Livingstone, Arthur A., 1926. Studies on Australian Bryozoa. No. 4. *Records of the Australian Museum* 15(2): 167–176, plates xi–xiii. [18 November 1926].

doi:10.3853/j.0067-1975.15.1926.807

ISSN 0067-1975

Published by the Australian Museum, Sydney

STUDIES ON AUSTRALIAN BRYOZOA.

No. 4.

By

Arthur A. Livingstone, Assistant in Zoology, Australian Museum.

This number contains notes on several species that require further study, and a description of two new species.

(Plates xi-xiii.)

Lepralia mucronata *Smitt* var. celleporoides *Busk.*

(Pl. xii, figs. 5-6.)

Escharipora mucronata Smitt, Sv. Vet.-Ak. Handl. n.s., xi, 1872, p. 24, pl. v, figs. 113-115 (typical form).

Lepralia celleporoides Busk, "Chall.," Zool., x, pt. xxx, 1884, p. 142, pl. xvii, fig. 4.

Lepralia mucronata var. unipora Waters, Bry. Supplement, "Chall.," Zool., xxxl, pt. lxxix, 1888, p. 26.

? *Lepralia mucronata* Kirkpatrick (non Smitt), Sci. Proc. Roy. Dub. Soc., vi, n.s., 1890, p. 612.

The characters of this variety are set out by Busk (*loc. cit.*).

Remarks.—After Busk described *Lepralia celleporoides*, Waters (*loc. cit.* 1888) considered it in his list of references a synonym of Smitt's *Lepralia mucronata*, a view that I cannot follow for reasons set out herein. In the first place we read in Waters' text that the series (his Tertiary specimens of *Mucronella mucronata* and Busk's *celleporoides*) should perhaps be divided into varieties; this alone indicates doubt in the author's mind how the forms should be dealt with. Acting upon the suggestion, however, together with other data, I separate *celleporoides* of Busk from Smitt's typical *L. mucronata* as a variety and in doing so cannot accept the varietal name *unipora* suggested by Waters, because the name *celleporoides* takes priority.

Specimens in the Australian Museum collection from Nichol Bay, Western Australia, agree in every detail with Busk's description and figures of specimens from off Cape York, north Australia. Because the same form, showing the same characters, has been found in two different localities we have another reason for acting upon Waters' suggestion of separation.

Miss Jelly in her "Synonymic Catalogue," page 129, evidently follows Waters on the above question, for she merely quotes that author's synonymy.

MacGillivray[1] maintains that Waters' "*Mucronella*" *mucronata*

[1]MacGillivray—Trans. Roy. Soc. Vict., iv, 1895, p. 62.

from the Australian Tertiary Deposits has no connection with the true "*M.*" *mucronata* of Smitt, and considers it identical with *Hiantopora liversidgei* Tenison-Woods. Having examined specimens from the Australian Tertiaries I uphold MacGillivray's contention, and, further, maintain that "*M.*" *mucronata* of Smitt has no specific connection with *Hiantopora liversidgei* Tenison-Woods. *Lepralia mucronata*, therefore has only one variety, var. *celleporoides* Busk.

The variety has been recorded from "Challenger" Station 186, lat. 10° 30′ S., long. 142° 18′ E., 8 fathoms, coral mud (Busk); ? Albany Pass., Somerset, N. Queensland, 10 fathoms (Kirkpatrick).

There are specimens in the Australian Museum from Nichol Bay, Western Australia; presented by Mr. W. H. Wooster.

LEPRALIA VESTITA *Hincks* VAR. AUSTRALIS *Waters.*

Lepralia vestita Waters (non Hincks). Ann. Mag. Nat. Hist. (5), xx, 1887, p. 194, pl. vi, fig. 21.

Lepralia vestita Hincks *var. australia* Waters, Ann. Mag. Nat. Hist. (6), iv, 1889, p. 12, pl. i, fig. 19.

? *Lepralia rostrigera* Waters (non Smitt), Quart. Journ. Geol. Soc., xliii, 1887, p. 61, pl. vii, fig. 17.

Description.—Zoarium encrusting. Zooecia hexagonal, ovate and separated by well defined and slightly raised margins. Frontal zooecial walls punctured with numerous minute pores. On each side of the zooecial aperture and alongside the zooecial margins is a large pore as seen in *Lepralia rostrigera* Waters (*loc. cit.*, *non* Smitt). These lateral pores are, however, not distinguishable in every zooecium on the specimen before me.

Peristome well developed, thick and massive, its distal extremity slightly elevated much in the same manner as in *Schizoporella acuminata* Hincks, but not so pronounced as in that species. The peristome on each side of the aperture is raised into an umbo-like eminence.

The zooecial aperture is typical of the genus, rounded distally and proximally, and contracted slightly at the sides. Two prominent hinge teeth are present, one on each side of the aperture.

Colour.—In a dried condition the colony is brown.

Locality.—Described and figured from a specimen from Green Point, Port Jackson, New South Wales (type locality of variety).

