

## XIII.

NOTICE OF THE DISCOVERY OF REMAINS OF THE ELK, (*CERVUS ALCES*, LINN., *ALCES MALCHIS*, GRAY.) IN BERWICKSHIRE; WITH NOTES OF ITS OCCURRENCE IN THE BRITISH ISLANDS, MORE PARTICULARLY IN SCOTLAND, &c. BY JOHN ALEXANDER SMITH, M.D., V. P. S. A. Scot., F.R.S.E.

BERWICKSHIRE:—*Mertoun, Whitrig Bog*.—In the beginning of last July, I spent a week or two in Roxburghshire to recruit my health after a long and severe illness. Dr Dewar, Melrose, learning of my arrival, kindly called for me and informed me of the recent discovery of a deer's skull in Whitrig Bog, which he knew would interest me. It was not apparently that of a round antlered red deer, but had somewhat palmated horns, and might therefore be found to be that of an elk.

The next day, the 7th of July, my friend whom I was visiting kindly drove me over to Whitrig Bog, and I was fortunate enough to meet Mr Hogarth, who had discovered the deer's skull, and resided in a neighbouring cottage, where he still had the skull itself in his possession.

On seeing the skull, its large size, deeply depressed forehead, high occipital crest, and distinctly palmated horns, left little doubt of the species to which it belonged—the true elk, *Cervus alces*, Linn. Mr Hogarth took us to the place where it was found, and gave us the details of its discovery. I was glad to be able to get the skull with me for examination, and only regret that various circumstances have prevented me from exhibiting it to the Society at an earlier part of the session.

Before proceeding to describe the skull, I may give a sketch of the locality where it was found. Whitrig Bog is situated in that part of Berwickshire, which, almost like a peninsula, partially bounded by the river Tweed, runs into the north-eastern part of the county of Roxburgh, opposite to old Melrose. This district includes, on the high ground, Whitrig Bog; at some distance, on the river side, the picturesque ruins of Dryburgh Abbey; and still farther down the river, Mertoun House, the beautiful seat of the Right Hon. the Lord Polwarth, on whose property the bog is situated. The bog has been an old lake of considerable size, and is bounded on the south by rising ground

crowned by a series of rocky eminences designated the Sandyknowe Craigs ; on the higher and eastern extremity of these crags stands the well-known Sandyknowe or Smailholm Tower, and in the adjoining farm-house of Sandyknowe Mains, the great novelist, Sir Walter Scott, as is well known, spent some of his early days with his paternal grandfather, Mr Robert Scott. To the north of the bog rises up Brotherston Hill, so designated, it is popularly said, from the presence of two old standing stones, the "Brother's Stones," which stand a little apart from each other on the northern shoulder of the hill. The locality has been made classic by the genius of Sir Walter Scott, and he refers to it in his poem of "The Eve of St John." In the first stanza he says :—

"The Baron of Smaylh'ome rose with day,  
He spurr'd his courser on,  
Without stop or stay, down the rocky way,  
That leads to Brotherstone."

Whitrig Bog has been extensively cut into from its western extremity, and a large brick and tile work has been in operation there for many years, making use of the brick clay which lies below the shell marl of the peat bog. On the north edge of the bog, there is a partial bed of sand about three feet in greatest depth ; beyond this, is found the great bed of peat, averaging about ten feet in thickness, and containing portions of trees ; one, which I examined, was of birch. Below the peat there is an extensive bed of shell marl ; for three feet in thickness you have pure marl, then over a part at least of the bog there is a bed of blue clay about three feet in thickness, and below this again, there are other three feet of marl. Under the marl is a bed of brick clay, averaging six feet in thickness, and underneath this clay you come at last to the hard till, or boulder clay.

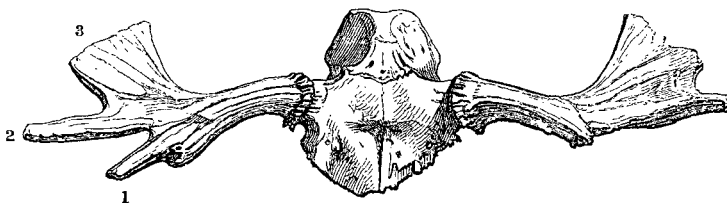
Mr Hogarth told me the elk's head was found about two months before my visit, at about 150 or 200 yards, from the northern margin of the bog. They were cutting peat at the time, and there was a great abundance of water in the peat ; the wall of peat, I may mention, is not cut down to its very bottom, to avoid the marl, and Mr Hogarth cut a drain through the bottom or remaining peat and part of the marl, towards the open side of the bog, to let the water escape. It was while cutting this drain in the peat, and before he reached the marl, that the skull was discovered.

The skull was lying with the under side upwards; he did not notice any lower jaw, but striking his spade downwards, he cut obliquely through the front of the head (from behind forwards, through the nasal fossæ to the upper part of the nasal bones); the double row of molar teeth, which were turned upwards, however, attracted his attention, and he preserved the pieces of bone that contained them. He then dug out the rest of the skull, which was soft, part of its earthy constituents having been removed by its long submersion in the peat; and in doing so, unfortunately also broke off the points or extremities of the antlers. He dug no deeper and made no farther search for any of the other bones of the animal. The skull he saw was of an unusual character, he therefore took home the portions of it for preservation. Mr Hogarth had lived for many years at the bog, but never saw any horns of a similar kind dug up; he had, however, occasionally seen skulls with rounded horns resembling those of the red deer; remains of the large ox, the *Urus*, *Bos primigenius*, have also been found in the same bog.

At Lord Polwarth's seat of Mertoun House, I afterwards had an opportunity of examining a skull of a fine red deer, *Cervus elaphus*, with large and well-developed horns, displaying some fifteen or sixteen points, which was found with the entire skeleton of the animal in Whitrig Bog. I also saw various articles of furniture made of black oak from the same bog. To the Rev. M. H. Graham, of Maxton, I am indebted for sending me portions of the antlers of a large round antlered deer, *Cervus elaphus*, which were discovered in the neighbouring parish of Maxton, Roxburghshire, at a depth of three feet or so from the surface, when the ground was being tilled or stripped from the rock at the red sandstone quarry by the schoolhouse, in 1848. This gives us another instance of the occurrence of the remains of the red deer in a district from which they have long since disappeared.

*Description of Skull*—This skull of the elk is that of a large adult animal, as shown by the well ground state of the molar teeth. The horns, however, are not nearly so well developed as in some elks, the animal not having reached the mature age necessary for the full development of the large expanded horns. It consists now of only the upper part of the cranium, extending from the upper part of the nose and orbits to the complete back part of the skull. The superior maxillaries and

palate bones were cut through and broken by the spade, but contain, as already mentioned, the series of molar teeth. Its most striking feature is the broad expanded forehead, from each side of which spring the large horns, this part forms a rounded ridge, and is the highest part of the skull. This ridge consists principally of the frontal bones, its back part being formed by the two parietal bones, and it is crossed in the middle by the sagittal suture, which forms a slightly projecting ridge, and is the most prominent part of the projection in the mesial line. In front of this frontal ridge there is a deep abrupt frontal depression in the middle of the forehead, which becomes shallower forwards, and rises to the surface of the face in the line of the supra-orbital foramina; through this deep hollow the sagittal suture rises up as a rather prominent ridge.



Skull of the Elk, *Cervus alces*, found in Whitrig Bog, Berwickshire.

The back part of this frontal ridge or eminence is formed by the junction with the parietal bones in the coronal suture, and at the union of the two bones rises up into a prominent rounded knob, projecting backwards, on the middle of each side; these knobs are about four inches apart from one another, and from these knobs there is a projecting ridge on the parietal bones which runs backwards and inwards on each side towards the occipital protuberance, but terminates in a transverse ridge, crossing the middle line of the occiput, about half an inch in front of its suture, and about two inches in front of the occipital notch; the lateral lines of this projecting ridge run backwards and outwards, and form the occipital notch and ridge of the occipital bone. The back part of the skull, behind the elevated central ridge, is formed by the parietal

bones in the middle, with their curved lateral sutures separating them at the sides from the expanded temporal bones; their much curved posterior sutures separating them behind from the occipital bone and its projecting terminal ridge. This ridge projects also much backwards and outwards, having on its posterior surface a strongly marked oval-shaped and rugged projecting surface, about  $1\frac{1}{2}$  inch in depth, crossed by a vertical ridge, for the insertion of the strong *ligamentum nuchæ*; the occipital bone then slopes slightly outwards until it reaches the condyles at the foramen magnum. (See preceding figure.)

*Horns of Elk.*—The horns each show three well-marked divisions or snags—first, the rugged burr springs from each extremity of the frontal eminence, and the cylindrically shaped beam runs outwards, bending slightly downwards for about  $6\frac{1}{2}$  inches, and then becoming a little palmated. The right horn gives off a broad flattened branch or snag towards the front of the horn, which measures about  $3\frac{1}{2}$  inches across, it runs forwards and outwards for about 6 inches, and divides in front into two or more projecting snags or terminal branches (No. 1 of woodcut). The flattened and more palmated beam then proceeds outwards, rising upwards in the middle, again becoming depressed, and again rising upwards and forwards, and terminates in a rounded cylindrical snag  $1\frac{1}{2}$  inch across at its base, forming apparently the second branch (No. 2 of woodcut), and the true terminal extremity of the horn. It measures from the burr in the line of this snag,  $17\frac{1}{2}$  inches in total length, or nearly 20 inches in a straight line from the sagittal suture to the distal extremity of this rounded second snag. Rising from the back part of this second branch or beam, there is the third branch, the large palmated portion which runs backwards, and forms the terminal posterior portion of the horn (No. 3 of woodcut); it measures about 4 inches across its base, expands backwards and outwards to 5 inches in breadth, and terminates in a number of projecting snags or branches which spring from its external margin, but, like the others, are unfortunately all broken off. The horn of the left side is very similar in character, only its first branch to the front is not quite so broad and is imperfect, the horn having been broken across; it has next the second or rounded snag, which runs outwards and forwards, and forms, as I believe, the true terminal part of the horn; and beyond and behind it, the third portion expands back-

wards and outwards to a breadth of  $6\frac{3}{4}$  inches. The terminal snags which spring from its outer border being all also unfortunately broken off.

Mr Lloyd, in his "FIELD SPORTS OF THE NORTH OF EUROPE," vol. ii. p. 329, states that "The elk is a long-lived animal; he does not attain his full growth until after his fourteenth year. At least so it is to be presumed, as up to that period his horns, which are of a flat form, are annually provided with an additional branch. He sheds his horns about the month of February in each year. The female elk, unlike the reindeer of that sex, has no horns."

"The horns of the young male elk are perceptible nine months after its birth; for the first year, they are cylindrical, and short; the second year they are about a foot in length, but not branched; the third year, two points are discernible; the fourth year, three; the fifth, they are full grown in length. From that time forward, they yearly increase in breadth, and in the number of branches, until there are as many as fourteen on each horn." "The male is very much larger than the female." "The elk is easily domesticated."

In the NATURAL HISTORY OF NEW YORK, ZOOLOGY, by James E. De Kay, 1842, the horns of the American elk, *Cervus alces*, are described as follows:—"Horns in the male only. In the first year it exists in the shape of a short knob, not more than an inch high; in the following year it is a round spike slightly directed outwards, and about a foot long; in the third year they begin to branch forward, and to become palmated above. In full grown adult males, the palmated portions end in from five to eight short tips; and the brow antlers, if present, are round and pointed, directed forwards, and occasionally bifid or even trifid."

The growth and general plan of the development of the horns of the elk, it seems to me, may be explained as follows:—

First there appears an unbranched, short, and cylindrical horn; it then becomes longer and broader, but is still unbranched at the second year; at the third, two points are developed; and at the fourth year, three points, one being directed to the front, another in the middle, the line of the beam, and the third towards the back; in the fifth year the horn attains its greatest length, running outwards in the line of the rounded beam, the middle or longest snag (often more cylindrical in form, and generally single), being its termination. The snag which

springs from the front of this middle one then develops in breadth, spreading out upwards and forwards, and gives off two or more terminal snags; and the third or posterior snag becomes still more largely developed in breadth, running backwards, and rather inwards, and giving off numerous terminal snags along its external border as it increases in age.

