X.

NOTES ON THE ANCIENT CATTLE OF SCOTLAND:—

I. THE SMALL SHORT-HORNED OX, *BOS LONGIFRONS*, OWEN.
II. THE GREAT LONG-HORNED OX, THE URUS, *BOS PRIMIGENIUS*, BOJANUS, AND OWEN.

By JOHN ALEXANDER SMITH, M.D., V.P. S.A. Scot., Etc. (Plate XLI.)

It has been suggested that some notes on the ancient Cattle of Scotland, especially as represented by their remains in the Museum of the Society, might not be altogether uninteresting to the Fellows; as a continuation of the papers on the ancient animals of the country, the Rein-Deer, the Elk, and the Irish Elk, already published in the Proceedings of the Society. The Society has accordingly given me permission to reprint some papers read by me many years ago before another Society, and published where they are not now easily accessible, and probably have not been seen by the Fellows of this Society. These notices describe some of the remains of the ancient cattle preserved in the Museum of the Society, and I shall supplement them with details of some of the specimens since presented to the Museum, and others found in different parts of Scotland; giving also a short sketch of their Geological Age and their Distribution, so as to enable us to judge somewhat of the previous existence and prevalence of these animals in our country.

I. THE SMALL SHORT-HORNED OX, *BOS LONGIFRONS*, Owen.

The following paper gives some details of the Roman remains discovered at Newstead, Roxburghshire, and of the various animal remains found. It is, however, especially taken up with the description of the ancient short-horned cattle; and I think it best, instead of re-arranging, simply to give it in detail, more especially as all the remains described were presented by me to the Museum of the Society, where they are now preserved. Some notes are also given of the so-called wild white cattle still existing in the country.

(The attention of the public has, since this paper was read, been called in an especial manner to these white cattle by the recent visit of H.R.H.

The Prince of Wales to Chillingham Castle, Northumberland. The account of his shooting there a wild bull, on the 10th October 1872, has been published in all the newspapers, especially in the "Illustrated London News," of 19th October and 16th November 1872, where figures are given of Chillingham Castle, the Cattle, &c. The writer states that "it was a fine bull, seven years old, and weighing 70 stones. . . . . It exists, we believe, nowhere but at Chillingham; in Scotland, it is to be found in the demesne of Cadzow, at Hamilton on the Clyde."—P. 476.)

The second Notice gives details of portions of additional crania of these short-horned cattle, found in the same locality.

(1.) Notices of various Animal Remains, as the Small Short-Horned Ox, *Bos longifrons*, &c., found with Roman Pottery, near Newstead, Roxburghshire; with Notes in reference to the Origin of our Domestic Cattle, and the "Wild White Cattle" of this Country. By John Alexander Smith, M.D. (With Plate.)[1]

In the winter of 1846–47, during the excavation of a cutting on the Hawick branch of the North British Railway, in the neighbourhood of Melrose, and a little to the east of the village of Newstead, a number of shafts or well-like pits were come upon. There were about five or six of these of a large size, two of which were built round the sides with stones, and were about 20 feet deep, and about 2 feet 6 inches in diameter; the others, being simply dug out of the ground, were about 4 feet in diameter, and varying from 15 to 18 feet in depth. These pits were all found in a space of about 30 yards square, and among them were discovered some 15 or 16 small pits, about 3 feet deep and 3 feet in diameter, which were lined throughout with a layer of whitish clay, some 5 or 6 inches thick. All these pits were filled with a black peaty-like stuff, apparently damp ashes and earth, and in them were observed numerous pieces of Roman pottery, consisting principally of the dark-coloured or smother-kiln ware, coarser varieties of the gray, and yellowish, and also some portions of the fine red or Samian ware, both plain and embossed. Many of these, I have

[1] Read before the Royal Physical Society, Edinburgh, April 2, 1851, and published in the "Edinburgh New Philosophical Journal," New Series, Vol. liv. No. cvii. January 1853.

been informed, might have been preserved entire, or the broken fragments collected together, which, I regret to say, were carelessly thrown with the earth and rubbish to form the adjoining mound. I have been able to collect a few specimens of the different kinds of ware (some of which I exhibit), and have presented them to the Museum of the Scottish Antiquaries. Several silver and brass coins, of the Emperors Vespasian, Trajan, and Hadrian, were also found, and the bones of various animals.

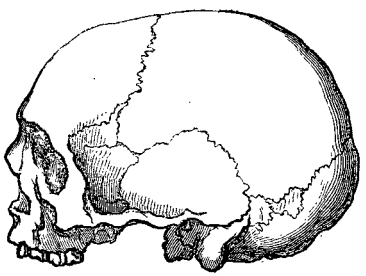
I shall not enter here into the more strictly antiquarian details of the subject (which I have already, some time ago, fully described in another place—see Proceedings Soc. Ant. Scot. vol. i. p. 28, &c., and Archæologia Scotica, vol. iv. p. 422), farther than to say, that the popular idea of these pits having been wells seems rather absurd, if we consider the number of them clustered together, as well as their near neighbourhood to the River Tweed. English archæologists call pits of this kind rubbish-holes or dirt pits, the name sufficiently pointing out their supposed use; but it certainly seems to me very strange, that the Romans should have taken so much apparently unnecessary trouble for such a purpose, as the land would surely not be so very valuable in those ancient days, and the River Tweed, running at no great distance from them on the north, would seem to afford a simple means for carrying off anything of the kind. I am inclined to the opinion, from considering all the circumstances of the case, that these had been the burying-places of the ancient Roman town, which I believe to have existed in the immediate neighbourhood, and that in these pits were deposited the inurned ashes gathered from the extinguished funeral piles of the dead; the remains of sacrificed animals being then apparently laid over them as their most appropriate covering. However this may be, pits of a corresponding kind have been discovered in various places in England; but, as far as I am aware, this is only the second time anything at all resembling them has been noticed or described as occurring in Scotland. A little to the east of these pits a bed or stratum of considerable size, and consisting apparently of burnt earth, mixed with wood charcoal, was observed, and a little farther to the east another of smaller size was also come upon; and in both of these, various pieces of pottery, and the bones and teeth of animals, were discovered. I regret my not being able to give a full and satisfactory account of the various animal remains which these beds and pits contained, as

most of them were carelessly dug out by the rough hands of the "navvies," and added with the earth to form an adjoining mound. Those I have been able to collect and examine are the following:—

In the first place, however, I must notice the discovery of a *Human Skeleton* in a pit, about 3 feet in diameter, and 10 feet in depth, a little to the south-west of the large built pits. It was found standing erect, with a spear beside it; the head of the spear was of iron, 14 inches long,

Iron Spear-head, found with Human Skeleton, in Roman shaft, Newstead, Roxburghshire.[1] (In the Museum of the Society.)

and $1\frac{1}{4}$ inch broad at its widest part, and traces of the handle still remained, the rotten wood falling out on the spear being touched. The skull alone was preserved, and, through the kindness of my friend, Dr Brown, Melrose, is now in my possession (since presented to the Museum



Human Skull, found in Roman shaft near Newstead, Roxburghshire.[1]

of the Scottish Antiquaries). It is well formed, of moderate size, of the Caucasian type, with strongly-marked muscular impressions, and the

[1] I am indebted for the use of these woodcuts, which are given in Dr Wilson's "Prehistoric Annals," to Messrs Constable & Co., Publishers, &c., Edinburgh.

teeth generally sound and little worn, being evidently the skull of an adult male in the prime of life. An examination of it was carefully made by Dr D. Wilson and myself, for his interesting paper "On the Crania of the Tumuli" (read to Brit. Assoc. here), and the following are the details of its various dimensions, according to the terms used by Dr Morton in the "*Crania Americana:*"—Longitudinal diameter, 7 in. 3 lin.; parietal diameter, 5 in. 4 lin.; frontal diameter, 4 in. 6 lin.; vertical diameter, 5 in. 4 lin.; intermastoid arch, 14 in. 7½ lin.; intermastoid arch, from upper root of zygomatic process, 12 in.; intermastoid line, 5 in. 3½ lin.; do., from upper root of zygomatic process, 5 in. 6 lin.; occipito-frontal arch, 14 in. 4 lin.; do., from occipital protuberance to root of nasal bones, 12 in. 9 lin.; horizontal periphery, 20 in. 6 lin.; relative capacity (which is here assumed by adding together the longitudinal and vertical diameters and the horizontal periphery), 33 in. 1 lin.

If this skeleton, from the place where it was found, be considered that of a Roman citizen, it must, in my opinion, have belonged to the later period of their occupation of this district; as it was not till then that the practice of burning the dead began to be given up, and the simpler rite of inhumation reintroduced. It is not improbable it may belong to a much later period; but on this difficult subject it is no easy matter to decide.

Of the various remains of the lower animals which were collected, the first I shall notice has been well called "the noble associate of man,"—I refer to the Horse, *Equus caballus*, Linn., to which I consider this back part of a mutilated skull to have belonged, and which seems to have been an animal of rather a small size.

The next is the Common Hog, *Sus scrofa*, Linn., of which a small lower jaw was preserved. It is easily distinguished by its peculiar form, the posterior grinders being oblong, with tuberculated crowns, and the incisors sloping forwards.

The third animal which I have to notice is represented merely by a portion of a round antler, apparently of the Common Stag or Red Deer, *Cervus elaphus*, Linn. It seems to be a part of the first or brow antler; and I was informed, that tolerably perfect antlers, said to be those of the red deer, had also been found; but these I was unable to get for examination.

The other remains consisted of skulls, and apparently other bones of small-sized Short-horned Oxen, which I shall attempt more particularly to describe. I need hardly allude to the well-known fact of the previous existence in Britain of two species of enormous wild oxen,—the one the shaggy Bison, the other the large-horned and mighty Urus (*Bos primigenius*, Bojan.), an animal, according to Cæsar, almost equalling the elephant in bulk; but, in addition to these, there were also short-horned cattle of a very inferior size, which have been proved to have existed in Britain from the period of the newer pliocene formation, their remains being found in drifts and fresh-water deposits, along with those of the mammoth and the rhinoceros, and in the caves of the same period,—the prey, it may have been, of tigers, bears, and hyænas; as well as through the deposits of the alluvium; down to their existence in the bogs, and among the traces of men in the latest of all the formations; being spared apparently for man's sake, while their dread contemporaries of earlier times had passed from the face of the earth. After this, however, they also seem to disappear as a distinct species, still existing, it may be, in some of the many varieties of our present domesticated ox.

This small short-horned ox Professor Owen has designated the *Bos longifrons*. "It belongs," the learned Professor says in his excellent work on "British Fossil Mammals," "like our present cattle, to the subgenus *Bos*, as is shown by the form of the forehead, and by the origin of the horns from the extremities of the occipital ridge; but it differs from the contemporary *Bos primigenius*, not only by its great inferiority of size, being smaller than the ordinary breeds of domestic cattle, but also by the horns being proportionally much smaller and shorter, as well as differently directed, and by the forehead being less concave. The horn cores of the *Bos longifrons* describe a single short curve outwards and forwards in the plane of the forehead, rarely rising above that plane, more rarely sinking below it; the cores have a very rugged exterior, and are usually flat at their upper part." (*Vide* Owen's "Brit. Fos. Mammal.") With regard to the horn cores, Professor Owen seems to allow some little latitude both as to their size and curvature. In alluding (p. 501) to the Urus being distinguished from the *Bos taurus* by its great size and the direction of the horns, he quotes from Cuvier the following remark, "The naturalist well knows that such characters are neither constant nor

proper for the distinction of species;" and accordingly he admits that the Urus was subject to some variety in these respects; and, in the passage just quoted, he also appears to allow a certain amount of range in the curvature of the horn cores of the *Bos longifrons;* for he says, as already mentioned, they "rarely rise above the plane of the forehead, and more rarely fall below it."

The four skulls in my possession (which I now exhibit) seem to correspond very considerably with these general characters of the *Bos longifrons*, if we consider an allowance made for the slightly upward bend of the horn cores of one at least of them, while they agree with the forward curvature, and scarcely rise above the plane of the forehead. Indeed, two of them (Nos. III. and IV.) seem very closely to resemble the description given by Professor Owen, and the horns of No. IV. especially correspond; the other two, Nos. I. and II. (*vide* Plate), although perhaps slightly different, and of rather a larger size, still agree considerably in most particulars; the largest of these, No. I., being probably a bull, as well from its larger size and more strongly-marked horn cores, as from the proportionally broader and squarer forehead, which is believed to be characteristic of the male; and the others being in all probability cows. I would be inclined to account for their slight differences upon the supposition of these skulls being the remains of cattle which had become domesticated at that early period in our country's history, when the Roman soldier was a dweller in the south of Scotland; and should they be considered as not absolutely identical with the *Bos longifrons,* they seem apparently so closely allied as to afford a strong reason for believing it to be, at all events, the native source from which they had been derived. I have made out a table of their different dimensions, as compared with those given by Professor Owen, and it will be seen how very closely they correspond (*vide* Table). One of the skulls, No. IV., seems to have been sawn through the middle, and, from the appearance of some of the others, you might fancy the animals had been killed by the heavy blow of an axe, or some such instrument, striking them obliquely immediately behind the horns. On examining these skulls, I have been struck by what appears to me to be the large relative size of their prominent orbits, as contrasted with those of the *Bos primigenius*, and even of our domestic cattle. In the *Bos primigenius*, indeed, the orbit seems to be small in

relation to the immense bulk of the skull, and I may also notice the peculiar prominence in the middle of their supra-occipital ridge, especially in the skulls Nos. III. and IV. Since writing these notes, I have read a very interesting paper by Professor Nilsson of Lund, in the "Annals and Magazine of Natural History," vol. ii. of Second Series, "On the Extinct and Existing Bovine Animals of Scandinavia," in which he gives a detailed account of the characters of the *Bos longifrons* of Professor Owen, or Dwarf Ox, a few of which I may enumerate here. He says, "As far as we yet know, it is the smallest of the ox tribe that had lived wild in our portion of the globe; the whole length, from the muzzle to the end of the rump bone, he supposes to have been about 6 feet 8 inches, and, from the slender make of its bones, it had rather resembled a deer than an ox. The forehead upwards over the eyes is flattened, with an edge going along the frontal seam, which is most prominent upwards, and ends with a rounded indenting backwards. Between the eyes is a more or less considerable depression, above which there is often a rising, and beneath which lies the incision for the nasal bones, which go right up to the line drawn between the lower borders of the orbits. (Thus the frontal bones are not longer in this species than they are in the Urus or *Taurus*.) The horn cores are small, cylindrical, short, curved only in one direction forwards; sometimes, though seldom, downwards, in the plane of the forehead. The form of the temporal cavity is, behind, transverse-obtuse; before, oblique-pointed; its hinder part (to the angle above the joint of the under jaw), only one-fourth part broader than the forepart. The anterior palatine apertures lancet-shaped, at the back oblique inward-pointed; the back ones lie between the palate bones; the nape transverse, upwards with a vertical indenting, downwards with a vertical edge over the circular foramen of the nape. The skull of this species varies considerably in size, and even something in form, according to its age and sex. The species, however, is always known by a protuberance upon the upper part of the forehead in front, and an indenting backwards." He gives a table, also, of the usual dimensions of young specimens, which I have added to mine, to show their general correspondence.

These four skulls then (before you), which were found near the village of Newstead, Roxburghshire, seem to me to agree so very closely with all these distinctive characters as to prove them to have been very nearly

allied indeed, if not absolutely identical with, the *Bos longifrons;* and should you agree with me in this opinion, then I may say, I consider these as of course proving their existence in the south of Scotland at the time of the Roman occupation of the country, of which, as far as I am aware, these skulls are the only evidence.

The Origin of our ordinary Domestic Cattle.—The examination of the skulls of cattle, which had undoubtedly existed in our country at a very remote period, naturally suggests some queries as to the origin of our domestic cattle,—a question of considerable interest as well as difficulty, but into it I do not intend to enter farther than to bring forward a few notes bearing upon this interesting subject.

Professor Nilsson, in his paper already alluded to, describes what he considers to have been an additional species of extinct and fossil ox, found in this country as well as in Sweden; this he calls the *Bos frontosus*,[1] and to it, in passing, I must allude. It is distinguished, he says, by the ridge of the occiput rising high in the centre, convex; the horns, which rest on longer pedicles than among any known species of ox, are short, and directed outwards and backwards, and then bend forwards. The size of the skulls denote an animal which, although much less than the *B. primigenius*, is yet considerably larger than the *B. longifrons*. It belongs, he says, to the country's oldest post-pliocene period; and with regard to the question of the origin of our present cattle, the Professor considers that a race of our domestic cattle have probably been derived from each of the three species he describes of the subgenus *Bos* with the flat forehead; the *B. primigenius, B. frontosus, and B. longifrons;* none of them, according to the general opinion of naturalists, being derived from the Bison or Aurochs, which is quite different in its characters, and never pairs with the domestic cow.

Other naturalists, however, consider the *Bos primigenius* as the origin from which our domestic cattle are derived. I entirely concur with the opinion of Professor Owen, in considering it highly improbable, in fact almost impossible, that the enormous and savage Uri, of which Cæsar says, "great is their strength and great their speed, and they spare neither

[1] Professor Owen considers the *B. frontosus* a variety of the *B. longifrons*. See p. 618.

man nor beast which they catch sight of;" and that the man who killed the greatest number of them, even by the pitfall, brings the horns as an evidence of his prowess, and is highly applauded by his countrymen; and so savage is their nature, that, "though taken never so young, they cannot be tamed" (lib. vi. 27, 28). To suppose beasts like these not only tamed, in opposition to such decided evidence to the contrary, but also so strangely degenerated into the comparatively small-sized and placid ox of the present day, seems to me really past belief.

With regard to the opinion, that the domesticated British cattle were originally derived from those of the Roman colonists, we must recollect that we have evidence which proves the existence of numerous herds of domesticated cattle in Britain before ever Cæsar's troops set foot in the country. This Professor Owen seems rather to overlook when he says (Brit. Fos. Mam., p. 500), that in all probability the "herds of newly conquered regions would be derived from the already domesticated cattle of the Roman colonist." No doubt to a certain extent this might afterwards be the case; but Cæsar himself tells us, in his Commentaries, at the very commencement of his operations in England, that "the country was well peopled, and that they possessed 'pecoris magnus numerus'"—(lib. v. 12), numerous herds of cattle; for "pecus" is frequently used when domesticated cattle are spoken of, although certainly its more correct signification refers to sheep; and that in this instance it refers to cattle, we think is rendered the more likely by his going on to tell us that the natives of the interior of the country seldom troubled themselves with the tillage of the ground, but lived on milk and flesh meat, and clothed themselves with the skins (lib. v. 12, 14); all of which facts are proofs of the reference being at least to domesticated herds; and also, as has been well remarked, that the proverbial fondness of the natives of the southern parts of our island, at the present day, for the "roast beef of Old England," is a taste of no recent origin. It should also be remembered, that it must have taken no little time before the country could be filled with "numerous herds of cattle," especially if we consider the difficulty of transit from one country to another in the still earlier and ruder times; and I may remind you of the fact, of which Cæsar also informs us, that the Germans were, like the British, in possession of numerous herds of cattle before the Romans invaded them, not being

tillers of the ground, but resembling the British in their "milk, cheese, and flesh" diet, derived of course from their domesticated cattle. Considerations such as these would make me rather agree with Professor Owen's other remarks, when, treating of the *Bos longifrons*, he says, "that if it still be contended that the natives of Britain, or any part of them, obtained their cattle by taming a primitive breed, this small-sized, original variety of ox is most likely to have furnished the source." Now, I am inclined to think that the several instances where bones of this animal have been found along with the ancient works of man, as mentioned by Professor Owen, as well as in the present case, are, in all probability, proofs of the early domesticated state of an ox identical with the *Bos longifrons*, which, as already mentioned, had existed in this country from the times of the newer pliocene period.

In support of the opinion of the *Bos longifrons* being the true origin of our domesticated cattle, or at least as showing its more general resemblance to them, I may extract one or two statements from the paper of Professor Nilsson already referred to; for example, when describing the *Bos frontosus*, he says, "It seems to have been about the size of our common cow, from which, however, in form it totally differs." And in the *Bos longifrons*, as already noticed, "the form of the temporal cavity is behind transverse-obtuse, before oblique-pointed; its hinder part (to the angle above the joint of the under jaws) only one-fourth broader than the fore part. Herein it resembles the tame ox, but differs visibly from the *B. frontosus*, in which the back part is twice as broad as the fore part, and also from the Urus." And he also states that in the Urus the nasal bones are five times as long as broad; in the *B. longifrons* they are nearly six; while in the domestic ox they are six and a half times as long as broad.

It is curious to notice the fact, that the wilder districts of Britain, as the extremity of Devon and Cornwall for example, and the mountainous districts of Wales, as well as our own rugged land, seem all, according to Mr Youatt, to have been originally stocked with cattle having even yet as it were a general family likeness, with moderate sized horns, and of no great general bulk; being the very localities, as Professor Owen well remarks, where the natives would drive their domestic cattle before the advance of an invader, and where of course traces of the original breeds

are most likely to be found. Full allowance must, however, at the same time, be made for the wonderful changes produced on cattle by variety of situation and climate, by pastures, and attention on the part of their possessors to their breeding, so as to favour, from what originally might be an accidental peculiarity, the preservation and gradual spreading over the herd of some fancied excellence, or beauty, or fashion of the time. The Galloway cattle may perhaps be cited as an instance of the changes produced in this way; they are now known as a breed of polled or horn-less cattle; whereas it is said that so late as the middle of the last century, the greater part of them had horns of a rather small or medium size.

The Ancient White Cattle.—The ancient White Cattle, still existing in some gentlemen's parks, may also, it seems to me, be considered as simply an instance of a beautiful and much-esteemed variety of our domesticated cattle being artificially preserved; but as these are believed by many to be the last remains of our native wild cattle, I may perhaps be excused entering a little into detail on this curious subject.