Synonymy.—Closely allied, if not identical, is a species from a Tertiary deposit in New Zealand, which was described by Waters (*loc. cit.* 1887) as *Lepralia* [*Escharella*] *rostrigera* Smitt.[2] This latter species was found by Waters[3] to be identical with *Lepralia depressa* Busk,[4] but he did not include in the synonymy the New Zealand species he previously identified as Smitt's *L. rostrigera*.

In the same year, 1889, Miss Jelly, on p. 126 of her "Synonymic Catalogue," includes *rostrigera* Smitt[2], together with Waters' supposed "*rostrigera*" from New Zealand, in the synonymy of *Lepralia depressa*

[2]Smitt—Sv. Vet.-Ak. Handl., n. ser., xi, 1872, p. 57, pl. x, figs. 203-5.
[3]Waters—Ann. Mag. Nat. Hist. (6), iv, 1889, p. 13.
[4]Busk—B.M. Cat. Mar. Poly., 1854, p. 75, pl. xci, figs. 3-4.

Busk. I do not wholly agree with this course. The true *rostrigera* of Smitt is, according to Osborn[5] not synonymous with *L. depressa* Busk, nor do I consider that the "*rostrigera*" from New Zealand is the same. I have compared specimens of *L. depressa* with Waters' figure of his so-called "*rostrigera*" but cannot detect any great degree of likeness. Therefore the New Zealand "*rostrigera*" will require a new name, if my surmise that it may be identical with *L. vestita* var. *australis* is incorrect.

PETRALIA UNDATA *MacGillivray.*

(Pl. xii, figs. 1-3.)

Petralia undata MacGillivray, Trans. Proc. Roy. Soc. Vict., ix, 1, 1868, p. 141.
Petralia undulata Maplestone, Trans. Proc. Roy. Soc. Vict., xviii, 1882, p. 51.
Petralia undata Jelly, Syn. Cat. Rec. Mar. Bryozoa, 1889, p. 203 (and synonymy).
Petralia undata MacGillivray, Trans. Proc. Roy. Soc. South Austr., xiii, 1890, p. 5.

This well differentiated species is very common off the southern New South Wales coast and has often been brought to light by trawlers operating in that region. Specimens of the species recently secured by my colleague Mr. W. Boardman when accompanying the trawler "Bar-ea-mul" on one of her cruises are of great interest. Not only does the collection prove the abundance of the species in the locality, but many specimens possess a remarkable tape-like filament which anchors the colony to the sandy sea floor on which it occurs.

MacGillivray[6] states that the colonies are "probably of considerable size, as all the specimens I have seen are broken on the edges."

All the specimens I have seen appear to be broken on the edges also, but I doubt if they will ever be found appearing any other way. My reason for doubt is that the material before me possesses anchoring filaments which appear to be complete, the so called broken edges being a natural state. The edge from which a filament arises is no different to a free edge of a colony, and thus it is not likely that the "fragments" would grow anchoring filaments if they were broken off a parent colony possessing quite a different anchoring arrangement.

The species has been recorded from Portland and Queenscliff in Victoria, and from South Australia (MacGillivray).

Localities.—There are specimens in the Australian Museum from the following localities:—S.W. of Eden, New South Wales, 45 fathoms, collected by W. Boardman; 3 to 4 miles off Eden, 25 to 30 fathoms, collected by H. O. Fletcher and A. A. Livingstone; 12 to 22 miles N.$\frac{1}{2}$E. from Green Cape, New South Wales, 39 to 46 fathoms, collected by H. O. Fletcher and A. A. Livingstone; Westernport, Victoria, collected

[5]Osborn—Papers from the Tortugas Laboratory, Carnegie Inst. Wash., 5, 1914, p. 211.

[6]MacGillivray—in McCoy's Prod. Zool. Victoria, dec. vi, 1879, p. 45.

by J. Gabriel; Port Phillip, Victoria, collected by J. B. Wilson; off Launceston and Devonport, Tasmania, collected by the Commonwealth Fisheries Investigation steamer "Endeavour."

HASWELLIA CORONATA *Reuss.*

(Pl. xii, fig. 4.)

Cellaria coronata Reuss, Fossile Polyparien d. Wiener tertiär Beckens, Haidinger Naturw. Abhandl., ii, 1848, p. 62, pl. viii, fig. 3.

Porina coronata Jelly, Syn. Cat. Rec. Mar. Bryozoa, 1889, p. 209 (synonymy).

Haswellia coronata Levinsen, Morph. and Sys. Stud. Cheil. Bryozoa, 1909, p. 299.

