

23. *The SILURIAN SPECIES of GLAUCONOME, and a SUGGESTED CLASSIFICATION of the PALÆOZOIC POLYZOA.* By GEORGE W. SHRUBSOLE, Esq., F.G.S., and GEORGE R. VINE, Esq. (Read June 21, 1882.)

[Abridged.]

THE genus *Glauconome*, originally founded by Goldfuss, was so modified by Lonsdale, as to become virtually a new genus, of which *Glauconome disticha* from the Dudley Limestone is the type. Later on came the discovery by Sedgwick of apparently a similar polyzoan from the Bala beds of North Wales. This was regarded by Prof. McCoy* as identical with the Wenlock species, and, as such, has been generally received.

We have been of late examining these Silurian species of *Glauconome*, both as to their identity with one another and their connexion with the Carboniferous and Devonian species, and we find that the Bala and Wenlock species are not even generically related, while the members of the large Carboniferous group have not the least affinity with the type species from the Wenlock beds.

The present Bala, Devonian, and Carboniferous species evidently belong to a modified group of the Cyclostomatous Polyzoa, while the type species from the Wenlock can only be classed in a distinct division of the Polyzoa, for which at present no provision is made.

In coming to this decision, we have been mainly guided by zoarial form, and not outward resemblance. Evidence in this direction has been carefully sought for in the several species. In *Glauconome disticha* from the Wenlock Limestone we find the cell open and exposed throughout its entire length; this, we find, is not accidental, but characteristic. The cells are built up of a series of thick longitudinal walls running parallel with the branch, and divided at regular intervals by cross walls, which go to form the cell or, rather, cell-area, which may be pyriform or quadrangular in shape and depressed in the centre. The keel is normally rounded, having on the elevated portions prominent nodes.

The remarkable feature about the cell is its open character; for out of the many examples we have examined we have not found it otherwise. That this is not due to the wearing away of any part of the structure is apparent from the fact that even more delicate polyzoans associated with it are not so affected. Lonsdale noticed the same peculiarity; for he says "that the nature of the covering and opening of the cells is unknown." This is still the extent of our knowledge.

We turn now to the other species of *Glauconome* from the Bala beds, which McCoy regarded as identical with *G. disticha*. In working out the affinity of this species, we have been favoured with specimens from Glyn Ceiriog, North Wales, in which the cell-features are well shown. The zoœcia are seen to be long and cylindrical in shape, buried in the length of the branch, and the cell-neck bent, and protruded through the branch.

* British Palæoz. Foss. p. 49.

As a natural consequence, there can be no generic relationship between the tubular cell of this Bala *Glaucanome*, and the open quadrate one of the Dudley species. The difference between them is considerable; it is even more than generic. The zoarial character, as seen in the Dudley species, can have no place even among the Cyclostomatous Polyzoa. There is an antique arrangement of the cells unlike anything in recent types. Its characteristics are entirely Palæozoic. It is scarcely necessary to say that the numerous species of Carboniferous *Glaucanome* with their cylindrical zoœcia can no longer be associated with the Dudley species. The latter is a polyzoan which is not provided for in the existing suborders of the group; and for the reception of it and similar species, a suitable suborder will be requisite. It will remain the type and, so far as at present known, the only representative of the genus *Glaucanome*. On the other hand the Bala species is clearly allied by close zoarial affinity with the Devonian and Carboniferous *Glaucanome*, and may be included in a new genus to be presently described. We are aware that some years ago * Mr. Etheridge, Jun., proposed to assign this Bala species to *Ramipora*, a genus founded by Toula upon a fragment of a Polyzoan brought from the Arctic regions. The reference mainly rested on a certain outward resemblance, not very marked or reliable, which cannot outweigh its zoarial agreement with the Carboniferous *Glaucanome*, or even its outward resemblance to the perfect condition of the zoarium in the same.

The new genus to be now described will include the discarded Bala, Devonian, and Carboniferous species of *Glaucanome*.

PINNATOPORA, nov. gen.

GLAUCANOME (pars), M'Coy, Brit. Pal. Fos. p. 49.

Zoarium made up of a series of main stems, having a common attachment, with secondary and tertiary branches, which come off at an acute angle. The tertiary branch may or may not unite with a corresponding branch on the adjoining stem. Zoœcia cylindrical, arranged in longitudinal and alternate series over one half of the surface. Between the row of cells a dividing keel.

PINNATOPORA SEDGWICKII, Shrubsole.