[Various places in England, where herds of these white cattle were preserved, are enumerated in the "General History of Quadrupeds" of Thomas Bewick, Newcastle-upon-Tyne. I quote from the editions of 1790 and 1824. It is there stated that—

"There was formerly a very singular species of wild cattle in this country, which is now nearly extinct. Numerous herds of them were kept in several parks in England and Scotland; but they have been destroyed by various means; and the only breeds now remaining in the kingdom are in the park at Chillingham Castle, in Northumberland; at Wollaton, in Nottinghamshire, the seat of Lord Middleton; at Gisburne, in Craven, Yorkshire; at Limehall, in Cheshire; and at Chartley, in Staffordshire.

"The principal external appearances which distinguish this breed of cattle from all others are the following:—Their colour is invariably white; muzzles black; the whole of the inside of the ear, and about one-third of the outside, from the tip downwards, red; horns white, with black tips, very fine, and bent upwards: some of the bulls have a thin upright mane, about an inch and a half or two inches long. . . . .

"At the first appearance of any person, they set off at full gallop, and at the distance of two or three hundred yards make a wheel round, and come boldly up again, tossing their heads in a menacing manner; on a sudden they make a full

stop at the distance of forty or fifty yards, looking wildly at the object of their surprise; but upon the least motion being made, they all again turn round, and fly off with equal speed, but not to the same distance, forming a shorter circle, and again returning with a bolder and more threatening aspect than before; they approach much nearer, probably within thirty yards, when they make another stand and again fly off. This they do several times, shortening their distance and advancing nearer, till they come within ten yards, when most people think it prudent to leave them, not choosing to provoke them further.

"The weight of the oxen is generally from forty to fifty stones the four quarters; of the cows about thirty. The beef is finely marbled, and of excellent flavour.

"About twenty years since, there were a few at Chillingham with black ears, but the present park-keeper destroyed them; since which period there has not been one with black ears. The ears and noses of all those at Wollaton are black. At Gisburne there are some perfectly white, except the inside of their ears, which are brown. They are without horns, very strong boned, but not high. They are said to have been originally brought from Whalley Abbey, in Lancashire, upon its dissolution in the thirty-third of Henry the Eighth. Tradition says they were drawn to Gisburne by the power of music.

"Those at Burton-Constable, in the county of York, were all destroyed by a distemper a few years since. They varied slightly from those at Chillingham, having black ears and muzzles, and the tips of their tails of the same colour; they were also much larger, many of them weighing sixty stones, probably owing to the richness of the pasturage in Holderness, but generally attributed to the difference of kind between those with black and with red ears, the former of which they studiously endeavour to preserve. The breed which was at Drumlanrig, in Scotland, had also black ears. . . . .

"Tame cows, in season, are frequently turned out amongst the wild cattle at Chillingham, and admit the bull. It is somewhat extraordinary that the calves produced by this mode are invariably of the same colour with the wild breed (white with red ears), and retain a good deal of the fierceness of their sire."

Mr Thomas Bell, in his "History of British Quadrupeds," London, 1837, quotes from Mr Cullen "On Live Stock," the description of the appearance and habits of these white cattle in presence of strangers, which I have already given from Bewick's "Quadrupeds," apparently as a proof of the wild nature of these animals. I have, however, again and again seen all these wild habits exhibited by our Highland kyloes, when a boy fishing up a stream on the borders of Roxburghshire, which ran past a low grassy hill and through the remains of an old decaying

wood principally of birches, part, indeed, of the skirts of the old Etterick forest. Here the kyloes remained for many months together, sometimes followed by their calves, seeing nobody but an occasional shepherd, and got almost like wild animals, acting exactly like these Chillingham cattle when they caught sight of us, and we were glad to beat a speedy retreat before they came close enough to make their final rush; which, indeed, they had done some time before, knocking down a man and endangering his life, had not his cries speedily brought the much-needed help, which happened most providentially to be at no very great distance.

Sir Philip Grey Egerton, F.R.S., &c., published, in the "Annals and Magazine of Natural History," vol. iii. p. 241, London, 1839, a note showing the former existence of these white cattle at Bishop's Auckland, in the county of Durham, copied from a manuscript in his own possession, entitled "The Second Yeares Travell throw Scottland and Ireland, 1635." The writer passes a few days, on his road to Scotland, "att Bishoppe Auckland wth Dr Moreton, Bishoppe of Durham." After describing the palace, "chapples," &c., he mentions "A daintie stately parke: where-in I saw wild bulls and kine: w^{ch} had 2 calves ruñers; there are about 20 wild beasts all white: will nott endure yo^{r} approach; butt if they bee enraged or distressed, verye violent and furious: their calves will bee wonderous fatt."

In Scotland in ancient times these white cattle, according to Boece, were found throughout the Great Caledonian Forest, which formerly covered the country from Callander to Athol and Lochaber; but Boece (to whom I shall afterwards more particularly refer), writing in 1526, says that in his time they were only to be found in the district of Cumbernauld. In writing his account of these cattle, Boece probably had in his mind Cæsar's description[1] of the great long-horned wild and untameable Uri (already referred to), which is not to be wondered at, when we remember they were the only wild cattle known in his day, no fossil remains of the large *Bos primigenius* having then been noticed. Bishop Leslie in 1578 states that the white cattle were then to be found in three places, of the same great district however, Stirling, Cumbernauld adjoining it on the south, and "Kincarnia," probably Kincardine on the Forth.

[1] See quotation from "De Bello Gallico," p. 650.

Bewick, whom I have already quoted, states that they formerly existed at Drumlanrig, in Dumfriesshire, and Pennant in his "British Zoology," vol. i. p. 18 of 4th edition, 1786, mentions "having seen in the woods of Drumlanrig in North Britain, and in the park belonging to Chillingham Castle in Northumberland, herds of cattle, probably derived from the savage breed"—white cattle, with black muzzles and ears; their horns fine, and with a bold and elegant bend. The keeper at Chillingham informed him that the weight of the ox was 38 stones and the cow 28.

Mr Hindmarsh, in his paper on "The Wild Cattle of Chillingham,"[1] gives the following note about the Drumlanrig Cattle, which he had received in 1839 from the clergyman of the place:—"In what year the wild cattle came to Drumlanrig I have not been able to ascertain. The breed are described as being all white, with the exception of the ears and muzzle (which are black), and without manes. They went under the name of the wild Caledonian Cattle." "They were driven away about 1780." The date must have been a little later, as I have already quoted from Pennant his having seen them about this time.

The only locality in which they are now to be found in Scotland is Cadzow Forest, part of the great park of Hamilton Palace. In the "Statistical Account of Scotland," of Sir John Sinclair, Bart., Edinburgh, vol. ii. 1792, the account of the parish of Hamilton is given by Mr John Naismith. After describing the old oaks still remaining in the Duke of Hamilton's park, some of them measuring 20 feet round—the last remains of ancient forests—he says:—"Among these venerable trees grazed the wild cows mentioned by naturalists as an untamed native breed. They seemed to differ in nothing from the domestic kind, excepting that they were all over white, with black or brown ears and muzzles; and, from their manner of life, very shy, and even fierce, when they had not room to fly. They were exterminated, from economical motives, about the year 1760," p. 208. In the account of the parish of Hamilton, by the Rev. Wm. Patrick, in 1835, published in the "New Statistical Account of Scotland," we read that Cadzow

[1] An account of the Chillingham cattle, as descended from the wild cattle of the country, is also given in "A Catalogue of the Mammalia of Northumberland and Durham," by H. T. Meunell and V. R. Perkins. *Trans. Tyneside Nat. Field Club, Newcastle-upon-Tyne*, 1864, vol. vi.

wood "is browsed by about four score white cows of the ancient British breed. Their bodies are milk-white; their ears, muzzles, and hoofs black; and the skin in front, above the hoof, is mottled with black. They are perfectly docile, except when they have calves." My attention has been lately called to a communication to the Royal Society of Edinburgh, by Dr Robert Knox, in April 1838, "On the Wild Ox of Scotland," of which a very short abstract is published in the "Proceedings of the Royal Society," vol. i. 1845. In it Dr Knox, after endeavouring to trace the antiquity of the white oxen during the historic period of Britain, for which, however, he thinks materials are altogether wanting, examined the question as to whether the white cattle of Britain constitute a distinct species of the Bovine tribe, and thinks they do not; but as the domestic ox is now a mixed breed derived from several species, he is at a loss to show to which of these the white ox of Hamilton most approaches; they seem to bear the strongest resemblance, he thinks, to the Galloway breed. Dr Knox states that "many of the bulls have horns, whilst others are polled," and he "suggests, in conclusion, that the type of these cattle can never be satisfactorily made out so long as their breeding is so much interfered with by the destruction of all the calves, which may differ in form or colour from the standard considered by the noble proprietors as essential to the purity of the breed," p. 202.[1]

A fine specimen of a white bull from Hamilton (with black ears and muzzle, horns white, tipped with black, and some very slight black mottling above the hoofs of the fore feet and on the lower parts of the body), is in the Museum of Science and Art. In the report of the Proceedings of the Wernerian Society of March 5, 1842, it is stated that "a splendid specimen of the white bull from the park of Hamilton Palace, presented to the Museum by the Duke of Hamilton, was exhibited." (Edin. Phil. Jour. vol. xxxii. p. 400, 1842). Mr John Gibson, of the Museum of Science and Art, has furnished me with the following measurements of this fine stuffed specimen of the white ox, which enables us to judge pretty nearly of the size of these so-called wild cattle:—

[1] See subsequent Note of Dr Knox's specimen of this ox, p. 614.

	Ft.	In.	Lin.
Length of head from muzzle to line between the horns or top of the head,	1	6	3
Length from this line to the root of the tail,	7	2	6
Total length of body,	8	8	9
Length of horns,	1	3	6
Length between tips of horns,	2	7	0
Height to top of shoulder,	4	2	6

From the politeness of a correspondent at Hamilton I learn these cattle are now a considerable herd, but they are all without horns or polled, and have been so for some time past. By the liberality of the Duke of Hamilton, several are slaughtered every year, in order to afford a New Year's Day dinner to the poor of the town, all the clergyman sending in a list of the poor of their congregations for the purpose.

In "Black's Picturesque Tourist of Scotland," Edinburgh, the annexed figure (for the use of which I am indebted to our well-known publishers Messrs A. & C. Black) is given in illustration of the remarks on the white cattle of Hamilton. It is there stated that at Cadzow "the famous breed of Scottish wild cattle are still preserved." "They were expelled on account of their ferocity about 1760, but have since been restored." (Edit. 1849).[1]

We find then, among these various herds of park-kept, so-called Wild White Cattle, at present or lately in existence in the country, a considerable diversity in their general appearance; some with red ears, others with black, and this latter peculiarity occurring occasionally even among those of the red-eared variety, as mentioned by Bewick of the Chillingham cattle; and some having horns, while others have none, as the breed of wild white cattle at Gisburne, in Craven, Yorkshire, &c. (*vide* Bewick's Quadrupeds); and, besides other little peculiarities, we have also the occurrence from time to time among these breeds of cattle more or

[1] I have added from my notes these additional details of the "ancient White Cattle."

less marked with brown or black spots, but these individuals are always killed, to prevent this variety spreading among the herd. "And when the calves have been taken young, they have been completely tamed, and become like the common domestic ox, feeding as rapidly in confinement as a short-horned steer."—(*Vide* Paper "On the Wild White Cattle of Chillingham," by William Hindmarsh, Esq., in the *Annals of Nat. Hist.* for 1839, vol. ii.)

All these peculiarities seem to me to favour the idea of these cattle being merely an ancient fancy breed of domesticated cattle, preserved for their beauty in the parks of the nobility.

It is well known that the colour of many animals is changed by domestication, and that they frequently become more or less entirely white; and it is interesting, as showing apparently where some of the last traces of the original colour of an animal, which has been changed in this way, may be expected still to remain, to notice the remark of Professor Bell of London, in his valuable work on "British Quadrupeds," that "it appears the ears are more liable to retain colour in animals which become white by domestication than any other parts. This is the case, as we have seen, with the guinea pig, and it is no less true of the ox, and some others."—(P. 355.) I have heard a similar remark made by Professor Fleming, that he had never seen an entirely white ox, but that the ears always remained of a different colour. Now, in these park-kept white cattle, we have this same peculiarity also existing; and Professor Nilsson alludes in his paper to the well-known fact, that no race of wild oxen of this white colour is known to naturalists.

In Mr Hindmarsh's paper, already referred to, he quotes passages from several ancient authors, to justify the hypothesis of their being the remains of the ancient wild cattle of the country. These authors are, Hector Boece or Boethius, "Scotorum Historiæ a Prima Gentis Origine," published at Paris in 1526; and Bishop John Leslie, "De Origine, Moribus, et Rebus Gestis Scotorum," published at Rome in 1578. Now these, I suspect, must be considered, not as two independent authorities, but merely as one; for the Bishop, in his book, published some fifty-two years after the other, gives manifestly, in this instance, almost a *verbatim* copy of the statements of Boethius. To show this, I may compare the original passages, which refer to the existence of these white cattle in the

Great Caledonian Forest, which formerly covered the country from Stirling to Athol.

(1.) BOETHIUS, "Scotorum Historiæ a Prima Gentis Origine," fol. 6, l. 63; Scotorum Regni Descriptio, &c., of edit. Paris 1574:—"Hic initia olim fuere Caledoniæ sylvæ, manentibus videlicet veteribus adhuc nominibus Callendar et Caldar, excurrens per Monteth et Ernevallem longo tractu ad Atholiam et Loquhabriam usque. Gignere solet ea sylva boves candissimos in formam leonis jubam ferentes, cætera mansuetis simillimos, verum adeo feros indomitosque atque humanum refugientes consortium, ut quas herbas, arboresque aut frutices humana contrectatas manu senserint plurimos deinceps dies fugiant: capti autem arte quapiam (quod difficilimum est) mox paulo præ mæstitia moriantur."—"Hujus autem animalis carnes esui jucundissimæ sunt, atque in primis nobilitati gratæ, verum cartilaginosæ. Cæterum quum tota olim silva nasci ea solerent: in una tantum nunc ejus parte reperiuntur, quæ Cummirnald appellatur, aliis gula humana ad internecionem redactis."

(2.) BISHOP LESLIE, "De Origine, Moribus, et Rebus Gestis Scotorum" Rome, 1578, p. 19, (Scotia Descriptio):—"Ab his regionibus vastissima illa olim Caledonia sylva initium sumpsit, ut quædam locorum nomina hodie indicant."—"In Caledonia olim frequens erat sylvestris quidem bos, nunc vero rarior, qui colore candissimo, jubam densam, ac demissam instar leonis gestat, truculentus, ac ferus ab humano genere abhorrens, ut quæcunque homines vel manibus contrectarint, vel halitu perflaverint, ab iis multos post dies omnino abstinuerint."—"Ejus carnes cartilaginosæ, sed saporis suavissimi. Erat is olim per illam vastissimam Caledoniæ sylvam frequens, sed humana ingluvie jam assumptus, tribus tantum locis est reliquus, Stirivilingi, Cumernaldiæ, et Kincarniæ."

As for Boethius himself, we must remember, that though perhaps a good enough authority as to anything that happened under his own observation, he is so credulous as to believe apparently all that was told him, however extraordinary; so that his description of these cattle, of the purest white, maned like lions, untameably wild, and fleeing the very neighbourhood, or even the scent of men, and which apparently he had never seen, must all be taken with a considerable allowance. In all probability they were nothing more than strayed domestic cattle, which, in the course of years, had lapsed into a semi-wild state. As an instance of his

credulity, I may refer, in the words of Bellenden's Translation of 1553, to his account of the extraordinary animal described by Sir Duncan Campbell,—"That out of Garloll, ane loch of Argyle, the yeir of God M.DX yeiris, came ane terrible beast, als meikil as ane grew hound, futit like ane ganar, and straik down greit trees with the dint of her tail, and slew thre men quhilks wer at their hountis with thre straikis of her tail; and wer not the remanent hunteris clam up in strang aikis, they had been all slane in the samin maner."—(Chap. vii., *Bellenden's Trans. of Boethius' History.*)

It is curious, however, to trace the description of these white cattle, maned like lions, &c., published by Boece in 1526; as it seems to have been adopted by naturalists on his authority, and to have apparently been the only source from which they derived their descriptions.

In the "Descriptio Britanniæ, Scotiæ, Hiberniæ, et Orcadum" of Paulus Jovius, published at Venice in 1548, we have the following passage:—

"Cæterum Caledonia sylva antiquis nota scriptoribus, quæ hodie Callendar appellatûr, vasta sui magnitudine è mediterraneis ad maritima variis anfractibus se extendit. In ea inusitati generis feras, et volucres esse tradunt, equos silicet agrestes et indomitos; atque item tauros summæ feritatis leonum similitudine jubatos, Bisontibus quos Sarmatia gignit, populusque Romanus aliquando in arena spectavit, torvitate aspectus non omnino dissimiles. Ii vestigia hominum insidiarum metu astutis sensibus devitant, attrectatasque forte hominis manu frondes quum olfecerint, repente profugiunt, nec, capti labyrinthis et foveis ulla omnino pabuli copia placantur. Servitutis enim contumeliam non diu ferunt, in eaque mæstitia, contumaci spiritu efflato, citissimè moriuntur; tanta autem iracundia et robore venatores invadunt, ut eos nonnunquam transfossos cornibus, vibratosque in sublime, crudeliter interimant."—(P. 32, a., Venet., 1548.)[1]

This author simply repeats again the account given by Boethius of these wild cattle, untameable and of extreme ferocity, maned like lions. He adds, however, the statement, probably from his own knowledge of the European Bison,—that to the Bisons which Sarmatia produces, and

[1] The quotation from Paulus Jovius was only obtained after this paper was first published.—J. A. S.

the Roman people have sometimes seen in the arena,—in the savageness of their aspect they are not altogether unlike; and following the passage I have quoted above, he goes on to detail the story of the narrow escape made by King Robert Bruce from being destroyed by one of these animals, by the bravery of one of his followers, exactly as the circumstance is detailed by Boethius; but as I have omitted this account in my quotation from Boethius, I need not quote it from Paulus Jovius.

This, however, appears to be the first time these cattle were compared to the Bison of Central Europe, and in the next author I shall quote, we find a step taken in advance, and Paulus Jovius's comparison of the wild cattle of Scotland to the Bison is now expanded into a description of these wild cattle as the *Bison album Scoticum*.

Aldrovandus, then, in his work, "Quadrupedum Omnium Bisulcorum," Bonon, 1632, referring to the older work of Gesner, "Historia Animalium," 1551, notices these white cattle, in all probability from their being described as having manes like lions, and not altogether unlike the Sarmatian Bison, under the name of *Bison album Scoticum, sive Calydonicum*, using the very description of Boece already so often quoted.

Then, again, in the "Historia Naturalis de Quadrupedibus" of John Jonston, M.D., published at Amsterdam, 1657, we have this same description of Boece again in part repeated; in two different places, however,—first, in the chapter "De Bove Domestico," and again, "De Bobus Feris," with a marginal reference to "Aldrovand. Histor. Bisul." To show this more fully I may quote the passages. Art. 1, De Bove Domestico, *Differentiæ*, p. 34:—"In Scotia boves sunt sylvestres colore candidissimo, juba densa ac demissa, truculenti et feri, adeoque ab humano genere abhorrentes, ut ab iis quæ homines vel manibus contrectarint, vel halitu perflaverint, per multos dies abstineant, dolo capti, moriantur, Carnes cartilaginosæ habent." And again, Art. 2, De Bobus Feris, p. 1. *De Bisonte:*—"Huc pertinet et *Bison Scoticus*. Candidissimum esse aiunt, in formam leonis jubam ferre, cætera mansuetis simillimum, verum adeo ferum et indomitum, humanique consortii hostem, ut quas herbas aut frutices humana contrectatas manu senserit, plurimos deinceps fugiat: captum autem arte quadam, mox præe mæstitia mori." So that we have now *two species*, apparently, made in this way out of Boece's description.

Accordingly, in the "Scotia Illustrata, *sive Prodromus Historiæ*

Naturalis," of Robert Sibbald, M.D., published at Edinburgh in 1684, we find this Scottish naturalist quoting from Jonston's work, referred to above, adding, however, the following remarks:—"Quæ quidem ab Historicis nostris petita sunt, sed confirmatione egent. In pluribus locis montanæ partis Scotiæ reperiuntur quidem Boves feri, albi quoque: sed non ita truculenti, neque forma a domesticis differunt. An jubati Bisontes nunc extent, nescio."—*De Bisulcis Ruminantibus Cornigeris*, p. 7. So that Sibbald seems to doubt the existence of the so-called *Bison Scoticus*, though he admits that white cattle, exactly however resembling the domesticated breeds, and by no means so fierce and savage as they are described, still run wild in some of the mountainous districts of the country. The original source of the whole statement is apparently the description given by Boece, and repeated by Paulus Jovius, Bishop Leslie, and others, which I have already taken the liberty of criticising, as being, in all probability, a very exaggerated account.

Moreover, if we search still further back in the records of a much greater antiquity, we find evidently the same kind of white cattle described in such a way as seems to me to imply, without a doubt, their thorough domestication. In the "Leges Wallicæ," of "Howell Dda," the Welsh laws of King Howell the Good, which date from about A.D. 942–3, or before the middle of the tenth century,—*vide* Translation by Gul^{s}. Wottonus, London, 1730,—we find white cattle with red ears, in all probability the same breed of cattle as those I have been referring to, ordered to be paid as a compensation for offences committed against the Princes of Wales—(*vide* Lib. 1, chap. vi., pp. 10–11):—

"*De solvenda Multa Regis.*—Multa pro injuria Regi Aberfraviæ illata hoc modo solvenda. Centum vaccas pro qualibet centuria subditione ejus Reus solvet, et cum singulis centenis vaccis unum Taurum auribus rufis præditum cum Virga aurea ejusdem cum Rege longitudinis, magnitudine digiti ejus minimi, et crassitudine unguis aratoris qui per novem annos araverit. Aurum nemini debitur nisi Regi Aberfraviæ."—"3. Domini Dinevoræ privilegium est accipere pro compensatione injuriæ sibi illatæ vaccas albas aures rufas habentes, totidem quot ordine sibi succedentes pertingent ab Argöelia (*e*) ad Dinevoram, et cum singulis vicenis vaccis taurum ejusdem coloris. Aurum nemini penditur nisi Regi Dinevoræ vel Regi Aberfraviæ."

