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Membraniporoidea, Microporoidea and Cellarioidea (Bryozoa, Cheilostomata) collected by Discovery Investigations

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Thirty eight species of anascan Cheilostomata are described from the collections of Discovery Investigations, and other British antarctic expeditions. Ten new species are described, including *Stomhypselosaria watersi* introduced for *Cellaria dubia* (Busk) *sensu* Waters (1904). Two new genera are introduced, and *Swanomia* nom. nov. is proposed for *Mawsonia* Livingstone 1928, non Woodward 1907.

KEYWORDS: Antarctic, Bryozoa, New genera, New species.

Introduction

The neglected collections of Discovery Investigations (1925–1939) comprise probably the largest single source of data on the bryozoan faunas of the Antarctic and Subantarctic regions, and include also substantial accumulations of material from the southern Patagonian Shelf, the islands of the South Atlantic and southern Indian Ocean, and from a few areas of northern New Zealand. Hastings' (1943) account of six families of anascan Cheilostomata was the first modern treatment of Antarctic and Southern Ocean Bryozoa, and the only report on the Discovery collections to be published. Subsequently, a number of authors have published studies on Antarctic and Subantarctic cheilostome Bryozoa, the most significant being those of Rogick (for example, 1956, 1957, 1959, 1960) and Moyano (1965, 1966, 1969, 1970, 1984). Recently, Winston (1983) has produced the first ecological study of Antarctic bryozoans. All recent authors would have benefitted from published accounts of the Discovery collections. These reveal a considerably richer fauna of certain families and genera of Cheilostomata than is presently realised (e.g. Hayward and Thorpe 1988 a), and the extensive series of specimens permits a re-evaluation of the systematic status and relationships of many poorly known taxa (e.g. Hayward and Thorpe 1987). Similarly, information on the faunas of subantarctic and cold temperate waters, and particularly of the southern oceanic islands, is potentially of great importance to an understanding of the historical biogeography and phylogeny of southern hemisphere Bryozoa.

The importance of the Discovery collections has been demonstrated in several previous papers (Hayward and Thorpe 1987, 1988 a–d), and it is clearly desirable that these immense collections be properly described, and made available to other specialists. The present account comprises descriptions of 38 species of anascan Cheilostomata, in 13 genera within the superfamilies Membraniporoidea, Microporoidea and Cellarioidea. Six new species are recognised in the genus

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Amphiblestrum, and two in the genus *Paracellaria*. *Cellaria dubia* (Busk, 1884) *sensu* Waters (1904) is described as *Stomhypselosaria watersi* sp. nov. *Pyriporoides* gen. nov. is introduced for *Membranipora uniserialis* Waters, 1904, *Xylochotridens* gen. nov. is introduced for *X. rangifer* sp. nov. The anagram *Swanomia* is established as a *nomen novum* for *Mawsonia* Livingstone 1928, preoccupied by *Mawsonia* Woodward 1907. The Discovery collections, which have kindly been made available for study by the Institute of Oceanographic Sciences, Wormley, incorporate the earlier collections of the National Antarctic Expedition (1901–1904) and the British Antarctic Expedition (1910–1913) together with later samples originating from Operation Tabarin (1943–1945), the Falkland Isles Dependencies Survey (1948–1960) and the British, Australian and New Zealand Antarctic Research Expedition (BANZARE, 1929–1931). All specimens listed here have been deposited in the Bryozoa Section, Department of Zoology, British Museum (Natural History): registration numbers of type specimens are denoted by the prefix BMNH. Station details are given in Appendix I.

Systematic accounts

Pyriporoides gen. nov.

Colony encrusting, developing branching, uniserial chains; budding cruciform, with each autozooid producing one distal and paired lateral buds from small basal pore-chambers. Gymnocyst and cryptocyst both well developed, the latter with a substantial opesia. Short distal spines present. Embryos brooded in substantial hyperstomial ovicell. Avicularia absent.

Type species: *Membranipora uniserialis* Waters, 1904.

In its ovicells, pore chambers and spines, and in the development of both gymnocystal and cryptocystal calcification; *Pyriporoides* gen. nov. conforms to the characters of the family Calloporidae.

Pyriporoides uniserialis (Waters)

(Fig. 1 A)

Membranipora uniserialis Waters 1904: 32, pl. 2, fig. 2.

Material. Discovery stn. 190.

Description. Colony developing spreading, uniserial chains, each autozooid developing a single distal bud, and one or two lateral buds where space permits; cruciform pattern perfectly developed on flat substrata. Autozooids clavate, narrowest at proximal end, broadest halfway along length of cryptocyst. Gymnocyst occupying about half total autozooid length, continuous distally with smooth, sloping lateral walls. Frontal membrane enclosed by a smooth, thickened mural rim; underlain for half its length by a flat, smoothly calcified cryptocyst; opesia elongate oval. Six stout, pointed, thickly calcified spines arranged in an arc at distal end of opesia. Ovicell (described by Waters, 1904) prominent, elongate oval, smoothly calcified, and sometimes developing a short, longitudinal frontal ridge.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length	0·89 ± 0·08
Autozooid width	0·48 ± 0·04

Remarks. This rather inconspicuous species does not seem to have been collected again since Waters (1904) recorded it from three stations in the Bellingshausen Sea, at depths of 435 to 480 m. Like the present specimens, which were collected at 315 m in the Bismarck Strait, Waters' material encrusted the surfaces of stones. The ovicells, spines and basal pore chambers demonstrate that this species belongs to the Calloporidae rather than the Membraniporidae. It bears a remarkable superficial resemblance to the uniserial *Pyripora catenularia* (Fleming) (Taylor 1986), which lacks spines and ovicells, and is considered to belong to the Electridae. However, uniserial habit is perhaps not an indication of primitiveness, and the systematic relationship between these two species is probably remote.

Amphiblestrum alcinum Gordon

(Fig. 2A–B)

Amphiblestrum alcinum Gordon 1984: 33, pl. 5, fig. A.

Material. Terra Nova stn. 90.

Description. Colony encrusting. Autozooids oval to hexagonal, separated by deep grooves. Cryptocyst concave, granular, enclosed by a raised, thickened mural rim, with crenulate edge; gymnocyst smooth, variably developed but always comprising less than one-fifth total autozooid length, continuous distally with the slightly incurved lateral walls. Opesia trifoliate, as broad distally as proximally, bordered by a narrow rim of smooth calcification, raised distally where it fuses with the mural rim; condylar processes prominent; opesia length equivalent to less than half total autozooid length. Two short, delicate, distal spines present in early ontogeny. Proximal adventitious avicularium present on almost all autozooids, rostrum slender, triangular, acute to frontal plane, laterally directed; opesia narrowly oval, condyles indistinct. Ovicell prominent, spherical, smooth, with a narrow, triangular area of granular entooecium frontally, delimited by a thickened ridge. Rarely, a vicarious avicularium with cystid slightly smaller than an autozooid, supporting a slender, acutely pointed rostrum about three times the length of that of the adventitious avicularium.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length	0·53 ± 0·07	Opesia length	0·21 ± 0·03
Autozooid width	0·41 ± 0·04	Opesia width	0·19 ± 0·02

Remarks. This species was described by Gordon (1984) from seven stations around the Kermadec Islands, off northeast New Zealand. The single specimen collected by the *Terra Nova* also came from off northern New Zealand.

Amphiblestrum alienus sp. nov.

(Fig. 2 D–E)

Material. HOLOTYPE: BMNH reg. no. 1988.4.20.1, *Terra Nova* stn. 90.

Description. Colony encrusting. Autozooids oval to hexagonal, separated by deep grooves. Gymnocyst well developed, comprising up to half total autozooid length, continuous distally with the incurved lateral walls of the autozooid. Cryptocyst depressed, flat, smooth, enclosed by a raised, crenulate mural rim. Opesia less than half total autozooid length, roughly trapezoidal, broadest proximally, with indistinct condylar processes. Four to six short distal spines present. Proximal adventitious avicularium small, distally directed; acute to frontal plane, its slender, triangular rostrum just projecting beyond the mural rim: opesia extensive, cryptocyst at proximal end only, condyles indistinct. Occasional vicarious avicularia present, with broad, flat, irregularly oval cystid, supporting a slender, triangular rostrum about twice the size of

adventitious type. Ovicell prominent, elongate oval, narrow, with longitudinal keel, and narrow band of entooecium just distal to aperture, marked by a thickened ridge.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length 0·51 ± 0·04	Opesia length 0·19 ± 0·02
Autozooid width 0·35 ± 0·03	Opesia width 0·15 ± 0·01

Remarks. This species conforms to the diagnosis of *Amphiblestrum* Gray in all respects, with the exception of its rare vicarious avicularia. Gordon (1984) notes that the absence of vicarious avicularia may be regarded as an important feature distinguishing *Amphiblestrum* from certain other genera within the Calloporidae. However, *A. alienus* seems closer to *Amphiblestrum* than to any of the other genera discussed by Gordon (1984: 33), and it is possible that a subgenus within *Amphiblestrum* would be appropriate for this species. In view of the fact that study of southern hemisphere Membraniporoidea continues to yield new species, and that their taxonomy is constantly being revised (for example, Gordon 1982, 1984, 1986), it seems unwise to institute a new taxonomic category at this stage, particularly as the present material consists of just a single colony.

Amphiblestrum familiaris sp. nov.

(Fig. 2 C)

Material. HOLOTYPE BMNH reg. no. 1988.4.20.2., Discovery stn. 1948. Other material: Discovery stn. 1948.

Description. Colony encrusting. Autozooids large, broad and flat, more or less hexagonal, separated by thin raised ridges. Cryptocyst flat, finely granular; gymnocyst present in some autozooids as a narrow, triangular area of smooth calcification at the proximal end; in others, continuous with the calcification of the avicularian cystid. Opesia equivalent to about half frontal length of autozooid, broadly trifoliate, bordered by a narrow margin of smooth calcification; proximal edge straight, condyles thickened and prominent. Two short distal spines present in early ontogeny, lost in older autozooids. Proximal adventitious avicularium with broad-based cystid occupying most of autozooid width; rostrum acute to frontal plane, directed laterally; slender, triangular, slightly curved laterally at distal end; opesia elongate oval, surrounded by well developed cryptocyst, condyles inconspicuous. Ovicells were absent from the present material.

Measurements. Means and standard deviations of 15 values, mm:

Autozooid length 0·78 ± 0·09	Opesia length 0·36 ± 0·03
Autozooid width 0·67 ± 0·08	Opesia width 0·39 ± 0·04

Remarks. The broad based avicularium cystid is most similar to that seen in *A. inermis* (Kluge), which is particularly characterised by its ovicells. None of the material of *A. familiaris*, all collected from a single station in the South Shetland Isles, bore ovicells; however, it differs from *A. inermis* in its paired distal oral spines, in its less markedly trifoliate opesia (the condylar processes of *A. inermis* are especially thickened and prominent), and in its larger autozooids.

Amphiblestrum georgensis sp. nov.

(Fig. 3 A–B)

Material. HOLOTYPE: BMNH reg. no. 1988.4.20.3. Discovery stn. 474. Other material: Discovery stns 27, 42, 140, 156, WS33, WS42, WS88, MS10.

