

obtained in a similar manner from *Chlorococcum*. Both contain the six different-coloured substances usually, if not invariably, met with in green algae and in plants of higher organization, but in different relative proportion. The most striking fact was, that the variety of chlorophyll which I have named "yellow chlorophyll," characterized by a spectrum very different from that of the more abundant "blue chlorophyll," exists in a much larger relative amount than in plants of high organization, and even in larger amount than in other green algae which I have examined, but perhaps not in larger than might very well occur in minute green algae growing in damp tropical woods. On the contrary, what I have called "orange xanthophyll" occurs in smaller amount in the algae from the hair than in *Chlorococcum*. I subjoin comparative analyses, which must be looked upon as only approximate. They, however, suffice to show most clearly that the green colour of the hair of Sloths is due to the presence of precisely the same colouring-matters as those found in green algae, the difference being no greater than what may be due to small differences in conditions.

	<i>Chlorococcum.</i>	Sloth's hair.
Blue chlorophyll	48	53
Yellow "	10	17
Xanthophyll	16	17
Yellow xanthophyll	16	8
Orange "	6	1
Lichnoxanthine	4	4
	100	100

Descriptive Catalogue of the Species of *Cellepora* collected on the 'Challenger' Expedition. By GEORGE BUSK, F.R.S., F.L.S.

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THE number of species here referred to the genus *Cellepora* is about 26 or 27.

Of these—

1. The *North-Atlantic* region yielded three, from depths varying from 51 to 450 fathoms.

2. The *South-Atlantic* furnished five, from depths varying from 5 to 600 fms.

3. The *Kerguelen* or *South-Indian region* yielded seven, all from the immediate neighbourhood of Kerguelen's Land, and from depths varying from 20 to 150 fms.

4. The *Australian region* afforded eleven species, all, with one exception (*C. solida*), from depths varying from 2 to probably not more than 40 fms. The exception is a very aberrant form, and only doubtfully referred to the genus; it was procured from a depth of 2600 fms.

5. The *North-Pacific region* furnished only two species, one at 18 and the other from 310 fms.; and

6. The *South-Pacific* three or four species, from depths varying from 45 to 150 fms., except in one rather curious instance, in which the specimen appears to have been brought up from 1325 fms., near the western coast of South America. The circumstance is curious, since the same species, *C. Eatonensis* (var. *magellensis*), occurred near the Falkland Islands at a depth of not more than 5 to 12 fms.

On the whole, the genus, as represented in the present collection, would appear to belong to comparatively shallow water.

Class POLYZOA.

Order GYMNOLEMATATA.

Suborder CHEILOSTOMATA.

Fam. CELLEPORIDÆ.

Celleporidæ, *Johnst.*; *Brit. Mus. Cat.*; *Hincks, &c.*

Escharidæ (pars), *D'Orbigny.*

Myrizoidæ (pars), *Smitt.*

Char. Zoœcia urceolate, erect or suberect, irregularly heaped together, and often forming several superimposed layers.

Gen. I. CELLEPORA.

Cellepora (pars), *Fabric.*; *Linna., &c.*

Cellepora, *Brit. Mus. Cat.*; *Johnst.*; *Hincks; auct.*

Tubipora (pars), *Linna.*

Millepora (pars), *Filix & Solander.*

Celleporaria, *Lamæ.*; *Reuss.*; *D'Orb. Sc.*

Spongiætes, *Owen.*

Char. Zoarium multiform, lamellar and incrusting and partially adnate, or free; or erect and attached by a thick base; massive or irregularly branched, solid or hollow; or in the shape of small parasitic, pisiform or discoid growths. *Zoecia*, in the older portions, more or less erect or vertical, very irregularly disposed and heaped together. *Orifice* entire, or sinuated in front, with one or more small avicularia closely contiguous to it. Often a preoral rostral process (sometimes aborted), usually supporting an avicularium; very generally interspersed avicularia.

The species of *Cellepora* here enumerated may be artificially arranged into groups, characterized respectively by the form of the orifice, or, more accurately perhaps, by that of the oral valve or operculum; whilst a secondary division may be made from the characters afforded by the general zoarial habit†, which may be either incrusting or lamellar, or more or less solid, massive, branched, or lobate.

§ I. Border of the primary orifice entire; not sinuated or notched in front (Holostomatous).