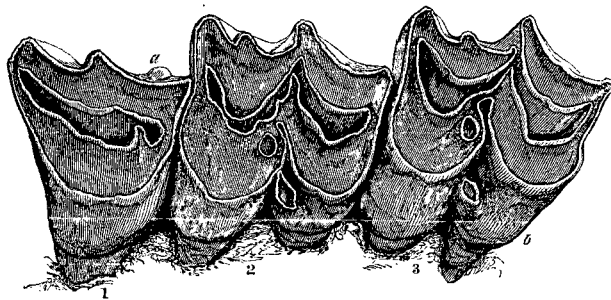
The first branch or antler of the horns generally springs at some six inches or so from the burr, much farther up the rounded beam than in the Irish elk or red deer; it cannot, therefore, be very correctly described as a brow antler. The beam of the horn runs outwards, and at some six inches distance or so from the burr expands into a palmated form, it then becomes divided into three portions, one running forwards and upwards the first snag or antler, the second running transversely outwards, and the third and last running backwards and rather inwards, thus completing the form of the horn, and by the development of these anterior and posterior snags the great breadth of the horn is apparently produced.

The large palmated portions appear to rise up in opposite planes from the line of this central snag as from a base, the one in front, and the other behind, as the horn increases in size with age. The original middle snag, corresponding to the beam of the horn, is sometimes lost in the greater development of the third or posterior snag, thus appearing to fall back on the original plan of the two snags, or first developed points of the horn of the young elk.

This progress of development is well seen in this skull found in Berwickshire, the three great divisions of the horn being very distinct. The animal was therefore probably upwards of five years of age.

*Dentition of the Elk.*—The series of teeth are of much interest from their well ground and strongly marked characters; and it is curious to notice, that those wanting on one side, fortunately remain on the other, and in this way a perfect series of the superior maxillary molar teeth can be described. There are on each side of the upper jaw six teeth, three premolars and three molars, and each tooth is inserted a little obliquely in the jaw, so that the posterior and outer angle of the crown of one tooth rests within about a third of the breadth of the next tooth behind it, and in this way the projecting saw-like character of the combined cusps of the teeth is much increased.

The *premolars* consist each of a single column, convex next the interior of the mouth, and, on its outer side, of a somewhat straight surface. There is on the outer surface of each tooth, however, a fold or depression approximating it so far to the double columnar character of the true molars, and the third or last of the premolars shows a slight indication of an additional point or cusp on the posterior part of its external surface, next the first true molar (see No. 1, *a* of woodcut). In these premolars, the surface is worn down, showing the outer coat of enamel surrounding the bone or dentine of each tooth, and a crescent-shaped island of enamel in the middle of each, the rounded part of this crescent being next the inner side of the tooth; this rounded inner surface of enamel is



(1.) Last Premolar, and (2 and 3) First and Second, Maxillary Molar Teeth of the Elk, *Cervus alces*, found in Whitrig Bog, Berwickshire—(natural size).

also slightly folded on itself towards its posterior part, approximating it to the outer part of the crescent, and making thus somewhat of a loop of enamel on each tooth; this is most distinct in the first and third of the premolars. The premolars each measure, on the upper surface, about 1 inch in length, and about  $\frac{3}{4}$ ths of an inch in greatest breadth.

The true *molars* may be described as each formed of two columns, somewhat like two of the premolars joined together, only a little more compressed



in character ; their two convex surfaces being next the inside of the mouth, and their outer or more concave surfaces, set like the premolars rather obliquely, towards the outside of the mouth. Their upper surfaces are well ground down, and show their structure very distinctly ; like the premolars, the dentine has been stained of a dark or black colour by the peat, while the enamel retains its original whiteness.

In the first of the true molars, we have the inner or central crescent-like portions of enamel (of the premolars) continuous, thus forming a double crescent-shaped portion with the dentine surrounding it ; outside, we have the outer coating of enamel of the tooth, double convex next the mouth, and the two oblique or concave portions, next the outside of the tooth. The first portion or crescent of the inner enamel, that next the premolars, displays like them, a fold of enamel on its posterior surface. Behind this first crescent-shaped portion of enamel of the middle of the tooth (next the premolars), and towards its inner extremity, there is in the dentine a small isolated circle or ring of enamel ; and on the outer side of the convex inner column of the tooth (next the mouth), there is a small but distinct denticle or accessory column, the enamel of which is worn off, and shows, enclosed by it, a somewhat triangular patch of dentine (see No. 2 of woodcut).

In the second molar the general character of the tooth is the same, only the double crescentic-shaped portions of enamel in the middle of the tooth communicate at their junction with the external surface or outer enamel, coating the tooth ; and in one tooth the little distinct ring of enamel in the dentine, behind the first inner or crescent-shaped portion of enamel, is seen to be formed of a loop of the enamel coating the external surface of the first column or half of the molar, next the middle of the tooth on its inner side ; the other corresponding second molar tooth, however, shows it still isolated. The accessory denticle is also present towards the base of the second column of the tooth, on its inner surface, the enamel being also worn off its top, and the dentine displayed (see No. 3, *b* of woodcut).

In the third or last molar, the character of the tooth is, of course, much the same, only here the two inner crescents of the enamel of the tooth communicate in the mesial line with the enamel of both the external and internal surfaces of the tooth, and the distinct ring of enamel of the other teeth is seen here to be simply an open fold of the enamel of the internal

surface of the first column of the tooth, where it passes to the middle of the tooth to join the extremity of the first crescentic fold of enamel of the interior of the tooth. The accessory denticle at the base of the inner surface of the tooth is distinct and pointed, the tip merely being ground down and exposing a small spot of dentine.

In the Irish elk, *Megaceros Hibernicus*, this small accessory column or denticle is also present, but lies apparently more directly between the two lobes or columns of the tooth, and perhaps also a little lower down on its base, so that it does not apparently become ground down on the top, as in the elk. The small loop, or ring of enamel, already described as existing at the inner and back part of the first column (or middle of the tooth), of each of the molar teeth of the elk, does not appear to exist in the *Megaceros Hibernicus*.

The true molars measure from 1 inch to  $1\frac{1}{4}$  in greatest length, and from  $\frac{3}{4}$  of an inch to an inch in greatest breadth, the length of the whole series being  $6\frac{1}{4}$  inches. The distinctly marked character of the teeth has tempted me to be thus minute in their description; it may perhaps be useful for comparison, and assist in discovering other instances of the existence of the elk.

*Measurements of Elk's Skull.*—The cranium measures in length from the middle of the occipital notch to the transverse nasal suture, in the mesial line,  $9\frac{3}{4}$  inches. The length from the occipital notch to the coronal suture, between the parietal and frontal bones, is  $4\frac{1}{4}$  inches in the mesial line; and from the same occipital notch, to the supra-orbital foramina,  $8\frac{1}{4}$  inches. From the occipital notch to the basal side of the foramen magnum the skull measures 6 inches in depth.

The breadth of the skull across the frontal bone (between the orbits, and the base of the frontal processes from which spring the burrs of the horns), is 8 inches. Between the burrs of the horns themselves, the frontal bones measure  $7\frac{1}{2}$  inches. The frontal processes, which give rise to the horns, each measures  $7\frac{3}{4}$  inches in circumference below the burr, and are considerably flattened on their under side.

The rounded beam measures  $6\frac{1}{2}$  inches in circumference beyond the burr.

The horns in their present imperfect state measure 3 feet 4 inches across, from the point of the second or rounded snag of one horn, to the

extremity of the corresponding snag of the other horn. The greatest breadth of the right or largest horn is 1 foot, measuring from the broken points of the first palmated and projecting snag to the back part of the third portion, which projects outwards and backwards.

I may state that I extracted from the brain cavity of the skull, through the foramen magnum of the occipital bone, a mass of hardened peat, which had filled the entire cavity. I am thus enabled to corroborate the statement of Mr Hogarth, that the skull was found in the peat, and not in the shell marl of the bog.

Some time ago I met Dr David Page, our well-known geologist, and told him of the elk's head I had got at Whitrig Bog. He mentioned that he had a letter from Mr Charles Lapworth of Galashiels, informing him of the discovery of a large deer's skull in Whitrig Bog, and asking for information as to the species. He had little doubt it was the same skull I had got. Mr Lapworth afterwards wrote to me that, along with his friend Mr Wilson of the "Border Advertiser," he learned of the deer's head being found, had gone to see it, and examined the place where it was discovered. Mr Wilson thought of drawing up a note of its discovery for his newspaper, but this intention was never carried into effect. They were geologists rather than zoologists, and were engaged at the time in working at the geology of their district, following it out very successfully across a great part of the south of Scotland.

*The Elk (Cervus alces), of America.*—The elk of the old world, and the elk<sup>1</sup> or moose-deer, the *Mūsūā* of the Cree Indians of the new world, are believed by naturalists to be the same species of animal. Sir John Richardson, in his "Zoology of H. M. S. Herald, 4to, London, 1854," gives details of the skeleton of a recent moose-deer, in illustration of the fossil remains of the elk found along with the bones of the *Elephas primigenius*, *Cervus tarandus*, &c., in the bone deposit in the frozen cliffs of Eschscholtz Bay, near Behring's Strait, in Arctic North America. The skull closely corresponds with the one I have described; some dimensions of my specimen, however, seem rather larger than that described by Sir John. His descriptions give the distinctive characters between the elk

<sup>1</sup> Unfortunately in America the name elk is given also to the *Cervus canadensis*, so that there, the moose deer, is the necessary and distinctive appellation.

and other species of deer, I shall, therefore, quote some of his details of the osteology of the skull, which will help to show the almost exact correspondence of his American specimen with this elk from Berwickshire; they may also be useful to those who have portions of the skulls of deer of doubtful species, but have no access to any work detailing the osteology of the elk:—

*American Elk, C. alces, Linn.*

“ In the abbreviation of the nasals, the prolongation of the maxillaries and premaxillaries, and in the elongated parietals extended in the same plane with the face, the *muswa* or moose-deer differs from the other *Cervidæ*, *Bovidæ*, or *Capridæ*. The summit of the skull on its coronal aspect is formed by the median elevation of a rounded ridge which crosses from the basis of one antler to that of the other, and is cut at right angles by the sagittal suture, whose raised edges constitute the summit in question. Into the composition of the transverse ridge the parietals enter, but it is constructed chiefly by the frontal; and, at its lateral termination each way, and on its inial aspect there is a short conical protuberance belonging to both bones. The distance from the apex of one of these protuberances to that of the other is 4 inches, and the spaces between them and the orbital plates of their respective sides are occupied by the swelling bases of those processes, which, having a lateral direction, with a slight inclination coronad, give origin and support to the antlers. Close to the prominent basal ring of the antler, the process has a circumference of  $6\frac{1}{2}$  inches. In the middle of its length the *frontal* is bent inwards towards the encephalon, as if it had received a violent blow when in a plastic state, and the hollow is divided longitudinally by the raised edges of the sagittal suture. A similar incurvature, but not to the same extent, exists in the frontal of the reindeer. Opposite to the antinial border of the depression in the *muswa*, the supra-orbital foramina perforate the orbital plates, which are thinner and less prominent than those of the musk ox. As it is in the development of the *parietals* that the peculiarly elongated form of the posterior calvarium depends, so we find that these bones differ in form from their homologues in other ruminants. Conjointly they are bounded next the frontals by a straight transverse edge, having a very concave occipital one opposite to it, and laterally on each side by less concave edges, which the squamosals overlap. In forming the posterior transverse boundary of the frontal, the coronal suture does not bend antinial in its median portion, as it does in the reindeer cranium. . . . Except in the camel, none of the genera allied to *Cervidæ* and *Bovidæ* present an example of so prominent an occipital crest as this deer. Rounded in outline laterally, the crest is notched mesially in the usual site of the occipital spine; and beneath its margin, the super-occipital plate is concave and rough

for the attachment of muscles, but the ex-occipitals have an inial slope as they approach the *foramen magnum*, whose nearest border still falls an inch antinial<sup>1</sup> of the overhanging margin of the crest. . . . The lateral edges of the condyles are acute and free, without the slightest tendency to form an accessory trochlea as in the musk ox ; and a defined transverse line on each condyle indicates the meeting of its two articular surfaces. . . . About one-third of the distance between the frontals and the extreme tip of the premaxillaries is occupied by the nasals. These bones representing the neural spine of the rhinencephalic vertebra, are subject to greater variety than the centrum, and judging from the discrepancies that occur in the few crania of the elk I have had an opportunity of examining, the variations in that species are more frequent than in other deer. In our specimen the right nasal is shorter than the left one, the transverse facial suture being rendered irregular by the antinial projection of a short angular process of the frontal on that side. The cranium of one American elk in the museum of the College of Surgeons in London agrees with ours in this respect, while in another in the same collection there is a triangular mesial bone interposed between the nasals for nearly their whole length, this skull having, in fact, three nasals. In the skull of a European elk, also in that collection, this intercalated bone is smaller and more irregular in shape, and looks like a large sesamoid bone. The nasals of our specimen differ from all the three just mentioned in having a suborbicular bone, half an inch in diameter, united to the antinial extremity of each of them by suture. With respect to the general form of the nasals of the muswa, they are rather broad in a lateral direction, and much arched, not regularly, but abruptly bent, so that each bone has a defined lateral as well as a coronal surface. By the abbreviation of the nasals, much of the interior structure of the nostrils is exposed in the skeleton. . . . The breadth of the face at the most protuberant parts of the maxillaries is less in the muswa than in the European elk, as I ascertained by comparing the crania in the College of Surgeons, and as Mr Queckett had previously observed. . . . Between the rows of the molars the palate is moderately concave transversely, and slightly convex longitudinally. It measures  $2\frac{1}{2}$  inches across at the first premolars, and  $3\frac{1}{2}$  inches at the last molars. In length, the entire molar series is 6 inches, while the distance from the first premolar to the tip of the premaxillary is  $9\frac{1}{4}$  inches. Anterior to the premolars the palate is narrowed to an almost semicircular channel, bounded by thin ridges of the maxillary, but widens and flattens again where it is formed by the premaxillaries."

