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XXXI.—On the Skull of *Tritylodon longævus*, Owen.
By Dr. BRANISLAV PETRONIEVICS.

[Plate X.]

SINCE Owen described in 1884, for the first time as mammalian, the skull of the single specimen of *Tritylodon* existing in the British Museum, several authors have re-examined his statements. Seeley, in 1888, declared *Tritylodon* to be a "bunotheroid Rodent"; but in 1894, after his discovery of *Gomphodontia*, he gave up this opinion and declared *Tritylodon* a "theriodont Reptile" or as "intermediate between Mammals and Theriodonts." R. Broom, in 1901, showed that the reasons of Seeley for the statement that *Tritylodon* was a reptile are not tenable. In 1910, after having studied the specimen, Broom established the presence of new sutures between bones which had been wholly overlooked by the earlier observers, and so reinforced his opinion that *Tritylodon* is a true mammalian.

Having examined the specimen at the end of last year while in London, I believe that some new sutures can be made out, and that the limits between the bones are somewhat different from those established by Broom. A new preparation of the specimen has also cleared up some controversial points.

Text-fig. 1 shows the upper view of the skull. The plainest suture is that separating on the left side for some distance the nasal from the maxillary. In the front part of this suture begins another, which is for the first time plainly to be seen only with a magnifying-glass (it lies just above a zig-zag crack). The prolongation of this latter suture on the right is not clearly indicated, but is probable. If so, the whole would separate the nasal from the frontal; but it is not impossible that the visible part separates the lacrimal from the nasal.

The sutures separating the prefrontal from the frontal and lacrimal are doubtful or not at all indicated. The right side is so damaged that only the suture bounding the maxillary is to be seen for some distance.

The septomaxillaries, first observed by Broom, are now, after the new preparation, plainly (comp. text-fig. 1 and the photograph of the nares in Pl. X. fig. 1) to be seen. They limit the nares laterally, cross them from below, and send a short joint process above, which seems to meet in the middle

FIG. 1.

FIG. 2.

FIG. 5.

FIG. 3

FIG. 4.

Skull and Teeth of *Tritylodon*, *Cynognathus*, and *Diademodon*.

with the forward process of nasals (or, perhaps, with part of the ossified internasal septum) from above, so that the bone

Fig. 1.

Skull of *Tritylodon*, upper view, $\frac{2}{3}$ nat. size. —, probable sutures; - - - -, possible suture (between *fr.* and *pr fr.*); ----, restored parts.

pa., parietal; *sq.*, squamosal; *ju.*, jugal; *fr.*, frontal; *pr fr.*, prefrontal; *lc.*, lacrimal; *na.*, nasals; *mx.*, maxillary; *smx.*, septomaxillary; *pmx.*, premaxillary; *pr. pmx.*, process of the premaxillaries; *i.2*, second upper incisor.

vertically separating the two nares seems to be composed of these two parts. Between the front part of premaxillaries

and the septomaxillaries there is a gap, so that the nares are wholly separated only horizontally*.

The suture separating the frontals from the parietals is not plainly to be seen; but it is probable that it lies before the groove in the front of parietal bones. Unfortunately the foramen parietale could not be established in this groove by the new preparation; but it seems to me still to be possible.

Text-fig. 2 shows the lateral view of the skull from the left side, but the sutures have been completed from the right side.

Fig. 2.

Skull of *Tritylodon*, left side, nat. size. —, probable sutures; - - -, possible suture (between *fr.* and *prfr.*).

pa., parietal; *prfr.*, prefrontal; *fr.*, frontal; *for.lc.*, lacrimal foramen; *na.*, nasal; *smx.*, septomaxillary; *pr.pmx.*, process of the premaxillaries; *pmx.*, premaxillary; *mx.*, maxillary; *lc.*, lacrimal; *ju.*, jugal; *osph.*, orbitosphenoid; *i.2*, second upper incisor; 1-6, postcanine teeth.

The suture separating the parietal bone from prefrontal and bounding it from below is plainly indicated † and was observed

* Broom's contention that "there is no evidence that the nares have been separated by a complete internasal process of the premaxillaries" (comp. Broom, 1910, p. 763) has been confirmed by the new preparation, which shows a mode of division of the nares quite different from that in the theriodont Reptiles and without parallel in Mammals.

† As this suture is on the right side going up to the front part of the parietal bone, no doubt can be entertained about the lateral continuity of this whole bone on the right side (on the left side the bone is far more fractured in the middle than on the right side). So that Seeley's supposition that the two bones diverging from the median crest laterally are the posterior prolongations of the postfrontals must be wholly rejected. Comp. Seeley, 1895, p. 1026 s.

by Broom. The other sutures indicated in the figure are rather doubtful, the best established being that bounding the maxillary from above, observed by Broom. The bone between this suture and the suture bounding the parietal from below I suppose to be the orbito- or alisphenoid. Broom

Fig. 3.

Skull of *Tritylodon*, underside, nat. size. —, probable sutures.

$i.^1-i.^3$, upper incisors; *pmx.*, premaxillary; *mx.*, maxillary; *mxpl.*, maxillopalatine; *pl.*, palatine; *pm.*, premolar; $m.^1-m.^5$, upper molars.

takes it to be a prolongation of the parietal bone, having supposed that the two bones meeting in a median crest are frontals*.

* I see no serious reason why these two bones should be frontals, even if the suture separating the frontal from the nasal would prove to be

On the underside of the skull (text-fig. 3) the sutures separating the premaxillaries from the maxillaries and the palatine processes of the latter are almost certain (comp. Owen, 1884, p. 147) ; but the suture between the palatines and the maxillaries is very doubtful.