- | | |
|-------------------------------|-----------------------------|
| 1. <i>C. hastigera</i> . | 7. <i>C. columnaris</i> . |
| 2. <i>C. apiculata</i> . | 8. <i>C. honolulensis</i> . |
| 3. <i>C. nodulosa</i> . | 9. <i>C. imbellis</i> . |
| 4. <i>C. zamboangensis</i> . | 10*. <i>C. rudis</i> .‡ |
| 5. <i>C. albirostris</i> . | 11. <i>C. solida</i> . |
| 6. <i>C. tridenticulata</i> . | |

§ II. Orifice notched or sinuated in front (Schizostomatous).

α. Incrusting or massive, branched or lobate.

- | | |
|-------------------------------|----------------------------|
| 1. <i>C. Simonensis</i> . | 6*. <i>C. polymorpha</i> . |
| 2. <i>C. pustulata</i> . | 7. <i>C. tuberculata</i> . |
| 3. <i>C. cylindriformis</i> . | 8*. <i>C. vagans</i> . |
| 4. <i>C. Eatonensis</i> . | 9. <i>C. Jacksoniensis</i> |
| 5*. <i>C. ovalis</i> . | |

β. Parasitic, usually pisiform.

- | | |
|----------------------------|-------------------------------|
| 10. <i>C. bicornis</i> | 14. <i>C. ansata</i> . |
| 11. <i>C. bilobulata</i> . | 15. <i>C. canaliculata</i> . |
| 12. <i>C. signata</i> | 16. <i>C. bidenticulata</i> . |
| 13. <i>C. emnea</i> . | |

† *Vide* Hinks, Brit. Mar. Polyzoa, vol. i. p. 398 *et seq.*

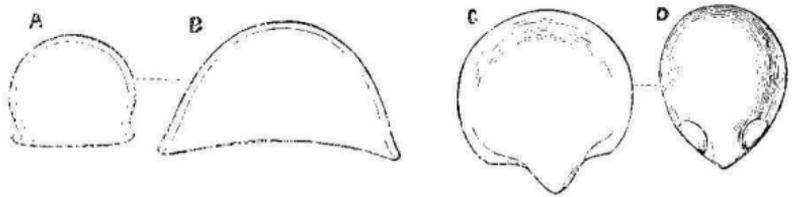
‡ In the species marked with an asterisk the form of the orifice does not accord with that of the operculum.

If the form of the operculum be taken as the character*, the species may be arranged as under:—

§ I. Operculum suborbicular, semicircular, or arcuate.
(Woodcuts A & B.)

- | | |
|-----------------------------|------------------------------|
| 1. <i>C. nodulosa.</i> | 8. <i>C. apiculata.</i> |
| 2. <i>C. hastigera.</i> | 9. <i>C. tridenticulata.</i> |
| 3. <i>C. albirostris.</i> | 10. <i>C. zamboangensis.</i> |
| 4. <i>C. ovalis.</i> | 11. <i>C. honohulensis.</i> |
| 5. <i>C. columnaris.</i> | 12. <i>C. vagans.</i> |
| 6. <i>C. polymorpha.</i> | 13. <i>C. imbellis.</i> |
| 7. <i>C. Jacksoniensis.</i> | |

§ II. Operculum more or less pyriform or contracted below, with an articular notch on each side. (Woodcuts C & D.)



α. Massive, lobate, or incrusting.

- | | |
|--------------------------|--------------------------------|
| 1. <i>C. tessellata.</i> | 3. <i>C. rudis.</i> |
| 2. <i>C. Eatonensis.</i> | 4. <i>C. cylindriciformis.</i> |

β. Pisiform, parasitic.

- | | |
|----------------------------|------------------------------|
| 5. <i>C. ansata.</i> | 9. <i>C. signata.</i> |
| 6. <i>C. bicornis.</i> | 10. <i>C. bidenticulata.</i> |
| 7. <i>C. canaliculata.</i> | 11. <i>C. bilabiata.</i> |
| 8. <i>C. conica.</i> | |

Section I.

1. *C. HASTIGERA*, n. sp.†

Char. Zoarium erect, expanded, lobate. Zoecia deeply immersed; surface entire dull. Orifice (primary) suborbicular, with a slightly sinuated lower border and no spines. Preoral rostra of two kinds—one, very stout and subconical, supporting on the posterior face, either at or near the apex or lower down, an avicularium, with either an acute or a duckbill-shaped mandible and a toothed beak; the other slenderer and very acute, with a small lateral avicularium at the base overhanging a notch.

Hab. St. 162. Bass Strait, 38–40 fms., sand.

* See paper by A. W. Waters in Proc. Lit. & Philos. Soc. Manch. 1878, vol. xvii. p. 125.

† "Chall. Rep." pl. xxix, fig. 1. The illustrative figures here referred to along with the name of each new species will appear in my Monograph of the 'Challenger' Polyzoa, now nearly completed.