<sup>1</sup> *Aspects of the Head.*—An aspect towards the plane of the ridge of the occiput is *inial* ; towards the plane of the corona, *coronal* ; towards the base, *basilar* ; or towards the side, opposite the inion or ridge of the occiput, *antinial*.—*Professor Barclay.*

Sir John Richardson states that the breadth of face, at the most prominent part of the maxillaries, is less in the *muswa* than in the European elk; he is, therefore, inclined to think the American elk distinct. I have already mentioned that naturalists now believe them to be the same species. Sir John thus describes—

*The Dentition of the Muswa.*—"Incisors  $\frac{2}{3}$   $\frac{2}{3}$ , Canines  $\frac{1}{1}$   $\frac{1}{1}$ , Premolars  $\frac{2}{3}$   $\frac{3}{3}$ , Molars  $\frac{2}{3}$   $\frac{3}{3}$ ; total  $\frac{16}{16}$   $\frac{16}{16}$ . A complete saw is formed by the very acute cusps of the molars. Each of the maxillary molars has a minute projection or denticle on the mesial aspect of the posterior lobe, and the lateral surfaces of both molars and premolars have a strong inclination mesiad. The inclination in the opposite direction of the mandibular molars is not so great, and it is only the first mandibular molar that has the accessory denticle, situated, of course, on its lateral aspect. No more effective instruments could be devised for cutting the flexible willow-twigs on which the animal browses than its molar series of teeth, and they retain all their sharpness in use. The incisors are also acute-edged, and differ little from one another in size, the unciform canine, however, and the tooth which adjoins it, being a little narrower than the middle pair. There are no vestiges of the upper canine which exists at the maxillary in both male and female reindeer.

"*Antlers of the Elk or Muswa.*—These extraordinary deciduous growths take their origin in the lateral processes of the frontal, which project about an inch and a half from the sides of the skull. A prominent ring, rough with blunt wart-like projections, marks the commencement of the antler, and is finally, by obliterating the nourishing arteries, the cause of its fall. Beyond the ring there is a stem, round at the beginning, but becoming speedily more and more compressed, until it expands into a large palmated plate, which is so curved that its inial and antinial halves make an angle with each other of 130 degrees, the curve being, however, gradual, rather than sharp, and having its apex situated about three inches inial of the axis of the stem, thus dividing the palm into two unequal planes. The antinial expansion rises coronad, with a slight inclination antinial, but not so much as to cause it to pass the line of the frontal borders of the orbits, while the direction of the inial and larger portion is, after the curvature becomes complete, nearly directly inial. The large palmated portion of the antler terminates in a number of short snags, with sinuses of various depths between them, varying in number according to the age of the animal."

In the specimen described by Sir John Richardson, there were eleven short snags on one horn, and fourteen on the other; the longest snags were the pair that stand nearly in the axis of the stems, and their tips were 22

inches from the sagittal suture, or 40 inches from each other. From the antinial snag to the last inial one, the distance was 27 inches in one antler, and nearly 2 inches less in the other. The front snags of the two antlers were  $10\frac{1}{2}$  inches apart, and the two most inial ones nearly 28 inches. The weight of the antlers with the skull and mandible was nearly 24 lbs. avoirdupois.

I add a few of the dimensions of the skull given by Sir John Richardson, which will show its close correspondence with my specimen:—

*Dimensions of the Skull of the Muswa (by callipers).*

	Inches.
Length of the skull from the antinial end of the premaxillary to the occipital ridge, . . . . .	21·7
Length from the same point to the transverse suture at the root of the nasals,	13·7
Length from the transverse suture to the occipital ridge mesial line, . . . . .	9·7
Breadth at the orbits' inial edges, . . . . .	8·7
Breadth at the orbits' basal edges, . . . . .	8·5
Breadth at the orbits' antinial edges between the projecting corners of the lachrymals, . . . . .	7·2
Breadth of frontals between orbits and antlers, . . . . .	7·8
Breadth at the widest part of the squamosal adjoining the paroccipitals,	6·5
Breadth between the outsides of the zygomatic arches, . . . . .	8·1
Distance between the lateral edge of one condyle to that of the other on the inial aspect, . . . . .	3·7
Distance between the occipital crest and the basilar edge of the foramen magnum on the mesial line, . . . . .	5·2
Distance between the basilar edge of the foramen magnum and the antinial end of the basi-sphenoid, . . . . .	3·8
Breadth of the shoulders of the basi-occipital, . . . . .	2·4
Distance between the points of the exoccipital spinous processes, . . . . .	3·7
Greatest width of the opening to the posterior nostrils, . . . . .	1·5
Width of the maxillæ at the fangs of the first and second true molars, . . . . .	6·0
Distance between the roots of the incisors and the posterior border of the mandibular condyle, . . . . .	19·2
Distance from the same point to the inial curve at the angle of the mandible,	18·7
Rise of the coronoid process above the surface of the condyle, . . . . .	2·7
Chord of the premolar and molar series, . . . . .	6·4
Distance from the roots of the medial pair of incisors to the first premolar,	8·0
Distance from the last molar to the inial curve of the jaw, . . . . .	4·4

NOTES OF THE OCCURRENCE OF THE ELK (*CERVUS ALCES*), IN  
THE BRITISH ISLANDS.

I. SCOTLAND.

I shall now notice in detail various instances of the discovery of the true elk, *C. alces*, in the British Islands. It is only within a very few years that our naturalists have actually taken cognizance, or been satisfied of, the existence of the true elk in Britain; therefore, when one of our older naturalists, the distinguished Professor John Fleming, D.D., refers, in his "*History of British Animals*," Edinburgh, 1828, 8vo, to two of the earliest notices, which I shall describe, as being stated to be the discovery of the remains of the elk; he never seems even to consider the possibility of its being really the true elk, but states—"Whether these two examples from marl beds should be referred to the fallow deer or the Irish elk, may admit of some doubt, though it is probable that they belong to the former."—*British Animals*, p. 27.

The first four instances of the occurrence of the remains of a deer designated the elk which I shall notice, seem to have been overlooked by naturalists. From the general description of these specimens, I am rather inclined to attribute the most of them to the *Cervus alces*, especially as very few instances of the discovery of remains of the *Cervus megaceros*, the Irish elk, have been recorded in Scotland.

MID-LOTHIAN.

*Duddingston Loch*.—In the "*Account of the Institution and Progress of the Society of the Antiquaries of Scotland*," by William Smellie, Edinburgh, 1782, 4to, we have a printed list of the first donations made to the Museum of the Society. The second donation in this published list, under the date Jan. 16, 1781, was a very remarkable one; it consisted of a great quantity of bronze weapons, and remains of man and animals which were discovered in a marl bed at the bottom of Duddingston Loch. Among these relics were horns of deer, some being at the time distinguished as of the elk, and therefore, undoubtedly, differing from the common red deer found along with them. Unfortunately, none of these horns have been preserved. They were probably broadly palmate horns, and might be correctly designated as belonging to the elk, as various good



naturalists were, at that time, members of the Society, and the remains of this animal have since been found in other marl beds in Scotland.

At the early date of this donation all bronze weapons were believed by antiquaries to be of Roman manufacture, and, accordingly, these are described as Roman; those in the Museum of the Society belong to the ordinary class of early bronze weapons, spear-heads, and leaf-shaped swords.

I annex a copy of the donation, which will show the extent of the discovery, and might well tempt modern antiquaries to make an additional search in a locality so close to our Scottish metropolis:—

“By Sir Alexander Dick of Prestonfield, Bart.

“No. 2. A quantity of Roman arms, consisting of twenty-three pieces of the heads of the hasta and jaculum; twenty pieces of the blades, and nine of the handles of the gladius and pugio; a ring, three inches in diameter, fastened to the end of a staple; and a mass of different pieces of these arms, run together by fire, all of brass; skulls and other human bones, together with the horns of animals of the deer and elk species, dragged out of the middle of a bed of shell marle at the bottom of his loch of Duddingston.”

“By the Secretary.

“No. 3. A drawing of such of the above arms as are entire.”—P. 39.

Here, then, we have remains probably of the elk apparently associated with the bones and weapons of man.

*Greycrook.*—At p. 54 of the same work, we have the following donation recorded, under the date July 5, 1781:—

“By Mr James Muirhead,

“No. 63. A skeleton of a palmated head, with very large horns, projecting both before and behind, dug up lately on the farm of Greycrook, near Cramond, occupied by Mr Henry Sawers, and found buried eight feet below the surface, covered with five feet of marle, above which was three feet of moss.”

Unfortunately, this skull is not now to be found in the collection; but, from the description so particularly detailed in the donation list, there can be little doubt it had been the skull either of the *Megaceros Hibernicus*, or probably the true elk, *C. alces*.

## FORFARSHIRE.

*Brechin—Trinity Muir.*—In the second part of Smellie's "Account of the Society of Antiquaries of Scotland," and in the list of donations to the Museum, under the date of July 1, 1783, we have recorded a donation :—

"By Mr George Aitkenhead,

"No. 521. The broad upper part of the horn of an elk, dug up *anno* 1779, seventy-six feet below the surface of the ground, in Trinity Muir, in the heart of a marle bed, which, besides being covered with several strata of earth, clay, and sand, each between six and eight feet in thickness, had over them all a covering of moss to the height of thirty feet."

## BERWICKSHIRE.

*Dunse.*—In the same second part of Smellie's "Account," in the list of donations to the Society of Antiquaries, we have a donation under the date Sept. 2, 1783 :—

"By Mr William Mabon, cutler in Dunse,

"No. 552. A large palmated horn, twenty-seven inches in length, and nine inches in breadth."

It is not stated where it was found, but it is not improbable that this horn was found in Berwickshire, the same county in which the skull of the elk described by me was discovered. It is very unlikely that the horn of a foreign elk would be presented to the Museum of Antiquities.

These instances are probably among the first that have been recorded of the elk as found in Scotland.