Description. Colony encrusting. Autozooids oval to hexagonal, rather small, separated by narrow grooves; lateral walls raised, tuberculate, with finely beaded edge. Cryptocyst concave, coarsely granular; gymnocyst lacking. Opesia about half length of autozooid, roughly trifoliate, proximal edge straight or convex, bordered by a band of more finely granular cryptocystal calcification; condylar processes situated about halfway along length of opesia, prominent, thick, blunt. No distal spines. Proximal adventitious avicularium present on all autozooids, relatively large, occupying entire width of autozooid; rostrum triangular, acute to frontal plane, directed laterally; opesia small, oval, proximal cryptocyst well developed; condyles short and thick. Ovicell prominent, with broad area of coarsely granular entooecium, occupying most of frontal surface, becoming more or less triangular in later ontogeny, bordered by a thickened rim of ectooecium.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length 0·46 ± 0·04	Opesia length 0·23 ± 0·01
Autozooid width 0·37 ± 0·06	Opesia width 0·19 ± 0·02

Remarks. This species is most similar to *A. inermis* (Kluge). It differs in the smaller size of its autozooids, its coarser calcification, and in the ovicell, which does not develop the proximo-lateral processes seen in *A. inermis*. The opesia of *A. georgensis* has particularly well thickened condylar processes, and appears more distinctly trifoliate than that of *A. inermis*. One specimen was collected from the southern Patagonian Shelf (Stn. WS88), but the rest all originated from the vicinity of South Georgia.

Amphiblestrum inermis (Kluge)

(Fig. 3 F)

Membranipora inermis Kluge 1914: 663, pl. 34, fig. 6.

Material. Discovery stns 167, 363, 366, 371, 599, 1652, 1660, WS482. Terra Nova stns. 295, 316, 321, 331, 339, 340. BANZARE stn. 39. National Antarctic Expedition 29.1.1902, 13.2.1902, 25.2.1902, 6.12.1902, 8.4.1903, 18.5.1903, 3.6.1903, 20.8.1903, 18.9.1903, 30.9.1903.

Description. Colony encrusting. Autozooids hexagonal to quadrangular, separated by indistinct grooves, 0·6–0·75 mm long, 0·35–0·45 mm broad. Cryptocyst convex proximally, dipping gently towards opesia, finely and regularly granular; gymnocyst not developed. Opesia equivalent to half total autozooid length; broadly trifoliate, as wide proximally as long, with prominent, blunt condylar processes halfway along its length. No distal spines. Proximal adventitious avicularium prominent, occupying entire width of autozooid; rostrum elongate, triangular, acute to lateral plane, directed laterally, and strongly curved. Ovicell distinctive, prominent, strongly convex, slightly longer than wide; frontal area consisting almost entirely of granular entooecium, bordered by a thin, raised rim of ectooecium, variably produced at the proximal corners as pointed processes; usually intimately associated with the avicularium of the succeeding autozooid.

Remarks. This species is probably to be regarded as an endemic Antarctic species. The extensive series of specimens listed here suggests a wide distribution in Antarctic waters; it occurred in samples from the Ross Sea and McMurdo Sound, from the Bellingshausen Sea and the Palmer Archipelago, and along the Scotia Arc as far north as the South Sandwich Islands. *A. familiaris* sp. nov. is represented by a number of specimens from a single station in the South Shetland Isles, while the larger number of specimens of *A. georgensis* originated from the area around South Georgia. Neither of the latter two species occurred in samples from the Antarctic Shelf. All three species perhaps represent a closely related phylogenetic group, which may prove to include further, similar species of *Amphiblestrum* in the cold temperate southern hemisphere. However, records of *A. inermis* (Kluge) from South Africa discussed by Hayward and Cook (1983) perhaps do not after all represent this species, which must be regarded as restricted to Antarctic waters.

Amphiblestrum novella sp. nov.

(Fig. 3 E)

Material. HOLOTYPE: BMNH reg. no. 1988.4.20.4. Discovery stn. WS88, Other material: Discovery stn. WS85.

Description. Colony encrusting. Autozooids oval to hexagonal; at first separated by well marked grooves, obscured in later ontogeny by the thickening and fusion of the lateral walls of adjacent autozooids, to form raised ridges. Cryptocyst slightly concave, finely granular, comprising almost whole of frontal calcification; a small area of gymnocystal calcification visible in the proximal corners of autozooids in early ontogeny only. Opesia about two-thirds length of autozooid, broadly pear-shaped; only slightly trifoliate, the condylar processes scarcely developed. No distal spines. Proximal adventitious avicularium present on many, but not all, autozooids, occupying almost whole width of autozooid; rostrum triangular, acute to frontal plane, directed laterally; opesia extensive, only a narrow rim of cryptocyst developed, condyles scarcely developed. Ovicell prominent, almost quadrangular; entooecium granular, occupying most of frontal area, bordered by a thin, raised rim of ectooecium.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length 0·67 ± 0·09	Opesia length 0·38 ± 0·03
Autozooid width 0·48 ± 0·06	Opesia width 0·33 ± 0·04

Remarks. This species is characterised principally by its broad opesia, and by the minimal development of the condylar processes. It was collected from two stations on the southern Patagonian Shelf.

Amphiblestrum rossi sp. nov.

(Fig. 3C–D)

Material. HOLOTYPE: BMNH reg. no. 1988.4.20.5, Discovery stn. 1652. Other material: Discovery stn. 1660. National Antarctic Expedition, 3.6.1903.

Description. Colony encrusting. Autozooids large, broad and flat, hexagonal, separated by narrow grooves. Cryptocyst slightly concave medially, finely granular; gymnocyst comprising only a narrow band of smooth calcification in the proximal corners of the autozooid. Opesia equivalent to half autozooid length, broadly trilobed, condylar processes prominent. No spines. No avicularia. Ovicell as wide as long; ectooecium smooth, forming a thin rim around the frontal area of granular entooecium, quadrangular or triangular, variable in extent, but tending to become more narrowly triangular in later ontogeny. Ancestrula similar to later autozooids but bearing 8(?) peripheral spines, budding a distal triplet of autozooids.

All specimens encrusting other Bryozoa.

Measurements. Means and standard deviation of 20 values, mm:

Autozooid length 0·94 ± 0·09	Opesia length 0·36 ± 0·03
Autozooid width 0·56 ± 0·08	Opesia width 0·35 ± 0·03

Remarks. The large, flat autozooids of this species, few of which bear avicularia, are reminiscent of *A. blandum* Gordon, from New Zealand (Gordon 1986). *A. rossi*, however, has larger autozooids, with a proportionately smaller opesia rimmed by a thickened band of smooth calcification. It was recorded only from the Ross Sea, and is probably an endemic Antarctic species.

Amphiblestrum siciliculum sp. nov.

(Fig. 4A–B)

Material. HOLOTYPE: BMNH reg. no. 1988.4.20.6. Discovery stn. 935. Other material: Discovery stn. 935.

Description. Colony encrusting. Autozooids small, broadly hexagonal, separated by raised ridges. Cryptocyst finely granular, depressed, dipping steeply from proximal to distal end of autozooid; gymnocyst not developed. Opesia just less than half total autozooid length, strongly trifoliate, twice as wide, proximally, as long, with strongly crenulate edge; condylar processes thickened and prominent. Proximal adventitious avicularium occupying almost whole of autozooid width; rostrum acute to frontal plane, directed laterally, slender, and strongly curved; opesia narrow, elongate, condyles indistinct. Ovicell prominent, not obscured by avicularium of succeeding autozooid, with broadly triangular area of granular entooecium frontally.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length 0·49 ± 0·03	Opesia length 0·16 ± 0·05
Autozooid width 0·38 ± 0·05	Opesia width 0·26 ± 0·02

Remarks. This species is distinguished by its slender, strongly curved avicularian rostrum, and by its short, markedly trifoliate opesia. The Discovery specimens originate from a single station of northern New Zealand.

Crassimarginatella inconstantia (Kluge)

(Fig. 1B)

Membranipora inconstantia Kluge 1914: 660, pl. 34, fig. 2.

Material. Discovery stn. 1660.

Description. Colony encrusting, forming a thin, flat sheet. Autozooids large, oval to rectangular, separated by distinct grooves. Vertical walls thinly calcified, deep, with conspicuous multiporous septula. Frontal surface entirely membranous, except for a very small area of gymnocystal calcification, most obvious in autozooids at the dichotomy of a row; cryptocyst developed as a very narrow, finely granular edge to the proximal half of the opesia. No spines. Vicarious avicularia infrequent, about half size of autozooids, elongate oval, the rostrum rounded and slightly raised distally, parallel-sided, supporting a linguiform mandible equivalent to half total length of avicularium; proximal half with a large opesia bordered by a narrow, granular, cryptocystal rim,

condyles apparent as slight thickenings only. Ovicell prominent, recumbent on distally succeeding autozooid, convex, with a smooth peripheral band of ectooecium, and the frontal surface consisting entirely of granular entooecium.

Measurements. Means and standard deviation of 20 values, mm:

Autozooid length 0·89 ± 0·10
Autozooid width 0·50 ± 0·08

Remarks. The ovicells, avicularia and multiporous septula indicate that this species is appropriately placed in *Crassimarginatella*, many species of which have been described recently from New Zealand waters by Gordon (1984, 1986). *C. inconstantia* has not been reported since its original description by Kluge (1914). Its thin, flat and lightly calcified colony is inconspicuous when encrusting more heavily calcified bryozoans. The single specimen described here was collected in the Ross Sea and the species is probably restricted to Antarctic waters.

Crassimarginatella perlucida (Kluge)

(Figs 1C, 4E)

Membranipora perlucida Kluge 1914: 660, pl. 34, fig. 1.

Material. Terra Nova stn. 335. National Antarctic Expedition 20.5.1903.

Description. Colony forming a thin, encrusting sheet. Autozooids large, oval to hexagonal, with low, lightly calcified vertical walls, pierced by small, indistinct multiporous septula. Frontal surface entirely membranous, with the exception of a minute area of gymnocystal calcification in each proximal corner; no cryptocyst; no spines. Ovicell partially immersed, but convex frontally, and conspicuous; ectooecium smooth, entooecium granular, exposed over much of frontal surface. Vicarious avicularia infrequent, oval, about one-third size of autozooids, with smooth gymnocystal calcification, but no cryptocyst; frontal surface equally divided between frontal membrane and a large semicircular mandible.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length 1·12 ± 0·2
Autozooid width 0·63 ± 0·06

Remarks. Like the preceding species, *Membranipora perlucida* is assigned to *Crassimarginatella* Canu on the basis of its avicularia, ovicells and septula. Despite the large size of its autozooids, its extremely thin and very lightly calcified colonies render it most inconspicuous. The material described here comprised several colonies encrusting *Lageneschara lyrulata*, all from the Ross Sea.

Crassimarginatella (Valdemunitella) lata (Kluge)

(Fig. 4C–D)

Membranipora lata Kluge 1914: 661, pl. 34, fig. 4.

Material. Discovery stns 42, 51, 190, 1652, WS42, WS250. Terra Nova stn. 220.

