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New genera of Antarctic cheilostome Bryozoa

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Abstract : Eight new genera are introduced for certain endemic Antarctic cheilostome Bryozoa, formerly assigned to genera with tropical or North Atlantic geographical distributions. Two new species are described. Each species is illustrated and its geographical distribution is briefly documented.

Résumé : Huit nouveaux genres sont créés pour certaines espèces de Bryozoaires chilostomes, endémiques à l'Antarctique, qui étaient auparavant attribués à des genres de distribution tropicale ou nord-atlantique. Deux espèces nouvelles sont décrites. Chaque espèce est illustrée et sa distribution géographique rapidement commentée.

INTRODUCTION

Present knowledge of Antarctic cheilostome Bryozoa is founded upon the work of comparatively few authors. Although the Antarctic Cheilostomata are known to be taxonomically rich, with a high level of endemicity (Rogick 1965), few species have been reported upon on more than one occasion, and many have never been adequately described or illustrated. Hastings' (1943) "Discovery" report gives a detailed account of six families of cellularine anascan Cheilostomata, incorporating the contributions of earlier authors, most importantly those of Waters (1904), Calvet (1909) and Kluge (1914), and critically reviewing the systematics of the six families. Rogick (1955, 1956, 1959 a, 1959 b, 1960) and Moyano (1965, 1970) are the only modern authors to have treated the ascophoran Cheilostomata, not only introducing new species, but also redescribing imperfectly known species described by earlier authors. However, a majority of non-cellularine anascan, and ascophoran Cheilostomata are still known only from their original descriptions in Waters (1904), Calvet (1909), Kluge (1914), Livingstone (1928), and a very few other sources.

Many Antarctic Cheilostomata are strikingly distinctive species whose substantial colonies are immediately recognizable in benthic samples. The reportedly high endemism of Antarctic bryozoan species is not matched by high endemism at the genus level ; indeed, and particularly among the Ascophora, most cheilostome genera recorded from Antarctic waters occur not only in adjacent areas of the Southern Ocean, but have also been widely reported from the tropics or from temperate northern hemisphere waters as well. A large proportion of these genera, in fact, are defined by type species with North Atlantic distributions. This curious situation invites further investigation, and more detailed study of the morphology

of certain Antarctic Cheilostomata increasingly demonstrates a divergence from the genus type to the extent that the Antarctic species cannot be seen to be even remotely related to its non-Antarctic congeners (eg. Hayward & Thorpe 1987, 1988, Moyano 1970).

The collections of the National Antarctic Expedition (1901-1904), the British Antarctic Expedition (1907-1909), "Discovery" Investigations (1925 - 1939), and several smaller expeditions, presently being studied by the authors, comprise a vast assemblage of Antarctic and Subantarctic Bryozoa. Most of the species described by previous authors are represented in these collections, together with a substantial proportion of undescribed species, providing opportunities to redescribe poorly characterized species, and to begin to review and revise the unsatisfactory systematic placing of many of them. Eight new genera are introduced here, founded on previously described but wrongly assigned species ; two new species are also described. In some cases it is clear that the new genera may be satisfactorily accommodated in existing cheilostome families. In others it is questionable whether the new genus conforms to any presently constituted family, except in the broadest sense. However, it would be premature to attempt a major reclassification of Antarctic cheilostome genera until a more complete account of all Antarctic bryozoan faunas has been achieved.

All specimens studied have been deposited with the Bryozoa Section, Department of Zoology, British Museum (Natural History). Registration numbers of type and figured material are denoted by the prefix BMNH.

SYSTEMATIC DESCRIPTIONS

Chondriovelum gen. nov.

Diagnosis

Colony encrusting or erect. Autozooids with depressed cryptocyst extending beneath frontal membrane for greater part of its length. Cryptocyst with reflected distal lip, and lateral opesiular indentations, extending distally as a thin ridge delimiting the opesia. Avicularia vicarious, as large as autozooids, with distal groove for reception of the tip of the mandible ; with complete granular cryptocyst pierced by small opesiular foramina in separate distal and proximal groups. Mandible symmetrical, with thickened longitudinal sclerites, fusing to form a central rachis distally, and membranous lateral expansions. Ovicells assumed not to occur.

Type species : *Labioporella adeliensis* Livingstone, 1928.

Discussion

The tropical genus *Labioporella Harmer* is characterized by an extensive, porous cryptocyst, continuous distally with a calcified, basally directed tube which partly encloses the retracted polypide of the autozooid. It has large vicarious avicularia,

