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XLV.—On Harpacanthus, a new genus of Carboniferous Selachian Spines

Dr. R.H. Traquair F.R.S. F.G.S.

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Pores scattered through a distinct dermal membrane. Skeleton :—(a) dermal, an irregular feltwork of slender cylindrical spicules ; (b) main, a reticulation of large acerate spicules, with fibres distinct in parts. Spicules :—(1) smooth, slightly curved cylindricals, size $\cdot 48$ by $\cdot 012$ millim., chiefly dermal ; (2) long, smooth, curved acerates, sometimes sharp and sometimes blunt, size $\cdot 9$ by $\cdot 025$ millim. ; (3) a very small and slender sceptrella-like spicule, consisting of a slender shaft, bearing two saucer-like whorls near the base, with very slightly denticulated margins, length $\cdot 037$ millim., diameter of larger (upper) whorl $\cdot 0125$ millim. Occurring scattered, chiefly in the dermal membrane.

Locality. Station 135 ?, 60 fath.

ERRATUM.—We find that the generic name *Trochoderma* (p. 344, *supra*) has been already used ; we therefore propose instead the name *Axoniderma*, from Greek ἄξων, a wheel (type species *Axoniderma mirabile*, Ridley and Dendy).

XLV.—*On Harpacanthus, a new Genus of Carboniferous Selachian Spines.* By Dr. R. H. TRAQUAIR, F.R.S., F.G.S.

UNDER the name of *Tristychius fimbriatus* a small but interesting Selachian spine from the Carboniferous Limestone of Gilmerton, near Edinburgh, was described and figured by Mr. T. Stock in a paper "On the Structure and Affinities of the Genus *Tristychius*," published in this journal three years ago*.

The spine is described as being $1\frac{2}{3}$ inch in length ; it is tolerably slender, and, according to the figure, is pretty sharply curved backwards beyond the middle. "Its surface is smooth ; but a shallow and wide groove occupies a nearly central position along the middle third of the spine." Posteriorly it shows along its distal fourth seven strong, pointed, recurved denticles, in connexion with which the writer remarks that "the second row (if existent) is concealed in the matrix." The walls are described as being "apparently thick and the pulp-cavity small," and it is further stated that the inserted portion of the spine is not preserved.

* Ann. & Mag. Nat. Hist. (5) xii. pp. 177-190, pl. vii.

That this spine was new there can be no doubt; its reference to Agassiz's genus *Tristychius* is another matter.

Tristychius arcuatus, the type of the genus, was described and figured by Agassiz in the 'Poissons Fossiles,' vol. iii. p. 21, Atlas, vol. iii. pl. i. a. figs. 9, 10, 11; and the very beautiful original specimen, from the Carboniferous-Limestone series of the neighbourhood of Glasgow, is now in the museum of Anderson's College in that city. I have carefully examined that specimen, as well as a large number of others from various Scotch Lower-Carboniferous beds, and may therefore sum up the essential characters of this spine as follows:—

Specimens occur from 1 inch to nearly 5 inches in length: in shape the spine is gently and gracefully curved backwards, tapering to a point; and it must be noted that some examples are more strongly curved towards the apex than others. The extremity is longitudinally sharply sulcated or ridged, the ridges mostly soon disappearing until, at a distance of from 1 to 1½ inch from the point, usually three only remain—one median and two lateral, which pass down beyond the others along the anterior aspect of the spine towards the base. The inserted portion is not, as in *Ctenacanthus*, *Hybodus*, or *Gyracanthus*, distinctly marked off from the exerted, and the former, as well as the non-ridged part of the exposed surface, is closely covered with minute and delicate longitudinal furrows mingled with pores. The base is hollow, with rather thin walls, which are always crushed in by pressure; posteriorly this hollow is widely open by the usual sulcus, superiorly it passes up into the narrow pulp-cavity of the closed portion of the spine. Above the closure of the sulcus the posterior aspect shows a rather narrow concave area, bounded by two prominent edges, immediately within which latter there is on each side a row of strong recurved hooks or denticles; towards the apex the denticles of each row are very close together and alternate in their arrangement; and, as I have already emphasized in my notes on *Gyracanthus**, the young spines are not miniatures of the larger ones, but represent only their distal portions, so that the *proportion* of the surface covered by longitudinal ridges varies according to the size of the specimen. In very small ones the entire exerted surface may appear fluted, while in one very large specimen, in which the apical portion is *worn* away, only the three long ridges remain.

Although Agassiz did not enter quite so much into detail in his description, yet the leading characters of the genus were

* Ann. & Mag. Nat. Hist. (5) xiii. p. 41.

very well grasped by him in his definition of *Tristychius*, and he lays particular stress upon the presence of the three long ridges, on which he in fact founded his generic name. But if we compare Agassiz's figure of *T. arcuatus* with that of Mr. Stock's "*Tristychius*" *fimbriatus*, it will be apparent that the two forms have hardly that amount of resemblance which would warrant reference to a common genus. Agassiz's *Tristychius* is eminently ridged and striated—Mr. Stock's spine is perfectly smooth. The former is gently curved and tapering, and shaped generally like the spine of *Hybodus*; the latter is nearly as thick at the extremity as at the middle, and shows, moreover, a very peculiar sudden backward curve. To this curve Mr. Stock attaches "very slight importance,"

Fig. 1.

