

ON THE PREHISTORIC MAMMALIA OF GREAT BRITAIN.

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AT the time man first appeared on the earth, the physical conditions obtaining in Western Europe were altogether different from those under which we now live. Britain formed part of the mainland of Europe, and low fertile plains, covered with the vegetation peculiar to a moderately severe climate, stretched far away into the Atlantic, from the present western coast line.* The Thames also, instead of flowing into the German ocean, joined the Elbe and the Rhine in an estuary, opening on the North Sea about the latitude of Berwick. The climate also was very severe, and strongly resembled that of Siberia and North America. One would naturally suspect that the animals living on that vast pleistocene continent, under those conditions of life, would differ materially from those now living in what are the mere relics of that submerged land. Some of them have utterly disappeared from the face of the earth, such as the sabre-toothed lion, the cave bear, the Irish elk, the mammoth, *Elephas antiquus*, the hippopotamus, the woolly rhinoceros, and *Rhinoceros leptorhinus* of Owen. Others again have departed to northern regions, such as the glutton, the reindeer, the true elk, the musk sheep, the pouched marmot, and the lemming; while others, such as the cave lion and cave hyæna, have retired southwards, and taken refuge, the one in Africa, the other in that continent and in Asia.

Among the extinct mammalia may also be reckoned the post-glacial dwellers on the banks of the Somme and in the caves of the Dordogne, as well as those who in our own

* See 'Address to Geological Section of British Association, 1868.' By R. A. C. Godwin-Austen, F.R.S., president.

country inhabited the caves of Pembrokeshire, Somerset, and Devon. They have passed away as utterly as the mammoth.

The epoch during which the post-glacial mammals dwelt in Britain is removed from the beginning of history in Western Europe by an interval of unknown duration. On looking back, indeed, on it from the stand-point of history, we feel as if we were on the top of a lofty mountain, gazing over the lower ground as far as a distant range, that rises up sharp and clear against the horizon, the minor hills and valleys in the middle distance being dwarfed and obscured by the background. The British post-glacial period stands out so prominently, that the middle distance—the interval between it and the dawn of history—has received little attention in Britain.

In the following essay I have collected all the mammalian evidence at my disposal relating to this prehistoric epoch—an epoch of uncertain length, to be reckoned possibly by centuries, and possibly by tens of thousands of years. The human remains found in Britain, and belonging to the Stone and Bronze folk, have been diligently looked after by the archaeologists and craniologists, but the remains of the animals, carefully sought after in Switzerland and Denmark, have for the most part either been overlooked in this country, or confounded with the animals of the post-glacial age. They have been derived from villages and tumuli of unknown antiquity, from refuse heaps, and from caverns which were the abodes and burial-places of some early race of men. Unfortunately I cannot separate those belonging to the Stone folk from those living in Britain during the Bronze Age. The remains found in tumuli and villages will be first considered.

In 1862 I had the opportunity of examining the remains at Stanlake, a small hamlet in Berkshire. They were found in and around the circular depressions and trenches, which mark the site of a village probably of Keltic age. They consisted of large quantities of the bones, teeth, and skulls of animals that had been used for food, such as *Bos longifrons*, in great abundance, the sheep or goat, the horse, red deer, pig, the dog, wild cat, and marten. The metacarpal of a roe

* *Archæologia*, vol. xxxvii. p. 363. *Proceed. Soc. Antiq.* vol. iv. p. 93.

deer had been polished, and exhibited the marks of friction by a string. Along with them were large quantities of flint flakes, rudely-chipped lumps of flint, and coarse pottery and ashes. There was nothing found to stamp the absolute date of the village, but it may have been inhabited at the time of the Roman invasion. In the tumuli of Wiltshire the same group of animals has been met with by Dr. Thurnam, with the exception of the cat and marten.

In the same county also, the skull of urus * has been found underneath a tumulus near Calne, associated with remains of the deer and wild boar, and fragments of pottery ornamented with right lines. A second instance of the occurrence of the animal along with traces of man is afforded by the remarkable discovery in the fens of Cambridgeshire of a skull with a portion of the stone celt, with which the death-blow was inflicted, still lodged among the bones.

A vast number of bones have been dredged out of the Thames near Kew Bridge along with polished stone axes and bronze swords. Their condition proves them to have belonged to animals that were eaten for food, the horse, *Bos longifrons*, pig, sheep, goat, red-deer, and roe-deer. There were dredged up also with them several human skulls, that had been gashed and partially cleft, and Roman horse-trappings. The river at Kew is shallow, and when we take the number of bronze swords into consideration, some of them even with the metallic end of the scabbard still on the blade, the human skulls, and the Roman phaleræ, it is very probable that it was the site of a battle between the Kelts and the Roman legions. All that can be said with reference to the date of the accumulation of bones is, that it was probably anterior to the time of the Romans. A little higher up the river, near the new waterworks, a similar deposit of bones was discovered in the beginning of the year 1867. I found on examination that large oaken piles had been driven into the gravel which anciently formed the bottom of the Thames, and that a quantity of brushwood, principally of willow, had

* Fossil skull of Ox, by Henry Woods, A.L.S. 4to. Lond, 1839. The skull has since been proved to have been obtained from a bed of river gravel. (Some Account of the Blackmore Museum, p. 51.)

been pressed in between them. On the top was a large quantity of bones, broken more or less for food, and belonging principally to *Bos longifrons*. The whole was covered with alluvium from four to five feet in thickness. It is very probable in this case, that the piles are the remains of dwellings somewhat similar to those in the Swiss lakes; there were, however, no fragments of pottery and no implements, the only human remains being some of the long bones.