A specimen of the species recently trawled in deep water off the coast of New South Wales near Eden shows evidence of a remarkable mode of attachment. The colony is composed of somewhat flattened branches arising from a perfectly cylindrical rod of calcareous material. This cylindrical pillar-like structure appears to have been at one time a column of zooecia, but, as calcification has been carried on to such a considerable extent, I cannot be certain on this point; to section the colony would mean its destruction as evidence of its scheme of attachment. At the extremity of the unbranched end of the calcareous column is a pore, from the interior of which arises a brown filament of delicate texture resembling that seen in *Petralia undata* MacGill. The pore extends inwards some distance, thus giving the column a hollow appearance, but whether the column possesses a complete hollow axis is not known. The whole colony is attached to the sandy sea floor, no doubt by the burial of part of the anchoring filament referred to above.

Locality.—S.W. of Eden, New South Wales, 45 fathoms, collected by W. Boardman on trawler "Bar-ea-mul," July, 1925.

ESCHAROIDES LARVALIS (*MacGillivray*).

(Pl. xi.)

Lepralia larvalis MacGillivray. Trans. Proc. Roy. Soc. Victoria, ix, 1868 (1869), p. 134.

Porina larvalis Jelly, Syn. Cat. Rec. Mar. Bryozoa, 1889, p. 210 (and synonymy).

Lepralia larvalis MacGillivray, Trans. Proc. Roy. Soc. Victoria, iv, 1895, p. 104, pl. xiv, fig. 26.

Escharoides larvalis Levinsen, Morph. Syst. Stud. Cheil. Bryozoa, 1909, p. 318.

Specimens from Tasmania, which form a new record for the distribution of the species, are extremely well preserved, and having attained full zooecial growth without excess of calcification, have been used to figure and redescribe the species.

Description.—Zoarium loosely adnate. Zooecia not distinctly defined when viewed on the frontal surface, but when the basal surface

is examined the zooecia are seen to be roundly hexagonal. The frontal zooecial walls are perforated distally each with two large foramina and proximally with small foramina or pores. The latter, like the pores of *H. ferox* MacGillivray, possess small teeth or denticles on their inner edges. On the frontal walls of many zooecia is a somewhat regular pattern of raised lines, but such pattern is absent on distorted zooecia. The pattern commences at the proximal lip of the peristome and proceeds for some distance in a proximal direction as a straight median line; it then branches into three parts, two deviating laterally and one continuing onward until it reaches the small foramina or pores where it becomes lost. The two large foramina situated distally in the frontal wall lie immediately below the two lateral branches of the pattern and are divided by the continued median branch.

The basal zooecial walls, which collectively form the encrusting surface of the colony are thin and membranous. When the colony is incinerated these membranous walls disappear entirely. The peristome is strongly developed, produced, and easily seen with the unaided eye. It is produced distally and proximally into thin walls, but laterally is raised very little above the surrounding frontal walls. The produced proximal lip is, to some extent, supported by the rib-like line commencing the pattern referred to above. The situation of the peristome is not directly upright or vertical, but surrounds an imaginary axis directed distally, and at about forty five degrees to the horizontal plane.

Hollow calcareous spines occur in the neighbourhood of the peristome, generally one on each side, but in some cases four may be found, two occurring on each side. The produced peristomial lips of a zooecium on which four spines occur are always reduced in width but never in height. The peristomial apertures are irregularly circular or elliptical.

Avicularia occur on raised eminences or umbos, which are scattered at random all over the frontal surface of the colony. The mandible is long and triangular, wide, and sharply cornered at its base. The structure tapers towards its free extremity, where it ends in a curved point. The avicularian cavity is very deep, rounded at its widest end, and tapering to a sharp point. The lateral edges of the avicularian cavity are distinctly serrated or toothed. A distinct cross-bar is present, on which the base of the avicularian mandible is attached. Ooecia are not present on the specimens before me.

Described and figured from a specimen of a series from Banks Strait, Tasmania.

Colour.—Dried colonies are of a dull brown hue.

Localities.—Living specimens have been recorded from:—Western Australia (Waters); South Australia, Semaphore (MacGillivray and Waters); Victoria (Waters and MacGillivray); Williamstown (MacGillivray); New South Wales, Bondi Bay (Waters and Whitelegge); Norah Head (Bretnall).

Tertiary records are.—South Australia, Mount Gambier (Waters); Victoria, Bairnsdale (Waters and MacGillivray); Moorabool (MacGillivray); Fyansford, Griffins, Corio Bay, Mitchell River, Flinders, Muddy Creek (Maplestone).

There are specimens in the Australian Museum from:—Banks

Strait, Tasmania, 1924 (on weed), collected by Dr. W. E. J. Paradice, R.A.N., ; Tasmania, collected by Rev. Dr. Thos. Porter.

Affinities.—A near ally to this species appears to be *Hiantopora halli* MacGillivray,[7] but comparison of the description and figures serve to distinguish readily between them. Waters[8] considers that his *Porina*(?) *bioculata* is also "clearly related" to *E. larvalis.*

Remarks.—Fresh colonies are covered by a heavy brown membrane, which, until removed by incineration, obliterates many important characters.

LEPRALIA BICORNIS *Thornely.*

(Pl. xii, fig. 8.)

