

Camara limosa, Walk. *loc. cit.* p. 237. n. 1, = *Tyoma cryptorhyncha*, Germ.
Ansa distincta, Walk. *loc. cit.* iii. p. 548 (1868), = *Ogmocoris hypomelas*,
 Burm.

To be treated as non-existent.

Types mutilated.

Sciocoris deficiens, Walk. Cat. Het. i. p. 173. n. 22 (1867).
Discocephala transversa, Walk. *loc. cit.* p. 188. n. 28 (a species of the gen.
Eurystethus).
Discocephala longula, Walk. *loc. cit.* p. 189. n. 29 (apparently belonging
 to gen. *Menida*).

Species the types of which are supposed to be in Australia.

Sciocoris lugubris, Walk. Cat. Het. iii. p. 538 (1868). National Museum,
 Melbourne.
 — *indicator*, Walk. *loc. cit.* p. 539. National Museum, Melbourne.
Pæcilometis alienus, Walk. *loc. cit.* i. p. 210. n. 15 (1867). National Mu-
 seum, Melbourne.

L.—*A Contribution to the History of the Carboniferous Ganoid, Benedenius deneensis, Traquair, with Notes on Two newly-discovered Specimens.* By G. A. BOULENGER, F.R.S.

[Plates IX. & X.]

THANKS to the kindness of my friend the Rev. Dom Grégoire Fournier, O.S.B., I am able to make some additions to our knowledge of an imperfectly characterized Lower Carboniferous Fish allied to *Eurynotus*, previously known from two specimens only—the original, preserved in the University Museum of Louvain, first described as a *Palæoniscus* by the late Prof. Van Beneden and later as the type of a distinct genus, *Benedenius deneensis*, by Prof. Traquair; the second, preserved in the University Museum of Liège, described as *Benedenius Soreili* by Prof. Fraipont.

These specimens were obtained from the black marble quarries of Denée, Prov. Namur, Belgium. The same quarries have lately yielded two further specimens of the fish, which are deposited, under the care of Father Fournier, in the beautiful abbey of Maredsous, near Denée, where I had an opportunity of seeing them on a recent visit. Having been so fortunate as to obtain the loan of these valuable fossils, I propose to give an account of them, and thus to supplement

on some points the excellent descriptions given by Profs. Traquair and Fraipont.

The most complete of the two specimens before me, which I will designate as A, is well preserved, so far as the body and fins are concerned, in slab and counter-slab; but the head shows only roughly the general outline, so that nothing can be added to our previous very scanty knowledge of the skull.

The second specimen, B, of about the same size and also exposed in two slabs, is much dislocated; but this is all the better, as it enables us to view the inner aspect of the scales, which was still unknown, and it shows remarkably well the pectoral girdle. It also affords the first direct evidence of the absence of ossifications round the notochord.

It is difficult to conceive anything poorer, considering the date of its publication, than Van Beneden's description and figure in Bull. Acad. Belg. (2) xxxi. 1871, p. 512, pl. iv., and, from the imperfection of the fossil on which it is based, one cannot account for the remark, "On ne pourrait avoir un poisson frais dans un plus bel état de conservation." The fish was referred to a genus the characters of which are very different, and named "*Palæoniscus de Denée*." Neither in the original description nor in the later published list of the fossil fishes of Belgium ('*Patria Belgica*,' i. [1873] p. 387) was the name latinized, as stated by mistake in the British Museum '*Catalogue of Fossil Fishes*' (ii. p. 451). Therefore, according to the current rules of nomenclature, the species must bear as author's name that of Traquair, who described and figured it in 1878 (*De Koninck's Faune Calc. Carb. Belg.* i. p. 16, pl. ii.) as *Benedenius deneensis*, and again in his *Monograph of the Platysomidæ* (Tr. R. Soc. Edinb. xxix. 1879, p. 354, pl. iii. fig. 17), correctly referring it to a new genus in the immediate vicinity of *Eurynotus*. Yielding to the suggestion of a reviewer in these '*Annals*' for 1880, that the name *Benedenius* is preoccupied by the earlier *Benedenia*, Gray, Traquair himself in 1890 (*Ann. & Mag. Nat. Hist.* [6] vi. p. 492) changed it to *Benedenichthys*, a change which, in my opinion, was unwarranted.

The fish under consideration should therefore be called *Benedenius deneensis*, Traquair.

A supposed second species of the same genus, *Benedenius Soreili*, was described and figured by Fraipont in 1890 (*Ann. Soc. Géol. Belg.* xvii. p. 211, pl. v.) in a paper to which my attention has kindly been drawn by my friend Mr. Smith Woodward. I must regard it as a synonym, the only distinctive character of some importance residing in the shorter tail,

which may be due to its extremity being imbedded in the matrix.

On the evidence of the material now available it appears that the depth of the body is contained 2 to $2\frac{2}{5}$ in the total length (without caudal fin), the length of the head 4 to $4\frac{1}{3}$. The caudal peduncle is much deeper than long and the length of the caudal fin is contained about 4 times in the total.

