Further evidence of Endothiodon bathystoma.

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FURTHER EVIDENCE OF ENDOTHIODON BATHYSTOMA.

On Further Evidence *of* Endothiodon bathystoma (*Owen*) *from* Oude Kloof *in the* Nieuwveldt Mountains, Cape Colony.

By H. G. Seeley, Esq., F.R.S., F.G.S., Professor of Geography and Lecturer on Geology in King's College, London.

I am indebted to Mr. Thomas Bain, Geologist and Irrigation Officer to the Government of Cape Colony, for two bones collected by him in the Oude Kloof, a picturesque mountain-valley which traverses the Nieuwveldt range north of Tamboer, on the road towards Fraserburg.

The remains consist of the left ramus of the mandible, which is almost complete, and what I regard as the left squamosal bone underlapped by the malar in front, but fractured at both ends, so that only the external zygomatic bar is preserved. Small as the cranial fragment is, it is important as showing that the back of the head probably conformed to the type of skull seen in some of the Dicynodonts. The skull was as large as that of *Dicynodon leoniceps*.

The Zygomatic Bar.

The longitudinal squamosal bar is 20 centim. long, compressed from side to side and flattened, with the superior border convex in length. The convexity is most marked in the hinder part, where the edge of the bone is about 0·75 centim. thick and rounded, and the depth of the bone in front of its hinder termination is 6·25 centim. A wide shallow concavity extends along the external surface, and appears to be defined inferiorly by a rugose condition of the bone. Anteriorly the depth of the bar is a little less, but its thickness augments; this is due to the strong malar bone, 2·5 centim. thick, which forms its infero-anterior border, and extends behind the thin, external, zygomatic prolongation forward of the squamosal.

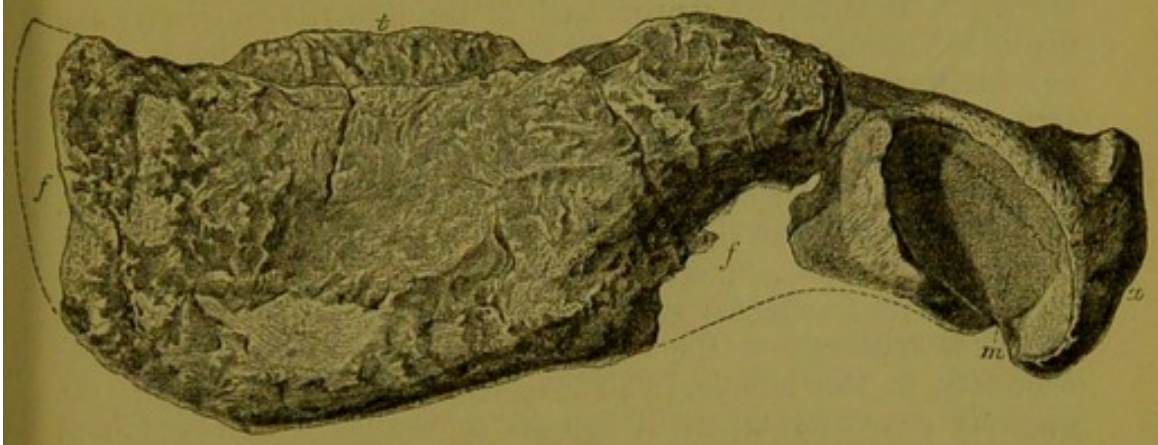
The inferior margin of the bar appears to be concave in length to the abrupt angle where the descending bar (if it was developed) is broken away, so that the bone has a depth of only $8\frac{1}{8}$ centim. from the superior border. This descending bar, so characteristic of all Dicynodonts and absent from Theriodonts and the Placodontia, if present would support Sir Richard Owen's judgment in regarding *Endothiodon* as affiliated to *Oudenodon*.[1]

The Lower Jaw.

The left ramus of the mandible, as preserved, is 30 centim. long, but has apparently lost about 2·5 centim. from the anterior extremity. It is nearly straight, with a slight inward inflection at

[1] Quart. Journ. Geol. Soc. vol. xxxv. (1879) p. 557.

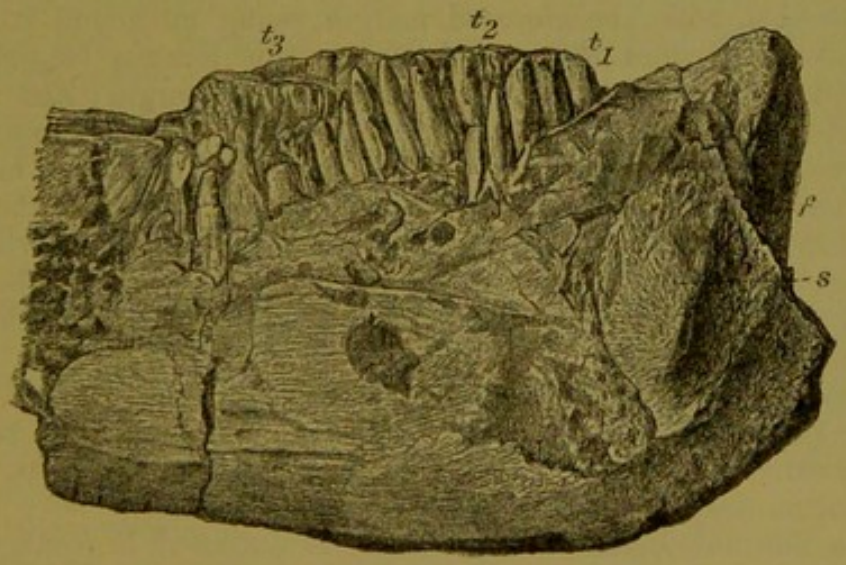
Fig. 1.—*Left ramus of mandible of* Endothiodon bathystoma.



