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ON THREE NEW GENERA AND ONE NEW SPECIES OF MADREPORARIA CORALS, by the Rev. J. E. TENISON-WOODS, F.L.S., F.G.S., &c., &c., Hon. Corr. Mem. Linn. Soc., N. S. Wales.

The corals which I now describe I believe to be new, and are most interesting. Two are from Fiji (Nandi) and the other two are extratropical and Australian. The first belongs to the family *Turbinolidae*, sub-family *Turbinolinae*, group (probably) *Flabellaceae*. It is distinguished however in such a way from *Flabellum* proper, that in my judgment it should be made the type of a new genus. *Flabellum*, it will be remembered, is distinguished not only by its compressed calice of many septa, but also by the complete absence of pali and any trace of a columella. The septa are however often thickened and spread out on their interior edge at the base of the fossa, making what is called a pseudo columella by their contact. But though they frequently fill up the base of the fossa, yet the opposite septa do not unite. In the specimen to which I draw attention, the primary and tertiary septa which are opposite to one another do unite without any expansion or alteration beyond a slight thickening, and thus the spaces included between the primaries and secondaries become complete compartments, extending continuously from one side of the calice to the other. The form of the calice also is certainly not flabellate. It is broadly elliptical, and narrowed very little below until it suddenly rounds off to a small pedicel. The peculiar ornamentation of the base, and the general contour forcibly remind one of an urn or ornamental vase. The affinities of the genus are probably more with *Sphenotrochus* than *Flabellum*, and if the specimen were in a little better state of preservation, one could speak more positively as to the epitheca and the edge of the calice. From the general aspect of the corallum, I propose for the genus the name of *Vasillum*. The following is the diagnosis:—

VASILLUM. New genus.

Corallum generally resembling *Sphenotrochus*, but in place of a columella the septa of opposite sides of the calice unite to form separate compartments.

VASILLUM TUBERCULATUM, N. S., Pl. 10, figs. 3, 3a, 3b.

Corallum urn shaped, attached by a rather small cylindrical pedicel; apparently no epitheca;* the costæ broad and flat, divided by slight grooves which correspond with the primary and secondary septa; at the base of the ribs, but not at the base of every one, there is a blunt, prominent and conspicuous tubercle, symmetrically placed, so that there is one at each end and two at each side (six in all, corresponding to the systems) of the major axis; calice broadly elliptical and rather everted; ends of major axis somewhat lower, from which the edge curves upwards to the minor axis in a zigzag line; angles of zigzag very obtuse; the apices corresponding with the primary and secondary septa, and therefore with the grooves between the costæ; fossa shallow except at the centre where there is a deep groove; septa in six systems of four cycles, but the third and fourth, though always present are merely rudimentary; primaries and secondaries equal, salient, but not exsert, thickened at their point of union; the primaries at the end of the major axis of the calice do not unite with the secondaries which meet in front of them; all highly granular. Alt. 10; major axis $9\frac{1}{2}$, minor 7, mil. Port Phillip or Bass Straits. The specimen was forwarded to me by Prof. McCoy, from examples in the Melbourne National Museum.

I may mention further that when the base of the fossa is examined by a lens and with a good light, there is a kind of calcareous deposit in the centre underneath where the septa unite, and at the end of the major axis, one of the secondaries sends forth a process to unite with a primary. I should say that the individual was not very young even though the third and fourth cycles are so rudimentary. It has many analogies with a fossil described by me from the Muddy Creek beds, in *Proc. Roy. Soc. N. S. Wales*, vol. 9, (1877), p. 189, and named *Placotrochus elegans*. I think also there is a fossil found still more nearly allied, but which has not been described, nor is it just now accessible to me for comparison. Its form was similar though smaller, and as far as I remember it would belong to the same genus.

* The specimen is rather worn, and the details of the epitheca, costæ, &c., could not be well made out.

The new coral to which I have now to draw attention is a very remarkable instance of the appearance in the present epoch of characters which belong to long-extinct forms of life, united to others which are our commonest forms of zoophytic life. Most geologists are familiar with a certain fossil coral which goes by the name of *Microsolena*. It is a zoothome of a dense tissue with rather deep calices, without pali or distinct walls, with confluent septa very much perforated or trabecular, and the whole mass of the calices surrounded by a strongly marked epitheca. The most marked feature amongst them is their confluent calices, which renders it difficult to distinguish them from *Thamnastrea* and *Oroseris* when they are not in a good state of preservation. They are all lower Mesozoic fossils, the most of them having been found in the Upper Jura of France, or in the Great Oolite of England. Lamouroux (*Exposition methodique des genres de l'ordre Polypiers*, Caen 1821, p. 65,) and subsequently Blainville (*Manuel d'actinologie*, 1834, p. 423), regarded the fossil which served as the type of the genus, as near to the *Tubulipora*, (which are Polyzoa,) because they mistook the trabecular portions of the septa as tubes which had been filled up by a process which was then supposed to happen in the case of *Ceripora*. Mons. H. Michelin (*Iconographie Zoophytologique. Description des polypiers fossiles de France et des pays environnants fig. par L. Michelin and J. Delarue*, 1841-1847, p. 227, 1845) was the first to recognize the true character of these corals, but he mistook the genus and named them *Alveopora*. In reality says Milne Edwards (*Hist. Nat. des Corallaires* vol. 3, 1860, p. 196,) the genus *Microsolena* differs very little from *Coscinaraea*, and is only distinguished by the lax tissue, the complete epitheca, and the more scattered trabecular septa.