Description. Colony encrusting, forming flat, loosely-attached sheets; perhaps developing erect, unilaminate sheets. Autozooids elongate, hexagonal or rectangular, distally rounded. Vertical walls deep, thinly calcified, with two small multiporous septula in the distal wall, and two (perhaps three) in each lateral wall. Frontal wall

entirely membranous, no gymnocyst; cryptocyst present in proximal half of autozooid as a narrow, coarsely granular, or beaded, rim. No oral spines. Ovicell partially immersed, convex, smooth-surfaced, with a median longitudinal groove and paired frontal fenestrae, separated by a thickened septum, immediately distal to the aperture. No avicularia.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length 1·00 ± 0·1
Autozooid width 0·57 ± 0·07

Remarks. Membranipora lata Kluge is here assigned to the subgenus *Valdemunitella* Canu, redefined and discussed by Gordon (1986), principally on the basis of its curious bifenestrate ovicell. The colonies form loosely encrusting sheets, which in several instances had become almost completely detached from their substratum. In this condition it resembles *Carbasea renilla* Pfeffer, described from South Georgia (Calvet 1904: 10), which also has conspicuous bifenestrate ovicells. The identity of this latter species requires re-investigation, and it may prove to be the same as Kluge's *M. lata*. The specimens described here suggest a wide distribution in Antarctic and Subantarctic waters, reaching the Ross Sea, Palmer Archipelago, South Georgia and the southern Patagonian Shelf.

Ellisina antarctica Hastings

(Fig. 5A–B)

Ellisina antarctica Hastings 1945: 94, fig. 6.

Material. Discovery stns 935, 1321, 1660, 1872. BANZARE stn. 39. National Antarctic Expedition, Winter Quarters, McMurdo Sound.

Description. Colony encrusting, developing extensive sheets. Autozooids oval to irregular, separated by distinct grooves. Frontal surface almost completely membranous, with a small area of smooth gymnocyst developed proximally in some autozooids; cryptocyst developed as a distinct granular rim around all but the distal edge of the opesia, distinctly crenellate where it meets the slightly incurved lateral walls. No spines. A small vicarious avicularium present at the distal end of almost all autozooids; cystid smoothly calcified; rostrum acute to frontal plane, directed disto-laterally, supporting a short triangular mandible; condyles well developed, not fusing medially; cryptocyst relatively broad, granular, with a semicircular opesia. Ovicell prominent, convex, smoothly calcified, with a pronounced median longitudinal keel in later ontogeny; closely associated with the avicularium, the ectooecial calcification continuous with that of the avicularian cystid. Ancestrula oval, simple, without spines.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length 0·51 ± 0·07
Autozooid width 0·35 ± 0·04

Remarks. Ellisina antarctica appears to have a remarkably wide geographical distribution. Hastings (1945) listed specimens from the Ross Sea, the Bellingshausen Sea, the Palmer Archipelago, the South Shetlands, the Falkland Isles and southern Patagonian Shelf, and from Heard Island. The material recorded here is from equally remote localities, including the Magellan Strait, northern New Zealand and the Ross Sea, yet all specimens seem to conform closely to Hastings' (1945) description, and type specimen.

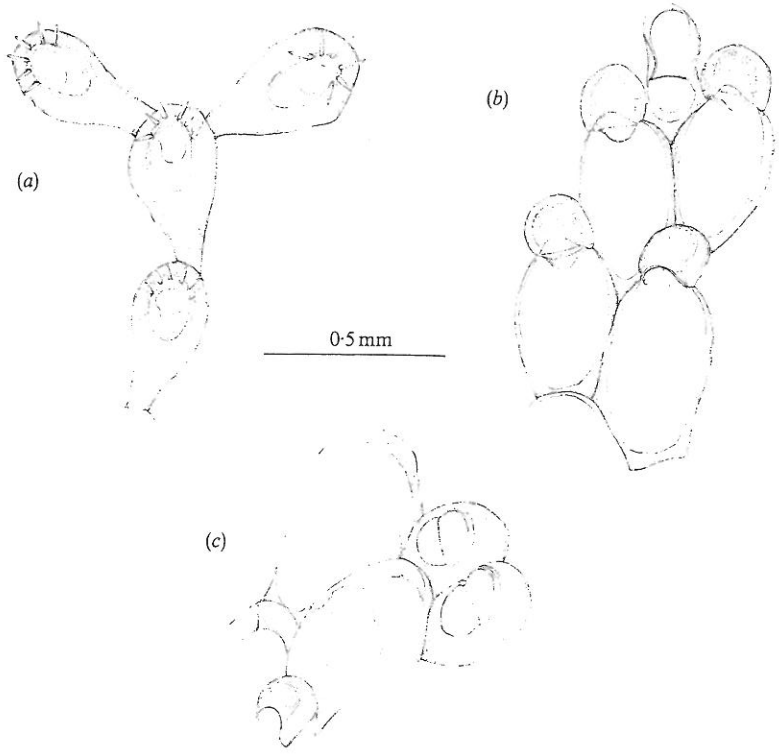


FIG. 1. A, *Pyriporoides uniserialis*. B, *Crassimarginatella inconstantia*. C, *Crassimarginatella perlucida*.

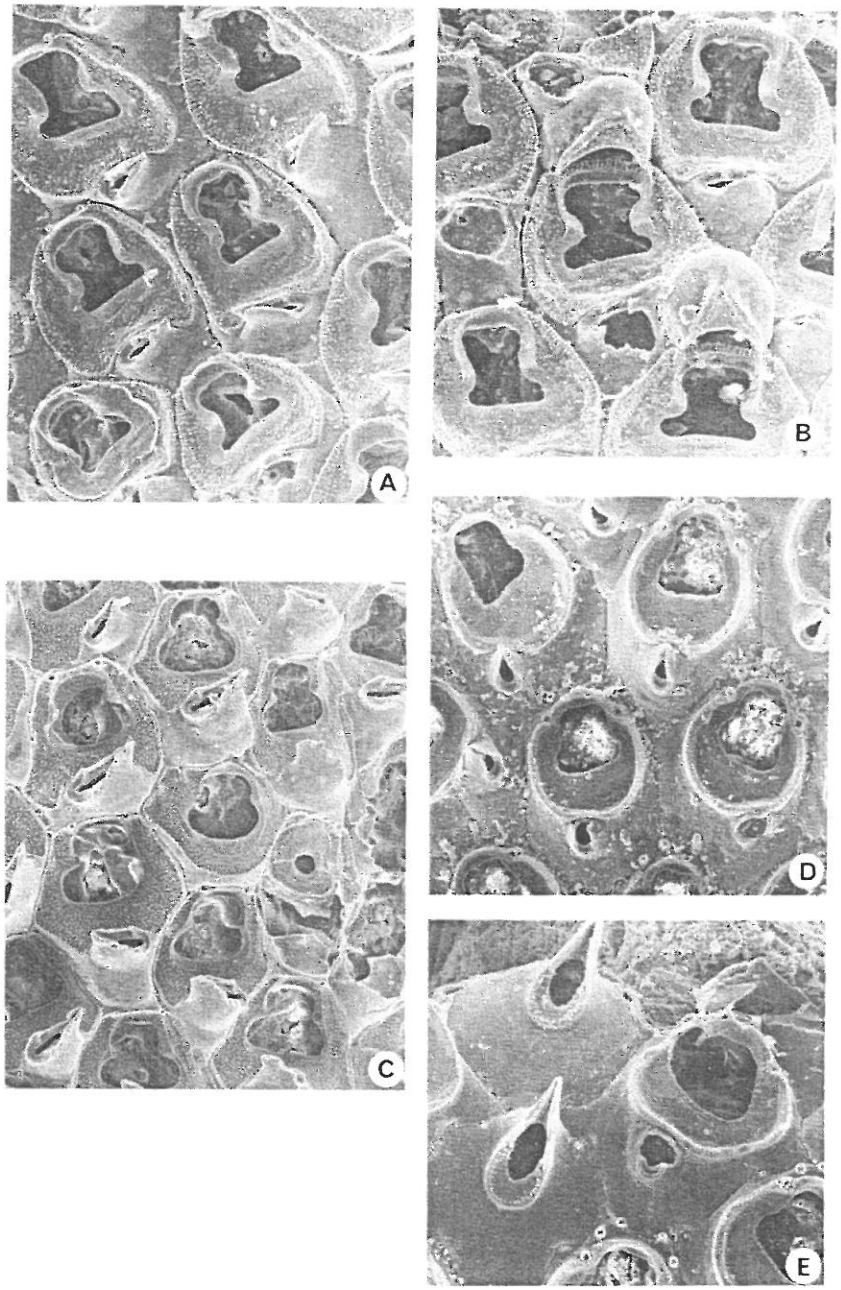


FIG. 2. A, B, *Amphiblestrum aicinum*. A, Group of autozooids, × 50. B, Ovicelled autozooids × 50. C, *Amphiblestrum familiaris*, × 30. D, E, *Amphiblestrum alienus*. D, Group of autozooids, × 70. E, Vicarious avicularia, × 70.

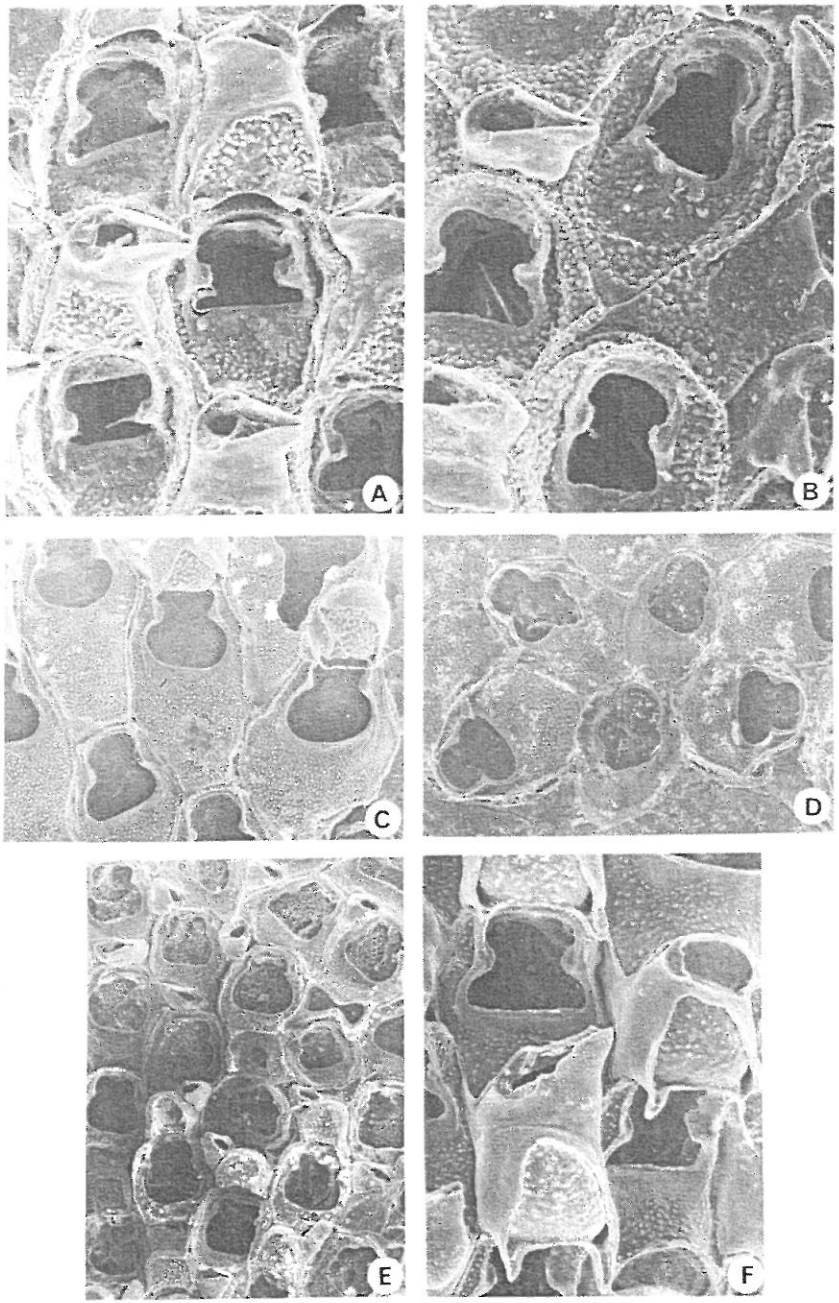


FIG. 3. A, B, *Amphiblestrum georgensis*. A, Ovicelled autozooids, ×70. B, Autozooids at the growing edge, ×90. C, D, *Amphiblestrum rossi*. C, Autozooids and ovicells, ×30. D, Ancestrula and periancestrular autozooids, ×35. E, *Amphiblestrum novella*, ×25. F, *Amphiblestrum inermis*, ×60.

