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## A NOTE ON THE CYNODONT, *GLOCHINODONTOIDES GRACILIS* HAUGHTON

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The type in the Transvaal Museum was originally described by Haughton (Ann. Trans. Mus., XI, p. 85). Although it is not stated, Broom's figures (Mammal-like Reptiles of South Africa, p. 280) of the dorsal and ventral aspects of the skull were based, not on the type, but on a skull (A. M. 2223) now in the American Museum.

This skull is nearly perfect—the lower jaw, the internasal bar and the quadrates being the only parts missing; furthermore, it has not suffered from post-mortem deformation as the type has.

The following account incorporates and supplements the accounts by Haughton and Broom.

In dorsal view (Fig. 1)<sup>2</sup>, the main features of interest can be enumerated as follows: the septomaxilla has practically no facial exposure, being a small bone lying nearly wholly within the nostril; the nasals are large and are constricted in their middle portion, but are wide anteriorly and posteriorly; the lacrymal is a fairly large bone with a flat outer surface showing no tubercle or foramen; the prefrontal is of medium size and forms a large part of the supraorbital border; the frontals are small and narrow and do not enter the orbital border; the postorbitals are large elements overlying the edges of the frontals and prefrontals; dorso-medially, they are raised above the frontal surface; their posterior extension along the lateral parietal face is not great; no postfrontal is visible in dorsal view; the parietals are small; the parietal crest is low and triangular in section and it forms the roof of the posterior part of the brain; a small pineal foramen pierces the parietal crest; the squamosal is a large element, extending very far anteriorly along the infratemporal bar, forming the mesial surface of a deep auditory groove and loosely supporting the posterior surface of the quadrates; the jugal forms nearly half of the postorbital bar and has a long posterior limb forming the ventral part of the infratemporal bar.

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<sup>2</sup>The drawings in this paper are by my wife, Esmé E. Boonstra.

On the ventral surface (Fig. 2), some interesting features are revealed: the two halves of the secondary palate do not meet in the median line; between the two maxillary plates the ventral keel on the prevomer is visible; the secondary palate is formed by plates from the palatines,

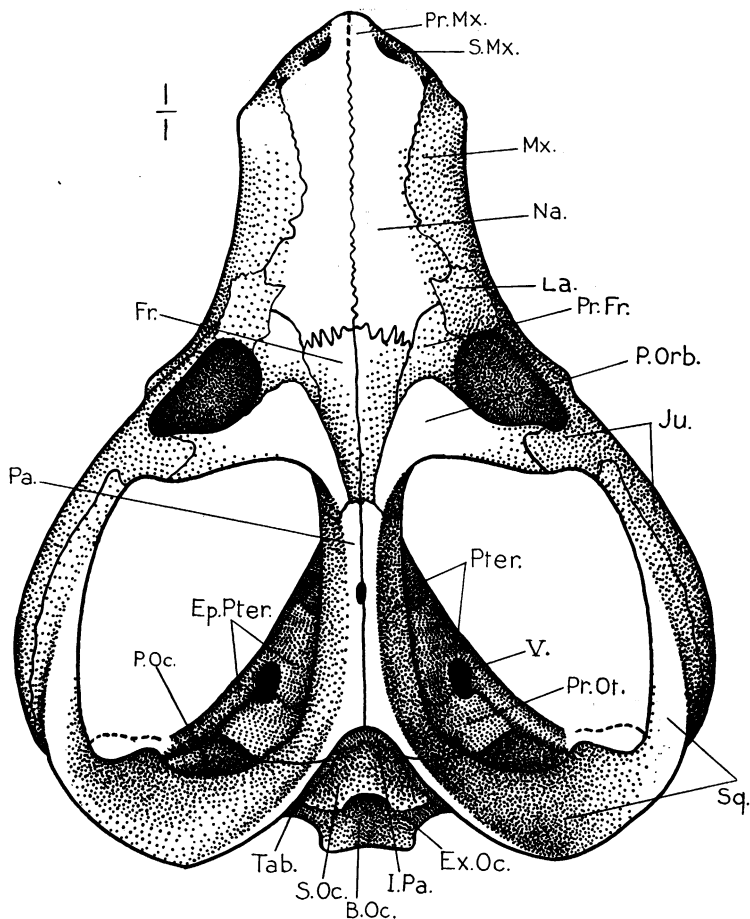


Fig. 1. *Glochinodontoides gracilis*. Dorsal view of the skull. Natural size. A. M. 2223.

