

XIV. *Observations on the Structure, and Mode of Growth, of the grinding Teeth of the Wild Boar, and Animal incognitum.*
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THE peculiarities in the mode of growth of the grinding teeth of the *Sus Ethiopicus* have, upon a former occasion, been laid before this learned Society, and the similarity of their structure to those of the elephant explained.

The wild boar has been since discovered to have similar peculiarities, although in a less degree, and taking place at a later period of the animal's life: an account of these is the subject of the present Paper.

When the peculiarities just alluded to were noticed in the teeth of the *Sus Ethiopicus*, it naturally led to the examination of the grinding teeth in the different species of *Sus*; and, that no such peculiarities should be found in any of them, appeared undoubtedly very extraordinary; but, upon reflecting that they only belonged to the second set of teeth, and that the first or temporary teeth of the *Sus Ethiopicus* were exactly similar to those of the common hog, the idea suggested itself, that a similar change might take place in the teeth of the other species, at a more advanced period of life; and, that it had not been detected in the heads that had been examined, because the animals were too young.

This view of the subject encouraged me to prosecute the enquiry, and made me desirous of examining the grinding teeth of the wild boar in the different stages of their growth, and, if possible, after the animal had arrived at an advanced age.

My wishes respecting the wild boar were mentioned to Sir JOSEPH BANKS, who very obligingly sent me two skulls he had received from Germany; and GEORGE BEST, Esq. F. R. S. was so good as to send over to Hanover, for the head of one of the largest boars that could be procured: his request was immediately complied with, and the animal to which the head belonged, was considered by the hunters as under seven years of age.

From an examination of these different specimens, I have been able to make out very satisfactorily, the mode of dentition of the wild boar during the first seven years; and to ascertain, that there is a succession of grinding teeth beyond that period.

In this species of *Sus*, the temporary grinders consist of sixteen; four on each side, both of the upper and under jaw.

These sixteen teeth are shed in the usual manner, and their places supplied by larger teeth rising up from the substance of the jaw, immediately under the old ones.

Before these first teeth are shed, one of the more permanent grinders is formed, in the posterior part of each side of both the upper and under jaw; this tooth, although it is in its place with the first set, is to be considered as belonging to the second set.

In explaining the subsequent changes which take place, I shall confine myself to the lower jaw; as the figures which are annexed are taken from the teeth in that jaw.

Of the five teeth on each side of the lower jaw, one is separated from the rest, and is close to the tusk, which admits of a space, for the curve of the upper tusk to rest upon; so that

there are, properly speaking, only four grinders, forming a regular row.

As the jaw increases in length, a small cell is formed in its substance, behind the last grinder, in which the rudiments of a new tooth appear: these increase, along with the cavity in which they are contained; and the new tooth is in every respect larger than the preceding one. By the time it is completely formed, and ready to cut the gum, the jaw has extended itself, so that there is room for it to come into its place, as the posterior grinder.

While this tooth is concealed in the jaw, another cell is formed immediately beyond it; and there is a small round hole of communication between the two cells, similar to what is met with in the elephant; but there are no remains of such a communication, between the anterior cell and the socket of the full grown tooth immediately before it.

The last mentioned cell is at first very small; but gradually increases to a prodigious size; and the tooth formed in it is nearly double the size of the preceding large grinder. Its masticating surface has a row of four projections on each side, and the tooth has eight fangs; so that it very much resembles two large grinding teeth incorporated into one: the posterior fangs are not completely formed at seven years of age.

This large tooth, although it is formed in the posterior part of the jaw, is brought sufficiently forward, by the growth of the jaw bone, to cut the gum, and range in the line with the other teeth, making the connected row of grinders six in number. From its very great size, it not only fills the jaw completely, but all the bodies of the other five teeth are pushed by it out of their perpendicular direction, leaning a little forwards.

As soon as the sixth grinder has cut the gum, a new cell begins to appear immediately beyond it, to receive the rudiments of another tooth.