Lepralia bicornis Thornely, Trans. Linn. Soc., (2), xv, 1912, p. 151, pl. viii, fig. 11.

Specimens of this species from New Caledonia do not possess avicularia, though almost every other character described by Miss Thornely can be distinguished. An incinerated fragment shows the frontal zooecial walls to be very rough near their borders, a character not discernible on fresh specimens. The pores around the borders of the zooecia are very conspicuous owing to their large size and depth. The sutures dividing the zooecia are very deep. Zooecial apertures a little more elongate than figured by Miss Thornely ; a prominent hinge tooth is present midway on each lateral border.

Localities.—Indian Ocean ; Cardagos, 30 fathoms ; Salomon, 75 fathoms (Thornely). There are specimens in the Australian Museum from Anse Vata, Noumea, New Caledonia, coll. A. F. Basset Hull, August, 1925.

LEPRALIA UNITURRITA *sp. nov.*

(Pl. xii, fig. 7, and Figs. 1-2.)

Zoarium encrusting, thick and strong. The zooecia are broadly ovate and their frontal zooecial walls are provided with a number of uniformly arranged pores. The zooecia are rounded in outline and are separated by conspicuous furrows as well as by their common walls.

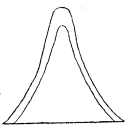


Fig. 1

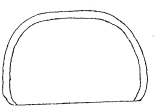


Fig. 2.

Lepralia uniturrita sp. nov. 1. An avicularium from the top of one of the columns. 2. Operculum.

They are entirely covered with a glistening epitheca, which, when removed by incineration, allows an uninterrupted view of the outside zooecial structure.

[7]MacGillivray—Trans. Proc. Roy. Soc. Victoria, iv, 1895, p. 61, pl. viii, fig. 25.
[8]Waters—Quart. Journ. Geol. Soc., xlvii, 1890 (1891), p. 26, pl. iii, f. 15.

The zooecial aperture, which occupies about one third the area of the entire frontal zooecial wall, is typical of the genus. It is as broad as long, arched above, contracted on each side below the middle, and has the lower margin straight or sometimes faintly turned outwards. A hinge tooth is present on each side of the aperture below the middle. A distinct peristome is present, which has much in common with that seen on normal colonies of *Lepralia pallasiana*. The operculum is not heavily chitinised and fits the zooecial aperture perfectly. Its structure is supported by a chitinous thickening, which continues the whole way around the operculum at slight varying distances from the edges. On each side there is a strong articular thickening as well. On one side of the aperture there is a strong and well calcified vertical column. This structure is hollow and is, in many cases, as high as the aperture is broad. Upon the free extremity of this stout column is a small elongated avicularium with a rounded point. A central cross-bar is present in the mandibular cavity, which, in reality, represents the hollow axis of the column. No other type of avicularium occurs on the colony.

There are no ooecia on the specimen before me.

Colour.—Dull cream in a dried condition.

Variation.—Save for the apertures, which may vary slightly in relative length and breadth, no variation occurs on the single specimen before me.

Affinities.—The only known species liable to be confused with this form is *Lepralia gigas* Hincks,[9] but *L. uniturrita* can be distinguished from this form by the large vertical column and the comparatively small ovate zooecia.

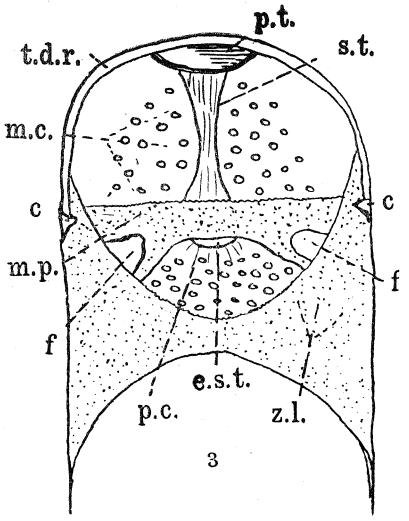
Locality.—Broughton Island, off Port Stephens, New South Wales.

Steganoporella greavesi[10] *sp. nov.*

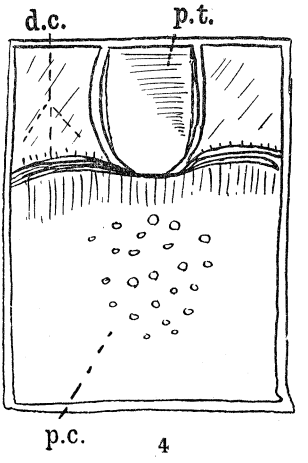
(Pl. xiii, figs. 1-3 and Figs. 3-8.)

