

ON THE MANDIBLE OF ZYGOMATURUS.

By C. W. De VIS, M.A.

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SOME time ago, as friends around me may remember, it fell to my lot to question the soundness of the judgment of the English palæontologist, Sir R. Owen, in pronouncing the fossil skull named *Zygomaturus*, by Macleay, to be but the cranium belonging to his own *Nototherium* mandibles. As the reasons given on that occasion in favour of my contention were never met with counter arguments of the slightest value, I have waited in patient expectation that my view of the matter would ultimately be confirmed by the course of events. Accordingly this has brought about the anticipated, yet welcome, discovery of a veritable mandible of *Zygomaturus*, as announced by our President at our last meeting. Mr. Jack was then good enough to say in effect that the jaw in evidence was there to give me an opportunity of forming an opinion of it, but at the moment I was under the impression that the practical absence of both premolar teeth would make it a somewhat difficult matter to form any positive opinion, and naturally I did not venture to express one off-hand. When leisure permitted, a little study of the jaw brought me an agreeable surprise. I have now no hesitation in saying that it is not by any means the mandible of a *Nototherium*, and consequently that the skull claimed by Owen for that genus can no longer be refused its original rank as the representative of Macleay's genus. The fact becomes obvious to

anyone placing the new arrival beside a *Nototherium* mandible of approximately the same age.

But are we at liberty to compare the two? It would appear that before we dare to take that liberty there is a question to be settled. What represents the genus *Nototherium*? Does the genus assert itself to all practical intents and purposes in the mandibles referred to it in 1877, by Owen; or does it appear in his type specimen only? It may be well to recall Owen's account of the dental wreck shown by the fossil which nevertheless served him sufficiently well for a type; he says of it* "The first tooth," the very important premolar, "is wanting, and the crowns of the rest are broken away,"—the only guide to the structure of the teeth left is that "the base of the third remains and gives an indication of a middle transverse valley which most probably separated two transverse eminences." The utter uselessness of this type at the present day, sufficient as it was fifty years ago, when differentiation from *Diprotodon* was the only thing to be established by it, led me in charity to seek the premolar characteristic of the genus among the examples of *Nototherium* fossils identified with the type by its propounder, barring of course the cranium in dispute.† This action was declared illegitimate.‡

Suppose the decision were confirmed by general opinion, we must then necessarily fall back on the type; also we must take the type as we find it described, abiding by the terms imposed upon us; also we must demand from its describer the same duteous observance of his own conditions as we ourselves have to maintain. The result will be disastrous.

After arriving at the conclusion that his fossil was from a marsupial of an extinct genus, Owen proceeds to compare it with *Diprotodon*. "From the jaw of *Diprotodon*," he says, "the present fossil differs in the much smaller vertical extent of the symphysis, and the convexity of the jaw at its outer and anterior part, and more essentially in the absence of the incisive tusk, and its socket. On these grounds I propose to

* Brit. Assoc. Report, 1844, page 231.

† Proc. Roy. Soc. Queensland, Vol. V., page 3 (1888).

‡ Lydekker—Ann. Mag. Nat. Hist., Series 6, Vol. III. (1889), page 149.

Op. cit., page 232.

indicate the genus, etc.” The species he names *inerme*, and he then goes on to describe a second species, *N. mitchelli*, from the hinder half of a jaw which he must necessarily have assumed to have been equally devoid of an incisive tusk during life. It follows that no jaw containing such a tooth can belong to *Nototherium*, consequently that all the fossil jaws, the type of *N. mitchelli* included, referred to it by Owen himself, or by whomsoever has followed his lead, must be withdrawn from the genus, since they either possess, or can be shown by intercomparison to have, in their perfect condition, possessed incisive tusks. The genus will thus be represented by the unique, and probably abnormal, specimen named *N. inerme*. Refuge from the catastrophe will of course be sought in the latitude allowed to authors should experience shew that the generic definitions with which they deal are inexact in detail, or too narrow in scope. A frank straightforward amendment of a genus by its originator is unobjectionable; even a silent desertion of the “most essential” character of a genus may be condoned for the sake of preserving long established names. But then, if an author be permitted to amend and enlarge as he goes on, his amendments and additions become parts of the diagnosis of the genus, and it is clear that an opponent of any one of his determinations cannot be denied the right of appeal to characters so introduced unless it is shewn that such characters were erroneously introduced. To deny the right in the present case is to stand between the horns of a dilemma; we must either adopt a new name for all these mandibles with incisive tusks, or allow others at their discretion to take their stand upon the generic characters inherent in them. Presuming that this is the alternative which will recommend itself to most minds we will again compare a *Zygomaturus* fossil with a *Nototherium* exemplar other than the type.