## FORFARSHIRE.

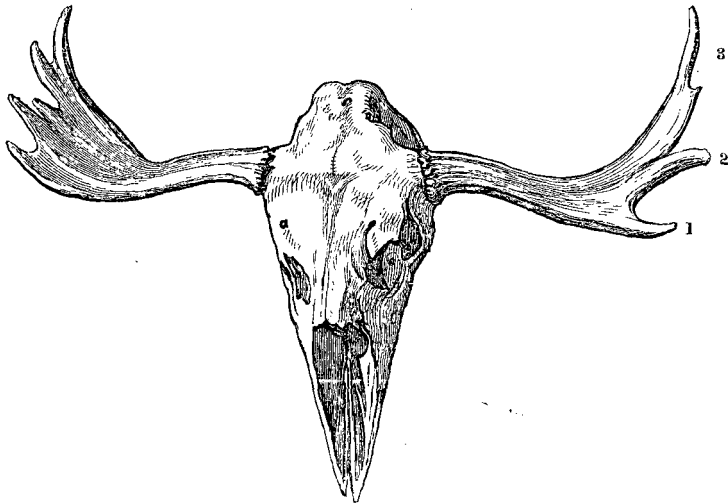
The next recorded example of the discovery of the elk which I have to describe is one of those so doubtfully referred to in the "British Animals." Some years ago, when looking over the first volume of the Transactions of the Royal Society of Edinburgh, I made, as I conceived, a discovery of some little importance. A detailed history of the Society is given in the Transactions; at p. 36, under the date of January 1785, it is stated that,—

"Dr Walker (at that time Professor of Natural History in the University) laid before the meeting a collection of specimens of Natural His-

tory, and other curiosities which had been presented to the Royal Society. These are enumerated in the list of donations at the end of Part I. of this volume." Turning to the end of the volume, at p. 77, we find an appendix, with the list of "Donations presented to the Royal Society of Edinburgh," and among these, under the date 1788, one: "By the Honourable Lord Dunsinnan. A painting in oil of the head and horns of an elk, found in a marl pit in Forfarshire, No. 44." The following note at the end of the donation list informs us of the meaning of this appended, No. 44. "*N.B.*—The numbers refer to the order in which the articles are deposited in the Museum of the University of Edinburgh."

When a medical student attending the Edinburgh University many years ago, being fond of the study of natural science, I attended several courses of lectures under Professor Jameson, then the Professor of Natural History: as one of his students, I had free access to the Natural History Museum of the University, and spent much time in examining the various interesting objects it contained. There was one section of the Museum which had an especial interest for me, an upper gallery set apart from the *mare magnum* of the general collection, and devoted to the illustration of our local zoology; this was "The British Gallery" of the collection; here, with Fleming's "British Animals" for my guide-book, I spent many days. Now, over the inside of one of the doors of this gallery there was hung a painting in oil of the skull and horns of an elk. I wondered how it happened to be there; it seemed to me that it was but a poor specimen of an elk, the horns being small and undeveloped, and therefore it could scarcely have been thought worth making a painting of at least as a characteristic specimen of the animal, unless, indeed, it had been found in some remarkable locality. I could, however, learn nothing as to its history, and was obliged to give up my inquiries for the time. By-and-bye, when I began to look a little into the account given in the Transactions of the Royal Society, and discovered that the oil painting of the elk formerly presented to the Society, of which I could learn nothing, had been actually presented to the Museum of the University. I had then no doubt that I had now discovered the cause of the painting of the elk's head being hung up in the British gallery of the Museum, and that this was actually the sketch in oil of the elk's head found in Forfarshire, and presented to the Royal Society by Lord Dunsinnan

in 1788. Some years ago, I asked Mr J. B. Davies of the Museum of Science and Art, to which the old Natural History Museum of the University had been transferred, what had become of this old painting of the elk's head, telling him my history of it; and was glad to find that, though not now exhibited, it was still to be got when wanted. Mr Davies informed me nothing was known or recorded of its history, and, at my request, he made a search into the earlier records of the Museum, but



Painting in oil of Elk's Skull (*Cervus alces*) found in Forfarshire.

could find no reference to it anywhere. The Director of the Museum, Mr Archer, has kindly allowed me to exhibit this clever painting of the skull to the Society (and I have given a copy of it in the accompanying woodcut). I have no doubt it is this early recorded example of the true elk or *C. alces*, and one of the first authentic instances discovered in Scotland, or indeed in Britain.

It is interesting also to find its occurrence in this county of Forfar, where one of the still earlier and perhaps more doubtful instances of its discovery has been already referred to.

## PERTSHIRE.

*Kinloch, Marlee.*—The other instance of the supposed discovery of remains of the elk, alluded to by Professor Fleming, is published in the old "Statistical Account of Scotland," vol. xvii. p. 478, Edinburgh, 1796. In the account of the parish of Kinloch, Perthshire, by the Rev. John Brodie, it is stated that :—"A pair of very large deer's horns were found a few years ago, in a bed of marl, in Mr Farquharson's marl pit at Marlee. From their superior size and palmed form they appear to be the horns of the elk-deer, antiently the stately inhabitant of the Caledonian forests."

Professor Richard Owen, in his valuable and beautiful work, "A History of British Fossil Mammals and Birds," published in London in 1846, does not include the true elk, *C. alces*, among his list of British mammals, no authentic instance of its occurrence in Britain being at that time generally known to naturalists. Under his description of the Reindeer, however, he alludes to those two instances which I have just detailed, taking the reference from Fleming's "British Animals." Professor Owen refers also to notices, by Mr Patrick Neill, of the beaver, and deer's horns of large dimensions and branched, being got in the marl of this same loch of Marlee, along with very deeply grooved leg bones. From the latter discovery, he is inclined to suppose both it and the former examples may refer to horns of the reindeer, as he considers these leg bones probably do. "The reindeer is most remarkable," Professor Owen says, "for the depth of the grooves, especially the posterior one of the metatarsus. In the *Megaceros Hibernicus*, however, the median longitudinal groove is wider and shallower on both the fore and back part of the metacarpals and metatarsals than in any other species of deer." The metatarsal bones of the elk, I may remark, are also grooved, though not so deeply as in the reindeer.

Professor Owen says—"Dr Fleming ('British Animals') cites a pair of deer's horns found in a marl-pit at Marlee, which, from their superior size and palmed form, were supposed to be the horns of the elk-deer; he refers also to the donation to the Royal Society of Edinburgh 'by the Hon. Lord Dunsinnan, of a painting in oils of the head and horns of an elk found in a marl-pit, Forfarshire,'" and adds: "Whether these two examples from marl beds should be referred to the fallow-deer or the Irish elk, may admit of some doubt, though it is probable that they

belong to the former." Professor Owen remarks—"The superior size of the palmed antlers militates against their reference to the ordinary fallow-deer," as Professor Fleming had supposed probable; "and the observation of the deeply grooved metacarpal or metatarsal bones, from the same marl deposit, renders it desirable to compare the specimens, and the oil painting, with the large palmed varieties of the antlers of the rein-deer, figured by Cuvier in the fourth volume of the 'Ossemens Fossiles,' 4to, 1823, Plate iv. figs. 11, 18, and 16." The last number is apparently a misprint for 26.

In a paper of mine, being "Notices of the Remains of the Rein-deer found in Scotland," &c., published in the Proceedings of the Society, vol. viii. p. 186, 1869, I quoted some of these remarks of Professor Owen on the *deer's horns of large dimensions and branched*, found at Marlee, along with *very deeply grooved leg bones*, and described by Mr Patrick Neill in 1821, which Professor Owen included under his notice of the reindeer, in his "British Fossil Mammals." These remains, I considered, were, in all probability, those of a reindeer.

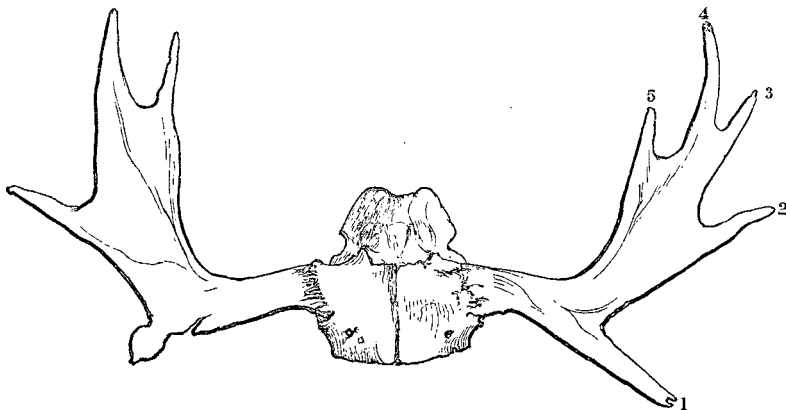
In the same paper, I also quoted from the "Old Statistical Account" this notice of the *very large palmed deer's horns*, found at a much earlier date, in the same locality, as probably having been also those of the reindeer. Now, however, from the various instances recorded of the true elk, as well as from the description of the bones themselves, I am inclined to consider these earlier remains really were, as indeed they were described at the time by the Rev. John Brodie, those of the elk-deer.

It is at least highly probable this might have been the skull of the true elk, *C. alces*. The great fossil *Megaceros hibernicus*, the Irish elk, with its large palmated horns, being, as I have already stated, more rare in Scotland than the true elk appears to have been, judging by the discovery of their fossil remains.

As suggested by Professor Owen, I have now been able to make the comparison with the oil painting, and, as I have already stated, it is undoubtedly a picture of the skull of the true elk, *Cervus alces*, the history of which I have already so fully detailed.

*Auchtergaven, Airleywight.*—Mr James Smith of Jordanhill, in his

“Researches in Newer Pliocene and Post-Tertiary Geology,” Glasgow, 1862, in a paper on the “Phenomena of the Elevated Marine Beds of the Basin of the Clyde,” p. 42, says, “In Scotland the remains of the elephant, the stag, and the fallow deer, all probably of extinct species, have been found in the diluvial drift or till ; and in marl pits or marine beds, those of the rhinoceros, the Swedish elk (*Cervus alces*), and the Irish elk (*C. megaceros*). It may be questioned, however, whether either of the elk species belong to the tertiary epoch.” I make this quotation simply on account of his reference to the *C. alces*, and therefore only refer to it. He



Skull of Elk (*C. alces*) found at Airleywright, Perthshire. [From above.]

adds in a foot-note, “There is a head and horns of the elk from a marl pit in Perthshire, preserved in the Hunterian Museum.”

(Since this paper was read, I wrote Professor John Young, M.D., of the Glasgow University, asking for information about the specimen in this Museum ; Professor Young tells me, with regard to the history of the elk referred to by Mr Smith, he was fortunate to have got quite recently, through William Kidston, Esq., 50 West Regent Street, Glasgow, the

following detailed account of its discovery, from Thomas Wyllie of Airleywight, Esq., on whose property it was discovered. Mr Wyllie writes to Mr Kidston,—“ Airleywight, 15th February 1872,—In answer to your note, I have to say that I have a perfect recollection of the finding of the elk's head and bones, as well as the head and bones of a large species of deer; they were found at nearly the same time and place, it was about 1821-22, or 23. They were got in the mossy hollow ground to the north of this house in digging for marl. The first section was moss of from 10 to 12 feet in depth; then 2 or 3 feet of an inferior kind of marl; then a bed of rich plastic red clay of about 1 or 1½ feet in thickness; and



Skull of Elk, from Airleywight, Hunterian Museum. (From left side, the skull being slightly tilted over to right side.)

last, the rich marl for which the work was done. It was between the moss and inferior marl strata, and partly in both, that the heads and bones were found. The heads were pretty perfect when got, and the horns almost entire, showing distinctly the species to which each belonged, the one evidently of the elk kind; the other just like our present red-deer heads, but of rather larger size than we now see. The bones found along with the elk's head showed it to have been a very large animal; it



must have been, at least, as tall as a good sized ox. Your father, when here on one of his visits, took the head and horns of the elk with him to Glasgow, and gave them to the Museum in connection with the College, and, if I don't forget, I saw them there in 1830. At the time these remains were found, little attention was paid to that sort of thing; they were brought up to the house here, and stuck up on the back of a rustic chair, of course exposed to all changes of weather, and soon got much decayed. I have never heard of anything of the same class being found in this district. It is now many years since we used any of the marl; indeed, it was just the last pit opened that contained the remains."