In some respects the characters of this form render it doubtful whether it may not be a variety of *C. bispinata*, B.M. Cat., or *C. (Discopora) albirostris*, Smitt (Florid. Bryoz.); but the total absence of any sign of the two long slender oral spines in the marginal zoëcia, and the different form and proportions of the preoral rostral process, render them, in my opinion, sufficiently distinct.

2. *C. APICULATA*, n. sp.*

Char. Zoarium incrusting, or unilaminar and unattached. Zoëcia (at the growing edge) ventricose or barrel-shaped, with a granular unpunctured surface; in the older portions deeply immersed and very confusedly disposed, varying much also in size. Primary orifice semicircular, with a straight entire lower border, and surmounted in the earliest stage by two, or rarely three, long oral spines. Preoral rostrum very irregular in size, and supporting usually on one side a large avicularium, with an obtuse serrated beak, and a subacute lanceolate or triangular mandible, and usually produced beyond the avicularium into a longer or shorter obtuse apiculate spine.

Hab. St. 163 A. Off Port Jackson, 30-35 fms., rock.

The extreme irregularity of growth and great diversity in the form and size of the preoral rostrum, which is sometimes very small and at others developed into a very large avicularian process, renders any description of this species very difficult. The chief points at present are:—(1) the semicircular orifice (about 0".07 wide) with a straight entire lower lip; (2) the, at first, short and thick hollow rostrum, which afterwards becomes produced into an obtuse spine, and on the side of the wider portion, some distance above the base, supports on one side a large avicularium with a finely serrated beak and rather blunt elongated mandible; (3) the presence on the youngest zoëcia only of two, or sometimes three, long oral spines, like those in *C. bispinata*, mihi, or *C. albirostris*, Smitt. The figure in "Chall. Rep." plate xxix. has unfortunately been taken from a very bad specimen, and shows little of the real characters.

3. *C. NODULOSA*, n. sp.

Char. Zoarium a rounded, irregularly nodular massive growth. Zoëcia perfectly upright, very deeply immersed below, often free above, and united in sets of three or four together. Orifice suborbicular or elliptical, about 0".007 wide. A few excessively minute denticles within the lower border. Operculum subtrian-

* "Chall. Rep." pl. xxix. fig. 2.

gular rounded, about 0''·006 in diameter. *Preoral rostrum* small, conical, obtuse, most frequently represented by a mere transverse tuberosity. On the back a very minute avicularium with a semi-circular mandible. *Oecium* partially recumbent, free, with a wide arched opening, and frequently with a round pore on each side in front. Interspersed *avicularia* rare, columnar, vicarious. Mandible blunt, triangular; beak obtuse, not toothed.

Hab. St. 163 A. Off Port Jackson, 38-45 fms.

The open honeycomb aspect of this form and the peculiar habit (if constant) are very characteristic at first sight.

4. *C. ZAMBOANGENSIS*, n. sp.*

Char. *Zoarium* expanded thick, loosely adnate; surface uneven, but not distinctly mamillated. *Zoecia* distant, very confusedly disposed, obscurely punctured round the border; the interspaces are sometimes irregularly cancellated; surface porcellanous. Primary *orifice* suborbicular or slightly coarctate; operculum suborbiculo-triangular. *Preoral rostrum* small, conical, obtuse, presenting on one side near the base a very minute avicularium, with a semielliptical mandible pointing upwards. Interspersed prominent *avicularia* with a short duckbill-shaped mandible and simple non-serrated beak; very rarely one of large size, completely immersed, with a long spatulate obtuse mandible very wide at the base.

Hab. Off Zamboanga, 10 fms.

In the figure the orifice is represented as notched on one side, but the apparent notch is merely caused by the projection of the base of the rostrum, and the rostral avicularium is represented larger than it should be.

5. *C. ALBIROSTRIS*, *Smitt.*†

Discopora albirostris (forma typica), *Smitt, Florid. Bryoz. part ii.* p. 70, pl. xii. figs. 234-239.

? *Cellepora bispinata*, *Bk. Brit. Mus. Cat.* p. 87, pl. cxx. figs. 1, 2.

Char. *Zoarium* massive, irregularly lobate, cristæform, erect or partially incrusting sponges or fucus. *Zoecia* (marginal) barrel-shaped; surface pearly, smooth or finely granular; imperforate, or with a few punctures round the border. *Orifice* (primary) suborbicular, or arcuate; two long, very slender, unarticulated oral spines above. *Rostrum* (when fully formed) very long, straight and acuminate, solid, with a minute avicularium, with semi-

* "Chall. Rep." pl. xxx. fig. 7.