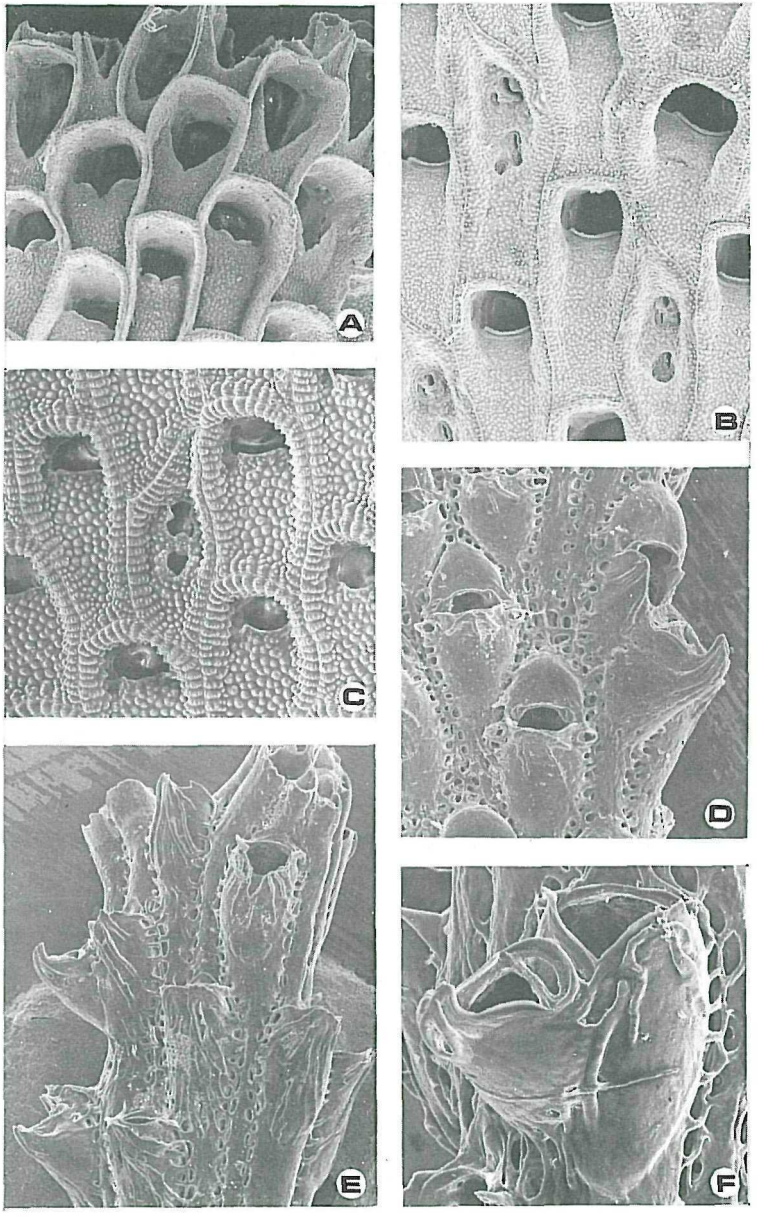

PLATE 1 - A, B. *Chondriovelum adeliense* (BMNH 1987. 9. 20. 1): A, Autozooids at the growing edge of the colony, x32; B, Autozooids and vicarious avicularia in later ontogeny, x40. C, *Chondriovelum angustiloba* (BMNH 1987. 9. 20. 2): Autozooids and a vicarious avicularium, x61. D - F, *Antarcticaetos bubeccata*: D, Ovicelled autozooids, x33; E, Autozooids at a branch tip, with a developing dichotomy, x33; F, Detail of an aperture and an enlarged avicularium, x80.

each with a well developed cryptocyst and a polypide - tube homologue, and supporting a rounded mandible (Cook 1964). *L. adeliensis* Livingstone (Fig. 1A, B), in contrast, has an extensive, imperforate cryptocyst, reflected distally and not developing a polypide tube (Fig. 1A). The vicarious avicularia of *L. adeliensis* have an almost complete cryptocyst, and symmetrical, winged mandibles with a slender distal portion. Livingstone's species is more properly assigned to the Onychocellidae than to the Labioporellidae (Cook 1964), and in its symmetrical, bimembranous avicularian mandible is most similar to species of *Smittipora* Jullien. It differs from all species of that genus, however, in its more complete development of cryptocystal calcification, particularly in the case of the avicularia, which in *Smittipora* have a substantial opesium. Further, the avicularian cystid in *Smittipora* is rounded distally, lacking the curving, distal groove, for accommodating the rachis, which is seen in *L. adeliensis*. These differences are sufficient to separate Livingstone's species at the generic level, and it is accordingly denoted as type species of a new genus, *Chondriovelum*.

Chondriovelum adeliense (Livingstone) forms erect, slender, branching, bilaminate colonies, each rising from an encrusting base. Autozooids and avicularia are thickly calcified, with deeply depressed, granular cryptocysts, and distinctly beaded mural rims. *Smittipora angustiloba* Moyano is strikingly similar to *C. adeliense*, most particularly in its granular calcification and in the almost complete avicularian cryptocyst (Fig. 1C). It is here formally reassigned to *Chondriovelum. C. angustiloba* forms thickened encrusting patches on hard substrata.

Geographical distribution

Chondriovelum adeliense appears to be an endemic Antarctic species. It was described by Livingstone (1928) from three stations off Queen Mary Land (92° - 97° E), and by Androsova (1972) from six localities on the coast of Australian Antarctic Territory between 63° E and 167° E. The present material is from Discovery stn. 190, Bismarck Strait, Palmer Archipelago (64° 56' S, 65°35' W, 315 m). *Chondriovelum angustiloba* (Moyano) was originally described from Tierra del Fuego. "Discovery" samples originated from two stations, off Cape Horn (56° 19.5' S, 67° 10' W, 121 m), and from the Patagonian Shelf (54°S, 64° 57.5'W, 118 m). It does not seem likely to occur in Antarctic seas.

Antarcticaetos gen. nov.

Diagnosis

Colony erect, slender, branching dichotomously, with or without tubular, chitinous nodes at the base of each ramus; cylindrical, with autozooids opening around the whole circumference of the branch. Autozooids with umbonuloid frontal wall development, and well marked marginal frontal septula. Proximal edge of aperture produced as a pronounced lip, but lacking denticles; no distal oral spines. Avicularia adventitious, sporadic; developed on one or both sides of the aperture, in the

axil of the aperture lip, small; a gigantic adventitious avicularium, with elongate, hooked rostrum, sporadically developed on frontal surface, close to aperture lip. Ovicell developed from distal wall of autozooid, recumbent on succeeding autozooid, smooth, imperforate.

Type species: *Escharoides bubeccata* Rogick, 1956.

Discussion

E. bubeccata (Fig. 1D-F) was described by Rogick (1956) in her account of the Antarctic species of *Escharoides* Milne Edwards, to which it certainly bears a superficial resemblance. However, *E. bubeccata* differs from all species of that genus not only in its delicate, erect colony form, but also in certain other features of its morphology. In *Escharoides* the strongly calcified autozooids are linked by well developed basal pore chambers, while in *E. bubeccata* interzooidal communication is through small, multiporous septula. Its delicate apertural lip is quite unlike those of other species, which have a complex series of denticles and internal ridges, and it lacks the distal oral shelf and well developed spines characteristic of *Escharoides*. *E. bubeccata* is clearly adapted for a different mode of living than those of the encrusting species of *Escharoides*, nonetheless, its morphology is sufficiently distinct to warrant the introduction of a new genus.

Several of the "Discovery" samples comprised large numbers of colonies, including flat-sectioned rods, slender, nodulated growths, and branching colonies with one or two bifurcations. The colonies were mostly about 20 mm high, rarely attaining 30 mm; the most slender comprised rods with whorls of three autozooids, while the broad flat colonies had a maximum of eight whorls. In some instances autozooid rows were continuous above and below dichotomies; in others a node consisting of a bundle of chitinous tubes was interposed above the dichotomy. These arose from short, tubular units lacking apertures, and developed distally as normal autozooids. The nodes perhaps coincide with periodic growth checks.

Geographical distribution

Rogick's material of *A. bubeccata* was collected from two stations in the Ross Sea. The present material comprised 16 samples from McMurdo Sound, Ross Sea, from the collections of the National Antarctic Expedition; the British Antarctic Expedition yielded two further samples, "Terra Nova" stns. 339 and 340, also from the Ross Sea. The "Discovery" collections included seven samples of *A. bubeccata,* four from the Ross Sea ("Discovery" stns. 1644, 1651, 1652, 1660), but also from Signy Island, South Orkney Islands (stn 167, 60° 50.5' S, 46° 15' W, 244 - 344 m), from the Bismarck Strait, Palmer Archipelago (stn 190, 64° 56' S, 65° 35' W, 315 m) and from the South Sandwich Islands (stn. 371, 1 mile east of Montagu Id., 99 - 161 m). *A. bubeccata* is likely to have a circumpolar distribution and is certainly an endemic Antarctic species.

Lageneschara gen. nov.

Diagnosis

Colony developed from an encrusting sheet, forming erect, folded, unilaminar plates; frequently enrolled or overlapped basally to give irregular bilaminar portions. Frontal wall of autozooid with proximal cryptocystidean portion, perforated by small stellate pores, and a more extensive distal umbonuloid shield, devoid of pores. Aperture produced as a prominent, thickened peristomial tube, with a broad, sharp cornered lyrula at its base, just above the frontal membrane. Ovicell prominent, spherical, imperforate; not closed by autozooidal operculum. No spines or avicularia. Ancestrula tatiform.