We will now pass on to the consideration of the prehistoric caverns in Britain which have afforded traces of the abode of man. In 1859 I explored a small cave at the head of Cheddar Pass in Somersetshire. The mammalia found in it consisted of the wolf, fox, badger, wild boar, goat, roebuck, *Bos longifrons*, and horse. A human skull also from this cave is preserved in the Oxford Museum, which is very well developed, and may have belonged to a person of considerable capacity. During the exploration of caverns in Somersetshire by Mr. Sanford and myself in 1863,* a second cavern of prehistoric age came before our notice; also in the mountain limestone of the Mendip range, in Burrington Combe, a magnificent defile about twelve miles from Bristol. It was situated high up in the ravine, and was very nearly blocked up with earth mingled with charcoal. It contained a large quantity of the remains of *Bos longifrons*, red-deer, goat, wolf, fox, badger, rabbit, and hare. In the lower portion of the cave we disinterred fragments of a rude urn, of the coarsest black ware, devoid of ornament, and with the rim turned at right angles, together with a piece of bent iron, which more closely resembles those found strengthening the angles of wooden chests in Roman graves on the banks of the Somme, than anything else we have seen. The accumulation of bones and charcoal prove that the cave was inhabited by man for some considerable time. The interment is clearly of a later date than the occupation, because it is made in the mass of earth, bones, and charcoal, which resulted from the latter. The interval between the two is of doubtful length. In the same year we explored another cavern in the same ravine, which consisted of two large chambers, connected to-

* Proceed. Somersetshire Arch. and Nat. Hist. Soc. 1864.

gether by two passages not more than a few inches high. The natural entrance, but a little larger than a fox-hole, was in the roof of the first chamber, and through this we had to let ourselves down into the cave. Subsequently we blasted a second entrance. The first chamber was at least half full of broken rocks, covered with a mortar-like mass of decomposing stalagmite. Underneath them was a group of four skulls, one of which belonged to the *Bos longifrons*, two others were those of a species of the goat tribe, approaching more closely to the *Ægoceros Caucasica* of Asia than any other recent species, in the oval section of the horncores, in their parallelism to one another, and their slight backward curvature. We have met with a similar form in a refuse heap at Richmond, in Yorkshire,* and in the disturbed soil on which London stands; and M. Lartet writes me that he has detected it in a cave in the Pyrenees. In the absence, however, of the necessary materials for comparison from the museums of London, Oxford, and Paris, I do not feel justified in proposing a new specific name, as it may possibly belong to a variety of *Capra hircus*. The fourth skull belonged to the pig, and had a round hole in the frontals rather larger than a crown piece, which had the appearance of being made by human hands. The presence of the lower jaws with the skulls indicates that they were deposited in the cavern while the ligaments still bound them together. They were all more or less covered with decaying stalagmite. The outer chamber was remarkable for the absence of earth of any kind, except underneath the hole in the roof, where there was a very little; while the inner one, running in the same slope, has its lower end entirely blocked up by a fine red earth, deposited by a stream which flows during heavy rains. Between the stones on the floor were numerous bones and teeth, of wolf, fox, mole, arvicola, badger, and bat, along with a metacarpal of red-deer and the remains of birds. How the animal remains were introduced, for they exhibit no marks of gnawing, and there are no fragments of charcoal in the cave, or any other traces of man, is altogether a matter of conjecture. But the fact of finding the skulls in one group,

* Quart. Geol. Journal, November, 1865.

coupled with the presence of the hole in the frontals of the pig, leads us to believe that they have been introduced by the hand of man. The entrance was far too small to admit of an ox falling into the cave by accident, and scarcely large enough for a goat or deer to squeeze themselves through; had they been brought in by wolf or fox, the bones would have exhibited marks of teeth.

In 1863 Mr. James Parker explored a cave in the limestone cliffs at Uphill, near Weston-super-Mare, and obtained human skulls and bones, along with rude pottery and charcoal. I have determined the presence of the following animals: the wild cat, wolf, fox, badger, *Bos longifrons*, pig, red-deer, dog, and water rat; most of the remains belong to young animals, and some are gnawed by dogs, wolves, or foxes. The Heatheryburn Cave, in Durham, explored by Mr. John Elliot in 1862,* yielded, besides the remains of man, those of the otter, badger, goat, roe-deer, hog, and water-rat.

These caves present no trace of the post-glacial fauna, but contain merely the remains of the animals associated with man in prehistoric times. There are some, however, in which the remains belonging to these two very distinct epochs are found in close association. In Kent's Hole, overlying the mass of bones dragged in by hyænas during the post-glacial epoch, and in places covered by stalagmite, there was a stratum of dark earth, containing the remains of the feasts and fires of some ancient people, bone implements, chert and flint arrow-heads, a hatchet of syenite, sandstone spindle-whorls, shells of mussel, limpet, and oyster, a palate of scarus, and numerous fragments of pottery made by hand, ornamented with zig-zag indentations, not unlike those from the barrows of Wilts. The latter, in ornamentation and texture, is identical with that obtained by the Earl of Enniskillen from the bears' den of Kùhloch, and that from the pile dwellings of Switzerland, in the collection of the late Mr. Christy. In some places the stalagmitic floor had been broken through, apparently for purposes of sepulture, and human bones and flints of all forms, 'from the rounded pebble

