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On a Remarkably Branched *Syllis*, dredged by H.M.S. 'Challenger.'

By W. C. M'INTOSH, LL.D., F.R.S., F.L.S.

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[Read June 19, 1879.]

WHEN, in the summer of 1878, Sir Wyville Thomson wrote me, inquiring if I knew of any branched annelid, I believe that the substance of the knowledge then extant was expressed when I mentioned that, though familiar with budding in such Turbellarians as *Catenula*, with the propagation by division in *Nais proboscidea* and *Chætogaster*, as well as the more complex condition in *Autolytus*, *Myrianida*, and *Filigrana*, I could not say that I had seen or read of a well-marked case of the kind. The subsequent arrival of a Hexactinellid sponge containing the annelids, and the various slides with mounted specimens, placed all doubts at rest; and, at Prof. Sir Wyville Thomson's request, I now make a note on this remarkable form. Unfortunately, the annelid was not observed till the return of the Expedition, and after immersion in spirit.

The Hexactinellid sponge was dredged at Station 209, in 95 fathoms, near Zebu, one of the Philippines, on greyish muddy ground, celebrated for the abundance of *Euplectellæ* and other remarkable sponges of the kind. Besides the *Syllis* the sponge was tenanted (as in *Euplectella*) by a small member of the Polynoidæ, which will be described in due time.

The Syllidian (*Syllis ramosa*) is located for the most part in the basal canals of the sponge, above the "wisp." In this region masses of the annelid, about a quarter of an inch in diameter, occur, and a multitude of branches pass into the smaller canals adjoining. Two of such masses are especially conspicuous. The intricate manner in which the branches are arranged makes it a very difficult matter to dissect them out, especially when the friability of the annelid and the sharp spicules of the sponge are taken into account. Even after removal from the sponge it is a laborious operation to unravel them without frequent rupture.

The masses and their numerous branches, as well as the isolated portions, consist of a *Syllis*-like annelid of the thickness of common sewing-thread. No head can be observed either in the parent-stock, amongst the masses, or in the canals elsewhere, so

that they must either be very few, only occasionally developed, or by some means have been swept off, as it is hard to believe that they are entirely absent. The latter, however, must be the condition in some of the examples (unless we are to suppose that all are connected with a single head), which, therefore, would appear to derive nourishment at the open end; yet, in many, the aperture rapidly develops a bud, which nearly closes it. If, in life, there are many examples with such open ends, then the whole series branching from them presents an analogous condition to that of very elementary animals, the food being swept in with the sea-water to traverse the moniliform nutritive canal throughout the organism.

The body of the animal stretches, from any of the broken ends, of a nearly uniform diameter for a considerable distance, the numerous narrow segments being distinctly marked, and each furnished laterally with well-formed feet. The latter have dorsally a long, and often gracefully curved, cirrus, composed of a variable number of segments, since injury and reparation constantly occur. The longer cirri have about twenty-six segments, and all the organs are gently tapered from base to apex. Beneath, and confluent with, the base of the cirrus is the somewhat conical setigerous region, which has a few simple bristles, with a stout and slightly curved shaft, the dilated distal portion having the simple terminal process apparently ankylosed to it. This modification of the bristle is peculiar. A single stout spine supports the setigerous region, and, as usual, its point passes to the upper border. The ventral cirrus is broad and short, its tip being within the line of the former division.

The body of the annelid appears to have a furor for budding—laterally, terminally, and wherever a broken surface occurs. The young buds remain slender till they have reached a considerable length, and into each a diverticulum of the alimentary canal of the parent enters. These buds, on attaining a certain size, by-and-by give off other buds, so that the whole has a remarkably branched condition. The tail of the bud (*i. e.* its distal point) is early formed, and soon becomes furnished with two long cirri. Indeed it would seem that in such a case the tail and the anus were more useful than the head, the eyes, and the finished buccal and pharyngeal apparatus.

The number of buds seems to be indefinite, the data at present being insufficient to enable me to fix a limit. Some of the larger

fragments show nine or ten buds, yet they are evidently far from being complete. The absence of a head leaves great uncertainty on the latter point; and if it existed at all, it could only have been in the siliceous stem of the sponge, which had been torn off.

Two female buds were found. One of these is still attached by its pedicle of four segments to the parent-stock. These intermediate segments somewhat resemble those of ordinary buds, only they are more slender. All have rudimentary lateral cirri and setigerous processes. The diverticulum of the alimentary canal proceeds from the main trunk in the ordinary way, passes through the anterior segments of the bud, and becomes lost in the opacity caused by the ova. The head of the bud is bilobate, and furnished dorsally with a large reddish-brown eye on each side, and a still larger pair, of similar shape (somewhat circular) and colour, on the ventral surface. These eyes, while useful for both dorsal and ventral vision, approach so near the margins that they are also available for lateral sight. The head terminates laterally in two short cirri and a setigerous process furnished with a spine.