Type species: *Phylactella lyrulata* Calvet, 1909.

Discussion

Phylactella lyrulata Calvet (Fig. 2A, B) is a distinctive species which has been well described and illustrated by both Livingstone (1928) and Rogick (1957). However, its systematic placing has always been unsatisfactory. It differs from all other species within the Phylactellidae in the structure of the orifice and ovicell, and, more fundamentally, in the ontogeny of the frontal wall of the autozooid, which in *P. lyrulata* is quite clearly umbonuloid. It bears a superficial resemblance to species of *Escharella* Gray, but in that genus frontal wall ontogeny is entirely cryptocystidean. Gordon (1984) instituted the new genus *Elleschara,* within the Umbonulidae, for *Lepralia bensoni* Brown, another problematic species in which some features of *Escharella* are combined with umbonuloid frontal wall ontogeny. *P. lyrulata* differs from *Elleschara bensoni* in lacking spines and in the form of the aperture, which in the latter is developed as a peristomial tube with an inner ridge on its proximal side, modified basally as a lyrula-like structure. Finally, unlike *P. lyrulata, E. bensoni* has well developed basal pore chambers.

Geographical distribution

Lageneschara lyrulata (Calvet) has been reported from numerous Antarctic localities, from Marguerite Bay, Graham Land (Rogick 1955), eastwards to Queen Mary Land (Livingstone 1928), and the Ross Sea (Rogick 1955). The extensive series of samples from the National Antarctic Expedition and the British Antarctic Expedition were all from the Ross Sea, and a single specimen from "Discovery" Investigations (stn. 164) originated from the South Orkneys. *L. lyrulata* has not been recorded from beyond Antarctic shelf waters, and may be considered to be an endemic species.

Emballotheca Levinsen, 1909

This genus was introduced by Levinsen (1909) for *Lepralia quadrata* MacGillivray, an erect, bilaminar species from Victoria, Australia, and for two other species. It was discussed by Rogick (1955), who recognized two distinct groups of

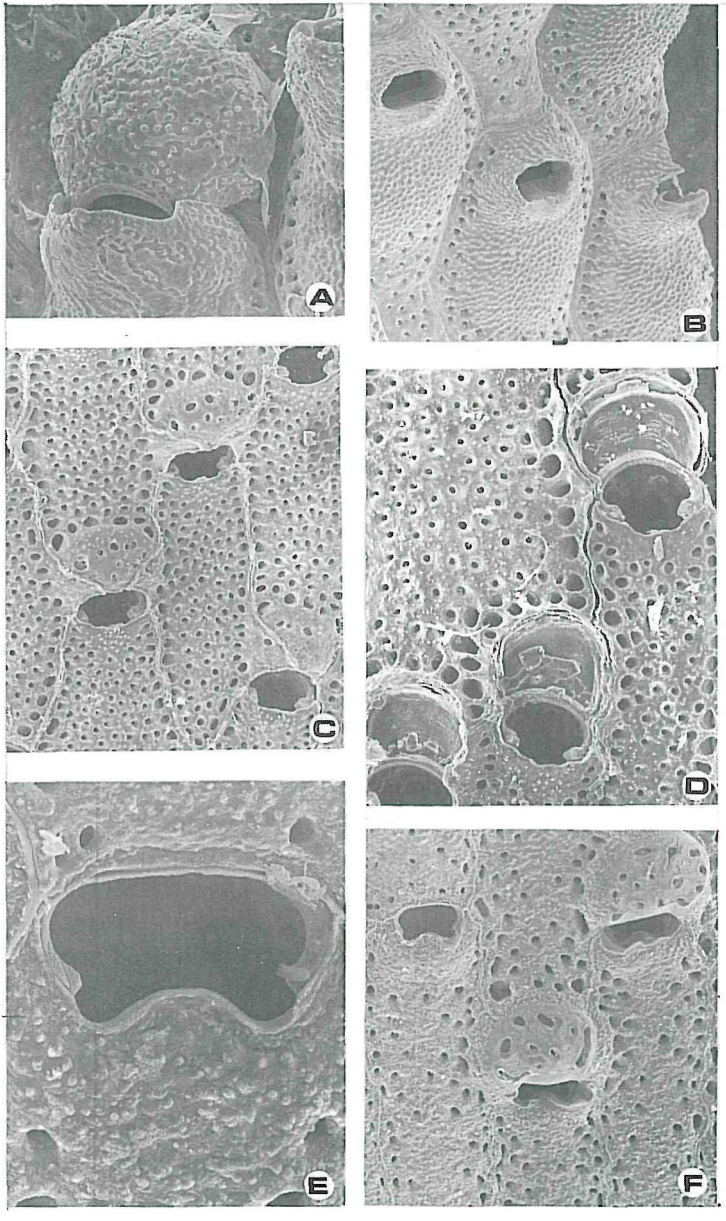

PLATE 2 - A, B, *Lageneschara lyrulata* (BMNH 1987. 9. 20. 4): A, Detail of an ovicell, x60; B, Group of autozooids, x40. C, D, *Thrypticocirrus contortuplicata* (BMNH 1987. 9. 20. 5): C, Autozooids with ovicells, x40; D, Developing ovicells, x50. E, F, *Thrypticocirrus phylactelloides* (BMNH 1987. 9. 20. 6): E, Detail of primary orifice, x160; F, Ovicelled autozooids, x40.

species, listing 19 species with schizoporellid orifices in one group, and nine species with "mucronellid" orifices in the second. Harmer (1957) distinguished his new genus *Calyptotheca* from *Emballotheca* partly by its schizoporellid orifice, and described eight new tropical species of *Calyptotheca* and two new tropical species of *Emballotheca*. Dumont (1981) discussed the differences between the two, noting the correspondence between Rogick's (1955) groups and Harmer's (1957) genera, and described further new species of both *Emballotheca* and *Calyptotheca* from the Red Sea.

While differing in the form of the orifice and operculum, species of both genera are alike in possessing a complex, tripartite ovicell, developed from the three autozooids surrounding the distal end of the brooding autozooid. In both genera, brooding autozooids tend to have broader orifices than non-brooding autozooids; avicularia are present along the margins of the autozooids, and are often particularly associated with ovicells.

The Antarctic species *Mucronella contortuplicata* Calvet (Fig. 2C, D) was first assigned to *Emballotheca* by Livingstone (1928), on the basis of Calvet's (1909) description of its ovicell. Subsequently, Rogick (1955) gave illustrated accounts of *M. contortuplicata* and the very similar *M. phylactelloides* Calvet (Fig. 2E, F), referring them to her second group within *Emballotheca.* In his posthumously published fourth Siboga Report, Harmer (1957) had also accepted Livingstone's (1928) opinion regarding *M. contortuplicata,* and noted that *M. phylactelloides* could probably be accommodated within *Emballotheca,* on the grounds of a supposed presence of dimorphic orifices.