"(e) Loci nomen prope Dinevoram, sibi ubi præcise situs sit ignoratur."

It seems very evident that such numbers of living wild cattle could never be exacted as payment of a fine, but that beyond all doubt domesticated cattle are here referred to, and apparently, from the special character of the notice, a favourite variety, highly prized for their beauty and peculiar colour. To show how highly this breed of cattle had been valued at a very early period, I may quote several passages from Mr Youatt's well-known work "On Cattle." He says (p. 478), "Howel dha, or Howell the Good, describes some of the Welsh cattle, in the tenth century, as being 'white, with red ears,' resembling the wild cattle of Chillingham Castle. An early record speaks of a hundred white cows with red ears being demanded as a compensation for certain offences against the Princes both of North and South Wales. If the cattle were of a dark or black colour, one hundred and fifty were to be presented. When the Cambrian Princes did homage to the King of England, the same number of cattle, and of the same description, were rendered in acknowledgment of sovereignty. Speed tells us that Maud de Breos, in order to appease King John, whom her husband had offended, sent to his Queen a present from Brecknockshire of four hundred cows and a bull, all white, and with red ears. Whether this was the usual colour of the ancient breed of Welsh and British cattle, or a rare variety, esteemed on account of its beauty, and chiefly preserved in the parks of the nobles, we are unable to determine. The latter is the more probable supposition; and the same records that describe the 'white cattle with red ears,' speak also of the 'dark or black-coloured breed,' which now exists, and which is general throughout the principality."

It appears to me only natural to suppose that these were all domesticated and surely not wild cattle, to which reference has been made in these various passages; and that they were a highly-prized variety is shown by their colour being specially mentioned, as well as their being valued at a half more than the dark-coloured, which were most probably the more common breed of the district. And let me call to your recollection a remark of Hector Boece himself, in the passage already quoted,—that, with the exception of their colour and manes, the wild white cattle are exceedingly like the ordinary tame or domesticated breed; and that their flesh is very pleasant food, and much approved of by the nobility;—both of which

observations, in my opinion, tend to show the truth of the views now stated.

Youatt says, the old legends of Wales speak of the ancient domesticated cattle being of a dark or reddish colour, resembling considerably the Devon cattle; and according to the same authority, "the slightest observation will convince us that the cattle in Devonshire, Sussex, Wales, and Scotland, are all essentially the same." He considers that red had been their primitive colour, as he traces it through all these varieties, and declares that even where another colour, as black, now prevails, the memory of the red still remains, and has a superstitious reverence paid to it in the legends of the people. In Scotland also there has always existed a popular feeling of preference for the red cow, it being declared to be "luckier," and to give more milk. It is, perhaps, worthy of notice, in relation to the question of colour, that the Urus or *B. primigenius* is believed to have been of a dark or black colour; and in what I consider to be a very rare specimen of a portion of the skull of the *Bos longifrons*, with the horns and part of the skin and hair still attached, which was kindly shown me by Professor Fleming, the colour of the hair, as far as you can judge from a specimen found in an Irish bog, is also of a black or dark reddish or brownish tint; it may be, bearing a relation to the very colour to which I have been alluding.

I may remark that the small size of the domesticated cattle in this country, from the very earliest times, seems to me an additional and unanswerable objection to their having descended from the gigantic *Urus*. Professor Nilsson, however, in his paper already referred to, considers "that we may take it as a given and general rule, that the tame race is always less than the wild species from which it springs." Now, this is a proposition which I am very much inclined to doubt, believing, as I do, that animals are by no means necessarily degenerated and dwarfed in their dimensions, as the Professor supposes, when taken under the care and protection of man, but, on the contrary, are rather increased in size, by careful tending and feeding, as well as by attention to their breeding; and examples in proof of this view, I am inclined to think, may be found in our domesticated dogs, horses, &c. We know, from such specimens as these skulls I have described, the small size of at least some species of cattle in the Roman period; and others, of an exactly corresponding kind

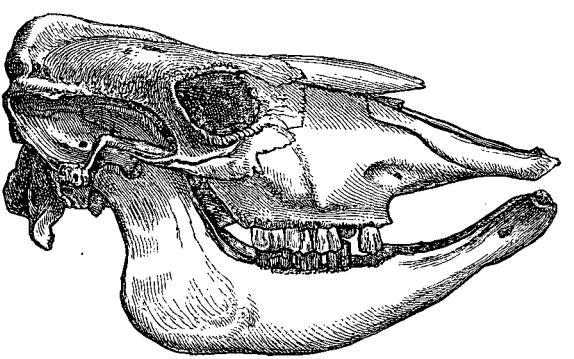
and size, have been found, as already mentioned, belonging to an immensely older geologic period, carrying us back in this way to times altogether prior to the existence of man. Then, in much later times, as shown in the Welsh Laws of Howell the Good, in the tenth century (*vide* Wotton's Trans. Leges Wallicæ), we have apparenly given to us the different sizes of the yokes used for ploughing; and if so, from these we find that the cattle of that date must have been much smaller than those of the present day. Thus we find it stated in Lib. III., chap. ix., p. 279, *De Societate Arationis:*—"Jugum breve quattuor pedibus (longum); Jugum maiale octonis pedibus; Jugum axillare duodenis pedibus; Jugum longum senis denis pedibus." In other passages of these laws, we have these various yokes referred to as measures of the land, being apparently taken from the well-known sizes of the different yokes themselves. The cattle, Mr Youatt says, were always yoked abreast, and the short yoke for two oxen was only four Welsh feet of nine inches each, or three feet English in length, increasing in the same proportion for four oxen; and for eight, which was sixteen Welsh feet, or twelve feet English long. Chap. ix., 2 of Lib. III. of Leges Wallicæ:—"Uncia longitudine trium granorum hordeacorum constat—Palma tribus unciis—Pes tribus palmis;" showing in this way of what these measures consist. Mr Youatt declares that an ox of the present day would require a somewhat larger space than eighteen inches in order to work or even to stand. (*Vide* Youatt "On Cattle.") And when we remember the small size of our domesticated cattle in ancient times, it is interesting to notice another remark in page 3 of his valuable work, in regard to the comparative size of the well-tended cattle of the present day:—"There is no doubt that within the last century their size has progressively increased in England, and kept pace with the improvement of agriculture." How far this may go on seems rather a difficult matter to determine, as well as to what extent a species of animal like the ox may be changed from its original type, degenerating, it may be, in some places, and improving in others, by being long under the dominion and management of experimenting and calculating man.

These rough notes I consider as tending to show the extreme improbability of our domestic cattle being the descendants of the large-sized *Bos primigenius;* and shall I say, the probability of their true progenitor

being this small and equally-ancient *Bos longifrons*, or short-horned ox, which has been proved to have existed in this country from the later geologic periods down at least to the bustling times of busy man.

In conclusion, I have to return to my catalogue of animal remains, and, making a rapid descent in the scale of animal life, allude to an ancient mollusc, which had been prized then as now as a delicacy for the table, and is the last of these relics I have to notice, which were found with the traces of the Roman occupation of this district; I refer to the Common Oyster, *Ostrea edulis*,[1] of which this shell, measuring $4\frac{1}{4}$ inches in greatest diameter (which I exhibit), and several others were found; affording a proof of the large size of this ancient shell-fish, as well as of the fondness of the Roman epicure, even at this inland station, for the celebrated oysters of our British seas.

[1] My best thanks are due to my friend Adam Smith, Esq., Darnick (now of Melbourne, Australia); and to Mr Francis Burnet, Newstead (since deceased), for their zeal in procuring for me these various specimens.



Side-View of Skull of "White Ox" from Hamilton, formerly in Dr Knox's Collection.
(See pp. 602 and 614.)

Table of Measurements of various Specimens of Skulls of the Bos longifrons *(Owen).*

	Skulls found near Newstead. (See Plate.)				From Prof. Owen's Brit. Fos. Mam.					Prof. Nilsson, of Lund, Young Specimens.[3]		
	In. lin.	In. lin.	In. lin.	In. lin.	In. lin.	In. lin.	In. lin.	In. lin.	In. lin.	In. lin.	In. lin.	In. lin.
	No. I.	No. II.	No. III.	No. IV.	(1.)[2]	(2.)	(3.)	(4.)	(5.)	(1.)	(2.)	(3.)
Length of the skull from the supra-occipital ridge to front edge of intermaxillary bone,	18·6	17	16	...	...	...	...	...	...	16	...	...
Length from supra-occipital ridge to nasal bones,	8·6	8	8	...	8	8	...	...	...	7·2	...	8·4
Length from roots of horn cores to upper edge of orbits,	4·2	3·6	3·6	...	...	...	...	...	...	3·4	...	...
Length of orbits,	2.9	2·6	2·6	...	...	...	...	...	...	2·4	...	...
Breadth of orbits,	2·8	2·5	2·5	...	...	...	...	...	...	...	...	...
Length from orbit to end of maxillary bone,	8·3	7·9	7·6	...	...	...	...	...	...	8·4	...	...
,, from orbit to front edge of intermaxillary bone,	10	9·3	9	...	...	...	...	...	...	10	...	...
Breadth of forehead, between roots of horn cores,	6·3	5·6	5·8	5·6	5	5	5	5	...	5	5·3	5·2
Breadth across narrowest part about midway between roots of horn cores and orbits.	6·9	6	5·9	5·6	...	...	...	...	...	5·4	...	...
Breadth of skull across middle of orbits,	6·9	6·6	6·3	...	6·9	6·6	...	...	...	nearly 7	7·5	...
,, across front of intermaxillary bones,	3·3	3	3	...	...	...	...	...	...	...	...	...
Horn-cores; circumference of base,	6·9	5	4·3	4	4	3·6	4·6	...	7	4·3	7·1	4·2
,, length following outer curvature,	6	4·6	3·6	3	4	3·6	4	4	7	4	...	3
,, span across, from tip to tip,	16·6	11[1]	10·6[1]	9[1]	12	11	12	11·3	...	...	...	...
Length of alveolar sockets and molar teeth of upper jaw,	5	4·9	4·9	...	...	...	...	...	...	5·2	...	...
Height of skull from supra-occipital ridge to upper edge of foramen magnum,	4·5	...	...	4·3	...	...	...	...	...	4	...	...
Height of skull from supra-occipital ridge to the base of the skull,	5·11	...	...	5·9	...	...	...	...	...	5·5	...	...
Breadth of occipital condyles posteriorly,	4·3	...	...	...	...		...	...	...	...	...	...

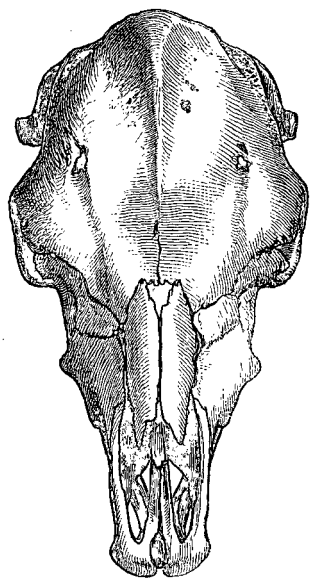
[1] These measurements are obtained by doubling the length from the tip of one horn core to central suture of forehead.

[2] (1.) Hunterian, Irish bog. (2.) Mr Ball, bog, Westmeath. (3.) Mr Brown, Clacton beds (freshwater). (4.) Mr Woods, bog, Bridgewater. (5.) Larger size, supposed to be bull, and others cows.—*Prof. Owen.*

[3] Professor Nilsson says this species seems to vary considerably in size, according to age and sex.

NOTE OF THE "WILD WHITE OX" OF CADZOW, HAMILTON.

In the very short abstract of Dr Robert Knox's paper already referred to "On the Wild Ox of Scotland," published in the "Proceedings of the Royal Society of Scotland," vol. i., 1845, p. 201, he says:—"The cranium of the wild ox of Hamilton differs very much from those of most domestic



Skull of White Ox from Hamilton, formerly in Dr Knox's Collection.
(9 inches 9 lines in length.)

oxen, particularly in the breadth of the forehead, shortness of the nasal bones, and configuration of the interior of the nostrils. Many of the bulls have horns, whilst others are polled." At the sale of Dr Knox's collections, a polled skeleton of the Hamilton wild ox was purchased by Professor Goodsir, labelled by him *Urus Scoticus*, and added to the Anatomical Museum of the University. This is undoubtedly the animal to which Dr Knox refers in his paper. Through the kindness of my friend

Professor Turner, I have had an opportunity of examining it, and, with the assistance of Mr A. B. Stirling, add a few measurements for comparison with the other varieties of cattle described. I am also able to give figures of the skull of this Hamilton ox (pp. 612 and 614), which, so far as I am aware, have not yet been published :—

Measurements of Skull of Recent White Ox from Hamilton.

	In.	Lin.
Length of skull from supra-occipital ridge to front edge of intermaxillary bones,	19	9
Length from supra-occipital ridge along centre of forehead to nasal bones,	9	9
Length from nasal suture to front of intermaxillary bones,	10	3
Length from centre of occipital ridge to upper edge of orbits,	8	3
Length of orbits,	2	9
Breadth of orbits,	2	3
Length from front of orbit to front of maxillary bone,	8	6
Length from front of orbit to front edge of intermaxillary bone,	11	3
Length of nasal bones—		
Right,	5	9
Left,	5	6
Breadth of nasal bones,	2	6
Breadth of forehead at upper part,	6	0
Breadth across about midway between top and orbits,	7	9
Breadth of skull across middle of orbits,	9	3
Breadth across front of intermaxillary bones,	3	9
Length of alveolar sockets of upper jaw,	5	0
Height of skull from supra-occipital ridge to upper edge of foramen magnum,	5	3
Height of skull from supra-occipital ridge to the base of the skull,	7	0
Breadth of occipital condyles, posteriorly,	4	5
Lower jaw, length,	15	6
Depth from condyloid process to base,	7	0
Depth from temporal process to base,	9	0

Measurements of Skeleton.

Atlas, length through foramen,	2	6
Greatest breadth below,	7	6

	In	Lin.
Axis, length,	5	0
Breadth below,	4	6
Scapula, length (without cartilage),	16	6
Breadth across base,	10	0
Humerus, greatest length,	12	9
Breadth across lower articulation,	3	6
Radius, length,	11	6
Breadth of lower articulation,	3	6
Ulna, length from olecranum,	14	6
Carpus, length,	2	3
Metacarpus, length,	8	0
Breadth across lower articulation,	3	0
Phalanx, first, length,	2	3
Second, length,	1	6
Hoof, length,	2	0
Pelvis, length between tuby. of ilium and tuby. of ischium,	15	0
Breadth across tubs. of ilium,	25	0
Breadth across tubs. of ischium,	13	0
Breadth across acetabula,	8	6
Femur, greatest length,	16	0
Breadth across lower articulation,	4	6
Tibia, length,	14	0
Breadth across lower articulation,	2	6
Calcaneum, length,	6	0
Tarsus, length,	2	6
Metatarsus, length,	9	0
Breadth across lower articulation,	2	6
Phalanx, first, length,	2	6
Second,	1	3
Hoof,	2	0

This ox is therefore rather larger than the usual size of the ancient *Bos longifrons;* but considerable range of size, as well as variety in the direction of the horns, must be apparently allowed even in the latter. The more massive skull and breadth of forehead is partly due probably to this Hamilton ox being a bull; and the principal difference is in the shortness of the nasal bones, and the configuration of the interior of the nostrils which is apparently due to the greater projection forwards and downwards towards the septum of the nose, of a lamina from the lower

part of the upper half of naso-turbinal bone. Probably mere individual varieties of size and proportion in a young animal.

In the Museum of Science and Art there is a skeleton of an ordinary polled ox resembling that of the Hamilton White Ox, being nearly of the same size. The skull measures in

	In.	Lin.
Length from centre of occipital crest to anterior part of intermaxillary bones,	19	9
Do. to nasal suture,	9	3
Length from nasal suture to front of intermaxillary bones,	10	6
Nasal bones in length, right,	6	6
Do. left,	6	6
Do. in breadth,	1	10
Length of orbits,	2	6
Breadth of orbits,	2	6
Breadth of forehead between orbits,	8	9
Breadth of intermaxillary bones in front,	3	9

(2.) Notice of Two Additional Crania of the Ancient Short-horned Ox (*Bos longifrons*, Owen), found some time ago near Newstead, Roxburghshire; with Note of the Skull of a Recent Shetland Ox. By John Alexander Smith, M.D.[1]

In a previous communication to the Society (April, 1851), I exhibited and described four more or less perfect crania of this ox, the *Bos longifrons*, which were found during the formation of a cutting on the Hawick branch of the North British Railway, in the vale of Melrose, a little to the east of the village of Newstead. They were discovered in a series of deep well-like shafts, which contained various remains, with Roman pottery and a few coins.

Since that time I have been able to procure the two portions of skulls now before the Society, which, I believe, complete the collection of ancient animal remains that have been obtained from this place. The larger of the two skulls seems to have been an animal of rather greater size than any of those formerly described, measuring, as it does, about $7\frac{1}{4}$ inches

[1] Read before the Royal Physical Society, Edinburgh, January 25th, 1854, and published in the "Edinburgh New Philosophical Journal," vol. lvii., 1854, p. 162.

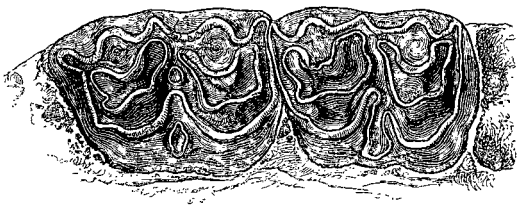
across the forehead between the roots of the horn-cores; and the horn-cores themselves are also larger, being $7\frac{1}{4}$ inches in circumference at the base. They are about $5\frac{1}{4}$ inches in length, but the points being broken, we cannot of course determine this measurement correctly. This skull is also more prominent in the upper part of the forehead, and has the "prominent edge standing up along the middle of the forehead," which Professor Nilsson of Lund gives as a specific character of this ox, more distinctly marked than in any of the other specimens. The second skull belongs to a much smaller animal, being nearly equal in size to the least of those formerly described. The measurements here are:—Breadth across the forehead between the horn-cores, $5\frac{1}{2}$ inches. The horn-cores are nearly $3\frac{3}{4}$ inches in length, following the outer curvature; and their circumference at the base is 4 inches. In this individual also the prominence of the upper part of the forehead and of the occipital ridge is very distinct. These specimens are interesting, as showing somewhat of the range in the size and shape of this animal. We may suppose the smaller to be a cow, and the larger one a bull. But in all the varieties of size, there is a constant general resemblance in character.

Professor Nilsson has described as a distinct species of ox, a variety principally distinguished from the *Bos longifrons*, by having longer pedicles to the horns, the forehead more rounded in front, and the ridge of the occiput rising high in the centre, which he has called the *Bos frontosus;* but you will observe that in the crania on the table, there is a very considerable variety both in the prominence of the forehead and the outline of the occipital ridge.

In a letter with which I have been favoured by Professor Owen, he informs me that two of the specimens previously exhibited are the most perfect crania of the *Bos longifrons* which he has yet seen. And he considers that they tend to strengthen his opinion of this ox being a distinct species of fossil ox, all the varieties which it presents in the different specimens he has examined being within the limits of an admitted range; while he believes the *Bos frontosus* of Nilsson to be merely a variety of the *Bos longifrons*.

This is the most ancient of the small sized cattle, being found in the drifts and fresh-water deposits of the newer pliocene formation, along with remains of the huge animals of that time, the elephant and the

rhinoceros; and downwards through the deposits of the alluvium to the period of man, as the specimens on the table show, shortly after which it becomes lost as a species,—probably remaining in some of the domestic cattle as its later posterity, and as a small additional evidence on this point, I may mention that in one of the skulls previously described,[1] there still remained three of the molar teeth, being the two last molars of the upper jaw, and the third the last molar of the other side. These I have compared with the teeth of our domestic cattle, and found them to be almost identical in character, the arrangement of their enamel folds and general structure being the same (see woodcut).



3. 2.

Two last (2d and 3d), Maxillary Molars of right side of small Short-horned Ox, *Bos longifrons* (Owen). Found at Newstead, Roxburghshire. (See Plate, No. III.) (natural size).

I believe these skulls to be the first remains of the *Bos longifrons* which have been discovered in Scotland.

I may also mention, that in May 1853 there was presented to the Museum of the Society of Antiquaries of Scotland a portion of the lower jaw-bone of an ox, which had been found in a strange building, of several chambers, covered by a tumulus, and called a "Picts' House," situated on the western declivity of Wideford Hill, near Kirkwall, Orkney, which was opened and particularly examined by George Petrie, Esq. The specimen, which consists of a portion of the body of the jaw-bone, was lately examined by Professor Queckett of the Royal College of Surgeons, London, and was considered by him to belong to this same species of the *Bos*

[1] Vide Plate, No. III.

longifrons. It seems especially worthy of notice, as proving the existence of this small ox in the Orkney Islands, at a very early period, when the country in all probability was inhabited by some of the primitive races of our land; and is, so far as I am aware, the first instance of its existence being noticed so far to the north in Britain.

In conclusion, I may remark, that the occurrence of this Orkney specimen, should we believe it to be a domesticated ox, is also interesting, as it may be considered an additional evidence of the early inhabitants of this country having tamed an original native breed, it being by no means likely that in this comparatively remote place the domesticated ox could have been derived from the cattle, introduced it may be, into the southern parts of Britain by the Roman colonist.

Note.—Having, through the kindness of Professor Fleming, examined a skull of the Small-sized Ox of the Shetland Islands, I have added some of its measurements for comparison with the small oxen referred to here and in the previous communication. In this skull we have the prominent edge in the middle of the forehead rising from the depression between and rather above the orbits, and the rounded protuberance in the central part of the supra-occipital ridge. The horn-cores, however, are considerably longer and larger in proportion to the size of the skull, and curve backwards, outwards, and upwards.

