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XVI.—*On the Tasmanian and Australian Species of the Genus* Stenopora, *Lonsdale.* By H. ALLEYNE NICHOLSON, M.D., D.Sc., Regius Professor of Natural History in the University of Aberdeen, and ROBERT ETHERIDGE, Jun.

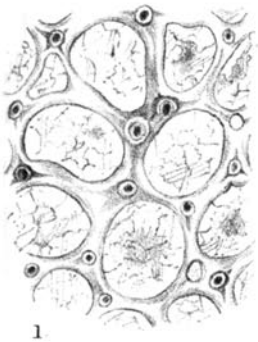
[Plates III. & IV.]

SOME years ago the present writers gave an account of the structure of the corallum in the genus *Stenopora*, Lonsd. (Ann. & Mag. Nat. Hist. 1879, vol. iv. p. 265). In the same memoir two species of the genus were described and figured, one of these being identified (erroneously, as it proves) with *S. ovata*, Lonsd., while the second was characterized as new under the name of *S. Jackii*. Having now had the opportunity of examining in greater detail the collection of *Stenoporæ* in the British Museum, and also some interesting specimens which have been submitted to us by our friend Mr. R. L. Jack, we propose on the present occasion to shortly characterize all the well-defined species of the genus which are known to us as occurring in Tasmania and Australia.

Stenopora ovata, Lonsdale. (Pl. III. figs. 1–4.)

Stenopora ovata, Lonsd., in Darwin's Geol. Obs. Volc. Islands, p. 163 (1844), and in Strzelecki's Physical Description of New South Wales, p. 263, pl. viii. figs. 3*a*, 3*b* (1845).

(Non *Stenopora ovata*, Nich. & Eth., Jun., Ann. & Mag. Nat. Hist. 1879, vol. iv. p. 274.)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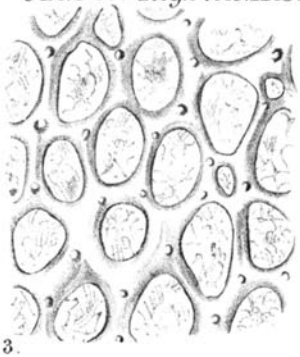
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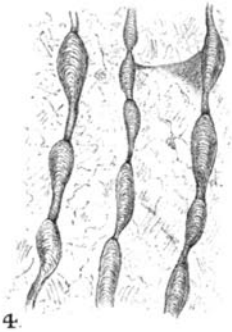
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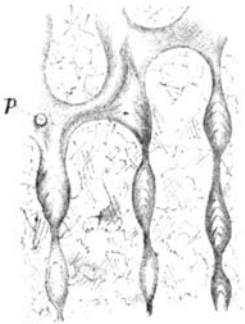

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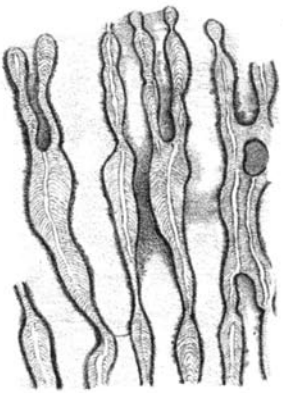
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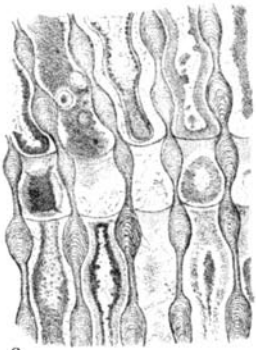
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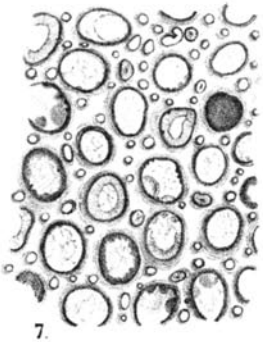
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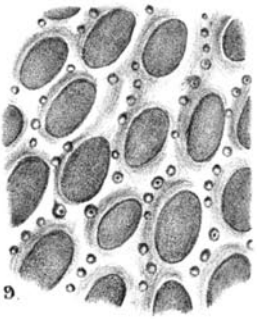
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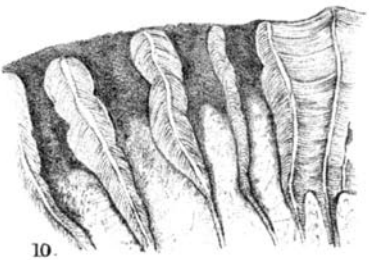
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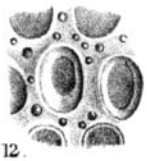
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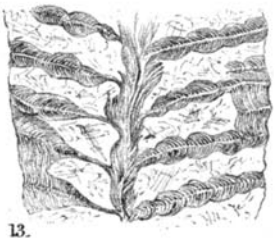
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H. A. Nicholson del. A. S. Foord lith.

Mintern Bros. imp.