$\frac{1}{3}$ nat. size.

t = teeth.
ff = fractured portions.
m = muscular excavation, crossed by suture
a = articulation.

Fig. 2.—*Portion of the above, showing position of teeth.*



$\frac{1}{2}$ nat. size.

f = fractured portion.
s = symphysis.
t_1–t_3 = teeth in parallel rows.

the posterior extremity, which is broken. It is deepest in front, below the commencement of the teeth, where the vertical measurement is about 10 centim. In the middle length, behind the teeth, the depth is about $8\frac{1}{8}$ centim. and at the posterior extremity the depth is 7 centim. The superior or buccal margin, which is sharp externally, is concave in length to behind the teeth; but the posterior half of this contour is convex in length, with the bone flattened above, slightly rounded from side to side, and 3 centim. wide. The inferior contour is convex in front and concave behind, though the thin inferior part of the bone beneath the superior coronoid convexity is broken away.

The vertical external surface converges forward to the symphysis, is flattened at the side, with a slight shallow longitudinal concavity in the middle, which increases in depth beneath the coronoid convexity, where it appears to become a narrow lateral perforation through the jaw about 10 centim. from the posterior extremity. The hinder end of the jaw is the condylar articulation. It is terminal, vertical, convex from above downward, wider above than below, and deeper than wide; it measures 7 centim. deep by 4 centim. wide as preserved, but may have been heart-shaped, with a concavity indenting the superior border. Its lateral and inferior margin is rounded.

Immediately in front of the condyle is a transversely ovate excavation in the external side of the jaw, with its posterior extremity inclined downward. It is fully 7 centim. wide, measured downward and backward, and 3·75 centim. wide measured upward and backward. Its outline is almost that of a perfect egg, with the wide end in front. The floor of this cavity is absolutely flat and vertical, with the elevated margin rising all round it. The articular surface of the condyle forms this margin behind; the upper surface of the jaw makes the superior margin; and at the supero-anterior angle the elevation is least. The infero-anterior border is most elevated, rising fully 2·25 centim., extending outward to a sharp crest, in front of which the thickness of the bone diminishes towards the sub-coronoid perforation. This cavity may have given attachment to the masseter muscle, and may be compared with the excavation below the condylar region in the Lion and many mammalia.

The jaw is about 3·75 centim. thick in its anterior half. Not more than 5 centim. of the symphysis between the rami is preserved. It was vertical, and its posterior margin, about 10 centim. deep, is convex from above downward.

The internal surface of the ramus is flattened in front, with a posterior longitudinal concavity in the region of the foramen. The base is rounded, but its median line is a sharp longitudinal ridge.

The mode of arrangement of the teeth has been described by Sir Richard Owen[1] as consisting of three parallel rows, extending successively within and behind each other, but the nature of their

[1] *Op. cit.* pl. xxxvii.

crowns was not shown. From the forms of their bases it seemed not improbable that they might resemble the teeth of *Placodus*. The present specimen has the crowns perfectly preserved. The longest are more than 2·5 centim. high. They are compressed from side to side, of a long lanceolate form, with strong transverse serrations on the anterior and posterior margins.

The dentigerous area is obliquely inclined on the Lacertilian plan, and the different groups of teeth, instead of being arranged from the front backward, as in Theriodonts, succeed each other in the opposite or transverse direction. In front and external to the teeth is a concave area 2·25 centim. wide anteriorly, limited by the buccal margin of the bone externally, and bordered internally by a short sharp longitudinal ridge, which prolongs the line of the dentigerous area forward. The concave space between these ridges is prolonged backward external to the teeth, becoming narrower. The first or external row of teeth, which may be incisors, are apparently six in number; the crowns are compressed from side to side, rather wider and shorter than in the other parts of the series. The second or premolar series is counted with difficulty, but appears to number 10 teeth. In no case is the summit of the crown preserved, but the anterior teeth have been worn obliquely on the external side by the teeth in the upper jaw. This condition is well shown in three anterior crowns. The third or molar row apparently includes 15 teeth. In this series the serration of the crown is seen. It has been observed in nearly all the crowns, but from the nature of the matrix it becomes removed in process of development. There is no evidence that it extended below the upper half of the crown.

Fig. 3.—*Teeth (enlarged) showing serrations.*

$\frac{3}{2}$ nat. size.

There is a fourth row of six teeth developed on the inner anterior border. These teeth descend in position, as do the hinder molars, as they extend backward. The two middle series are between and behind the short internal and external series, which converge forward; it is possible that this anterior inner group may represent a series of canines, more perfectly developed than among lizards. There is remarkably little variation in the forms and characters of the teeth in the several rows; so that if the tooth-rows bear the interpretation suggested for them, it must rest upon their grouping, and not upon differentiation. The roots of the teeth are in sockets, embedded deep in the jaw.

In no Anomodont or other reptile has a jaw been described which in any way resembles this in form, muscular attachment, position of the articulation, and form and arrangement of the teeth.

Like so many of the South African fossil bones, this jaw is invested with a layer which seems to me to be the remains of the original skin. This layer has been left upon the bone.

The form of the articular condyle indicates a difference from *Dicynodontia* and all other *Anomodontia* hitherto described, which implies that the quadrate bone was inclined obliquely forward. This character is probably as important in defining the sub-order *Endothiodontia* as the condition of the teeth, which may only distinguish the family *Endothiodontidæ*. But all the characters of the dentition suggest near affinity with the *Theriodontia*.