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FOSSOPORA, A NEW GENUS OF PALÆOZOIC PERFORATE CORALS.

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(Plates i., ii.)

The compound corallum is in the form of lobate masses of medium size, and is composed of very small prismatic and polygonal corallites, firmly united by their walls, divided into well-defined peripheral and axial portions, the corallites in the former being more or less vertical, and in the latter gradually bent or inclined outwards to the surface. In consequence of the specimen being wholly included in matrix the appearance of the corallites at the surface of the corallum, or terminal period of growth, has not been studied, nor is the method of attachment known.

It is proposed to term this coral *Fossopora*¹ *wellingtonensis*².

The firmly united polygonal corallites are long, and chiefly hexagonal and pentagonal, but their regularity of outline, from causes to be described later, frequently becomes lost. The average diameter is as near as possible half a millimetre, or two calices in the space of one millimetre. The firmly united, or rather indistinguishably amalgamated walls in the axial region are sufficiently thickened to sometimes obliterate the prismatic form, but in the peripheral area stereoplasmic matter has been added to such an extent as to almost conceal all other points of structure.

In a transverse section prepared for the microscope the small size of the corallites is at once seen, and the polygonal outline generally so. It also becomes evident that neighbouring tubes are placed in communication by large mural pores. In places this perforation predominates to such an extent that the structure practically becomes cribiform, and through this the outline of the corallites is also sensibly interfered with.

The septa are very apparent, invariably six in number, projecting inwards towards the centres of the visceral cham-

¹ *Fossa*, & a channel or trench.

² In allusion to the locality.

bers, but never meeting, revolving, or departing from the straight in the slightest degree. As seen in transverse section each septum has a trabecular or spine-like appearance, terminating distally in a club-shaped, or somewhat pyriform end, this, however, is not wholly their entire structure, as will be shown later. The septa are primary only, no trace of intermediate projections having presented itself, nor has a single instance of departure from the number six been verified. There is no cœnenchyma, nor a columella.

In a transverse section (tangential) of the peripheral area the sclerenchymatous thickening in a very great measure obliterates the essential features of the coral, still the sex-radiate septa and perforate walls are more or less distinguishable. In a longitudinal section of the axial region some very instructive features are brought to light. The perfectly amalgamated walls are at once apparent, the true structure of the septa, after a little consideration grasped, and the characters of the tabulae displayed. The corallite walls are detected by their darker and thicker appearance, but in many, if not in most of the visceral chambers are finer vertical lines passing in and out of the plane of the section. In the same alignment with any given one of these lines are also visible circular dark dots, resembling the cut ends of spiniform septa in some *Favosites*. I believe the explanation of these structures is as follows:—The septa are at first in the form of vertical lamellæ extending the whole length of the visceral chambers of a corallite, from top to bottom, and represented in a transverse section by the straight proximal portions of the radii; the inner or free ends of these lamellæ then become divided or broken up into free spines having distal more or less club-shaped ends. I conceive that this explanation is to all intents and purposes proved by the break in the continuity of the lamellæ when viewed longitudinally, and in the same alignment occupied by the dark spots, the cut ends of the free, spine-like portions of the septa. Indeed, it is even possible to here and there detect a faint vertical line uniting a series of these dots.

The pores of communication are visible under two aspects as usual, either as direct breaks in the continuity of the amalgamated walls, or as openings in the latter, where the section has passed vertically through a visceral chamber out of the centre; they are uniserial and usually in the centre of a wall. These mural pores are large, oval, and with their longest diameters parallel to the direction or growth of the coral.

The tabulae, like the lamellar portions of the septa, are not thickened to the same extent as the walls. They are horizontal, oblique, concave, and occasionally anastomosing, very numerous, close, although at variable distances apart,

sometimes on the same level in contiguous corallites, but not necessarily so. The old visceral chambers are wider than long, i.e., their greatest diameter is transverse to the direction of the growth of the coral.