The upper part of the skull and the horns are preserved. I am indebted to Professor Young for the accompanying sketches of it, kindly taken by him for me, with the camera lucida. It shows the palmated horns, the first antler of the left horn being single and rounded (1), the second projecting outwards on each side (2), and behind, the third or palmated portion, displaying three snags on the left and two on the right horn (3, 4, 5). Professor Young has also favoured me with the following measurements:—

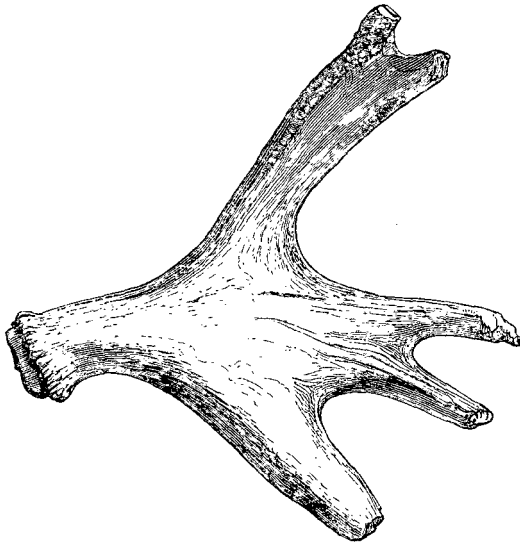
From vertex to occipital plane, . . . . .	4.75 inches.		
From upper margin of occipital plane to <i>foramen magnum</i> , . . . . .	3 ..		
From vertex to conical proturbance on transverse ridge, . . . . .	2.5 ..		
From one proturbance to the other on transverse ridge, . . . . .	4.25 ..		
From vertex to burr, . . . . .	3.75 ..		
Girth on proximal side of burr, . . . . .	{ Right 8 ..		
	{ Left 8.75 ..		
Girth of beam $1\frac{1}{2}$ in. beyond burr, . . . . .	{ Right 6.5 ..		
	{ Left 6.25 ..		
These are chords of arcs.	{	Vertex to first tyne, . . . . .	Left 15.5 ..
		Vertex to angle of first tyne, . . . . .	{ Right 13.5 ..
			{ Left 11.5 ..
		,, to point of second tyne, . . . . .	{ Right 20.25 ..
			{ Left 19 ..
		,, ,, third tyne, . . . . .	{ Right none.
			{ Left 20.12 ..
		,, ,, fourth tyne (centre), . . . . .	{ Right 20.25 ..
			{ Left 20.5 ..
		,, ,, fifth tyne, . . . . .	{ Right 17.5 ..
	{ Left 16.12 ..		
Vertex to fourth tyne along centre of palm, . . . . .	{ Right 28 ..		
	{ Left 28 ..		

Span between tips of second tynes, . . . . .	38 inches.
„ „ „ fourth tynes, . . . . .	31 „
Breadth of palm at distal side of root of second tyn, R. & L.	4·25 „
Four tynes on right, five on left.	
Breadth of skull in front of root of burr, . . . . .	8·25 „ )

## SUTHERLANDSHIRE.

*Strath Halladale*.—I am indebted to the Rev. J. M. Joass, of Golspie, for the notice of the occurrence of the elk in this northern county. A horn of the elk is in the collection of His Grace the Duke of Sutherland, at Dunrobin Castle, and, through Mr Joass' politeness, I got the specimen for examination. It is a shed palmated horn of the left side of the head, and measures  $14\frac{3}{4}$  inches in greatest length, directly outwards along the curve of the beam, from the burr of the horn to the point of the second antler; and  $5\frac{3}{4}$  inches in circumference just above the burr. The beam is broad, expands outwards, and the horn then divides into three portions, separated by deep notches; on its anterior margin it gives off first at about  $5\frac{1}{2}$  inches distance from the burr, a flattened snag, about  $2\frac{1}{2}$  inches broad; next a broader snag or antler, the continuation of the beam of the horn, which measures  $3\frac{1}{4}$  inches in breadth, and divides at its extremity into two terminal branches, the first measuring  $14\frac{3}{4}$  inches in length from the burr of the horn, and the next  $15\frac{1}{2}$  inches, and, in the hollow or notch between this bifurcated antler and the first antler of the horn, the palm measures 6 inches across in greatest breadth. Beyond this second antler there is given off a third branch, palmated in character, which runs backwards and outwards, and measures only about 2 inches across at its base, and terminates in two short snags; it measures along the curve of the horn 16 inches in total length from the burr. (The horn is well shown in the annexed drawing, although, unfortunately, from the artist elevating too much the elongated back part, the hollowed and curved character of the rest of the horn is rather diminished in appearance). It was found about forty years ago, in the formation of a cutting made for diverting the course of the river, in Strath Halladale (a river valley running north through the eastern part of the county, and opening to the shores of the North Sea at the bay of Melvich), and was preserved by Mr Robert Rutherford, Helmsdale, in

whose possession it remained until it was recently presented, through the Rev. Mr Joass, to the Duke of Sutherland's Museum at Dunrobin. Mr Rutherford mentions that the horn was quite perfect when it was discovered. The upper part of the beam and the points of some of the tines now show marks of the teeth of rats or mice, which have gnawed



Elk's Horn (*Cervus alces*) found in Strath Halladale, Sutherlandshire.

them; this, however, only occurred since it came into his possession, and lay neglected in a merchant's storehouse. The cutting where the horn was got was partly through clay and partly through gravel, and possibly peat; but Mr Rutherford cannot now say definitely in which of these, or at what depth it was found. Mr Rutherford was inclined to think the

ground cut through might at some former period have been part of the bed of a lake. The horns of a very large red-deer, *Cervus elaphus*, were also found in the course of the same cuttings, and are now in the Museum at Dunrobin; they display no less than some twenty-five or twenty-six points. Mr Joass writes to me that these large red-deer horns measure 3 feet along the curve on one side, and about 11 inches in circumference above the burr. Some of the local names, he says, suggest a swampy locality near a haunt of deer, *e. g.*, "Cnoc na Dalach baite," the knoll of the flooded field; "Cuil an Fhearna," Alder nook; "Clais an Daimh," Stag's swamp; "Loch na Seilg," and "Allt na Seilg," loch, and stream of the hunting. There are two Pictish towers near the place where the horns were found, and many tumuli and hut circles throughout the strath suggesting a large early population.

This horn has almost the look of the horn of a recent elk, having apparently lost little or nothing of its animal or mineral constituents. So that, judging from its appearance, we are led to consider it must either have belonged to a recent elk; or that the elk lived down to a comparatively late period of time in this most northern part of Scotland, and perhaps to a still later period here, than in the more southern localities in which its remains have been discovered.

#### BERWICKSHIRE.

*Coldingham.*—The series of Scottish instances of the discovery of the remains of the elk was begun with this county, and I now return to it before I close. In the "Proceedings of the Berwickshire Naturalist's Club, for 1860, Alnwick, 1863," there is a communication "On Fossil Antlers of the Roebuck and Gigantic Irish Elk found at Coldingham in 1859. By James Hardy (with a plate)." Mr Hardy states, that "In October 1859, while cutting a new course for a small burn, called the Court Burn, that runs through the Weaver's, or Tumbling Down Green, in Coldingham, close by the footpath that passes to the east of the glebe, the workmen came upon two antlers of the Deer family, embedded at the depth of five or six feet amidst a deposit of gravel, earth, and large boulders, similar in appearance to those collections of water-worn stones and pebbles that underlie the common soil in many parts of Berwickshire." Mr Hardy believes these fossils to be the first that have been detected in the

Berwickshire superficial gravels. One of the antlers was nearly perfect, and was that of a fully developed roe-deer (*Cervus capreolus*). The other horn Mr Hardy considered to belong to the Irish elk (*Megaceros Hibernicus*), as yet unrepresented, he says, in Scottish formations. A figure of the posterior surface of this latter horn is given in an accompanying plate: it is a portion of a palmated horn, which is broken across towards the cranial extremity of the horn, and the palm expands at the opposite extremity into four terminal snags. It measures  $2\frac{3}{8}$  by 2 inches in diameter at its broken extremity, and  $9\frac{1}{4}$  inches in circumference, and 12 inches in circumference below the branches; from this broken part to the top of the front or shortest antler it measures 10 inches; the second much about the same, or only a very little longer; the third  $10\frac{1}{2}$  inches; and the fourth or longest, to its tip, which is fractured, 14 inches. The width of the palm measured in front is 9 inches, and 10 across the back, and the breadth across the tips of the branches 15 inches. Mr Hardy states that—"The specimen bears only a general resemblance to those given of the *Megaceros* in 'Owen's Fossil Mammals, &c.,' figs. 184 to 186, and that figured in Jameson's edition of Kerr's translation of Cuvier's 'Theory of the Earth.'" I must say I agree with him in this opinion, it seems to me to bear a much closer resemblance in character to the horn found in Strath Halladale, which I have figured and described as an antler of the true elk (*Cervus alces*). The latter horn is about the same size, or only a very little longer, the horn being perfect; and differs in the longest or innermost antler which terminates in two small points. I would therefore be inclined to consider this as another example of the occurrence of the true elk in Scotland. Mr Hardy refers in a footnote to what he supposes may be another example of the Irish elk found in Scotland, but which perhaps is quite as likely to have been, as it is described, that of the true elk or moose-deer. It occurred in the adjoining county of

#### HADDINGTONSHIRE.

*North Berwick.*—In volume first of "Hill-side and Border Sketches," by W. H. Maxwell, London, 1847, at page 317, when referring to the neighbourhood of North Berwick, he says, giving the sentence as a quotation between inverted commas, but no reference to the authority from which he quotes,—“A medal of Trajan, a fibula, a patera, and a

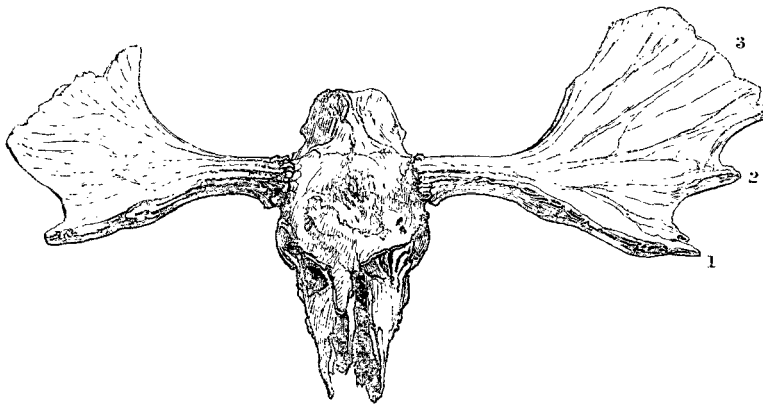
horn of a moose-deer" were discovered. The notice is of much interest, supposing it to be correctly stated, as giving us another example in Scotland of the remains of the moose-deer or true elk found associated with human remains, and apparently of the Roman period.

#### ROXBURGHSHIRE.

*Hawick, Williestruther Loch.*—Since this paper was read, I am indebted to Sir Walter Elliot, of Wolfelee, K.S.I., for being able to describe the skull of a noble specimen of the elk (*C. alces*), which was discovered in the year 1828 in Roxburghshire. It was found, along with other bones of the skeleton, in a peat moss on the edge of a small loch called Williestruther or Willie Struther's Loch, in the valley of the river Slitrig, not far from his residence of Wolfelee. A skull of the ancient small ox (*Bos longifrons*), and some other bones, were found at the same time in the moss. In answer to my enquiry as to whether this skull was found in the peat, or in the marl under the peat, Sir Walter Elliot informed me that he was in India at the time of its discovery, and was not therefore able exactly to reply to my question, but he was inclined to believe it was found in the peat itself. The brown colour and softened character of the skull is decidedly in favour of this opinion. It is, as far as I am aware, the finest specimen of the true elk that has yet been discovered in the British islands. (See the annexed figure.)

The skull had been very perfect when discovered, the terminal bones of the face and the tips of the antlers having been unfortunately, from their softened state, broken off in digging out the skull; the large broad palmated horns stand boldly out from the sides of the skull, and the series of teeth is nearly perfect; unfortunately the lower jaw has not been preserved. The skull is large and massive. The frontal eminence between the horns being broad and prominent, although not so much so as in the Berwickshire specimen, and the central line at the sagittal suture rises up into a prominent crest, the frontal bones in front are rather roughened as if from injury, and there is no distinctly defined frontal depression; the anterior part of the bone rises upwards towards the transverse suture at the roots of the nasal bones. One of the rather short nasal bones is present, and, as in the instances mentioned by Sir John Richardson, we have a variety in the arrangement of the nasal bones.

There is here a third narrow bone,  $1\frac{3}{4}$  inch in length and  $\frac{1}{2}$  an inch in greatest breadth in the line of the transverse suture; it is pointed at each extremity, and is inserted between the extremities of the frontal bones in the extremity of the sagittal suture; it projects also anteriorly for about half an inch between the roots of the nasal bones. The actual shortness and small size of the nasal bones, as contrasted with the great size and length of the nasal cartilages and projection of the



Skull of Elk (*Cervus alces*) found at Williestruther Loch, Roxburghshire.

muzzle, is a very striking peculiarity of the *C. alces*. In this skull the nasal bones are perhaps slightly broken; they measure only 3 inches in greatest length, by rather more than  $1\frac{1}{2}$  inch in greatest breadth.