* Geol. Mag. 1862. See also Proc. Soc. Ant. second series, vol. ii. p. 127.

as it came out of the chalk, to the instruments fabricated from them, as the arrow and spear-heads and hatchets were confusedly disseminated through the earth, and the whole agglutinated together by stalagmite. Flint cores were lying by the side of the flakes cut from them.* The remains of the animals found in the same layer belonged to the wild boar, red-deer, fox, rabbit, and small rodents, and are in part preserved in the museums of London and Oxford. The bovine meta-tarsals and -carpals in the latter museum belong to the small short-horn *Bos longifrons*. The fragments of charcoal imbedded in the adherent matrix prove that they also were derived from the upper prehistoric stratum. It is an open question whether these remains belong to the age of Stone or of Bronze, but the absence of the latter material renders it probable that the cave was inhabited by neolithic savages, closely allied to those whose remains are found in hut circles and tumuli.

The Paviland Cave, described by Dr. Buckland,† affords another instance of the mixture of post-glacial and prehistoric remains. To the one period belong the elephant, rhinoceros, horse, bear, and hyæna; to the other, the so-called woman's skeleton (which equals in size the largest male skeleton in the Oxford Museum), the bones of ox and sheep (or goat), the whelk, limpet, periwinkle, littorina, and trochus, and small ivory rods. The presence of the remains of sheep underneath the bones of elephant, bear, and other post-glacial mammals, coupled with the state of the cave earth, which had been disturbed before Dr. Buckland's examination, proves that the interment was not of post-glacial date. No traces of sheep or goat have as yet been afforded by any post-glacial deposit in Britain, France, or Germany.

The mammalia associated with man, as we have seen in the hut circles, tumuli, and caves, occur also in caves, peat-bogs, and alluvia, in association with other species. By putting the two groups together we can form an adequate idea of the entire group of animals that inhabited Britain,

* *Cavern Researches*, by the late Rev. J. Mac Enery, F.G.S.; edit. E. Vivian, 1859.

† Buckland, '*Reliquiæ Diluvianæ*,' 4to. 2nd edit. 1824, p. 90.

from the disappearance of the post-glacial mammalia down to the time of the Roman invasion. Professor Owen* quotes a cave at Arnside Knott, near Kendal, that yielded wild boar, brown bear, and other existing species. The Manea fen in Cambridgeshire has yielded the brown bear; the peaty mud near Newbury, the bear, wolf, otter, wild boar, horse, water-rat, red-deer, roe-deer, goat, Irish elk, *Bos longifrons*, and urus; the peat and marls of Ireland, the Irish elk, *Bos longifrons*, red-deer, and wild boar; the peat of Hilgay in Norfolk has furnished the beaver and Irish elk. The reindeer also occurs in some eight or nine places in Britain, either in the peat or in the underlying marls. Professor Owen figures in the 'British Foss. Mammals,' fig. 197, a skull with antlers from a subterranean deposit in Bilney Moor, near East Dereham, in Norfolk. He also gives a figure of a metatarsal bone from the Fens of Cambridgeshire. A third case was afforded during the excavation at Crossness Point, on the southern bank of the Thames, near Erith, which was made for the reservoir of the southern outfall of the Metropolitan sewage. A fine antler was obtained from the bottom of a layer of peat, varying from five to fifteen feet in thickness, along with the remains of beaver, *Bos longifrons*, goat, horse, and a human skull. This is the only instance that has come before my notice of the association of reindeer with man in any British prehistoric deposit. A tracing of an antler sent me by Mr. Tiddiman, of the Geological Survey, brings the number of cases of its occurrence in England up to four. The original was found in a shell-marl underlying the peat near Whittington Hall in Lancashire. Nor was it much more abundant in Scotland.† In 1775 some of its antlers were found by Dr. Ramsay, professor of Natural History in Edinburgh. Antlers also were obtained in 1833 from the alluvium of the Clyde, along with a skull of the great urus.‡ In 1865, Sir Philip Egerton met with a small fragment of antler in the peat bogs of Rosshire, which beyond all doubt belongs to this animal.

* British Fossil Mammals.

† Pennant, 'Quadrupeds,' vol. i. p. 100.

‡ Edinburgh New Philosophic Magazine, 1852, vol. lii. p. 135.

The first instance of its occurrence in Ireland is afforded by some sketches of antlers found in 1741, in the bog of Ballyguiry, by Major Quarry, which have been in the possession of that gentleman's family ever since. In the preface to the 'Zoologist' for 1836 the animal is recorded from Lough Gur, in the county of Limerick. In 1847 Mr. Oldham (now Dr. Oldham) brought before the notice of the Royal Dublin Society the 'skull, horns, and lower jaw of a reindeer found by Mr. Moss at Ballybeta, near the Golden Ball, in the county of Dublin;' but the most remarkable discovery was that of a perfect skull with attached antlers, brought before the notice of the Royal Dublin Society by Dr. Carte in 1863. It was found in 1861, on the verge of the Curragh Bog, near Ashbourne, in the county of Dublin. It is, beyond all doubt, the most magnificent specimen of reindeer that has ever been found in the fossil state. Dr. Carte also mentions three antlers that were found at Coonagh, on the south side of the Shannon, in county Clare. Thus in Ireland, also, the animal was rare as compared with the Irish elk or *Bos longifrons*. I have given all the cases known to me of its occurrence in Great Britain and Ireland because they have an important bearing on the climate of the prehistoric period.*

Thus by comparing the mammalia found in the burial-places and dwellings of prehistoric man in Britain, belonging either to the age of Stone or possibly of Bronze, with those found in the most recent of the stratified deposits, the turbaries and alluvia, we arrive at this important fact, that the two belong palæontologically to the same epoch. For this epoch I have proposed the term prehistoric,† believing it to be of precisely the same classificatory value as the term post-glacial or quaternary.

