

34. THAMNISCUS: *Permian, Carboniferous, and Silurian.* By
GEORGE W. SHRUBSOLE, Esq., F.G.S. (Read April 26, 1882.)

THE genus *Thamniscus* was founded in 1849 by Prof. King for a Polyzoan of large size found in the Permian beds of the north of England. The main interest of the genus consisted in Prof. King claiming for the type species the possession of certain "denticles," "vesicles," and "hemispherical bodies" similar to those observed in "certain Lunulites and *Cellaria salicornia*"*. Prof. King further institutes comparisons between these peculiarities in his genus and some of the recent forms of Polyzoa formerly included among *Elasmopora*, *Escharina*, and *Cellepora*†. It is needless to say that these features at once assign the genus to the order of Chilostomatous Polyzoa; and as such it is entitled to rank as the most pronounced type of its class found among the Palæozoic Polyzoa. How far these characters can be sustained will be the subject of after inquiry. The next reference to the genus that I find is in 1874, when Mr. R. Etheridge, Jun., described, as found in some Scottish Carboniferous Limestone shale, a fragment of a Polyzoan which he thought might be a new species of *Polypora*, at the same time remarking that the disposition of the cells and the mode of branching were exceedingly like those seen in the type species of *Thamniscus* (*T. dubius*, King), and suggesting that it might be a species of that genus‡.

In 1875 the Messrs. Young, of Glasgow, described (under the name of *Thamniscus Rankini*) a free, robust, branching Polyzoan which they had received from Dr. Rankin of Carluke, and which is probably identical with the species referred to by Mr. R. Etheridge, Jun. At the same time they remark that the generic position of the fossil is uncertain; and if the "gemmuliferous vesicles" described by Prof. King are essential to *Thamniscus*, this character is wanting in their species, even in the best-preserved specimens§. After further discussing its position they conclude by saying, "we think it safer to leave it in the Palæozoic genus *Thamniscus*." There is very little doubt about the correctness of this reference, since it is an undoubted *Thamniscus*.

As yet I have no record or trace of *Thamniscus* being found in the Devonian rocks, and therefore pass on to the Silurian species.

I have long been familiar with fragments of a Polyzoan in the Dudley Limestone which bear a general resemblance to the Permian *Thamniscus*; but the fragmentary condition of the remains forbade description. Recently I have found in the Woodwardian Museum, labelled by Salter *Ceriopora*, a fine specimen of the same, in which the growth, habit, and cell-pore are sufficiently displayed to

* Perm. Foss. England, p. 45.

† Ibid. p. 46.

‡ Mem. Geol. Surv. Scotland, Explan. Sh. 23, p. 102.

§ Ann. & Mag. Nat. Hist. 1875, vol. xv. p. 336.

admit of specific description, and a determination of its affinities, which in outline are clearly with the Thamniscidæ.

This Silurian Polyzoon has had a somewhat chequered palæontological history. It was known to Lonsdale as *Hornera crassa*; in 'Siluria' it is referred to *Polypora*; Salter in his 'Catalogue' refers to it as a doubtful *Ceriopora*; in the Woodwardian Museum it is labelled *Ceriopora*; by other authorities it is regarded as a *Polypora*.

In determining its true affinities it will be sufficient to state that, as only one half of the surface is poriferous, it clearly does not belong to the Cerioporidæ, which are poriferous on all sides. The absence of dissepiments, which are a distinguishing mark of *Polypora*, further excludes it. Its relation to *Hornera* is the more feasible on account of a certain amount of outward resemblance, but equally fallacious, since the cell-arrangements of *Hornera* are widely distinct.

There remains, then, the Permian *Thamniscus* with which to compare it. With this genus, in habit, growth, and cell-arrangement, there is a very close agreement, with the one exception of its wanting the peculiar adjuncts to the cell which relegate the Permian species to the Chilostomata, the Silurian form being clearly Cyclostomatous. In this respect it agrees with the Carboniferous species of *Thamniscus* described by Messrs. Etheridge and Young. At this point an interesting inquiry arises as to the generic identity of these three species; and also does the later, Permian species, to take an extreme view, owe its peculiarities in any way to further development? To set these questions at rest, I decided upon investigating the claim of the Permian species to the possession of these exceptional characters; for it must be confessed that they are so anomalous, and among the Palæozoic Polyzoa so unique, that it is highly important that there should be no doubt upon the point. In elucidating the question as to the existence or otherwise of these cell-adjuncts, the resources of the Newcastle Museum have been placed at my disposal. To Mr. Howse of Newcastle I am especially indebted for much assistance.

