, but they could not be identified until the smaller fertile form was found. There is also a specimen in the Herbarium of the British Museum (Natural History), a fly (*Blepharoptera serrata* Fabr.) bearing long sterile hair-like clavæ, collected 'in a stalactite cave,' Yealhampton, Devon, June 1906, which can now be assigned to the new British species of *Hirsutella*.

Only one normal unparasitised specimen of this *Hirsutella* occurs in Mr. Armstrong's collections.

Stibella Kervillei (Quel.) Lingelsh.—This species was described by Quelet from specimens apparently parasitic on flies (*Blepharoptera*), found in caves in France. It has since been found in caves elsewhere on the Continent. Mr. Armstrong's specimens, first found in the Creswell Caves in 1923 and recorded by Mr. F. A. Mason in *Journal of Botany*, August, 1931, pp. 205-207, were the first to be found in Britain. More recently several examples have been collected by Mr. Armstrong in Pin Hole Cave.

Quelet described his species as having a simple white stalk and a yellow globose head, but with brown mycelium on the body of the insect, and unusual difference in colour. Mr. Armstrong's first specimens agreed with Quelet's description, but in the examples from Pin Hole Cave many were apparently branched, up to twenty *Stibella* fructifications occurring as short lateral branches of a long central stalk. On examination it was found that the central stem was really a *Hirsutella* clavæ, and that the brown mycelium on the insect was *Hirsutella* mycelium bearing typical *Hirsutella* conidiophores and conidial clusters.

Thus Mr. Armstrong's specimens demonstrate that *Stilbella Kervillei* is not parasitic on insects, as was supposed, but is parasitic on another fungus, a *Hirsutella*, the latter being entomogenous.

As far as is known, neither *Stilbella Kervillei* nor the *Hirsutella* have been found except in caves.

Spicaria (Isaria) farinosa (Holms) Fr.—The large majority of the specimens from Pin Hole Cave consists of gnats, each enveloped in a greyish loose ball of mycelium. This mycelium bears a scanty growth of *Spicaria* conidiophores. On taking this into culture, the fungus proved to be *Spicaria (Isaria) farinosa*, the common *Isaria* of *Lepidoptera* in this country.

Sporotrichum Isariæ Petch.—Some of the balls of mycelium on the gnats are pale brown. This colour is due to the growth on them of another fungus, *Sporotrichum Isariæ* which is parasitic on *Spicaria (Isaria) farinosa*. This fungus has been found previously in Yorkshire, Norfolk and Sussex.

Beauveria Bassiana (Bals.) Vuill.—This common entomogenous fungus was found on one fly from Pin Hole Cave. It is generally distributed throughout the world, and is the cause of the disease of silkworms known as Muscardine.

THE RODENT REMAINS FROM THE PIN HOLE CAVE.

By J. WILFRID JACKSON, D.Sc., F.G.S.

The rodent remains obtained by Mr. A. Leslie Armstrong, F.S.A., readily fall into two main groups, a lower and an upper, according to the levels from which they come. Those submitted from the Lower Rodent-level, viz. 10 ft. to 13 ft., comprise the following species:

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Lemmus lemmus (L.) (very abundant), *Dicrostonyx henseli* Hinton (common), *Microtus ratticeps* (K. & Bl.) (one jaw at 11-12 ft.), *M. anglicus* Hinton (a few jaws), *M. arvalis* (Pall.) group (a few jaws), *Arvicola abbotti* Hinton (three jaws), and *Apodemus flavicollis* (Melch.) (= *lewisi* Newt.) (few jaws and skulls). The remains of Red Grouse (*Lagopus scoticus* Lath.) occurred at 10 ft., and those of Ptarmigan (*Lagopus mutus* Mont.) at 9 ft. 6 in. Rodent remains from the Upper Rodent-level, viz. 2 ft. to 5 ft., are as follows: *Lemmus lemmus* (L.) (few), *Dicrostonyx henseli* Hinton (common), *Microtus anglicus* Hinton (common), *M. arvalis* (Pall.) group (common), *Arvicola abbotti* Hinton (one jaw), *Apodemus sylvaticus* (L.) and *A. flavicollis* (Melch.) (common), *Evotomys glareolus* (Schr.) (five jaws), and *Muscardinus avellanarius* (L.) (two jaws). The remains of Red Grouse and Ptarmigan also occurred at these levels.

In addition to the two main levels, I have identified some rodent remains from 8 ft., as follows: *Lemmus lemmus* (L.) (two jaws), *Dicrostonyx henseli* Hinton (one skull), *D. guillemi* (Sanford) (one skull), and *Arvicola abbotti* Hinton (one skull); also Red Grouse and Ptarmigan at 7 ft.

Among the remains of larger animals are those of Woolly Rhinoceros (2-11 ft.), Reindeer (2-15 ft.), and Alpine Hare (2-7 ft.).

The Dormouse (*Muscardinus avellanarius*) does not appear to have been previously recorded from British caves, though I possess unrecorded jaws from the Late Pleistocene cave-earth at Dog Holes Cave, North Lancashire. On the Continent several forms of Dormice have been recorded from the 'Upper Rodent' layer (Magdalenian) of the Schweizersbild Cave.

According to Mr. Armstrong, who has based his conclusions on the physical evidence and on the human artifacts, the levels 10 to 13 ft. (Lower Rodent-layers)

antedate the first phase of the Maximum Glaciation of Britain (Mousterian). The level 8 ft. is placed immediately before the second phase of this glaciation, and the levels 2 ft. to 5 ft. (Upper Rodent-layers) are later than the second phase and earlier than the Magdalenian cold phase. Judging from the material submitted, the Arctic rodents were more numerous when the Lower Rodent-layers were being deposited and became scarcer at later stages.