We will now discuss the characteristics by which it may be defined from the post-glacial epoch on the one hand, and from the period of the Roman occupation on the other. In the following table I have condensed all the information I could collect on the subject. The first three columns show the

* Popular Science Review, January 1868, pp. 39, 40.

† Introd. Pleist. Mammalia, Part. I. 1866, Pal. Soc.

numbers of the post-glacial mammals, and the relation which those found associated with man bear to the whole group. The first column is the result of a personal inspection of nearly all the collections of mammalia in Great Britain, full details of which will shortly be published by the Palaeontographical Society; the second is based on the discoveries at Hoxne, Bedford, Salisbury, and Gray's Inn Lane; the third upon those made in Kent's Hole, Wookey Hole, and the caves of Gower and Brixham. The next three show the relation that the mammalia, found associated with man during the prehistoric period, bear to those found in prehistoric caverns, alluvia and turbaries; while the last three represent all the information I can gather respecting the animals inhabiting Britain during the Roman occupation, at the time of the Norman Conquest, and, lastly, at the accession of William and Mary.

The enormous difference between the post-glacial and prehistoric faunas is to be measured by the fact that out of forty-eight well ascertained species living in the former, only thirty-one were able to live on into the latter; and that, out of those thirty-one, all, with the exception of six, are still living in our island. The cave bear, cave lion, and cave hyæna had vanished away, along with a whole group of pachyderms, and of all the extinct animals but one, the Irish elk, still survived. The reindeer, so enormously abundant during the post-glacial epoch, lived on, greatly reduced in numbers; while the red deer, which was rare, became very numerous, and usurped those feeding-grounds which had formerly supported vast herds of the reindeer. With this exception all the Arctic group of mammalia, such as the musk-sheep and the marmots, had retreated northwards; a fact which shows that the climate of Britain during prehistoric times was warmer, or rather less severe, than during the former epoch. This conclusion is corroborated by the comparison of the ice-borne gravels and the large sheets of brick earth formed by the spring floods of the one, with the evenly stratified alluvia and regularly sorted river gravels of the other. The amelioration of climate may probably be accounted for by the supposition that Britain was insulated

Table showing the Relation of the Prehistoric to the Post-glacial and Historic Mammals in Britain.

	Post-glacial Mammals, River-beds, Caves.	Post-glacial Mammals associated with Man, River-beds.	Post-glacial Mammals associated with Man in Caves.	Prehistoric Mammals in Tombs, Dolmens and other deposits associated with Man.	Prehistoric Mammals associated with Man in Caves.	Prehistoric Mammals, River beds, Caves.	Mammals living during Roman occupation.	Mammals living at the time of the Norman Conquest	Mammals living at the time of William and Mary.
Homo, L.	x	x	x	x	x	x	x	x	x
Rhinolophus ferrum equinum, Leach	x	x	x	x	x	x	+	+	x
Vespertilio noctula, Schreb.	x	x	x	x	x	+	+	+	x
Sorex vulgaris, L.	x	x	x	x	x	+	+	+	x
Talpa Europaea, L.	x	x	x	x	x	+	+	+	x
Ursus arctos, L.	x	x	x	x	x	x	x	x	x
Ursus spelæus, Gold.	x	x	x	x	x	x	x	x	x
Ursus ferox, Lew. and Cl.	x	x	x	x	x	x	x	x	x
Gulo luscus, Fab.	x	x	x	x	x	x	x	x	x
Meles taxus, L.	x	x	x	x	x	x	+	+	x
Mustela erminea, L.	x	x	x	x	x	+	+	+	x
M. putorius, L.	x	x	x	x	x	+	+	+	x
M. martes, L.	x	x	x	x	x	+	+	+	x
Lutra vulgaris, Erxl.	x	x	x	x	x	+	+	+	x
Canis vulpes, L.	x	x	x	x	x	x	x	x	x
C. lupus, L.	x	x	x	x	x	x	x	x	x
C. familiaris	x	x	x	x	x	x	x	x	x
Hyæna spelæa, Gold.	x	x	x	x	x	x	x	x	x
Felis catus, L.	x	x	x	x	x	+	+	x	x
F. lynx	x	x	x	x	x	x	x	x	x
F. antiqua, Cuv.	x	x	x	x	x	x	x	x	x
F. leo, var. spelæa, Gold	x	x	x	x	x	x	x	x	x
Machairodus latidens, Owen	x	x	x	x	x	x	x	x	x
Megaceros hibernicus, Owen	x	x	x	x	x	x	x	x	x
Alces Malchis, Gray	x	x	x	x	x	x	x	x	x
Cervus tarandus, L.	x	x	x	x	x	+	x	x	x
C. capreolus, L.	x	x	x	x	x	x	x	x	x
C. elephas, L.	x	x	x	x	x	x	x	+	x
C. dama, L.	x	x	x	x	x	x	x	+	x
Ovibos moschatus, Desm.	x	x	x	x	x	x	x	x	x
Bos urus, Pliny	x	x	x	x	x	x	?	?	x
Bison priscus, Owen	x	x	x	x	x	x	x	x	x
Bos longifrons, Owen	x	x	x	x	x	x	x	x	x
Capra regagrus, L.	x	x	x	x	x	x	x	x	x
C. hircus, L.	x	x	x	x	x	x	x	x	x
Ovis aries	x	x	x	x	x	x	x	x	x
Hippopotamus major, Desm.	x	x	x	x	x	x	x	x	x
Sus scrofa, L.	x	x	x	x	x	x	x	+	x
Equus fossilis, Owen. (Cabalus)	x	x	x	x	x	x	x	x	x
Rh. leptorhinus, Owen	x	x	x	x	x	x	x	x	x
Rh. tichorhinus, Cuv.	x	x	x	x	x	x	x	x	x
Elphas antiquus, Falc.	x	x	x	x	x	x	x	x	x
E. primigenius, Blum.	x	x	x	x	x	x	x	x	x
Lemmus sp., Link.	x	x	x	x	x	x	x	x	x
Lepus cuniculus, Pall.	x	x	x	x	x	x	x	x	x
L. timidus, Erxl.	x	x	x	x	x	x	x	x	x
Lagomys spelæus, Owen	x	x	x	x	x	x	x	x	x
Spermophilus erythroge- noides, Falc.	x	?	x	x	x	x	x	x	x
S. citillus, Pall.	x	x	x	x	x	x	x	x	x
Arvicola pratensis, Bell	x	x	x	x	x	+	+	+	x
A. agrestis, Flem.	x	x	x	x	x	+	+	+	x
A. amphibia, Desm.	x	x	x	x	x	+	+	+	x
Mus musculus, L.	x	x	x	x	x	+	+	+	x
Castor fiber, L.	x	x	x	x	x	+	+	+	x