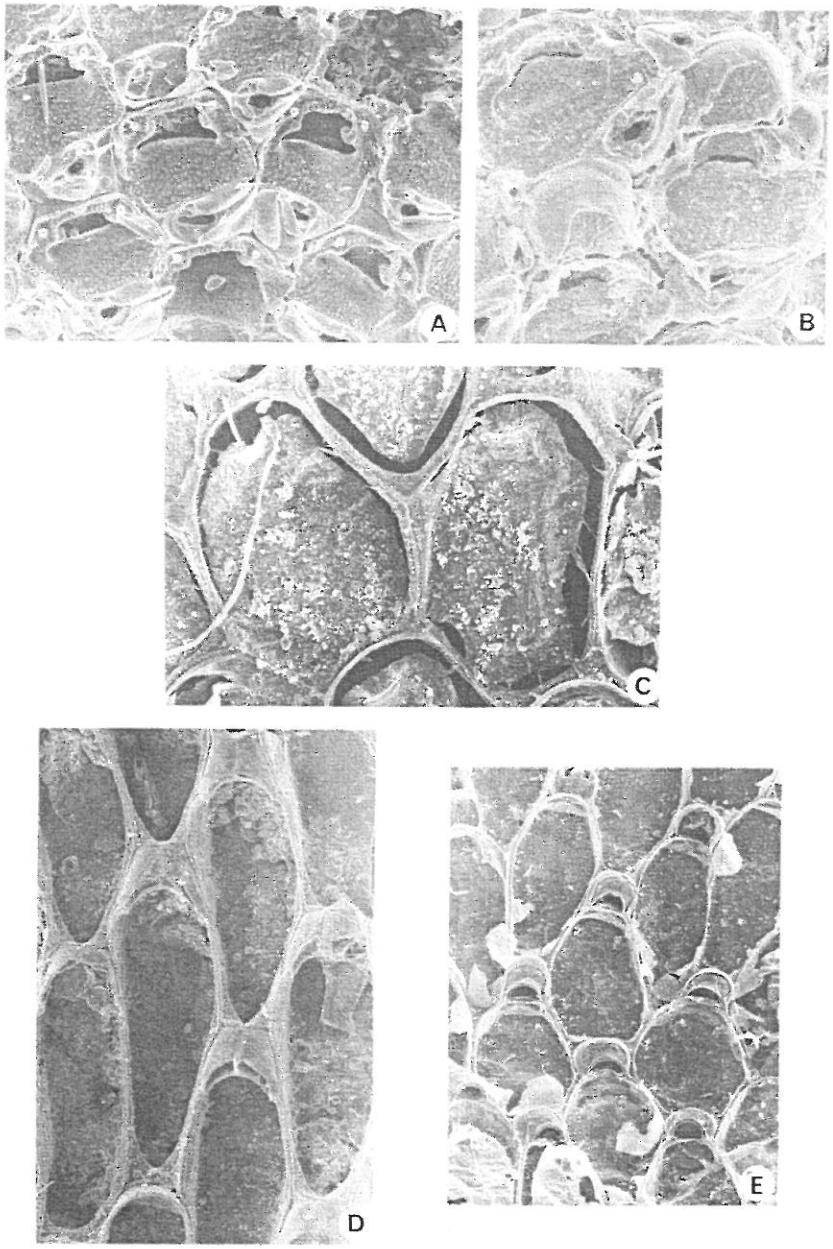


FIG. 4. A, B, *Amphiblestrum siciliculum*. A, Autozooids at the growing edge, ×60. B, Ovicelled autozooids, ×60. C, D, *Crassimarginatella (Valdemunitella) lata*. C, Specimen from stn. WS42, ×40. D, Ovicelled autozooids from stn. 1652, ×26. E, *Crassimarginatella perlucida*, ×22.

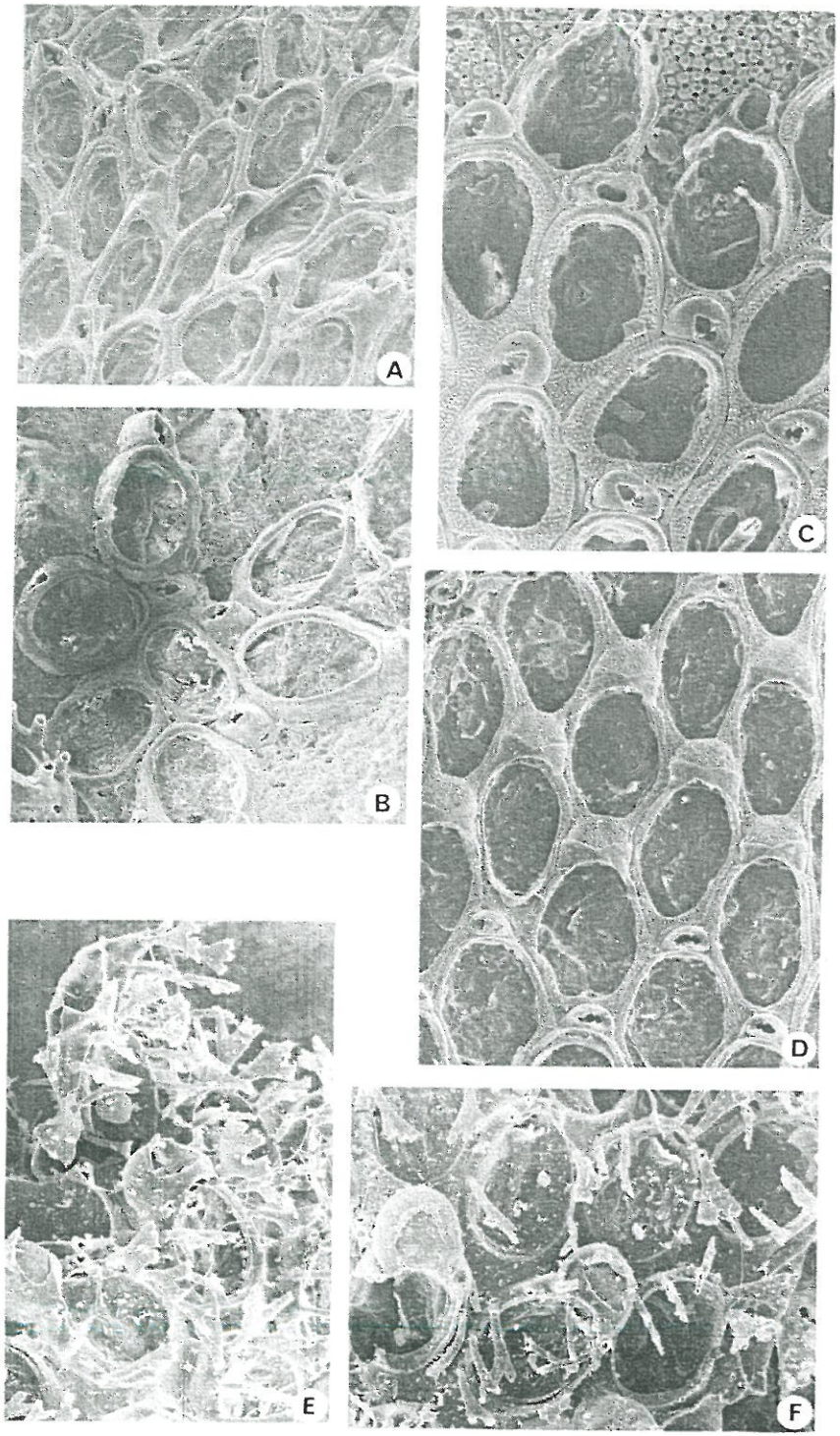


FIG. 5. A, B, *Ellisina antarctica*. A, Autozooids at the growing edge, ×35. B, Ancestrula and periancestrular autozooids, ×40. C, *Ellisina incrustans*, autozooids at the growing edge, ×60. D, *Ellisina constantia*, ovicelled autozooids, ×23. E, F, *Xylochotridens rangifer*. E,

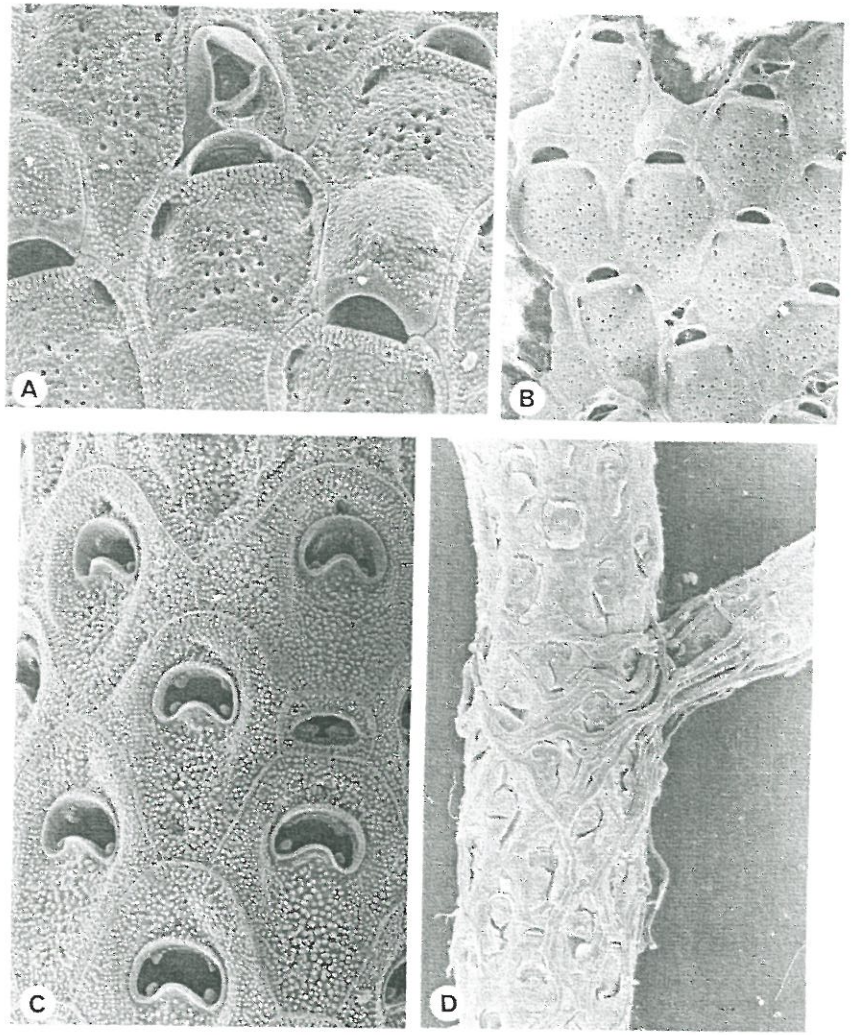


FIG. 6. A, B, *Micropora brevissima*. A, Specimen from East Falkland, ×90. B, Specimen from stn. 1948, ×30. C, D, *Cellaria clavata*. C, Autozooids and avicularium, ×65. D, Portion of colony with offset branch, ×23.

