10. *The ELK (ALCES MACHLIS, OGILBY) in the THAMES VALLEY.*

By EDWIN TULLEY NEWTON, ESQ., F.R.S., F.G.S. (Read December 17th, 1902.)¹

[PLATE V.]

THAT the elk, *Alces machlis*, was an inhabitant of Great Britain in prehistoric times is now an established fact. Sir Richard Owen, in 1846, did not obtain satisfactory evidence of the elk as a British fossil, and consequently the genus is not included among his 'British Fossil Mammals' published at that date: writing, however, in 1869,² he accepted the recorded discovery of elk-remains in a peaty bed in Northumberland, and himself described certain bones of the same species from a similar peaty deposit at Walthamstow, Essex. In the light of more recent discoveries, it seems likely that some of the earlier accounts of the discovery of elk-remains, which had been discredited, were really founded on bones or antlers of *Alces machlis*, and were not, as had been thought possible, due to a wrong determination of the specimens, or to the misuse of the name 'elk.' However that may be, numerous reliable accounts have since been published, which have established the occurrence of the true elk (*Alces machlis*) in a semifossil state at numerous localities in both England and Scotland. Two specimens referable to *Alces machlis* are said to have been found in Ireland. One is a skull with antlers, preserved in the Belfast Museum; but Leith Adams,³ having specially examined this skull, came to the conclusion that it was of recent origin and had been imported into Ireland. The second specimen was mentioned by Hermann von Meyer⁴ in 1832. He gave a figure of an undoubted elk-antler, said to be from Ireland, preserved in the Museum at Leyden. Unfortunately, its precise locality and horizon are unknown.

A full account of the discoveries of elk-remains in the British Isles previous to the year 1872 is given by John Alexander Smith,⁵ who mentions more than twenty localities where such remains have been found, extending from Sutherland to Essex. The greater number of these records are from the southern parts of Scotland and the northern parts of England: the southernmost locality being Walthamstow in Essex, recorded by Owen (*loc. cit.*) in 1869. The specimens described by Owen from Walthamstow I have examined in the Natural History Museum, and see no reason for doubting the identification.

In the year 1863 Édouard Lartet⁶ saw in the Oxford University

¹ Communicated by permission of the Director of H.M. Geological Survey.

² Geol. Mag. vol. vi (1869) p. 389.

³ Journ. Roy. Geol. Soc. Irel. n. s. vol. iv (1877) p. 248.

⁴ Nova Acta Acad. Cæs. Leop.-Car. vol. xvi (1832) p. 471.

⁵ Proc. Soc. Antiq. Scot. vol. ix (1872) p. 297.

⁶ 'Revue Archéologique' n. s. vol. ix (1864) p. 250, footnote.

Museum some mammalian remains from a cave at 'Lhandebie,' in Caermarthenshire, among which was a cervine jaw which he referred to elk ('un maxillaire d'élan'). This determination was given by J. A. Smith¹ as evidence of the elk in South Wales; but Prof. W. Boyd Dawkins² says that the specimen, which he saw in the Oxford University Museum, is referable to the Irish *Megaceros*, and not to the genus *Alces*. Up to the present I have not been able to see the specimen, and accept Prof. Dawkins's correction.

There is in the Natural History Museum at South Kensington the left frontal and antler of *Alces machlis* (M. 3824), said to be from Cleveland (Yorkshire), which was presented to the Museum by the Trustees of the Christy Collection, in 1889. It appears that the specimen was originally in the possession of the late Mr. Edward Tindall, of Bridlington. Mr. Thomas Boynton, of Bridlington, who knew Mr. Tindall and is much interested in the remains of fossil elk, believes this specimen to be the one obtained by Mr. Tindall³ from a lacustrine or peaty deposit on Carnaby Moor; and in kindly answering my enquiries, says he thinks that some mistake has crept in as to the locality on the label. He also says that he himself possesses an antler of *Alces machlis*, found about 60 years ago at Barmston, about a mile from Carnaby, in a similar lacustrine deposit. It is not deemed necessary to allude specially to other known specimens of fossil elk, as the references will be found in the works noticed on pp. 88-89.