The result of a careful microscopic examination of the poriferous face of several specimens of *Thamniscus* is, that I find no confirmation of Prof. King's claim for his species of having affinity with recent forms and possessing appendages homologous with theirs. I refer now more especially to the secondary cell-pore. On the contrary, I find, as to cell-character, a perfect agreement between Permian, Carboniferous, and Silurian species. I do notice, however, on the cell-face of *Thamniscus dubius*, a feature not recorded by King, and one which is very common in the Palæozoic Polyzoa—a strong defensive spine which is hollow at the base; it occurs here and there in an irregular line between the cells; more often than not it is worn down, showing the hollow centre and projecting circular walls. I have little doubt that the "hollow cavities" and the secondary cells of King are nothing else than the hollow centres of these spines. Spines, when worn away, which is more often the case than otherwise, have often been mistaken, in the Palæozoic Polyzoa, for minute

cells and "gemmuliferous vesicles." The supposed occurrence of these secondary cells, as shown by King*, in a single irregular line along, and not extending across, the face of the branch, is in perfect agreement with the mode of occurrence of the spines I have indicated.

Again, as to the "denticle-like process" † said to be possessed by *Thamniscus dubius*; I can only trace this to the unequal wearing-down of the cell-mouth, which may often be seen on the protected side of the branch, prominent and circular; this is seen to weather unequally, and the more prominent portion remaining becomes the denticular process. The perfect cell-aperture is circular and well defined; the denticular process is therefore an accident, and not a natural occurrence.

These details are necessary to justify the course which I intend to take; for with the discovery of Carboniferous and Silurian *Thamniscidæ*, it is obvious that if King's diagnosis of the genus is correct, then a new genus would be necessary to receive them. Happily it has been shown that this addition is not needful. Take away the supposed cell-adjuncts and the denticulate aperture, for which I find no warrant, from the Permian species, and the whole of the series are in perfect accord.

Thamniscus dubius is very fully described and figured by King. As to the drawings of it, I can only admit fig. 9 as typical of the poriferous branch, the rest are misleading. Fig. 10, intended for *Thamniscus*, really represents the basal branches of *Synocladia virgulacea*; these differ very materially in appearance from the upper and the more characteristic portion of the zoarium. The difference is due to a thickening and solidifying of the branches which is needful to carry the large expansion of *Synocladia*. In the future reading of the genus *Thamniscus* it will be necessary to omit the reference to "gemmuliferous vesicles," retaining as its distinctive character frequent and regular bifurcation of the branches.

As King's generic description is faulty as well, it will be necessary to redefine the genus, and also to give a new description of the Permian species.

THAMNISCUS, King.

Branches free, round, frequently and regularly bifurcating; more or less on one plane. Zoecia on one side. Cells immersed, round, arranged in oblique lines.

THAMNISCUS DUBIUS, King.

Sp. char. Zoarium a flattened expansion. Branches free, thick, round, somewhat flattened, frequently dividing. Zoecia on one side of the branch, immersed; apertures circular; peristomes prominent, about their own diameter apart, arranged in regular lines, both longitudinal and oblique, a slight wavy line between the longitudinal rows. Reverse finely striate. Remains of spiniferous processes

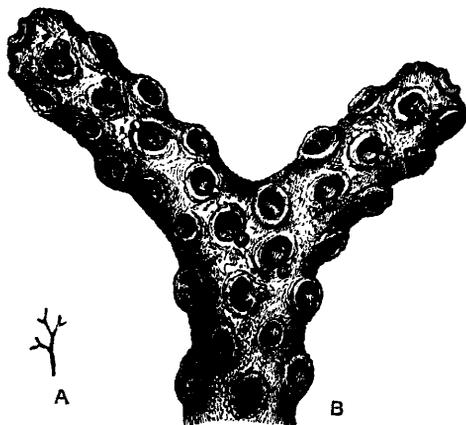
* Perm. Foss. England, pl. v. fig. 11 b.

† Ibid. pl. v. fig. 12.

here and there. Six cells in one line longitudinally, from three to six cells on the width of a branch.

The habit of growth in *Thamniscus* is characterized by the branches being free and regularly divided. This readily distinguishes it from any associated Polyzoan. It scarcely merits the variable character which Prof. King gives to it when he speaks of "almost every specimen offering a modified aspect"*. Much of this confusion may be due to the obscurity invariably present in the Permian Polyzoa, owing to the incrustation of calcic carbonate which often hides their true features. Owing partly to this cause, I notice that a fragment showing irregular branching and anastomosis of the branch is indicated as an instance of *Thamniscus* simulating the character of *Synocladia*†. The drawing in question is clearly that of *Synocladia* and not *Thamniscus*‡. This dichotomization of *Thamniscus* is a well-marked and distinguishing feature, and forms a good generic distinction; and hence, in redescribing the genus, I have characterized the branches as regularly instead of "irregularly bifurcating."