Description.—Zoarium unilaminate, large and massive; seemingly of a loosely encrusting nature. Zooecia large, well defined, and with large raised borders. A conspicuous thickening occurs on each zooecium on the distal border of the aperture, and continues down each lateral border, ending abruptly at the condyle on each side. Only " A " type of zooecia and opercula can be distinguished on specimens before me. The zooecial aperture is dome-shaped distally and occupies about one half the area of the frontal surface. A continuous ledge runs around the internal sides of the upright zooecial walls and is lowest distally. Its proximal edge, which is highest, appears serrated owing to the strongly tubercular nature of the entire structure. The cryptocyst, which is perforated proximally, descends gradually at first, then dips suddenly, forming an almost vertical wall. It then turns again at right angles and proceeds towards the distal wall, which it joins about midway. The polypide tube is situated in the distal extremity of the cryptocyst, and is in a median position from the lateral walls. It is vertical and

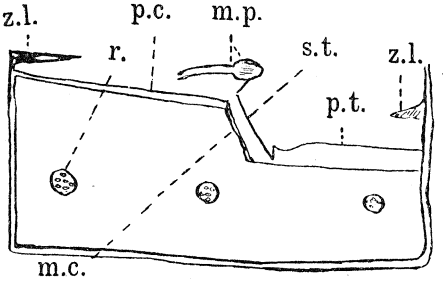
[9]Hincks—Ann. Mag. Nat. Hist. (5), xv, 1885, p. 255.
[10]Named for Mrs. Lilian Wooster Greaves of Perth, Western Australia.



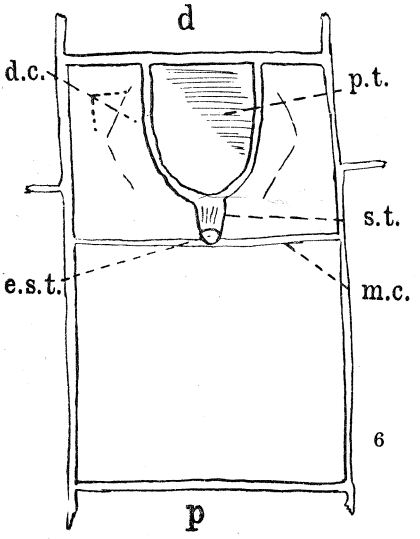
3



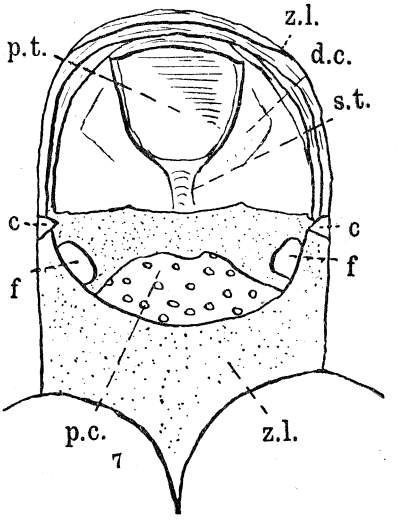
4



5



6



7

Figures 3–7.

its proximal and lateral walls are very short. A portion of the distal zooecial wall acts as a distal wall to the polypide tube. A cross section of the tube shows the distal wall (part of distal wall of zooecium) to be straight, the lateral walls almost straight, and the proximal wall concave. The cryptocyst is perforated by a large opening immediately below the median process. The opening is the entrance to a small almost vertical tube which proceeds downward on the distal side of the median and downwardly directed portion of the cryptocyst until it connects with the proximal wall of the polypide tube.

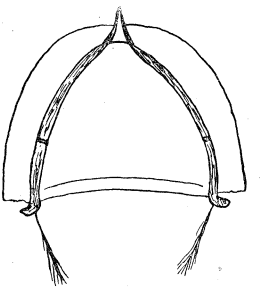


Fig. 8.

Steganoporella greavesi sp. nov. Operculum.

The median process has a thickened distal wall which joins the lateral walls immediately below the condyles. It dips downwards as it proceeds proximally, and joins the lateral edges of the zooecial ledge by two processes in such a way as to form a large foramen on each side. The median process is deficient proximally, and through the opening can be seen the proximal perforated portion of the cryptocyst beneath.

The polypide tube and the secondary tube can be properly seen only when the median process and the proximal (highest) portion of the cryptocyst is removed by sectioning, or when the colony is tilted under the microscope. When the basal zooecial wall is removed only the descending cryptocyst and the large funnel-like polypide tube in the last and horizontal turn of the cryptocyst just before it reaches the distal wall, can be seen.

EXPLANATIONS TO FIGURES 3 TO 7.

Steganoporella greavesi sp. nov. Fig. 3. Normal zooecium showing structure seen when the colony is tilted to about 45 degrees under the microscope. Fig. 4. View of zooecium when the basal wall is removed. Fig. 5. Section through zooecium, lateral view. Fig. 6. Front view into zooecium when the proximal cryptocyst, the zooecial ledge, and median process are removed by sectioning. Fig. 7. Normal zooecium, showing structure when slightly tilted or inclined under the microscope. The entire structure cannot be seen or clearly made out in one focal plane.