Spec. char. Corallum branched, of cylindrical or compressed stems, from $1\frac{1}{2}$ to 3 centim. in diameter. The corallites diverge from a central line, or radiate nearly at right angles from both sides of a median plane. The corallites are long-oval, rounded or subpolygonal in shape, from $\frac{1}{3}$ to $\frac{1}{2}$ millim. in diameter, more or less. The walls are thickened, and show no clear line of demarcation between adjoining tubes. Tabulæ few and remote. Mural pores doubtfully detected. "Acanthopores" * are developed at the angles of junction of the corallites, but are comparatively few in number and of large size; they appear at the surface in the form of blunt spines. In the axis of the corallum the corallites are polygonal, but they become more or less cylindrical as they diverge outwards, and in the peripheral region they are annulated with numerous close-set periodical thickenings.

Obs. In our former memoir upon *Stenopora* (*loc. cit.*) we identified with the present species certain examples of a *Stenopora* which had been submitted to us by Mr. Jack, from the Permo-Carboniferous rocks of Queensland, and which we had carefully examined by means of thin sections. Our identification rested upon the fact that the specimens in question agreed entirely in external form and in macroscopic characters with the Strzeleckian type of *S. ovata*, Lonsd., preserved in the British Museum. We have, however, now been able to make a microscopic examination of thin sections of the type-specimen of *S. ovata*, and we find that in spite of the close external resemblance which it bears to the Queensland specimens, its minute structure is entirely different. The above definition of this species is therefore based upon the type-specimen of *S. ovata*, and not upon the Queensland examples,

* Most of the species of *Stenopora* are provided with the singular modified corallites for which the name of "acanthopores" has recently been proposed by Mr. A. H. Foord and one of the present writers (Ann. & Mag. Nat. Hist. ser. 5, vol. xvi. p. 497). These remarkable structures, formerly spoken of by one of us under the name of "spiniform corallites," are exceedingly characteristic of the Monticuliporoids. This fact, taken along with other marked resemblances between the *Stenoporæ* and certain of the Monticuliporoids, has led us to think that too great weight has perhaps been attached by De Koninck, as also by ourselves, to the value of the "mural pores" as a character of classificatory value. There can be no doubt that the walls of the corallites in some (and probably in all) of the species of *Stenoporæ* are pierced by irregular mural pores, and hence we have formerly referred the genus to the Favositidæ. In all other points except this the species of *Stenopora* are, however, most nearly related to the Monticuliporoids. The question therefore arises whether the *Stenoporæ* might not with propriety be regarded as an independent group of Corals (probably Alcyonarian), resembling the Monticuliporoids in their general characters, but having perforate walls.

and we shall describe these latter under the name of *S. australis.*

The character which distinguishes *S. ovata*, Lonsd., from all the other species of the genus is the presence of a single large acanthopore at most of the angles of junction of the corallites (Pl. III. figs. 1 and 3*). This character is specially noted by Lonsdale (Phys. Descript. N. S. Wales, p. 264), who mentions that there is only one "relatively large tubercle" in "the interspaces between four mouths;" whereas in *S. tasmaniensis*, Lonsd., each tube is encircled by a more or less complete ring of acanthopores. The acanthopores in *S. ovata* are not only few in number, but are of large size, with well-marked thickened walls. The corallites are mostly oval or subpolygonal, their walls completely amalgamated, and with but few and remote tabulæ. There is no evidence that the tabulæ were perforated by any central aperture. There is also no conclusive evidence as to the existence of mural pores, though there occur here and there in long sections rounded apertures which may very probably be of this nature (Pl. III. fig. 2, *p*). In the peripheral region of the corallum the corallites are furnished with regular and close-set periodical thickenings (Pl. III. figs. 2 and 4).

Locality and Horizon. The Strzeleckian type of *S. ovata* was found in the Permo-Carboniferous rocks of "Mount Wellington, Mount Dromedary, Norfolk Plains, Van Diemen's Land" (*Lonsdale*). In addition to the above-mentioned, the British Museum contains two examples from Tasmania, presented by Dr. J. Milligan. We have examined these microscopically, and find them not to differ essentially from the type-specimen (see Pl. III. figs. 3 and 4). The corallum, however, is more compressed, the corallites radiate from both sides of a central plane, and the acanthopores are relatively smaller than in the type, while the corallites themselves are also not so large. It would not appear, however, that these differences are of specific importance. (*Coll.* Brit. Mus.)

Stenopora australis, Nich. & Eth., Jun.
(Pl. III. figs. 5 and 6.)

Stenopora ovata, Nich. & Eth., Jun., Ann. & Mag. Nat. Hist. 1879, vol. vi. p. 274, pl. xiv. figs. 1–1 *c*.

Spec. char. Corallum sublobate or submassive, of cylin-

* A tangential section of *Stenopora ovata*, Lonsd., showing the solitary acanthopores, was figured by one of us (Nicholson, Pal. Tab. Corals, p. 281) under the name of *S. tasmaniensis*, Lonsd. This section was taken, not from the Strzeleckian specimen, but from one of the examples presented to the British Museum by Dr. J. Milligan.

drical or flattened branches, which have a diameter of from less than 2 to more than 3 centim. Corallites approximately vertical in the centre of the branches, but finally bending outwards nearly at right angles. In the central portion of the corallum the tubes are thin-walled and polygonal; but in the peripheral part of their course they are annulated by periodical thickenings of the wall separated by unthickened segments, and they are here subpolygonal. The average diameter of the tubes is about $\frac{1}{3}$ millim. The tabulæ are few and remote, and for the most part placed at corresponding levels in contiguous tubes; they appear to be sometimes complete, but they seem at other times to be perforated by a central aperture. Acanthopores wanting.