I am now able to make known an interesting discovery of elk-bones near Staines, on the River Thames. My colleague Mr. T. I. Pocock, working in the district, found that some mammalian remains had been discovered during the construction of the Staines Reservoir, and wished them to be examined for the purposes of the Geological Survey. By the Director's desire I examined these remains, which included a skull with a pair of antlers undoubtedly belonging to the elk, *Alces machlis*; the range of which southward as far as the Thames, was thus fully confirmed. It appears that some three or four years ago, in connection with the construction of the large reservoirs at Staines, an aqueduct was built leading from the Thames, and at about 6 furlongs north-west of Staines the excavations for this aqueduct were carried across the Wraysbury River. Mr. W. B. Duff, the resident engineer, to whom we are indebted for all the particulars of this discovery, has kindly given me the following information. It was at Youveney, on the right bank of the Wraysbury River, as it runs at the present time, and at a depth of 7 feet below the surface, in a somewhat peaty soil, that the antlers and bones were found. It appears that when this part of the Great Western Line was constructed some years ago, the Wraysbury River was diverted from its old bed, which is about 100 feet to the south-west of its present course and of the place where the elk-bones

¹ Proc. Soc. Antiq. Scot. vol. ix (1872) p. 339.

² 'British Pleistocene Cervidæ' Monogr. Palæont. Soc. 1886 (1887).

³ See Proc. Yorks. Geol. & Polytechn. Soc. vol. v (1870) p. 7.

were found. Mr. Duff suggests the possibility of this ground having been disturbed when the new course for the river was dug; but it seems very unlikely that the bones were disturbed at that time, for if they had been, they would almost certainly have been more broken than they are. It is more probable that the bones have lain undisturbed in the peaty mud of the marshy river-bank, until they were unearthed some three or four years ago.

It is by the courtesy of the engineers for the Staines Reservoirs, Messrs. Walter Hunter & R. E. Middleton, that I have had the opportunity of examining these interesting fossil-remains, which included, besides the elk-skull and antlers already mentioned, a pair of lower-jaw rami with complete set of grinding-teeth and a tibia, which almost certainly belonged to the same animal. With these elk-remains were portions of other cervine mammals: namely, a lower-jaw ramus and a tibia of a large red-deer (*Cervus elaphus*) and an antler of a fallow-deer (*Cervus dama*). Besides these, were found the skull and lower jaw of a pig (*Sus scrofa*), the teeth of which were worn away almost to the roots, and the lower jaw much diseased; and, lastly, there were a skull and a metatarsal of a horse.

Description of Elk-Remains.

Antlers and brain-case.—The right antler and the brain-case are almost perfect, but the left antler is somewhat broken, and the anterior facial parts of the skull, together with the maxillaries and upper teeth, are wanting. The frontal suture not being closed has given way, so that the left frontal bone with its antler is detached from the rest of the skull. The two antlers are not quite alike in form, and the right one is larger than the left; but both are widely palmated, and show little or no indication of the division into anterior and posterior portions such as may mostly be seen in modern elk-antlers. The pedicles with the beams extend almost directly outward from the frontals, with a curve downward and forward. There is no indication of a brow-tine. When the base of the skull is horizontal, the concave surface of the palmation looks almost directly upward. The right antler, which is the most perfect, has had six (or perhaps seven) points. The frontal bones between the antlers are raised into a rounded, but well-marked crest, which is seen in both front and side views, and stands higher than antler-burrs. Immediately in front of this crest, and just behind the level of the orbits, is a large median depression divided by a slight ridge along the frontal suture. The following are some of the most important measurements:—Circumference of right pedicle = $6\frac{1}{2}$ inches (163 millimetres); from frontal suture to outermost tine (imperfect) of right antler = 21 inches (535 mm.). Same measurement of left antler = 19 inches (475 mm.). The greatest width across both antlers to outermost tines = 39 inches (985 mm.). Width of palm of right antler, measured from tips of anterior and

posterior tines as now preserved = about 18 inches (457 mm.); but when perfect it must have been $22\frac{1}{2}$ inches (560 mm.) wide. Length of beam from burr to beginning of palmation = about 5 inches (120 mm.). Least distance between two burrs = 8 inches (202 mm.). Greatest width of skull at hinder and outer margin of orbits = $8\frac{3}{4}$ inches (223 mm.).