Both *M. contortuplicata* and *M. phylactelloides* are endemic Antarctic species. A close systematic relationship between these two species, and species of the essentially tropical genera *Emballotheca* and *Calyptotheca* seems unlikely, and a consideration of their morphology shows that any such relationship is indeed remote. Firstly, the ovicells of *M. contortuplicata* (Fig. 2D) and *M. phylactelloides* (Fig. 2F) develop as single units. They have a standard two-layered structure, with the outer, ectooecial layer bearing a number of irregular pores. In later ontogeny a granular ooecial cover develops from the frontal calcification of the three autozooids adjoining the ovicell, with sutures indicating the different origins of each part. This ovicell is radically different from the much larger compound ovicell of *Emballotheca* and *Calyptotheca,* in which each of the three ectooecial and entooecial elements has separate origins. In neither of the two Antarctic species is there any evidence of orifice dimorphism. In both, the primary orifice has a distinct proximal lip, often angular, which becomes more prominent in late ontogeny and is variously developed among the autozooids of a single colony. In *M. phylactelloides* brooding autozooids frequently develop a thickened proximal peristome, but their orifices are of the same size and shape as those of non-brooding autozooids. Finally, avicularia are only sporadically present in colonies of *M. contortuplicata* and *M. phylactelloides;* in both, they occur singly, immediately proximal to the primary

orifice, and constantly proximally directed. In *Emballotheca* and *Calyptotheca* the often numerous avicularia are developed along the edges of autozooids.

Emballotheca is thus an inappropriate genus for the endemic Antarctic species, *Mucronella contortuplicata* and *M. phylactelloides.* Both are here assigned to *Thrypticocirrus* gen. nov., together with a third, previously undescribed species, *T. rogickae* sp. nov.

Thrypticocirrus gen. nov.

Diagnosis

Colony developing erect, unilaminar or bilaminar sheets, folded or enrolled. Frontal wall of autozooid with inferred cryptocystidean development, evenly perforated by small, round pseudopores and with a marginal series of larger frontal septula. Primary orifice with an inner distal and disto-lateral rim (vestibular arch) continuous on each side with a short, bluntly rounded condyle; proximal border shallowly concave, or developing a projecting, convex lip. Ovicell recumbent on distally succeeding autozooid, with perforated ectooecium; developing a sutured, perforated, ooecial cover derived from adjacent autozooids. Avicularia infrequent; when present, adventitious, frontal, immediately proximal to orifice. Vertical walls of autozooids with multiporous septula.

Type species: *Mucronella contortuplicata* Calvet, 1909.

Discussion

The three species here assigned to *Thrypticocirrus* gen. nov. are alike in developing erect, lobed or branching colonies of large autozooids, in which bands of ovicelled autozooids are distinct. Periodic growth checks are indicated by lines of blind-ending kenozooids, similar in size to autozooids but lacking orifices. The colony of *T. contortuplicata* consists of enrolled or folded unilaminar sheets, which may overlap on their basal surfaces to form loosely organized bilaminar sheets. In *T. phylactelloides* the colony is bilaminate, developing a broad- or narrow-bladed shape, with a convoluted growing edge. The autozooid of *T. phylactelloides* differs from that of *T. contortuplicata* in the shape of its primary orifice, which is almost twice as wide as long, with smaller condyles and a more pronounced proximal lip than in *T. contortuplicata.*

Geographical distribution

Thrypticocirrus contortuplicata apparently has a wide distribution in Antarctic seas. Originally described from the west coast of Graham Land (Calvet 1909, Rogick 1955), it was reported by Livingstone (1928) from two stations off Adelie Land (141° E, 142° E). The present material comprises a sample from the coast of Wilkes Land (Banzare stn. 90), another from off Oates Land ("Terra Nova" stn. 194), and three samples from the Ross Sea ("Terra Nova" stns. 295, 316; "Discovery" stn. 1660). *T. phylactelloides* has a similar distribution. Calvet (1909) reported

it from two stations off Graham Land, Livingstone (1928) recorded it from off Kaiser Wilhelm II Land (94° E), while Rogick (1955) had specimens from two stations in Marguerite Bay, Graham Land, and a third at 101° 18' E. The present material comprises seven samples : two from the Palmer Archipelago, close to the type locality ("Discovery" stns. 187, 190), one from off Oates Land ("Terra Nova" stn. 194) and four from the Ross Sea (National Antarctic Expedition, Coulman Id. ; "Terra Nova" stns. 294, 295, 316).

Thrypticocirrus rogickae sp. nov. (Fig. 3A, B)

Material

Holotype : BMNH 1987.9.20.7, "Discovery" stn. 1660, 27.1.1936, 351 m.

Other material : British Antarctic Expedition, "Terra Nova" stns. 294, 316, 339, 355. "Discovery" stn. 1652.

Description

Colony developing delicate, erect, unilaminar sheets, folded or enrolled and occasionally overlapped to form bilaminar sheets. Autozooids hexagonal to rectangular, flat, separated by low ridges. Frontal wall densely perforated by small, round pseudopores, except for a small area immediately proximal to orifice, sometimes bearing an avicularium. Primary orifice as wide as long, almost rectangular in appearance, proximal border slightly convex and gently arched frontally ; vestibular arch thin but distinct, condyles short and peg-like, situated midway along length of orifice. Ovicell elongate oval, with relatively small pores ; ooecial cover develops early in ontogeny, but does not extend on to central, frontal region of ovicell. Suboral avicularia sparsely developed, slender oval, less than half length of orifice.

Discussion

This species has a superficial resemblance to *T. contortuplicata* ; it differs in its larger orifice, with smaller condyles, and in its more prominent ovicell, with less developed ooecial cover.

Measurements : means and standard deviations of 20 values, mm :

Autozooid length 1.27 ± 0.15 Orifice length 0.21 ± 0.01
Autozooid width 0.68 ± 0.07 Orifice width 0.22 ± 0.01

Geographical distribution

Thrypticocirrus rogickae is presently known only from the Ross Sea. It was present in four samples collected by the British Antarctic Expedition ("Terra Nova" stns. 294, 316, 339, 355) and two collected by "Discovery" Investigations (stns. 1652, 1660).

