

3. Cymbuliidæ.—The Silurian fossils described by Ehrenberg<sup>1</sup> under the name of *Panderella*, and regarded as larval shells of Cymbuliidæ,<sup>2</sup> are coiled in a plane, and are bilaterally symmetrical like those of *Bellerophon* or *Oxygyrus*.

As to the fossils referred with a “?” to larval shells of *Cymbulia*<sup>3</sup> and *Tiedemannia* (= *Gleba*),<sup>4</sup> they are entirely uncoiled, the turns of the spire not being in contact; and in most cases they are coiled in one plane, neither spire nor umbilicus being visible. There is thus no connection between these fossils and the larval shells of Cymbuliidæ.

To sum up, we see that in the case of all these Primary so-called “Pteropoda” there is no reason whatever to regard them as Thecosomata. One palæontologist even has recognised the improbability of the organisms being referable to the Pteropoda: Hoernes,<sup>5</sup> in speaking of *Conularia* and *Hyolithes*, says that they “perhaps form a group distinct from the Pteropods and of unknown affinities.”

I am strongly inclined to believe that among these Primary “Pteropods” there are organisms belonging to different groups, but I am unable to decide which; and perhaps, even after a prolonged study, it would be impossible to class them with any known living organisms. What I can definitely assert, however (and Boas, whose authority on this point cannot be doubted, has arrived at the same opinion<sup>6</sup>), is that not one of them has the least affinity of any kind whatever with the Pteropoda, and that these latter are only to be discerned with certainty at the beginning of the Tertiary period.

## B. ORIGIN OF THE GYMNASOMATA.

We have already shown that the Gymnosomata are closely related to the Aplysioidea. Just as we consider that the Thecosomata are descended from the Bulloidea, so we are persuaded that the Gymnosomata have arisen from Aplysioid ancestors, and we have already expressed this opinion several times.<sup>7</sup>

In the present instance we cannot, as with Thecosomata, call palæontology to witness. The shell of the Aplysioidea is quite rudimentary, scarcely calcified, and but little adapted to fossilisation; and in the Gymnosomata both mantle and shell have entirely disappeared in the adult.

In *Notarchus* among the Aplysioidea, the mantle is already extremely reduced, and the shell has become microscopic, being lodged a little behind the anus.<sup>8</sup> Thus this form

<sup>1</sup> Ueber massenhaft jetzt lebende oceanische und die fossile ältesten Pteropoden der Urwelt, *Monatsber. d. k. preuss. Akad. d. Wiss. Berlin*, 1861, p. 434. Ueber die Obersilurischen und Devonischen microscopischen Pteropoden, Polythalamien und Crinoiden bei Petersburg in Russland, *Ibid.*, 1862, pp. 599, 600.

<sup>2</sup> Ueber massenhaft jetzt lebende, &c., *loc. cit.*, figs. 1-9.

<sup>3</sup> *Ibid.*, figs. 10, 11.

<sup>4</sup> *Ibid.*, figs. 12-18.

<sup>5</sup> Manuel de Paléontologie, p. 373.

<sup>6</sup> *Spolia atlantica*, pp. 94, 95.

<sup>7</sup> Description d'un nouveau genre de Pteropode Gymnosome, *Bull. Scient. Dép. Nord*, 1886, p. 226; and *Zool. Chall. Exp.*, part lviii. p. 67.

<sup>8</sup> Vayssière, Recherches zoologiques et anatomiques sur les Mollusques Opisthobranches du Golfe de Marseille, i. Tectibranches, *loc. cit.*, p. iii. fig. 81.