The form of this skull; the palmation of the antlers; the outward direction of these from the frontals; as well as the absence of any brow-tine, are characters which prove this specimen to have belonged to the elk (*Alces machlis*).

Lower jaw.—The pair of rami found with the skull and antlers undoubtedly belong to an adult elk, and almost certainly are parts of the same animal as the skull and antlers just described. A comparison of these rami with several jaws of elk in the Museum of the Royal College of Surgeons leaves no doubt as to their specific identity. The description of the left ramus, which will now be given, would do equally well for the ramus of one of the specimens of *Alces machlis*; such small differences as exist will be pointed out in the course of the description.

The jaw is cervine in character, and led me in the first instance to compare it with the great Irish deer (*Cervus giganteus*); but obvious differences are at once seen, which prevent its reference to that animal.

The great length of this ramus is very striking, and this peculiarity is especially marked in the region of the diastema; the distance between the anterior premolar tooth and the alveolus for the outermost incisor is 6 inches (153 mm.), and must have been more than 7 inches (175 mm.) when perfect. In the region of the cheek-teeth the ramus is flattened from side to side, more compressed indeed than in either of the rami of recent elks with which it has been compared. The length of the ramus, $19\frac{1}{4}$ inches (480 mm.), is greater than in either of the recent specimens; while the six cheek-teeth occupy rather less space than the teeth of those specimens.

The molar teeth differ in pattern from the premolars, but all have short crowns and coarse enamel. On the outer side the anterior true molar has a large tubercle at the base between the two lobes, while the second and third true molars only show a very small tubercle in this position. In three recent male elks this tubercle is only seen in the first true molar: but the lower jaw of a female has it well developed in all three true molars. In the great Irish deer (*Cervus giganteus*) this tubercle is large in all the true molars.

The premolar teeth are proportionately large: the hindermost one having as great an antero-posterior extent as the first true molar; and the enamelled crown is absolutely higher than in that tooth. This same hindermost premolar has the outer surface divided into two distinct lobes—the anterior larger than the posterior lobe, and separated, the one from the other, by a deep groove,

which extends to the base of the enamel; this last-named character at once distinguishing this fourth premolar from that of *Cervus giganteus*. The greater height of the crown of this tooth causes the edge of its alveolus to be pressed down below the level of those of the true molars, and results in an uneven alveolar margin, which is rendered more obvious by the base of the anterior premolar being somewhat above the line of the true molars. Another character of the hindermost premolar is seen in the pattern of the grinding-surface; two deep sulci extend obliquely quite across the tooth, from behind forward and outward, dividing the surface of the crown into three unequal portions. When a little more worn, the anterior and larger sulcus would become closed in front; indeed, this closure has taken place in the corresponding tooth of the right ramus. The extension of the oblique sulci quite across the tooth is unlike what is found in *Megaceros*, where these sulci are very shallow, and consequently are early cut off from the outside by the wearing of the tooth, giving a very different aspect to the pattern of the grinding-surface. It is worthy of note that this peculiarity of the fourth premolar agrees very closely with what is found in the corresponding tooth of the reindeer.

Another peculiarity of the elk's teeth is the extreme obliquity of the crescents as seen on the grinding-surface: this character is well shown in the lower jaw of the Staines specimen. The inner and hinder part of each crescent projects inward much beyond the anterior part of the crescent next behind it, thus giving a strongly serrated edge to the inner surface of the lower cheek-teeth. In the Irish *Megaceros* this obliquity of the crescent is much less, and the serration nothing like so prominent.