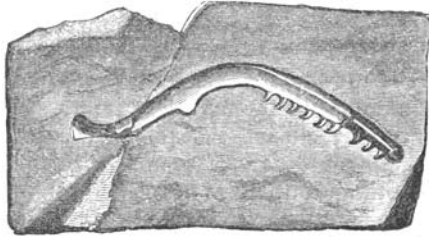


Fig. 2.

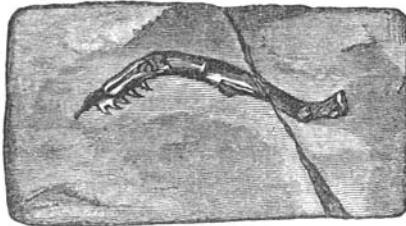


Fig. 1.—*Harpacanthus fimbriatus*, Stock, sp. Here the greater part of the spine is seen only in impression.

Fig. 2.—The other side or counterpart of the same specimen, containing more of the actual spine, but wanting the impression of the distal extremity, which has splintered off.

remarking also that it is "possibly due to disease;" and he has also given a "restoration" of the spine, in which he has to a large extent straightened it out, so as to make it look rather more like that of the genus in which he has placed it.

A second specimen of the same spine has, however, subsequently been found in the same locality by Mr. W. Anderson, now of the Geological Survey of New South Wales, to whom, along with Mr. W. Tait Kinnear, the discovery of the first

was also due. This specimen having been presented by Mr. Anderson to the Edinburgh Museum of Science and Art, I am now in a position to say a few words as to its characters.

On comparing this spine with Mr. Stock's figure (*op. cit.* pl. vii. fig. 1) there can be no hesitation as to identifying it with his *Tristychius fimbriatus*. It is 2 inches in length by about $\frac{1}{8}$ inch in antero-posterior diameter at the thickest part (about the middle), and presents a strong backward curvature, though not quite so strong as in Mr. Stock's specimen; and it may also be noted that the bend takes place nearer the middle of the spine. Above the base the posterior margin of the spine is rounded, the anterior rather sharp; the sides are flattened, and beyond the curve show a longitudinal shallow groove, the surface all over being perfectly smooth and destitute alike of the coarser ridges and more delicate striæ of *Tristychius*. A considerable amount of the substance of the basal extremity of the spine is lost by being broken away; but what remains, along with the excellent impression, shows that there was no posterior sulcus—that the basal extremity was, in fact, solid; a pulp-cavity is very soon seen extending towards the apex. Furthermore there is no posterior area; but about $\frac{1}{10}$ inch from the inferior extremity there is a small rounded backward projection, beyond which again, and commencing $\frac{7}{16}$ inch from the bluntly rounded apex, the rest of the posterior margin is occupied by a series of nine strong recurved denticles, which are in this specimen clearly seen to form *one* median row.

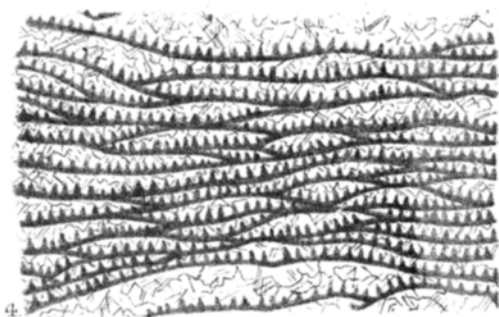
It is therefore not only clear that the spine described by Mr. Stock as *Tristychius fimbriatus* cannot possibly be referred to *Tristychius*, but that it also displays peculiarities which remove it still more widely from that genus, and such allied forms as *Ctenacanthus*, *Hybodius*, &c., than might have been supposed; for not only is the posterior area wanting and the row of denticles a single one, but the base is altogether different in not presenting the spacious hollow or sulcus open posteriorly. The occurrence of the second specimen shows also that the posterior curvature is natural and not the result of accident or disease.

It is, however, clearly a Selachian appendage; more I do not at present say regarding it. So far, however, as I am aware, it does not seem to have been hitherto generically recognized, and I therefore propose for it the term *Harpacanthus**, so that the name will now stand *Harpacanthus fimbriatus*, Stock, sp.

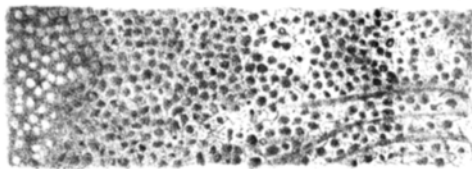
* ἄρπη, a sickle, and ἄκανθα, a spine.