Thamniscus crassus, from the Wenlock Limestone near Dudley.
(From drawings by Rochfort Connor, Esq., from a specimen in my cabinet.)



A. Natural size. B. A portion of the same, showing the cells and position of the spiny processes, enlarged 25 diameters.

The Upper Silurian species from the Dudley Limestone I propose to describe as

THAMNISCUS CRASSUS.

? *Hornera crassa*, Lonsd. Sil. Syst. p. 677, pl. 15. figs. 13, 13 a.

? *Polypora crassa*, Siluria, p. 215, Foss. 35 (i.).

Ceriopora, Salter, Cat. Cambr. Foss. p. 100.

Hornera crassa, Vine, Quart. Journ. Geol. Soc. vol. xxxviii. p. 60.

* Perm. Foss. England, p. 45.

† Ibid.

‡ Ibid. pl. 5, fig. 10.

Sp. char. Zoarium a flattened expansion. Branches round, somewhat flattened, regularly dichotomizing at intervals of two or three lines. Diameter of branch $\frac{1}{20}$ to $\frac{1}{30}$ of an inch. Reverse striated longitudinally. Zoecia long and cylindrical, tapering towards the mouth, raised margins more than their own diameter apart when not eroded; spirally arranged one side of the branch, three or four cells across, and five or six in oblique lines. Spines on the interspaces between the cells.

Locality. Wenlock Limestone, near Dudley.

Large specimens somewhat rare, small fragments more common.

Obs. The specimen of *Thamniscus* in the Woodwardian Museum, while it is the largest and best-preserved fragment that I have seen, bears evidence of having suffered from lateral crushing and breakage, which interferes somewhat with the characteristic display of its growth. The seeming coalescence of the branches is the result of this lateral pressure.

It is often seen in this class of organisms that the best-preserved portion of the structure is near the base. This is the case here. On the basal branches will be seen the remains of large spines half the diameter of the cells in size. The cell-openings, it will be observed, are circular, with considerable interspaces between them; comparing these with other and more eroded parts of the branch, it will be seen that in the latter the interspaces have decreased, and will, with further erosion, altogether disappear, leaving the cells with only the division-walls between them. The explanation is that while the cells of *Thamniscus* are cylindrical, they are also tapering, the base of the cell being the wider part, and twice the diameter of the aperture. The cell-aperture was an important as well as a peculiar feature. All that is now to be seen of it are the remains of the cell-walls, which appear springing from the body of the cell. It might be compared, as far as the outline of the aperture is concerned, with a somewhat eroded cell of *Glaucanome stellipora*, Young. As to the existence of denticles there is no evidence forthcoming.

I may here notice, as showing the agreement between the Carboniferous and Silurian *Thamnisci*, that the Messrs. Young, when describing the former, speak of the cell-aperture as tuberculate; this quite describes the appearance of the Silurian species in parts where not eroded. Indeed the cell-neck might be said to be built up of a series of pillars, arranged in a circle, judging from their present tuberculate appearance.

Fragments of this Polyzoan are not uncommon in exposures of Dudley Limestone; and Mr. Vine informs me that he has found it in the Wenlock shale, with characters identical with those above described. From the robust character of the fragments it may be inferred that it attained considerable size; its expansion was probably fan-shaped, although the fragments I have seen would not be inconsistent with an open cup-shaped zoarium. It may readily be distinguished by its branches of equal width, regularly dichotomizing and not anastomosing. It closely resembles a *Polypora* without the connecting bars; indeed it might be so described. Most of the

Palæozoic Polyzoa, when seen under favourable circumstances, are found to have been protected by spines either long or short. In this respect *Thamniscus crassus* is no exception; for notwithstanding the natural and often artificial weathering to which the Dudley fossils are subject, there are still to be seen little irregularities on the surface, which when seen in profile leave no doubt as to their being the remains of spines; this is confirmed by the observations of Mr. Vine, who has noticed the base of spiniferous processes in fragments from the Wenlock shale*.

As yet we know of only the three species of *Thamniscus* which I have referred to as occurring severally in the Silurian, Carboniferous, and Permian periods. We have least knowledge of the Carboniferous species, for the reason that as yet it has only been found in fragments. The Silurian species is probably the more compact in growth, and the Carboniferous and Permian the more vigorous; the last is more outspread in its bifurcation. As yet I know of no older form than the Dudley species.

I have to acknowledge my indebtedness to Prof. T. M'Kenny Hughes, for giving me facilities for studying the Polyzoa of the Woodwardian Museum.

* Quart. Journ. Geol. Soc. vol. xxxviii. p. 60.