Besides the differences above mentioned, the lower-jaw ramus of *Megaceros* differs from the Staines specimen and the recent elk in being much thicker below the cheek-teeth; in having a less elevated articular and coronoid process; and in the diastema being much shorter.

As already stated, there can be no question as to these rami from Staines being referable to the true elk (*Alces machlis*), and not to the Irish *Megaceros* (*Cervus giganteus*).

Measurements of the Lower Jaw.

	Millimetres.
Coronoid process to alveolus of median incisor	490
Articular condyle to ditto.....	465
Angle to ditto.....	440
Depth of ramus on inside below hinder end of m. 3.....	64
Do. do. do. in front of anterior pm.	52
Thickness of ramus below m. 3.....	28
Length of alveolar margin of cheek-teeth	165
Do. three premolars	73
Do. three molars	95
Do. grinding-surface of pm. 4.....	27.5
Do. grinding-surface of m. 1	28.0
Height of enamel-crown, outside pm. 4	25.0
Do. do. do. outside m. 1	19.5
Distance between front pm. and alveolus of outer incisor...	153.0

Tibia.—The tibia found with the skull and lower jaw, which is likewise referred to *Alces machlis*, is remarkable for its great length and slenderness: for, while equalling in length the tibia of a large *Megaceros*, its proportions are those of the red deer rather than those of *Megaceros*, the limb-bones of which, it will be remembered, are almost bovine in their stoutness and general proportions. The limb-bones of the modern elk are characterized by similarly slender proportions; indeed, the comparison of a tibia with the one from Staines leaves no room for doubt as to their identity. The following measurements of three tibiæ indicate these proportions, but do not make them so obvious as an examination of the specimens themselves:—

Measurements of Cervine Tibiæ.

	Staines specimen.	Modern Elk.	<i>Megaceros</i> .
	Millimetres.	Millimetres.	Millimetres.
Greatest length	515	495	500
Width of proximal end	103	114	127
Width of distal end.....	71·5	70	86
Least circumference of shaft ...	129	114	156

Age of Deposits in which *Alces machlis* has been found in Britain.

The elk-remains hitherto found in Great Britain have mostly occurred in peaty ground, or in near relation with peat; but the evidence for the age of the deposit has been in many cases very unsatisfactory. Only in a few instances have any other remains been found, with those of the elk, which might indicate the age of the deposit. In no case, so far as I can ascertain, have elk-remains been found in a definitely Pleistocene deposit, or associated with positively Pleistocene mammals. In a few instances, red deer, roe deer, or *Bos primigenius* have been recorded as accompanying the elk-bones; and at Walthamstow, the deposit yielding the elk also contained implements of the Bronze and Celtic ages, together with beaver, reindeer, *Bos longifrons*, *Bos primigenius*, and a number of modern species. Although *Bos primigenius* is a Pleistocene form, it is known to have lived in Europe in Roman times: any deposit, therefore, in which its remains may be found is not necessarily older than that period.

The assemblage of remains found at Walthamstow would seem to limit the age of the deposit yielding the elk to some period between the Neolithic and Celtic times, for *Bos longifrons* is not known from deposits earlier than Neolithic. Some confirmation of this limit is found in the fact that in the bed immediately below

the one containing the elk, remains of *Elephas primigenius* were discovered.

The elk-remains found at North Berwick¹ are said to have been accompanied by Roman objects, which, if correct, would point to the elk having continued in Britain until the Roman period, which is not improbable, seeing that it is known to have been living in Central Europe in Caesar's time.

It is a remarkable fact that, although *Cervus giganteus* and *Alces macchilis* have been found in similar peaty deposits in the United Kingdom, their remains do not seem ever to have been found together. *Megaceros* was certainly contemporaneous with the mammoth, and continued to inhabit Great Britain and Ireland while some of our peat-deposits were being formed. The elk, as we have seen, is not known as a Pleistocene mammal in this country, but appears for the first time in more modern peaty deposits. Both these large cervine mammals have been recorded from the Isle of Man, but not as being found together.

