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THE CRANIAL BUCKLER OF A DIPNOAN FISH,
PROBABLY *GANORHYNCHUS*, FROM THE DEVONIAN
BEDS OF THE MURRUMBIDGEE RIVER,
NEW SOUTH WALES.

By R. ETHERIDGE, Junr., Curator.

(Plate xxviii.).

Mr. C. A. Süßmilch, Lecturer on Geology, Technical College, Sydney, favoured me with the loan of a cranial buckler of a Dipnoan fish, obtained by him from the Devonian beds of the Murrumbidgee River. A reproduction of this specimen has been placed in the Museum collection.

The buckler in question so closely resembles one described by Dr. R. H. Traquair, some years ago, as *Ganorhynchus woodwardi*,¹ that I am induced to publish a description of the new specimen under the same generic name, as *G. süßmilchi*. Dr. Traquair's specimen consisted of the anterior portion of the head only, but unfortunately nothing was known, at the time of his description "regarding the geological formation, or the locality." It consisted of "the extremity of the snout of a very large fish, probably 4 or 5 feet long." Dr. Traquair's description, epitomised, is as follows, so far as it concerns the present fossil. The fragment is semilunar in form, with a superior arched ganoid surface forming part of the upper aspect of the snout, the anterior rounded margin being the front edge of the upper lip. When placed in its natural position, with the labial margin horizontal, the superior surface slopes downwards and forwards in the middle line at an angle of 45°, and is arched at the sides. The surface is smooth, glossy, finely reticulate-punctate, and exhibits no trace either of sutures or external nasal organs. Near the labial margin, the small punctures of the superior ganoid surface give place to larger ones. On viewing this snout from below it is seen to be flattened centrally and laterally, and with a shallow central emargination or indentation, set on its edge with a row of six small blunted tooth-like projections. On each side is a deep

¹ Traquair—Geol. Mag., x., 1873, p. 552, pl. xiv.

rounded notch, which Traquair considers to represent the position of the anterior nasal opening. The author concluded his description in these words—"Our fossil is certainly neither *Dipterus* nor *Ceratodus*; *Cheiroodus* is known only by its teeth; and as to *Ctenodus*, the front of the head has not yet been discovered, so that all evidence is wanting to connect it with that genus. It seems, therefore, in these circumstances, best to frame a new genus for its reception."

Dr. Traquair's description of this remarkable fossil seems even now to be practically all that is known of it, for Dr. A. S. Woodward writes² of *Ganorhynchus* as "a provisional genus at present incapable of definition, comprising large Palæozoic Dipnoan fishes in which the extremity of the snout (as also presumably all the external headbones) is enveloped in a thick layer of punctate ganoin."

The specimen discovered by Mr. Süssmilch is externally much more complete than that figured by Traquair. It consists of the snout and most of the plates of the cranial buckler covered with glossy ganoin densely and minutely pitted, and separated from one another by fairly-well marked sutures. This cranial shell, 2 mm. thick along the posterior edge, is strongly arched from side to side, but unarched between the anterior and posterior extremities, so far as preserved. In its present condition it measures four inches from end to end, and three inches transversely at its greatest width, without following the curve. The plates are more or less distinguishable to within one inch of the snout extremity, this portion being, as in the corresponding but much larger area of *G. woodwardi*, devoid of sutures, and the punctæ of the polished surface interspersed with others of a larger diameter. The snout is fairly perfect, but the posterior end of the specimen is fractured and imperfect. Dr. Traquair's description of the fore-under surface can almost be applied to the corresponding part of Mr. Süssmilch's fossil. We see the arched and flattened front of the snout and margin of the upper lip, the rounded superior edge of the former fading into the surface of the shield. On this labial margin the ganoin has been worn off, but leaving traces of punctæ larger than any of those on the upper surface. The central portion of the lower margin of the lip, when viewed from the front, is convex, with on each side a shallow rounded notch, the anterior nasal opening according to Traquair. The median indentation of this lip edge in *G. woodwardi* is not visible in *G. süssmilchi* until the specimen is turned completely upside-

² Woodward—Brit. Mus. Cat. Foss. Fishes, Pt. ii., 1891, p. 245.

down, and is even then, faint and inconspicuous, and there are no tooth-like projections visible so far as the lower portion of the specimen has been developed. The ends of the lateral projecting portions of the labium are slightly enlarged and blunt, but not incurved.