The present mandible is from an individual past maturity; the ridges of the hindmost molars are worn down half way to the base, the foremost has no trace of ridge or valley to be seen in it; a further proof of age is that the hinder lobe of the last molar has in the forward travel of the whole series advanced to the level of the base of the coronoid process. On the right side of the jaw all the teeth are in place, but m^4 , m^2 , and the

premolar have suffered damage. On the left side the last three molars are well preserved ; the foremost and the premolars have been ruined by exposure to the accidents of burial and removal. Both ascending limbs are broken away—that of the left side with a clean fracture which yields important information.

The fracture traverses the base of the coronoid process a little above its junction with the horizontal ramus, ascends to a little above the level of the angle of the post-dental platform and then passes nearly horizontally through the ascending ramus. The coronoid process rises, not gradually from a narrow, rapidly attenuating, and obliquely set base, but abruptly from a broad base retaining its thickness to a great degree as it recedes and with a longitudinal axis parallel with the line of the teeth. Opposite to the middle of the post-dental platform it has a thickness of 21 mm., almost twice that of the bone in *Nototherium* in which it is 12 mm. ; its outer margin is here 51 mm. distant from the angle of the platform against 44-5 in *Nototherium*. Further back, we see evidence of a similar inordinate thickening in the ascending ramus ; between the two fossæ the fracture attains a breadth of 37 mm., whereas at the same point in *Nototherium* the bone is but 15 mm. in thickness. Furthermore the posterior surface of the ascending ramus has a breadth of 55 mm., while that of *Nototherium* between the same points is only 40-5. The extraordinary strength of the posterior portion of the mandible indicated by these measurements, is in accord with the massiveness of the whole cranium. and was necessitated by the great volume of the masticating muscle, itself demonstrated by the outwardly bulging and ponderous zygoma. But incrassation was not the only effect which the enormous muscle had on this region of the jaw ; the thickness of that portion of it which was attached to the inner surface of the ascending limbs of the mandible forced these asunder to a proportionate extent, while the tooth-bearing portion, having to remain in correspondence with the less increased width of the upper jaw, remained less expanded ; the consequence is that the angles of divergence of the facial and articular parts of the mandible are different. The ascending ramus which in *Nototherium* is in fore and aft direction almost

parallel with the horizontal, in *Zygomaturus* bends distinctly outwards behind the base of the coronoid process. The extent of this outbending will be best estimated from comparative measurements; though the *Zygomaturus* mandible is the narrower along a line joining the outer surface of the bases of the coronoid process in the ratio 195 : 203, at the back of the ascending process it is wider in the ratio 255 : 235. While the mandible contracts anteriorly, the expansion of the alveolar axes remains greater than in *Nototherium*, the space between the hinder molars being 116 mm., whereas to be in the same proportion to the length of the molar series as in the *Nototherium* it should be but 110 mm.

The teeth of this series are notably smaller than in any example of *Nototherium*, their combined length is but 144.5 mm. In the *Nototherium* mandible under comparison, which happens to have the shortest molar series I can find, its length is 166; in other jaws, including Owen's examples, the length goes on increasing to 186.9. Individual teeth are smaller in just proportion—the last molar being 38 x 25 against 42.5 x 31. The premolar is exactly the size of the milk tooth of *Nototherium* figured by Owen.*

The molars offer in their form and structure no significant peculiarity—they maintain the close family likeness seen in the molars of the allied genera *Diprotodon*, *Nototherium*, and *Euowenia*, which led to the confusion between the two genera in question, and still makes these teeth a most unsafe means of identification.