Although the occurrence of remains of these two animals in peat would seem to show that both were living here at about the same period, yet, as the formation of peat has continued for a lengthened period, the particular peat-beds in which these two animals have left their remains may be of different ages, and the elk may not have arrived here until after the departure or extinction of *Megaceros*. Or, it may be that they were contemporaneous, but did not occupy the same districts.

Bones of the elk have been recorded from lake-dwellings at several localities in Switzerland; but in each case they have been associated with modern species of mammals, which do not indicate an earlier date than Neolithic.

M. Édouard Harlé² has described and figured the ungual phalange of an elk, from a deposit at La Plagnotte (Ariège) which he concludes to be transitional between the Quaternary and Recent periods. The same writer also says that the remains of elk are very rare in the South-east of France, a district well known to him, and that in no instance have they been detected among the numerous bones of mammals from the Quaternary deposits of that region. Earlier French writers, such as Jules de Christol³ and Paul Gervais,⁴ speak of the elk as occurring in the Diluvium of France; but it is open to question whether those described by Christol are really of Pleistocene age; and Gervais says that the elk appears to have left its remains in the Diluvium, but that they are few in number and the determination uncertain. It seems, therefore, that the elk was a rare animal in France in Pleistocene times, if indeed it was present there before the close of that epoch.

¹ W. H. Maxwell, 'Hill-side & Border Sketches' 8vo, London, vol. i (1847) p. 317.

² Bull. Soc. Géol. France, ser. 3, vol. xxviii (1900) p. 39.

³ Ann. Sci. Nat. ser. 2, vol. iv (1835) p. 201.

⁴ 'Zoologie & Paléontologie Françaises' 2nd edit. (1859) p. 143.

With regard to the presence of the elk as a fossil in Central Europe, Dr. Nehring¹ says that it is among the cervine mammals commonly found in Germany, in strata formed during the last thousand years, and is occasionally met with in 'Diluvial' deposits. In the first-mentioned paper the elk is given as present in Quaternary beds at five out of the twenty-four Central European localities enumerated; but in three of these instances the identification is doubtful, and it is only in these three that the remains were accompanied by *Elephas primigenius*. In the other two cases, although the deposits would be accepted as of Pleistocene age, *E. primigenius* has not been found in them.

The North American record of fossil *Alces* is very similar to that of Europe. Dr. O. P. Hay,² in his recently published Catalogue of the Fossil Vertebrata of North America, gives numerous references to a number of fossils, more or less closely allied to *Alces machlis*, from what are believed to be Pleistocene deposits; and Prof. S. W. Williston³ describes a series of upper and lower grinding-teeth which he refers to *Alces* sp., from similar beds in Kansas. The evidence for the age of some at least of these remains needs verification; and it seems that in America, as in the Old World, *Alces machlis* must have been a rare animal in Pleistocene times.

The occurrence of elk-remains with those of mammoth, musk-ox, reindeer, and two forms of bison in the 'ice-cliffs' of Eschscholtz Bay, was pointed out long ago by Sir John Richardson⁴; but this does not necessarily indicate a Pleistocene antiquity for the elk in the far north, where the mammoth may have continued to live to a later time than it did in the more temperate latitudes of Europe.

A remarkable skeleton, with very aberrant though elk-like antlers, has been described from the Quaternary deposits of New Jersey by Prof. W. B. Scott⁵ as a new genus, *Cervalces americanus*, on account of its presenting several characters apparently intermediate between *Cervus* and *Alces*. Mr. R. Lydekker,⁶ however, regards this form as only specifically distinct from the elk, and names it *Alces Scotti*.

Prof. Cope gave the specific names of *Alces brevitrabalis* and *A. semipalmatus* to some fragmentary specimens from the *Equus*-beds (? Pleistocene) of Whitman County (Washington); but the specimens are very imperfect, and it is difficult to form an opinion as to their specific value.

Prof. W. Boyd Dawkins⁷ has referred to the genus *Alces* certain

¹ 'Uebersicht über vierundzwanzig mitteleuropäische Quartär-Faunen' Zeitschr. Deutsch. Geol. Gesellsch. vol. xxxii (1880) p. 468; also Neue Deutsche Jagd-Zeitung, May 25th, 1889.