Key to abbreviations.—c. Condyle. d. Distal. d.c. Distal portion of cryptocyst. e.s.t. Entrance to secondary tube. f. Foramina. m.c. Median (almost vertical) portion of the cryptocyst. m.p. Median process. p. Proximal. p.c. Proximal portion of the cryptocyst. p.t. Polypide tube. r. Rosette plate. s.t. Secondary tube. t.d.r. Thickened distal border of the aperture. z.l. Zooecial ledge.

The operculum is semicircular, not heavily chitinised, and with a U-shaped main sclerite. The two basal extremities of the main sclerite are considerably thickened for articulation with the condyles. On each side of the sclerite within the basal half is another thickening. At the top of the operculum is a large tooth formed by the continuation of the inside bar of the main sclerite.

Described and figured from normal zooecia and sectioned portions of colonies.

Colour.—Dull cream in a dried condition.

Locality.—Near Perth, Western Australia. Presented by Mrs. Lilian Wooster Greaves, through Mr. W. H. Wooster, an Honorary Correspondent of this Museum.

Arachnopusia acanthoceros (*MacGillivray*).

(Pl. xiii, fig. 4.)

Cribrilina acanthoceros MacGillivray, in McCoy's Prodr. Zool. Victoria, dec. xx, 1890, p. 320, pl. 187, fig. 7.

Arachnopusia acanthoceros Livingstone, Rec. Austr. Museum, xiv, 3, 1924, p. 204.

Having recently acquired a specimen of this species from Rev. Dr. Thos. Porter, who collected it in Victoria, I am able to amplify the remarks made in a previous paper (*loc. cit.*).

Stress has been laid both by MacGillivray and myself upon the character of the large oral spine as a distinguishing feature of the species. MacGillivray's figure shows the spine to be jointed, and infers that the basal portion is stunted and many times shorter than the free portion. While his specimens may have shown such a condition, the specimens before me prove the basal joint to be, in many cases, just as long as the free portion, the two together in their natural state being extremely huge. Only the free portion of the spine possesses the characteristic " prickles " as MacGillivray calls them.

Not knowing these facts, and having only a specimen in which the free joints of the spines were missing, one would be led to believe that at least a new variety of the species had been secured. Indeed, so complete and robust looking is the remaining portion of the spine that reference to MacGillivray's figure would not suggest or even hint at similarity in the structure of this portion of the spine.

EXPLANATION OF PLATE XI.

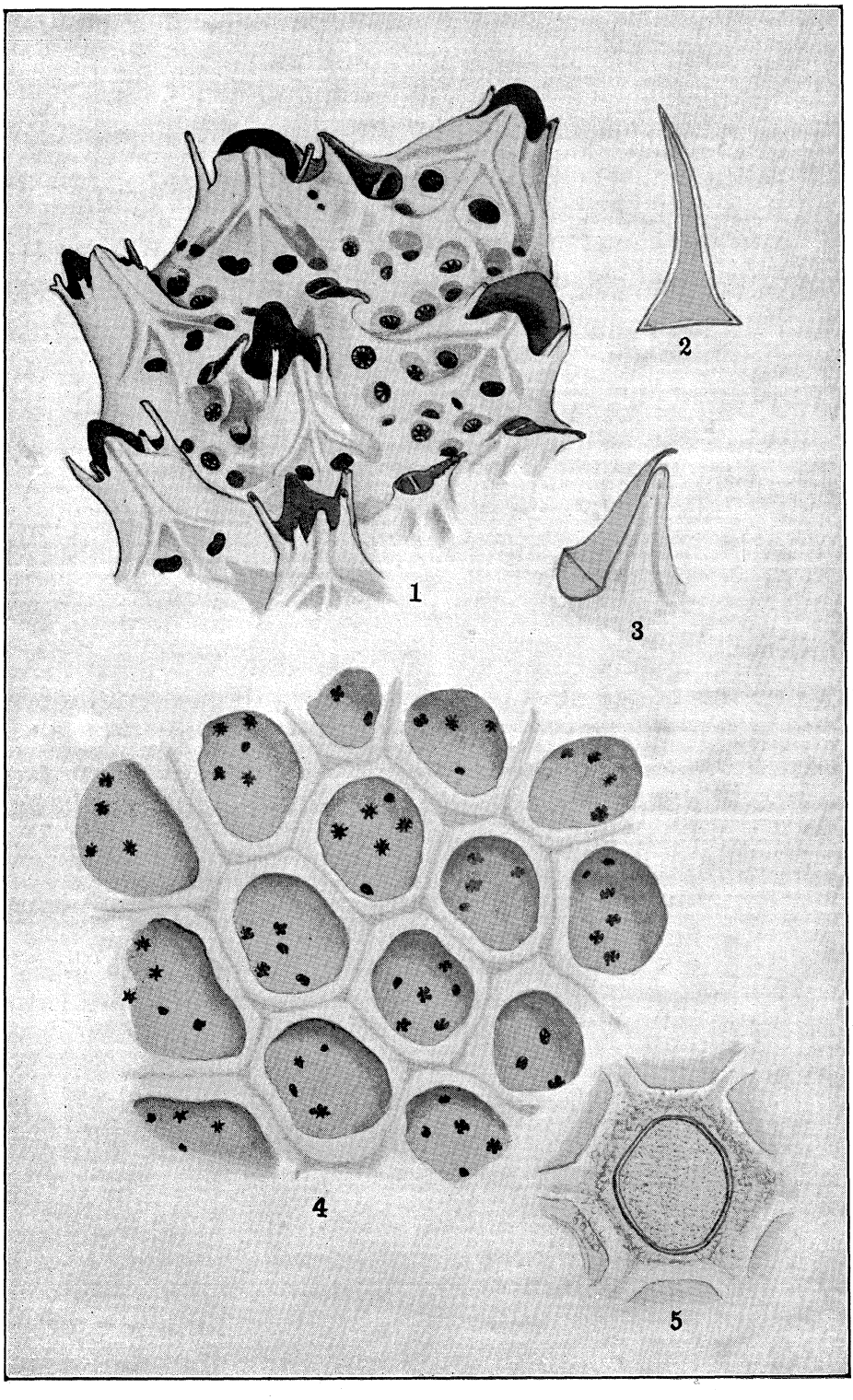
Fig. 1. *Escharoides larvalis* (MacGillivray). A portion of an incinerated colony.