Measurements of Skull of Recent Shetland Ox.

	In.	Lin.
Length of skull from supra-occipital ridge to front edge of intermaxillary bones,	17	3
Length from supra-occipital ridge along centre of forehead to nasal bones,	7	9
Length from roots of horn-cores to upper edge of orbits,	3	10
Length of orbits,	2	6
Breadth of orbits,	2	3
Length from orbit to end of maxillary bone,	7	8
Length from orbit to front edge of intermaxillary bone,	9	6
Breadth of forehead between middle of roots of horn-cores,	5	11
Breadth across narrowest part,	5	7
Breadth of skull across middle of orbits,	6	3
Breadth across front of intermaxillary bones,	2	11

	In.	Lin.
Horn-cores, circumference of base, ...	6	4
Horn-cores, length following outer curvature, ...	6	6
Length of alveolar sockets of upper jaw, ...	5	6
Height of skull from supra-occipital ridge to upper edge of foramen magnum, ...	4	6
Height of skull from supra-occipital ridge to the base of the skull, ...	6	0
Breadth of occipital condyles, posteriorly, ...	3	10

In the "Statistical Account of Scotland," vol. i. Edinburgh, 1791, in the account of the parish of Delting, Shetland, it is stated that the carcase of a Shetland ox weighs from 3 to 4 cwts., that of a cow from 170 to 230 lbs.

I subjoin a few measurements of the skeleton of a young animal of *Bos longifrons*, to give an idea of the size of this species of ox, taken from Professor Nilsson's paper already referred to :—

"BOS LONGIFRONS.

"*General Character.*—The forehead flattened, with a prominent edge standing up along the middle, and a smaller indenting backwards; the horns round, small, and directed outwardly upwards, and bent in one direction forwards.

"To judge from the skeleton, it was 5 feet 4 inches long from the nape to the end of the rump-bone, the head about 1 foot 4 inches, so that the whole length must have been about 6 feet 8 inches. From the slender make of its bones, its body must rather have resembled a deer than our common tame ox; its legs at the extremities are certainly somewhat shorter and also thinner than those of a crown deer (full-antlered stag). The skull is long and narrow, even more so than that of a deer.

"The rest of skeleton most like that of the tame ox, but each bone in proportion to the length is more slender and thin.

"*Atlas:* the breadth over the wings 4 inches 5 lines; under the length of the curve, 1 inch 3 lines; *axis* about 3 inches.

"*Shoulder Blade, Scapula:* length, 11 inches 4 lines; breadth, 6 inches 1 line; from cav.-glen. to spin., 1 inch 7 lines.

"*Humerus:* length, 8 inches 6 lines; breadth of lower joint's superficies, 2 inches 4 lines.

"*Radius:* about 10 inches in length.

"*Metacarpus:* length, 7 inches 3 lines; breadth of lower articular surface, 2 inches.

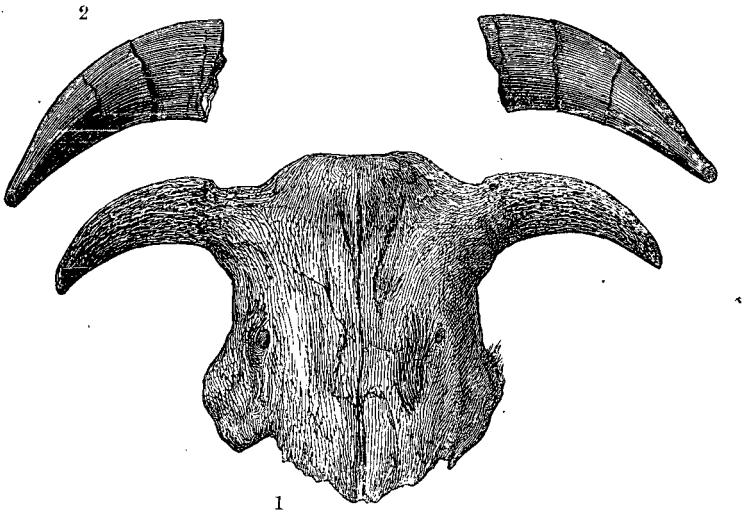
"*Pelvis:* length in a right line, 1 foot 2 inches 2 lines. *Foram. obturat.*, oval, in front somewhat narrower.

"*Femur:* length, 11 inches 4 lines.

"*Tibia:* length, 11 inches 4 lines.

"*Metatarsus:* length, 8 inches 4 lines. First toe joint, 2 inches; second, 1 nch 2 lines; the hoof, 2 inches 2 lines in length.

In the first paper on the *Bos longifrons*, I referred to an interesting specimen shown to me by the late Professor John Fleming, D.D., in the



Portions of Skull of small Short-Horned Ox (fig. 1), with Horns (figs. 2), found by Mr James Crawley 25 feet below the surface of his bog, near Castle Connell, county Limerick, Ireland, in June 1846, and given to Mr James Denniston of O'Brien Bridge, by whom it was presented to the Museum of the New College, Edinburgh, 1846.

Museum of the New College, Edinburgh, having both the horns, and also remains of part of the skin with the hair attached, apparently showing a

rough shaggy hide like our Highland kyloes. Professor Duns has kindly allowed me again to examine this skull. It shows distinctly the characters of the *Bos longifrons*. The upper part of the skull is separated at the orbits from the superior maxillæ, and the occipital bone is also separated. The whole bones are of a dark brown colour, and have lost almost entirely their mineral constituents, caused, as Professor Fleming was inclined to suppose, by their exposure in the bog to a spring of water surcharged with carbonic acid, which had apparently dissolved them away. The bones, having been soft, are now somewhat shrunk and split, but correspond closely to Professor Owen's description and figures of the *Bos longifrons*.

It measures 6 inches from the prominent centre of the supra-occipital ridge or top of the forehead, to the upper edge of the orbit, and between the roots of horn-cores $6\frac{1}{4}$ inches. The occipital condyles measure $3\frac{1}{2}$ inches across the back part. The horn-cores measure, the right nearly 6, and the left $5\frac{3}{4}$ inches in greatest length, along their outer curvature; and in circumference at the base, 3 inches.

The horny sheaths—the horns—are of much interest; they are nearly black in colour, and taper rapidly towards a rather sharp-pointed extremity; the other end being probably expanded somewhat by its long steeping in the bog. They now measure, the right $9\frac{1}{4}$, and the left $8\frac{3}{4}$ inches, along their greatest outer curvature; and in circumference at the base, the right horn $7\frac{1}{4}$, and the left 7 inches. When placed on the horn-cores, they slope outwardly slightly downwards, and forwards, rising above the plane of the forehead in front.

(3.) Notes of the Occurrence of the Remains of Ancient Short-Horned Cattle in different Districts of Scotland.

Roxburghshire.

Newstead.—Various specimens of *Bos longifrons* were found with Roman remains in 1846-7, near Newstead, of which I have given the preceding detailed accounts.

Hawick.—Sir Walter Elliot of Wolfelee informs me that the skull and different parts of the skeleton, he believes, of the *Bos longifrons*, Owen,

were found many years ago along with the bones of an elk (*Cervus alces*),[1] in the peat moss adjoining Williestruther's loch, near Wolfelee. The loch lies not far from the river Slitrig, in the parish of Hawick. The bones have now unfortunately all fallen aside.

Kirkcudbrightshire.

(*Borgue, Borness.*—Since these notes were put together, some bones of the *Bos longifrons*, including a portion of the frontal bone with the characteristic small horn-core, were exhibited at a meeting of the Society in June 1873. They were some of the first-fruits of an exploration of a cave on the line of cliffs to the south-west of the bay of Kirkcudbright, on the farm of Borness, in the parish of Borgue. The cave is being carefully examined by Mr A. J. Corrie and Mr W. Bruce Clarke, and full details will be published when they have concluded their investigation. A short note of the commencement of this work is published in "Nature," for August 7, 1873; it is there stated that the bones included ox, red-deer, goat, horse, pig, pine-marten, rabbits, water-vole, &c., with remains of birds, frogs, and fish, and rude implements of bone, stone, &c.)

Wigtonshire.

Dowalton Loch.—A lake-dwelling or crannog in Dowalton loch was examined by Sir William Maxwell of Monreath, Bart., and various bronze vessels, &c., including a Roman patella, and numerous bones of animals, were presented to the Museum by Sir William in March 1865. These included two frontal bones with horn-cores; one a larger horn-core, $6\frac{1}{2}$ inches in circumference at its base, and 3 inches long, its point being broken off. The smaller horn-core measures $4\frac{1}{4}$ inches in circumference, and 3 inches long. Two portions of skulls, and also of lower jaws, all of a small-sized ox, the *Bos longifrons*.

Edinburghshire.

Inveresk.—Some remains of Roman pottery, amphoræ, mortaria, &c., along with bones of animals, deer and oxen, found at Inveresk, near Musselburgh, were presented to the Museum by Admiral Sir Alexander

[1] See Notice of Remains of Elk found in Scotland, "Proc. Soc. Antiq. Scot." vol. ix. p. 326.

Milne, K.C.B., in May 1865. The bones of the oxen may probably be referred to the *Bos longifrons* of the Roman period.

Kinleith.[1]—A curious double-bladed and edged bronze implement, of a unique character (3¾ in. long), was found at a depth of nearly 11 feet from the surface, in an undisturbed bed of gravel, along with some of the bones of a small-sized ox, and the radius from the right fore-leg of a moderate-sized dog, in the valley of the Water of Leith, at Kinleith, not far from the village of Currie. The gravel-bed was overlaid by beds of sand and clay and the ordinary vegetable mould, and was nearly 300 feet distant from the present bed of the stream. The bones of the ox consisted of part of the left hip-joint or acetabulum, with a portion of the pubic bone attached, lower portions of the tibia or leg-bone, and the cannon or metatarsal bone of the same side; also the condyles or lower part of the femur or thigh-bone of the right. From the small size of these bones, they may be supposed to belong to the *Bos longifrons*. They were presented by me to the Museum of the Society in 1863.

Edinburgh, North Loch.—James M'Bain, M.D., R.N., &c., informs me that he has in his possession portions of three specimens of the *Bos longifrons*, which were discovered in 1870 when excavating for the foundations of the Waverley Station of the North British Railway, in the valley extending from the north of the Castle Rock between the Old and New Towns of Edinburgh, the site formerly of the Nor' Loch. The bones consisted: one, of part of the frontal bone, with the left horn-core, outer curvature measuring 4½ inches, and its circumference at the base 5 inches; another specimen included the whole upper part of the frontal bone, with both horn-cores attached; the horn-cores each measured 4 inches along their outer curvature, and 4 inches in circumference round the base of the horns; it measured also 4 inches across the forehead, between the roots of the horn-cores. The last specimen was also part of the frontal bone, with the right horn-core attached; it measured along its outer curvature 4½ inches, and its circumference at the base 5 inches. The bones were found along with abundant masses of lacustrine shells,

[1] See Remarks on a Bronze Instrument found with bones of ox and dog in a bed of river gravel, &c., "Proc. Soc. Ant. Scot." vol. v. p. 84.

Planorbis, Lymneus, &c., the greater portion unbroken, thus showing the character of the formation, as the bottom of the old loch. The age of these remains is of course very uncertain. The bones were presented to Dr M'Bain by Alexander Christie, Esq., by whom they were discovered and preserved.

Inchkeith.—In the account of a kitchen midden of uncertain age, discovered on the island of Inchkeith, in the Firth of Forth, in 1872, by David Grieve, Esq., F.S.A. Scot., and published in the Proceedings of the Society, he describes various animal remains, including those of small-sized cattle. There were also found the remains of the grey seal, *Halichœrus grypus.*

Haddingtonshire.

Seacliff.—In April 1870, a paper was read before the Society by J. W. Laidlay, of Seacliff, Esq.,[1] giving details of an ancient structure built of dry stone walls, and a kitchen midden: discovered on an isolated rock, known as the "Ghegan," on the sea-shore near Seacliff. The lower part of the building is about 22 or 23 feet above high-water mark, and among the remains of ancient occupation some pins of different sizes, needles, and ornamental combs of bone, were found; a few fragments of coarse pottery, a quern, &c., and various animal remains; besides a few human bones,—"of oxen a great abundance, and consisting of several varieties, the *Bos longifrons* including a right metacarpal bone (named apparently by Prof. Owen), and others; sheep also, in very great abundance, and of a small size; goats, a few; horses, pretty numerous, of a small size; hogs, a few; deer, the red-deer, the roe; dogs, several, of a large size; rodents, the water vole, &c.; birds and fishes, a very few; besides the remains of rabbits, rats, &c., of which, as they might find their way naturally to the deposit, no account need be taken."—P. 374.

On mentioning the somewhat Celtic-like name of "Ghegan" to the Rev. Thomas M'Lauchlan, LL.D., F.S.A. Scot., our well-known Celtic scholar, he told me, it might be explained as Gaelic—"Geogan," the "little bay, or the little thing or rock at the bay," which seemed to be descriptive of the locality; the Saxon *goe,* which is synonymous with the Celtic *geo*

[1] Proc. Soc. Antiq. Scot. vol. viii. p. 372.

or *geotha*,—an inlet, is, however, also a possible root: or the old Icelandic *Gja;* but the *an* is a true Celtic termination.

Drem, Balgone.—Some bones of the *Bos longifrons*, found 15 feet under a peat moss at Balgone, were presented to the Museum of Science and Art, Edinburgh, by Sir G. Grant Suttie, Bart. These consist of the broken upper portion of a small skull with horn-cores, lower jaw, femur, &c. They measure,—

	In.	Lin.
Horn-cores:—		
Right, length along greater curvature,	3	4
Circumference of base,	3	9
Left, length nearly,	3	0
Circumference of base,	3	9
Lower jaw, portion of body of left side with two molar teeth, depth behind last molar,	2	9
Femur, greatest length,	9	9
Length between articular surfaces,	8	9
Breadth across lower articulation,	2	6
Sacrum, length inside,	8	4

LINLITHGOWSHIRE.

Kinneil.—A skull and part of the pelvis of a short-horned ox, found in a moss at Kinneil, were presented to the Museum of the Society by Dr Walter Adam in 1849. The skull is tolerably perfect, the anterior part of the superior maxillaries being broken away. It has two short horn-cores, and there is also a rounded broken aperture in the front of the forehead. It measures in,—

Length from the middle of occipital ridge to transverse nasal suture,	$8\frac{3}{4}$ inches.
Do. to upper part of orbits,	$7\frac{3}{4}$,,
Horn-cores, in length, right,	3 ,,
Do. do. left,	4 ,,
Do. circumference at base,	6 ,,
Orbits, length,	$2\frac{1}{2}$,,
Do. breadth,	$2\frac{3}{8}$,,
Length of alveolar sockets,	$4\frac{3}{4}$,,

The innominate bones of the pelvis measure 1 ft. 3 in. in greatest length; 1 ft. 4 in. greatest breadth above, and $9\frac{1}{2}$ inches across the front of pelvis at upper part of acetabula. These bones are of much interest, from the locality where they were found. In some notes which were published in vol. viii. of the Proceedings of the Society, describing the large Roman sculptured stone [1] got at Grange, near Borrowstounness, in the immediate neighbourhood of Kinneil, I called attention to the fact that Kinneil meant in Gaelic the "Head of the Wall," and it was in this neighbourhood, probably near where the sculptured stone was found, that the Roman wall between the Forth and Clyde terminated. The skull, therefore, was found in a locality anciently occupied by the Romans.

Lanarkshire.

Glasgow.—In a paper published in the "Transactions of the Geological Society of Glasgow," vol. ii. p. 152, 1867, "On the Occurrence of *Bos longifrons* and *Bos primigenius* in the Ancient Drift of the Clyde," read to the Society on 12th April 1866 by Mr James Bennie, of H.M. Geological Survey, to which my attention was called by Mr John Young of the Hunterian Museum, Glasgow. Mr Bennie states that "part of the forehead of a small ox, which Dr Scoular has recognised as of the *Bos longifrons*, one of the extinct cattle of Clydesdale," was found "in true river drift at Rutherglen loan, Gorbals." The horn, which I have had an opportunity of examining, measures $5\frac{1}{4}$ inches across the forehead between the roots of the horn-cores. The small horn-cores are each broken, the right measuring $4\frac{1}{2}$ inches in circumference at the root, and the left the same, and 2 inches in length to its fractured extremity. The excavation was for a sewer extending several hundred yards. It was seven or eight feet deep, and was clearly and unmistakeably thorough river sand and gravel, characterised throughout by the same kind of vegetable remains which mark the Clyde drift so emphatically elsewhere. The forehead of the ox had been dug out of a bed of fine grey sand, from a depth probably of about seven feet, and it had every appearance of having lain long in water before it had been silted up. Mr Bennie considered that this skull belonged probably to what he called the canoe

[1] Proc. Soc. Ant. Scot. vol. viii. p. 112, 1869.

period of the Clyde, more especially as there were two small oval holes nearly together, just behind the occipital ridge, which he considered had been made by the hand and tools of man. He found in the same bed a small perforated stone, 1 inch long, which he considered had also been manufactured by man.

Stirlingshire.

Blair-Drummond.—In the course of the extensive operations used many years ago for draining the peat-moss at Blair-Drummond, near Stirling, various relics of early antiquity were discovered; stone celts, hammers, arrow-heads, &c. The remains of various small short-horned cattle were also found; and the horny sheaths or horns of apparently three different specimens of these cattle were exhibited to the Society by G. Home Drummond, Esq.

The largest of these—a horn of the right side of the head—measures $11\frac{3}{4}$ inches in greatest length along its larger and outer curvature, and $6\frac{1}{4}$ inches in circumference about the middle of its length, or rather a little nearer the point, where the horn remains perfect. A label, apparently belonging to this horn, states that it was found about 1816, a few inches under the surface of the clay, below the moss in Kirklane, in John Ferguson's land, and is initialed H. H. D. by the late Henry Home Drummond, of Blair-Drummond, Esq.

The next, also a right horn, measures $10\frac{1}{4}$ inches in length along its outer curvature, and $5\frac{1}{2}$ inches in circumference at about half its length, where the horn begins to be more perfect. It is labelled as having been found near the bottom of the Chalonerston Moss, in May 1861. The smallest, a horn of the left side of the head, measures only $6\frac{3}{4}$ inches in length along its outer curvature, and $4\frac{1}{2}$ inches in circumference about the middle of the horn, where it is perfect. These horns are dark-coloured or black; they curve from the root gently outwards and rather upwards, then slightly downwards and forwards towards the tip, which again, as in the first horn, rises slightly upwards. The horn (No. 2), has the tip curved rather more inwards than the others, like that of the modern "short-horned" cattle. The horns are much split into layers near the roots, and all taper rather rapidly to a small and somewhat fine and sharp-pointed extremity.

KINCARDINESHIRE.

St Cyrus—Lower Warburton.—At a meeting of the Royal Physical Society of Edinburgh on the 28th March 1866, a communication was read from Dr J. C. Howden, Montrose, "On a Bone Cave at Lower Warburton, Kincardineshire," which is published in their Proceedings (Edinburgh, vol. iii.) Dr Howden states that the cave was discovered in 1847, in a range of trap cliffs on the farm of Lower Warburton, in the parish of St Cyrus. It is situated about half a mile from the estuary of the North Esk, and fifteen feet above high-water mark. A short account of it was published by the late Mr Alexander Bryson in the "Edinburgh New Philosophical Journal" for 1850. The late Mr William Beattie, Montrose, also read a notice of this cave before the British Association, at its meeting in Aberdeen in 1859. The entrance of the cave, which was about 12 feet wide by about 5 feet high, faces the south, and its cavity, consisting of two chambers, widened to about 20 feet broad, with a varying height of 20 or 30 feet. It was filled with a loamy soil, portions of stalagmite being found in it, and a great quantity of organic remains. These consisted of an extraordinary abundance of the shells of recent edible mollusca from the sea-shore, *Buccinum*, *Mytilus*, *Cardium*, *Patella*, &c, along with the bones of various animals *Cervus elaphus* and *capreolus*, *Bos* ——, *Sus*, *Erinaceus europæus*, *Felis catus*, *Canis familiaris*, *vulpes*, *Hypuduus* or Vole, *Mus*, &c, and bird bones of the *Sula bassana*, in considerable quantity, all these bones were chiefly broken into small fragments, the shafts being split open. A portion of a human parietal bone and radius were also found.

Some portions of coarse pottery ornamented outside with a small cord-like pattern, were also noticed, one of these vessels, charred inside, had been about 10 inches in diameter; another, not charred, had measured about 7 inches. Dr Howden has sent me drawings of some of the bones collected, and I find the remains of the ox had apparently belonged to the *Bos longifrons*, one of the horn-cores measuring about $6\frac{1}{2}$ inches in length along its outer curvature, and $5\frac{1}{4}$ inches in circumference at its base, and another about $5\frac{1}{2}$ inches in length, and $4\frac{3}{4}$ inches in circumference.

Dr Howden is inclined to consider the contents of this cave as corresponding to the kitchen-middens of the Danish antiquaries, and supposes

it had been occupied as a place of human habitation, but that there was no evidence of its probable age. Few caves have been as yet explored in Scotland; much interest is therefore attached to any such account, and it would have been of great importance had the whole contents of the cave been carefully examined. Captain Fitzmaurice Scott, the proprietor, on William Beattie's recommendation, commenced the exploration, but unfortunately part of the roof fell in, a mass of rock of many tons weight, and precluded further research. This is much to be regretted, and its interest would have been increased by the fact, that a race of wandering cave-dwellers or gipsies still exist along some parts of our rocky north-eastern coasts of Scotland.

Forfarshire.

Cupar-Angus.—Stewart T. M. Hood, Esq., in April 1863, presented to the Museum some bones and teeth of a small-sized ox, apparently the *Bos longifrons*, which were found in an underground building, or "Picts' House," along with portions of rusty iron, and two small pieces of red embossed Samian ware, suggesting the probability of its being of contemporaneous age with the Roman occupation of Britain.

Ross-shire.