The incisors, on the other hand, afford differentiating characters of value—they have to a less extent the curve and the vertically extended, compressed, and rapidly tapering fang of the incisors of *Euowenia*, and, as in that genus, their crowns are much narrower, and more divergent at the apex than in *Nototherium*. A section of the fang on a level with the front of the premolar is in form an oval 38.5 x 22 mm.; the wall of bone between these voluminous fangs is reduced to a thickness of 4 mm.—the narrower and more columnar fangs of *Nototherium* leave

* Extinct Mam. Aust., Plate 40.

an interval of 15 mm. in breadth The whole tooth is abbreviated in correspondence with the shortness of the intermaxillary and its armature; the length of the diastoma being 60 mm., while that of the longer faced *Nototherium* is 98-5.

There are now two crania of *Zygomaturus* in this Museum, besides two pieces of other crania, and two editions of a cast of the type skull preserved in the Australian Museum. As a passing thought it may appear somewhat strange that of *Nototherium*, of which so many maxillary and mandibular remains are extant, the upper deck of the skull should be unknown, while the single jaw of *Zygomaturus* now brought to light should have been preceded by several cranial relics. The difficulty would hardly be worth notice were it wholly true; but as a matter of fact the *Nototherium* skull is by no means absent from our collections. We have here the greater portion of one skull, the facial and maxillary parts of another, the nasals with the intermaxillary of a third and numerous fragments of the brain case; no doubt others exist elsewhere but have escaped recognition owing to their unlikeness to corresponding parts of the *Zygomaturus* skull. I do not propose to describe the skull of *Nototherium* in this place, but will merely say that in general form it resembles that of *Diprotodon*, as indeed we might have expected from the likeness between the mandibles. The facial region is elongate, the nasals small and but little expanded, the post-nasal depression long and shallow, the brain case narrow in front with well marked parietal crests, the zygomas flat and comparatively feeble, the occipital region sloping backwards; all features in forcible contrast with those of *Zygomaturus*. The upper incisors may be known from those of *Zygomaturus* by their retaining nearly the same breadth and thickness throughout and consequently exhibiting a much greater surface of wear.

In sum, the massiveness of the articular region, its expansion at a different angle to that made by the horizontal limbs, the form of the incisors, with the shape and size of their sockets, the small size of the molars and shortness of the symphysis, are likely, one would fain think, to be convincing proofs that the mandible of *Zygomaturus* has no generic affinity with that of *Nototherium*.

The chain of proof, strong enough as it is to secure assent, will be completed when a cranium of *Nototherium* with mandible attached is unearthed, as I feel assured it will be in course of time.

Though *Zygomaturus* is thus proved to be distinct from *Nototherium* its differential characters are not strong enough to erect it into a separate family—but, associated with its three allies, *Diprotodon*, *Nototherium*, and *Euowenia*, it forms a natural family of the phascolomine section of the marsupials. To this we cannot consistently yield an exclusive claim to the name of *Diprotodontidæ*; I therefore once more suggest a name derived from the second genus in order of discovery and prevalence, and call it *Nototheriidæ*.

The representative of the femur of *Zygomaturus* found with the skull, confirms the conclusion that the animal belonged to the Phascolomine stirps, but gives little additional information—its distal end is the only part from which ideas of form and size can be derived—the pronounced gibberosity of the epiphysis over the inner condyle is here seen in a greater degree than in *Diprotodon*—measured across the condyles the bone is 167 mm. in breadth—its depth from the summit of the tuberosity is 133 mm.—the rest of the bone is partly mutilated, partly deformed, by some crushing force to which it has been exposed.

THE SERUM TREATMENT OF INFECTIOUS DISEASES.

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