III.—ON SOME BONES OF THE LYNX FROM TEESDALE, OBTAINED BY MR. JAMES BACKHOUSE OF YORK.

By WILLIAM DAVIES, F.G.S.;
of the British Museum.

(PLATES XI. AND XII.)

THE evidence relating to the habitation in England at some distant period of a species of the section of the genus *Felis* represented by the Lynx, rests, up to the present time, upon a portion of a skull and a ramus of a mandible, which were discovered in a cavernous fissure in rocks of Permian age, in Pleasley Vale, Derbyshire. They were found by Dr. Ransom, who communicated an interesting paper descriptive of the fissure and its contents, to the British Association Meeting held at Nottingham in 1866, and the fragments were then referred to the Lynx of Northern Asia (*Felis cercaria*). Subsequently they were examined by Professor Boyd Dawkins, who, after carefully comparing the skull, jaw, and teeth, with the corresponding parts of other species of Lynxes, and also taking into consideration its geographical range, says, "that they may be referred with equal justice to the Lynx of Norway and Sweden" (*Felis borealis*).¹

To the foregoing evidence may now be added two bones of the limbs, a humerus and a metatarsal, discovered under similar conditions, and associated with the debris of a similar fauna which had been deposited in a rock fissure in the Carboniferous Limestone in Teesdale, Durham. The specimens formed part of a very miscellaneous collection of bones sent to me for examination by James Backhouse, Esq., of York, who, in conjunction with his sons, Mr. James and Mr. W. E. Backhouse, discovered and explored the "cave," and themselves, with the assistance of a miner, extracted the various objects found therein. These consist of remains of many kinds of animals, but all of species now existing, and, eliminating a few forms, probably still native to the district. The bones of the Lynx are in excellent preservation, and were it not for some slight abrasions of the margin of the scapular articulation, and of the great trochanter, the humerus might be pronounced perfect. It belonged to an adult animal, somewhat smaller than the Northern Lynx, as represented by a skeleton of a large individual from Sweden (British Museum Collection, 1230a), with which I compared it. The annexed measurements of the recent and fossil bones will show their relative proportions, and general correspondence. In the fossil the space posterior to the ridge which descends from the lesser trochanter, and to which is attached the first head of the anconeus medius muscle, is more deeply depressed, otherwise the two bones are so alike that there can be little doubt as to their specific identity. Of *Felis cervaria* there is no skeleton in the National Collection, so that I have been unable to learn by comparison whether it possesses characters by which it could be differentiated from its northern relative.

¹ Monographs of the Palæontographical Society, 1868, Pleistocene Mammalia, part iii. p. 174.

G. M. Woodward. 127b.

(J. Backhouse del.)

West, Newman & Co. imp.

The spot where the bones of the Wolf & the Lynx were found; Teesdale Cave.

The metatarsal is the third of the right foot; it is also perfect, and, as it bears the same relative proportion to the humerus, as do the same bones to each other in the recent skeleton above referred to, the fossils may safely be assigned to the same animal.

The following measurements of the fossil and recent bones, show that the present Lynxes are not dwarfed descendants of their early predecessors. The measurements are in inches and tenths.

MEASUREMENTS OF HUMERUS.		FOSSIL.	RECENT.
Maximum length		7' 12	7' 6
Transverse diameter proximal articular end		1' 2	1' 3
Antero-posterior diameter of scapular articulation		1' 05	1' 15
Transverse diameter of distal end		1' 4	1' 5
Ditto ditto of trochlea		0' 87	1' 0
Antero-posterior diameter of ulnar articulation		0' 65	0' 75
Smallest circumference of shaft		1' 75	1' 75
MEASUREMENTS OF METATARSAL.			
Length		3' 8	4' 07
Transverse diameter proximal end		0' 45	0' 55
Ditto ditto distal end		0' 48	0' 52

So far as they have been specifically identified, the associated vertebrate remains occurring, both in the Pleasley Vale and in the Teesdale Cave, are the same. In neither have been found any bone of the extinct Pleistocene Mammals, nor of the cave Hyæna or Bear. From the former cave, Dr. Ransom enumerates the Wolf, Fox, Pig, Roebuck, Water Vole, and a large number of bones that he had "not yet determined." From the Teesdale Cave have been obtained bones of the Shrew, Mole, Wolf, Dog, Fox, Wild Cat, Lynx, Marten, Otter, Badger, Horse, Ass (?), Wild Boar, Red Deer, Roebuck, Goat or Sheep, small Ox, Hare, Rabbit, and water, bank, and field Voles; also bones of Birds; Snakes or Lizard, and Frogs. A good total, but all of which, Mr. Backhouse assures me, were exhumed from the "Cave." However, many of the bones, judging, from their state of preservation, have been introduced into the cave in comparatively recent times; among which may be specially mentioned the domestic Cat, Dog, Rabbit, Sheep or Goat, the small Ox (*Bos longifrons*?), and a few others. Nevertheless, many are of early introduction, and were undoubtedly contemporary with the Lynx; and, although belonging to species dating from Pleistocene times, were yet still common in Britain in the historic period; for the Wolf and Wild Boar roamed at will over the northern counties within a few centuries ago, and the Fox, Badger, and Otter, and other forms of equally ancient origin, are still native.