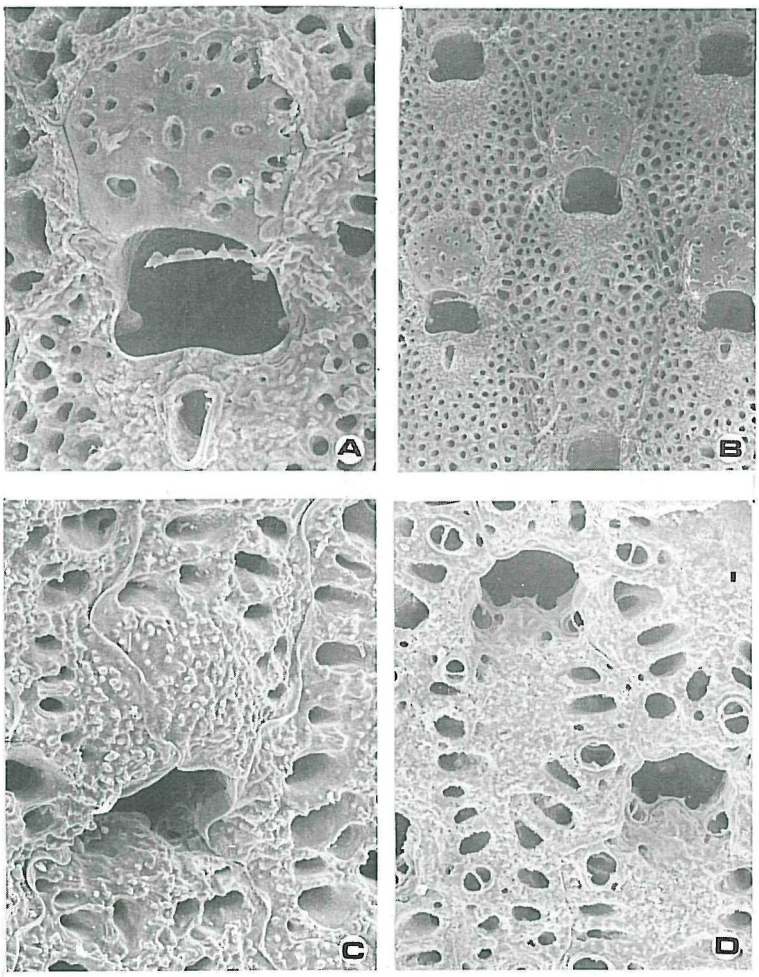

PLATE 3 - A, B, *Thrypticocirrus rogickae* (BMNH 1987. 9. 20. 8) : A, Detail showing primary orifice, x105 ; B, Ovicelled autozooids, x35. C, D, *Bostrychopora dentata* (BMNH 1987. 9. 20. 9) : C, An ovicell, x80 ; D, Autozooids with oral and frontal avicularia, x70.

Bostrychopora gen. nov.

Diagnosis

Colony rising from an encrusting base, developing erect, broad, folded, unilaminar sheets. Autozooid frontal wall with inferred cryptocystidean development, bordered by deep areolae, incorporating distinct frontal septula. Vertical walls with small, recessed, multiporous septula. Primary orifice with short condyles, and a well developed proximal lyrula. Paired adventitious avicularia typically present lateral to orifice, enclosed within a peristomial rim, one frequently enlarged; additional avicularia developed along margins of autozooids, budded from marginal septula. Ovicell hyperstomial, coarsely calcified, imperforate; developing a thickened, sutured ooecial cover.

Type species: *Smittia dentata* Waters, 1904.

Discussion

The frontal wall ontogeny, and the form of the orifice of *S. dentata* Waters (Fig. 3C, D) militate against its retention in *Umbonula* Hincks, to which it was referred by Rogick (1956). It clearly belongs in the Smittinidae, but does not conform to the diagnosis of any genus presently recognized within that family.

Consequently, it is practical to introduce a new genus, *Bostrychopora,* for this endemic Antarctic species. *Bostrychopora dentata* forms substantial, thickly calcified plates, which may be flat, folded or enrolled. The largest fragments present in the "Discovery" collections had surface areas in excess of 10 cm^2 , but no complete, undamaged colonies had survived.

Geographical distribution

B. dentata was described by Waters (1904) from the Bellingshausen Sea (70° S, 80° 48' W), and was subsequently reported by Rogick (1956) from Marguerite Bay, Graham Land, on the eastern side of the Bellingshausen Sea, and by Hayward and Taylor (1984) from the Ross Sea. Of the nine large samples in the present collection, one originates from the Palmer Archipelago, close to the type locality ("Discovery" stn. 190), a second from off Oates Land ("Terra Nova" stn. 194), and the rest from the Ross Sea (National Antarctic Expedition, Coulman Isd.; "Terra Nova" stns. 294, 316, 339, 355; "Discovery" stns. 1652, 1660).

Rhamphosmittina gen. nov.

Diagnosis

Colony developing from encrusting patches, forming erect, unilaminar sheets , delicate and folded. Frontal wall of autozooids with inferred cryptocystidean development; bordered by small areolar pores. Vertical walls with recessed septula, pierced by few pores. Primary orifice with prominent, blunt, lateral condyles, proximal border with a low lyrula. A single adventitous avicularium present mediproximal to orifice, perpendicular to frontal plane, facing laterally, with sharply

hooked rostrum. Additional avicularia developed along margins of autozooids. Ovicell hyperstomial, spherical, budded from distal wall of brooding autozooid and recumbent on proximal frontal wall of succeeding autozooid; smooth, imperforate except for two or three small pores close to aperture, developing a sutured ooecial cover. No spines.

Type species: *Rhamphostomella bassleri* Rogick. 1956.

Discussion

R. bassleri Rogick (Fig. 4 A, B) is incorrectly placed in *Rhamphostomella* Lorenz, a northern hemisphere genus, with a circumpolar distribution, all species of which display umbonuloid frontal wall ontogeny. It is properly a member of the Smittinidae, but its prominent, perpendicular suboral avicularium (reminiscent of that characterizing species of the genus *Rhynchozoon* Hincks), and the form of the ovicell, preclude its inclusion in any presently recognized genus. It is consequently here designated type species of the new genus, *Rhamphosmittina*.

Geographical distribution

Rogick (1956) described *R. bassleri* from two widely separate localities; Marguerite Bay, Graham Land, and Queen Mary Land (65° 25' S, 101° 13' E). The six samples reported here are from equally widespread localities, suggesting that the species is widely distributed in Antarctic waters. Four samples originate from the Ross Sea ("Terra Nova" stns. 295, 339; "Discovery" stns. 1652, 1660), another from the Palmer Archipelago ("Discovery" stn. 190), and the most northerly from Shag Rocks, South Georgia ("Discovery" stn. 160).

Pemmatoporella Hayward and Taylor, 1984

Diagnosis

Colony developing as brittle, unilaminar sheets; loosely encrusting, or erect and folded. Frontal wall of autozooids with inferred cryptocystidean development; with conspicuous marginal pores. Primary orifice lepralioid, with large lateral condyles. Ovicell recumbent on distally succeeding autozooid, hyperstomial, closed by autozooidal operculum; ooecial cover with frontal sutures and a single central foramen. Vertical walls with a single series of large, multiporous septula. Frontal adventitious avicularia proximal to orifice in many autozooids; small, oval, or larger, elongate oval.

Type species: *Lepralia marginata* Calvet, 1909.