† "Chall. Rep." pl. xxxiii. fig. 7.

circular mandible on one side of the base, and overhanging a wide sinus; on the older zoœcia often a long, solid, upright acuminate spine, arising apparently from the side of the zoœcium about the middle of its length; the rostrum often developed into a very thick subcylindrical process, obliquely truncated at the end, and presenting on the oblique face a large avicularium with a blunt spatulate mandible and toothed beak (fig. 7*d*). A few interspersed immersed avicularia, usually placed transversely on the front of a zoœcium, and varying greatly in size; the mandible elongated, obtuse, or subspatulate, with a simple rounded beak.

Hab. St. 151. Off Heard Island, 75 fms., mud.

As Prof. Smitt remarks, the typical *C. albirostris* in a fresh condition is readily recognizable by its greyish-brown colour and blackish-brown opercula. The zoœcia, he goes on to observe, in the growing edge of the colony, are elongated ovate, presenting the greatest resemblance to *Cellepora bispinata*, B. M. Cat.

In this I quite agree with Prof. Smitt, and am strongly inclined to think that his *Cell. albirostris* is identical with my *C. bispinata*. Unfortunately I have no specimen of the latter to compare, and the figure and description in the Brit. Mus. Cat. are hardly sufficient to determine the point. Under these circumstances I have thought it best to retain Prof. Smitt's appellation. I would remark, however, that my term of "very minute," as applied to the usual kind of rostral avicularium, quite accords with that of *C. albirostris*. The large rostral avicularia are only occasional.

With respect to Prof. Smitt's supposition that *C. albirostris* and my *Cell. mamillata* may be connected, if I understand him correctly, I may observe that there can be no doubt of their complete distinctness. Nor can I see any reason for regarding the form described by Prof. Smitt, under the name of *C. (Discopora) pusilla*, as merely a variety of his *C. albirostris*. The two seem to me to be quite distinct; and how their close relation is "incontestably proved by the very same form of their zoœcial aperture," seems to me to be by no means clear, seeing that the form of aperture in question is one of very common occurrence.

6. *C. TRIDENTICULATA*, n. sp.*

Char. Zoarium lamellar, expanded, apparently unattached, uneven. Zoœcia deeply immersed; surface shining, granular,

* "Chall. Rep." pl. xxix. fig. 3.

imperforate. *Orifice arcuate or subtriangular*, with three (sometimes four) internal denticles within the lower border, about 0"·006-0"·007 wide. *Rostrum* (sometimes absent) a small rounded tuberosity, supporting on the summit, seated in a shallow depression, a minute avicularium with a semicircular mandible; a strong articulated spine on each side of the orifice. Large interspersed *avicularia* apparently vicarious (certainly not rostral), usually immersed, but sometimes more prominent, and partially erect, with a short, broad, duckbill-shaped mandible, shutting down into a shallow boat-like beak, the edge of which is finely pectinate.

Hab. St. 186. Lat. 10° 30' S., long. 142° 18' E.; 8 fms., coral-sand.

This well-marked species is at once recognizable by the long, articulated and indistinctly jointed oral spine on each side of the orifice. The limited development of the rostrum, with its little imbedded avicularium, is also a well-marked feature, as is also the fine pectination of the border of the cup in the interspersed avicularia. Another curious feature is the frequent occurrence on the surface of the zoarium of lengthened tubular processes or tunnels, looking like enormously elongated zoëcia. The nature of these curious appendages is very obscure.

7. *C. COLUMNARIS*, n. sp.*

Char. *Zoarium* expanded, thick, irregular in form and extent. *Zoëcia* very deeply immersed, ventricose, but with the outlines very obscure; substance of wall solid, porcellanous; surface finely granular. *Orifice* semicircular, lower lip straight and entire. A long, solid, tapering, columnar process springs from the back or side of the zoarium close to the orifice. In many zoëcia there is a small tubercular avicularian process in front below the orifice, which also sometimes rises in a columnar form; mandible triangular.

Hab. St. 162. Off East Moncœur Island, Bass Strait, 38-80 fms., sand.

8. *C. HONOLULENSIS*, n. sp.†

Char. *Zoarium* massive, irregular. *Zoëcia* very confusedly crowded, deeply immersed; surface finely granular, imperforate. *Orifice* (primary) semiorbicular or subtriangular, lower border

* "Chall. Rep." pl. xxix. fig. 11.