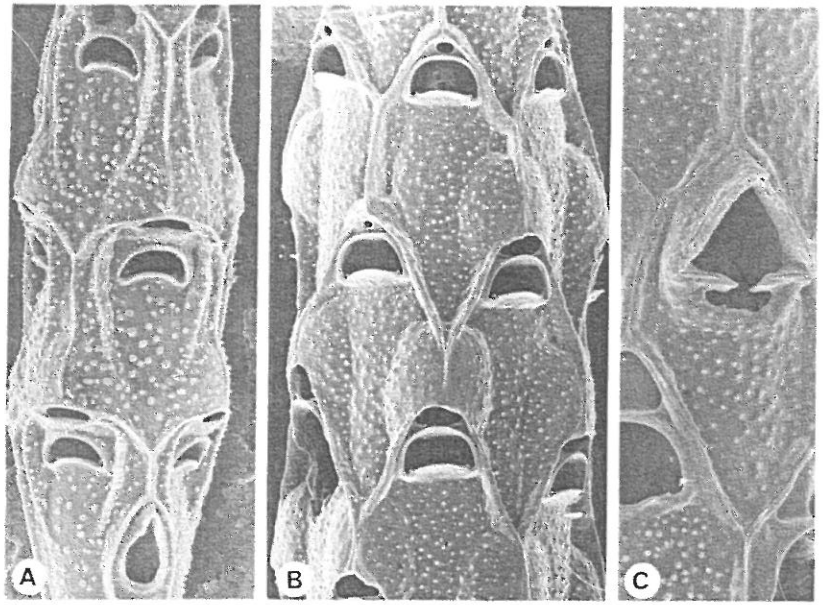


FIG. 7. A, *Cellaria moniliorata*, × 70. B, C, *Cellaria diversa*. B, Autozooids and ovicells, × 55. C, An avicularium, × 100.

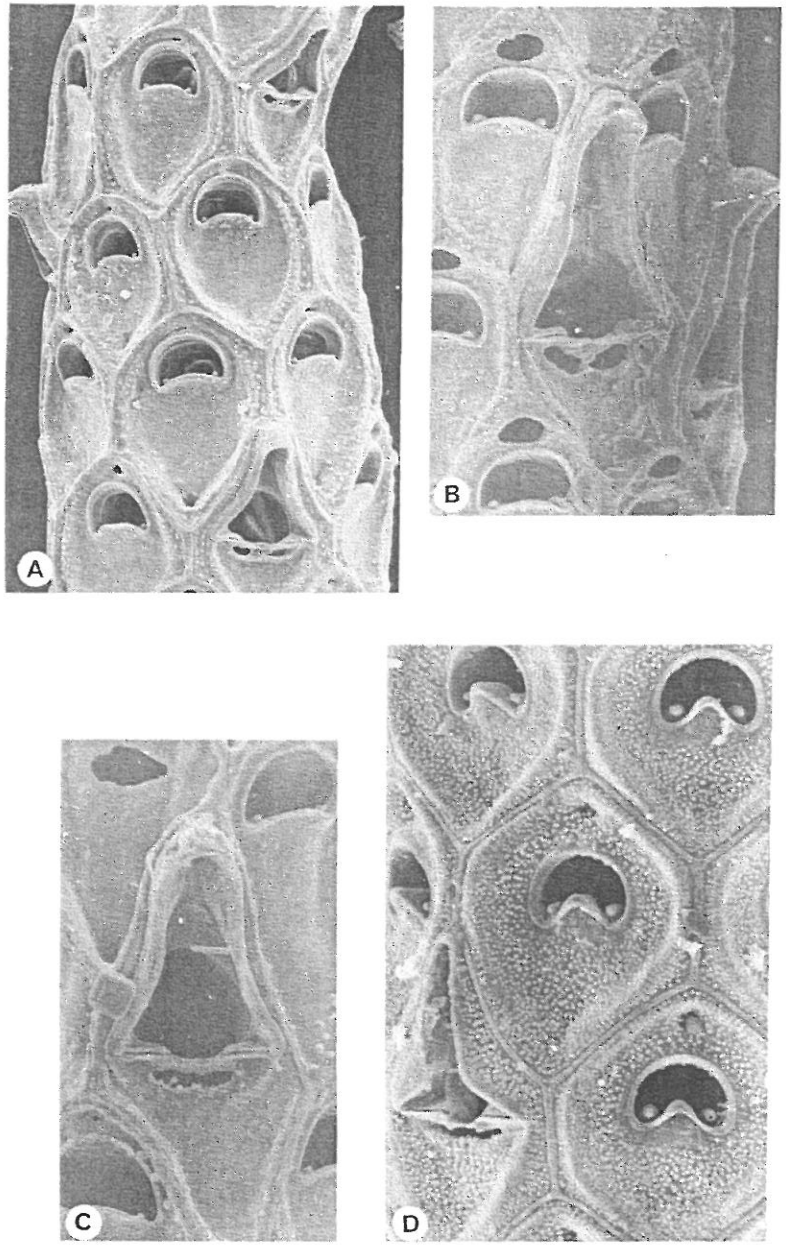


FIG. 8. A–C, *Cellaria malvinensis*. A, Specimen from stn. 1321, × 80. B, Specimen of stout variety from stn. WS177, × 90. C, Specimen of slender variety from stn. 562, × 110. D, *Cellaria immersa*, × 117.

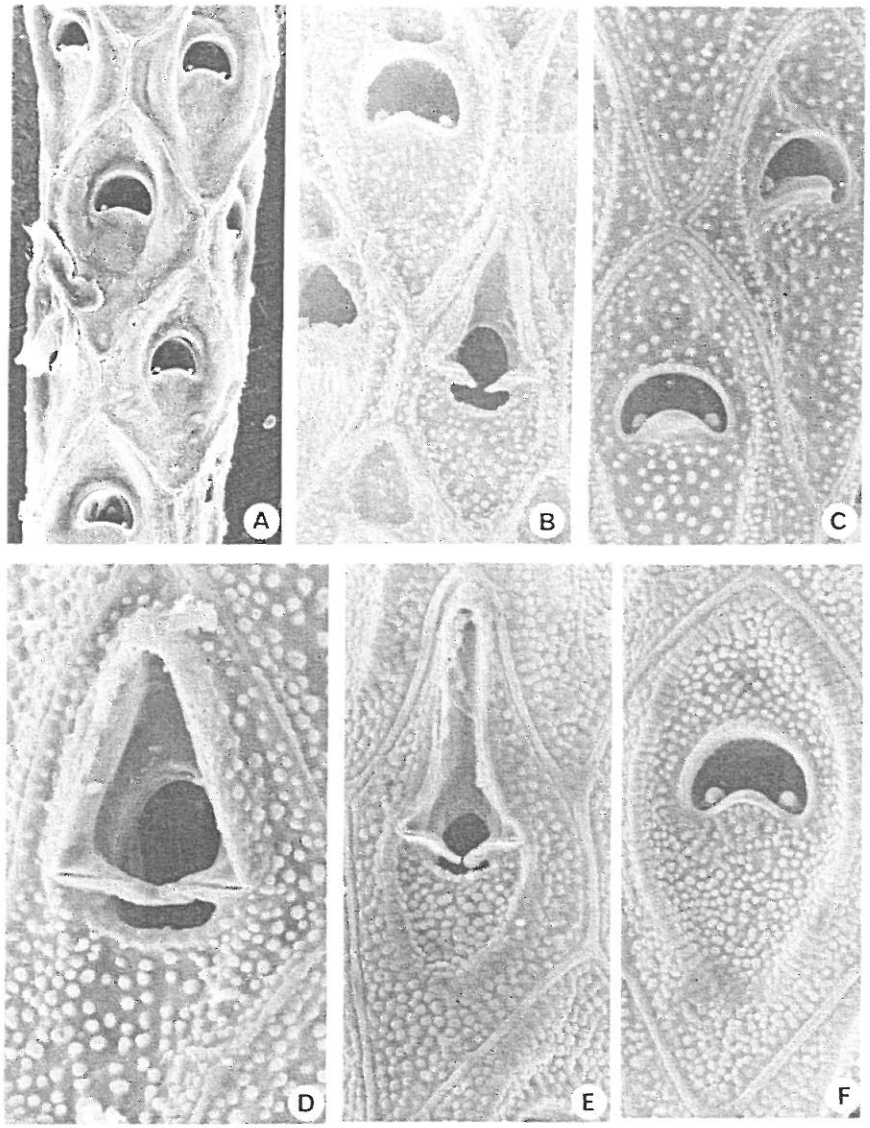


FIG. 9. A, B, *Cellaria tenuirostris*. A, Part of internode with epitheca still attached, ×90. B, Portion of cleaned internode, with avicularium, ×130. C, D, *Cellaria variabilis*. C, Autozooids, ×154. D, Avicularium, ×225. E, F, *Cellaria scoresbyi*. E, Avicularium, ×116. F, Autozooid, ×171.

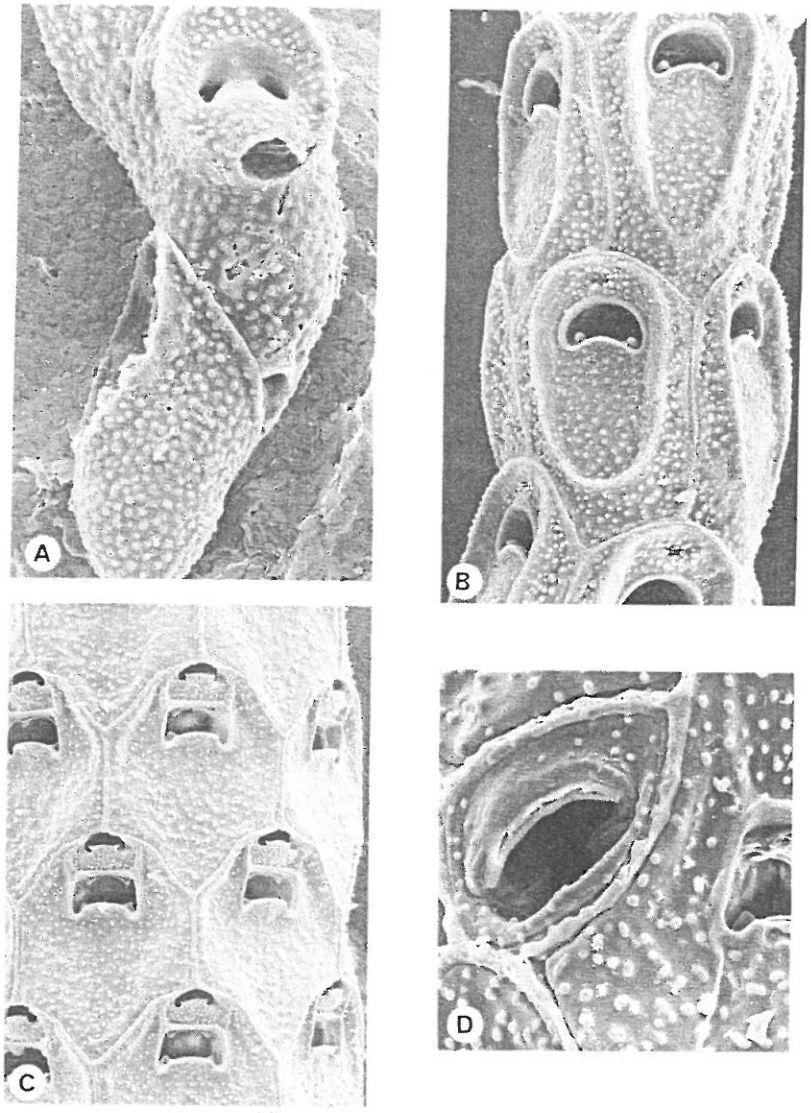


FIG. 10. A, B, *Cellaria* sp. A, Ancestrula and basal portion of colony, ×130. B, Autozooids, ×100. C, D, *Cellariaeforma aurorae*. C, Brooding autozooids, ×50. D, Avicularium, ×180.

