II.—ON THE CURVATURE OF THE TUSKS IN THE MAMMOTH, *Elephas primigenius* (Blumenbach).¹

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[PLATES XXII. AND XXIII.]

THE object of this paper is to call attention to the magnificent head of the Mammoth, discovered by Antonio Brady, Esq., F.G.S., of Maryland Point, Stratford, Essex, in a brick-pit at Ilford, in 1864, and now placed in the Geological Department of the British Museum.²

This remarkable fossil still remains quite unique, no other skull having ever been exhumed in anything like a perfect state, owing to the very friable and perishable condition in which the bones are found in most of our river-valley deposits.

But the immense number of molars met with, and also of more or less entire tusks, attest their former numerical abundance.

Mr. Antonio Brady has lately obtained four almost entire tusks of the Mammoth, from the same pit which yielded the head, and he has, in his collection, tusks and molar teeth of elephants of all ages, from the milk-molars of the calf, a year old, to the remains of such veterans as that figured in our plate.

All the larger of Mr. Brady's tusks, also those from the Rev. J. Layton's collection, dredged off Hasboro', on the Norfolk coast, and the very perfect tusk found in a gravel-pit south of Spalding, Lincolnshire, agree exactly in their general curvature, as do also the specimens in the British Museum from Escholtz Bay and Siberia, and these likewise correspond with the tusks of the Ilford cranium, the left tusk of which still remains in the alveolus.

The drawing of Adams's Mammoth, found in Siberia in 1799,³ well known from Mr. Waterhouse Hawkins's clever diagram, has the extremities of its tusks curved in a completely reverse direction to that of our British example.

Dr. Tilesius observes (*op. cit.*³), "The Mammoth is distinguished from the African and Indian Elephants, by the teeth, and by the size of the tusks, which are from ten to fifteen feet long, much curved, and have a spiral turn *outwards*. The alveoli of the tusks are also larger, and are produced further."

In Benkendorf's graphic narrative of the finding of an entire Mammoth, in a half-frozen condition, in the river Indigirka, in 1846 (noticed by Mr. W. Boyd Dawkins in a paper "On the Range

¹ The substance of this paper was read before the International Congress of Pre-historic Archaeology (Third Session), Norwich, August 25, 1868.

² A brief account of this specimen appeared in Vol. I. of the GEOLOGICAL MAGAZINE, 1864, p. 241, accompanied by a wood-engraving, representing a side-view of the skull, with its one attached tusk. The specimen was not, at that time, set up in the gallery, so that the artist was unable to obtain a favourable view of its peculiar features.

³ Figured in the Memoirs of the Imperial Academy of Sciences of St. Petersburg, vol. v., and in the abridged English translation of Dr. Tilesius's paper, printed in London, in 1819 (Select Strzelecki Edition).

7

G. de Wilde lith.

W. West imp.

Fig 1. Skull of Mammoth from Ilford.
Elephas primigenius, Blum. (Front view.)

Geo. Wilde lith.

W. Hest. imp.

Side view of Skull of the Mammoth from Ilford; *Elephas primigenius*, Blum.

of the Mammoth," published in the Popular Science Review, vol. vii., July, 1868) it is stated that "the tusks were eight feet in length, thick, and curving *outwards* at their ends."

This, then, was evidently (like our Ilford Mammoth) an adult and, probably, an aged beast.

It is greatly to be regretted that Benkendorf had no draughtsman with him, as the loss of the animal (through the giving way of the river's-bank) deprives science of one of the grandest relics of a former world ever met with.

With regard to Adams's Mammoth (preserved in the St. Petersburg Museum) most of the readers of this Journal will be familiar with its history.

It was discovered in the summer of 1799, half-buried in frozen soil and ice, by a Tungusian chief, engaged in seeking for 'Mammoth-horns' along the shores of the peninsula of Tamut, at the mouth of the river Lena, in Siberia.

After overcoming his first fears that the beast was an evil omen (which brought on a serious illness), his desire for gain, says Adams, caused him to set a watch on the beast until 1804, when, it being then entirely freed from the ice, he cut off its horns and exchanged them with a merchant for goods of the value of 50 roubles (= £7 18s. 4d.), the reward of five years waiting and watching!

Adams having heard of it, in 1806, in his travels, determined, if practicable, to obtain it. With infinite pains and industry he traced out the spot where the Mammoth lay, and gathered together all that remained of his prize. For, after its 'horns' had been annexed by the chief, it became common property; and first the Jakutski of the neighbourhood, with their dogs, assembled and feasted on its flesh, and then the white bears, wolves, wolverines, and foxes polished off the remainder and picked the bones, which, however, remained almost entire, being held together by their cartilages and sinews. These he carefully packed up and forwarded to St. Petersburg, a distance of 11,000 wersts (7,330 miles).

He adds: "When I arrived at Jakutsk, I had the good fortune to re-purchase the tusks." But there is reason to doubt whether Adams really did get the right tusks after all.

Professor Maskelyne, who examined the specimen very carefully when in St. Petersburg in 1865, considers that they do not belong to the skull, and that there is a disparity between the portion within the alveolus and the rest of the tusk.

There is a statement made by Mr. Boyd Dawkins in the paper already referred to in the "Popular Science Review," which I beg here to be allowed to correct.