The right infratemporal and postorbital bars are drawn from the left side, where they are completely preserved.

maxillaries and partly also from the premaxillaries; the anterior portion of the secondary palate is feebly developed, as here there are only beam-like processes of the premaxillaries between the prevomer and the anterior palatal vacuity; posterior to the palatal process of the right

premaxilla, there lies a small piece of bone which may be part of the premaxilla, but a strip of matrix separates it from the premaxillary process proper; between the two premaxillary processes the widened anterior end of the prevomer is visible; the latter carries a median and a lateral

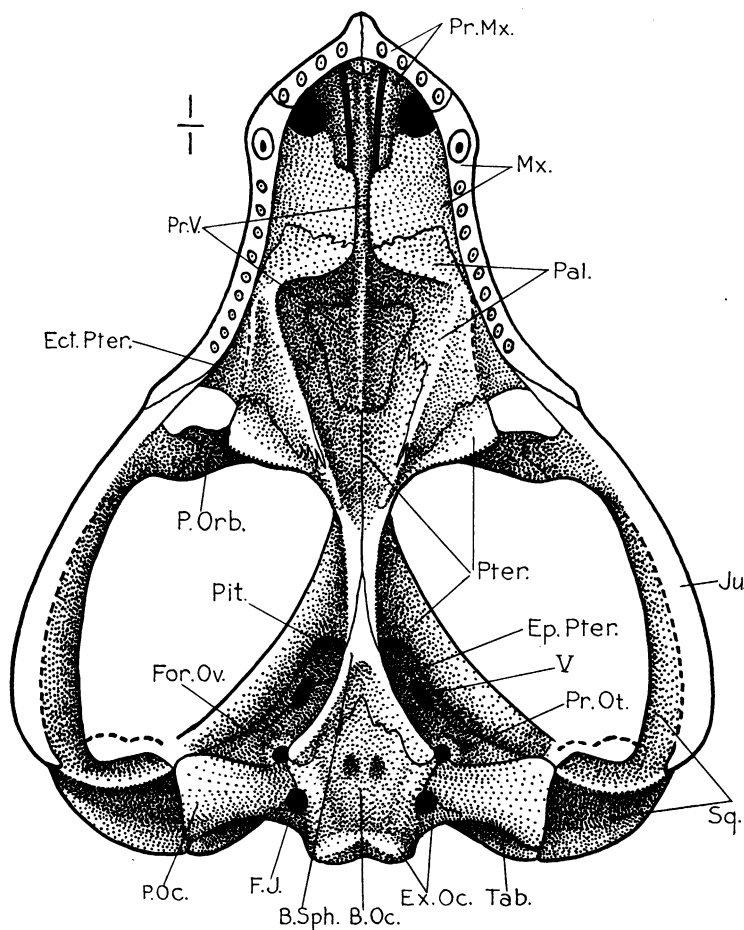


Fig. 2. *Glochinodontoides gracilis*. Ventral view of the skull. Natural size. A. M. 2223.  
The quadrates are not preserved.

ridge as is typical in the therocephalians and gorgonopsians; the posterior end of the prevomer, which underlies the palatines, is broadly spatulate and carries a ventral keel, which dies out at the posterior end of the bone; the palatines are large and form part of the dorsal roof of the

naso-pharangeal duct; antero-laterally, the palatine descends to form a ridge, whence it sends a sheet of bone mesially to form part of the floor of the naso-pharangeal passage; the lateral border of the palatine forms a slight ridge, lateral to which lies the ectopterygoid; the pterygoid has a fairly strong quadrate ramus, which does not, however, reach the quadrate; the lateral pterygoid ramus is weak and does not descend so far as in the more primitive therapsids; a ridge between the lateral and anterior pterygoid rami is continued forward on the palatine and served for the attachment of the soft palate; the basioccipital is practically excluded from the condyle, but, antero-ventrally, it has two fairly strong tubera to which the basisphenoid is applied; the basisphenoid has no tubera; anteriorly, it is clasped by the pterygoids; although here described as the