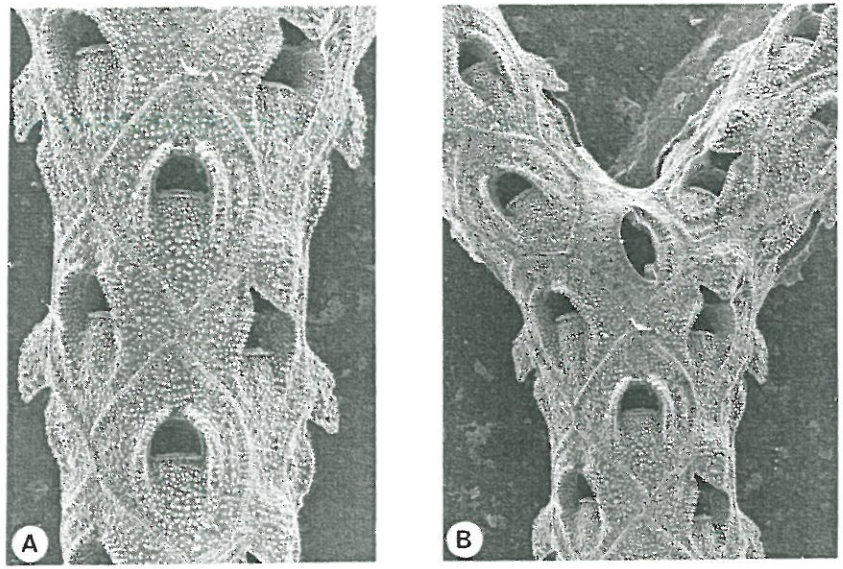


FIG. 11. *Stomhypselosaria watersi*. A, Middle portion of an internode, with ovicelled autozooids, ×45. B, A dichotomy, showing axial avicularium, ×31.

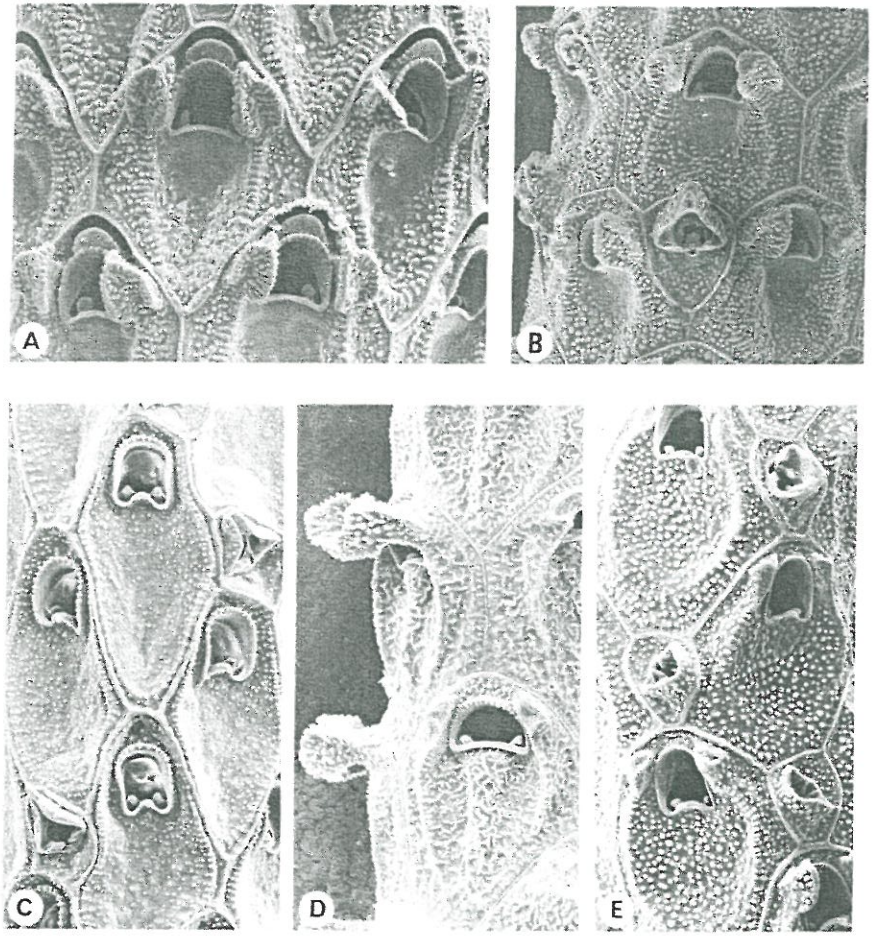
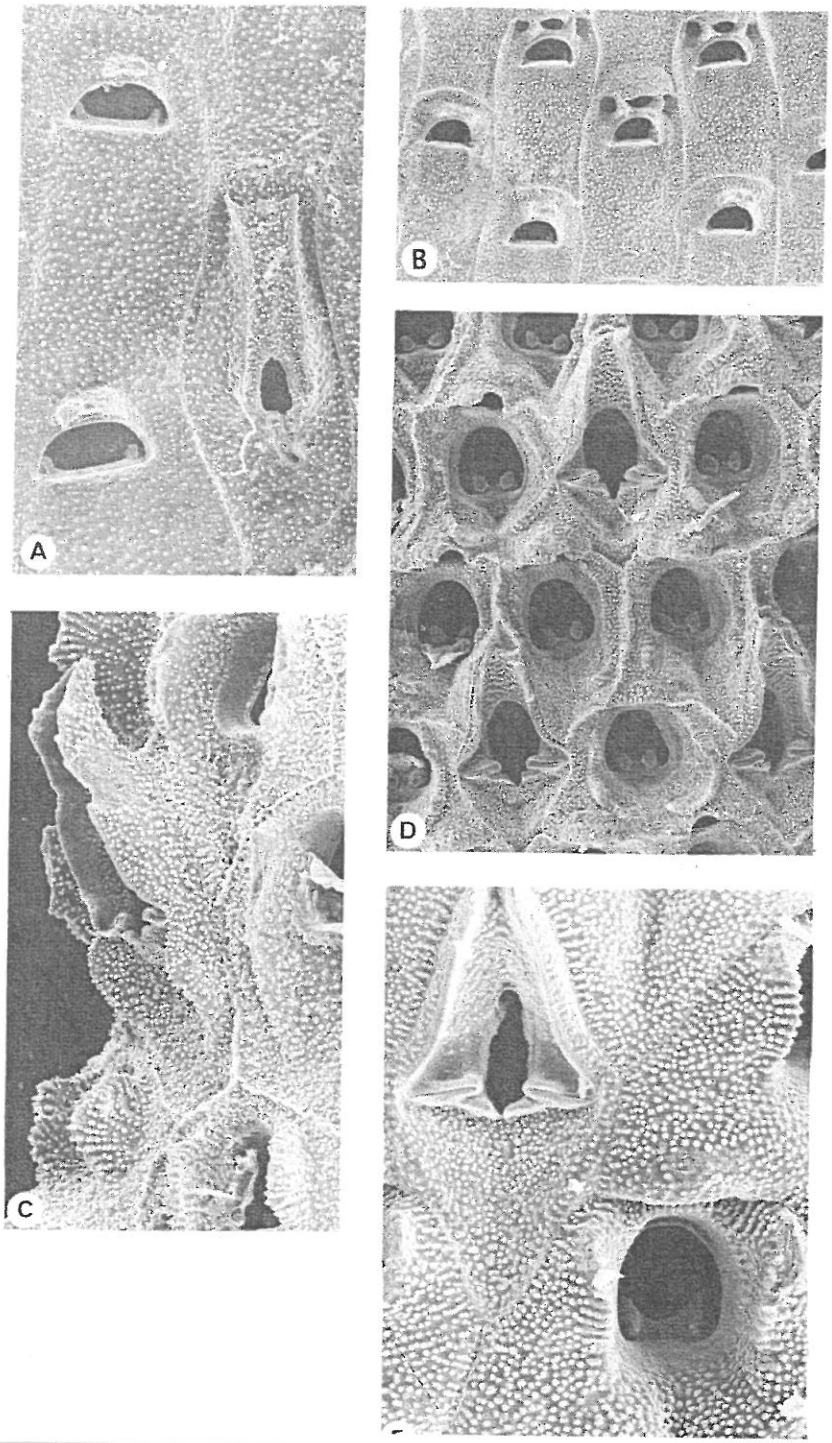


FIG. 12. A, B, *Paracellaria cellarioides*. A, Brooding autozooids, ×80. B, Non-brooding autozooids and an avicularium, ×65. C. *Paracellaria wandeli*, ×60. D, *Paracellaria calveti*, ×80. E, *Paracellaria elephantina*, ×80.



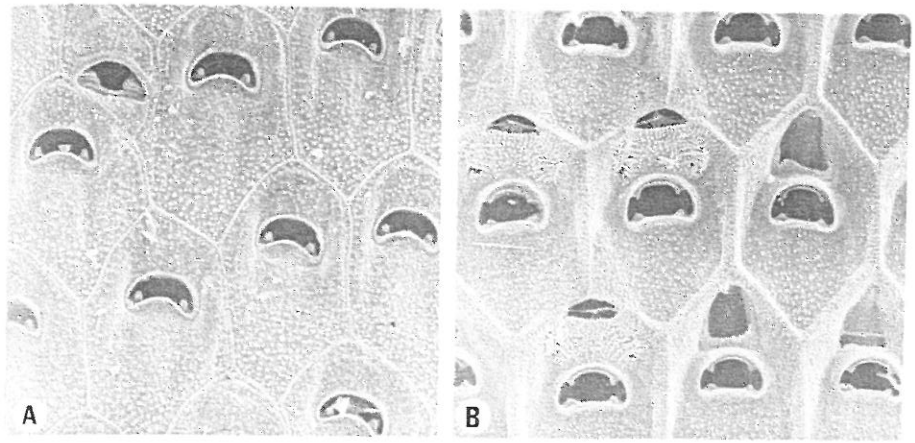


FIG. 14. A, *Melicerita latilaminata*, × 60. B, *Melicerita blancoae*, × 60.

Ellisina constantia (Kluge)

(Fig. 5D)

Membranipora constantia Kluge 1914: 661, pl. 34, fig. 3.