This last cell, at seven years of age, is very small; and the specimens in my possession do not enable me to prosecute the enquiry; but there is every reason to believe the tooth formed in it, equals or exceeds the large one that has been described.

The appearances which have been mentioned will be better understood by referring to the annexed figures, (Plates XX, XXI, XXII, and XXIII.) than by any verbal description.

The large grinder in the wild boar resembles those of the *Sus Ethiopicus* and elephant, in having a larger extent of masticating surface than is met with in other teeth; it differs, however, materially in its structure, having that surface composed of a strong crust of enamel, with projecting transverse ridges; showing that it is not intended for grinding simply, but belongs to an animal which, like the human species, is fitted to live on both animal and vegetable substances.

Previous to a tooth of this structure having been discovered with an extended masticating surface, the curious mechanism of the elephant's grinders appeared to be the only one peculiarly fitted for that purpose; but we now find, that the more usual structure of grinding teeth will admit their surfaces to be extended, whenever their enlargement becomes necessary to enable the animal to prepare the food for the process of digestion.

The elephant, the *Sus Ethiopicus*, and the wild boar, are the only recent animals in which this extended masticating surface of the grinding teeth has been met with. There is nothing

similar to it in the bear ; and, in the lion and tyger, the posterior grinder has a small tooth placed close to it, which is a different mode of increasing the grinding surface.

The rhinoceros and hippopotamus have no increase of the surface of the posterior grinders, beyond what is usually met with.

The tapir I have not had an opportunity of examining in its full grown state ; so that I am unable to say what extent the masticating surfaces of the posterior grinders may acquire.

In the human species, the mode of dentition is upon the same principle as in the wild boar ; only the last-formed grinding teeth in each jaw, called *dentes sapientiæ*, from the late period of life at which they cut the gum, do not in size exceed the others, but are rather smaller, and very often have not sufficient room in the jaw to come into their regular place, although they do not make their appearance till between twenty and thirty years of age.

In the negro, the *dentes sapientiæ* have sufficient room to come into their place, and are in general full as large as the other grinders ; the growth of the posterior part of the jaw being evidently greater than in the European.

When the age of man was much greater than at present, it is natural to suppose the growth of the posterior part of the jaw was continued for a longer time, and the space for the *dentes sapientiæ* was more extensive. Under such circumstances, these teeth would probably be large, in proportion to the space which was to receive them ; and when, instead of threescore and ten, a thousand years was the period of a man's life, we should be

led to conclude, from the preceding observations, that there was a succession of *dentes sapientiæ*.

There is a very curious circumstance in favour of this conjecture, which has been mentioned to me by Sir JOSEPH BANKS. In Otaheite, the natives have a tradition, that Adam, or the first man, was remarkable for the length of his jaws. His name, in their language, is *Taa roa tabi etoomoo*, which signifies the one (the stock) from which all others sprung, with the long jaws; so that these islanders have a tradition of the original race of men having had their jaws much longer than at present.

Although the grinder of the boar differs in appearance, as in extent of surface, from those of all the recent animals that have been mentioned, yet, upon comparing it with the large fossil teeth found on the banks of the river Ohio in North America, belonging to the animal incognitum, they are so much alike, both in their external appearance and internal structure, that it is evident they are teeth of the same kind, only of very different sizes.

This resemblance led me to examine the mode of dentition of this unknown animal, as far as could be done from the specimens preserved in this country, to see if any resemblance could be traced between it and that of the wild boar.

From the different specimens of these fossil teeth deposited in the British Museum, the collection of the late Dr. WILLIAM HUNTER, and the HUNTERIAN Museum, together with one in my own possession, presented to me by Sir JOSEPH BANKS, the following facts have been ascertained.

The first grinders are small, when compared with those which

are afterwards formed, being scarcely more than half their size : they have three transverse projecting ridges, completely encrusted with enamel, as well as every other part of the masticating surface.