The following measurements are taken from specimen A:—

	millim.
Total length	290
Length of head	48
From head to caudal fin	170
Caudal fin (end imperfect)	76
Greatest depth of body	100
Length of caudal peduncle	22
Depth of caudal peduncle	31
From head to dorsal fin (in a straight line)	102
From head to ventral fin	79
From head to anal fin	125
Length of dorsal fin	58
Greatest depth of dorsal fin	40
Length of anal fin	25
Greatest depth of anal fin	40
Length of pectoral fin	46

The dorsal fin, high and pointed in front, low behind, formed of 54 slender, distally bifurcating rays, originates just behind the vertical of the base of the ventrals and twice as far from the base of the caudal as from the end of the snout. Van Beneden says, "S'il y a des écailles sur le bord antérieur, elles doivent être extrêmement petites." Traquair, notwithstanding the imperfect condition of the fossil, recognized the presence of fulcra, but could not have given a quite exact representation of them, nor are they correctly shown in Fraipont's figure. There is a series of well-developed fulcra along the anterior border of the fin, as much developed as in *Eurynotus*, and these fulcra are a prolongation of the enlarged dorsal scales or ridge-scutes, which extend both in front and behind the dorsal, not to midway between the fin and the head, but right to the occiput. The posterior half of the base of the dorsal fin happens to be denuded of scales in specimen A, and shows well the distal endoskeletal fin-supports (baseosts) as short stout bones, somewhat hourglass-shaped, one to every three rays.

Fraipont represents the dorsal fin as short, formed of 25 rays and ending above the origin of the anal. This condition

is due, I think, to injury of the specimen and not to a specific difference, the "déchirure du bord dorsal du tronc en arrière de cette nageoire," to which the author alludes, and which is shown in the figure, accounting for the absence of the posterior half of the fin.

The anal fin is triangular, much deeper than long, and fulcrate like the dorsal; its base measures nearly half that of the dorsal. I count about 20 rays.

The pectoral fin has been described by Van Beneden as "comparativement peu développée, arrondie et non pas anguleuse"; and Traquair believed it to have been small, recognizing, however, its imperfect preservation. It is, on the contrary, long, longer than as restored by Fraipont, who made a much better guess at its real shape, nearly as long as the head, falciform, very similar to and but little smaller than that of *Eurynotus*. Its base is covered by 4 scales, the outer of which is much elongate and continued as a series of fulcra along the edge of the fin. The whole pectoral arch is well seen in specimen B, from which fig. 1, Pl. X., is taken. The post-clavicle overlapped the outer surface of the clavicle; the same is the case in Chondrosteous Ganoids and Clupeidæ alone among recent fishes, the post-clavicle being almost universally applied to the inner surface of the clavicle.

The ventral fin has a rather elongate base and, I think, 13 rays.

The caudal fin has been incorrectly represented in the type specimen owing to its imperfection. This accounts for Van Beneden's curious statement: "Le lobe inférieur ne paraît être qu'une seconde nageoire anale." For, as in the specimen studied by Fraipont, the rays really extend along the lower border of the prolonged axis, clad with small lozenge-shaped scales, almost to its extremity, as in *Palæoniscus*, *Eurynotus*, and allied forms. The large ridge-scutes which reappear behind the dorsal and anal fins are continued as a series of fulcra along the upper and lower lobes of the caudal fin; but it still remains undecided whether their arrangement was monostichous or distichous.

The scales, strongly imbricate and with the usual peg-and-socket articulation, number 63 in a longitudinal series and 35 in an oblique transverse series; they are, like the dorsal ridge-scutes, finely striated, a striation I would describe as produced by grooves rather than by raised ridges. The scales on the middle of the side are tetragonal, twice to twice and a half as deep as broad, considering only the exposed surface, obliquely striated, the striation being more distinct on the anterior half of the body than further back. As usual, the

scales become more equilateral towards the dorsal and ventral lines and towards the caudal extremity; close to the ridge-scutes they assume a more rounded shape and concentric striation. I am unable to detect a lateral line.

The inner surface of the scales is seen in specimen B (Pl. X. fig. 3) to be extremely similar to that of *Eurynotus*, viz. with a strong keel parallel with and near the anterior border, and a point at the upper end the length of which is about half that of the largest scales.

In specimen A, as it lies on the right side, the ventral scutes anterior to the ventral fins scarcely appear, being covered with small scales forming oblique series directed forwards; the two or three front ones, which are partially exposed, appear to be directed backwards, but this is probably due to crushing, what is seen on the outline of the pectoral region being the right branch of the V which is formed by these scutes. I must regard the arrangement described and figured by Van Beneden and Traquair as the natural one, and am therefore quite unable to account for the position these scutes assume in Fraipont's specimen, which has led to the interpretation that they formed a single series, each scute being disposed transversely and perpendicular to the sides. On the contrary, these elements, as shown isolated in specimen B (Pl. X. fig. 4), were V-shaped pieces, as are known in many Ganoids, and formed of two distinct halves joined on the median line. Seen facing, they are thickest at the line of meeting of the branches of the V, which taper to a point.