The genus *Microsolena* belongs to the second family of MADREPORARIA PERFORATA, the PORTITIDÆ, a division which is characterized by the reticulate, trabecular and porous *sclerenchyma*; the individuals always closely united together either directly by thin walls or by the insertion of a spongy *cænenchyma*; they increase by gemmation which is ordinarily extracalicular and submarginal.

The septal apparel is always more or less distinct, never completely lamellar, and formed only by a series of trabecules,[†] which constitute by their union a sort of loose and irregular trellis-work. The walls present the same porous and irregular structure. The visceral chambers contain at times certain rudimentary traverses, but are never divided by floors* (*planchers*).

This family of PORTITIDÆ is divided into two groups. 1. PORITINÆ = no *cænenchyma*; 2. MONTIPORINÆ = *cænenchyma*, well developed; and it is among the 1st. group that the *Microsolena* are found. This group contains nine genera; the first two (*Porites* and *Rhodaraea*) distinguished by pali, and the other seven (*Goniopora*, *Litharaea*, *Protaraea*, *Alveopora*, *Meandaraea*, *Cosinaræa*,) destitute of those organs.

As already stated, *Microsolena* is distinguished by having all the individuals enclosed in a strong or compact epitheca, and the septal apparatus confluent. The zoothome thus resulting is massive, turbinate, gibbous, digitiform, dendroid or spread out in plates. There are about twenty fossil species known, and they appear as late as the later mesozoic rocks.

The coral which I am about to describe is a *Microsolena*, in which the septa are not confluent. It would belong to the turbinate division, but must be placed in a genus by itself, for the septa are not only trabecular irregular and distinct, but the gemmation is most peculiar, being intracalicular and in congeries of individuals, rising one above another. The walls are also entire above, and form more or less complete partitions above with none of that open spongy tissue which occurs in *Alveopora*, neither could I see any of those horizontal partitions across the cells, which gives to the genus just named that tabulate character of the ancient *Favosites*.[†] From these peculiarities of the walls, septa, and mode of gemmation, I propose the erection of a new genus, to which I give the name *Diechoræa* (from *διεχω* to stand apart in allusion to the non-confluent septa). The genus is thus characterized:—

* Hist. Nat. des Cor., Vol. 3, p. 172.

† On account of this tabulate structure, a related species of unknown locality has been made the type of new genus called *Favositipora* by Mr. W. S. Kent (see Ann. Nat. Hist., 1870), but Mr. Dana had already called attention to the structure.

DIECHORÆA. New Genus.

Poritinae with the individuals enclosed in a common and conspicuous epitheca like *Microsolena*, but with the septa not confluent, apart and trabecular; gemmation intracalicular.

DIECHORÆA BOLETIFORMIS, N. S., Pl. 10, fig. 4, magnified 4 diam. fig. 4a, calice, magnif. 6 dia.

Corallum small, turbinate, elliptical, spreading rapidly into a broadly flaring undulating disc. Peduncle wide, but not so wide as the summit.* Calices numerous, polygonal, irregular in shape and size, and all very minute, but some so much longer than others that they appear to result almost from the confluence of two. Septa, an irregular series of sharp needle-like points of every length, sometimes almost stretching from side to side, and making the interior of the very deep fossa bristle with their transparent projections; wall thickly studded with short stout and very conical points, swollen at the base and always pointing towards the interior of the fossa. Epitheca in very thick folds of yellowish, shining, fibrous-like tissue completely covering the exterior and projecting as a thin lamina above the edge. Inside this there are, in the only specimen I have seen, other raised rings of epitheca enclosing a number of calices, but only very slightly (half a millimeter) above the parent. This raised ring enclosed another circle, also slightly raised, but in this circle the calices appear incomplete, for they are closed completely across by a kind of transparent membrane, on which a few spiculæ like septa are lying, and the walls are more roughly granular. The whole calicular surface is convex, broadly elliptical, the ends of the major axis being depressed. The appearance is very like a small dry *Boletus* such as grow upon dry or withered branches. Alt. 7, major axis 7, min. 6, mill. Taken from the side of a dead coral on a reef off Nandi, Fiji Group.

We may suppose in this very interesting species that the real septa upon which the animal rests are the granular points on the summit of the wall, and that the spiculæ or pseudo septa in the

* The specimen was broadly attached to a coral, and it seems as if in breaking it off, some of the points of attachment had been broken as well.

fossa are the supports for the base of the animal. The calices themselves are quite microscopic, three or four of them occupying no more than the space of a millimeter.