In the skull of a female elk from Norway, kindly lent me for examination by Professor Duns of the New College, the nasal bones measure  $3\frac{3}{8}$  inches in length; and the distance from the transverse frontal suture at the base of the nasal bones to the anterior extremity of the premaxillaries is  $13\frac{3}{8}$  inches, so that the length of the nasal bones is less than a third of the total length.

In a skull of the common red-deer (*C. elaphus*), the nasal bones measure nearly  $4\frac{1}{2}$  inches in length; and from the transverse suture

at the base of the nasal bones to the anterior extremity of the pre-maxillaries it measures 7 inches, the nasal bones being more than half of the whole length of the space.

In skulls of the rein-deer (*C. tarandus*), also in my possession, the nasal bones measure fully 4 inches in length, and from the transverse suture at the base of the nasal bones to the anterior extremity of the premaxillaries, is  $7\frac{1}{2}$  inches; the nasal bones being thus rather more than half of the whole length.

This elk has the superior maxillaries tolerably perfect, but the only part of the pre-maxillaries that remain is the posterior process, which is inserted into the front border of the nasal fossæ, and terminates at the distance of an inch from the nasal bones, the superior maxillary completing the rest of the border of the nasal fossa, and running up to its suture with the nasal bones; the anterior parts of the premaxillaries are unfortunately wanting. The breadth of the maxillaries at the fangs of the first and second true molars is half an inch more than in Sir John Richardson's specimen, and so far would seem to show that the face was broader in the European elk than in the American; but, as this specimen of the Scottish elk is larger altogether, it must be considered too slight to imply any difference in character. The back part of the skull is nearly perfect, and well marked in its characters, closely corresponding to Sir John Richardson's description of the American *muswá*. The surface of the occipital bone, immediately behind the occipital crest and notch, is very rough along its whole upper outline in a belt of nearly  $\frac{3}{4}$  of an inch in breadth; and the rough oval portion in the middle line for the attachment of the ligamentum nuchæ, terminates below in two short and rounded processes.

*Horns of Elk.*—The large horns spring from very short frontal processes not more than  $\frac{3}{4}$  of an inch in length, the ring of the burr measuring not more than 1 inch from the back part of the ring of the orbit, and the process itself is rough and furrowed almost like the horn beyond the burr.

In the right horn, the rounded beam, strong and rough, proceeds outwards, and, at about 6 or 7 inches distance from the burr, begins to expand into the palmated portions of the horn; the portion to the front being the first, rises up in a broad blade forwards, about  $7\frac{1}{2}$  inches broad across its base, and curves rather backwards at the top, where it terminates in three or more short snags, with very shallow notches between them. There is then a



wide and deep sinuosity or notch between it and the posterior part of the blade of the horn, the cylindrical second snag or portion being here wanting, or rather altogether taken up by, and forming the front of the next or third and large portion of the horn, which measures at this part nearly 18 inches from the burr ; the third portion expands backwards and outwards, being nearly 10 inches across in greatest breadth, and terminates like the other horn in a series of short snags, which, like it, are also unfortunately all broken off (see the preceding figure).

In the left horn the burr is rugged, and beyond it the cylindrical beam passes nearly horizontally outwards, expanding in front, at about the same distance as in the right, into a large and broad palmated portion fully 9 inches in breadth at the base (in the line of the beam), which rises boldly upwards and terminates in four or more short snags with very shallow and wide notches or sinuosities between them.(1). Next we have the snag which projects outwards in the line of the beam, in this instance only free for about 2 inches at its extremity, which measures 18 inches from the burr of the horn (2). Behind this snag there is the larger expanded and palmated portion, separated from the last by a large notch ; it rises as it were from the whole back of the beam, about 10½ inches in breadth at the base, expands backwards and outwards to more than a foot in breadth, this part of the horn is also imperfect, and terminates in a series of snags along its outer border (3) ; unfortunately only a couple of these remain, with a very shallow notch separating the one from the other.

The series of *teeth*, premolars and molars, agrees in general character with those of the skull found in Berwickshire ; except that the last premolar has not the small projecting point or cusp on its exterior surface which is present in the skull from Whitrig bog. (See figure, *ante*.) The first and second molars of the right side display the distinct isolated ring of enamel, which, however, is formed as a loop of the enamel in the third molar ; in the teeth of the left side of the superior maxillary bone the isolated ring exists only in the first molar, and as a loop of the enamel in the other two molars.

The following table gives some of the measurements of this cranium :—

	Ft.	In.
Length from the occipital notch to the transverse suture at root of		
the nasal bones, . . . . .	0	10¼

	Ft.	In.
The nasal bones in greatest length, . . . . .	0	4
Length from transverse suture to premaxillary bone, . . . . .	0	4 $\frac{3}{4}$
Length from occipital notch to coronal suture behind frontal eminence, . . . . .	0	4 $\frac{1}{4}$
Length from occipital notch to inner margin of occipital foramen, . . . . .	0	4 $\frac{3}{4}$
Greatest breadth of temporal bones at projection behind auditory foramen, . . . . .	0	6
Breadth across frontal bone between burrs of horns, . . . . .	0	6 $\frac{1}{4}$
Breadth across forehead between burr and back part of orbit, . . . . .	0	7 $\frac{3}{4}$
Breadth across orbits in the line of the supra-orbital foramina, . . . . .	0	7
Breadth of superior maxillary bones at the projections at the fangs of the second true molars, . . . . .	0	6 $\frac{1}{4}$
Breadth of superior maxillaries at the infra-orbital foramina above the first premolars, . . . . .	0	3 $\frac{1}{4}$
Length of series of molar teeth, . . . . .	0	5 $\frac{3}{4}$
Breadth of palate in front between the first premolars, . . . . .	0	2 $\frac{1}{2}$
Breadth between the last molars, . . . . .	0	3 $\frac{1}{2}$
Horns—Circumference of beam above burr—right horn, . . . . .	0	6 $\frac{1}{4}$
Do. do. left horn, . . . . .	0	6 $\frac{1}{2}$
Length from extremity of the second snag, or portion of horn, to corresponding extremity of other horn (in a straight line), . . . . .	3	5
Length from sagittal suture to extremity of right horn, . . . . .	1	8 $\frac{1}{2}$
Do. do. left horn, . . . . .	1	9
Greatest breadth of right horn, from front to back across the palm (in a straight line), . . . . .	1	3
Greatest breadth of left (both imperfect), . . . . .	1	7
Breadth of occipital condyles across the back part, nearly . . . . .	4	0
The condyles are about $\frac{1}{8}$ of an inch apart in front, and about $1\frac{1}{4}$ inch behind.		

On comparing this large and comparatively perfect skull with that of the younger animal found at Whitrig Bog, I find very slight differences in the relative proportions of the skull. The principal one, however, is in the space between the burrs of the horns, or the breadth of the forehead, which, in this large horned specimen, measures only 6 inches across, being shorter or narrower than in the other, which measures 7 inches. The frontal processes are also rather shorter in this older animal. Can it be that as the horns increase in size and weight with age, they are developed more closely together from the frontal eminence, and thus bring their weight more to the centre of head, which is thus perhaps better balanced, and more easily carried by the animal?

I may also mention that the skull has had two large round holes recently bored through its forehead, to enable it to be put up as an ornament in the hall at Wolfelee. (These holes are not shown in the accompanying figure.)

## SELKIRKSHIRE.

*Selkirk Parish—Oakwood, on the Etterick.*—To the courtesy of the Right Honourable the Lord Polwarth, I am indebted for being able to record an example of the true elk, *C. alces*, found in this county. It was discovered in a bog on his Lordship's property of Oakwood, a few miles up the river Etterick above the town of Selkirk, and was brought, upwards of thirty years ago, by the Hon. Francis Scott to Mertoun House, Roxburghshire, where it is still preserved. The specimen consists of the upper part of the cranium with the horns, the nasal bones still remaining. The horns are not large, but are distinctly palmated. The right horn is the most perfect, the rounded beam passes outwards from the frontal bone, and soon expands into a palmated form, giving off a broad first antler in front, which terminates in three snags or points running upwards, forwards, and outwards; the second antler or continuation of the beam then runs outward, and rather upwards; and behind it you have the third antler, which runs backwards and upwards, forming the broader upper part of the palm of the horn; one snag remains on the outer side of the palm, but the rest are unfortunately all broken off. The left horn is of much the same character, with a broad snag to the front; then the second, a rounded snag or antler, or terminal part of the beam, which is broken; and behind it the third or broad palm of the horn, the snags being all broken off. The skull measures in length, from the occipital notch to the transverse suture at the root of the nasal bones,  $8\frac{3}{4}$  inches. The nasal bones are nearly 4 inches in length, and the two together measure about  $4\frac{1}{4}$  inches across at the upper part, and 3 inches across at their distal extremities. The skull measures between the burrs of the horn  $7\frac{1}{2}$  inches across, and between the supra orbital foramina  $4\frac{1}{2}$  inches.

Horns, greatest length from burr to extremity of second snag or terminal part of beam—Right, 1 foot  $4\frac{1}{8}$  inches; Left (broken),  $11\frac{1}{2}$  inches. Greatest breadth from front of first or front antler, across the palm to back part of expanded third antler—Right, 1 foot 5 inches; Left, 1 foot  $2\frac{1}{2}$  inches.

In the description of Selkirkshire, written by Mr William Laidlaw, which was published in the "Edinburgh Encyclopædia" of Sir David Brewster, Edinburgh, 1830, it is stated:—"It is likely that in ancient times the urus had been common, for skulls of that animal have frequently been found in the marl mosses along with those of the stag, and another extinct species of deer with palmated antlers, of a size which seem to indicate the bearers to have been as large as a blood horse. (Probably the same as the deer of Saomme of Cuvier)."

*Yarrow*.—The Rev. James Russell, A.M., in his account of the Parish of Yarrow, dated 1833, and published in the "New Statistical Account of Scotland," Edinburgh, 1845, states that:—"The skulls of the urus, described by Cæsar, and an extinct species of deer with large palmated antlers have been found imbedded in the marl mosses."

#### PEEBLESHIRE.

*Kirkcubbin*.—In the account of this Parish by the Rev. Alexander Kerr, dated 1839, and published in the "New Statistical Account of Scotland," it is stated that—"Not long ago, in digging for marl in the Mount bog, several horns of the elk, in a high state of preservation, were found."

#### II. ENGLAND.

##### NORTHUMBERLAND.

*North Tyne—Chirdon Burn*.—At a meeting of the Tyneside Naturalist's Field Club, held on 22d December 1861, a paper was read "On the Fossil Remains of some recent and extinct Mammalia found in the Counties of Northumberland and Durham. By Richard Howse." A series of horns and bones of various animals were exhibited, including the true elk and the Irish elk. The paper is published in the Transactions of the Society, Newcastle-upon-Tyne, vol. v. p. 111, 1863. Mr Howse stated that he now records, for the first time, he believes, the occurrence of the true elk in the fossiliferous deposits of England. He says,—“The former existence of the true elk or moose deer of the Canadians in our district, indeed I may say, in England, for its occurrence in any of the fossiliferous deposits of South Britain has not yet been recorded, rests on the authority of a very fine antler presented to the Natural History Society by Mr Walter Dodds, Hope

House, North Tyne." Dr Charlton, through whose kindness it was presented to the Museum, informed him "that it was found in Chirdon Burn, near the bottom of the recent peat formation, resting partially on the coarse gritty marl formed by the weathering of the subjacent strata." The horn, which is a shed horn belonging apparently to the right side of the skull, shows, judging from the figure given of it in an accompanying Plate, a short rounded beam which expands into a palmated portion in front, a smaller portion projecting outwards more in the line beam itself, and another larger and more expanded but unfortunately broken portion running backwards, and now terminating in three points or snags. The horn, however, is considerably broken; it is of a dark brown colour, and "measured, when perfect, from tip to tip, 2 feet, and from the burr to the farthest point about 2 feet 10 inches, round the burr 10 inches, and round the beam nearly 8 inches." Mr Howse also states—"The perfect appearance of the burr or boss shows it to have been shed, and the number of points or digitations indicate it to have belonged to an individual six or seven years old, and therefore immature, as it is said the elk does not complete the growth of its horns till the fourteenth year." It is also mentioned at p. 190 of the same vol. of the Transactions; that on a recent visit to Newcastle, Professor Owen stated "that this was the first and only proof he had seen of the occurrence of the moose in the fossiliferous deposits of England." Mr Howse refers in this paper to the Proceedings of the Berwickshire Club, 1860, and the description and figure by Mr Hardy of the antlers of the deer found at Coldingham, which he believes to belong to the great Irish elk. Mr Howse says—"We are inclined to think, from the drawing which accompanies this paper, that it belongs to the true elk." I have already referred to this elk found in Berwickshire, which I agree with Mr Howse in considering as an instance of the occurrence of the *Cervus alces*, rather than of the *Megaceros Hibernicus*.