NOTE.—x implies that the animal has been found; +, that the animal must have been living at the time, because it is found before and after.

from the mainland of Europe at the close of the post-glacial epoch.

But the prehistoric period is defined most sharply from that which preceded it by the introduction of forms of life hitherto unknown in Britain. The goat, the small deer-like *Bos longifrons*, and the dog—these three animals have been considered by eminent naturalists to belong to an epoch vastly more remote, on evidence that seems to me singularly worthless and inconclusive. The goat (*capra hircus*) has found its way into the list of British ‘newer pliocene mammalia’* because a frontlet and lower jaw were picked up on the Walton shore by the late Mr. John Brown of Stanway, and forwarded to Professor Owen, along with the remains of mammoth, rhinoceros, and hippopotamus which were found on the same shore, and for the most part cast up by the waves. The alluvial deposits in the neighbourhood are full of remains of goat, just as the remarkable fluviatile clay is full of post-glacial mammals; and both lie exposed to the wear and tear of the sea on a coast line that is rapidly advancing inland. We cannot wonder, therefore, at the remains from these two very different deposits being found side by side in the shingle. They bear to each other no closer relationship than any other two groups of waifs and strays thrown up on the same spot. This is the only case on record of the asserted occurrence of the animal with newer pliocene mammalia. Professor Gervais,† therefore, is perfectly justified in his refusal to recognise the animal as of higher antiquity than the prehistoric, or, as he calls it, the Keltic period. The evidence brought forward by Professor Owen in favour of the newer pliocene age of *Bos longifrons*‡ is precisely of the same nature. It is based on the following specimens. Two skulls washed up on the shore at Clacton, and one from Walton, also a waif cast up on the shore. A third locality is cited also in the ‘British Fossil Mammals,’ of its occurrence with urus and bison at Bricklehampton Bank, near Cropthorne

* British Fossil Mammals.

† Paléontologie française.

‡ Quart. Geol. Journ. 1867, Feb. 20, p. 176, on the British Fossil Oxen, part ii. *Bos longifrons*, Owen.

in Worcestershire. On examining the collection made by the late Professor Strickland from that place, and now preserved at Apperley Court, I found a mixture of remains similar to that of Walton. The urus and bison, to which may be added hippopotamus, were derived from brick-earth, while the remains of *Bos longifrons* were proved, by the adherent fragments of matrix, to have been derived from the alluvium close by. The remains of the urus and bison, presented by Professor Strickland to the Museum of the College of Surgeons, were obtained from the former deposit. In the 'Life and Papers of H. E. Strickland,' published by Sir William Jardine in 1858, there is no mention of the *Bos longifrons* in the list of mammals from Bricklehampton. The remains ascribed to *Bos longifrons* from Kirkdale belong to the smaller variety of the bison. The gravel-pits of Kensington are given as the fifth locality where the animal has been found associated with the extinct post-glacial mammalia. In the absence, however, of direct proof that its remains were derived from the same undisturbed gravel as the mammoth, the fact that the disturbed soil round London is full of its bones, strongly suggests the probability, that those in question were found in the superficial soil, and not in the gravel below. In the list of mammals found at Fisherton* it is quoted as having been found in association with the lemming, spermophilus, marmot, tichorhine rhinoceros, and other characteristic post-glacial species; but the remains ascribed to this animal and preserved in the Salisbury Museum belong, as at Kirkdale, to the smaller variety of bison. In fine, all the cases of its reputed occurrence, associated with post-glacial mammalia in Britain, may be resolved either into a mistaken identification of its remains with those of bison, or by the mixture of its remains with those of animals derived from a different formation.