Two of these grinders, and probably more, are present on each side of the jaw at the same time. As the animal increases in size, and the jaw extends itself, a larger kind of grinder is formed in the posterior part of the jaw, exactly similar to what happens in the elephant ; and, as this large tooth, which has five projecting transverse ridges on the masticating surface, becomes completely formed, it comes forward, and occupies the principal seat in the jaw, and the others drop out.

When the smaller grinders are examined, the greater number of them have their fangs all bent in one direction, in consequence of the bodies of the teeth having been pushed forward, by the large posterior tooth coming into their place, as was observed in the temporary grinders of the young *Sus Ethiopicus*.

This process is well illustrated by two specimens, which show the teeth in the two stages of growth, and which are represented in the annexed figures.

The first is a lower jaw preserved in the HUNTERIAN MUSEUM, in which the two small grinders are in their sockets ; and the cavity for the formation of the large grinder has, upon its sides, the impression of the different parts of the body of the tooth.

The second is a lower jaw in the British Museum, in which the large grinder is completely formed, and occupies the principal part of the jaw, at the anterior part of which are the

remains of the sockets, from which the smaller grinders had fallen out.

This mode of dentition is precisely similar to that of the elephant; and, in the structure of the tooth, it resembles that of the boar; we have therefore complete evidence of a tooth of this last structure acquiring the size of that of the elephant, and succeeding those which preceded it in the same manner.

The animal incognitum, with respect to its teeth and the mode of their succession, being an intermediate step between the elephant and wild boar, both of which have tusks, gives a degree of probability to the opinion which has been very generally adopted, of this animal also having tusks.

Of this, however, there is at present no confirmation; nor is there sufficient ground for denying their existence; the part of the upper jaw in which they ought to be situated not having been preserved entire, in any of the specimens that have come under my observation.*

That tusks have been found, resembling those of the elephant, in the same places in which the fossil teeth were met with, proves nothing; since fossil elephants' grinders have been found in the same situation.

The skull of the fossil skeleton found in South America, a description of which is given by Mr. CUVIER, Secretary to the National Institute at Paris, in size resembles that of the animal incognitum; but, when it is particularly examined, it will be found that the animal is of a very different genus. The shape

* From the appearance of the lower jaw in the British Museum, there is sufficient evidence to ascertain that there is no tusk in the lower jaw.

of the lower jaw is totally unlike; and there are four grinding teeth on each side of the jaw, with flat crowns, on which are transverse grooves; which shows that the number and appearance of the teeth are very different from those of the animal incognitum of North America. This South American animal incognitum, therefore, having no tusks, cannot be brought in evidence either for or against their existence in the other.

The mode of dentition by a succession of large grinders formed in the posterior part of the jaw, is not the only one adopted by nature for the supply of those animals who live to a great age, and require a renewal of their teeth, with an increase of size proportioned to the enlarged growth of the animal.

Crocodiles and seals live to a considerable age, and grow to a very large size; but, from the nature of their food, their teeth are small; and therefore, in those animals, the succession is from the portion of the jaw immediately under those which are to be shed. As the jaw becomes larger, the teeth increase in size, but never so much as to prevent there being room for the growth of the new tooth under the old, although the succeeding teeth are three or four times larger than the original ones, in both these genera of animals.

The mode of dentition in the elephant, animal incognitum, and boar, appears to be confined to those animals of great longevity, whose food has so much resistance as to require the teeth being of a size too large to admit of the new tooth and the old being contained in the same portion of the jaw, at the same time.

That the elephant lives to a great age, is sufficiently ascertained; and the size of the bones of the animal incognitum, is almost sufficient evidence of its being a long lived animal.

The wild boar of Germany, from living in a savage state, cannot have its natural life appreciated with any accuracy; but, if we may credit the accounts recorded, of the size to which it grows, it may be presumed that many years are necessary for that purpose.

The following statements upon this subject, have been communicated to me by Mr. BEST, from Hanover.