Discussion

Rogick (1959) assigned *Lepralia marginata* Calvet to *Porella* Gray. Hayward and Taylor (1984) showed this to be an inappropriate genus for Calvet's species, and introduced for it the new genus, *Pemmatoporella.* Unfortunately, it has since become apparent that the material described and figured by Hayward and Taylor (1984) was not *L. marginata* but a superficially similar species which seems to be

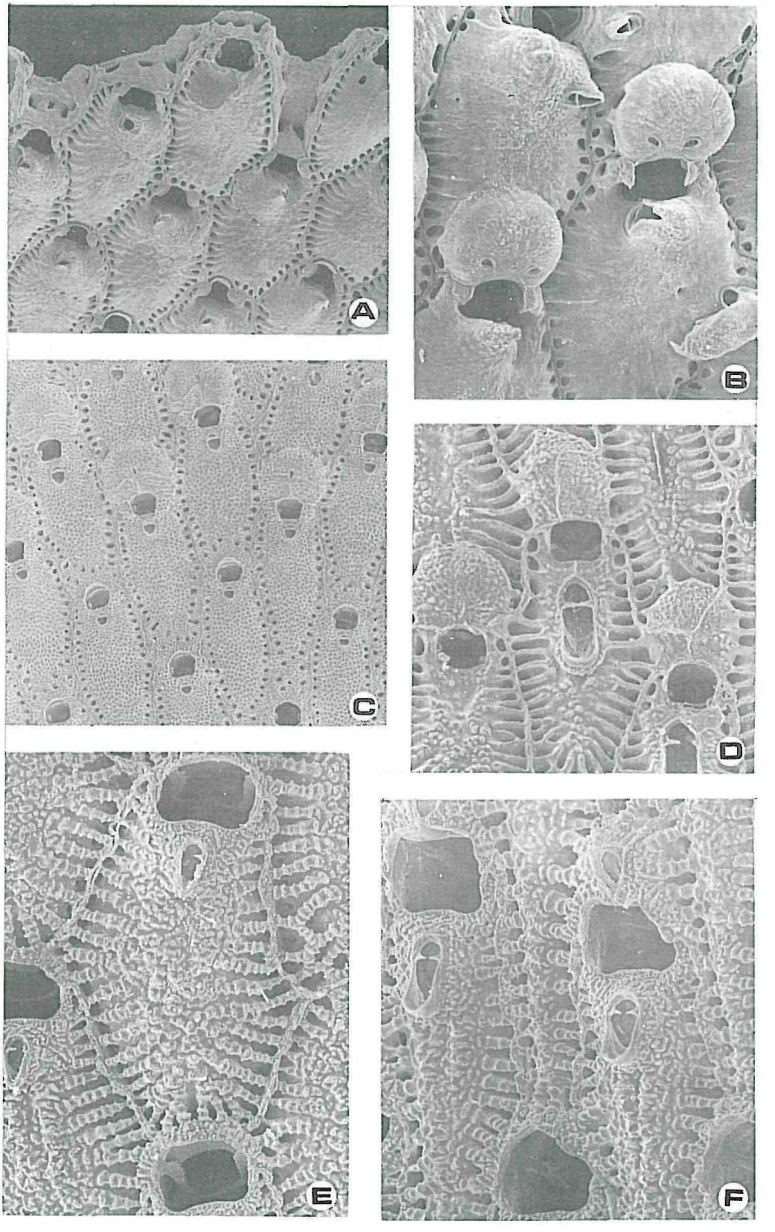

PLATE 4 - A, B *Rhamphosmittina bassleri* (BMNH 1987. 9. 20. 11, 12) : A, Autozooids at the growing edge, x23 ; B, Ovicelled autozooids, with additional frontal avicularia, x50. C, D, *Pemmatoporella marginata* (BMNH 1987. 9. 20. 14, 15) : A, Autozooids with normal suboral avicularia, x25; D, Autozooids with enlarged suboral avicularia, x40. E, F. *Astochoporella cassidula* (BMNH 1987. 9. 20. 17) : E, Group of autozooids with presumed occlusor laminae well shown, x40 ; F, Ovicelled autozooids, x40.

otherwise undescribed. The justification for removing *L. marginata* Calvet from *Porella* is, however, unchanged, although it is necessary to emend the diagnosis of *Pemmatoporella,* as above, to accommodate the morphology of the type species. A new taxonomic combination is here introduced for *Pemmatoporella marginata* Hayward and Taylor non Calvet, which is described below as *Astochoporella cassidula* gen. et sp. nov.

Pemmatoporella marginata (Calvet) (Fig. 4C, D) forms delicate folded or enrolled growths, enveloping substrata such as sponges, or growing freely above more solid substrata. The tubular growths so formed are characteristically banded or ringed with successive generations of brooding autozooids and, like certain other large Antarctic bryozoans, show periodic growth checks. The frontal walls of newly developed autozooids have a finely shagreened appearance, with rounded pores, which becomes more distinctly nodular in later ontogeny. The short, oval suboral avicularium is of inconstant occurrence, and in some parts of the colony may be replaced by a larger, elongate oval type. *Pemmatoporella* is at present most suitably accommodated within the Smittinidae.

Geographical distribution

P. marginata is an endemic Antarctic species, limited to Antarctic shelf waters. It was originally described from Graham Land (Calvet 1909), and has subsequently been reported from both Graham Land and the Kaiser Wilhelm II coast (Rogick 1959), from Adelie Land (Livingstone 1928) and from the Ross Sea (Hayward & Taylor 1984). The "Discovery" collections included 11 samples of *P. marginata,* from Shag Rocks, South Georgia ("Discovery" stns. 160, WS177), the Palmer Archipelago ("Discovery" stns. 190, 1872), and the Ross Sea ("Terra Nova" stns. 294, 316, 335, 355 ; "Discovery" stns. 1652, 1658, 1660).

Astochoporella gen. nov.

Diagnosis

Colony forming folded, unilaminar sheets, loosely encrusting or erect. Frontal wall of autozooids with umbonuloid development, displaying well marked marginal septula. Aperture thin-rimmed, lacking denticles ; rounded distally, straight or slightly convex proximally. Operculum supported distally by a narrow, calcified vestibular arch, continuous proximally on each side with a basally- deflected, dentate, occlusor lamina. Ovicell developed as a submersed expansion of the distal wall of the maternal autozooid, with ooecial cover developed from the frontal wall of the distally succeeding autozooid ; closed by autozooidal operculum. Frontal adventitious avicularia present proximal to aperture.

Type species : *Astochoporella cassidula* nom. nov.

Discussion

A. cassidula nom. nov. is introduced for *Pemmatoporella marginata* Hayward and Taylor (1984), non Calvet (1909). Its familial placing is problematic. It is superficially similar to certain genera within the Smittinidae, including *Pemmatoporella,* but its umbonuloid frontal wall ontogeny and its dentate occlusor laminae indicate that it is systematically remote from that particular cheilostome grouping. For the present it may be placed among the Umbonulidae, with the reservation that the Umbonulacean families now seem to be increasingly heterogenous assemblages of genera which will eventually require substantial systematic reassessment.

Astochoporella cassidula nom. nov. (Fig. 4 E, F)

Pemmatoporella marginata : Hayward and Taylor 1984 : 76, Fig. 2A, B.