The third animal, the dog, is stated by MM. Marcel de Serres, Dubreuil, and Jeanjean, to have occurred in the caves of Lunelviel, and by Dr. Schmerling in the caverns of Liège, along with post-glacial mammalia. In the first of

* Quart. Journ. Geol. Soc. vol. xx. p. 102: Catalogue of Blackmore Museum, Salisbury, 8vo.

these cases Professor Gervais is by no means satisfied that the canine remains really belong to the dog; and in the second there is precisely the same uncertainty. During the post-glacial epoch the wolves varied considerably in size in Europe, and it is very probable that the remains in question may have belonged to the smaller races of wolf. In Britain there is no evidence whatever of the existence of the dog in post-glacial times. In France and Germany the first indisputable proof we have of its existence is furnished by the remains found along with man in prehistoric caves, and those in the alluvia and peat-bogs.

To these three characteristic mammals found in the prehistoric deposits in Great Britain, a fourth may with very great probability be added. In Aveline's Hole, one of the caverns in Burrington Combe explored by Mr. W. Ayshford Sandford and myself, the skull of *Ovis aries* lay buried under a deposit of cave-earth twenty-six feet in thickness, along with an incisor of *Sus scrofa*. But, nevertheless, this solitary case of its occurrence in the British caves that has come before my notice is not sufficient to prove that the sheep lived in Britain during the Prehistoric Period; because the accumulation of cave-earth in the line of drainage may have taken place within the last two thousand years. In France, however, the animal has been found in many of the caverns of Aude and Gard (Gervais, 'Paléont.' p. 138), and was kept in Switzerland by the pastoral tribes of the Stone Age that inhabited the Pfahlbauten. However doubtful, therefore, its prehistoric age may be in Britain, there can be no doubt whatever that it was living at the time on the mainland of Europe.

These four animals, therefore, may be considered as characteristic of prehistoric deposits in Central and Western Europe, and as defining them as accurately as the mammoth, or the musk-sheep, those of the post-glacial epoch. Whence they came is altogether an open question; but they stand by themselves among the relics of the post-glacial fauna that lived on into the prehistoric epoch, and they appear, as it were, strangers and sojourners, although they are spread throughout the length and breadth of Western Europe. If I might hazard

a speculation it would be that they were introduced by some ancient race of men from a district to the south-east of Europe—from the mysterious land that is called the birthplace of the nations, that they were already domesticated before they arrived in Europe, and that the abundance of the goat and *Bos longifrons* in peat bogs and alluvia may be accounted for by their reversion to a wild condition of life, analogous to that of the cattle and horses in Australia and America. It is a very significant fact, that the ancient neolithic race of men, who dwelt in the pile-dwellings of Switzerland, suddenly make their appearance, possessed of these four animals. Mr. Darwin infers from their knowledge of the Egyptian wheat, and from other evidence collected by Dr. Heer, that they either still ‘kept up commercial intercourse with some southern people, or had originally proceeded as colonists from the south.’* At all events there is nothing improbable in the idea that these four animals were introduced into Europe by the hand of man, and that they were not indigenous and domesticated by him after his arrival.

The bison has not yet been recognised in any British prehistoric deposit. In France and Germany, on the other hand, it is abundant, and lived down into the historic period. Its absence from Britain may perhaps be accounted for by our island having been cut off from the mainland of Europe before the commencement of the prehistoric period, and by the animal having been consequently exposed to the craft of the hunter in an area too small for its concealment.

The existence of the true elk (*Alces malchis*) in Britain, during the Prehistoric Period, is based on the solitary occurrence of an antler at the bottom of a bed of peat, near Newcastle.† The urus, the Irish elk, and the reindeer, were very rare.

We have now to discuss the relation of the prehistoric animals to those that inhabited Britain during the Roman occupation. But first of all I will give a few instances of the discovery of animals in and around Roman camps, villas, and

* Darwin, ‘Variation,’ vol. i. p. 317.

† Trans. Tyneside Naturalists’ Field Club, vol. v. part ii. p. 111.

cities, that have come before my own notice. In 1864 I examined the remains* found by my friend the Rev. F. Warre, in the hut circles which exist within the massive fort of Worle Hill near Weston-super-Mare; that, to say the very least, was occupied by the Roman troops. They belonged to *Bos longifrons*, horse, pig and badger, and from their fractured state clearly were the relics of the food in use at the time. They were associated with the following articles of metal: spears and arrow-heads, reaping hooks and horse-trappings of iron, a ring and some coins of bronze, the latter of Constantine, Constantinus, and Crispus Valerianus. There were also red, green, and blue glass beads, clay beads, the calcined head of a femur, and a liassic nodule perforated for suspension, a ring made of a segment of the shaft of the metatarsal of *Bos longifrons*, rude pottery not turned in the lathe, lathe-turned and well-moulded Roman pottery, whetstones, flint-flakes, and one remarkable implement, pyramidal in form, with a flat base carefully chipped all round. This form was also found in the Keltic village of Stanlake by Mr. Stone, and by the Rev. H. H. Winwood in the excavations now going on in ancient Roman Bath (*Aquæ Solis*). From the latter place the remains forwarded to me belong to the roe and red deer, *Bos longifrons*, *Capra hircus*, and pig.