#### ESSEX.

*Walthamstow—River Lea.*—The next instance of the discovery of the elk is described by Professor Richard Owen, in the "Geological Magazine," vol. vi. No. 9, Sept. 1, 1869, p. 389, in a "Note on the occurrence of Remains of the Elk (*Alces palmatus*) in British Post-Tertiary Deposits."

Professor Owen states, that at the publication of his "British Fossil Mammals (1846)," he had not obtained satisfactory evidence of the previous existence of the true elk in Britain. The first was that recorded in the "Transactions of the Tyneside Naturalists' Club, 1863. He was "now able to add to that notice, evidence of the extension of the localities of true elk's remains as far south as Walthamstow, Essex."

Excavations were being made for the East London Water Works, and these exposed sections of an old bed of the river Lea, near Walthamstow, "In this bed, at from 5 to 8 feet in depth have been obtained remains of *Bos longifrons*, *Capra hircus*, with remarkably fine horn cores, part of an antler 2 feet 8 inches long, of a reindeer (*C. tarandus*), and in another kind of deposit, as evidenced by the darker colour of the bones, and a thin partial coating of limy matter, were obtained the humerus, antibrachium, and metacarpus of an elk, closely corresponding with those of the existing Scandinavian species (*Cervus alces*, Linn; *Alces palmatus*, Auct.; and *Alces Europæus*, Hamilton Smith.) (I have not been able to discover any distinctive character of specific value between the North American and Scandinavian elks.) The length of the humerus is 1 foot 3 inches; the least circumference of the shaft, 4 inches 10 lines; the length of the antibrachium is 1 foot 7 inches; its least circumference, 5 inches 3 lines. The ulna is ankylosed to the radius along a great part of its distal half. The metacarpus is 1 foot 9 lines in length, and 4 inches in circumference. The characters of these bones in the peculiar long-legged kind of deer called 'Elk' or 'Moose' differentiate them readily and strongly from those of the Bovines, of the *Megaceros*, and of the Wapiti, or other large round-antlered deer. They are perhaps more satisfactory evidences of *Alces* than portions of antler."

I may quote here from Sir John Richardson's Zoology of H.M.S. "Herald," where he states that in the moose deer "The coalesced third and fourth *metacarpal* bones form the single cannon bone, which is a third longer than its homologue in a full-sized ox; and though narrower in a lateral direction, has a greater ancono-thenal diameter. . . . The length of the cannon bone from the carpal joint to the most distant curve of the ridges between the metacarpal trochleæ is 13 inches 4 lines. The *metatarsal* bone of the *muswa* is more slender, but above one-third

longer than the corresponding bone of a full-grown domestic ox. In its shape it differs little from its homologue in the rein-deer, except that the groove on the popliteal surface is wider and shallower. The groove on the rotular surface is equally marked in both species. The extreme length of the metatarsal is 16 inches 3 lines."

Professor Owen goes on to say, in the paper which I have quoted above, that "Professor Gervais writes doubtfully on such grounds in regard to the *Cervus alces* as a French fossil." ("Palæologie Française," 4to, p. 80.) Professor Owen also reminds us in the conclusion of his paper, that "we owe to Julius Cæsar the valuable record of the existence of both the rein-deer (*Bos-cervus*) and the elk (*Alces*) in the Black Forest and coterminous part of Germany, at the period of his campaign in that country and in Gaul. (De Bello Gallico, Lib. VI. cap. xxvi. p. 320. Ed. Ludg. Bat. 1737.)" In the same part of the "Geological Magazine" in which Professor Owen's paper is published, there is an interesting communication on "The Fresh-water Deposits of the Valley of the Lea, near Walthamstow," by Mr H. Woodward, p. 385. He gives a long list of the various animal remains from the peat and shell marl of the forest, and this list includes that of the elk described by Professor Owen. He also describes many ancient relics of man, osseous remains, and implements in stone, bone, and bronze. These have been examined by A. W. Franks, Esq., A.M., F.S.A., Keeper of the Ethnological Department of the British Museum, and include weapons of the late Celtic period, as an iron sword with bronze sheath, dagger, &c., and various late Celtic earthen pots, some hand-made, others made on the wheel, &c. It is not stated, however, that any human remains were found associated with or near those of the elk, so as to suggest the idea of their being of contemporary age.

#### STAFFORDSHIRE.

*Wetton*.—The only instance of the occurrence, in England, of the remains of the elk, *C. alces*, actually associated with man with which I am acquainted, is incidentally mentioned in a volume entitled "Ten Years' Diggings in Celtic and Saxon Grave Hills, in the Counties of Derby, Stafford, and York, from 1848 to 1858, by Thomas Bateman. London, 1861." At page 298 of this work we have a detailed list given of the "Animal Remains found in the Tumuli associated with Works of Human

Art." This list includes the Elk (?) *Cervus megaloceros*, in a subsequent note however, it is added, that this was the true elk :—

"A portion of a large palmated horn, found with Romano-British remains near Wetton (Staffordshire), at least double the size of the antler of the fallow-deer, may possibly be assigned to the elk ; but it is proper to state, that it does not reach the magnitude of a large horn from the extinct Irish elk, in the collection at Lomberdale, though it resembles it in form, so far as its fragmentary condition admits of comparison." "Since the above note has been in type, the horn has been ascertained to be that of the German elk."

I quote at full length the details given of this interesting discovery :—

"MR CARRINGTON UPON A ROMANO-BRITISH SETTLEMENT NEAR WETTON, STAFFORDSHIRE."—(After various details of the discovery in certain fields in the village of Wetton, known by the name of the Burrough Hole, of the remains of pavements and floors, buildings, &c., bones of stags, horses, and other animals, &c., so as to constitute, Mr Carrington says, the locality the very Pompeii of North Staffordshire,) he farther states, at p. 201—

"Here—as is not unfrequently the case in more serious and weighty matters—there was but a step between the living and the dead, for on the 10th of August 1852 we found, by continuing the excavation along the surface of the rock, that we were gradually extending deeper and deeper as the rock inclined downwards ; the earth, also, that we had to remove became darker in colour as we advanced, and was mixed with ashes and large loose stones. After we had removed some large blocks, a human skull appeared upon the rock, by which it was evident that we had unawares broken into a cist, which by careful examination was found to contain the skeleton of a female—the femur measuring seventeen inches, and the skull indicating a person of middle age—which lay on the right side, with the head towards the south, and the feet to the north. The bones, with the exception of the legs, which were slightly bent back, were extended at length by the east side of the grave, which was formed by a wall built of flat stones, the uppermost of which were very large, and almost reached up to the surface of the land. A flat stone was set up edgeways at the head, as is not unusual in barrows of a much more remote antiquity ; and close to it was a broken upper millstone. The bones were embedded in compact dark-coloured earth, intermixed with charcoal and burnt bones, and the body had been interred with three small beads, two of lilac-coloured, and one of blue glass, and a plain bronze ring fibula,  $1\frac{1}{2}$  inches diameter, about the neck, as they were discovered upon removing the skull. An iron awl, several iron nails, and pieces of stag's horns



and other animal bones, were found about the skeleton. Some of the horns have been sawn across, particularly a very large palmated one (*the elk's horn referred to*): a tine from another had been neatly sharpened for some purpose. Another strong iron awl was found beneath the uppermost stone of the wall guarding the east side of the grave, the other sides of which were fenced out by large stones, extending almost up to the surface, 2 feet 6 inches above the bottom of the grave. The surrounding ground, except on the north-west, had been cut down to the rock, about 6 inches lower—a circumstance which induced us to continue the search, in hope of finding other interments, to a further distance of 8 yards, finding throughout the whole extent abundance of ashes, boars' tusks, and other bones, as well as a few articles of greater interest, comprising the skull of a stag, a neatly squared sharpening-stone, between 2 and 3 inches square, and two coins in small brass, one of them of the Constantine family—reverse, *GLORIA EXERCITUS*, two soldiers holding standards; the other is one of the minute imitations of the currency of the Lower Empire, in such poor condition as to be quite illegible.”—P. 202.

When residing at Buxton last September, and learning from my guide-book that strangers were admitted to see the collection of antiquities at Lomberdale House, I made a trip, on the 3d of the month, by Bakewell to Youlgrave, near which Lomberdale House is situated, in expectation of seeing the valuable collection of British Antiquities made by the late Mr Thomas Bateman, and in particular, examining this portion of elk's horn found along with human remains. On reaching Lomberdale House, however, I was not fortunate enough to find any of the family at home, and was told by the servant that no person had been admitted to see the museum since the death of the late Mr Bateman; so that the principal object of my excursion turned out a decided failure.

#### DURHAM.

*Hartlepool.*—Dr David Page (now Professor of Geology, College of Science, Newcastle-upon-Tyne) informed me that remains of the true elk had been discovered in the submarine forest at East Hartlepool, and were now, he believed, preserved in the Museum there. Dr Page could not inform me where a notice of the discovery was published; accordingly, I wrote to the keeper of the Museum asking for information on the subject, but unfortunately have not as yet been favoured with any reply to my inquiries (see note, page 345).

In the paper by Mr Richard Howse, already referred to (Tyneside Nat. Club, vol. v. 1863), I find that "a fragment of a skull with the horn cores apparently belonging to the *Bos longifrons*, was found during the excavation of the innermost dock at West Hartlepool, and is preserved in the museum there, with remains of a mammoth (a small tusk), red-deer, and human beings" (p. 121), from the same locality.

#### YORKSHIRE.

Since this paper was read, I have had an opportunity of reading an interesting paper by Mr Edward Tindall, of Bridlington, entitled "Remarks on the Extinct Fauna of the East Riding of Yorkshire," published in the "Proceedings of the Geological and Polytechnic Society of the West Riding of Yorkshire," for 1869, Leeds 1870; where he describes two instances of the occurrences of the true elk (*Alces malchis*) in Yorkshire. Unfortunately he gives no detailed accounts of the specimens themselves. The first of these was at

*Thorpe Hall, near Bridlington.*—"In the spring of 1822, as some workmen in the employ of Messrs G. & W. Tindall, nursery and landscape gardeners, of Beverley, were employed in digging out some drift-gravel to construct a lake at Thorpe Hall, near Bridlington, the seat of Lord Macdonald, they found, at the depth of about  $4\frac{1}{2}$  feet from the surface, some of the bones and horns of the elk (the largest of the Cervine family, which still exists on the surface of the globe), and also a fine horn of the stag or red deer." The next at

*Carnaby, near Bridlington.*—"In the month of February 1868, a horn and the occipital portion of the skull of a female (?) specimen of the elk were found, during the process of draining, in a peat bog, about 2 feet below the surface, on the property of Sir George Cholmley at Carnaby, near Bridlington; and it is very probable the remaining parts of the skeleton of one of these animals may still be entombed in the same locality."

Mr Tindall refers to other and earlier instances of the supposed occurrence of the elk in England, as well as to "the first authentic instance" found at Chirdon Burn and recorded in the "Transactions of the Tyneside Naturalists Field Club" for 1861. He believes, however, that this

Yorkshire specimen found in 1822 is "the first reliable example on record of the *moose* occurring in Britain," p. 11.

#### ISLE OF MAN.

*Peel*.—In the Museum of the Leeds Philosophical and Literary Society, as I was kindly informed by Dr David Page, there is preserved the skull of an elk, *Cervus alces*.