A longitudinal section of the peripheral area, or that portion of the corallum in which the corallites diverge from the vertical (more or less) to pass out to the surface, is rendered obscure by the large amount of the stereoplasmic matter deposited, greatly thickening the walls and filling up the visceral chambers. This deposit is of a lighter colour than the other tissues.

The absence of any trace of spongy coenenchyma, or reticulated sclerenchyma, the presence of regular mural pores, instead of highly and irregularly porous or lattice-like walls removes *Fossopora wellingtonensis* from the Poritidae proper. On the other hand, the occurrence of these pores of communication, and the fact that the walls of neighbouring corallites are indistinguishably fused, appear to point to the Favositidae, but the bistructural form of the septa seems to mark it as peculiar in this family. The septa in the Favositidae may be obsolete (some *Favosites*), rudimentary (*Fletcheria*), in the form of ridge-like marginal lamellæ (*Laceripora*, *Calapæcia* and *Nyctopora*), tooth-like projections of limited number (*Cænites*), squamose (*Cladopora*), or more commonly as simple vertically disposed rows of spinelets (other *Favosites*, *Pachypora*, *Alveolites*, *Chonostegites*, *Trachypora*, etc.). The first and last conditions, typically represented by *Favosites* itself, are by far the most common.

It may be advantageous to refer more in detail to the structure of three of the more highly perforate genera, as compared with that of *Fossopora*.

1. *Calapæcia*, Billings (*Columnopora*, Nicholson). — The mural pores in this genus are so numerous as to reduce the walls to a mere lattice-work. The septa, according to Nicholson, consist of "longitudinal ridges," or "marginal ridges," generally about twenty in each corallite³. Lambie, on the other hand, speaks of them as "spiniform septal ridges"⁴; his figure apparently representing them as separate septal spines⁵. Nicholson also describes the walls as longitudinally traversed by "intra-mural canals," but Lambie does not refer to them. It is difficult to reconcile the two authors' statements. Are the septa simply longitudinal lamellæ, or are they primarily the latter, secondarily giving support to spines on their free edges? If in the last-named condition, a resemblance to the septa of *Fossopora* is manifest, although the number of septa in a cycle

³ Nicholson—Tab. Corals Pal. Period, 1879, pp. 159 and 161.

⁴ Lambie—Contrib. Canadian Pal., iv., 1., 1899, p. 42.

⁵ Lambie—Loc. cit., pl. i, fig. 6.

is largely increased. On the other hand, I have seen no trace of intra-mural canals in my genus, and the arrangement of the pores of communication is very different.

2. *Laceripora*.—In Eichwald's genus the corallum is ramosæ, and the walls of the corallites, like those of *Fossopora*, are firmly united, but so numerous are the mural pores that the unequal visceral chambers appear in cross sections as if confluent. The septa are either rudimentary or lamellar, and when in the latter condition vary in number from two to many, but there are usually five or six, as I find from a specimen of *Laceripora cibrosa*, Eichw., very kindly supplied to me by Mr. H. Pietz, Curator of the Geological Museum of the Imperial University of St. Petersburg.⁶

The tabulae, unlike those of *Fossopora* are said by Eichwald to be on the same level in contiguous corallites throughout the corallum, so as to form superimposed stages or strata, one above the other.⁷ The abundance of the mural pores renders the walls highly cribriform.

3. *Somphopora*.—In general appearance and structure *Somphopora*, Lindström, is closely allied to *Laceripora*, for Nicholson says:—"Very closely allied to *Laceripora*, Eichw., if indeed really generically distinct from it, is *Somphopora*, Lindstr."⁸ On the other hand, Lindström⁹ points out that in his genus the septa are constantly six, and spiniform only, and the tabulae few. Furthermore, one of his figures renders it perfectly clear that the tabulae were comparatively far apart, and were not so regularly placed on the same level as to break the corallum up into a series of superimposed strata.

It would appear, therefore, that in *Laceripora*, *Somphopora*, and *Fossopora*, we have three closely allied genera, but with structural details sufficiently varied to separate one from the other.