† "Chall. Rep." pl. xxix. fig. 5.

straight, with a minute 3-toothed pectinate process within it. A short pointed preoral rostrum, supporting on one side a small avicularium, with a semicircular mandible. In the older parts very numerous, large, interspersed prominent avicularia, with lanceolate mandible pointing upwards, and simply channelled beak.

Hab. St. 260*. Off Honolulu, 18 fms.

Differs from *C. tridenticulata* in the much smaller size of the internal denticles, which rather resemble a minute 3-toothed comb, and in the almost universal presence, on the front of the older zoëcia, of a prominent avicularium with a lanceolate mandible and simply channelled non-serrated beak.

9. *C. IMBELLIS*.†

Char. Zoarium lamellar, flexuose, thin. Zoëcia distinct, erect, free above, ventricose and immersed below; surface finely pitted. Orifice arcuate, or subtriangular or suborbicular, about 0".006 wide; peristome slightly thickened, a small avicularium in front just within the border. A few interspersed immersed avicularia, with an elongate spatulate mandible.

Hab. Off Bahia, 10–20 fms.

Only a single specimen, apparently old and dead.

10. *C. RUDIS*, n. sp.‡

Char. Zoarium (in a single specimen) consisting of a short, thick, cylindrical stem rising from a broad base and dividing into two rounded lobes. Aspect rugose and coarse. Zoëcia completely immersed and very confusedly heaped together. Orifice subquadrangular, large (nearly 0".01 wide), depressed. Preoral rostrum in the ordinary zoëcia merely a tubercle supporting an oval avicularium, with a blunt elliptical mandible pointing downwards; in the fertile zoëcia the rostrum is developed into a broad hollow process, from which a raised border passes back on each side of the orifice to the sides of the oëcium. Oëcium deeply immersed, having on the front a crescentic disk, marked with radiating furrows. Very numerous interspersed immersed avicularia, lying in all positions, and of very various sizes, with a broad short mandible, much contracted at the base.

Hab. St. 320. Lat. 37° 17' S., long. 53° 52' W.; 600 fms., hard ground.

† "Chall. Rep." pl. xxix. fig. 10.

‡ "Chall. Rep." pl. xxviii. fig. 7. The operculum in *C. rudis* is pyriform; so that it really belongs to the next section.

11. *C. SOLIDA*, n. sp.

Char. *Zoarium* ramose or globate, very irregular; in the older portions the zoecia are, as it were, all fused together, and coated with a porcellanous deposit, so that all trace of openings is lost. *Zoecia* (younger) barrel-shaped, wide above. *Orifice* quadrangular, border entire; the zoecium rises behind the mouth into an obtuse conical process, usually presenting a small *avicularium*, with a triangular mandible on the interior aspect. In front of the mouth is a much larger, rounded, tumid prominence, on which are, occasionally, placed a few very minute circular *avicularia*, also with an obtuse triangular mandible. Occasional large interspersed *avicularia*, with a broad, short, spatulate mandible.

Hab. St. 160. Lat. $42^{\circ} 42' S.$, long. $134^{\circ} 10' E.$; 2600 fms., red clay.

The entire growth is solid and has a porcellanous aspect.

Section II.

12. *C. SIMONENSIS*, n. sp.*

Char. *Zoarium* branched or massive and irregular; surface uneven, nodulated, or papillose. *Zoecia* deeply immersed and ventricose, with a row of punctures round the border, and sometimes sparsely punctured all over. *Orifice* elithridiate [keyhole-shaped]; peristome thick, in the older stage annular or shortly tubular. An obtuse avicularian process on one side close below the orifice, with a broadly triangular mandible pointing upwards. A few interspersed, minute, immersed avicularia with spatulate mandible.

Hab. St. 122. Lat. $9^{\circ} 5' S.$, long. $34^{\circ} 49' W.$; 400 fms., mud. Simon's Bay.

The oral valve is of the same shape as the orifice, and has a pyriform thickening on each side †.

The small interspersed avicularia in the older parts of the zoarium appear to be transformed zoecia of small size.

13. *C. PUSTULATA*, n. sp. ‡

Char. *Zoarium* cylindrical, irregularly branched; branches slightly tapering. *Zoecia*, in the younger portions, distinct, ventricose; walls entire, uneven. *Orifice* elithridiate; peristome

* "Chall. Rep." pl. xxviii. fig. 6 & pl. xxix. fig. 9.

† "Chall. Rep." pl. xxix. fig. 9a.

‡ "Chall. Rep." pl. xxviii. fig. 8.

thin. In the older zoëcia a small tubercular preoral process, having on one side a minute *avicularium* with a subtriangular mandible. In the older portions the individual zoëcia are, for the most part, obliterated; and in those parts of the zoarium the surface presents small pustular, subhexagonal eminences, each of which has a minute *avicularium* in its centre. Besides these there are a few interspersed *avicularia* with spatulate mandible, with a very contracted base.