A collection of Roman remains, made by Mr. Thomas Honeywood, of Horsham, from a villa on the South Downs, contained the following species, red and roe deer, wolf, fox, pig, and horse, shells of cockle, limpet, and periwinkle. The villa itself had undoubtedly been destroyed by fire, for a quantity of molten lead, derived probably from the roof, had fallen on a heap of corn, and still contains within its mass the carbonised grains. The same group of animals is represented also in the refuse heaps in and around the old Roman cities of Londinium (London) and Camulodunum (Colchester). In the former, however, I have detected also the remains of the fallow-deer, as well as *Capra ægagrus*, and sheep; in the latter, in the collection of Dr. Bree, a canine of the brown bear.

In the Maidstone Museum there is preserved a collection

* In the magnificent collection of mammalia at Taunton.

made from a swallow-hole near Allington Church, consisting of remains of dog, wild boar, sheep or goat, red and roe deer, along with shells of whelks, oysters, periwinkles, Samian ware, fine black ware turned in the lathe, and Roman tiles. In all these cases it is worthy of note that a large number of the remains belong to the red and roe deer, while those of the domesticated *Bos longifrons* are incomparably greater. It is clear, therefore, that although the dwellers in Britain during the Roman occupation lived for the most part on the herds, they lived also on the products of the chase. There is, moreover, reason to believe, from the fractured condition of the remains of horse, badger, and bear, that those animals also formed part of their food. The remains of the dog, on the other hand, are for the most part perfect, and without traces of fracture or of the use of the saw.

I have also met with traces of the dog, horse, and *Bos longifrons* inside some oaken chests at Hardham, near Pulbro' in Sussex, which beyond all doubt contains interments of the age of the Roman occupation. From a coin of Hadrian (A.D. 172), found in one of them, it is very probable that they belong to the third or fourth century.*

There are also caves which most probably were inhabited during this epoch. That of Longberry Bank, near Penally in Pembrokeshire, explored by the Rev. H. H. Winwood, F.G.S., contained the remains of *Bos longifrons*, sheep or goat, badger, dog or wolf, oyster shells, limpets, mussels, flint flakes, a human vertebra, premolar, and metacarpal, along with fragments of red, fine-grained pottery, turned in the lathe, of a kind that is repeatedly found in the refuse heaps of Roman cities and villas. Some of the Craven Caves in Yorkshire also present similar evidence, and were probably inhabited at an epoch not far removed from the Roman occupation.

The most noteworthy point of difference between the prehistoric mammals and those living during the Roman occupation is, that the Irish elk had become utterly extinct, the true elk had vanished away from our island, and the reindeer

* On a Romano-British Cemetery and a Roman Camp at Hardham. Sussex Archæol. Coll. 1863.

had been banished at least from that portion that presents any trace of Roman civilisation. In other respects there seems to have been little difference in the animal life. The Roman legionaries lived upon the same wild animals, and ate the beef furnished by the small *Bos longifrons*, and the mutton of *Capra hircus* and sheep. I have not, however, met with indisputable proof of the existence of *Capra egagrus* before their advent; but it would be rash to infer, therefore, its non-existence, because a sufficient number of prehistoric groups of animals have not yet been determined to cause negative evidence to assume any high value. There is also a cloud overhanging the first appearance of the fallow deer in Britain. Not the slightest trace has been found in any British prehistoric deposit. In Britain I have only met with it in two cases, associated with remains that may be ascribed to the date of the Roman occupation—at Richmond in Yorkshire, and in London.* M. Lartet believes that it was introduced into France by the Romans. There is no proof that it existed in the latter country, in Germany, or in Switzerland, during the prehistoric period, Dr. Rutimeyer having withdrawn his identification of it in the Swiss Pfahlbanten. It may, therefore, be assumed, with a very high degree of probability, that we are indebted to the Romans for the introduction of the southern form, the fallow deer (*Cervus dama*) of our parks.

The larger breeds of domestic cattle supplanted *Bos longifrons* in Roman Britain about the time that the Saxons drove the Roman provincials into Wales, Scotland, and Brittany, or just those districts in which it still lives. The few bovine remains I have seen from Saxon interments belong to the urus type, and not to the *Bos longifrons*. It is therefore very probable, that the larger and better breeds of cattle were imported by the Saxon invader from his own country, the low lying district between the mouth of the Rhine and Jutland, an area which is now famous for the size of its oxen.

From the time of the Saxon invasion down to the present

* In the collection of Colonel Lane Fox.

day there has been but little change in the mammalian life of Great Britain, and that has been brought about, for the most part, by the destruction of wild animals, consequent on the spread of civilisation and the encroachment of pastures and tilth on the ancient forests.