Obs. As before mentioned, this species so closely resembles the Strzeleckian type of *S. ovata*, Lonsd., that we thought ourselves justified in placing it under the latter species. In its minute structure, however, it differs widely from *S. ovata*, and resembles no other species of the genus known to us. One of the most marked characters of *S. australis*, in which it seems to stand alone among the species of *Stenopora*, is the total absence of acanthopores (Pl. III. fig. 5). This character at once distinguishes the species from *S. ovata*, Lonsd. It agrees with the latter in the fact that the walls of contiguous corallites are completely amalgamated, the primordial wall only being visible in the axis of the branches, and also in the average size of the tubes; but the corallites are mostly more of a polygonal than of a simply rounded shape. As seen in longitudinal sections (Pl. III. fig. 6) the corallites are thickened periodically in the peripheral region of the corallum by very regular fusiform thickenings placed at corresponding levels in contiguous tubes, as are also the tabulæ. As seen in long sections the tabulæ appear to be complete; but as viewed in tangential sections appearances are seen which are difficult to explain except upon the supposition that the tabulæ are perforated by a central aperture (Pl. III. fig. 5). Thus in many of the corallites, as seen in tangential sections, we observe a broad ring of light-coloured sclerenchyma internal to the proper walls of the tube and enclosing a central rounded aperture. What this ring is, unless it be a perforated tabula, it is difficult to see; but there is the curious feature that it is usually separated from the true wall for a portion of its extent on one side of the tube.

In our former description of this species (*loc. cit.*) we described and figured the above-mentioned singular structures, but were unable to give any explanation of their nature, as we believed the tabulæ to be imperforate. We are obliged to

admit, however, that if this be their real nature they differ in some inexplicable points from ordinary perforated tabulæ. In *Stenopora Howsii*, Nich. ('Annals,' Nov. 1883, p. 285), the tabulæ are not only perforated by central apertures, but this fact is quite as easily recognizable in long sections as in tangential ones. In this form, however, the tabulæ are extremely numerous, and the state of preservation is also very good. Mr. John Young has proposed ('Annals,' Sept. 1883, p. 154) the generic name of *Tabulipora* for a coral allied to or identical with *Stenopora Howsii*. In all other respects, however, save as regards its perforated tabulæ, *S. Howsii* does not differ from the normal species of *Stenopora*. If no other species of *Stenopora* possessed perforated tabulæ, there would be ground for accepting *Tabulipora* as a subgenus of *Stenopora*, or perhaps as a distinct genus. If, on the other hand, the structures above described as occurring in *S. australis* are really perforated tabulæ, there does not seem to be any need for a special generic name. Moreover, it is only on the supposition that perforated tabulæ occur in the species of *Stenopora* generally that we can account for Lonsdale's assertion that the mouths of the corallites in this genus are "closed at the final period of growth." In most of the specimens we have examined (except *S. Howsii*) the surface is so badly preserved that the characters of the mouths of the tubes could not be accurately determined; and in some (such as *S. ovata*, Lonsd.), where the preservation of the surface was better, we have not been able to recognize any such closure of the mouths of the tubes*. In one of the figures, however, which Lonsdale gives of *S. tasmaniensis* (Phys. Descript. N. S. Wales, pl. viii. fig. 2 *b*), the structure in question is well shown, and it corresponds entirely with what is seen in portions of the surface of *S. Howsii*, where it is undoubtedly the result of the existence of perforated tabulæ. We have ourselves observed the same structure in a single specimen of *S. tasmaniensis*, and we give a figure of it here (Pl. III. fig 11). We are therefore disposed to believe that perforated tabulæ were generally, if not always, present in the species of *Stenopora*, but that they were only produced (except in *S. Howsii*) at the final period of the growth of the tubes, and that they were, with the above exception, very few in number. It should be borne in mind in this connexion that the state of preservation of almost all the Australian and Tasmanian specimens of *Stenopora* which have been examined by us is highly peculiar. They are not

* Lonsdale himself states that he failed to recognize the phenomenon here alluded to in the case of *S. ovata*.

only highly mineralized, but they mostly exhibit in thin sections certain anomalous features which need not be further particularized here, but which render their structure in many respects very difficult of interpretation. In order to show the peculiar state of preservation here referred to, we have figured some of the sections precisely as they appear under the microscope (Pl. III. figs. 5–8).

Locality and Formation. Permo-Carboniferous, Coral Creek, Bowen-River Coal-field, Queensland. (*Coll.* Geol. Survey, Queensland, and Brit. Mus.)

Stenopora tasmaniensis, Lonsdale. (Pl. III. figs. 9–12.)

Stenopora tasmaniensis, Lonsdale, in Darwin's Geol. Obs. Volc. Islands, p. 161 (1844); and in Strzelecki's Phys. Descript. N. S. Wales, p. 262, pl. viii. figs. 2–2 *c* (1845).