,, 2. *Escharoides larvalis* (MacGillivray). Mandible of a zooecial avicularium.

,, 3. *Escharoides larvalis* (MacGillivray). An avicularium on a mucronate process. Such structures are present on the frontal zooecial walls.

,, 4. *Escharoides larvalis* (MacGillivray). A portion of a colony with the basal zooecial walls removed to show the structure of the underneath surface of the frontal zooecial walls and the contained foramina or pores. The zooecial apertures cannot be seen in such a view.

,, 5. *Escharoides larvalis* (MacGillivray). View of the outside of a basal zooecial wall. This is the surface which adheres to the weed, or rock, or whatever the colony is attached to.



G. P. WHITLEY, del.

EXPLANATION OF PLATE XII.

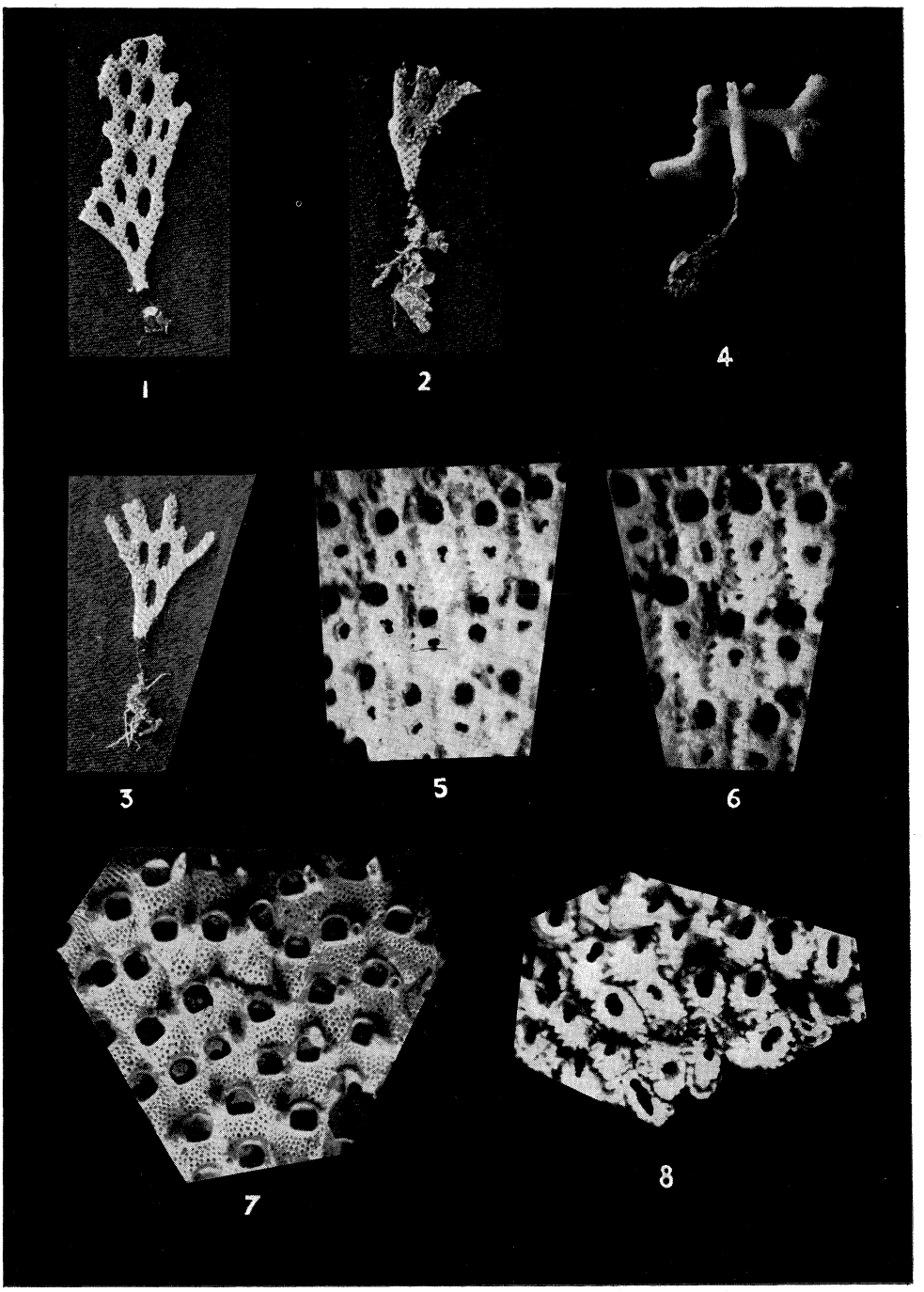
Figs. 1-3. *Petralia undata* MacGillivray. Colonies with filaments, by means of which they anchor themselves in the soft sand on the sea floor.