The last historical notice of the beaver is that afforded by Giraldus Cambrensis, in the year 1188, when he met with the animal in the river Teivy, in Cardiganshire, on his tour through Wales to collect volunteers for the First Crusade. The brown bear became extinct in Scotland in 1057, if there be any truth in a legend of the Gordon family of the origin of their crest. The wolf, which was sufficiently abundant in the Wealden forests to eat up the corpses of the Saxons left on the field of Senlac, by Duke William,—

Vermibus atque lupis, avibus canibusque voranda
Deserit Anglorum corpora strata solo*—

held its ground in England till 1306, in Scotland until 1680, and in Ireland, protected by the misrule and anarchy of the country, until 1710. There is evidence also that the reindeer lived in Caithness in the middle of the twelfth century, the animal being incidentally mentioned in the 'Orkneyinga Saga,'† as having been hunted, as well as the red deer, by the Jarls of Orkney. The passage is thus translated by a learned Iclander, Jonas Jonæus,‡ 'solebant comites quavis fere æstate in Katanesum transire, ibique in desertis feras rubras et rangiferas venari.'§ Dr. Hibbert gives an elaborate critique on the passage, and agrees with the rendering of Jonæus, which would prove the presence of the reindeer (*hréina*) in Caithness at the time that Henry II. occupied the throne of England, and Alexander Neckam was writing his natural history. Professor Brandt of St. Petersburg is also of the same opinion. The author or authors

* 'De Bello Hastingsensi Carmen.' G. Guido, Bishop of Amiens, who died 1075.

† That var sithr Jarla nær hvert sumar at fara yfer á Katanes oc thar upp á mekr at veida rauddýriedr hréina. The two Jarls in question, Ronald and Harold, hunted in Caithness, according to Jonæus, in 1159.

‡ He published in 1780 an abstract and Latin translation of the Saga.

§ Brewster's 'Edinburgh Journ.' new series, vol. v. p. 50.

of the Saga must have been well acquainted with the reindeer in Norway, Sweden, or Iceland; and therefore there is nothing improbable in the inference, that the animal termed *hréina* was a reindeer. Nor is the probable truth of this inference lessened by none of the remains of the animal having been found in the area occupied by the Romans, or by the fact of its not having been mentioned by any British historian. The Romans never conquered Caithness, and the highlands of Scotland were so utterly unknown to the English of the middle ages, that even so late as the time of William III. they were looked upon very much as we now look upon the extreme north of Lapland. The hills of Caithness lie in the same parallel of latitude as the south of Norway and Sweden, in which the animal was living at the time. Reindeer-moss is abundant in Caithness, and the only condition of life wanting to make that district still habitable by the animal, is a greater severity of cold. Taking all the circumstances, therefore, of the case into consideration, I feel disposed to admit the evidence of the reindeer having lived in Caithness in 1159.

‘Wild boars were common in the neighbourhood of London in the time of Henry II., and continued in our kingdom in a wild state till 1577: they were then only to be found in the woods of Lord Latimer, who, we are informed by Dr. Manset, took great delight in their chace.’* The *urus*, according to Leland,† continued wild in Britain as late as 1466, when six wild bulls were used at the installation feast of George Nevill, archbishop of York, and their descendants still survive in the half-tame Chillingham cattle. Nevertheless, it must be admitted that the allusion to wild cattle (*tauri sylvestres*, &c.) in Britain, in the middle ages, are quite as likely to relate to the runaways from the service of man, as to animals the ancestors of which had never been domesticated.‡ The white bodies and red ears of the Chillingham

* Pennant, ‘Arctic Zoology,’ vol. i. Introduction, part v.

† Coll. vi. p. 2.

‡ In 1866 I adopted the opposite view.—‘Quart. Geol. Journ.’ March 21, 1866, p. 398. New evidence, however, has induced me to modify my opinions, and to doubt the existence of the wild *urus* in Britain during the middle ages.

cattle agree exactly with the definition of the kind of cattle demanded as compensation by the princes of North and South Wales. 'If the cattle,' Mr. Youatt writes, 'were of a dark or black colour, 150 were to be presented; if white, with red ears, 100.' That is to say, that 100 white oxen of the urus breed were worth 150 of the much smaller *Bos longifrons* type. It is, therefore, highly probable that the Chillingham cattle have not descended from an unbroken line of wild ancestors, but are merely the representatives of a domesticated breed, which, at some time after the Roman occupation, supplanted the small *Bos longifrons*. It is indeed barely possible that a wild animal so bulky as the urus could have held its ground against the attacks of the hunter, during the Roman occupation, in an area so small as Britain.

In this brief outline of the history of the mammalia that inhabited Britain after the post-glacial, and before the historical period, I have confined my attention to Britain only. Their comparison with those of France, Germany, Switzerland, and Italy is well worthy of the naturalists of those countries. The prehistoric group of animals on the Continent will most probably be as sharply and clearly defined from those dwelling in the same area during post-glacial times as they have been shown to be in our island.

Mr. Busk expressed his sense of the value of Mr. Dawkins' paper, which undoubtedly contained a variety of interesting facts, which had been classified with great judgment. He agreed with the author in most of his statements, but thought that he perhaps used the term prehistoric in too vague a sense. Presuming that by it was meant the interval between the Christian or beginning of the Roman period, and the post-glacial epoch, so far as this country was concerned, he would divide that period into two distinct portions. One characterised by the existence of human remains solely with wild animals, and the other by their co-existence also with the remains of domesticated races. Although the author had clearly shown that the majority of our present

domestic animals had been associated with man from a very early period, he did not think that the sheep could lay claim in these countries to anything like the antiquity of the goat, or *Bos longifrons*. There was every reason, on the contrary, to believe that it belonged altogether to a much later period, and probably was never found under circumstances pointing to an epoch more remote than the Roman.

Mr. DAWKINS said that he agreed with Professor Busk in considering that the sheep was introduced into Britain at a later date than the goat, and that therefore its remains characterise a later series of deposits, but nevertheless direct proof on the point was wanting.