In the year 1581, a boar was killed near Koningsberg, in Prussia, of six hundred pounds weight.

In 1507, one was killed in the dukedom of Wirtemberg, seven feet three inches long, by five feet three inches high. The length of the head was twenty-three inches.

From these accounts of the enormous size of the wild boar in the 16th century, it cannot be doubted that the animal, where its haunts are not disturbed by hunters, lives to a great age; if that were not the case, the mode by which its teeth are renewed, would be entirely unnecessary.

A boar of this description, matured in its native forests, when it arrived at the age of 60 or 100 years, possessed of the strength and sagacity to be acquired in that time, must have been an animal more formidable than any which are at present to be met with; and, when it made occasional excursions into the nearest cultivated lands, it must have excited the greatest degree of terror and alarm among the inhabitants.

Before the use of fire-arms, it is not at all improbable that such an animal should drive before it the peasantry of a whole district; and that the boldest warriors should be solicited to come from the neighbouring cities, to put a stop to its ravages.

The histories of this kind which are to be met with in the works of the ancient poets and historians, are therefore not

to be considered as wholly fabulous, but the recital of events which really happened, although probably in many instances much exaggerated and embellished.

OVID's description of the wild boar killed by MELEAGER, which he asserts to be larger than the Sicilian bulls, with tusks equal in size to those of the elephant, was probably taken from some Greek account, which, being founded on tradition, may be supposed, from the preceding observations, to have been in its origin a true history.*

It is deserving of remark, in proof of the Roman poets having considered the wild boar as an animal that lived to a great age, and grew to an enormous size, that, while Ovid gives the particulars of its bulk, Virgil thinks it sufficient, when he means to describe the animal in all its power, to say it had lived many years, without at all particularizing its size.†

* Inquit ; et Ceneos ultorem spreta per agros
Misit aprum, quanto majores herbida tauros
Non habet Epiros ; sed habent Sicula arva minores.
Sanguine et igne micant oculi, riget horrida cervix,
Et setæ densis similes hastilibus horrent ;
Stantque velut vallum, velut alta hastilia setæ.
Fervida cum rauco latos stridore per armos
Spuma fluit ; dentes æquantur dentibus Indis.

OVID. *Metam.* lib. viii. l. 281

† Ac velut ille canum morsu de montibus altis
Actus aper, (multos Vesulus quem pinifer annos
Defendit, multosque Palus Laurentia,) sylvâ
Pastus arundineâ ; postquam inter retia ventum est,
Substitit, infremuitque ferox, et inhorruit armos.
Nec cuiquam irasci, propiusve accedere virtus ;
Sed jaculis, tutisque procul clamoribus instant.

VIRG. *Æn.* lib. x. l. 707.

The observations which have been made upon the wild boar, are laid before this learned Society, with a view of calling the attention of other physiologists to this subject, whose opportunities may enable them to prosecute it with more advantage.

From this consideration, these materials, so inadequate to the extent of the enquiry, have been brought forward; as many years might elapse before more could be procured; and the hints that have been thrown out may induce others to assist in collecting facts upon this subject.

EXPLANATION OF THE PLATES.

Plate XX. In this Plate are three figures of the lower jaw of the wild boar, in different stages of growth, to shew the mode in which the teeth are supplied. The figures are on a scale of half an inch to an inch.

Fig. 1. Represents the first set of grinders, and the mode in which they are shed, by others rising up immediately under them: one of the second set is in its place; another is forming in the substance of the jaw; and there is a small cell behind it, in which were the rudiments of the succeeding tooth.

Fig. 2. Represents the second set of teeth in their place, with the small cell delineated in the first figure increased to a large size, and containing an imperfectly formed tooth, greatly exceeding in size any of the others.

Fig. 3. Represents the jaw in a still more advanced stage of its growth, with the tooth which was only forming in the second figure now come to its full size, and in its proper place in the row of teeth; there is also a new cell formed, for a succeeding tooth.