I am indebted to the politeness of L. C. Miall, Esq., for a sketch of the specimen, which consists of the upper part of the cranium, with well-developed, palmated horns, and was found in a peat bog near Peel, on the west coast of the Isle of Man. Each horn gives off at some distance from the burr, in front of the beam an antler, rising upwards and forwards, which terminates in two points or snags; next a longer and rounded second antler, running outwards in the line of the beam of the horn, and beyond and behind this, the large portion, or third antler, running backwards and outwards to form the great palm of the horn. Mr Miall has also favoured me with the following measurements:—Length from sagittal suture of skull to burrs of horns,  $3\frac{3}{8}$  inches length (in a straight line) from the distal snag of first antler to the point of the corresponding antler of other horn, 2 feet 11 inches; length from point of second antler (greatest length of horn) to that of opposite side, 3 feet  $10\frac{1}{4}$  inches. Length from burr, in a straight line, across to posterior and interior extremity of palm of same right horn, 2 feet  $0\frac{1}{2}$  an inch. Length from posterior and inner extremity of palm of horn to corresponding point of other horn, 2 feet 8 inches. Circumference of horn at burr, 10 inches; circumference of beam above burr,  $6\frac{1}{4}$  inches. Greatest breadth of posterior antler or palm of horn,  $10\frac{1}{2}$  inches.

These horns were purchased for the Leeds Museum about three years ago, at the sale of Crosthwaite's Museum, Keswick.

#### III. WALES.

CAERMARTHEN, *Llandebie*.—A lower jaw of the elk was discovered in 1861, by Mons. Lartet, among other mammalian remains in a cave at Llandebie, in South Wales. It is now, I understand, preserved in the Museum at Oxford.

## IV. IRELAND.

## TYRONE.

*Stewartstown.*—As long ago as 1837, Mr W. Thompson, Vice-President of the Natural History Society of Belfast, exhibited to the Zoological Society of London the bones of various animals got in peat-bogs in Ireland. Among these he showed a horn of the true elk, *Cervus alces*, Linn., which was found in a peat-bog of the county Tyrone. "The number of snags upon the horn, and its dimensions, show that it belonged to a very old animal; its breadth, measured in a straight line across the centre, without the curve being reckoned, is 35 inches; its height, similarly estimated in a straight line from the base, 26½ inches. In the *Annales des Sciences Naturelles* for 1835, t. iv. (New Series), portions of the horn of the *Cervus alces* are figured and described by M. Christol, from specimens found in a fossil state at Pézénas."—*Proc. Zool. Society of London*, part v. p. 52, 1837.

This horn of the elk was stated by Mr Thomson to have been found by a relative of his own. It was dug out of a bog near Stewartstown, and was presented to the Natural History Society of Belfast. In a "Catalogue of the Fossil, or rather Sub-Fossil Mammalia of Ireland," by Robert H. Scott, M.A., appended to the Annual Report of the Geological Society of Dublin, read at the anniversary meeting, February 10th, 1864, and published in their *Journal*, vol. x. part 2, 1864, p. 149. It is thus referred to in a letter by Mr George C. Hyndman to Robert Patterson, Esq., and sent by him to Dr Carte:—"I have examined the elk's horn in the Museum, and I think the freshness of it, and the perfection of the points or tangs, forbid the supposition that it could ever have remained any lengthened time in the bog. Besides the paint upon it, mentioned by Thompson, there is a round hole bored through the broad plate of the horn, showing that at some period it had been put up as an ornament in some person's hall. It must have got into its position in the bog by some accident." "This opinion has received additional confirmation from Mr Bernard H. Ross, F.R.G.S., of the Hudson's Bay Company's Service, who pronounced it to be a North American specimen, and of no very great antiquity."

In the account of the skull found at Williestruther Loch, I stated that

holes had been bored through its forehead to facilitate its being hung up as an ornament ; this, however, taken by itself, of course in no way invalidated the true history of the specimen.

As this is, I believe, the only recorded example of the presence of the true elk in Ireland ; unless the state of the horn be taken as a proof of its comparatively recent existence there, it must apparently be considered doubtful, at least for the present, whether it should really be included in the catalogue of fossil mammals found in that country.

It seems to me that from the very abundance of the remains of the *Megaceros* or Irish Elk throughout the country, and the great size of their horns in many instances, there is a risk that specimens with small horns might be neglected as of little value by their unlearned discoverers, and in this way the occurrence of the true Elk, *C. alces*, may possibly have been overlooked in Ireland.

#### GEOLOGICAL RANGE OF THE ELK (*C. ALCES*).

Now that the existence of the elk as one of the ancient *feræ naturæ* of our country, is fully recognised by naturalists, there can be no doubt that its remains—the distinctive skull, horns, and teeth, or characteristic long limb bones, described by Professor Owen and Sir John Richardson, will probably be more frequently detected among the many remains of animals found in different parts of the country.

Sir John Richardson, in his *Zoology* of “H.M.S. Herald,” when describing the bones of the elk found in the same clay-bed with those of the *Elephas primigenius*, *Equus fossilis*, *Cervus tarandus*, *Ovibos moschatus*, fossil musk-ox, *Ovibos maximus*, *Bison crassicornis*, heavy-horned fossil bison, &c., in the ice-cliffs of Escholtz Bay, in Arctic America, says :—“The bone has the same dark hue as the other fossils, but is compact and weighty, having lost little of its animal substance. Its cells are filled with the same micaceous sandy loam that formed the general matrix of the bones, and phosphate of iron has formed in minute grains in many parts of the broken surface. Were it not that the moose deer still range to the Arctic Sea, and that its bones are not enumerated among the spoils of animals of the drift period dug up elsewhere, I should have had no doubt of these fragments of the skull of a moose being equally fossil with

the other parts of the collection: I have had no opportunity of comparing the large deer bones mentioned by Dr Buckland with those of the moose, as this would have settled the matter."—(P. 20.)

As far as the notices I have been able to collect at present guide us, the geological range of the existence of the elk would appear to be probably from the time of these glacial deposits (?) at least in America. In Britain the elk can be traced from the Post-Tertiary and the Post-Glacial Deposits, as in the cave of Llandebie, the old river gravels of Essex, and the gravel beds of Berwickshire, through the marl-beds, and the peat-bogs; shall I say, along with the bronze weapons of our early Britons at Duddingstone Loch, down to its occurrence apparently associated with Roman remains at North Berwick, and also in the graves of the ancient inhabitants of Staffordshire, along with human remains of the Romano-British period.

#### GEOGRAPHICAL RANGE OF THE ELK (*C. ALCES*).

Dr J. E. Gray, of the British Museum, has divided the Family *Cervidæ* into those which inhabit cold or snowy regions, and those which inhabit warm or temperate regions. The deer which are the inhabitants of the cold regions are the reindeer, *C. tarandus*, and the elk, *C. alces*, or *Alces malchis* of Gray. Those of the temperate regions include three principal divisions, the first of which is the group to which the red deer belongs. The reindeer seems able to live in the most northern tracts of country, the barren, treeless wastes that border the Arctic circle. The muzzle of the reindeer is entirely covered with hair, but in the moose a small space near the nostrils is left bare of hair; and as this latter deer is more purely than the reindeer a feeder on the twigs of various trees—the willow, the birch, the poplar, &c.—he is found in the swampy forests of the north, and straying down the wooded banks of rivers, even to a very high northern latitude.

In the New World, Sir John Richardson tells us, in the present day the moose deer ranges from the valley of the St Lawrence to the Arctic Sea, keeping in the wooded districts, being little known on the prairies, and little seen in the "barren grounds" of the north. It frequents willow thickets, and follows these along the banks of rivers, beyond the woods,

up to the 69th and 70th parallels. It would seem, however, that formerly its range extended much farther to the southwards than at present, while even yet it is described by sportsmen as being abundant south of the St Lawrence, in Nova Scotia; we may, therefore, assume that it still exists in America, from the latitude of about 45°, northwards towards the Arctic Sea, even to the 69th and 70th parallels.

In the Old World the range of the elk has, of course, been much more limited since historic times. At the present day his range, even in Scandinavia, is much diminished; and, curiously enough, we find a northern naturalist, Mr Nilsson, stating (I quote from Mr L. Lloyd's "Field Sports of the North of Europe," 2d edit., London, 1831, vol. ii. p. 327) that "The elk cannot endure so cold a climate as the stag, the 64th degree of latitude being the extreme limit at which he is met with in the Scandinavian peninsula." It still exists in greater or less abundance, according to locality, across the whole of the northern parts of the Old World, and, according to the testimony of various travellers, seems to range in Asia as it does in America, from about the same latitude of 45°, where, however, it is rare, or perhaps a little more to the north, than in the New World; and increases in number in particular localities as we proceed northward, towards the borders of the Arctic circle. In Europe, again, from the increased civilisation and abundance of population, its limits have been greatly reduced; it exists now only in the more northern districts, although it seems formerly to have reached here also a somewhat similar southern limit.

I have quoted, from Professor Owen's paper, the existence of the elk in Central Europe in the days of Julius Cæsar, and from Mr W. Thompson's, the fact of its remains having been found at Pézenas, in the very south of France, in the Department of Herault. Professor Gervais, however, as quoted by Professor Owen (*ante* p. 335), writes doubtfully in regard to "*Cervus alces*" as a French fossil:—"Cette espèce paraît avoir laissé des débris fossiles en France dans les terrains diluviens. M. de Christol y a rapporté quelques portions de bois extraites des sables diluviens des Riège, pres Pézenas, que nous attribuerons à notre *Cervus martialis*." ("Paléontologie Française," 4to, p. 80.)

The recent discoveries of the ake dwellings of Switzerland have also made us acquainted with its presence in a great number of these ancient

sites of human dwellings. Professor Rüttimeyer of Basle, who has published a work on the Fauna of the Lake Dwellings, has furnished a complete list of the animals found, to Mr J. E. Lee, the English translator of Dr F. Keller's "Reports on the Lake Dwellings of Switzerland, London, 1866," 8vo; and in this list, besides the red deer and the roe, which occur almost everywhere, we find remains of the true elk, *Cervus alces*, mentioned as having been discovered at Robenhausen, Meilen, Moosseedorf, Wanwyl, Möringen, Concise, and Bienne; all lying within the southern limits of latitude already referred to as the region formerly inhabited by the elk.

Sir John Lubbock, in his "Pre-Historic Times," London, 1865, says:—"We have no notice of the existence of the elk in Switzerland during the historical period, but it is mentioned by Cæsar as existing in the great Hercynian forest; and even in the twelfth century it was to be met with in Sclavonia and Hungary, according to Albertus Magnus and Gesner. In Saxony, the death of the last is recorded as having occurred in 1746. At present it inhabits Prussia and Lithuania, Finland and Russia, Scandinavia and Siberia, to the shores of the Amoor."

I may also notice the evidence of the occurrence of the elk in a more southerly range than any previously ascertained, detailed by the Rev. H. B. Tristram, M.A., in "The Land of Israel, a Journal of Travels in Palestine," London, 1865. In a bed of stalagmite, near Beyrout, bones, teeth, and flints were found. "The latter consist almost entirely of elongated chips, with very sharp edges."

"The bones are all in fragments, the remains, in all probability, of the feasts of the makers of the rude implements. Four of the teeth have belonged to an ox, somewhat resembling the ox of our peat-mosses, and one of them, probably, to a bison. Of the others, some may probably be assigned to the red-deer, or reindeer, and another to an elk. (*The determination of the teeth was made by Mr W. Boyd Dawkins.*) If, as Mr Dawkins considers, these teeth are referable to those now exclusively northern quadrupeds, we have evidence of the reindeer and elk having been the food of man in the Lebanon, not long before the historic period; for there is no necessity to put back to any date of immeasurable antiquity the deposition of these remains in a limestone cavern." (P. 11.)

From the various remains found in Britain, I have shown that the true elk formerly existed, may I say, from Strath Halladale, Sutherlandshire,



in the extreme north of Scotland, down through Perthshire, and Berwickshire, to Selkirk and Roxburghshire, in the south of Scotland. Then in England, from Northumberland in the north, through Yorkshire and Staffordshire in the middle, Wales, and the Isle of Man, to Essex in the south. So that I have now been able to trace its former presence through almost the whole extent of our island.

(*Note to page 337.*)

DURHAM, *Hartlepool*.—Mr William Weaver, Hon. Sec. to the Museum at Hartlepool, has since kindly replied to my inquiries respecting the remains of the elk, which, he says, were found while excavating the old dock (the Victoria Dock). Mr William Davison, late secretary of the Hartlepool Dock and Railway, who was there during the excavation of the dock, informed him that remains of the true elk were found, and he had them in his possession for some time; but afterwards, he thinks, he presented them to Mr Backhous of Sunderland.

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For comparison with, and illustration of these notices of the true elk, *Cervus alces*, I append the following note:—