(Non *Stenopora tasmaniensis*, Nich. Pal. Tab. Corals, p. 281 (1879), figure only.)

Spec. char. Corallum branched, the cylindrical stems varying from 1 to 1½ centim. in diameter; rarely in the form of a thin flattened frond. In the branched specimens the corallites radiate from the central axis, the peripheral portion of the corallum (in which the tubes are specially thickened) being very narrow. In frondescent specimens the corallites diverge nearly rectangularly from both sides of a median plane, and the axial region of the corallum is non-existent. The annulations or periodical thickenings of the walls in the peripheral region are very wide and run into one another, thus becoming comparatively indistinct. The corallites are oval, about ⅓ millim. in their long diameter, arranged in slightly oblique rows, with their long axes corresponding with the long axis of the corallum. Acanthopores are very numerous, arranged like the tubes in slightly oblique longitudinal rows, and forming a more or less complete ring round each corallite. Superficially the acanthopores appear as rows of small tubercles or minute apertures surrounding the mouths of the tubes. Tabulæ are very sparingly developed and appear in long sections to be complete; but the mouths of the tubes are sometimes closed by perforated tabulæ. Mural pores not detected.

Obs. This species is at once recognized by its long oval calices arranged in oblique longitudinal rows and by the similarly arranged rows of acanthopores (Pl. III. figs. 9 and 11). It agrees with *S. ovata* in the complete amalgamation of the walls of the corallites, which show no traces of the primordial wall. Transverse sections of the cylindrical specimens are remarkable for the great width of the axial region

of the corallum, the corallites in this region being angular and exhibiting the primordial wall distinctly. Another characteristic feature is that the annular thickenings of the walls of the corallites in the peripheral region of the corallum are nearly continuous with one another (Pl. III. figs. 10 and 11), and are not separated by marked unthickened segments. Tabulæ, further, are very sparsely developed, and are often not recognizable at all. The mouths of the tubes, however, are sometimes partially closed by perforated diaphragms (Pl. III. figs. 11 and 12). These structures, as previously noted, can hardly be anything else than perforated tabulæ, produced at the final period of growth, and they have been well figured by Lonsdale (Phys. Descript. N. S. Wales, pl. viii. fig. 2 *b*). In longitudinal sections of the thickened peripheral region of the corallum the acanthopores are seen as conspicuous narrow tubes (Pl. III. figs. 10 and 11) running in the thickness of the walls.

Locality and Formation. The original specimen of *Stenopora tasmaniensis*, Lonsd., appears to have been lost, as is also the case with the Strzeleckian type of the species. The British Museum, however, contains several specimens which more or less clearly belong to this form, viz. :—(1) A number of dendroid examples in a greenish ashy-looking matrix from Harper's Hill, near Maitland, New South Wales. One of these specimens shows mural pores excellently. Thin sections of one of these specimens are here figured (Pl. III. figs. 9–11). (2) Two examples from Port Lowell, Tasmania, in a light shelly limestone. (3) A remarkable frondescent specimen, numbered 48,746, also from Tasmania. In this example the corallum is only 3 millim. in thickness, and consists of two layers of corallites springing from a median plane (Pl. III. fig. 12). (4) Two examples in a dark-coloured matrix, from Killymoon, near Fingal, Tasmania. (5) A large cylindrical branched stem, likewise from Tasmania, and resembling the figured Strzeleckian type in general aspect. In minute structure, however, the tubes of the peripheral region show annular thickenings separated by distinct unthickened segments, thus giving rise to corresponding appearances in the tangential section; and we are therefore not clear as to the identity of this specimen with *S. tasmaniensis.*

Stenopora Leichhardtii, n. sp. (Pl. III. figs. 7 and 8.)

Spec. char. Corallum dendroid, of cylindrical branching stems, which vary in diameter from less than a centimetre up to 1½ centim. The corallites in the centre of the branches

are nearly vertical, with comparatively thin walls, and polygonal in shape. In the peripheral region of the corallum the corallites bend outwards nearly at right angles to the axis, the walls becoming thickened and being entirely fused with one another, while the visceral chambers become oval or rounded. The periodical thickenings of the walls of the tubes in the final portions of their course are mostly long and fusiform, and are generally placed at corresponding levels in contiguous corallites. The average diameter of the corallites is about $\frac{1}{4}$ millim. In the walls of the corallites in the peripheral region acanthopores are developed in great numbers, their shape being usually oval or subangular, their size large, and their walls not specially or only slightly thickened. Tabulæ are very sparingly developed, and are only occasionally to be recognized at all.