I now have further to introduce to science a very interesting coral of the tabulate section of Madreporaria (MADREPORARIA TABULATA). In the third family, the SERIATOPORIDÆ, we have arborescent corals with an abundant and compact *cænenchyma*, few traces of tabulæ, and the visceral chamber filling by the continuous growth of the walls and columella. The family is divided into four genera, the first, *Seriatopora*, remarkable for the hispid surface and the almost complete absence of septa. They are all nearly very small corals with exceedingly minute calices. The septa are more visible in the next genus, *Rhabdopora*, which is a Paleozoic (carboniferous) fossil with prismatic branches. *Dendropora* has the calices scattered, with a raised margin and a smooth *cænenchyma*. This is also a Paleozoic fossil as well as the next genus, *Trachypora*, which has the *cænenchyma* striate.

The species I propose to describe does not come under any of the foregoing genera, but appears to occupy an intermediate place and nearest to *Seriatopora*. It has thin cylindrical branches, very hispid, with scattered calices and exsert septa. I propose from the latter character to name the genus *Phyllopora*, which is thus described:—

PHYLLOPORA. New genus.

Cænenchyma, hispid, compact; tabulæ, rarely visible; calices, distant; septa, exsert, distinct, and in cycles.

PHYLLOPORA SPINOSA, N. S., Pl. 10, fig. 2, 2a.

Corallum very small, tufted, much branched; branches generally at right angles or sloping upwards, and bifurcating; surface very granular, the granules supporting long, fine, branched, and subdivided projections; calices in a linear, rather distant, projecting series; systems six, cycles, two always present with the rudiments of a third; septa hispid, exsert; primaries projecting into the calice; secondaries and tertiaries smaller,

and lying upon the margin; *columella* styliform, prominent, central. *Dimensions*: tufts 20 to 25 millim. high, diam. of branches 1 to 2.

There are about 32 calices in about 10 millim. of a branch, arranged in four lines on opposite sides and alternately, so that the series is quincuncial.

From a block of dead coral from Fiji. One very small tuft. Museum of Hon. W. Macleay.

Section *Madreporaria perforata*. Family *Madreporidæ*, subfamily *Eupsammineæ*.

BALANOPHYLLIA DENTATA, N. S., Pl. 10, fig. 1, 1a.

Corallum, moderately tall, very slightly spreading towards the calice which is broadly elliptical, very deep, and with a thick honeycombed margin, upon which the groups of three septa project to form a regularly coronate edge; calicular fossa wide and deep, septa subequal projecting very little from the wall, and therefore only slightly salient into the fossa, all highly granular, and with regularly dentate edges, the teeth on the third, fourth, and fifth orders being long and neat near the margin, becoming coarse tubercular and granular near the *columella*; four cycles in six systems; primaries thick and secondaries nearly equal to them; fourth and fifth orders uniting in front of the tertiaries close to the wall, the same orders closely adpressed to the primaries and secondaries at their origin and projecting above the edge of the calice; *columella*, loose, spongy, small and inconspicuous; costæ, distinct, broad, flat, very finely granular; no epitheca visible.

The only specimen seen by me is so encrusted with Polyzoa, as to make the epitheca doubtful. As however this organ is a mere secretion for the protection of the coral, this function no doubt was effected by the Polyzoa. The coral itself was parasitic upon an *Eschara* from the South Coast, which is probably *lichenoides*, M. Ed. I am not sure of the locality, but as the Polyzoa are known to me as from the South Coast, the coral must have come from the same locality. Amongst them was what I take to be D'Orbigny's *Discoporella Novæ Hollandiæ*, which

has not been identified since the author's description as far as I can learn. The coral itself was completely embedded in the foliations of the *Eschara* which had to be broken away in order to extract it. It is 14 millim high, major axis of calice 9, minor 7.

In the depth of the fossa, smallness of *columella*, granular septa and absence of epitheca, this species comes nearest to the tertiary fossil from Muddy Creek *B. tubuliformis*, Duncan, but in that species the higher orders do not unite.

I am not aware whether any other instances are known of corals growing on tufts of Polyzoa, but as this has been found, collectors will probably make a more diligent search, as the specimen of *Eschara* has been a long time in the Macleayan Museum, and had been many times handled by me before the existence of the *Balanophyllia* was observed. The *Eschara* in question grows on rocks and stones in comparatively shallow water, and the growth is very rapid. A specimen grew to a tuft about 6 inches high, and spread about 9 inches in every direction on the anchor chain of a vessel that was exactly three months in harbor.

EXPLANATION OF PLATE 10.

- Fig. 1.—*Balanophyllia dentata*, slightly enlarged.
 Fig. 1a.— ditto ditto calice
 Fig. 2.—*Phyllopora spinosa*, nat. size.
 Fig. 2a.— ditto ditto part of branch magnified.
 Fig. 3.—*Vasillum tuberculatum*, slightly enlarged.
 Fig. 3a.— ditto ditto calice.
 Fig. 3b.— ditto ditto base.
 Fig. 4.—*Diechoræa boletiformis*, enlarged 4 diameters.
 Fig. 4a.— ditto ditto calice.