Material

Holotype : BMNH 1987.9.20.16, "Discovery" stn. 1652, 23.1.1936, 567 m.

Description

Autozooids elongate, rectangular, flat, separated by thin, raised sutures. Frontal wall finely granular, with well marked marginal septula, interspersed with thickened, nodular ridges. Aperture relatively large, slightly wider than long, its proximal border straight, slightly convex or sometimes with a distinctly angular lip simulating a lyrula. Avicularium situated close to proximal edge of aperture ; elongate oval, with the rostrum slightly uplifted distally. Ovicell a short hemisphere, about as long as aperture, not very protuberant ; with relatively large, irregular foramen in ectooecium ; granular ooecial cover developing in early ontogeny.

Measurements, means and standard deviations of 20 values, mm :

Autozooid length 1.84 ± 0.01 Aperture length 0.32 ± 0.04
Autozooid width 0.90 ± 0.04 Aperture width 0.41 ± 0.02

Geographical distribution

The material figured by Hayward and Taylor (1984) was from the Ross Sea. The present material consists of eight samples, one from the Palmer Archipelago ("Discovery" stn. 190), and the rest from the Ross Sea (National Antarctic Expedition, Coulman Isd., "Terra Nova" stns. 295, 316, 339, 355 ; "Discovery" stns. 1652, 1660).

Adelascopora gen. nov.

Diagnosis

Colony erect, bilaminate, branching, with or without chitinous nodes. Autozooids with cryptocystidean frontal calcification, perforated by numerous small pseudopores ; a simple, crescentic ascopore present in the middle of the frontal surface.

Vertical walls with large, multiporous septula. Primary orifice more or less semicircular; the proximal border straight, with an indistinct condylar ridge. ovicells globular, prominent, budded from the proximal frontal wall of the autozooid distally succeeding the maternal autozooid; entooecium thinly calcified, ectooecium entirely membranous; aperture small, overhanging orifice of maternal autozooid. No avicularia. No spines.

Type species : *Microporella divaricata* Canu, 1904.

Discussion

M. divaricata Canu (Fig. 5A-D) differs from all other species of *Microporella* in its unusual colony form. It also differs in its interzooidal communication system, which in *Microporella* consists of well-calcified basal pore chambers, in its lack of avicularia, and, most importantly, in its ovicell. In all species of *Microporella* the ovicell is recumbent, thickly calcified, and is closed by the operculum of the brooding autozooid. In species of *Fenestrulina* the calcification of the ectooecium is generally thin, and may be incomplete, but in all species of that genus the autozooids are linked by substantial basal pore chambers, and have also a complexly calcified ascopore. *Microporella divaricata* is thus seen to be sufficiently distinct from other species of the Microporellidae to warrant a separate generic identity, and is here designated as type species of the new genus *Adelascopora.* A second species has also been isolated from the "Discovery" samples and is described below as *Adelascopora secunda* sp. nov.

Geographical distribution

Adelascopora divaricata was reported from the Bellingshausen Sea by Waters (1904), who recognized it as the same species described by Canu (1904) from Tertiary deposits of Patagonia. Part of Canu's material is conserved in the Waters Collection at the Manchester Museum. It is, as far as it is possible to judge, closely similar to the present specimens, but differs in that the autozooids are much smaller. It is possible that the Recent material represents a different species, but more fossil specimens are required before this possibility can be considered. Subsequent reports of Recent *A. divaricata,* are those of Livingstone (1928) from Queen Mary Land, and Androsova (1972) from Adelie Land. The present material comprises four samples, from the Palmer Archipelago ("Discovery" stn. 160), Oates Land ("Terra Nova" stn. 194), and the Ross Sea ("Terra Nova" stn. 316, "Discovery" stn. 1660).

Adelascopora secunda sp. nov. (Fig. 5E, F)

Material

Holotype : BMNH 1987.9.20.19, "Discovery" stn. 1952, 2.1.1937, 367 - 383 m.

Description

Colony erect, bilaminate, developing flat, flabellate, dichotomously branching

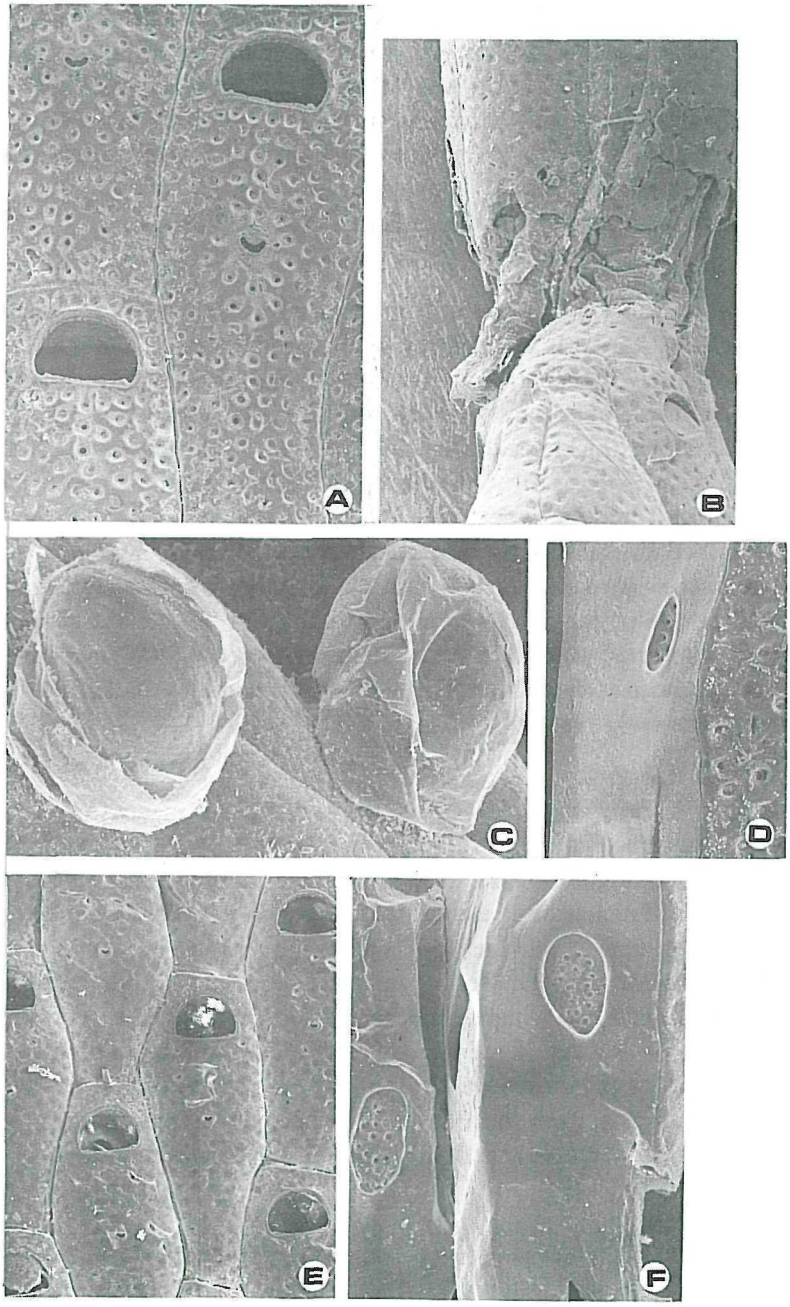

PLATE 5 - A, D, *Adelascopora divaricata* (BMNH 1987. 9. 20. 3, 18): A, Two autozooids, x70; B, Detail of a node, x50; C, Two ovicells, x70; D, A pore plate in a lateral wall, x110. E, F. *Adelascopora secunda* (BMNH 1987. 9. 20. 19): A, Group of autozooids, x40; F, Pore plates in lateral walls, x120.