Obs. In its general form this species closely resembles *S. ovata*, Lonsd., and the typical examples of *S. tasmaniensis*, Lonsd. From these two species, however, the present form is distinguished, among other characters, by the extraordinary abundance and large size of the acanthopores. *S. Howsii*, Nich., has also very numerous acanthopores, but these are for the most part very minute, and the annular thickenings of the wall are quite different, while the tabulæ are very numerous and are perforated. The acanthopores are best seen in tangential sections (Pl. III. fig. 7); but they are also well exhibited in sections of the peripheral region of the corallum, cutting the corallites longitudinally, in which they appear as delicate clear tubes running in the thickened walls of the corallites (Pl. III. fig. 8). Tabulæ are often not to be detected, and when present are very few in number. In tangential sections appearances are occasionally to be detected which may perhaps be caused by the existence of perforated tabulæ; but as the specimens are in a very peculiar condition of preservation this cannot be affirmed with certainty. None of our specimens exhibit the surface of the corallum, and we therefore do not know if the mouths of the corallites were closed at the final period of growth by the development of a perforated tabula, as seems to have been sometimes the case in *S. tasmaniensis*, Lonsd., and probably in *S. australis*, nobis.

Formation and Locality. The specimens of this form which we have examined are from a purplish ferrugino-micaceous rock, of Permo-Carboniferous age, from Pelican Creek, half a mile above Sonoma and Bowen-Road Crossing, Bowen-River Coal-field, North Queensland. (*Coll.* Geol. Survey, Queensland.)

Stenopora Jackii, Nich. & Eth., Jun.

Stenopora Jackii, Nich. & Eth., Jun., Ann. & Mag. Nat. Hist. 1879, vol. iv. p. 275, woodcut, fig. 1.

Obs. It is unnecessary for us to repeat the description of this form, as we have nothing fresh to add to the characters which we have previously (*loc. cit.*) given of it. We have examined some further material; but as the state of preservation of all the specimens we have seen is such as to forbid the preparation of thin sections, we have acquired no new knowledge as to its structure. The species is distinguished by the small size of its stems, the minuteness of the corallites, and the narrow and ring-like annulations of the tubes in the peripheral region of the corallum. It is also remarkable for the distinctness with which it exhibits minute irregularly distributed mural pores.

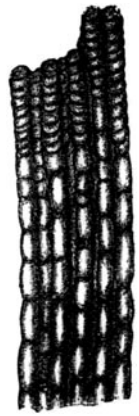
Formation and Locality. Permo-Carboniferous, Coral Creek, Bowen-River Coal-field, North Queensland. (*Coll.* Geol. Survey, Queensland, and Brit. Mus.)

Stenopora informis, Lonsdale.

Stenopora informis, Lonsdale, in Strzelecki's Phys. Descript. New South Wales, p. 264, pl. viii. figs. 4, 4 *a* (1845).

Obs. The figured type of this species, now in the British Museum, is a portion of a sublobate mass, preserved in a light brown rock, and itself silicified. It is about 2 inches wide and an inch or rather more in height, and its general appearance is very faithfully given in Lonsdale's figure (*loc. cit.*). The specimen comprises the *outer* portion of a large corallum, and shows that the tubes, which are approximately vertical in the centre of the mass, radiate outwards in all directions with a gentle inclination. In the deeper parts of the mass the tubes are in the main cylindrical, but are swollen at intervals, the swellings being of but small intensity and being placed at corresponding levels in contiguous tubes (woodcut, fig. 1). Hence the corallites are not in complete contact throughout, as is particularly well seen at the broken upper end of the specimen, where the tubes are fractured transversely. The growth of the corallum must have been periodic, as

Fig. 1.



A few of the tubes of *Stenopora informis*, Lonsd. (type-specimen), enlarged. (Drawn by Mr. A. H. Foord.)

the entire mass is stratified, each stratum being from 2 to 3 millim. in thickness. The diameter of the corallites is about one third of a millimetre. In the outer part of the corallum, when complete maturity has been attained, the corallites, still remaining cylindrical, become annulated with numerous well-marked and close-set rings of the regular Stenoporoid type.

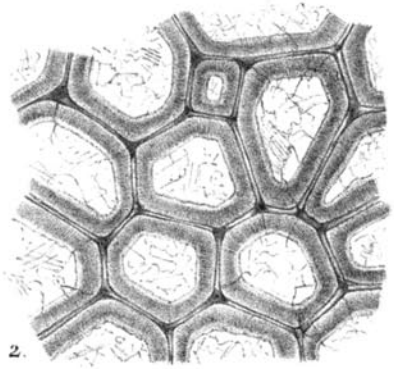
We were at first disposed to think that *Stenopora informis* might be the *outer* portion of a massive *Stenopora*, of which *S. crinita*, Lonsd., constituted the central or *axial* portion. We have, however, abandoned this idea upon the ground that the tubes in the deepest parts of the type-specimen are always cylindrical, and are not in complete contact, whereas in *S. crinita* they are basaltiform and in contact throughout. Moreover the corallites in *S. informis* have a diameter of only about one third millim., but reach half a millim. or rather more in diameter in *S. crinita*.

Locality. Lonsdale gives "Spring Hill, Tasmania," as the locality from which the type-specimen was obtained. (*Coll.* Brit. Mus.)

Stenopora crinita, Lonsdale. (Pl. IV. figs. 1–5.)

Stenopora crinita, Lonsdale, in Strzelecki's Phys. Descript. New South Wales, p. 265, pl. viii. figs. 5, 5 *a* (1845).