Fossopora wellingtonensis occurs in Siluro-Devonian beds of the Wellington District in this State, but whether on a horizon referable to the former formation, or on one forming a portion of the latter, I am not at present able to say.

⁶ Etheridge & Foord, Ann. Mag. Nat. Hist., (5), xiv., 1884, p. 314.—It is now quite clear to me that Mr. A. H. Foord and myself committed a very grave error when we referred Eichwald's *Laceripora cibrosa* to *Chonetes*. Our mistake evidently arose (1) from a misconception of the interrupted structure of the walls seen in transverse section; and (2) from the accidental non-appearance of mural pores in the longitudinal.

⁷ Eichwald—Lethæa Rossica, i., 1860 (?), p. 490.

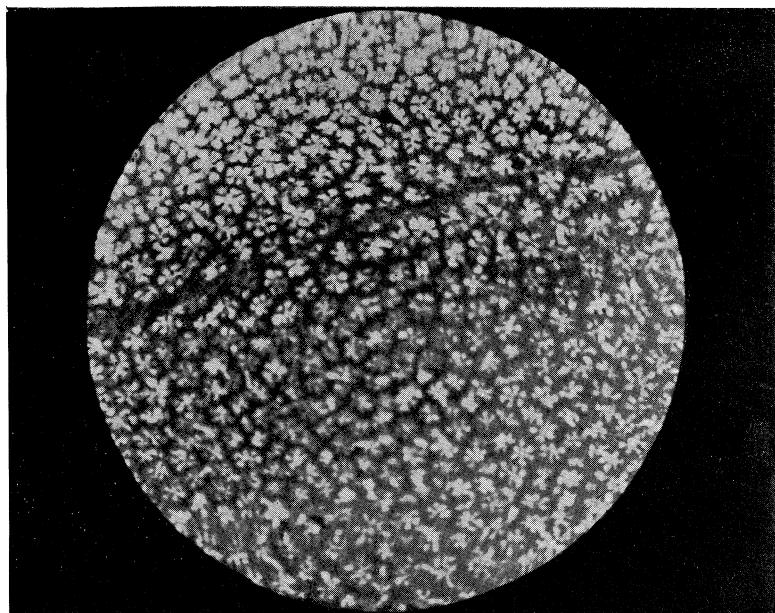
⁸ Nicholson—Geol. Mag., (3), iii., 1886, p. 291.

⁹ Lindström—Beiträge Pal. China, (Richthofen's China), iv., 4, 1883, p. 51.

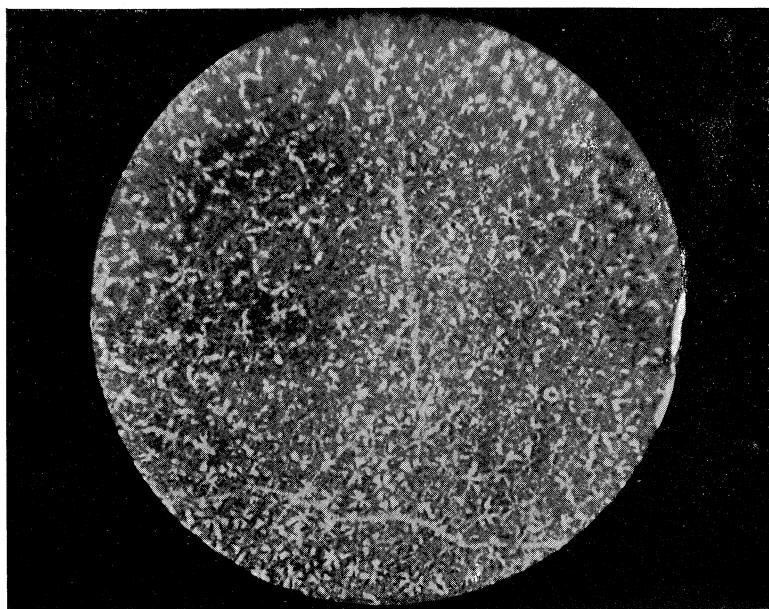
EXPLANATION OF PLATE I.