Tain.—When some draining operations were going on in the *Morbhaich Mor*, or great grazing, a flat sandy tract on the south shore of the Dornoch Firth, near the town of Tain, various bones—the lower jaw of a dog, a tine of a rein-deer,[1] and some bones of a small ox—were found in a peat moss in 1866 by the Rev. J. M. Joass, and were all presented to the Museum of the Society. Of these, deeply dyed by the peat, one was the frontal portion of the skull, with the characteristic small horn-core of left side, measuring 4 inches in circumference at the base, the horn being broken towards the point; with other bones of the ancient small ox, the *Bos longifrons*.

Sutherlandshire.

Cill Trölla.—In the Broch of Cill Trölla,[2] examined by the Rev. J. M.

[1] See "On Remains of Reindeer found in Scotland," Proc., vol. viii. p. 186.

[2] Archælogia Scotica, vol. v.; Account of "The Brochs of Cill Trölla," &c.

Joass of Golspie, numerous early implements of stone and bone were found; and the remains of various animals,—red deer, rein-deer, horse, pig, whale, and cattle were found; among the remains of the cattle is the horn-core of a small ox, apparently the *Bos longifrons*. This horn-core measures about 4 inches in length.

Caithness.

Kettleburn.—A. Henry Rhind, of Sibster, Esq., presented to the Museum of the Society, April 1854, a collection of various archæological relics and osteological remains found in the ruins of a broch or so-called Pictish Tower opened by him at Kettleburn, near Wick. The bones were examined by Mr Queckett of London, and give an interesting glimpse of the early fauna of Caithness. Mr Queckett's notes were published in the "Archæological Journal," London, vol. x. p. 223. The bones include those of deer, roebuck, horse, ox, sheep of small size, goats, pigs, seal, whale, &c. Among those in the Museum is a portion of the skull of *Bos longifrons*, with horn-core of left side, 5 inches long and 6 inches in circumference at the base, and a portion of a lower jaw, Mr Rhind says,—"showing the existence of this extinct species of ox when these dwellings were inhabited."

Keiss.—Samuel Laing, Esq., M.P., presented to the Museum, in January 1867, a large collection of stone, bone, and bronze implements, along with portions of human skeletons and animal remains found at Keiss. They are fully described in the "Prehistoric Remains of Caithness," published by him, London, 1866. Numerous remains of the *Bos longifrons* were found. In a paper on the "Age of the Brochs and some other Prehistoric Remains of Orkney and Caithness," by Mr Laing, read at the meeting in January 1867, and published in vol. vii. of the Proceedings of the Society, he states at page 67, where he gives details of the fauna and food of the inhabitants of these Brochs, that he considers it was similar to that of the dwellers at Keiss. He mentions, besides the red deer, horse, pig, goat, or sheep, the dog, fox, whales, and birds, including the now apparently extinct *Alca impennis* or great auk, fish, &c., and—"the ox, always the short-horned species, apparently *Bos longifrons*."—P. 67. To which I have since added the rein-deer.

Thrumster Little.—Mr John Bremner, jun., in June 1870, presented to the Museum a horn-core, 3 inches long and 4¾ in circumference at the base, from the left side of the skull of the *Bos longifrons.* It was found, along with an antler of red deer partially cut through with a hatchet, and showing also marks of a saw; in a Broch at Thrumster Little.

Yarhouse.—In the Broch of Yarhouse some remains of animals were discovered by Mr Joseph Anderson, and were presented by him to the Museum. These include a portion of the frontal bone, with the left horn-core of the *Bos longifrons,* the point broken, and measuring 5 inches in circumference at the base of the horn; and also a horn of the reindeer.[1]

ORKNEY.

Mainland, Kirkwall.—In my second notice of the *Bos longifrons,* I have referred to the lower jaw of an ox, defined by Prof. Queckett of London as the *Bos longifrons,* being found by George Petrie, Esq., Cor. Mem. S.A.Scot., Kirkwall, in a "Picts' House" on Wideford Hill, near Kirkwall, in 1849. It was presented by Mr Petrie to the Museum in May 1853, and is a portion of the body of the right side of the lower jaw. Four molar teeth still remain in their sockets.

Mainland, Bay of Skaill, Skara.—The upper part of skull with right horn-core of a small ox was found among the animal remains at the underground building at Skara. The horn-core measured 7 inches in length, and 7 inches in circumference at its base. It seemed allied at least to the *Bos longifrons.* A humerus 10 inches long was also presented to the Museum.

(*North Ronaldshay, Burrian.*—Numerous stone and bone implements and the remains of various animals found in the ruins of the Broch of Burrian, North Ronaldshay, were recently presented to the Museum of the Society by Dr William Traill. Among these remains there are two of an ox resembling the *Bos longifrons;* one has part of the frontal bone, with the horn-core of the right side; it measures 4 inches in length,

[1] See "On Remains of Reindeer in Scotland," Proc. vol. viii. p. 186.

and $7\frac{1}{2}$ inches in circumference at the base. The other has a broken horn-core, 3 inches long, and is $8\frac{1}{2}$ inches in circumference at its base. Among the numerous bones of cattle two phalangeal bones were found, apparently of this same small ox, having cut on one of them two of the so-called symbols of the "Sculptured Stones of Scotland;" the other had apparently been spoiled in the execution of the pattern of another figure or symbol.)

Hebrides.

Island of Harris.—In February 1860 Dr James M'Bain, R.N., read a paper before the Royal Physical Society [1] here "On Various Osteological Remains found in a Pict's House or Ancient Underground Building at Nisibost in Harris," by Captain Thomas of H.M. surveying ship "Woodlark." The remains included bones of the dog, common seal, the red deer, a small-sized sheep, and horse, also of small size, and of the *Bos longifrons*, or small short-horned ox, a horn-core measuring $3\frac{1}{2}$ inches along its outer curvature, and $3\frac{3}{4}$ inches in circumference round its base; teeth, bones, &c. Captain Thomas, R.N., Cor. Mem. S.A. Scot., described the peculiar ancient structure in which these remains were found in an important memoir "On the Primitive Dwellings of the Outer Hebrides," published in the Proceedings of the Society, vol. vii. 1867, p. 153.[1]

The Age or Geological Range of the Small Short-Horned Ox, *Bos Longifrons*, in Britain, and especially in Scotland.

In England the remains of this ox has been found in alluvial beds and peat bogs. They are associated also with early traces of human existence, as well as in the tombs or barrows of the early inhabitants, as described by Dr John Thurnam, of Wiltshire; and especially with remains of the Roman occupation. In Ireland these small cattle have been found in the peat mosses in numerous instances, and in various localities, and also associated with the early traces of man's occupation in different districts of the country.

Professor Richard Owen, in his well-known "British Fossil Mammals,"

[1] Proc. Roy. Phys. Soc. Edin., vol. ii.

London, 1847, from which I have so often quoted, tells us, that among the various remains of this animal, the *Bos longifrons*, examined by him, there were some from the peat bogs, others from the sub-turbary marls of Ireland; and there were also other specimens which had been obtained along with the remains of various extinct mammalia, such as the *Elephas* and the *Rhinoceros*, from different fresh-water deposits of England. Professor Owen therefore concluded, as I have already stated in my first paper, that the geological age of this small short-horned ox apparently extended from the times of the early inhabitants of the country, backwards through the bogs and marls of the alluvium, to the caves, and the drifts, and fresh-water deposits of the Newer Pliocene Period.

In an interesting memoir "On the Prehistoric Mammalia of Great Britain," by W. S. Boyd Dawkins, M.A., &c., published in the "Transactions of the International Congress of Prehistoric Archæology at Norwich," London, 1868, Mr Dawkins states that he had examined carefully many of the localities where the fossil remains of various animals had been found; and he tells us that in the localities of Clacton and Walton in Essex, from which Professor Owen got sent to him the bones of the *Bos longifrons*, associated with those of the *Elephas* and the *Rhinoceros;* he found the beds containing these ancient fossil mammals, and over them other and newer alluvial beds, which contained the remains of more recent animals, as the goat, &c. Both these sets of beds were exposed to the wear and tear of the sea, and he therefore considers the association of the bones of the *Bos longifrons* and the older fossil mammalia, the elephants, &c., was due merely to the accidental aggregation of them on the shingle of the sea-shore. Other recorded instances of the association of the *Bos longifrons* with the older fossil mammals may, he thinks, be explained by a similar accidental aggregation of the bones of animals belonging really to very different geological periods. Or, in other cases, from the bones of the *Bos longifrons* being mistaken for those of the *Bison minor* of Owen, which he believes to have been associated with the older fossil extinct mammalia. Mr Dawkins comes thus to the conclusion that this short-horned ox is not older geologically than what he terms the "Prehistoric Period," when it makes its appearance along with the goat and the dog. This period he thinks it necessary to separate from

the Post-Glacial Period, and defines as the interval between the British Post-Glacial Period and the dawn of history.

The various instances of the existence of this short-horned ox in Scotland, which I have been able to collect, add little to its geological history; my notes have, however, been principally taken from the results of archæological inquiries, and they show the relation of this small ox to man, rather than its general history in the country. In so far as my notes enable me to go, I find this small-sized ox associated apparently with our early races of men, probably as a domesticated animal, as shown by its remains in his kitchen middens and the ruins of his ancient dwellings, his underground and "Picts' Houses," and his "Brochs," &c., as well as with the traces of the Roman occupation of the south of Scotland. Older than these, it may be, I find its remains, as far as I have been able to discover, in the caves, the peat bogs, the lacustrine formations and the river drifts and gravels throughout the country. From the entire absence, however, of the remains of the larger extinct mammalia, as the elephant and the rhinoceros, &c., from at least our river drifts and gravels, it is not easy to contrast the age of our Scottish gravel-beds with those of England. The very few remains of the elephant as yet discovered in Scotland have been found apparently only in the boulder clay, intercalated with it or underneath it. At the time these animals lived in England, Scotland is believed, by some geologists, to have been either in a great measure submerged, covered with water, or to have had its lands deeply overlaid with an extensive covering of snow and ice.

Strange to say, a horn of a rhinoceros was "found in one of the marl-pits at the Loch of Forfar." From the interest attached to this old discovery, which has apparently never had given to it the importance it deserved, I may be excused a slight digression. It was exhibited by Professor Jameson to the Wernerian Society on the 25th January 1823, and was presented to the Museum of the University. The donation of a "Rhinoceros horn, found in the Loch of Forfar, by Mr Stephens," is included in the MS. "Catalogue of Donations to the College Museum in 1822–23." The next donation is that of an "*Anas fuligula*," also by Mr Stephens, and we find by a subsequent donation of another Scottish bird the "*Anas tadorna*," recorded as being made by "Mr Stephens of Dundee;" that the residence of the donor of the rhinoceros horn was at Dundee, the largest and most im-

portant town of the county of Forfar. In the MS. Minute-book of the Wernerian Society for 25th January 1823, it is recorded of Professor Jameson—"He then exhibited the horn of a rhinoceros, found in one of the marl-pits of the Loch of Forfar, and stated reasons for believing it to have belonged to one of the Rhinoceri which formerly inhabited this island." Professor John Fleming, D.D., refers to this same horn in his "Remarks illustrative of the Influence of Society on the Distribution of British Animals," published in the "Edinburgh Philosophical Journal," vol. xi. 1824, and states that—"A specimen of the horn of the fossil rhinoceros, found in one of the marl-pits at the Loch of Forfar (Wern. Mem. vol. iv. p. 582) exists at present in the Edinburgh Museum, and we have been informed by Professor Jameson that two other examples have occurred in Blair-Drummond Moss on the banks of the Forth. It is to be hoped that the skulls will yet be procured."—(P. 297.) I cannot find anything to show that Professor Jameson[1] ever personally examined these last supposed horns of the rhinoceros found in Blair-Drummond Moss, and as several horns of cattle were found, some of which I have referred to and described in my Notes, it is perhaps not impossible these macerated and partially split horny sheaths—the horns of the ox—may have been mistaken by the describer for those of the rhinoceros. I cannot, however, think the same objection can be justly made to the horn, so carefully examined and preserved, which was found at the Loch of Forfar. The only other instances of the discovery of the horns of an extinct rhinoceros known to me are the two referred to by Professor Owen ("British Fossil Mammals," p. 353), found with their frozen carcases in Siberia—one mentioned by Pallas in his "Voyages dans L'Asie Septentrionale," 1793—the other now preserved in the Museum of Natural History at Moscow. The latter, probably the first or nasal horn of the *R. tichorinus* of Cuvier, measures 3 feet in length. From the small size of the Scottish specimen, it may be supposed to have been possibly the second or smaller horn of a young woolly rhinoceros, *R. tichorinus*, Cuv., if it did not belong to a smaller and more slender species altogether. I have been trying to trace out this specimen (a note of which I may at some other time lay before the Society), and am inclined to believe that it still exists as a small-pointed and much weathered horn in the Museum of Science

[1] See Mem. Wern. Soc. vol. v. p. 573 (5th Feb. 1825.)

and Art. It measures about 7 inches in height along the front slope of the horn, and about $5\frac{1}{4}$ inches in the longest diameter of its oval base.

Then when you try to understand the arrangement of other river drifts and gravels, as, for example, the celebrated beds at Amiens, &c., in France, you find one set of geologists mapping them all out, into gravel of the recent period with remains of recent animals and its so-called "neolithic weapons," covered with loam of the same age; then lower level valley-gravel, with the remains of extinct mammalia, its "palæolithic weapons," and its covering loam; next, higher level valley-gravel, with contents similar to the last, and also with its loam of the same age; and lastly, upland gravel, of various kinds and periods. These different river gravels, with their recent and extinct mammalia and their neolithic and palæolithic weapons, are also found in England. Another and later observer, however, goes over to make a careful examination of these same river gravels in France. I refer to A. Tylor, Esq., F.L.S., F.G.S., who has published a careful and elaborate memoir "On the Amiens Gravel" in the Journal of the Geological Society of London, vol. xxiv. 1868; and one of the conclusions he has arrived at is—"That the whole of the Amiens valley gravel is of one formation, of similar mineral character, contains nearly similar organic remains, and belongs to a date not much antecedent to the historical period." So that I fear the whole subject of the age and arrangement of these river gravels would seem still to be an open and undecided question, and I am by no means astonished at this conclusion; when I remember the astounding changes caused by a few days rain, flooding the Highland valleys of the Spey, the Findhorn, and other neighbouring streams, so graphically described by Sir Thomas Dick Lauder, Bart., in his "Account of the Great Floods of August 1829, in the Province of Moray, and adjoining districts," Edinburgh 1830; new editions of which have been quite recently published. As yet, however, I have not been able to collect any data which appear to show the presence of this small-sized ox in any of the earlier geologic formations of Scotland.

The Roman occupation of Britain began in the first century of the Christian era, and it was in the beginning of the fifth that a Roman legion last visited Scotland, attempting to restore with the sword their dominion over the south of Scotland. It is to the earlier years of Roman

rule that I have been inclined to date the principal occupation of their station of Trimontium, near Newstead in Roxburghshire, at the base of the triple Eildon.[1] Then as to the age of the circular stone towers or brochs of the north of Scotland, with all their numerous rude bone and stone implements, &c., Mr Joseph Anderson has shown, and I think with great probability, that their existence may be dated from about the fifth or sixth down even to the eighth or ninth centuries.[2] The presence of the remains of this small short-horned ox in many of the sites referred to, in different parts of the country, thus brings its existence apparently quite down to historic times, when it becomes lost at last among the varying groups and breeds of our ordinary domestic cattle.

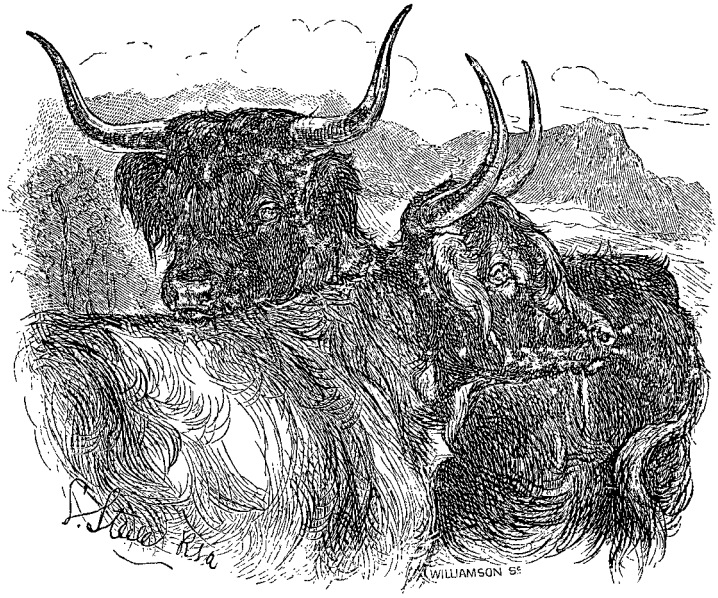
Mr Youatt, from whose valuable work "On Cattle" I have already quoted, tells us,—"The slightest observation will convince us that the cattle of Devonshire, Sussex, Wales, and Scotland are all essentially the same." The original type in these various localities was apparently a small, active, somewhat short-horned animal, very different indeed from the fine, soft-skinned, carefully bred kind of cattle, now known by the designation of a "short-horn," but probably a rather small-sized, rough, shaggy-haired, hardy animal, still represented, it may be, in some of these characters by its probable descendants, the Welsh and Highland, and probably also the Orkney and Shetland cattle; as well as the ancient white cattle preserved at Hamilton Palace or Cadzow Park, and in the park of Chillingham Castle. This original type, however, has been since much changed, and adapted by careful selection and breeding, to the taste and fancied standard of excellence of each particular district of the country.

I am indebted to our treasurer, David Douglas, Esq., F.S.A. Scot., for the accompanying sketch of our improved kyloe or Highland cattle by the talented artist, Gourlay Steele, R.S.A. It is taken from the very spirited and amusing "Sketches of Highland Character," one of the series

[1] Roman Antiquities found at Newstead, Roxburghshire. Proc. Soc. Antiq. Scot., vol. i. p. 28, 1855; and Archæologia Scotica, vol. iv. p. 422.

[2] Notice of the Broch of Yarhouse, &c., with remarks on the Period of the Brochs, &c., Proc., vol. ix. p. 292, 1871; and Archæol. Scot., vol. v.

of "Odds and Ends," lately issued by Messrs Edmonston and Douglas, publishers, Edinburgh.



DISTRIBUTION OR RANGE OF THE SMALL SHORT-HORNED OX, *Bos Longifrons*, IN BRITAIN, AND ESPECIALLY IN SCOTLAND.

Professor Nilsson tells us of the *Bos longifrons* that—

"Their remains have been found in turf bogs, and in the south of Scania it lived contemporaneously with the *Rein-deer* and *Bos primigenius*. With us, and as far as we know, over all Europe, they were, as wild, exterminated before the so-called Historic period."

In the list of the animal remains from "The Swiss Lake Dwellings," given in Dr Keller's work, translated by Mr J. E. Lee, Professor Ruti-

meyer states that this small ox, to which he refers under its synonyme of *Bos brachyceros*, occurs at Robenhausen, one of the earlier sites with its bone and stone implements; and indeed everywhere. He refers also to the *Bos frontosus*, Nilsson (which Professor Owen considers, as I have mentioned, to be merely a variety of the same species), as occurring at Bienne. Professor Rutimeyer, however, also adds to his list two or three additional named species, or rather, perhaps, domesticated varieties of the *Bos taurus*, the *Bos taurus trochoceros*, and *Bos taurus domesticus;* as well as the *Bos taurus primigenius*, referred by him to the large-sized cattle which I shall afterwards describe.

In England and Ireland the osseous remains of the small-sized ox, the *Bos longifrons*, have been found in many places over the country.

In Scotland, as I have attempted to show, this small-sized short-horned ox at a comparatively early period existed over the whole length and breadth of the land, from the south to the extreme north of the country, and even to the Orkney Islands beyond, as well as apparently to the Hebrides on the western coasts of Scotland.

II. THE GREAT FOSSIL LONG-HORNED OX, THE URUS, *BOS PRIMIGENIUS*, Bojanus and Owen.

As in the description of the small short-horned ox, I shall first quote my former paper, describing the skulls of the great fossil ox in the Museum of the Society, and shall supplement it with additional examples found in different parts of Scotland; adding also some remarks on their Geological age and Distribution over the country.

(1.) Notes on the Crania of the Urus (*Bos primigenius*) in the Museum of the Society of Antiquaries of Scotland. By John Alexander Smith, M.D.[1]

Some years ago, when gathering up various details in reference to the ancient small short-horned cattle of this country, my attention was

[1] Read before the Royal Physical Society, 27th April 1859, and published in their Proceedings, vol. ii. p. 111.)

also directed to the large cattle (*Bos primigenius*), and to the specimens of crania in the Museum of the Society of Antiquaries. I took various measurements of these crania, and searched the early records of the Society for such information in regard to the places where they were found, and any other details that might be of interest; and as Mr Turner has favoured us this session with some details of the specimens of this great ox in the Anatomical Museum of the University, I have thought it might interest the members if I produced my old notes on the subject.

There are three specimens of these crania of the *Bos primigenius* in the Museum of the Society; they are included in the list of the "Fossil Skulls," &c., in the printed catalogue of the Museum; and the following table gives some of their measurements:—

	1.	2.	3.
	Ft. In.	Ft. In.	Ft. In.
Length of skull from supra-occipital ridge to front of intermaxillary bones,	Intermaxillary bone awanting.	...	2 4
Length from do. to upper part of nasal bones,	1 $1\frac{1}{2}$	1 1	1 $2\frac{1}{2}$
Length from middle of supra-occipital ridge to upper part of orbit,	1 1	1 0	1 0
Length of orbit,	0 3	0 3	0 3
Breadth of do.	0 3	0 $2\frac{3}{4}$	0 3
Breadth of skull between roots of horn-cores,	0 10	0 10	0 $10\frac{1}{2}$
Breadth across middle of orbits,	0 $11\frac{1}{2}$	0 11	0 11
Horn-cores—circumference of at base,	1 $2\frac{1}{2}$	1 $3\frac{1}{2}$	1 $0\frac{1}{2}$
Length, following outer curvature,	2 $4\frac{1}{2}$	2 5	1 $10\frac{1}{2}$
span of horn-cores from tip to tip,	2 $7\frac{1}{2}$	2 $10\frac{1}{2}$	2 $2\frac{1}{2}$
across greatest width of horn-cores,	3 $1\frac{1}{2}$	3 2	2 7
Length of alveolar sockets for teeth,	...	0 7	0 6
Breadth across occipital condyles,	...	0 6	0 5

The cranium No. 1 was the one first presented to the Museum of the Society, by the Rev. Thomas Robertson, minister of Selkirk, in 1781. The donation was made through a Mr Cairncross, and the following letter accompanying it is preserved in the library of the Society:—

To Mr George Cairncross, Writer, Parliament Close, Edinburgh, (with an ox's skull and flints).[1]

"SELKIRK, *July 14th*, 1781.