Spec. char. Corallum massive or sublobate, of long corallites which radiate outwards gently towards the surface. In the axial region of the corallum the corallites are basaltiform and in close contact throughout; but they become transversely wrinkled with narrow periodic annulations as they approach the final period of growth. The corallites are polygonal or subpolygonal, with comparatively thin walls, their average diameter being about half a millimetre. Acanthopores are developed at all the angles of junction of the corallites, and occasionally in other parts of the walls of the corallites. The walls of the corallites are periodically thickened by narrow ring-like annulations, which are found in all regions of the corallum, but are most abundant in the outer or peripheral zone. These annulations are comparatively wide apart, and are separated by long unthickened internodes, giving to longitudinal sections of the wall a characteristic moniliform aspect (woodcut, fig. 2). Tabulæ are very sparsely developed in the axial region of the corallum, but are comparatively numerous in the peripheral region, and correspond in general with the thickened segments of the corallites. So far as determined, the tabulæ are complete and imperforate. Surface not observed.



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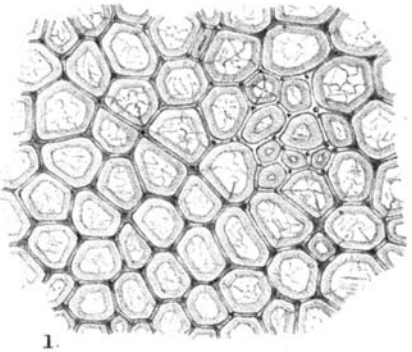

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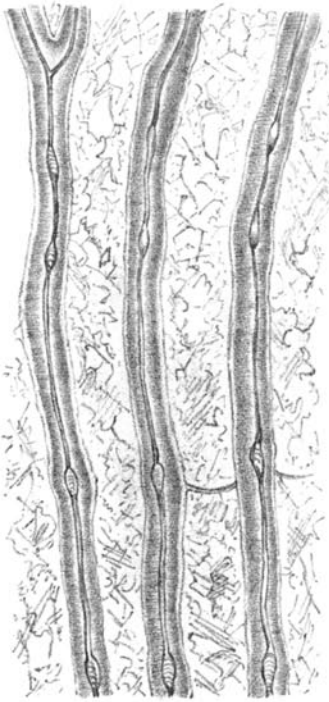

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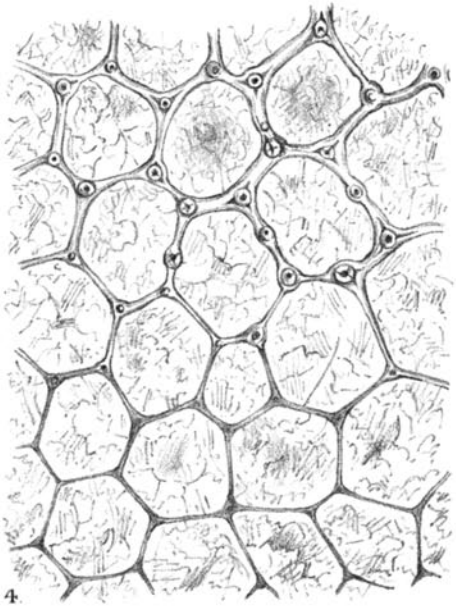

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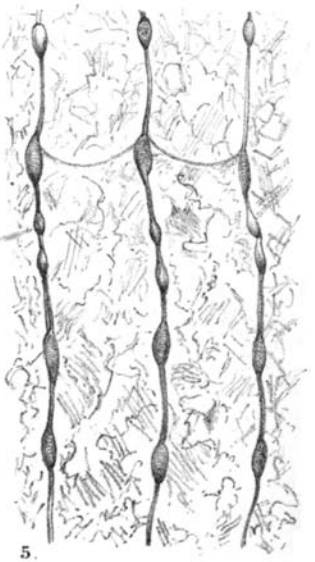


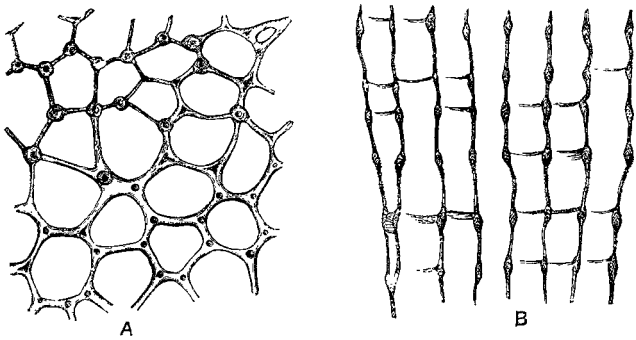
5.

H. A. Nicholson del. A. S. Foord lith.

Mintern Bros. imp.

Obs. The type-specimen of *S. crinita*, Lonsd., now in the British Museum, is a large mass about 4½ inches in length and composed of long basaltiform corallites, which diverge from one another by the interpolation of new tubes with a very gentle outward inclination. The average diameter of the corallites is about half a millim., and they are polygonal in shape and in close contact throughout. The growth of the corallum was periodic, and the entire mass (as shown in Lonsdale's excellent figure) is stratified, the polygonal corallites showing a slight transverse wrinkling as they approach the upper surface of each successive stratum. It seems almost certain, however, that the type-specimen is only the central portion of a large corallum of which none of the outer portion is preserved; and there is therefore no reason to doubt that the corallites in the peripheral region of the corallum would exhibit the characteristic annulations of the genus.