Hab. St. 167. Lat. $39^{\circ} 32'$ S., long. $171^{\circ} 48'$ E.; 150 fms., grey ooze. Off Marion Island, 50–75 fms.

14. *C. CYLINDRIFORMIS*, n. sp.*

Char. *Zoarium* conical or tapering. *Zoëcia* large, distinct. *Orifice* orbicular, widely emarginate. A strong, incurved, cylindrical preoral process, supporting a large *avicularium*, with a broad, equilateral, triangular mandible. Interspersed *avicularia* not numerous, having a broad, short, membranous mandible, either of a duck-bill form or squarely truncate. *Ovicium* small, erect, globose, punctured.

Hab. St. 142. Lat. $35^{\circ} 4'$ S., long. $18^{\circ} 37'$ E.; 150 fms., sand.

The only specimen is of a cylindrical form, about $\frac{3}{4}$ " long by 0"·1 in diameter, appearing, but not certainly, to be moulded on a worm-tube.

15. *C. JACKSONIENSIS*, n. sp.†

Char. *Zoarium* branched; branches compressed. *Zoëcia* barrel-shaped, very distinct at the growing edge, elsewhere confused: surface granular, with a row of small perforations round the border. *Preoral process* short, pointed, trifid, with an *avicularium* on one side at the base, with a rounded mandible. *Orifice* orbicular‡, widely notched in front. On some of the lateral zoëcia there is a strong projecting rostrum with a lanceolate *avicularium*, the beak of which is cupped and toothed.

Hab. St. 163 A. Off Port Jackson, 30–35 fms., rock.

16. *C. EATONENSIS*, n. sp.§

Char. *Zoarium* multiform, massive, or branched, the branches short, thick, and obtuse, or more or less lamellar, and free or incrusting, or parasitic, and more or less globose. *Zoëcia* (young) barrel-shaped, afterwards ventricose; surface entire, smooth.

* "Chall. Rep." pl. xxx. fig. 9.

† "Chall. Rep." pl. xxx. fig. 10.

‡ Not really notched.

§ "Chall. Rep." pl. xxix. figs. 4, 6, 8.

Orifice subarcuate, with a wide notch. *Preoral rostrum* very variable in size and conformation; small and conical, or very large and cylindrical towards the end, and deeply channelled on the posterior aspect, but always hollow; supporting near the extremity a small avicularium with a semicircular mandible; numerous, very large, interspersed avicularia, with a duckbill-shaped mandible, shutting down into a deeply cupped beak, the end of which is gouge-shaped and the border entire and sharp.

Hab. St. 149 D. Royal Sound, Kerguelen, 20–60 fms. St. 149 I. Off Christmas Harbour, 45–120 fms. St. 303. Lat. $45^{\circ} 31' S.$, long. $78^{\circ} 9' W.$; 1325 fms., *Globigerina*-ooze. St. 315. Lat. $51^{\circ} 40' S.$, long. $57^{\circ} 50' W.$; 5–12 fms., sand.

Though exhibiting great diversity, especially in the greater or less development of the rostrum, the specimens from the above localities agree in all essential particulars, such as the shape of the orifice and oral valve, the presence of the small rostral semicircular avicularium, which is sometimes terminal, sometimes seated below the summit, which may be prolonged into an acuminate point beyond it; but more particularly the peculiar conformation of the numerous and large interspersed avicularia.

At first I had divided the form into three species (*C. Eatonensis*, *C. magellensis*, and *C. rostrata*), but am now quite satisfied that they are all specifically identical.

17. *C. OVALIS*, n. sp.*

Char. *Zoarium* ramose, branches cylindrical, tapering. *Zoecia* distinct, very prominent in the younger parts. *Orifice* orbicular, with a notch on one side. *Preoral process* strong, hollow, pointed, varying very much in height, and being much more prominent and pointed on the younger branches than on the main stem; it supports an *avicularium* with a wide triangular mandible; the beak simple. *Oecia* subrecumbent, with two or three raised pores in front. Interspersed *avicularia* few, of an oval form.

Hab. St. 75. Lat. $38^{\circ} 37' N.$, long. $28^{\circ} 30' W.$; 450 fms., sand.

Parasitic on a bundle of radical fibres of a Sertularian.

The labial notch in this case resembles that which occurs in most of the Retepores; it is not median, but placed to one side, and appears, as in Retepores, to have a tendency to become converted into a suboral pore.