The polygonal cranial plates are not bilaterally symmetrical, in fact they are very irregularly arranged. In *Dipterus*, even, Traquair says³ "it is difficult to trace any exact correspondence between them and the cranial roof-bones of ordinary Ganoids and Teleostei." I certainly hoped to be able to institute a comparison between these cranial plates and those of *Dipterus* as restored by Dr. C. H. Pander,⁴ but those of our fossil do not appear to correspond with the arrangement shown in his restoration; even in the latter they are not wholly bilaterally symmetrical. For instance, assuming Pander's restoration to represent the complete cranial buckler of *Dipterus*, his median occipital is one of the largest plates of the series, and is posteriorly terminal. On the other hand, the largest plate in the median line of our buckler is not terminal and the two flanking plates on either side do not correspond in outline or size with one another. In Pander's figure the anterior semicircle is composed of three large plates, a central and two lateral, but these are not shown in Hugh Miller's representation⁵ of the same. In the present instance the dorsal surface of the snout evinces no sign of subdivision that I can detect, nor does that of *G. woodwardi*, Traq.

As compared with the snout of *G. woodwardi*, that of our specimen is less dome-like, much flatter above, and with a greater degree of spread between the rounded lateral projections in proportion to its size. This less dome-like outline is apparent in a side view (Pl. xxviii., fig. 2) if the fossil be placed in its natural position, corresponding with Traquair's fig. 3, Pl. xiv. Speaking in general terms it may be said that the labial features of *G. sussmilchi* are not so pronounced as those of *G. woodwardi*—the nasal openings are not so deeply excavated, nor is the median emargination visible until the buckler is seen from below.

The history of *G. woodwardi* is a curious one. It appears that when Mr. C. König was Keeper of the Geological Department of the British Museum, the specimen came under the notice of the illustrious Agassiz, who regarded it as the intermaxillary bone of *Megalichthys*. Years after Dr. H. Woodward called Dr. Tra-

³ Traquair—Ann. Mag. Nat. Hist. (5), ii., 1878, p. 9.

⁴ Pander—Die Ctenodipterinen, 1858, pl. i., f. 1.

⁵ Miller—Footsteps, 13th ed., 1871, p. 58, f. 20.

quair's attention to this fossil, at the same time expressing the opinion that it belonged to a new genus; in this view the latter concurred. The "specimen formed part of the old collection of the British Museum, of which there are no records, hence its history as to from whom and whence it came is wanting. Judging, however, from its general aspect, one might readily be tempted to infer that it was of Palæozoic age."⁶ The matrix is described as a dull grey argillaceous limestone.

In the present instance the matrix is a blue-black limestone, and both this colour and the mode of weathering are characteristic of the Murrumbidgee Devonian limestones. If my conception of this fish buckler is the correct one, it confirms Traquair's reference of *G. woodwardi* to the Palæozoic. The thought that perhaps the latter may have originally come from one or other of the New South Wales limestone localities is perhaps permissible.

The specimen was found by Mr. Süssmilch on Portion 44, Parish of Taemas, Co. Cowley (Murrumbidgee River), and is named in his honour.

⁶ Traquair—Geol. Mag., x., 1873, p. 554.

EXPLANATION OF PLATE XXVIII.

GANORHYNCHUS SUSSMILCHI, *Eth. fl.*

- Fig. 1. Buckler seen from above.
" 2. " " " the side.
" 3. Snout seen from in front.
" 4. " " " below.
" 5. Portion of granulated plate on the same matrix.