Fig. 2.



Sections of *Stenopora crinita*, Lonsdale (M'Cormick collection), enlarged twelve times. A. Tangential section, passing in part through the thickened nodes and in part through the unthickened segments of the corallites: *a*, acanthopores. B. Vertical section, showing the bead-like periodic thickenings of the walls of the tubes and the tabulæ. Both sections show a dense brown-coloured irregular lining in all the tubes; but this seems to be clearly due to mineralization, and is omitted in the figure.

Indeed in other specimens which may be unhesitatingly identified with this species, and in which the external zone of the corallum is preserved, the corallites do actually show the periodic annulations which are found in all the other species of the genus.

Thin sections of such specimens, taken in the peripheral

region of the corallum, exhibit exceedingly characteristic appearances. In tangential sections (Pl. IV. fig. 4, and woodcut, fig. 2, A) the corallites are seen to be polygonal or subpolygonal in shape, and to be furnished with thin, completely amalgamated walls. The thickness of the walls varies according as the plane of the section corresponds with the thickened nodes of the walls or traverses the unthickened internodes (Pl. IV. fig. 4). At all the angles of junction of the corallites are placed well-marked acanthopores, which are sometimes minute, but at other times large, circular, thick-walled, and showing a distinct lumen (woodcut, fig. 2, A). In longitudinal sections (Pl. IV. fig. 5, and woodcut, fig. 2, B) the walls of the corallites are seen to be thin, but to be rendered moniliform by small fusiform thickenings which are placed at corresponding levels in all the tubes. Tabulæ are developed from these nodal points, but vary much in their numbers. Sometimes there are only very few of these structures, but at other times they may be developed from almost every successive pair of nodal points.

Thin sections of the type-specimen of *S. crinita* show phenomena which are at first sight strikingly unlike those exhibited by the specimens just alluded to. Thus in transverse sections of the type-specimen (Pl. IV. figs. 1 and 2) the corallites are seen to be polygonal and for the most part furnished with thin dark linear walls, at the angles of junction of which are placed small acanthopores. Here and there, however, at tolerably regular intervals, we observe groups of comparatively small-sized corallites, with thicker walls and larger acanthopores (Pl. IV. fig. 1). The peculiar feature of this specimen, however, lies in the fact that the thin proper walls of the corallites are uniformly lined by a continuous investment of brown calcareous substance of considerable thickness (Pl. IV. fig. 2). This investment is so invariably present, is so constant in its thickness, and so exceedingly regular in its development, that it has every appearance presented by the layer of secondary sclerenchyma which is deposited on the inside of the proper wall in *Pachypora*, *Laceripora*, and other similar corals. Precisely the same thing is exhibited by longitudinal sections of the type-specimen (Pl. IV. fig. 3), which show the proper moniliform walls of the corallites invested on both sides by the same dense and regular deposit. Our first impression therefore was that we had to deal here with a thick secondary investment of sclerenchyma, such as is found lining the visceral chambers in various types of tabulate corals. Further investigation, however, satisfied us that this view was untenable, and that this curious

investment, in spite of its extraordinarily regular development, is of inorganic origin, and is produced by a post-mortem deposition of carbonate of lime within the cavities of the tubes. We have been led to this conclusion principally by two considerations. In the first place we found that in one specimen of *S. crinita*, as above described, this secondary lining of the tubes had no existence at all (Pl. IV. fig. 4). In the second place we found that in another specimen of the same species this singular brown lining was present, but was irregular in its development, terminating in a ragged free edge where it surrounded the visceral chamber. We may therefore regard the figures in Pl. IV. as belonging to one and the same species—those of the type-specimen (figs. 1–3) having undergone this curious process of mineralization, while those of the specimen in the "M'Cormick collection" (figs. 4 and 5) are free from this. Such other differences as may be observed between these two sets of sections (apart from the absence or presence of this investment) are not only slight, but are easily explained by the fact that those of the type specimen are from the axis of the corallum, while those of the second set are from the peripheral region.

Formation and Locality. Permo-Carboniferous (?). The type-specimen is from Illawarra, New South Wales. In addition to the type-specimen the British Museum contains two specimens, in precisely the same state of preservation as the type, collected by Dr. M'Cormick during the voyage of the 'Erebus' and 'Terror' in either Tasmania or New South Wales. These specimens are distinctly sublobate in form, and it is from one of these that the sections represented in figs. 4 and 5, Pl. IV., have been taken. Other specimens of this species contained in the collection of the British Museum are as follows:—(1) Two specimens from Wollongong, New South Wales, one of which exhibits the characteristic nodular appearance presented by so many of the fossils of that locality. In all essential respects these specimens resemble the type-specimen, one being massive and the other sublobate. (2) Three silicified specimens, from Eaglehawk Neck, Tasmania. We have examined thin sections of one of these, and have little hesitation in identifying them with *S. crinita*; but their state of preservation is very poor. (3) A small silicified specimen, believed to be from Point Puer, Tasmania.