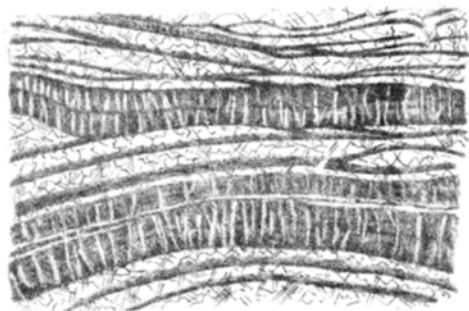
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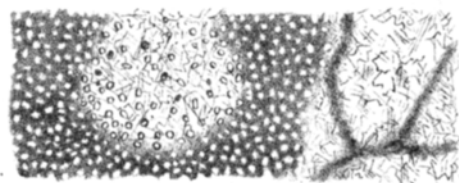
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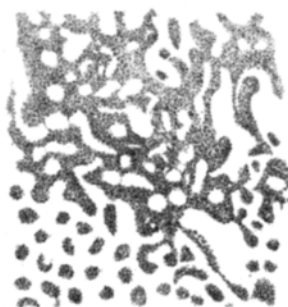
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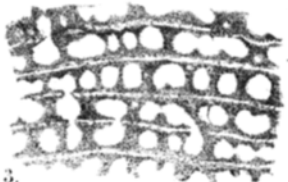
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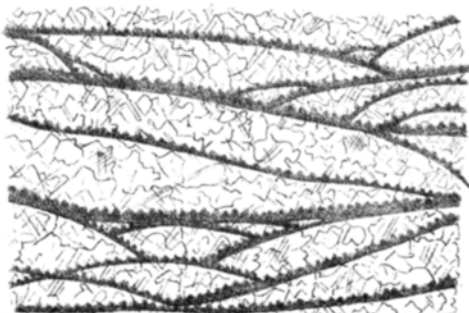
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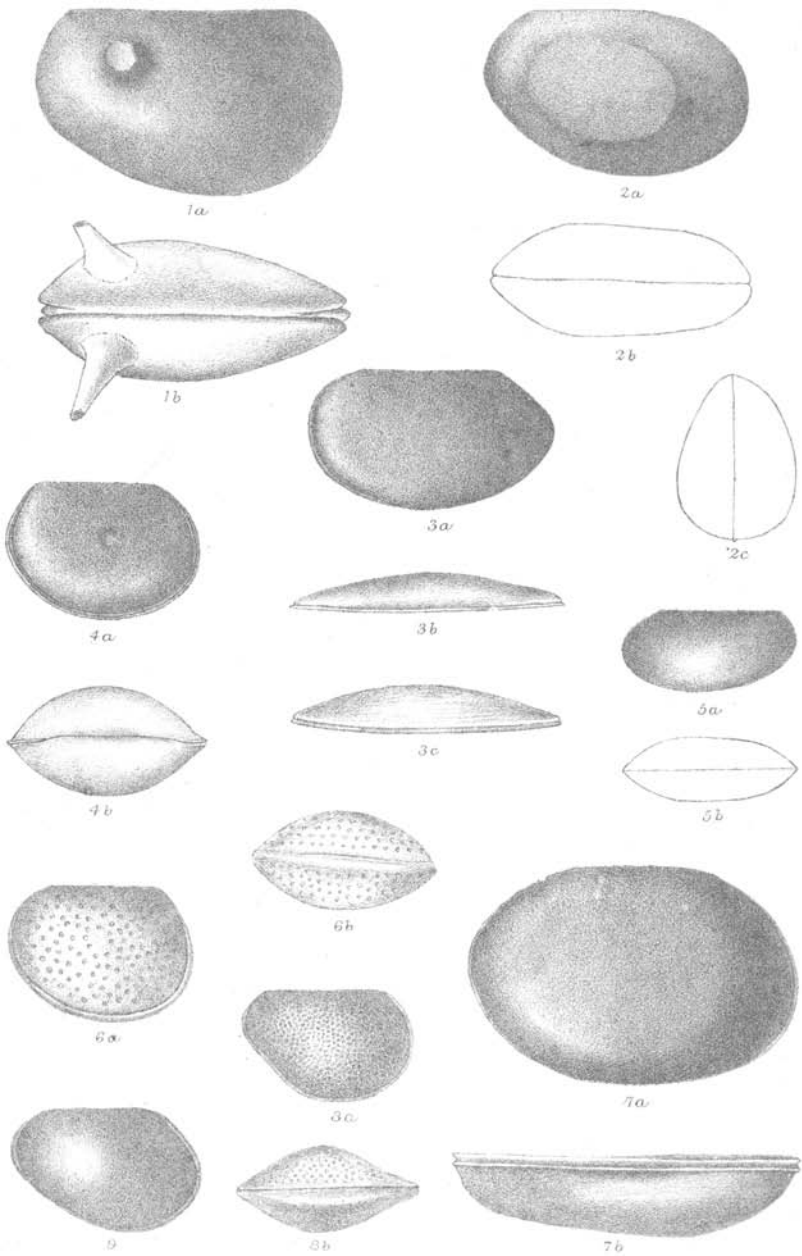
2.



3.



8.



J.W.K. del & E.C.K. lith.

West, Newman & Co. imp.

Carboniferous Ostracoda.