Material. Terra Nova stns 194, 316.

Description. Colony encrusting, forming thin, flat sheets. Autozooids large, oval to hexagonal, or irregular, separated by distinct grooves; vertical walls low; opesia bordered by narrow, coarsely granular cryptocyst, developed as a conspicuous, crenulate mural rim; gymnocystal calcification absent. No spines. Small vicarious avicularia present at the distal end of almost all autozooids; cystid smooth, rounded; rostrum bluntly triangular, directed laterally; condyles well developed, but not meeting medially; cryptocyst relatively broad, enclosing an oval opesia. Ovicell conspicuous, convex; calcification smooth frontally, separated by an abrupt transverse discontinuity from coarsely granular distal calcification, continuous with the cryptocyst of the succeeding autozooid. Avicularia not developed distal to brooding autozooids.

Measurements. Means and standard deviation of 20 values, mm:

Autozooid length 1·00 ± 0·09
Autozooid width 0·74 ± 0·07

Remarks. This distinctive species does not seem to have been recorded again since Kluge's (1914) original account, and is probably limited to Antarctic Shelf waters. It is readily distinguished from other species of *Ellisina* by its ovicell, and by its transversely orientated avicularia.

FIG. 13. A, B, *Larvapora mawsoni*. A, Autozooids and an avicularium, × 50. B, Autozooids and ovicells, × 21. C, D, *Swanomia membranacea*. C, Autozooids and an avicularium in lateral view, showing well developed cryptocystal expansions, × 60. D, Brooding autozooids and avicularia, × 42. E, *Swanomia brevimandibulata*, × 100.

Ellisina incrustans (Waters)

(Fig. 5C)

Membranipora incrustans Waters 1898: 686, pl. 47, fig. 13.
Ellisina incrustans: Hastings 1945: 91, fig. 5.

Material. Discovery stns 1321, WS85, WS88, WS228, WS825.

Description. Colony encrusting. Autozooids rather small, oval to hexagonal, separated by distinct grooves. Cryptocyst thickly calcified, nodular, developed as a relatively broad shelf around the lateral and proximal borders of the opesia, thickened at the edges to form a crenulate mural rim. No spines. Vicarious avicularium at the distal end of most autozooids; cystid smoothly calcified; rostrum triangular, acute to frontal plane, directed disto-laterally; condyles well developed, sharply pointed, not meeting medially, cryptocyst present as a broad shelf proximal to the semicircular opesia. Ovicell without an avicularium distal to it; smoothly calcified frontally, with the granular cryptocystal calcification of the succeeding autozooid overlapping it distally.

Measurements. Means and standard deviation of 20 values, mm:

Autozooid length 0·47 ± 0·04
Autozooid width 0·28 ± 0·06

Remarks. Ellisina incrustans was redescribed by Hastings (1945), who distinguished it from *E. antarctica*, and noted its similarity to *Membranipora constantia* Kluge. It differs from that species, here assigned to *Ellisina*, in its larger avicularium, obliquely orientated, and in its thicker cryptocystal calcification. The autozooids of *E. constantia* are more than twice the size of those of *E. incrustans*.

The Discovery samples all originate from a comparatively limited geographical area, from the west end of Magellan Strait to the Falkland Isles; Hastings (1945) recorded it from the same region of the southwest Atlantic, and from Tristan da Cunha. It is unlikely to occur in Antarctic waters.

Xylochotridens gen. nov.

Diagnosis. Colony encrusting. Autozooids with well developed gymnocyst, and narrow granular cryptocyst; opesia occupying larger part of frontal surface, surrounded by erect, spatulate spinae. Vertical walls with multiporous septula. Ovicell prominent, hyperstomial, closed by autozooidal operculum; with a large frontal fenestra, bounded by a raised rim. No avicularia.

Type species. Xylochotridens rangifer sp. nov.

The ovicell, and the presence of spines around the opesia, are suggestive of *Corbulella*, introduced by Gordon (1984) as a subgenus of *Crassimarginatella* Canu. *X. rangifer* differs from species of *Corbulella* principally in the absence of avicularia.

Xylochotridens rangifer sp. nov.

(Fig. 5E–F)

Material. HOLOTYPE: BMNH reg. no. 1988.4.20.7, Discovery stn. 1948. Other material: Discovery stn. 1948.

Description. Colony encrusting. Autozooids irregularly hexagonal, separated by shallow grooves, with deep vertical walls perforated by large multiporous septula; 0·8–1·00 × 0·5–0·6 mm. Opesia extensive, oval, constituting larger part of frontal surface, with a narrow, finely granular cryptocystal rim proximally, and enclosed by a thickened mural rim. Gymnocyst well-developed, smooth. Eight to ten stout spines evenly spaced around the opesia; straight or slightly incurved, broadening and branching distally to form four or five, flat-sectioned distal spines; the four distalmost spines distinctly palmate. Avicularia absent. Ovicell hemispherical, prominent, recumbent on distally succeeding autozooid; ectooecium smooth; entooecium smooth, at first exposed over the entire frontal surface of the ovicell, later limited to a transversely oval area as ectooecium calcifies in a band distal to the ovicell aperture; the ectooecial rim distal to the entooecium is typically produced as a projecting peak.

Remarks. Several colonies were collected from Discovery stn. 1948, in the South Shetland Isles, encrusting hydrocorallines; all specimens retained a reddish pigmentation in alcohol, which faded when they were dried.

Micropora brevissima Waters

(Fig. 6A–B)

Micropora brevissima Waters 1904: 40, pl. 2, figs. 7 a–c.

Material. Discovery stns 159, 170, 190, 474, 482, 1321, 1909, 1948, WS33, WS84, WS85, WS228. Terra Nova stns 194, 316.

Description. Colony encrusting, developing often extensive sheets. Autozooids rounded distally, tapered or truncate proximally; separated by raised, finely crenellate lateral walls, particularly conspicuous at the distal end of the autozooid. Opesia coincident with orifice, at extreme distal end of autozooid, wider than long, proximal edge straight; outline a slender crescent, or slightly angular in some populations. Adjacent to proximal corners of opesia, the lateral walls may be variably thickened, in some specimens developed as prominent knobs. Cryptocyst finely granular, convex medially; opesiules large, elongate-oval, each with a small stellate pore proximal to it; about 20–40 small, simple pores evenly distributed over the convex middle portion of the cryptocyst. Avicularia present at the distal end of some autozooids, sporadic, and varying in abundance between colonies; cystid rectangular, rostrum slender, triangular, directed disto-laterally; crossbar stout, complete, palate with extensive foramen; proximal opesia transversely oval, with broad border of granular cryptocyst. Ovicell partially immersed, but prominent, domed, about as wide as long; surface finely granular, except for a narrow frontal band of smooth calcification above the aperture, sometimes peaked or umbonate medially.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length	0·49 ± 0·06	Opesia length	0·05 ± 0·006
Autozooid width	0·34 ± 0·05	Opesia width	0·14 ± 0·01
Avicularium length	0·19 ± 0·02 ($n = 10$)		

Remarks. Waters' (1904) material of *M. brevissima* originated from four *Belgica* stations in the Bellingshausen Sea, and he implied that he had specimens also from Cape Horn. Moyano (1975) recorded it from the South Shetland Islands, and it is probable that Antarctic records of the northern hemisphere species *Micropora coriacea* (Esper) (e.g. Calvet 1909, Vigeland 1952) refer to this species. It appears to have a wide geographical distribution; the two Terra Nova stns listed above were in the Ross Sea, while the Discovery records range from the Palmer Archipelago, South Georgia, the Falkland Isles and the Magellan Strait. The two specimens illustrated are from the Falkland Isles and the South Shetlands.

Cellaria clavata (Busk)

(Fig. 6C–D)

Salicornaria clavata Busk 1884: 88 (in part), pl. 12, fig. 8.
Cellaria clavata: Hastings 1947: 236.

Material. Discovery stns 38, 388, WS80, WS88, WS97, WS225, WS226, WS228, WS237, WS243, WS244, WS246, WS825, WS871.

Description. Colony large, formed of stout internodes, 12–33 mm long, 1·5 mm wide, straight or irregularly curved; typically narrowest proximally, broader and slightly clavate distally. Branching not dichotomous: developing lateral offshoots, each arising from a single, modified autozooid, anchored by chitinous rootlets which wrap around the parent internode. Autozooids arranged in about 14 alternating longitudinal series, giving whorls of seven or eight; hexagonal, with straight distal and proximal borders, areolation thus modified rhombic, but clearly hexagonal in fertile areas of internode. Autozooids separated by thin raised ridges, less prominent in late ontogeny. Opesia in distal half of autozooid, but distant from distal edge, equivalent to about one-eighth total autozooid length; reniform, with low, rounded proximal lip, scarcely projecting, and a blunt, forwardly projecting denticle in each proximal corner; a pair of pointed, denticles present within distal border, variably developed, linked by a finely denticulate ridge. Ovicell aperture at first elongate oval, reduced in later ontogeny and almost occluded by a large, quadrangular proximal lip. Avicularium small, no longer than opesia of autozooid, with rectangular outline; rostrum acute to frontal plane, distally directed, crescentic, with thick, blunt condyles.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length 0·61 ± 0·04	Opesia length 0·09 ± < 0·01
Autozooid width 0·40 ± 0·02	Opesia width 0·16 ± 0·02

Remarks. Hastings (1947) examined the Challenger type series of *Cellaria clavata* and established that the specimens from Bass Strait (and presumably also those from Port Jackson) properly belonged to *Cellaria australis* MacGillivray. She considered that the specimens from Heard Island (the type locality), and Kerguelen differed from those from Prince Edward Island, principally in the 'areolation' of the autozooids. The Discovery material described here (also referred to by Hastings, who considered it to represent yet another species) all originates from the southern region of the outer Patagonian Shelf; it displays rhomboidal, hexagonal rhomboidal, and hexagonal areolation (Hastings 1947), yet the dimensions and morphology of the opesia and the avicularium are constant in all specimens, and compare closely with the type material of *C. clavata* (BMNH 1887.12.9.389,395; 1934.2.16.35).

Busk's (1884) Challenger specimen from Prince Edward Island (BMNH 1944.1.8.205) is identical to the Discovery specimens, except that it does not have distal condyles in the opesia. However, it does display the inner denticulate ridge which links the denticles in the Discovery specimens. The distal condyles are variably developed in the present material, and d'Hondt (1984) notes them to be inconstant in his new species *Neocellariaeforma elongata*, described from Marion Island.

This latter species seems very close to *C. clavata* (Busk) although d'Hondt (1984) did record *C. clavata* separately from Kerguelen (where the species was also reported by d'Hondt and Redier 1977, as *Mesostomaria hastingsae* sp. nov.). D'Hondt's genus *Neocellariaeforma* was partly characterized by its unjointed dichotomies and lateral offset branching, both of which were noted by Hastings (1947) in the Discovery material. No dichotomies were present in the material listed here, but unjointed dichotomies, fracture joints and lateral offsets seem to occur in all of the geographical or taxonomic groups discussed above and their occurrence may perhaps be ontogenetically related. At present it seems that there are grounds for regarding the South Atlantic and South Indian Ocean '*clavata* group' as a single species, although firm evidence is still lacking.

Cellaria diversa Livingstone

(Fig. 7B–C)

Cellaria diversa Livingstone 1928: 34, pl. 6, fig. 8; text figs 6, 7.
Cellaria vitrimuralis Rogick 1956: 232, pl. 4; pl. 5, figs A–E; Androsova 1972a: 338; 1972b: 97.