I have still to add that I can confirm the statement of Broom (comp. Broom, 1910, p. 762) that there are in *Tritylodon* not two but three incisors. Indeed, in the front of the two broken great incisors and near to the point where the two premaxillaries are meeting one another there are two small teeth-sockets (text-fig. 3). But Broom's statement (*ib.* p. 762) that there are seven and not six molars in *Tritylodon* I cannot accept, because the limit of the last molar on the right side is a sharp one, and no plain trace of a molar behind it is to be seen. I suppose, in consequence, the dental formula of *Tritylodon* to be $i\ 3, pm\ 1, m\ 5^*$.

According to my preceding statements, and to the previous statements of Owen, Seeley, Osborn, and Broom, I add here, in conclusion, a review of the mammalian and reptilian characters of *Tritylodon*.

I. Mammalian Characters.

1. Divided roots of molar teeth ;
2. Multituberculate teeth ;
3. Straight and parallel rows of teeth ;
4. No postfrontal bone.

From these four characters, the first is still the best proof for the mammalian character of *Tritylodon*, no theromorphous reptile being known with divided teeth-roots. But, as some doubts have been expressed about this division †, the preparation of the molar tooth in *Tritylodon* by Owen has been somewhat enlarged, and the new preparation shows (comp. the photograph in Pl. X. fig. 2) that no doubt about that division can be entertained, the bone between the two roots undoubtedly not being dentine (it has the same colour as the bone in front of the forward root). As a new corroborative proof

wrong. The posterior part of the skull would be in both cases almost the same (comp. the restoration of it in text-fig. 1 with the restoration of Broom in Broom, 1914, fig. 1, p. 119).

* In 1914 Broom gives the dental formula of *Tritylodon* as being probably $i\ 3, c\ 0, p\ 4, m\ 3$ (comp. Broom, 1914, p. 120).

† Comp. H. Gadow, 'Amphibia and Reptiles,' London, 1901, p. 309.

of this last statement I add here in Pl. X. fig. 3 a photograph of two newly prepared molar teeth of *Diademodon browni* with undivided roots *, and in Pl. X. fig. 5 a photograph of the newly prepared molar tooth of *Cynognathus crateronotus*, showing undivided root and a groove on the outer surface, indicating the beginning of a partial division of this root, as it seems, throughout its whole length.

II. *Reptilian Characters.*

1. Divided nares ;
2. Prefrontal bone † ;
3. Frontal bone not bounding the orbit.

III. *Characters both Mammalian and Reptilian.*

1. Septomaxillary bones ;
2. The terminal position of the anterior nares ;
3. The backward position of the posterior nares ;
4. Considerably diverging parietal bones ;
5. Orbito- or alisphenoid (or orbitopalatine ?) ;
6. No postorbital bar ;
7. Brain-case antero-laterally closed.

If we try to separate in this last group the characters that are primarily reptilian in *Tritylodon* from those which are probably purely mammalian, we should regard only the existence of the septomaxillary bone as a pure reptilian character (common both to *Tritylodon* and to Monotremes). So that *Tritylodon* is to be regarded, in the first place, as a mammal, but as a mammal with some undoubtedly reptilian characters, the *most primitive* of the known Mammals. With its mixed characters, *Tritylodon* is a direct proof that the Mammals have their origin in Reptiles, most probably in theriodont Reptiles.

* Seeley mentions (comp. "On *Diademodon*" in Philos. Trans. 1895, pp. 1029-1041, figs. 5-10) three isolated molar teeth of *Diademodon* with undivided roots, but they seem to belong to lower molars. I add here in Pl. X. fig. 4 another photograph of two single-rooted V-shaped teeth of *Diademodon* in section from the specimen R. 3605 in the British Museum (mentioned by Mr. Watson, "The Skull of *Diademodon*," in Ann. & Mag. Nat. Hist. (8) viii. 1911, p. 314), one with open and the other with closed pulpa.

† The existence of a prefrontal bone in mammals has been affirmed (comp. R. Cunningham, "Note on the Presence of Supernumerary Bones occupying the Place of Prefrontals in the Skull of certain Mammals," in Proc. Zool. Soc. Lond. 1889, pp. 76-77).

At the end of this paper I desire to express my thanks to Dr. Woodward and Dr. Andrews, of the British Museum, for the loan of the new preparations (executed by Mr. Hall), and to Dr. Andrews for some valuable help.

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EXPLANATION OF PLATE X.

- Fig. 1.* The front part of the skull of *Tritylodon*, showing the nares.
Fig. 2. Molar tooth of *Tritylodon* with divided root.
Fig. 3. Two molar teeth of *Diademodon browni* with undivided roots.
Fig. 4. Two single-rooted V-shaped teeth of *Diademodon*, R. 3605 in the British Museum, the left with open and the right with closed pulpa.
Fig. 5. Molar tooth of *Cynognathus crateronotus* with undivided root.

XXXII.—*Notes on Fossorial Hymenoptera*.—XXIX. *On new Ethiopian Species*. By ROWLAND E. TURNER, F.Z.S., F.E.S.

Family **Crabronidæ**.

Subfamily *BEMBECINÆ*.

Bembex atrospinosus, sp. n.

♂. Niger; mandibulis basi, labro, clypeo, fronte inter antennas, orbitis, macula curvata utriusque infra ocellos, scapo subtus, flagello subtus pedibusque pallide flavis; femoribus tibiisque