Glaucanome disticha (pars), Lonsdale, Brit. Pal. Fos. p. 49.

Ramipora Hochstetteri, var. *carinata*, R. Eth. Jun., Geol. Mag. 1879, p. 241.

Sp. char. Zoarium a series of main, non-bifurcating stems growing from a common base, having alternate, secondary, and tertiary branches, the latter uniting with a corresponding branch on the adjoining stem, so as to connect the entire zoarium. Zoœcia long, tubular; aperture circular, arranged longitudinally in alternate rows, spread over one half of the surface. A dividing keel between the rows of cells. Reverse angular.

Obs. The chief interest of this species is that it is the oldest known

* Geol. Mag. 1879, p. 241.

representative of its class. It is the head of an important genus ranging from the Bala or Caradoc beds to the latest Carboniferous. Although the earliest of its kind, this species was of strong robust growth, exceeding in size the species of later date. Large fragments of it are frequently found in the Bala beds. That so fragile an organism should be found in an almost unbroken condition suggests the fact that the sediment, from whatever cause, must have accumulated very rapidly around it.

Locality. Fairly abundant in the Bala beds of Glyn Ceiriog, Denbighshire, and Cefn Coedog near Corwen.

We would slightly enlarge the characters of the original Dudley species as follows :—

GLAUCONOME DISTICHA, Lonsd.

Glaucome disticha, Goldf. Petref. Germ. Tab. 64, fig. 15 ; Silurian Syst. pl. 15. fig. 12.

Pinniretepora Lonsdalei, D'Orb. Prodr. de Pal. i. p. 45.

Sp. char. Zoarium branched or pinnate, the branches diverging at a sharp angle from the main or central stem. Stem rooted by a strong base. Zoecia both on stem and branch. When fully developed, two rows of quadrangular or pyriform cell vestibules arranged longitudinally on stem and branch, on either side of a strong keel, which is nodulose when perfect. Three rows of cell-openings may often be seen on the main stem. Aperture of cells unknown.

Obs. In addition to the features already described in this species there is an antique arrangement of the cells that is unlike anything seen in modern types. There is another detail worth mention. In the cells of *Membranipora membranacea* and the Flustridæ generally, the cell is entirely bounded by its own wall. A perpendicular line drawn through the end walls would enclose the cell and its contents. In the Palæozoic types, lines similarly drawn would cut off the true cell from the area, the cell being buried beneath the area operated upon.

Recurring to the present classification of the Polyzoa, it is evident to a large extent that the divisions are founded upon recent types. Of the three suborders (i) Chilostomata, (ii) Cyclostomata, (iii) Ctenostomata, the latter is unknown to us in a fossil state. We know of no genera or species within the British area, in either the Cainozoic or Mesozoic epochs, that may not be included in the first or second of these divisions if slightly modified. When we pass to the Palæozoic forms, it is different. Here we meet with types of Polyzoa essentially different, in which the cells are devoid of stomata, either subterminal or terminal, being concealed beneath what we have called the vestibule. This is often very large and filled with matrix. The concealed stomata may be shown in sections of species of *Ptilodictyæ* and *Ceramoporeæ*. To meet the case of these older types of Polyzoa, we propose a new suborder which shall have special reference to the cell and stomata. As yet we have no clear evidence

that Chilostomatous types existed in Palæozoic times. The majority of these older species will be found to arrange themselves under the Cyclostomata; the rest will be accommodated in the new suborder Cryptostomata.

Class POLYZOA.

I. Suborder CHILOSTOMATA, Busk.

“Orifice of the zoœcium closed by a movable opercular valve. Ova usually matured in external marsupia. Appendicular organs (avicularia and vibracula) frequently present.” *Hincks*.

Very few species at present known to us in the fossil state. It is doubtful if they are found below the Cretaceous period.

II. Suborder CYCLOSTOMATA, Busk.

“Zoœcia tubular, with a plain inoperculate orifice. Marsupia and appendicular organs wanting.” *Hincks*.

Species belonging to this suborder less specialized than recent types range from the Lower Silurian upwards.

III. Suborder CRYPTOSTOMATA, Vine.

Zoœcia subtubular, in section slightly angular. Orifice surrounded by a vestibule, or otherwise concealed.

To this division we assign the Silurian species of *Glaucome* and *Ptilodictya*.

DISCUSSION.

Prof. HUGHES bore testimony to the valuable work which the authors were accomplishing in connexion with the study of a very difficult group of organisms.