As I have stated above, the dorsal ridge-scutes extend forwards to the occiput; 33 can be counted in front of the dorsal in specimen A, and 23 are preserved in regular succession in specimen B. Each of them corresponded to an interneural bone, which is to be detected in relief under the scales in specimen A.

The result of this examination entirely confirms Prof. Traquair's original conclusions, viz. that *Benedenius* is closely allied to *Eurynotus*, *Wardichthys*, and *Mesolepis*. Until we know something definite of the dentition, we may hold that the only fundamental difference between *Benedenius* and *Eurynotus* resides in the lesser elongation of the dorsal fin and the larger ridge-scutes in the former, characters shared by *Mesolepis* and the imperfectly known genus *Wardichthys*, allied fishes with very deep body. I cannot understand what could have induced Prof. Traquair to modify his views in 1890, as appears from a note in these 'Annals' (ser. 6, vol. vi. p. 492), to the effect that the author has "become convinced that, though it presents many resemblances to the *Platysomidæ*,

it [*Benedenius*] is after all more Palæoniscid, and should be restored to the family Palæoniscidæ"; the result of which has been, as I think, an incorrect allocation of this genus in Mr. Smith Woodward's 'Catalogue of Fossil Fishes.'

At the suggestion of Dr. Traquair, who has most kindly assisted me with advice, I have compared the new specimens with the type in the Zoological Museum of Louvain University, which has been most kindly entrusted to me by Prof. Gilson. I entertain no doubt as to their specific identity, although the proportions differ a little, as may be seen from the following measurements of the type specimen:—

	millim.
Total length	295
Length of head	53
From head to caudal fin	158
Caudal fin	85
Greatest depth of body.....	108
Length of caudal peduncle	20
Depth of caudal peduncle.....	31
From head to dorsal fin (in a straight line).....	104
From head to ventral fin	76
From head to anal fin	120
Length of dorsal fin	50
Greatest depth of dorsal fin.....	38
Length of anal fin.....	25

After the excellent description given by Traquair of that specimen, I have naturally little to add. I must, however, point out that the shape and sculpture of the scales approaching the dorsal ridge-scutes have not been correctly figured; they entirely lose the rhomboidal shape and assume a more concentric striation, as I have described above. A piece of this region is figured, enlarged, on Pl. X. fig. 5. The base of the dorsal fin is denuded, but there remain a few of the distal hourglass-shaped fin-supports (baseosts), noticed above, and I can also distinguish the extremities of several of the proximal supports (axonosts), the presence of which had not yet been ascertained in *Benedenius*; these axonosts are nearly as thick as the baseosts.

EXPLANATION OF THE PLATES.

PLATE IX.

Benedenius deneensis, Traq., nearly complete specimen (A), preserved in the Abbey of Maredsous. The greater part of the head and the extremity of the tail omitted. Natural size.

PLATE X.

- Fig. 1. Dislocated shoulder-girdle, from specimen (B) preserved at Maredsous. Natural size. *cl.*, clavicle; *i.cl.*, interclavicle; *p.*, pectoral fin; *p.cl.*, post-clavicle; *p.te.*, post-temporal; *s.cl.*, supra-clavicle.
- Fig. 2. Restoration of shoulder-girdle. Same lettering.
- Fig. 3. Inner view of scales, in middle of body, from specimen (B) preserved at Maredsous. $\times 2$.
- Fig. 4. Ventral ridge-scutes, as seen in specimen B. Natural size.
- Fig. 5. Dorsal scales, towards middle of body, from type specimen preserved in the Zoological Museum of the University of Louvain. $\times 2$.

LI.—*Descriptions of Three new Reptiles and a new Batrachian from Mount Kina Balu, North Borneo.* By G. A. BOULENGER, F.R.S.

AMONG some Reptiles and Batrachians collected in March 1899 on Mount Kina Balu by Dr. Hanitsch, of the Raffles Museum, Singapore, and submitted to me for identification, there are examples of several new species, which he has kindly permitted me to describe.

Gecko rhacophorus.

Head moderately large, once and one third as long as broad; snout longer than the distance between the eye and the ear-opening, once and a half the diameter of the orbit; ear-opening round, its diameter one third that of the eye. Body and limbs much depressed, bordered with dermal expansions; fingers and toes fully half-webbed. Head, body, and limbs covered with minute granules intermixed with small, round, smooth tubercles; rostral a little more than twice as broad as deep, without median cleft; nostril pierced between several small scales; nine upper and ten lower labials; symphyseal small, pentagonal; a series of six small chin-shields; spine-like tubercles on the sides of the head, the largest above the ear. A moderately developed scalloped membrane on each side of the body, scaled like the body and fringed on the edge. Abdominal scales flat juxtaposed granules. An angular series of præanal pores. Tail depressed, scaled like the body, bordered with a series of rounded lobes. Greyish above, speckled with darker and with wavy dark transverse lines; brownish beneath, throat with darker dots.



Boulenger, George Albert. 1899. "L.—A contribution to the history of the Carboniferous Ganoid, *Benedenius deneensis*, Traquair, with notes on two newly-discovered specimens." *The Annals and magazine of natural history; zoology, botany, and geology* 4, 445–451.

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