The body of the female bud is somewhat fusiform, gradually increasing in diameter till full bread this attained, and, after a nearly cylindrical region, diminishing towards the tail, though to a less degree than anteriorly. The entire body, from the middle of the second segment backward, as well as the bases of the feet, is filled with ova, which show germinal vesicle and spot. The anterior segments are provided with bristles of the same type as the parent-stock, only the terminal appendage is more differentiated. None of the long simple bristles are apparent in this fragmentary example.

Exactly opposite the point from which the pedicle of the foregoing bud sprang is another small one, consisting of upward of a dozen segments. Moreover, in the same specimen, a pair of young buds occur opposite each other. In these cases the segment of the intestine of the parent-stock, from which the diverticulum proceeds, is shorter than the rest. It would seem that the bud arises opposite a foot, and there is no evidence that it ever springs between two (successive) feet. The shortening of the intestinal segment may be due to the appropriation of the substance of both it and the body-wall in the production of the new bud.

A free female bud, again, occurred in one of the basal canals of

the sponge. It closely agrees with the description of the foregoing specimen, except in the larger garnet-tinted eyes, and the presence of beautiful tufts of long simple bristles in each foot. Its length is about 9 millims., and its breadth, including the latter, rather more than 2 millims. There are twenty-nine segments, but the condition of the tail is open to doubt. Dorsally each segment has a slender and distinctly jointed cirrus. Beneath the foregoing, is a dense tuft of long, translucent, simple bristles, with broad flattened tips after the fashion of the straight Roman swords, but marked at the tip by two peculiar longitudinal processes, and sometimes the end assumes a fimbriated appearance. The setigerous region beneath is short and conical, having superiorly the spine and inferiorly the bristles, which differ from those of the parent-stock in showing a more evident differentiation at the junction of the terminal process. Ventrally is a tongue-shaped cirrus, which nearly reaches the tip of the setigerous region. The entire body is filled with ova, which likewise occupy the feet almost to their tips, the first segment and the extremity of the tail (which is apparently in process of regeneration) alone being devoid of them. Some of the feet, indeed, assume a bulk four or five times larger than the others, from distention with ova. The latter apparently have embryos internally.

Amongst the tangled masses in the channels of the sponge is a fragment of the posterior end of a form which differs from either of the foregoing. The feet, which are well marked and long, have dorsally a slightly convex margin; ventrally the outline is also somewhat convex at the base, but curves upward toward the tip. A short cirrus of four or five segments extends from the extremity of the dorsal margin, while beneath it is a dense tuft of long, straight, sword-shaped translucent bristles, similar to those described in the female bud. A flat papilla, about the middle of the bristle-bundle, shows that part of the foot to which the tip of the slender supporting spine proceeds. This slender spine diverges upward from the side of the stronger inferior one, the arrangement of the parts indicating that the foregoing tuft of simple bristles is of less morphological value than the others. A somewhat lanceolate process occurs at the ventral margin of the foot, and apparently corresponds to the setigerous division. It is supported by the stronger spine, and bears two or three bristles with simple terminal processes, similar

to those in the parent-stock. The body contains a large number of granules, and also masses of what appear to have been fully formed spermatozoa. Whether this is the male of the above form, or another, is, of course, an open question ; but the bristles certainly correspond.

On Recent Species of *Heteropora*. By George Busk, F.R.S., F.L.S.

[Read June 19, 1879.]

(Plate XV.)

In the June number of the 'Journal of the Royal Microscopical Society,' Mr. W. Waters, F.G.S., has described a species of *Heteropora* from the seas of Japan to which he has given the name of *H. pelliculata*; he also mentions a second species from Australia under the appellation of *Heteropora cervicornis*, considering it to be identical with the *Plethopora cervicornis* of M. d'Orbigny *.

Till the appearance of Mr. Waters's interesting communication no species belonging to the genus seems to have been published. The occurrence, therefore, of the above two forms, belonging to a genus of which we had previously no species more recent than the Crag, and extending back to the Cretaceous period, is of particular interest.

My object in this brief communication is to indicate the existence at the present time of what may probably be a third species referable to the genus.

Some few years back Prof. Nicholson was good enough to furnish me with some very fine specimens of a recent *Heteropora* which he had received from New Zealand, and of which it was long since my intention to have furnished an account. This intention, however, has not hitherto been carried out; and I have thus been anticipated by Mr. Waters in the announcement of the fact of the present existence of the ancient genus *Heteropora*.

The New-Zealand species in most respects appears to bear a very strong resemblance to the Japanese form, and I am by no means satisfied that they are not specifically the same. As, however, there are one or two points in which, to judge from Mr.

* Pal. Française, pl. 799. figs. 4, 5.