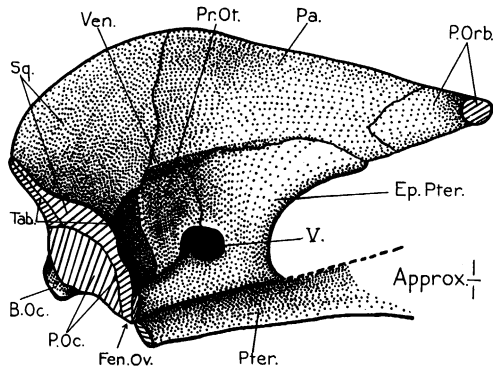


Fig. 3. *Glochinodontoides gracilis*. Lateral view of the posterior part of the right side of the brain-case. Nearly natural size. A. M. 2223.

The occipital plate and the postero-lateral extremities of the epipterygoid are shown in section.

basisphenoid, the bone visible in ventral view may really be a thin parasphenoid closely applied to an overlying basisphenoid; without a cross-section it is not possible to determine whether there are actually two bones; Parrington has described a parasphenoid in *Thrinaxodon*; when I was in Cambridge he very kindly showed me his specimens, and I was able to convince myself that in this genus at least, there is evidence of a thin shell of bone closely applied to the basisphenoid; it thus appears reasonable to assume the presence of a parasphenoid in all the cynodonts, but it would be valuable to have a series of cross-sections to confirm this assumption; the paroccipital is of medium size; laterally it abuts against the squamosal, where this bone forms the mesial surface of the auditory groove, and, mesially, it meets the basioccipital and exoccipital

and contributes to the formation of the raised border of the foramen ovale; the double condyle is formed by the exoccipitals; the limits of the latter cannot be determined as they are very closely fused to the basioccipital.

The outer surface of the brain-case has been exposed on the right side (Fig. 3). The occipital plate is shown in parasagittal section, and the outer surface of the brain-case as projected on the sagittal plane. The epipterygoid is widened, so that, dorsally, it has a long suture with the parietal and, ventrally, has a long base resting on the quadrate ramus of the pterygoid; the bone has a constricted waist, and its posterior edge is notched for the passage of branches of the fifth nerve; postero-laterally, the epipterygoid is prolonged beyond the termination of the quadrate ramus of the pterygoid; the anterior borders of the epipterygoids are situated widely apart (contrast "*Lycaenodon*"). The proötic lies at a greater distance from the median line than is the case in the more primitive gorgonopsians and therocephalians; it lies in the same plane as the epipterygoid, to which it is intimately applied; its dorsal edge meets the parietal and squamosal; its antero-ventral corner is notched for the passage of the two branches of the fifth nerve; a slit between the proötic and the parietal is a remnant of the large venous foramen usually found in therapsids. I have not been able to locate the foramen for the seventh cranial nerve. Postero-lateral to the proötic the small post-temporal fenestra pierces the occipital plate.

SHORT DISCUSSION.—The wide spatulate posterior end of the pre-momers appears to be a feature retained from the therocephalian ancestors. The widened epipterygoid, and the concomitant incorporation of the *cavum epiptericum*, are features whose development is foreshadowed in the primitive therocephalians and actually paralleled in some of the higher therocephalians. The narrow parietal crest and the loss of a distinct postfrontal are also therocephalian features. No therocephalian, however, has such a developed secondary palate; the approximation of the alveolar borders in the whaitsids is not homologous. In the bauriamorphs the development of the secondary palate has proceeded much further, but on a different path. In *Bauria* the false palate is formed by the premaxillaries and maxillaries, whereas in the cynodonts the premaxillary part is incomplete and the posterior part is formed by the palatine. If *Bauria* and the cynodonts are both derived from the therocephalians, then it is manifest that they diverged very early in their phylogenetic history.

## Chief Measurements of the Skull

Premaxilla to basioccipital.....	106 mm.
Premaxilla to pineal foramen.....	76 mm.
Premaxilla to front of orbit.....	44 mm.
Interorbital width.....	23 mm.
Intertemporal width.....	11 mm.
Width across the squamosals.....	90 mm.
Length of molar series (8 teeth).....	22 mm.