"DEAR SIR,—Among other curiosities dug out of a marle moss at Whitmuirhall in this parish, the skull and flints of an ox which I have sent you attracted my attention. You, I know, are fond of anything that tends to throw light upon the ancient state of this country, and therefore I used the freedom to transmit this, not merely on account of its uncommon size, but as a proof of the large breed of cattle with which this country abounded in the last century. I found five skulls, evidently larger, but not so entire. I found also several small axes, resembling those used by coppersmiths, but did not think it worth while to trouble you with them. If anything deserving the attention of your Society occurs in this part of the country, I shall assuredly transmit it to you. Mrs Robertson joins me in best compliments to Mrs Cairncross and the family—with, dear Sir, your humble servant, THOMAS ROBERTSON."—*First Letter-book of Soc. Ant. Scot.*, p. 628.

The skull (consisting of the upper portion to the transverse nasal suture, with both of the large horn-cores complete) was presented to the Society at its meeting on the 17th July 1781; and the following reference to it is recorded in the Minute-book, vol. i. p. 72:—

"Mr George Cairncross presented, from the Rev. Thomas Robertson of Selkirk, the bones of the head and flints of the horns of a large animal dug out of a marle-pit near Selkirk, at a place called Whitmuirhall. The circumference of each flint at the base is 14½ inches; the length of that on the right 27 inches, of the other 28 inches; the distance between the sockets of the eyes, 11½ inches; the breadth of the front, which is quite flat, from the sides immediately over the sockets of the eyes, 12½ inches; the depth from the top of the front to the top of the sockets of the eyes, 11 inches; and from the top of the front to the upper part of the insertion of the cartilage of the nose, 13 inches. This appears to be the animal described by Julius Cæsar in his 'Commentaries,' book vi. c. 5, by the name of *Urus*."

[1] *Flint* of a horn,—Scots for Horn-core.

The Secretary, Mr James Cumming, in a letter dated 25th July, informs the Rev. Mr Robertson that the skull was presented to the Society, and "in the opinion of some able naturalists among us, it is believed to belong to that species of animal described by Julius Cæsar in his 'Commentaries,' lib. vi. c. 5, by the name of *Urus*."

The cranium No. 2 is tolerably entire (wanting only the nasal bones and the intermaxillaries; it measures now in total length, from the middle of occiptal ridge to the extremity of the superior maxillaries in front, $23\frac{1}{2}$ inches, and the molar teeth referred to in the description seem to have dropt out). Like all the others, the lower jaw is wanting. It was found in a moss in the county of Galloway, and was presented to the Museum of the Society by the Rev. David M'Robert, in the year 1782, and is referred to in the Minute-book, p. 205, July 12, 1782, as follows:—

"There was presented, from the Rev. David M'Robert, the skeleton of the head and flints of the horns of a large animal dug out of a moss in the county of Galloway, similar in species to the one described in page 72, paragr. ult., and nearly of the same dimensions; the whole length of the front measuring 2 feet 2 inches; two of the *dentes molares* remaining in the upper jaw, each having one deep furrow in the middle, and measuring on the under surface $1\frac{1}{4}$ inch the one way, and $\frac{7}{8}$ of an inch the other." No letter relating to this skull seems to have been preserved, as, unfortunately, a gap occurs in the letter-books at this period.

From the same reason we learn nothing of the last specimen presented, No. 3 (which is a nearly perfect skull, the nasal bones only being wanting), except what is stated in the Minute-book, July 9, 1782, p. 220:—

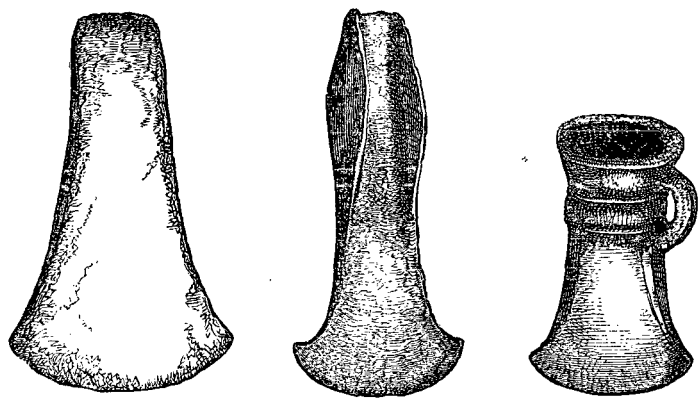
"There was presented from Thomas Scott of Hapsburn, Esq., the skeleton of the head and flints of the horns of a large animal similar in species to the one described in page 72, par. ult., and in page 205, paragr. 4, and nearly of the same dimensions, but more entire than either; the whole length of the front measuring 2 feet 4 inches, four of the *dentes molares* remaining in each side of the upper jaw, of the same size and shape with those in the head described in page 205."

As far as I am aware, these are the earliest instances on record of this large-sized ox being observed in Scotland, and it is interesting to find the conclusions come to in regard to them by the naturalists of this generation forestalled by a small body of quiet students of the Antiquities and Natural History of Scotland, meeting in Edinburgh so early as 1781; identifying these large cattle as being the same as the URUS, the gigantic ox described as occurring on the continent of Europe, by Julius Cæsar, in his "De Bello Gallico."

I need scarcely refer to the mistake made by the minister of Selkirk in his letter accompanying the first donation, that they were the remains of cattle of what he calls the "last century." The general opinion has been that they were extirpated in Britain before the invasion of the Romans, as historians are altogether silent on the subject of their existence. They had, however, apparently abounded, at least in Scotland, probably at a somewhat more early period, which seems to be shown by another part of Mr Robertson's letter, where he refers to various small brass axes being found along with the numerous crania of these large cattle. Unfortunately, he considered these axes as of very little consequence, from some supposed similarity to the tools of coppersmiths, though what work coppersmiths could have had to do in the wilds of Selkirkshire, so as to have left their axes lying about in such numbers, it is not very easy to understand. He apparently mistook the nature of these weapons, which were in all likelihood the ordinary bronze axe-heads or celts, now so well known as having been the weapons and tools of the early races who inhabited the British Isles, and which have been found over the whole country. (I exhibit various specimens of these bronze celts, palstaves, and socketed celts, which, I doubt not, correspond to the coppersmith's axes of the letter referred to. The accompanying woodcut shows various types of these axes.)

It has been stated, that bones of the *Bos primigenius* have been found indented with the primitive stone javelin of the aborigines of the north of Europe; here we apparently have them in close relation to the bronze weapons of a possibly still later age, showing that these animals roamed in our forests and marshes, and were hunted by the inhabitants of these early times in at least our northern kingdom of Scotland. Professor Owen says, "From the very recent character of the osseous substances in

the remains of these cattle, it may be concluded that the *Bos primigenius* maintained its ground longest in Scotland before its final extinction." And Professor Nilsson of Lund believes that the *Bos primigenius* was found in a wild or half-wild state in the forests of central Europe down even to the beginning or middle of the sixteenth century. (See papers on "The Extinct and Existing Animals of Scandinavia," in "Annals and Magazine of Natural History," 1849.)



Various Types of Bronze Axe-heads.

I have added to this paper some notes and measurements of the Urus from Professor Nilsson's communication "On the Extinct and Existing Bovine Animals of Scandinavia,"[1] already referred to.

Professor Nilsson designates this large ox:—

Bos urus, Antiquorum, *Bos primigenius*, Recentiorum.

"The forehead flat, the edge of the neck straight, the horns very large and long, near the roots directed outward and somewhat backward; in the middle they are bent forward, and towards the points turned a little upward."

[1] Annals and Mag. Nat. Hist., vol. iv. London, 1849, p. 256.

In a foot-note it is added :—

"Precisely such a direction have the horns of our tame oxen, quite contrary to the assertion of Bojanus and many others, who, in the unlike direction of the horns, choose to find a specific difference between the *Urus* and *Taurus*."

"*Description.*—This colossal species of ox, to judge from the skeleton, resembles almost the tame ox in form and the proportions of its body; but in its bulk it is far larger. To judge from the magnitude of its horn-cores, it had much larger horns, even larger than the long-horned breed of cattle found in the Campania of Rome. According to all the accounts, the colour of this ox was black; it had white horns, with long black points; the hide was covered with hair, like the tame ox, but it was shorter and smooth, with the exception of the forehead, where it was long and curly."

Professor Nilsson quotes Cæsar's reference to the long-horned *Urus* or *Bubalus*, which Pliny tells us were synonymous, and distinguishes it from the Bison with long hair on the back, neck, or under the chin (Hist. Nat. viii. 5). Both of these animals, he says, "were carried to Rome, and viewed by the people in the circus." Nilsson also considers that an engraving of the *Bos urus*, given in the fourth book, p. 416, of Griffith's admirable "Animal Kingdom" (an English elaboration of Cuvier's "Regne Animal"), copied from an old painting found at Augsburg, supposed to have been executed in the beginning of the sixteenth century, and marked *Thur* in gold letters, is really a representation of this *Bos primigenius*. From this he probably takes part of his description.

I have quoted Professor Owen's concise description of the skull in the subsequent note of the urus found at Athole, Perthshire.

Several skeletons and various skulls are preserved in the Museum of the University of Lund, and Professor Nilsson gives details of the sizes of the different bones, which may be useful for reference with those found in our own country. The most perfect skeleton from which these measurements are taken was, he thinks, a young specimen, and larger detached bones and skulls have been found. Larger specimens have also been got in Britain. The urus, he says, has thirteen pairs of ribs and six lumbar vertebræ, in this way agreeing with the tame ox, and differing from the bison (*Bison priscus*, Owen), (*Bos Bison*, Linn.), which has fourteen pairs of ribs, and not more than five lumbar vertebræ. The rein-deer agrees in this respect with the bison, and the red deer with

the urus. The aurochs (or bison) is still preserved alive by the Emperor of Russia, in the forest of Bialoweska, Lithuania, now part of the Russian dominions.

General Dimensions of Urus.

"The whole length of the skeleton from the nape to the end of the rump bones (*ossa ischii*), ... 9 feet.

Length of the head from the occipital ridge to the anterior border of the intermaxillary bones, ... 2 feet 4 inches 4 lines.

The whole length of the animal is thus about . 11 feet 6 inches to 12 feet.

The height over the mane about . . 6 feet to 6 feet 6 inches.

Dimensions of Skull.

	Ft.	In.	Lines.
The length from the horn-cores to the anterior edge of intermaxillary bones, ...	2	1	5
The length from the orbit's lower edge to ditto, . .	1	3	4
„ horn-base to orbits, . . .	0	6	4
The length of horn-cores, concave side, . . .	1	6	6
„ horn-cores, convex side, . .	2	2	0
Under jaw, from the angle to the point, . . .	1	8	0
The molar series in the upper jaw, ...	0	7	4
Breadth of the forehead between the upper part of the crown of the horn, ...	0	9	1
Breadth between the lower parts of ditto, . . .	1	0	2
„ the orbit's upper part, . . .	1	0	2
„ the orbit's lower part, . . .	0	11	4
„ the intermaxillary bones, upper parts, .	0	3	2
„ the apertures of the ear in a line, . .	1	0	4
Distance between the points of the horn-cores, . .	2	4	0
The circumference of the crown of the horn, . .	1	2	4

Of Body.

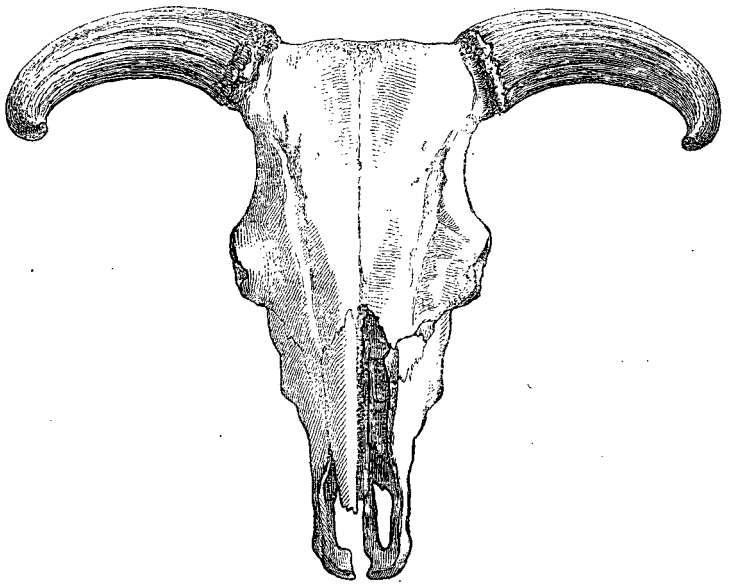
The length of the spinal column to the last dorsal vertebra,	7	7	4
„ further in a right line to the upper *tuber ischii*,	0	9	0
„ of the neck from atlas to and with the last neck vertebra, ...	1	11	4
Greatest length of one of the middle ribs without the cartilage,	2	5	0
Breadth of ditto, ...	2	0	5–6

Of Extremities.

	Ft.	In.	Lines.
The length of shoulder-blade,	1	8	0
Breadth of its base,	1	0	0
The length of os humeri between the articulations,	1	2	0
„ radius,	1	2	4
„ ulna, with olecranon,	1	7	6
„ olecranon from the articulation,	0	7	0
„ metacarpus between the articulations,	0	10	0
„ pelvis between the tub. ilii and ischii,	2	1	4
The breadth in a line between both tub. ilii,	1	11	0
The length of the os femoris between the articulations,	1	7	0
„ tibia,	1	5	6
„ metatarsus,	0	11	0

For comparison with the plate of the skulls of the short-horned ox, I thought it would be interesting to give figures also of this large long-horned ox, the *Urus*. Unfortunately, however, none of the skulls in the Museum of the Society were sufficiently perfect for this purpose, and by the permission of Professor Duns, D.D., I have taken a sketch of the nearly perfect skull of this large variety of *Bos taurus*, as the late Professor John Fleming, D.D., described it in his "History of British Animals," Edinburgh, 1828, 8vo. This skull is now preserved in the Museum of the New College here; it was found in Fifeshire, and an account of it is given in the subsequent Notes. I give a front view of the skull (taken from above, and therefore the horns appear perhaps rather low). In the skulls of the urus I have examined, the extremities of the horns are turned forwards and rather upwards; few have them turned so much outwards as represented by Professor Owen in his figure of the large skull from Atholl; probably due to its greater age and size. A side view drawn to the same scale. Also figures of the second and third maxillary molar teeth, the two last molars of the left side of the upper jaw. The teeth are figured of the natural size, and show at once their great size, as compared with those of the small short-horned ox (previously figured), and the close, indeed almost perfect correspondence of their structure, like the former, with those of our ordinary domestic cattle.

Cæsar, in his "Commentaries," states that in the Hercynian forest, which then covered a great part of Europe, there lived an animal which without doubt was the Rein-deer, another great animal called an Elk, and a third kind the Urus. As this is the earliest description of this

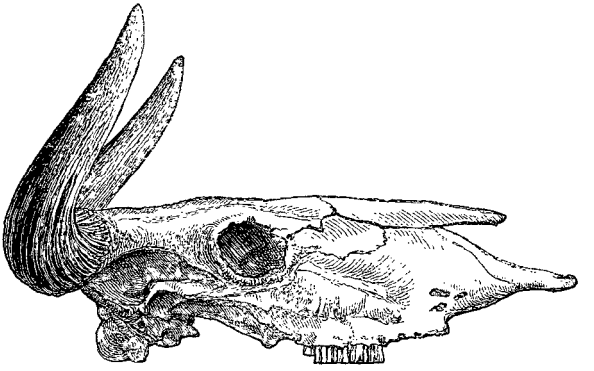


Skull of *Bos primigenius* found in Fifeshire (27¾ inches in length).

great ox, although it has been already referred to, still, from the interest attached to it, I quote here the whole passage:—

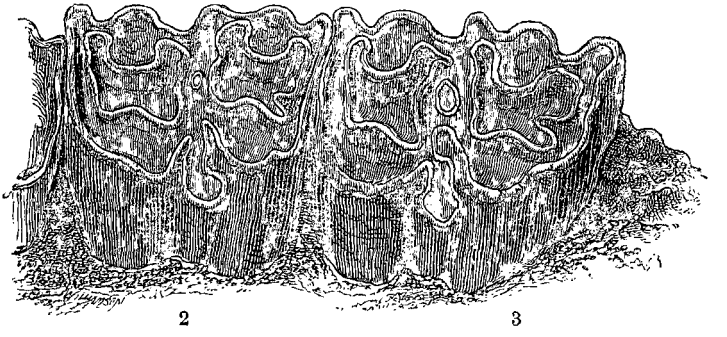
Lib. vi. cap. xxvii.—"Tertium est genus eorum qui Vri appellantur. Ii sunt magnitudine paullo infra elephantos, specie et colore et figura tauri. Magna vis est eorum, et magna velocitas; neque homini, neque feræ, quam conspexerint, parcunt; hos studiose foveis captos interficiunt. Hoc se labore durant adolescentes, atque hoc genere venationis exercent; et qui

plurimos ex his interfecerunt, relatis in publicum cornibus, quæ sint testimonio, magnam ferunt laudem. Sed assuescere ad homines, et man-



Side view of skull of *Bos primigenius*, found in Fifeshire.

suefieri ne parvuli quidem excepti possunt. Amplitudo cornuum, et figura et species multum a nostrorum boum cornibus differt. Hæc



2 3

Two last maxillary molar teeth (second and third) of left side of Urus, *Bos primigenius* (natural size).

studiose conquisita ab labris argento circumcludunt, atque in amplissimis epulis pro poculis utuntur."—*De Bello Gallico.* (Edit. Paris, 1678.)

(2.) NOTES OF THE OCCURRENCE OF REMAINS OF THE ANCIENT LONG-HORNED OX, THE URUS, *Bos primigenius*, IN DIFFERENT DISTRICTS OF SCOTLAND.

EDINBURGH.

Edinburgh University Anatomical Museum.—In this Museum there are preserved portions of three skulls of the *Bos primigenius;* nothing is apparently recorded of their history, but from their general appearance and age, and their resemblance to those in the Museum of the Royal College of Surgeons and the Society of Antiquaries, it may be assumed they were found in marl-pits, and probably, like some of the others, in Selkirkshire, where they appear to have been found in considerable numbers at the close of the last century.

I give the following table of their measurements. One skull, No. I., is nearly perfect, with the exception of the front part of upper jaw (the intermaxillary bone) of one side. The lower jaw is unfortunately wanting in all the specimens. The skull No. II. consists of the upper part of skull to transverse nasal suture, with the horn-cores remaining. Skull No. III. has only a small part of the upper part of skull, with the horn-core of the left side attached :—

	I.	II.	III.
	Ft. In.	Ft. In.	Ft. In.
Total length from centre of occipital crest to front of intermaxillary bones,	2 $2\frac{1}{2}$	...	...
Length from centre of occipital crest to nasal suture,	0 $12\frac{3}{4}$	0 $12\frac{1}{2}$	...
Length from do. to back of orbits,	0 12	0 12	...
Breadth of forehead between base of horn-cores,	0 $9\frac{1}{2}$	0 9	...
Breadth between orbits,	1 0	...	...
Horn-cores :—			
Length along outer curvature,	2 3	2 3	2 $3\frac{1}{2}$
Circumference at base,	1 2	1 3	1 $2\frac{1}{4}$
Span between tips,	2 6	...	...
Orbits :—			
Length and breadth nearly equal,	0 $2\frac{3}{4}$	0 $2\frac{3}{4}$	...
Breadth across back of occipital condyles,	0 6	...	...
Length of maxillary molar series of alveolar sockets, (Last two molars remaining on left side in No. 1.)	0 $6\frac{1}{2}$	...	...

Professor William Turner described these skulls, and others, in a paper "On some Fossil Bovine Remains found in Britain,"[1] which was read before the Royal Physical Society in February 1859, and published in the Proceedings of the Society for 1859. He considers from the deep brown colour of skull No. III., that it had been found in peat, and that several bones of the skeleton of a similar colour probably belong to this same animal. He compared these bones with corresponding bones of a recent ox, and found that they exactly corresponded, only that the ridges, spines, &c., of the fossil bones were on a much larger scale, on account of their larger size. Mr Turner gives the following measurements:—

	Fossil.	Existing.
	Inches.	Inches.
Right Femur—		
Extreme length,	20¾	17
Circumference of middle of shaft,	7¼	5¾
Diameter across condyles, posteriorly,	6	6
Left Scapula—		
Extreme length,	19	15¼
„ breadth,	10¼	9¼
Length of spine,	15	13
Largest diameter of glenoid fossa,	3¼	2¾
Right Humerus—		
Extreme length,	17½	13
Circumference of middle of shaft,	9⅓	7
Breadth across condyles,	4¼	3½
Greatest diameter of articular surface of head,	5	4
Rib, probably 7th on right side—		
Length,	28	...
Greatest breadth,	2½	...
Vertebra, 2*d Cervical*, or *Axis*—		
Extreme height,	8	...
Extreme antero-posterior diameter,	7	..
Circumference of anterior articular surface,	14	...

From the comparison of the bones with the recent ox, Mr Turner estimates that the skeleton of this extinct animal must have stood nearly 6 feet in height at the shoulder. Professor Turner has kindly allowed

[1] See Proc. Roy. Phys. Soc., vol. ii. p. 70, and Edin. New Philosophical Journal, July 1859.

me to examine the skulls in the Museum, and make these extracts from his paper.