* "Chall. Rep." pl. xxviii. fig. 5. *C. ovalis* really belongs to the Holo-stomatous division.

18. *C. POLYMORPHA*, n. sp.†

Char. *Zoarium* irregularly branched; branches tapering, short. *Zoecia* very confusedly disposed; surface coarsely granular. *Orifice* (primary) circular, widely emarginate; afterwards the peristome becomes much thickened and raised so as to conceal the primary mouth. Three or four acute curved denticles within the peristome, which, in this stage, is unarmed. In other *zoecia* the labial sinus becomes fissured, and eventually converted more or less completely into a suboral pore, whilst in front the peristome forms a prominent tubercular eminence, supporting on the side overlooking the fissure a large *avicularium*, with a blunt triangular mandible and toothed beak. A few interspersed *avicularia* on low horizontal eminences, with a spatulate mandible (often truncated) and bifid beak. *Oecia* erect or subrecumbent, globose; surface finely granular.

Hab. St. 260*. Off Honolulu, 20-40 fms.

18a. Var. *a.* DISCOIDEA.‡

Char. *Zoarium* (in single specimen) discoid, unilamellar, attached only at the centre. *Zoecia* at the growing edge ventricose, surface granular, entire; primary orifice suborbicular or elliptical, with a minute three-toothed process within the lower border. This latter is gradually developed into a large preoral rostrum placed to one side, at the base of which is a small labial sinus, and on the posterior face a large avicularium with a duck-bill-shaped mandible and toothed beak, beyond which, in the older *zoecia*, the *rostrum* is produced in the form of a strong conical solid spine. A few interspersed recumbent subimmersed avicularia, with a long lanceolate mandible and non-serrated beak.

Hab. St. 186. Lat. $10^{\circ} 30' S.$, long. $142^{\circ} 18' E.$, 8 fms.

19. *C. TUBERCULATA*, n. sp.§

Char. *Zoarium* massive, tuberculated. *Zoecia* erect, in groups of several together. *Orifice* arcuate or subquadrangular, slightly notched or sinuated below; peristome thick. *Preoral rostrum* very short, conical, with a minute avicularium near the summit. A few large interspersed *avicularia* on elevated hollow processes, with a broad, spear-shaped, obtuse mandible, which does not shut down within the beak.

Hab. Port Jackson, 2-10 fms.

† "Chall. Rep." pl. xxx. fig. 11.

‡ "Chall. Rep." pl. xxx. fig. 8.

§ "Chall. Rep." pl. xxviii. fig. 9.

As only a single, small, rather worn specimen was in the collection, the distinctness of this species must be regarded as doubtful.

20. *C. VAGANS*, n. sp.†

Char. *Zoarium* incrusting, dark olive-colour. *Zoecia* small, with a single row of puncta round the border. Surface granular. *Primary orifice* orbicular or subelithridiate. The peristome much produced in front, with a wide sinus; afterwards rising into a hollow conical-pointed rostrum, which usually supports on one side a minute avicularium with a semicircular mandible. Numerous large interspersed avicularia, whose mandible expands at the extremity into three or four branches, connected by a delicate membranous expansion, capable of being spread over foreign bodies: sometimes pointed, but always more or less membranous towards the end.

Hab. St. 148. Lat. 46° 47' S., long. 51° 37' E., 210 fms. St. 260*. Off Honolulu, lat. 21° 11' N., long. 157° 25' W., 310 fms.

The peculiarities of this species are:—

1. The almost tubular production of the peristome, even in the youngest zoecia seen. 2. The peculiar conical-pointed form of the preoral rostrum, which sometimes represents merely an obtuse tubercle, but is more commonly of an acute conical shape, the apical portion of which, being denuded of the dark fuscous epidermis, appears of an ivory whiteness, with a finely granular surface and porcellanous aspect.

The mode in which the partially membranous mandible of the larger avicularia sometimes spreads like a webbed hand over foreign bodies is very curious. In colour and superficial aspect this form might be confounded with *C. mamillata*, but they are quite distinct.

Section III.

21. *C. BICORNIS*, n. sp.‡

Char. *Zoarium* globose. *Zoecia* ventricose below, becoming tubular above. *Orifice* circular, notched; peristome much raised, tubular, and furnished in the perfect sterile zoecia with two cylindrical preoral processes, having on their summits minute avicularia, with an acute triangular mandible; besides these pro-

† "Chall. Rep." pl. xxix. fig. 10.