² Bull. U.S. Geol. Surv. No. 179 (1902).

³ Univ. of Kansas Geol. Surv. vol. ii (1897) p. 301 & pl. xlvii.

⁴ 'Zoology of the Voyage of H.M.S. *Herald*' 4to, London, 1854, p. 20.

⁵ Proc. Acad. Nat. Sci. Philad. 1885 [1886] p. 181.

⁶ 'The Deer of All Lands' 1898, p. 60.

⁷ 'British Pleistocene Cervidae' Monogr. Palæont. Soc. 1886 (1887).

portions of antlers and skulls from the Cromer Forest-Bed, two of which had already been described as *Cervus latifrons* by Randall Johnson.¹ These specimens are distinguished from *Alces machlis* chiefly by the greater width of the frontals and the more elongated beam. Only one or two of these fossils show the commencement of the palmation, and the form of the antler is therefore unknown. These remains are the more interesting as showing the existence of an elk-like mammal in the Cromer Forest-Bed, which some of us regard as the latest stage of British Pliocene deposits.

The elk of Europe and moose of North America being regarded as one species (*Alces machlis*), its distribution at the present day is exceedingly wide in both the Old and New Worlds. In the former it is known in Scandinavia, Russia, Poland, Prussia, and Lithuania, extending as far north as the limit of arboreal vegetation; it is also found in Siberia and Tartary, as well as in the deserts of Altai and Baikal. In North America, it seems to have been found living very generally in suitable localities between the latitudes of 43° and 70° N., but not quite so far south on the eastern side of the continent as on the western. Unhappily, this interesting animal has been completely exterminated from certain localities, where formerly it was very abundant.

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1860. HARDY, JAMES. 'On Fossil Antlers of the Roebuck & Gigantic Irish Elk, found at Coldingham in 1859.' Proc. Berwickshire Nat. Club [1863] p. 206.
1861. HOWSE, RICHARD. 'Notes on the Fossil Remains of some Recent & Extinct Mammalia found in the Counties of Northumberland & Durham.' Trans. Tyne-side Nat. Field-Club, vol. v (1863) p. 113 & pl. v.
1861. BATEMAN, THOMAS. 'Ten Years' Diggings in Celtic & Saxon Grave-Hills in the Counties of Derby, Stafford, & York' p. 298.
1862. SMITH, JAMES. 'Researches in Newer Pliocene & Post-Tertiary Geology' Glasgow, p. 42.
1864. LARTET, ÉDOUARD, & H. CHRISTY. 'Sur des Figures d'Animaux Gravées ou Sculptées, &c.' Revue Archéologique, n. s. vol. ix (1864) p. 250 footnote.
1868. 'ALCES.' The Elk. 'Land & Water' vol. v, no. 119, p. 233.
1869. OWEN, RICHARD. 'Note on the Occurrence of Remains of the Elk (*Alces palmatus*) in British Post-Tertiary Deposits.' Geol. Mag. vol. vi, p. 389.
1869. TINDALL, EDWARD. 'Remarks on the Extinct Fauna of the East Riding of Yorkshire.' Proc. Geol. & Polytechn. Soc. Yorks. vol. v (1870) p. 7.
1872. SMITH, JOHN ALEXANDER. 'Notice of the Discovery of Remains of the Elk (*Cervus alces*, Linn., *Alces machlis*, Gray) in Berwickshire; with Notes of its Occurrence in the British Islands, more particularly in Scotland, &c.' Proc. Soc. Antiq. Scot. vol. ix, p. 297.
1876. YOUNG, JOHN. [Abstract of a paper on the Existence of the Elk (*Alces machlis*, Gray) in Scotland.] Proc. Nat. Hist. Soc. Glasgow, vol. ii, p. 176. [Read Nov. 25th, 1871.]

¹ Ann. & Mag. Nat. Hist. ser. 4, vol. xiii (1874) p. 1.