Edinburgh Veterinary College.—In the Museum of this College, two skulls of the *Bos primigenius* are preserved; unfortunately, nothing is recorded of their history. One is nearly perfect, the tip of left horn-core being broken. The other consists of upper part of skull, with horn-cores. The following are some of their measurements:—

	No. I.	No. II.
	Ft. In.	Ft. In.
Length from centre of occipital ridge to front of inter-maxillaries (total length),	2 3	...
Do. to insertion of nasal bones,	0 $11\frac{3}{4}$	...
Do. to upper edge of orbits,	0 $11\frac{6}{10}$	0 11
Orbits:—		
Length,	0 $2\frac{9}{10}$	...
Breadth,	0 $2\frac{8}{10}$	...
Horn-Cores:—		
Length along outer curvature,	2 1	2 3
Breadth across concavity of both horn-cores,	...	2 5
Breadth from tip to tip of horn-cores,	...	2 2
Circumference at base,	1 2	1 $2\frac{1}{2}$
Breadth of forehead between roots of horn-cores,	0 9	0 $9\frac{1}{2}$
Length of alveolar sockets,	0 6	...
Depth of skull behind, from centre of occipital ridge to floor at occipital foramen,	0 8	0 9
Breadth of occipital condyles behind,	0 $5\frac{7}{10}$	0 $5\frac{8}{10}$

From the general appearance of these skulls, they may be assumed to have been found in marl-pits.

I am indebted to Dr James Murie for his kind assistance in their examination.

Selkirkshire.

Royal College of Surgeons' Museum, Edinburgh.—There is a fine specimen of a nearly perfect skull of the *Bos primigenius* preserved in the Museum of the Royal College of Surgeons, Edinburgh. It has much of the general aspect of the crania preserved in the Museum of the Society

of Antiquaries; and as its label informs us, it is also from Selkirkshire, and was probably obtained from that county about the same period as the others, or a little later.

The skull is nearly perfect, except in the front of the maxillaries and intermaxillaries, which are slightly broken. There are three molars on each side, still in the alveolar sockets, but, like the rest of the skulls, the lower jaw has not been preserved. I annex some of its measurements for comparison with the other specimens: —

	Feet.	Inches.
Length from middle of occipital ridge to nasal suture,	1	1¼
Do. to back part of orbits,	1	0
Breadth of forehead between base of horn-cores,	0	9
Breadth of back part of occipital condyles,	0	5¾
Horn-cores:—		
Length along outer curvature,	2	6¼
Length from centre of occipital ridge to point of right horn-core,	1	11
Circumference at base,	1	1⅝
Approximate span of horn-cores, left being broken toward point,	3	0
Orbits:—		
Length and breadth nearly equal,	0	2¾
Do. of nasal bones,	0	8½
Length of series of maxillary alveolar sockets,	0	6½

I have to thank Dr J. Bell Pettigrew, the curator of the Museum, for assisting me in taking these measurements.

Selkirk.— Whitmuirhall.—The first skull of urus presented to the Museum by Rev. Thomas Robertson in 1781. It is already described in my paper, and was found in a marl-moss at Whitmuirhall, near Selkirk.

Selkirk.—In the "Statistical Account of Scotland" of Sir John Sinclair, Bart., Edinburgh, 1792, vol. ii. p. 434, the Rev. Thomas Robertson contributes the account of the Parish of Selkirk. He shows the increased knowledge of these ancient cattle, he had derived from his correspondence with the Secretary of the Society of Antiquaries in 1781, already described in my paper, and states that "some skulls of the urus, and a Roman spear with which these animals were destroyed, were found

lately in a moss near to Selkirk, and presented to the Society of Antiquaries." The following note is added:—

"For the description of this animal, and the honorary rewards conferred on those who distinguished themselves in destroying them, see Cæsar's 'Commentaries,' lib. vi. chap. 5."

Alexander Jeffrey, Esq., Jedburgh, in his valuable "History and Antiquities of Roxburghshire," Edinburgh, 1864 (4 vols. 8vo), refers in vol. i. p. 244, to this occurrence of the urus in Selkirkshire, and adds a note that the spear, he believes, was found sticking in the skull. He recollects of reading this statement somewhere, but could not at the time remember where; I fear it requires confirmation.

I am also indebted to Mr Jeffrey for some references to the occurrence of the urus mentioned in the "Old Statistical Account of Scotland."

In the article *Selkirkshire*, of "Edinburgh Encyclopædia," 1830, it is stated that skulls of the *urus* have been found along with horns of red-deer, and palmated horns, I believe of Elk, *Cervus alces*.[1]

Yarrow.—In the "New Statistical Account of Scotland," it is stated that skulls of the urus, and of a palmated deer,[1] have been found in the marl-mosses.

Roxburghshire.

Jedburgh.—There is preserved in the collection at Abbotsford a fine large skull of the *Bos primigenius*. It was found many years ago in a moss in the forest near Jedburgh, M. J. C. Clabeaux informs me, and favours me with the following measurements:—

	Feet.	Inches.
Length of skull from centre of occipital ridge to front of snout,	2	3
Horn-cores, length of outer curvature,	2	11
Horn-cores, length across from tip to tip,	2	$0\frac{3}{4}$

Mr A. Jeffrey, of Jedburgh, informs me a good specimen of the skull of the urus, found in the neighbourhood, is preserved in the museum there.

[1] See on Elk in Scotland, Proc. Soc. Antiq., vol. ix. p. 332.

Ale Water.—Many years ago, when driving with a relative down the valley of the river Ale, not far from the town of Lilliesleaf, I was rather startled by seeing two large, and to all appearance nearly perfect, skulls of the *Bos primigenius*, impaled one on each of the wooden posts of an old field-gate. Our Border blood was sorely stirred within us "to lift the cattle" skulls at once, and carry them off in our dog-cart; neglected, however, as they certainly appeared to be, we knew they were not ours, and their great size was a decided objection to our little plan, so we rather unwillingly drove off, leaving them to fall to pieces with exposure to the weather, and, as it seemed to us, be totally lost. However, it gave me an additional locality for this great ox, being sure the skulls must have been got from some peat-bog or marl-pit in the immediate neighbourhood of the field-gate on which they had probably been very recently impaled.

Linton Loch.—My friend, Mr James Elliot, Gallalaw, Kelso, informed me that Mr George Purves, the tenant of Burnfoot, drained part of Linton Loch many years ago; the bones of a large ox, described as the *Bos primigenius*, were got in the marl about the year 1826, and the animal to which they belonged was estimated to have stood about 6½ feet in height to the top of the shoulder. Mr Purves has still in his possession the skull and horns of a large red deer which were got there. He informed him that great numbers of deer horns were found; "in some parts they dug through a perfect mass of horns." They also "came on a layer of hazel nuts, but nearly everything crumbled down on exposure to the air." Mr Purves also found below the peat, and on the surface of the marl, a very perfect skull of the Beaver, *Castor fiber*, now preserved in the Museum of the Tweedside Physical and Antiquarian Society at Kelso. It was described by Dr Charles Wilson in an interesting memoir, entitled "Notes on the Prior Existence of the *Castor fiber* in Scotland."[1]

Hapsburn.—A skull of the urus in the Museum of the Society, described in my paper, was presented in 1872 by Mr Thomas Scott of Hapsburn, Roxburghshire.

[1] See Edinburgh New Philosophical Journal, new series, July 1858.

BERWICKSHIRE.

Mertoun—Whitrig Bog.—In this bog, in which the skull of the Elk, *Cervus alces*,[1] was discovered in 1871; besides skulls, &c., remains of the red-deer; skulls also of the great urus, *Bos primigenius*, have been found. Part of a skull of the latter, with large horn-cores, was discovered a few years ago. This consisted of a portion of the frontal bone with horn-cores, which measured each in length, along the outer curvature, 28½ inches, and 12½ inches in circumference at its base. The cord of the arc of the inner curve of the horn from its base to its tip, was 5 inches in greatest depth. The horn was got by Dr Henderson when living at Melrose, and was presented by him to the Hunterian Museum, Glasgow. I am indebted to Mr John Young of the Museum for the note of its dimensions, and he informs me traces of the peat still remain in the cavities of the skull, showing the bed in which it was discovered.

Dunse—Swinton Mill.—Mr George Logan, W.S., exhibited to the Royal Physical Society, in January 1866, a bone of this great ox, found in the course of operations for deepening the river Leet, near Swinton Mill. It was found in the alluvium a little below the surface. Professor Turner, who examined the bone, stated that it was a right humerus of a young animal.

DUMFRIESSHIRE.

Shaw.—Sir William Jardine, Bart., informs me that, in a marl-pit on the property of George Graham of Shaw, Esq., there were found at the bottom of the moss, and lying on the marl, the remains of various animals, red-deer, roe-deer, *Bos primigenius* rare, the skull and rib of a black bear *Ursus arctos*, and horn of rein-deer.[2]

KIRKCUDBRIGHTSHIRE.

William Carruthers, Esq., of the British Museum, informs me that in addition to the skull of the *Bos primigenius* from Athol, there is also in the Museum a specimen from a turbary in Kirkcudbrightshire, presented by Lord Selkirk in 1859. A large number of the bones of the skeleton

[1] Elk in Scotland, Proc. Soc. Antiq., vol. ix. p. 332.
[2] Rein-deer in Scotland, Proc. vol. viii.

as well as the skull are preserved. The length of the face from the occipital ridge to the end of the intermaxillary bones is 2 feet $3\frac{1}{2}$ inches.

Galloway.—A skull in the Museum of the Society, already described in my paper, was found in a moss in the district of Galloway, and was presented by the Rev. David M'Robert in 1782.

Ayrshire.

Maybole.—In the account of this parish in the "New Statistical Account of Scotland," it is recorded by the Rev. Mr Gray that various animal remains have been found in marl-pits, including skulls of the Irish Elk, *Megaceros Hibernicus,*[1] and of "a large *Bos taurus*" (the *Bos primigenius,* I have no doubt). The latter measured 10 inches between the horns, and $13\frac{1}{2}$ inches in circumference at the base of the horn.

Renfrewshire.

Crofthead.—A portion of the skull, with a horn-core of the *Bos primigenius,* was found in a bed of clay in the valley of the Cowdenburn, near Crofthead, and was described by Mr James Geikie, H.M. Geological Survey, in the "Geological Magazine," London, for 1868. Mr Geikie considered the bed as intercalated with the true boulder clay of the district. Remains of the *Megaceros Hibernicus*[1] were found in the same locality in 1869, and were described by Mr John Young of the Hunterian Museum, Glasgow; they were on the same horizon as the remains of the *Bos primigenius,* at about 20 feet from the old surface of the ground. Bones of a small-sized horse, *Equus caballus,* were found in a lower series of the same deposits. Mr Young considered the beds in which these remains were found as comparatively recent lacustrine deposits.

Lanarkshire.

Lanark.—Mr William Lockhart, in his account of the parish of Lanark in "The Statistical Account of Scotland," vol. xv., Edinburgh, 1795, states: In September 1785, while digging the open part of an aqueduct for the first mill at the village of New Lanark, "there was found

[1] See Notice of Irish Elk in Scotland, Proc. Soc. Antiq. Scot., vol. ix. p. 346.

the skeleton of the *Bison Scoticus*, or urus, described by Cæsar, lib. vi., which has been extinct in Scotland for above 300 years. The cores or flints of the horns are still preserved, one in the College of Glasgow, and another in my possession; the last, though not entire, is 2 feet in length, and next the head measures above 15 inches in circumference."—(P. 34.)

Clyde.—When operations were carried on in 1833 in the alluvium of the river Clyde for improving the navigation, a skull of the large ox, *Bos primigenius*, and fragments of horns of the rein-deer,[1] were found in beds of fine laminated sand on the north bank of the Clyde, below the junction of the river Kelvin. These bones are now preserved in the Museum of the Andersonian University, Glasgow.

Glasgow.—In a paper by Mr James Bennie, "On the Occurrence of *Bos longifrons* and *Bos primigenius* in the Ancient Drift of the Clyde," published in vol. ii., 1867, of the "Transactions of the Geological Society of Glasgow," Mr Bennie states that a large horn, recognised by Dr Scoular as of the *Bos primigenius*, was found in an excavation in Greendyke Street, Glasgow, which was made for a sewer, and extended for a considerable distance. Its depth was about 10 feet, and the soil cut through consisted partly of forced earth, vegetable mould, and river silts, the silts being 7 feet deep where the horn was found. The horn, which Mr Bennie has allowed me to examine, belongs to the right side of skull, and has part of the frontal bone attached to it. It measures $8\frac{3}{4}$ inches in circumference at its base, and 10 inches in length to its extremity, which is broken. The horn appears to be considerably weathered and worn, as if by rolling in the bed of a river.

Fifeshire.

Newburgh.—Professor John Fleming, D.D., in his "History of British Animals," Edinburgh, 1828, refers to a large skull of a *Bos taurus*, of which he gives the following details:—"It measures $27\frac{1}{2}$ inches in length, 9 inches between the horns, and $11\frac{1}{2}$ inches across at the orbits." It is now preserved in the Museum of the New College, Edinburgh, and a label fixed on it, in Professor Fleming's handwriting, tells us that

[1] See Rein-deer in Scotland, Proc. Soc. Antiq. Scot., vol. viii. p. 207.

it was found in a marl-pit at Newburgh. The skull is nearly perfect, with the exception of part of the intermaxillary of the right side, and the lower jaw, which is wanting. Several molar teeth remain in the alveolar sockets, and as they are well ground down, they show very distinctly the various folds of the enamel of the teeth, which exactly correspond in character, but of a much larger size, with that of the domestic ox. (See figures of this skull and its molar teeth previously given).

The following are some of the measurements of this skull :—

	In.	Lin.
Length of the skull from the supra-occipital ridge to front edge of intermaxillary bone,	27	9
Length from supra-occipital ridge to nasal bones,	13	3
Do. from centre of do. to upper edge of orbits,	11	6
Do. of nasal bones,	10	5
Do. of orbits,	2	10
Breadth of orbits,	2	9
Length from front of orbit to end of maxillary bone,	12	0
Do. do. to front edge of intermaxillary bone,	13	6
Breadth of forehead between roots of horn-cores,	10	6
Do. across narrowest part about midway between roots of horn-cores and orbits,	9	6
Do. of skull across middle of orbits,	11	6
Do. across front of intermaxillary bones,	4	9
Horn-cores, circumference of base,	14	0
Do. length following outer curvature,	24	6
Do. span across, from tip to tip,	28	6
Length of alveolar sockets and molar teeth of upper jaw,	6	6
Do. of skull from supra-occipital ridge to upper edge of foramen magnum,	6	6
Do. of skull from supra-occipital ridge to the base of the skull,	8	6
Breadth of occipital condyles posteriorly,	5	3
Length of base of skull from front of foramen magnum to front edge of intermaxillary bones,	22	6

Perthshire.

Athol.—Professor Richard Owen, in his valuable and beautiful work, "A History of British Fossil Mammals and Birds," Van Voorst, London,

1846, figures and describes a large skull of the *Bos primigenius* got from Athol. His description is at once so complete and concise that I shall quote it in full:—

"The characters of the *Bos primigenius*, as contrasted with the *Bison priscus*, may be advantageously studied in the magnificent specimen of an entire skull from near Athol, Perthshire, now in the British Museum. The concave forehead, with its slight median longitudinal ridge; the origin of the horns at the extremities of the sharp ridge which divides the frontal from the occipital regions; the acute angle at which these two surfaces of the cranium meet to form the above ridge,—all identify this specimen with the *Bos primigenius* described by Cuvier, Bojanus, and Fremery. The cores of the horns bend at first slightly backward and upward, then downward and forward, and, finally, inward and upward, describing a graceful double curvature; they are tuberculate at the base, moderately impressed by longitudinal grooves, and irregularly perforated. The skull is one yard in length, and the span of the horn-cores is 3 feet 6 inches; but other British specimens of the *Bos primigenius* have shown superior dimensions of the bony supports of the horns. The breadth of the forehead between the horns is $10\frac{1}{2}$ inches; from the middle of the occipital ridge to the back part of the orbit it measures 13 inches; the length of the series of upper molar teeth is $6\frac{1}{2}$ inches; the breadth of the occipital condyles is 6 inches."—(P. 502.)

In this description Professor Owen states that the skull is one yard in length; this measurement, however, is taken from the occipital condyles, over the occipital ridge, to the front edge of the intermaxillary bones. The length of the face of the specimen, from the centre of the occipital ridge to the front edge of the intermaxillary bones, is 2 feet 7 inches; this latter measurement is given as the length of the skull, in all the other instances I have described. The length of the left horn-core (the tip of the right is broken off) is 2 feet $4\frac{1}{2}$ inches along its outer curvature, and the core measures 14 inches in circumference at its base.

Moulin.—In "The Statistical Account of Scotland," vol. v., Edinburgh, 1793, the Rev. Alexander Stewart, in his account of this parish, states—"The skull of a large-horned animal was found some years ago in a marl pit, half a mile from Moulin, and is preserved at that house. The head is shaped like that of an ox; the horns are lost, but the pith is entire; the length of the skull, from the edge of the bone between the horns to the extremity of the upper jaw; is $26\frac{1}{2}$ inches; the greatest circumference

of the pith (or horn-core), 13 inches; the diameter of the eye-socket, $3\frac{1}{2}$ inches; and the distance between the eyes, $10\frac{1}{2}$ inches. It is supposed to have belonged to one of those animals which Cæsar calls Uri, and which were found in the Hercynian forest in Germany, 'Bell. Gall.,' lib. vi. cap. 26."—(P. 70.)

Muthil.—The Rev. John Scott, in his account of this parish, published in "The Statistical Account of Scotland," vol. viii., Edinburgh, 1793, states that—"At this time there are no wild deer, but as the horns of both the elk and forest deer of a very large size have of late been found in marl pits, on both sides of the parish, and as the head and horns of the urus (*Bos ferus* of Linnæus) or mountain bull were lately dug up at the side of a small lake near Drummond Castle, it plainly shows that forest deer, and the other animals now so little known, once frequented this part of the country."—(P. 487.)

Drummond Castle.—A fine specimen of a skull of the *Bos primigenius*, got in a marl-pit in the neighbourhood several years ago, is preserved at Drummond Castle. Other skulls of the same kind were found at the time, and were given away as presents.

Aberdeenshire.

Belhelvie Moss.—Professor John Struthers, M.D., &c., of Aberdeen University, has kindly furnished me with the annexed measurements of a skull and bones of the *Bos primigenius* found in Belhelvie peat moss, a few miles north of Aberdeen, and now preserved in the Museum of the University.

(A.) *Upper part of Skull (frontal and occipital regions), with Horn-cores complete.*

			Inches.
1.	*Horn-cores.*	Length along outer curvature, . . .	31
2.	,,	Girth at their roots (at the raised edge), . .	14
3.	,,	Do. at the middle, ...	$10\frac{1}{4}$
4.	,,	Tip to tip, ...	$23\frac{7}{8}$
5.	,,	Width between greatest convexity of horns, .	$36\frac{1}{4}$
6.	,,	Do. between greatest concavity of horns, .	$30\frac{3}{8}$

	Inches.
7. *Direction of horns.* The occipital surface of the skull being placed vertical, the horns rise $7\frac{1}{2}$ inches to the tip, the first $\frac{1}{3}$ a little convex, the last $\frac{2}{3}$ concave upwards.	
8. Breadth across forehead between roots of horn-cores—	
(*a*) To raised edge of horn-core,	$12\frac{3}{4}$
(*b*) To beginning of rough surface of do.,	$9\frac{1}{4}$
9. Breadth across crest of skull—	
(*a*) To raised edge of horn-core,	$11\frac{1}{2}$
(*b*) To beginning of rough surface of do.,	$9\frac{1}{4}$
10. Length from crest to occipital foramen,	$7\frac{3}{4}$
11. Occipital foramen—	
(*a*) Vertically, at surface,	$2\frac{1}{8}$
(*b*) Transversely, at same level as last,	$2\frac{1}{6}$
(*c*) „ at level of edge of condyle,	$1\frac{3}{4}$
„ at ridge of condyle,	
12. Between extreme outer edges of condyles,	$5\frac{3}{4}$
13. Breadth of condyle along its ridge,	$2\frac{1}{2}$
14. Thickness of top of head 4 inches below crest, between frontal and occipital surfaces,	$3\frac{1}{2}$

(B.) *Humerus.* (About lower third.)

15. Extreme breadth at lower end,	$4\frac{7}{8}$
16. Breadth between edges of articular surface,	$4\frac{1}{4}$
17. Girth at 5 inches above lower end,	9

(C.) *Fore-arm.* (Lower $\frac{1}{3}$ or $\frac{1}{4}$) Radius and Ulna are ankylosed.

18. Extreme breadth at lower end,	$4\frac{3}{8}$
19. Breadth of entire carpal articular surface,	$3\frac{7}{8}$
20. Girth 5 inches above lower end,	10
21. Girths of radius and ulna separately, where an interosseous vacuity allows a cord to pass—	
(*a*) Radius, $3\frac{3}{4}$ inches above lower end,	$9\frac{3}{4}$
(*b*) Ulna, 3 inches above its lower end,	4

(D.) *Colour of the Bones.*

All the portions present a uniform clay-brown colour. Forehead mostly of a darker colour, but no streaks or spots.

SUTHERLANDSHIRE.

Kintradwell.—In February 1864 the Rev. J. M. Joass of Golspie, then of Eddertoun, made some excavations in a ruined building, a broch at Kintradwell, near the sea-shore, and found the remains of various animals, as the pig and red-deer, with the frontal bone and horn-core, and other bones of a large animal of the ox tribe.

CAITHNESS-SHIRE.