Stenopora? gracilis, Dana, sp.

Chætetes gracilis, Dana, Wilkes' U. S. Explor. Exped. vol. x. Geology (1849), p. 712, Atlas, t. ii. figs. 10, 10 *a–e*.

Spec. char. "Ramose, branches slender, $1\frac{1}{2}$ to 3 lines

thick; cells sub-elliptical and having the border a little prominent. Columns of the size in the *ovata* (about six to a line in breadth), even, with few constrictions." (*Dana.*)

Obs. We have never been able to satisfactorily detect this species in any collection of Australian *Stenoporæ* yet examined by us. It appears, however, to be distinguished by the remarkable paucity of annular thickenings and constrictions, or, at times, their total absence. This feature has led us to even doubt if it be a *Stenopora*, although in general habit it bears a strong resemblance to the other previously-cited species.

Formation and Locality. Carboniferous?, Wollongong Point and Black Head, Illawarra, New South Wales (*Dana*).

Stenopora? sp.

Stenopora? sp., Nich. & Eth., Jun., Ann. & Mag. Nat. Hist. 1879, vol. iv. p. 276.

Obs. In our paper on the "Palæozoic Corals of Northern Queensland" we drew attention to what may prove to be another species of *Stenopora*. For further information we refer to our previous description, simply remarking that we are not at present in a position to offer additional particulars.

Formation and Locality. Carboniferous, Gympie, North Queensland. (*Coll.* Brit. Mus. and Geol. Survey, Queensland.)

EXPLANATION OF THE PLATES.

Plate III.

Fig. 1. Tangential section of the Strzeleckian type-specimen of *Stenopora ovata*, Lonsd., enlarged about twenty-four times.

Fig. 2. Longitudinal section of the same specimen, similarly enlarged. *p*, supposed mural pore.

Fig. 3. Tangential section of another specimen of *Stenopora ovata*, Lonsd. (from the Milligan collection), enlarged about twenty-four times.

Fig. 4. Vertical section of the same, similarly enlarged.

Fig. 5. Tangential section of *Stenopora australis*, Nich. & Eth., Jun., enlarged about twenty-four times.

Fig. 6. Vertical section of the same, similarly enlarged.

Fig. 7. Tangential section of *Stenopora Leichhardtii*, Nich. & Eth., Jun., enlarged about twenty-four times.

Fig. 8. Vertical section of the same, similarly enlarged.

Fig. 9. Tangential section of *Stenopora tasmaniensis*, Lonsd., enlarged about twenty-four times.

Fig. 10. Longitudinal section of a few of the tubes of the same, similarly enlarged. The section is taken from the outer part of a transverse slice.

Fig. 11. Mouths of some of the corallites of *S. tasmaniensis*, Lonsd.,

slightly enlarged, showing the spiniform terminations of the acanthopores and the perforated tabulæ closing the tube-mouths. (Copied from Lonsdale.)

Fig. 12. A few of the cell-mouths of *Stenopora tasmaniensis*, enlarged about twenty-four times. The acanthopores are seen, and some of the tube-mouths are furnished with a perforated tabula.

Fig. 13. Longitudinal section of a frondescent specimen of *S. tasmaniensis*, enlarged about twenty-four times.

PLATE IV.

Fig. 1. Transverse section of the type-specimen of *Stenopora crinita*, Lonsd., enlarged about twelve times.

Fig. 2. Part of the same section, enlarged about twenty-four times.

Fig. 3. Longitudinal section of the same, enlarged about twenty-four times.

Fig. 4. Tangential section in the peripheral region of the corallum of another specimen of *S. crinita*, enlarged about twenty-four times. The section traverses in part the thickened portions of the corallites and in part the unthickened segments.

Fig. 5. Longitudinal section of the same specimen, enlarged about twenty-four times.

XVII.—*The Abyssal Decapod Crustacea of the 'Albatross' Dredgings in the North Atlantic* *. By SIDNEY I. SMITH.

THE most interesting feature of the Crustacea collected by the 'Albatross' is the great number of very deep-water or abyssal species of Decapoda obtained in a restricted region of the western North Atlantic. The whole number of species of true Decapoda dredged by the 'Albatross' is over 130; but nearly half of these are from shallow or comparatively shallow water. None of the shallow-water species were taken below 1000 fathoms, and it is perhaps best to limit the abyssal fauna to depths greater than this, although some true deep-water species are excluded by adopting so great a depth. Taking this limit strictly we have 44 abyssal species, as shown in the following:—

* This article is in the main abstracted from the introductory portion of the author's "Report on the Decapod Crustacea of the 'Albatross' Dredgings off the East Coast of the United States during the Summer and Autumn of 1884," with twenty plates, recently presented to the U.S. Commissioner of Fish and Fisheries, by whose permission it is here published in advance of the Government report. The collections made by the 'Albatross' in the West-Indian region during the winters of 1884 and 1885 are not referred to in this article, which applies exclusively to the region north of Cape Hatteras; but some of the results of a partial examination of the collections made in the summer of 1885 are included.