These facts have an interesting bearing in regard to the geological age of the respective caves, and of the presence in time of the Lynx in Britain. Neither cave has yielded evidence by which it could be connected with certainty to any period. Prof. Boyd Dawkins, commenting upon this subject, in reference to the antiquity of the various remains found in the Derbyshire Cave, and which comments apply with equal force to those from Teesdale, says: "So far as the internal evidence goes, they may be of Pre-historic, or even Historic date, with as great probability as Postglacial." He, however, thinks

"the latter hypothesis the most tenable," because bones of the tichorhine Rhinoceros, Mammoth and Bison have been found in a cave in the neighbourhood; also, that "the carnivore in question must have crossed over into Derbyshire while Britain formed part of the mainland of Europe." From these circumstances he concludes that "its Post-glacial age, therefore, may be assumed with a very high degree of probability, although not with absolute certainty."¹ Although concurring with these views, I must remark that no bones of extinct Pleistocene Mammals have been found in or about Teesdale; and the question naturally arises, if the animal under consideration was contemporary with its congeners the Cave Lion and Wild Cat, and was as generally distributed in area and in time, as we may assume it would be, in Britain, how is it that its remains are so rare, and in each instance derived from caves in which they are associated with bones of animals whose date of deposit cannot be satisfactorily assigned to any one of the three periods named? Its haunts and general habits are much alike to those of the Wild Cat; and while the bones of the latter, and also of the Lion, are far from rare, and are disseminated in many localities, not only in caves, but also in Pleistocene aqueous deposits (those of the Lion always, and of the Cat frequently, being associated with the remains of extinct species of Mammalia), no bone of the Lynx has been found under similar conditions; it must, therefore, be admitted that the period when the Lynx prowled in Britain is still a moot question.

The subjoined note has been forwarded to me by Mr. James Backhouse, and is inserted together with a view of the interior of the cave near the spot where the bones of the Lynx were found. (Plate XII.)

[The "Cave," above referred to by my friend Mr. Davies, is situated on the ridge of hills separating Weardale from Teesdale, and is at an elevation of about 1600 feet above the sea, and 500 feet or more above the adjacent valley of the Tees.

It consists of a series of nearly parallel fissures, varying in width from 1½ to 4 feet, intersected by transverse ones at right-angles with the main lines. These fissures are, in some places, 20 to 30 feet high, the "roofs" being gothic, and the lower portions tapering downwards. In a few places, where the width is greatest, the roof is "flat."

Stalagmitic deposits beautifully incrust the sides in many parts, and here and there form the floor of the galleries. In a few places only stalactites occur.

The plateau of Carboniferous Limestone above the cave covers many acres. Up to the present time we have only penetrated about 250 feet, but it is probable that the rock is fissured more or less throughout its entire area, and that considerable advance may yet be made.

Connected with the main cavern, but by a fissure so narrow as to be impassable, is a smaller one, traditionally known as "The Fairies' Hole." This we opened out, and explored first; and bones were

¹ *op. cit.* p. 173.

found in both. The opening into the larger cave was originally a mere crevice four to six inches wide, requiring many tons of cliff to be removed ere we could effect an entrance. Even then, for some 20 feet, it was but a natural "tunnel," too small, in most parts, either to creep or turn in. No large animals could possibly have entered *there*; so that the presence of their bones beyond, more or less imbedded in stalagmite, proved that some other entrance, not yet detected, must once have existed.

From one of the ramifications, we extracted almost the entire skeleton of a Wolf. Its bones were intermingled with those of a Roebuck, on which it had probably been feeding. The Wolf's skull was a little over three-fourths the size of a full-grown male Arctic specimen. A single canine tooth, belonging to a much larger Wolf, was found at no great distance, and near to the place where the Lynx bones were imbedded.

I see no reason to doubt that the Lynx may have roamed throughout our forests and mountain glens, along with the Wolf and the Bear, till a comparatively recent period, just as it still does in Norway; albeit its origin in Great Britain probably dated from the time when these islands were united to the Continent. JAMES BACKHOUSE.]

EXPLANATION OF PLATES XI. AND XII.

Plate XI. Figs. 1a, 1b, and 1c. Three views of the humerus of the Lynx (*Felis borealis*) from Teesdale.

1a. Front view.

1b. Outer side-view.

1c. Back view.

Plate XII. View of the interior of the cave where the bones of the Lynx and the skeleton of the Wolf were found. From a sketch made on the spot by Mr. Backhouse.

IV.—INFLUENCE OF EARTH MOVEMENTS ON THE GEOLOGICAL STRUCTURE OF THE BRITISH ISLES.¹

By J. J. HARRIS TEALL, M.A., F.G.S.,
Late Fellow of St. John's College, Cambridge.

IN the formation of a country three more or less distinct geological operations are concerned:—*a.* Rock formation; *b.* Earth movements; *c.* Denudation. In the case of our own country, to which the present paper more especially refers, these three operations have succeeded each other again and again; so that a very complicated structure is the result. The earth movements and denudations of one period have been interfered with by those of subsequent periods, and any attempt to trace the exact steps by which the evolution of the British Isles has been effected is therefore attended with very great difficulty. Earth movements may be divided into three groups, as follows:—

- a.* Slow movements of elevation and depression analogous to those now going on in the Scandinavian peninsula.
- b.* Movements which result in the displacement of rocks along planes usually inclined at a high angle to the horizontal surface; these are more familiarly known as faults.

¹ This article contains the substance of a paper read before the Literary and Philosophical Society, Nottingham.