Keiss.—Among the bones of animals brought from Keiss, in the Museum of the Society, there is the upper part of the skull of a large ox, with the frontal bone, and a horn-core of the left side, which is broken. The horn-core measures 10 inches in circumference at its base, and 12 inches in length along its outer curvature to its fractured extremity, which is now imperfect. Its large size corresponds more to that of the *Bos primigenius* than to any other ox. It was discovered many years ago by Mr Joseph Anderson in an ancient mound on the sea coast at Keiss. The horn is much weather-worn, and perhaps belonged to a young animal.

Breckigo.—The frontal portion of a skull, with large horn-cores attached, of the *Bos primigenius*, found in the marl of the Loch of Breckigo, along with various antlers of red-deer; was presented to the Museum by Bentley Innes, Esq. of Thrumster, in June 1870.

	Feet.	Inches.
The skull measures across the forehead, between the roots of the horn-cores,	0	9
Length from occipital ridge to lower border of foramen magnum,	0	9
Breadth across back of occipital condyles,	0	$5\frac{3}{4}$

The horn-cores are nearly perfect :—

The right horn-core measures along its outer curvature,	1	11
Circumference at base,	1	1
Left: length along its outer curvature,	1	10
Circumference at base,	1	0
Length between points of horn-cores,	2	1
Greatest width across inside curve of horn-cores,	2	3

Bower.—I am indebted to Mr Joseph Anderson for the two following notices of the occurrence of the *Bos primigenius* in this county, which were published at the time in the "John o' Groat Journal." They are remarkable from the fact of the horns of two of these large cattle being in each instance apparently locked together, as if they had been fighting in the bog, and each had been mutually exhausted, and thus destroyed by his opponent.

The first was discovered on Monday, 12th August 1839, by Mr John Bremner, Toff Kemp, in the parish of Bower, when digging for marl in a moss on the estate of Thura. He discovered bones of some animals of the ox species, but of a great size (the *Bos primigenius*). They were upwards of 3 feet under ground, and in a high state of preservation. Two heads were locked together by the horns, as if the animals had killed one another. One of the heads is preserved, and various other bones; they were measured in the presence of several individuals. The horn-cores of the horns only remain, forming a graceful curve of 5 feet 10 inches from tip to tip (along the curvature of the horns); breadth of skull across eyes (and horn-cores?), 1 foot 6 inches; one of the ribs measured $3\frac{1}{2}$ inches at the broadest part, and 3 feet 1 inch in length. Largest joint of leg-bone (femur?) measures 9 inches in circumference, but the bone itself is comparatively short. Unfortunately, from the non-scientific character of the measurer, it is not quite certain to what he refers.

The second instance was discovered in the same parish of Bower, at Clayock, near the loch of Scarmclett, by Alexander Ross, when digging a drain in the beginning of October 1840. Two heads were found together 3 feet under ground, as if the animals had fought and died together. The horns measured 5 feet from tip to tip (along curvature), and 11 inches in circumference.

Orkney.

Mainland, Sandwick, Skara.—Samuel Laing, Esq., in his paper on the "Age of the Brochs," already referred to,[1] compares the collection of animal remains, &c., found by Mr William Watt at Skaill, with those found by himself in Caithness. He states that the fauna appeared to be the same with that of the burgs or brochs, but with one remarkable

[1] Proc. Soc. Antiq. Scot. vol. viii. 1867.

exception, viz., "that in addition to the small straight horns of *Bos longifrons*, there were several large ox horns, which from their size and curvature must have been those of *Bos primigenius*, of which specimens have been found in the peat mosses, though, as far as I am aware, not before in connection with any ancient dwellings in Orkney or Caithness. One horn, now exhibited, was nearly 12 inches in circumference at the base, and had been upwards of 2 feet long."—(P. 76.) The remains of the small ox include a horn-core of right side partially broken; it measures 8 inches long, and nearly 7 inches in circumference at the base.

George Petrie, Esq., Corr. Mem. S.A. Scot., in a paper also read to the Society, April 1867,[1] gives a detailed account of the curious underground remains of buildings found at Skara, Bay of Skaill, worked out by Mr William Watt. After describing the ancient types of many of the bone and stone implements found, he states, that these remains are of very considerable antiquity may be inferred as well from the ancient type of the implements, as "also from the fact, that the bones and horns of animals long since extinct in Orkney, such as the deer, and it is believed the *Bos primigenius*, were thickly strewed throughout the debris of the building."—(P. 210.)

The Age or Geological Range of the Large Long-Horned Ox, the Urus (*Bos primigenius*, Owen), in Britain, and especially in Scotland.

Julius Cæsar described the urus as being then found with the elk and rein-deer in the Hercynian forest. Pliny states that the northern peoples drank out of urus horns, which were so large as to contain an urna. Professor Nilsson considers this statement probably an exaggeration.

Professor Nilsson believes that the urus came in, long *after* the Scandinavian boulder period, at a much later time than that during which the same species lived in England; he therefore supposes it had never attained to the same size in Scandinavia as in England. It lived in Scandinavia contemporaneously with the rein-deer and elk (their fossil remains being not unfrequently found together in our old turf-bogs). Its remains are also found abundantly in the Danish kitchen middens.

[1] Proc. Soc. Antiq. Scot. vol. viii.

In the Museum of the University of Lund, there is a skeleton of a urus which was discovered in a peat bog in 1840, under Professor Nillson's own inspection, near to Ounarp, in the district of Wemmenshög, in the south of Scania. It has, near the edge of the spinous process of the first lumbar vertebra, an opening surrounded with callus, which passes out on the back, and is continued through the projection of the next bone.[1] The Professor supposes this wound had been caused by the stroke of a javelin, the animal being struck from the front, and that the head of the spear had afterwards suppurated out. Various celebrated anatomists and physiologists also agree with Professor Nillson in this explanation of the cause of the injury. He therefore considers this instance proves that this animal had lived in Scania after the country was inhabited by man during the Stone period, and also during some part of the Bronze age, as a war-trumpet of bronze described and figured by him is, he considers, evidently copied from a horn of the ure-ox.[2]

In Professor Rütimeyer's catalogue of the "Animal Remains of the Lake Dwellings of Switzerland," he states that the *Bos primigenius* has been found at Robenhausen, Mooseedorf, Wanwyl, and Concise, and what he has designated the *Bos taurus primigenius* at Robenhausen, Mooseedorf, Meilen, Concise, and Bienne. No skulls of the *Bos primigenius* have, however, as yet been discovered on the older sites, so as to put beyond a doubt the supposed fact of its presence; and in the later ones the horn-cores and bones, which are believed to represent it, are also stated to be considerably less in size than the ancient urus or *Bos primigenius*.

In England the *Bos primigenius* is found in the Fen and Turbary deposits of the alluvium, and Professor Owen includes it in the list of animals found in the caves and the drift and fresh-water deposits of the newer Pliocene formation, associated with the remains of recent and also the extinct mammalia, as the elephant, rhinoceros, &c. The presence of its remains in the Cromer forest-bed in Norfolk, associated with many of the extinct mammalia, takes it back to the times before our glacial epoch, and therefore to a remote antiquity. Following the order given by Sir Charles Lyell, Bart., from the present to the past, it lived through the

[1] For notice and figures, see "The Primitive Inhabitants of Scandinavia," by Sven Nillson, translated by Sir J. Lubbock, London, 1869, p. 369.

[2] Bronze Age, p. 93, by Professor Nillson.

Recent and Post-Pliocene divisions of his Post-Tertiary Period. Still further back it may be traced into the Newer-Pliocene, or first division of his Pliocene Period, beneath the glacial drifts, as in the pre-glacial forest-bed of Cromer; beyond which its remains have not as yet been discovered.

In England very few instances have been recorded of the association of the bones of the urus with the remains of man. One is referred to by Professor Owen in his "British Fossil Mammals," published by Mr Woods, as the discovery of the skull and horns of the great urus in a tumulus on the Wiltshire Downs. In the "Account of the Blackmore Museum at Salisbury, 1868," various important papers were published on different archæological subjects read at the opening meeting, was one by Mr Boyd Dawkins "On the Pre-Historic Mammalia found associated with Man in Great Britain." This discovery of the skull of a urus in a tumulus in Wiltshire is there referred to. He says:—"It is remarkable, as being the only authenticated instance of the occurrence of the animal with the remains of man in pre-historic times in Britain." Mr Cunnington stated this was an error, for which he was partly responsible from a statement he had made in the "Wiltshire Magazine." He believed now, that the remains of the urus were not found in a barrow at Cherhill, but in a bed of local drift close to the rivulet which flows through the valley round the foot of Oldbury Hill. Thinking there might still be some doubt on the matter, I wrote to Dr John Thurnam,[1] Devizes, who I was sure would be cognisant of all the facts of the case, and received from him the following reply:—"There is no really reliable record of the discovery of part of the skull and horns of *Bos primigenius* at Cherhill near Calne. The first published notice is in Henry Woods' 'Description of Fossil Skull of Ox at Melksham,' 4to, 1858, with plate. The Cherhill specimen is named at p. 26. It is there said to be from a tumulus, and this account is repeated in the brief reference by Mr Cunnington in the 'Wilts Magazine,' vol. iv. p. 139, to which you refer. The original report was by a Mr S. Money, an undergraduate (?) at the time, and probably is to a great extent founded on hearsay. From what has since been heard, Mr Cunnington now believes that the horns were

[1] It is with much sorrow I have to record the lamented death of this accomplished medical man and antiquary, before these sheets were printed off. John Thurnam, M.D., F.S.A., died suddenly at Devizes on the 24th September 1873.

not from a barrow at all, but from the bed of a rivulet. This is confirmed by the fact that some pottery said to be found with the horns, seems to be water rolled, but whether the two are contemporary is very doubtful. The whole are now in the Devizes Museum (Wilts Arch. Soc.) Mr Cunnington gives a good woodcut of the horns."

In his memoir "On Ancient British Barrows," Archæologia, vol. xlii. (1869), Dr Thurnam mentions that:—"The Rev. W. C. Lukis presented to the Museum of the Wilts Archæological Society, at Devizes, the very large horn-core of an ox, possibly *Bos primigenius*, from some excavations made by him in the Chambered Long Barrow at Tidcombe, in North Wilts. The barrow, however, had been previously rifled, and it is doubtful whether or not this horn-core is of a period coeval with or subsequent to its erection." Dr Thurnam classes the long barrows as belonging to the Stone Period of the antiquary. This instance would, therefore, appear to show the association of the urus with the early inhabitants of the country. Remains of the small ox, *Bos longifrons*, though in small numbers, and also of the horse, &c., have been found in the Long Chambered Barrows. In describing what he considers the earlier simple Unchambered Long Barrow, Dr Thurnam says:—"The remains of oxen found by me in the long barrows were uniformly such as zoologists and comparative anatomists refer to the ancient small species, the *Bos longifrons* or *Bos brachyceros*."

A third instance of the association of the urus with man in England is recorded in the "Geological Magazine," London, vol. vi., Feb. 1869, in a paper entitled, "Man and the Mammoth; being an Account of the Animals found associated with Early Man in Pre-historic Times," by Henry Woodward, F.G.S., &c. of the British Museum. He states that:—"A grand head and entire horn-cores, with a large proportion of the skeleton of the *Bos primigenius*, was obtained from beneath the peat near Cambridge. The peat had grown into and filled the cavities of the skull and all the bones. On the removal of the peat from the frontal bone, a *stone celt* was disclosed broken off short *in the forehead*, which it had pierced, and had been apparently left there as useless by the hunter to whose skill the mighty beast had fallen. The specimen is now in the Woodwardian Museum, Cambridge." Mr Woodward considers that the hunter had left his broken celt sticking in the skull apparently as useless,

but it would appear he had also left the whole animal, as a large portion of the skeleton was found in the bog. The urus, we may of course suppose, on receiving its death wound, had fallen into the bog and been lost. As previous accounts showed similar statements were founded on a mistake, I was anxious to learn the exact relation in this instance of the stone celt to the fractured skull, but have unfortunately as yet failed to get any precise information. Mr Keeping, the Curator of the Museum, tells me the skull was found about 1863 by workmen while digging for peat in the fens at Burnwell near Cambridge. The men sold it to Mr W. Farren, and Dr Carter secured it for the Museum. The skull and much of the skeleton were obtained. The skull measures 2 feet 5 inches in length, and $9\frac{1}{2}$ inches across the forehead between the roots of the horn-cores. The horn-cores measure 2 feet $2\frac{1}{2}$ inches along their convex surface. There is an irregular fracture in the frontal bone between and rather above the orbits, which it is supposed was caused by the celt. He has kindly sent me a sketch of the celt, which shows apparently the lower and broader extremity of an ordinary shaped stone celt, partially chipped on the side, with the front polished at its edge. It measures $2\frac{1}{2}$ inches across its face, and 3 inches in length to its fractured surface above; and its maximum thickness is $\frac{3}{4}$ of an inch. It seems rather a small and feeble weapon to have pierced the strong forehead of the skull of a large urus. I would, therefore, desiderate more minute information as to the relations of both when first discovered, and would rather be inclined to suppose that, like those already referred to as found at Whitmuirhall near Selkirk, the stone celt may have been simply found lying in the same bed, and perhaps not more closely associated with the skull.

Mr Thomas Bateman, in his "Ten Years' Digging in Celtic and Saxon Grave Hills," London, 1861, gives a list of the "Animal Remains found in the Tumuli associated with Works of Human Art." In this list he includes of the "Bovidæ, *Bos urus? Bos longifrons?* Domestic Cow;" and states that the "remains are usually too imperfect to admit of the assertion of three species, but we think that at least two may be recognised."

In Scotland, as shown by the various instances I have been able to collect, we find the remains of the urus have been discovered in our clays and river drifts and gravels, our lacustrine deposits, our marls and peat-bogs, and in a few cases associated with the remains of other animals,

apparently among the debris in the ruins of our ancient human dwellings, suggesting, from their rarity there, as compared with the remains of the small short-horned ox, that they had been probably spoils of the chase, and not the remains of slaughtered domestic animals. With the exception of the bones found at Crofthead, described by Mr Geikie as in a bed intercalated with the boulder clay, and therefore, he thinks, of the glacial period, I know no other instances corresponding to those in England belonging to such an ancient period as the Glacial or Pre-Glacial times. It would appear, also, to have been exterminated at an early period, as no distinctive reference to its existence occurs, as far as I am aware, in any of our early Scottish records. I have already stated, on the authority of the Rev. Thomas Robertson, the discovery in 1781 of skulls of the urus in marl pits near Selkirk, and the discovery in the same locality of what appears to have been various bronze weapons, suggesting, at least, the possibility of the animals having existed at the time those weapons were used by the early natives of the district. The remains, apparently allied to this great ox, found in the ruins of human dwellings of Caithness and Orkney, may perhaps be considered to bring its existence down to the times just preceding the invasion of the Norsemen in the north of Scotland, from about the sixth to the eighth or ninth centuries.

Cæsar tells us that in his time the urus was considered as quite untameable; and if it ever was domesticated, it does not appear, as far as I am aware, to have existed in this state in Britain, or at least in Scotland.

Professor Nilsson says :—"That this wild ox has contributed to produce the race of our large long-horned cattle is more than probable. When and where this colossal flat-foreheaded, large-horned, wild ox first became tamed we do not know; but certainly it took place in remote antiquity, and in a land far distant from us. . . . .

"It appears to me probable that it was first tamed either in the south or south-west of Europe, or already in Asia by some Celtic race; but, nevertheless, long after this it was often found in a wild or half-wild state in the forests of Central Europe, even till the beginning or middle of the sixteenth century; that the tame race which sprung therefrom, perhaps, like all tame races, became gradually smaller than the wild stocks, but yet larger than other tame races which spring from smaller

stocks; and it was this *large breed of black cattle* which the Celtic races brought with them here to the north, and which are spoken of in many passages of our Sagas as belonging to the Tötens (giants)," &c.

I have already brought forward the opposite view of Mr Youatt and others, that domestication and man's management, instead of diminishing, may increase the size of animals long under his care. Probably both the one effect and the other may be produced under man's management and the varying circumstances of his position, in different parts of the world.

The great urus would appear, as far as we at present know, to be more ancient than the small short-horned ox, but both may be considered varieties only in size and a few unimportant particulars of the same species, the *Bos taurus*. The genus *Bos*, indeed, along with the few other genera or species from which man has derived his domesticated animals, seem to have had implanted in them, by their great Creator, a special and peculiar power of adaptation, shown now in their many varieties, to the ever varying circumstances of climate, food, and shelter, fitting them thus to be taken by man, in all his wanderings, as he spreads abroad over almost the whole of the habitable earth.

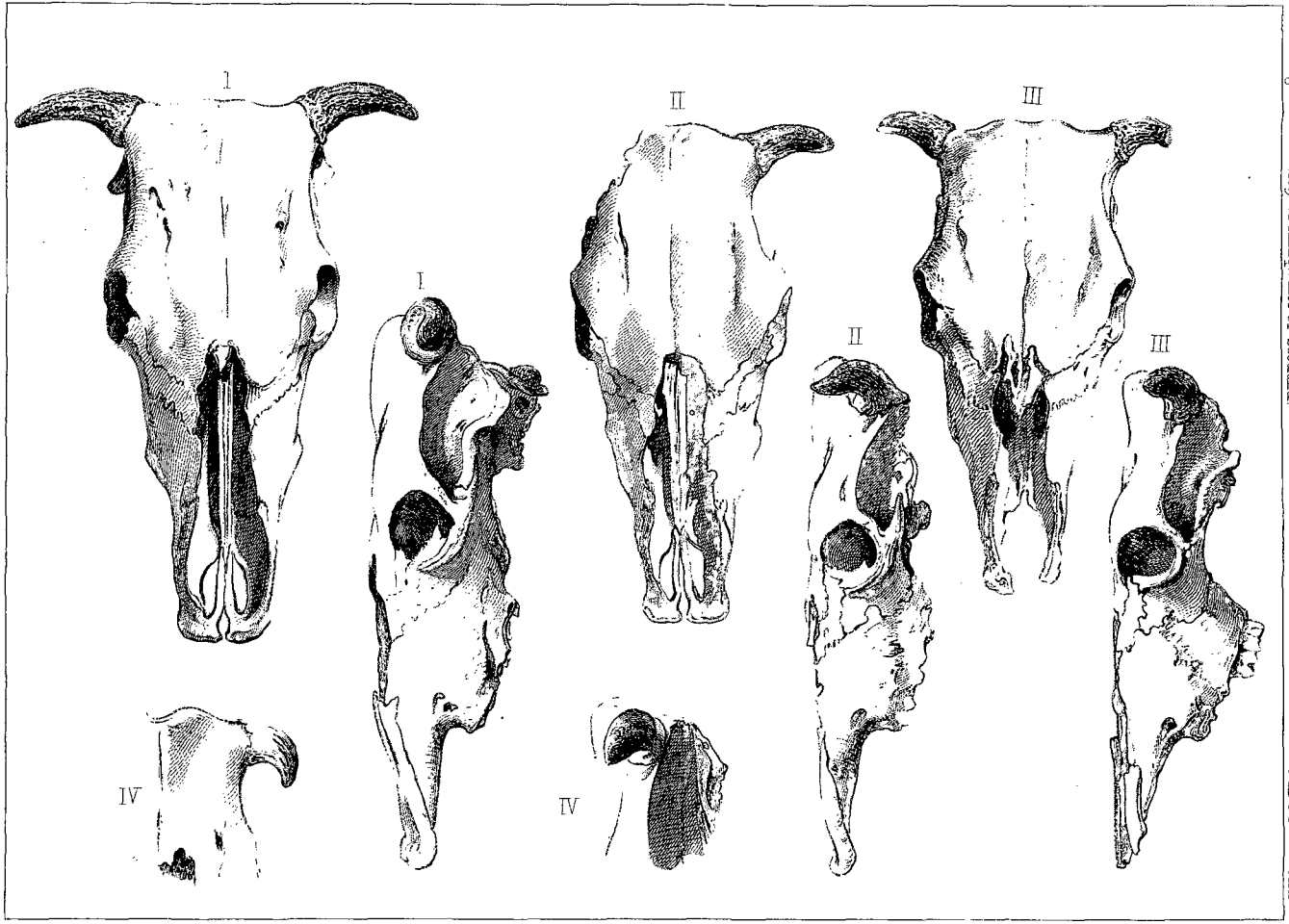
Distribution or Range of the Large Long-Horned Ox, the Urus (*Bos primigenius*, Owen), in Britain, and especially in Scotland.

This colossal species of ox, Professor Nilsson tells us, "was formerly widely spread over the greater part of Europe, from the present Scania to France and Italy, and from England to the northern and western parts of Asia; as in all those places its fossil bones are found in more recent strata." In the catalogue of Mammalian Remains discovered in Ireland, by R. H. Scott, Esq., given in the "Journal of the Geological Society of Dublin," 1864, and "Geological Magazine," London, 1870, it is stated that no remains of the *Bos primigenius* have as yet been found in Ireland.

In England the urus has been discovered in many and various localities. In Scotland, as shown by the numerous instances I have now been able to group together, it occurs from Selkirkshire and Roxburghshire on the south, and from Berwickshire on the east coast, to Kirkcudbright, Galloway, and Ayrshire on the west; through many of our midland counties, and passing on by Aberdeenshire, to Sutherland and Caithness on the north, and even, as it is stated, to the Orkney Islands.

Its remains have therefore been found over the greater part of Scotland, more especially, as yet, along its eastern borders, to the extreme north of our island.

Note.—W. Boyd Dawkins, Esq., M.A., &c., has published important memoirs in the "Quarterly Journal of the Geological Society of London," "On the British Fossil Oxen," *Bos urus*, vol. xxii. 1866; *Bos longifrons*, vol. xxiii. 1867. These I was not fortunate enough to have seen until I had collected my recent Notes on the Scottish cattle. I can only refer those who wish to study the subject to these, and the other valuable memoirs published by Mr Boyd Dawkins on the "British Post-Glacial Mammals," vol. xxv. 1869, and on "The Classification of the Pleistocene Strata by means of the Mammalia," &c., "Quart. Journal Geol. Soc. Lond." for 1872.



W.& A.K.Johnston.Sc.

Skulls found with Roman Remains near Newstead, Roxburghshire. 1846-7.

(*Bos longifrons*, Owen.)