‡ "Chall. Rep." pl. xxx. figs. 1 & 12.

cesses the peristome supports 2-4 spines, which in the perfect zoëcia are replaced by a recumbent globular oëcium, having a rounded fissure in front; the surface otherwise of the oëcium is smooth and polished. A very few interspersed *avicularia*, with an excessively delicate membranous mandible of a broadly lanceolate form.

Hab. Prince Edward's Island, 80-150 fms.; parasitic on *Myrio-zoum truncatum*. And St. 150, lat. 52° 4' S., long. 71° 22' E., 150 fms., on *Onchopora Sinclairei*.

22. C. BILABIATA, n. sp.*

Char. Zoarium pisiform, very minute. Zoëcia very irregularly disposed, erect, pitcher-shaped. Orifice circular, emarginate; peristome thick and often produced into a rather deep bilabiate cup. On some zoëcia a short, strong, conical preoral process. Oëcia small, spherical, recumbent.

Hab. St. 161. Off Port Philip, 38 fms., sand. St. 135. Off Tristan d'Acunha, 60-1100 fms., rock. Parasitic on *Amathea spiralis*.

The collection affords only one or two small specimens.

23. C. SIGNATA, n. sp.†

Char. Zoarium pisiform. Zoëcia deeply immersed and very confusedly arranged; surface smooth, shining. Orifice arcuate, with a straight lower lip, having a very minute median notch. A strong, curved, hollow, preoral rostrum, with an *avicularium* on its posterior aspect near the summit, with a short, obtuse spatulate mandible pointing upwards. A few large interspersed *avicularia* with broad spatulate mandible. Oëcia erect, flattened in front, on which is a semicircular area, punctured (not grooved) round the border.

Hab. St. 304. Lat. 46° 53' S., long. 75° 11' W.; 45 fms., sand. Parasitic on a Sertularian.

24. C. CONICA, n. sp.‡

Char. Zoarium forming small conical growths, disposed several together in a stelliform manner (parasitic on a Sertularian). Zoëcia, surface rugose, obscurely punctured when very young. Orifice elithridiate; peristome thick, sometimes raised into a ridge on one or both sides. Preoral rostrum cylindrical, short,

* "Chall. Rep." pl. xxx. fig. 2.

† "Chall. Rep." pl. xxx. fig. 3.

‡ "Chall. Rep." pl. xxviii. fig. 10. Subsequent observation renders it probable that the form here described represents the young condition of a large branched and lobate form, which also occurs in S. Africa, but is not in the 'Challenger' collection.

curved, with an avicularium on the summit. Interspersed avicularia few in number, of small size, with a spatulate mandible. *Oœcium* small, spherical, deeply immersed, punctured in front.

Hab. Simon's Bay.

25. *C. ANSATA*, n. sp.*

Char. *Zoarium* in the form of small stellate growths or tufts, having three or four conical-pointed divisions. *Zoœcia* deeply immersed at the base, but more free and erect above; surface shining, rugose. *Orifice* circular, notched; peristome, in the older zoœcia, produced in front and on the sides into a long tubular or rather canalicular process, which supports on each side a small *avicularium* with a semicircular mandible. Numerous interspersed *avicularia* with curved, spatulate, thin, membranous mandible.

Hab. St. 75. Lat. 38° 37' N., long. 28° 30' W.; 450 fms., sand. Parasitic on a small Sertularian.

26. *C. CANALICULATA*, n. sp.†

Char. *Zoarium* pisiform. *Zoœcia* ventricose, tolerably distinct; surface rough, entire. *Orifice* orbicular and notched in front, or more usually clithridiate. A strong curved preoral *rostrum*, from which a thin expansion is continued on each side of the orifice so as to form a spacious spout-like cavity, at the bottom of which the mouth is situated. On the posterior aspect of the process, near the summit, is an *avicularium* with a semicircular mandible; the apical portion of the process is cylindrical.

Hab. St. 48. Lat. 43° 2' N., long. 64° 2' W.; 51 fms., rock.

27. *C. BIDENTICULATA*, n. sp.‡

Char. *Zoarium* small, pisiform. *Zoœcia* ventricose; walls thin, sparsely punctured. *Orifice* sublithridiate, with two very minute denticles within the lower border; peristome, in the older zoœcia, raised on one side into a thin canalicular expansion, and on the other side into a thicker process, which supports, on its inner face, a rather large *avicularium*, with a triangular obtuse mandible.

Hab. St. 163 A. Off Port Jackson, 30–35 fms., rock. Parasitic on a Sertularian.

* "Chall. Rep." pl. xxviii. fig. 5.

† "Chall. Rep." pl. xxx. fig. 5.

‡ "Chall. Rep." pl. xxx. fig. 6.