Plate XXI. Represents a view of a portion of the lower jaw of the animal incognitum, (on a scale of half an inch to an inch,) to shew the appearance of the smaller or first formed grinders, in their place in the jaw; also the cavity immediately behind them in the substance of the jaw, in which were contained the rudiments of the larger grinder, which was afterwards to occupy the principal part of the jaw.

Plate XXII. Represents a view of the lower jaw of the animal incognitum, with the large grinder, (the cavity for forming

which was seen in the last Plate,) now come to perfection, and occupying its proper place in the jaw; there are also imperfect remains of the sockets of the smaller grinders. In this Plate the figure is on a scale of one-third of an inch to an inch.

Plate XXIII. Represents a section of the grinding tooth of the animal incognitum, (on a scale of half an inch to an inch,) to shew the internal structure, and the mode in which the tooth is formed upon the pulp. From this section it is evident, that this tooth, like that of the elephant, does not arrive at perfection in all its parts at the same time: one portion of the tooth is first completed, and afterwards, in succession, the other parts. The part which is nearly solid is the first formed; and the large cavity contained the pulp upon which the rest of the body of the tooth was to have been made solid.

Fig. 1.

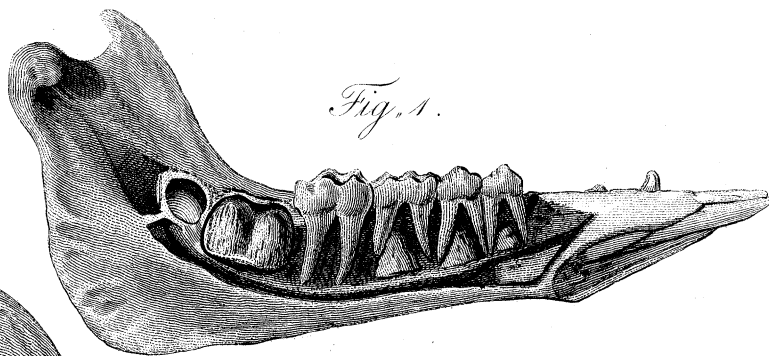


Fig. 2.

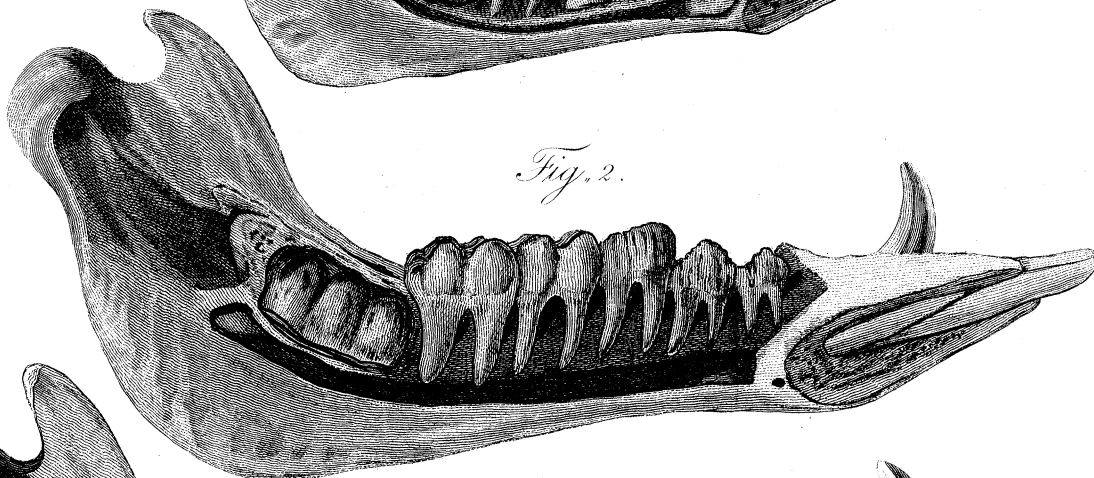


Fig. 3.