,, 4. *Haswellia coronata* Reuss. A colony with anchoring filament which serves as a means of attachment to the sea bottom. The filament arises from the central column, which is thought to be hollow.

,, 5-6. *Lepralia mucronata* var. *celleporoides* Busk. Views of incinerated portions of a colony.

,, 7. Zooecial detail of *Lepralia uniturrita* sp. nov.

,, 8. Zooecial detail of *Lepralia bicornis* Thornely.



G. C. CLUTTON, photo.

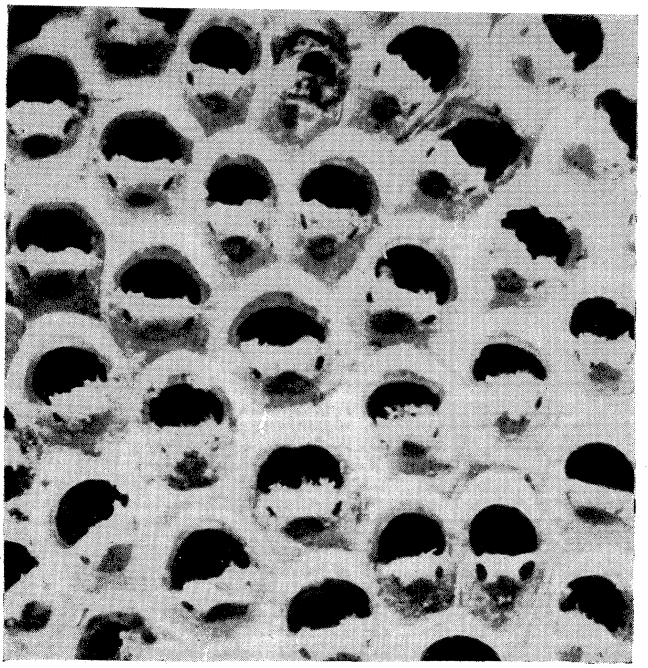
EXPLANATION OF PLATE XIII.

Fig. 1. Enlarged zooecial detail of *Steganoporella greavesi* sp. nov.

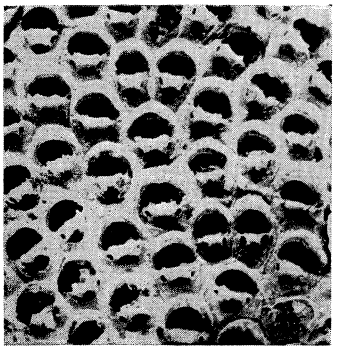
,, 2. Zooecial detail of same.

,, 3. View of portion of a colony of *S. greavesi* sp. nov. with basal wall removed, showing the polypide tube of each zooecium.

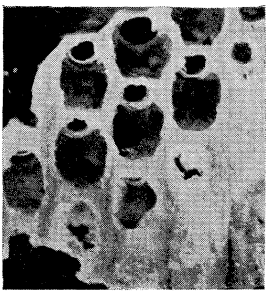
,, 4. Zooecial detail of *Arachnopusia acanthoceros* (MacGillivray), showing only the first or basal section of the spines.



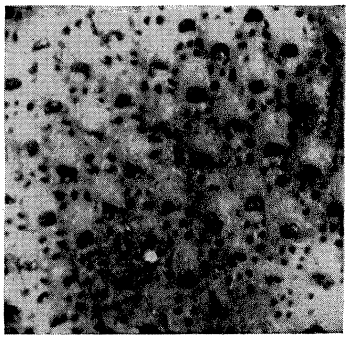
1



2



3



4

G. C. CLUTTON, photo.

[The following corrections were printed in the Index of Volume 15 in 1927.—Sub-Editor, September, 2009.]

CORRIGENDA.

Page 168, line 16. For *australia* read *australis*.

Page 259, line 19. Delete *shearsbyi*