After describing (at p. 277) the character of the Ilford deposit, and especially the layer containing the bones of Mammalia "full of the shells of *Corbicula* (*Cyrena*) *fluminalis* with the valves united, and of the common River-mussel (*Anodon*), and the land *Helix nemoralis*"—he proceeds to say: "On a continuation of the same platform, now cut away, the skull of the Mammoth was discovered in 1864, perfect with the exception of the tusks, which had been

broken away with their incisive alveoli. That on the right side lay 20 feet away from the skull, while that on the left has not yet been discovered. Owing to the surprising skill of Mr. Davies, the skull and tusk were taken up and re-united, and now constitute by far the finest specimen of Mammoth in the British Museum."

Now, if this were the case, the specimen in the National Collection would have no higher claim than the St. Petersburg example, to be cited as positive proof of the normal curvature of the tusks. But the woodcut given in Vol. I. of this Magazine (1864), p. 243, partly from a rough drawing made by myself on the spot, and partly from the specimen as it was lying in the mason's shop at the Museum, shows the alveolus and tusk united. The wood-engraver did not, however, reverse it, hence it appears that the *right* side has the perfect alveolus instead of the left, as now correctly represented by Mr. De Wilde in Plate XXIII. herewith. The *right-hand tusk* was the one found detached, as mentioned by Mr. Dawkins. It is placed beside the torn alveolus, as Mr. Waterhouse was disinclined to restore it; the artist has, however, represented the right-side as restored in Plate XXII. The left side was that exposed in the pit and was quite entire, save the zygomatic arch, which was probably broken by the workmen before our arrival.¹

In order to remove the vast and elongated mass of friable materials, it was found absolutely necessary to saw off the left attached tusk, about 6 inches below the alveolus, but the parts were again brought into normal contact in their true position after they had been placed in the gallery. The left alveolus was never broken, and the curvature of the socket, as well as of the tusk itself is therefore genuine and natural.²

A reference to Plate XXII. will show that there is a natural bend in the alveoli, and it would therefore be impossible to thrust a left-hand tusk into a right-hand socket; but if the tusks were sawn off *below the alveolus* then the lower portions might be transposed, and so placed as to have an outward curving extremity.

It is possible that Adams may have really obtained the actual tusks belonging to the skeleton of the Mammoth which he found, but not having seen them when attached to the animal, the tusks may have been placed in contact with the wrong sockets.

We know that the Ilford specimen was that of an aged individual, by its having cut its last pair of molars, and by these having been considerably worn. The St. Petersburg specimen is, no doubt, also that of an adult.

That the tusks in the young Mammoth were directed forwards and outwards, seems certain, but in the adult they all have, near their points, an upward and inward curve.

Nor need we be surprised at this, for, as a rule, we find that the continued growth of the tusks and the horns of most *aged* animals endowed with these weapons of offence and defence, is not that best

¹ This has since been restored by modelling the right side and then reversing it.

² The curvature of the right tusk corresponds with the left, showing that they are from the right and left side of the same head.

calculated to conduce to their formidable character, but the reverse. The horns of the goat, sheep, and ox, the incisive teeth in rodents, the tusks of the wild boar, &c., may be cited as examples in which the continued growth of these structures is often deleterious to the animal.

What I am most desirous to point out is, that in all the Siberian remains of the Mammoth I have seen, and in the figures given in "Cuvier's Ossemens Fossiles" (4th Edition, Plate 15), there is a constant uniformity and agreement as to the curvature of the alveoli, with our Ilford specimen.

If we compare the skull of the mammoth with that of the recent Indian elephant, we find the alveoli in the former (Plate XXII., Fig. 1) diverge near the nasal aperture (leaving a deep and somewhat elliptical cavity, broadest near its upper portion, between them); whilst they converge as they extend forward, until, in fact, they commence as separate and distinct prolongations of the incisive alveoli, when they again diverge to admit of the passage of the trunk; in the latter the alveoli converge at their upper part, and steadily diverge outwards to their extremities.

In *Elephas Ganesa* (probably one of the largest of all the fossil elephants, and certainly possessing the largest tusks,) brought by Colonel Baker from the Siwalik Hills in India, and exhibited next to the Ilford specimen in the Museum Gallery, the concavity between the alveoli is broadest at the lower part of the premaxillary bones, becoming narrower upwards until, near the nasal orifice, the alveoli are in contact. See Pl. XXII., Fig. 2, which represents the alveolar portion of this fine skull.

In "Cuvier's Ossemens Fossiles" already referred to (Pl. 15), two figures are given of two skulls from Siberia; one an upper view, the other an under, or palatal aspect. These have a precisely similar curve to the alveoli, as depicted in Plate XXII., Fig. 1.

Any tusk having the alveolar end preserved, can be determined with great certainty as to which side of the head it should be referred, by carefully noticing its curvature.

In calling attention to the fine series of Elephantine remains chiefly from Britain, India, and Siberia, preserved in the National Museum, we cannot fail to recall the loss of that great and able naturalist, Dr. Hugh Falconer, whose work especially lay among these fossils, and whose labours and those of Sir Proby T. Cautley, in the Siwalik hills, have tended in so great a degree to enhance the excellence of this portion of the Museum.

Nor among the names of still active collectors of these remains must we forget to mention the Rev. John Gunn, F.G.S., whose elephantine series from the Forest-bed of the Norfolk Coast now enriches the Norwich Museum; and Antonio Brady, Esq., whose collection (made with unsparing liberality to the workmen of the Ilford pits, and with every specimen rendered both as durable and as perfect as possible by the skill of Mr. W. Davies) we may hope some day to see adorn a public museum of a more or less national character.