Fossopora wellingtonensis, Eth. fil.

- Fig. 1. Tangential section exhibiting the highly thickened and partially obliterated corallites. $\times 7$.
- Fig. 2. Transverse section of the axial region showing the outlines of the corallites distinctly, and the six septa in each, etc. $\times 7$.



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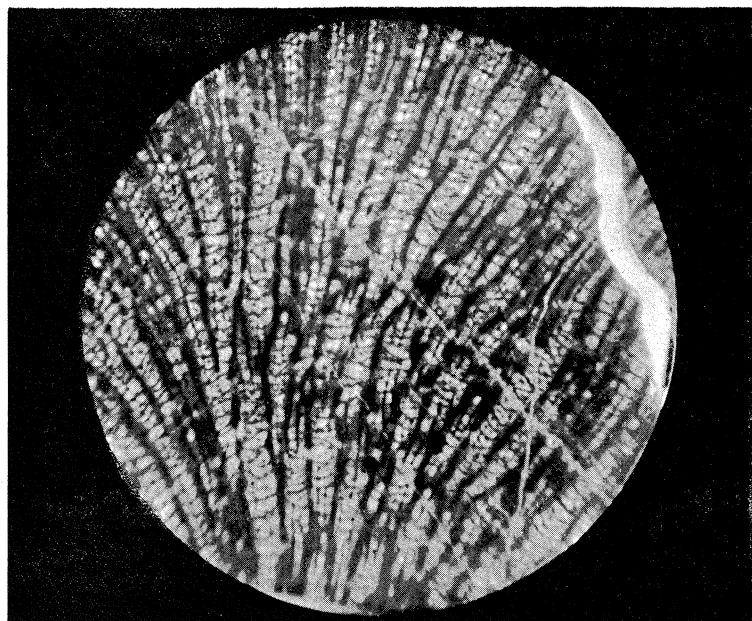


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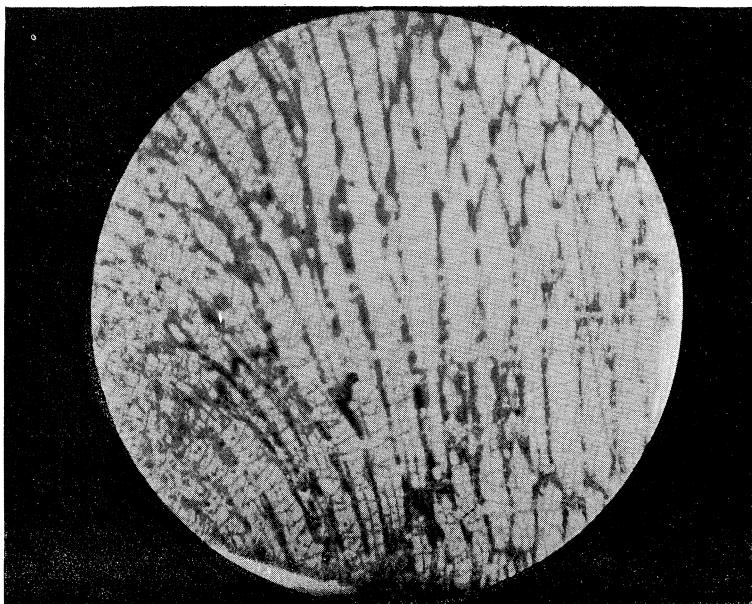
EXPLANATION OF PLATE II.

Fosspora wellingtonensis, Eth. fil.

- Fig. 1. Longitudinal section exhibiting somewhat thickened tissues, but the walls, tabulæ, and mural pores distinctly visible. The bistructural nature of the septa is also apparent, sometimes as continuous vertical laminae in the visceral chambers, at others as interrupted lines and dots. $\times 7$.
- Fig. 2. A similar section with large and very distinct mural pores. $\times 7$.



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2