1877. ADAMS, A. LEITH. 'Observations on the Remains of Mammals found in a Fossil State in Ireland.' Journ. Roy. Geol. Soc. Irel. vol. iv, p. 248.
 1883. SMITH, J. A. 'Notice of the Occurrence of the Elk (*Cervus alces*, Linn., *Alces malchis*, Gray) recently found in Wigtownshire.' Proc. Soc. Antiq. Scot. n. s. vol. v, p. 325.
 1885. LYDEKKER, RICHARD. Catal. Foss. Mamm. Brit. Mus. pt. ii, p. 78.
 1887. DAWKINS, WILLIAM BOYD. 'British Pleistocene Cervidæ.' [Pt. vi of 'Brit. Foss. Mamm.']. Monogr. Palæont. Soc. vol. xl (for 1886).
 1898. LYDEKKER, RICHARD. 'The Deer of all Lands' p. 49.

EXPLANATION OF PLATE V.

Remains of Elk (*Alces n. achilæ*, Ogilby) from Thames alluvium near Staines.

(Figs. 1, 2, & 4 are about $\frac{1}{6}$ natural size; fig. 3 is about $\frac{2}{3}$ natural size.)

Fig. 1. Skull and antlers viewed from above and in front.

2. Left ramus of lower jaw seen from outside.

3. Left ramus: cheek-teeth, grinding-surface seen from above.

4. Left tibia, front view.

DISCUSSION.

The PRESIDENT referred to the remains of the elk discovered in the peat-bogs of the basin of the Tweed in the year 1871.

Prof. SOLLAS expressed the hope that the specimens deposited by Lartet in the University Museum at Oxford were not lost, but mislaid, and assured the Author that every facility should be afforded him if he would visit the Collection and look for them.

Mr. E. SLOPER suggested that the introduction of the elk into Britain was of later date than most persons imagined. The discovery of the remains in Thames alluvium with mammoth, for the first time, would scarcely afford evidence of the elk being older than the alluvium, and the mention of its existence with Roman remains and its deposit in peat brought to his mind a subject which he had investigated and written on that might be worth mentioning. He said that the notion that the City of London had been built upon a marsh was entirely erroneous. The original floor of London was situated on the brick-earth, which had been removed from time to time, forming huge pits filled up subsequently by rubbish, and through this rubbish up to the 17th century piles had been driven into the gravel, on which buildings were erected. These pits were the ancient 'leystalls,' consisting of all kinds of refuse, among other things rushes and straw used for domestic purposes, and this had been mistaken for peat. So much so, that the late Gen. Pitt-Rivers (then Col. Lane-Fox) had in 1867 published an article in the 'Anthropological Review' detailing the discovery of an early lake-dwelling in London Wall built upon piles, which are figured in that Review. Remains of *Bos longifrons*, wild deer, and wild goat were found. The particulars have since been embodied in Dr. Munro's 'Lake-Dwellings of Europe'; but in justice to

Gen. Pitt-Rivers, it is only fair to say that he remarks with regard to the thickness of the supposed peat :—

‘ It is difficult, if not impossible, to reconcile this enormous rise of 7 to 9 feet of peat during the four centuries of Roman occupation.’

The existence of the remains of the elk in peat and with the remains mentioned, therefore excited the speaker’s curiosity, and it seemed to him that the many instances occurring in the North of England might lead to the possible conclusion that the introduction and domestication of the elk took place during the period of the Northmen and Danes, as that portion of the country was earlier affected by their invasion than the South of England. The domestication of the elk might have subsequently died out in Britain, as he believed that it had at a recent date in Norway and Sweden.

The AUTHOR, in reply, called attention to the fact that, although remains of *Alces machlis* had not been found with those of mammoth in Great Britain, yet it was associated with that species and reindeer in the frozen cliffs of Eschscholtz Bay—a fact noticed by Sir John Richardson in 1854, but which the Author thought was no proof of the Pleistocene age of the elk.

A. T. Hollick del. et hatched.

ALCES MACHILIS (GRAY) FROM THE THAMES VALLEY.

Mint em Bros. imp.