fronds; without chitinous nodes. Holotype material up to 65 mm high, broadening distally to a maximum width of 7 mm; distance between dichotomies about 10 mm. Autozooids rounded hexagonal, with distal and proximal walls straight; convex, separated by distinct grooves. Primary orifice wider than long, D-shaped; mid-distal portion with fine denticulation, proximal edge straight, or very slightly concave, with scarcely discernible lip thickened on each side to form minute condylar processes. Frontal wall thinly calcified, hyaline, with numerous small, closely spaced, round pseudopores; ascopore reniform, small, scarcely two or three times the size of the frontal pores, with only a lightly thickened edge, situated almost exactly halfway along length of autozooid. Vertical walls with few, large septula, each with numerous pores. Colony margins and axes of dichotomies edged with large, blind kenozooids. Ovicells not developed in present material.

Measurements, means and standard deviations of 20 values, mm:

Autozooid length 1.29 ± 0.11 Orifice length 0.18 ± <0.01
Autozooid width 0.57 ± 0.09 Orifice width 0.25 ± 0.01

Discussion

Specimens of this species were collected from "Discovery" stns. 1952 (South Shetlands) and 190 (Palmer Archipelago). It is distinguished from *A. divaricata* by its colony form, those of the latter being narrowly cylindrical or flattened, with distinct nodes consisting of cylindrical, chitinous tubes. The autozooids are rather larger than those of *A. divaricata,* but are otherwise very similar. The lateral septula of *A. secunda* (Fig. 5F) are proportionately larger than those of *A. divaricata* (Fig. 5D), with three or four times as many pores. However, apart from this, and their very different colony form, and lacking any information on the ovicells of *A. secunda,* it is difficult to indicate any further firm distinctions between the two species.

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REFERENCES

ANDROSOVA, E.I., 1972. Marine invertebrates from Adelie Land, collected by the XIIth. and XVth. French Antartic Expeditions. *Tethys, supplément.* 4 : 87-102.

CALVET, L., 1909. Bryozoaires. *Expédition Antarctique Française* (1903-1905) *commandée par le Dr. Jean Charcot,* Paris : 1-49.

CANU, F., 1904. Les Bryozoaires du Patagonien (échelle des Bryozoaires pour les terrains tertiaires). *Mém. Soc. géol. de Fr.,* Paléontologie, 12, 3 : 1-30.

COOK, P.L., 1964. Polyzoa from West Africa 1. Notes on the Steganoporellidae, Thalamoporellidae and Onychocellidae (Anasca, Coilostega). *Ann. Inst. Océanogr.* Monaco, 41 : 43-78.

DUMONT, J.P.C., 1981. A report on the cheilostome Bryozoa of the Sudanese Red Sea. *J. Nat. Hist.,* 15 : 623-637.

GORDON, D.P., 1984. The Marine Fauna of New Zealand : Bryozoa : Gymnolaemata from the Kermadec Ridge. *N. Z. Oceanogr. Inst.* Memoir. 91 : 1-144.

HARMER, S.F., 1957. The Polyzoa of the Siboga Expedition, Part 4. Cheilostomata Ascophora. *Siboga Expedition Report,* 28d : 641-1147.

HASTINGS, A.B., 1943. Polyzoa (Bryozoa) 1. *Discovery Reports,* 22 : 301-510.

HAYWARD, P.J. & P.D. TAYLOR, 1984. Fossil and Recent Cheilostomata (Bryozoa) from the Ross Sea, Antarctica. *J. Nat. Hist.,* 18 : 71-94.

HAYWARD, P.J. & J.P. THORPE, 1987a. The systematic position of *Smittia inclusa* Waters, an endemic Antarctic bryozoan. *J. Nat. Hist.,* 21 : 1469-1476.

HAYWARD, P.J. & J.P. THORPE, 1988. A new family of cheilostome Bryozoa endemic to the Antarctic. *Zool. J. Linn. Soc.,* 93 : 1-18.

KLUGE, G.A., 1914. Die Bryozoen der deutschen Südpolar-Expedition, 1901-3, 1. *Deutsche Südpolar-Expedition,* 14, 7 : 601-678.

LEVINSEN, G.M.R., 1909. *Morphological and systematic studies on the cheilostomatous Bryozoa.* Copenhagen : Nationale Forfatterers Forlag.

LIVINGSTONE, A.A., 1928. The Bryozoa, Supplementary Report. *Australian Antarctic Expedition* 1911-1914, *Scientific Reports, Series C, Zoology and Botany,* 9, 1 : 1-93.

MOYANO G., H.I., 1965. Bryozoa colectados durante la Expedición Antártica Chilena 1964-65. 1. Familia Sclerodomidae. *Instituto Antártico Chileno,* publicacion N° 5 : 1-16.

MOYANO G., H.I., 1970. Una familia, tres generos y una especies nuevos para la Antártica. (Bryozoa Cheilostomata). *Cah. Biol. Mar.,* 11 : 153-166.

ROGICK, M.D., 1955. Studies on Marine Bryozoa. 6. Antarctic *Escharoides. Biol. Bull.,* 109, 3 : 437-452.

ROGICK, M.D., 1956. Bryozoa of the U.S. Navy's 1947-1948 Antarctic Expedition, I-IV. *Proc. U.S. Nat. Mus.,* 105 : 221-317.

ROGICK, M.D., 1959a. Studies on Marine Bryozoa. 11. Antarctic Osthimosiae. *Ann. N. Y. Acad. Sci.,* 79 : 9-42.

ROGICK, M.D., 1959b. Studies on Marine Bryozoa. 12. *Porella. Ohio J. Sci.,* 59, 4 : 233-240.

ROGICK, M.D., 1960. Studies on Marine Bryozoa. 13, Two new genera and new species from Antarctica. *Biol. Bull.,* 119, 3 : 479-493.

ROGICK, M.D., 1965. Bryozoa of the Antarctic, *in :* P. Van Oye and J. Van Mieghem (editors), Biogeography and Ecology in Antarctica. *Monogr. Biol.,* 15 : 401-413

WATERS, A.W., 1904. Bryozoa. Expedition Antarctique Belge. *Résultats du Voyage du S. Y. Belgica en* 1897-1899, *Zoologie.* 1-103.