Material. Discovery stns 27, 42, 45, 123, 140, 142, 144, 148, 149, 175, 190, 366, 456, 474, 1652, 1660, WS27, WS177, Terra Nova stns 338, 339, 340, 348. National Antarctic Expedition, 13.9.1902, 24.4.1903, 18.5.1903, 3.6.1903, 18.6.1903, 8.9.1903.

Description. Colony developing dense tufts up to 50 mm high. Internodes long, straight and slender, up to 10 mm long, with a constant width of 0·75 mm. Autozooids elongate, hexagonal, rounded distally, separated by prominent raised ridges; arranged in ten alternating, longitudinal series. Cryptocyst evenly concave, finely granular, without longitudinal ridges. Opesia close to distal end of autozooid, approximately semicircular, comprising about one-tenth total autozooid length; with thin, raised rim, the proximal edge straight, slightly reflected, bearing a minute, pointed denticle close to each corner. Ovicell not completely immersed, visible as a prominent oval swelling distal to the maternal autozooid; aperture about half width of opesia, transversely oval. Avicularia infrequent, typically occurring at or close to basal part of internode, marking the division of an autozooid row; about two-thirds length of autozooid, hexagonal in outline, with short, broadly triangular rostrum in distal half; condyles prominent, almost meeting medially.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length 0·91 ± 0·07	Opesia length 0·10 ± 0·06
Autozooid width 0·36 ± 0·03	Opesia width 0·16 ± 0·01
Avicularia length 0·14 ± 0·05 ($n = 10$)	

Remarks. Rogick (1956) perhaps overlooked Livingstone's (1928) account of this species; although his illustration is indifferent, his detailed description matches Rogick's excellent figures and there can be no doubt in synonymizing the two taxa.

C. diversa is an endemic Antarctic species with a wide geographical distribution. It was recorded from Adelie Land by Livingstone (1928) and from the Ross Sea by Rogick (1956). The present material, which included large samples of many well grown colonies, originated from a number of stations in the Ross Sea, from the Palmer Archipelago, the South Shetlands and the South Sandwich Islands. Numerous samples were obtained from around South Georgia, and a single sample was collected at Bouvet Island.

Cellaria immersa (Tenison-Woods)

(Fig. 8D)

Salicornaria immersa Tenison-Woods 1880: 27.
Cellaria immersa: Brown 1952: 156; Gordon 1986: 74, pl. 29, figs C–E.

Material. Discovery stns 929, 933, 934, 935, 941, Terra Nova stns 90, 144.

Description. Colony developing diffuse tufts up to 25 mm high, often with long basal internodes and shorter distal internodes, giving a stalked, fan-shaped form. Basal internodes up to 10 mm long, distal commonly 4–5 mm, maximum width 0·75–1·0 mm. Autozooids forming short, broad hexagons, in 12 to 16 alternating longitudinal series, areolation rhombic at growing tips, distinctly hexagonal in later ontogeny. Cryptocyst finely granular, thick, evenly concave, with well-marked lateral ridges situated close to, and almost exactly in parallel with, the borders of the autozooid. Opesia in distal half of autozooid, equivalent to one-fifth total autozooid length; reniform, with a rounded triangular proximal lip, thickened and projecting slightly from the frontal plane; denticles bluntly pointed, forwardly directed; distal border indistinctly denticulate. Ovicell entirely immersed, marked by a small, semicircular aperture at the distal end of the autozooid. Avicularia frequent; cystid slightly longer than autozooid; rostrum very slender, triangular, abruptly broadened basally above pronounced condyles; opesia proximal to crossbar, small, narrowly oval.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length 0·37 ± 0·08	Opesia length 0·06 ± 0·006
Autozooid width 0·28 ± 0·02	Opesia width 0·10 ± 0·006

Remarks. The present material was collected at Discovery and Terra Nova stations in northern New Zealand waters, well within the apparently limited geographical range of this species. Gordon (1986) has noted the difficulties in discriminating between this species and *Cellaria tenuirostris* (Busk).

Cellaria malvinensis (Busk)

(Figs 8A–C)

Salicornaria malvinensis Busk 1852: 18, pl. 63, figs 1, 2. 1884: 91, pl. 12, figs 1, 5, 7.

Material. Discovery stns 39, 42, 45, 48, 51, 53, 72, 123, 126, 149, 159, 160, 250, 562, 1321, 1562, 1563, 1564, 1902, WS22, WS24, WS25, WS27, WS33, WS73, WS76, WS79, WS80, WS81, WS82, WS83, WS84, WS85, WS87, WS90, WS93, WS177, WS210, WS219, WS220, WS222, WS225, WS226, WS227, WS228, WS231, WS237, WS239, WS243, WS244, WS245, WS246, WS247, WS249, WS250, WS765, WS775, WS776, WS781, WS784, WS787, WS792, WS794, WS824, WS825, WS838, WS840, WS871, MS14, MS71.

Description. Colony developing dense clumps, up to 50 mm high. Internodes slightly curved proximally, straight distally, each dichotomous pair forming a tuning fork shape; 4–8 mm long, 0·75–1·75 mm broad, joined by small bundles of knot-like rootlets. Autozooids elongate hexagonal, in alternating longitudinal series, with rhomboidal areolation, forming spiral whorls of 6–12; separated by raised, often crenulate ridges. Cryptocyst initially smooth, becoming progressively more granular in later ontogeny, uniformly concave, without lateral ridges. Opesia in distal half of autozooid, relatively large, equivalent to one-quarter total length of autozooid; wider than long, the distal border with fine denticulations medially, proximal border gently convex, slightly projecting, with a small, bluntly tapered denticle close to each corner. Ovicell distinct at all ontogenetic stages as a pronounced swelling of the cryptocyst of the two autozooids distally succeeding the maternal autozooid; aperture relatively large, transversely oval or semielliptical. Avicularia frequent, at least one per internode; cystid almost twice as long as autozooid, displacing an autozooid in normal sequence and extending distally between the two succeeding autozooids; rostrum elongate triangular, projecting from the frontal plane distally, with stout condyles meeting and fusing medially, and frequently fusing also with the distal part of the cryptocyst; distal to the condyles the opesia occupies the whole of the palatal area.

Measurements. Means and standard deviations of 20 values, mm:

	slender	stout
Autozooid length	0·50 ± 0·03	0·46 ± 0·03
Autozooid width	0·29 ± 0·02	0·26 ± 0·03
Opesia length	0·08 ± 0·008	0·09 ± 0·005
Opesia width	0·13 ± 0·005	0·15 ± 0·007
Length avic. rostrum	0·29 ± 0·02 ($n = 10$)	0·38 ± 0·02 ($n = 15$)

Remarks. The large number of specimens in the Discovery collections seemed to fall into two distinct forms, one with slender internodes, and the other with very much more stout internodes. In the former, internodes comprised most commonly 12 to 16 longitudinal autozooid series, while in 'stout' colonies 20–24 were frequently encountered. In all other details the two forms were identical and measurements from examples of each (above) do not suggest that two distinctly different species were represented. Busk (1884) also noted stout and slender forms of *C. malvinensis* in the Challenger collections, and was also of the opinion that only a single species could be distinguished.

C. malvinensis has been reported previously over a wide region, extending from the Magellan Strait to Marion Island and Kerguelen (Busk 1852, 1884; d'Hondt 1984). It was the commonest and most abundant cellariid collected by Discovery Investigations and is evidently widely distributed over the south Patagonian Shelf, around the Falkland Isles, and over Burdwood Bank. It was collected from the west end of the Magellan Strait, and from Marion Island and Prince Edward Island in the southern Indian Ocean. It ranges southwards as far as South Georgia but probably does not occur in Antarctic waters.

Cellaria moniliorata Rogick

(Fig. 7A)

Cellaria moniliorata Rogick 1956: 229, pl. 5, F–I, 6, A–L; Moyano 1969: 44, pl. 1, fig. 3; Androsova 1972 a: 338.

Material. Discovery stns 190, 195, Terra Nova stn. 348. National Antarctic Expedition, 8.2.1903, 18.5.1903, 3.6.1903, 13.6.1903, 18.6.1903.

Description. Colony developing short delicate tufts, up to 10 mm long in present material. Internodes irregularly curved, very slender, up to 6 mm long, but with a maximum width of only 0·25 mm, increasing to 0·5 mm in fertile internodes. Autozooids forming elongate hexagons, arranged in eight alternating longitudinal series, giving a quadrangular branch section; thinly calcified. Cryptocyst with few, widely-spaced granulations; flat or gently convex proximally, concave medially; longitudinal ridges extending two-thirds of autozooid length, becoming indistinct proximally. Opesia in distal third of autozooid, wider than long, crescentic, with a thin, raised rim and a minute, indistinct denticle in each proximal corner. Ovicell immersed, but visible as a pronounced convexity between the two autozooids distally succeeding the maternal autozooid; aperture about half width of opesia, transversely oval. Avicularia frequent; cystid pyriform, with elongate triangular rostrum projecting slightly from frontal plane.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length 0·58 ± 0·04	Opesia length 0·05 ± < 0·01
Autozooid width 0·23 ± 0·02	Opesia width 0·10 ± < 0·01

Remarks. Cellaria moniliorata is an endemic Antarctic species. It was reported from Cape Royds and the Knox coast by Rogick (1956), and from Bransfield Strait by Moyano (1969). The present material originates from McMurdo Sound, Ross Sea, and from the South Shetlands and the Palmer Archipelago.

Cellaria scoresbyi Hastings

(Fig. 9E–F)

Cellaria scoresbyi Hastings 1947: 229, pl. 4, figs A–D.

Material. Discovery stns 388, 1562, WS226, WS243, WS847.

Description. Colony developing delicate, diffuse tufts, up to 20 mm high in present material; internodes slender, straight, or just slightly curved basally, up to 6 mm long, less than 0·5 mm wide; nodes comprising small knots of chitinous rootlets on axillary faces of internodes. Autozooids in eight or 12 alternating, longitudinal series, with hexagonal areolation, separated by distinct raised ridges. Cryptocyst coarsely granular, slightly concave medially, with prominent, curved lateral ridges, converging close to proximal end of autozooid. Opesia in distal half of autozooid, its proximal border just distal to the midpoint of the autozooid, about one-ninth total autozooid length; reniform, with rounded proximal lip scarcely projecting from frontal plane; a bluntly rounded, forwardly projecting denticle in each proximal corner. Ovicells not developed in present material. Avicularium replacing autozooid in normal sequence, cystid as large as autozooid: rostrum elongate, slender, almost parallel sided distally, hooked at tip but not projecting markedly from frontal plane; condyles well developed but not quite meeting medially, cryptocyst ridges prominent, joined proximally.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length 0·49 ± 0·01	Opesia length 0·05 ± < 0·01
Autozooid width 0·29 ± 0·02	Opesia width 0·09 ± < 0·01
Length avic. rostrum 0·24 ± 0·02 ($n = 10$)	

Remarks. Hastings (1947) showed that Busk's (1884) specimens of *Cellaria tenuirostris* consisted of two species, and established *C. scoresbyi* for his material from the Patagonian region. True *C. tenuirostris* seems to be limited to the western Pacific and the southern Indian Ocean. Unfortunately, the original description of *C. scoresbyi* is unhelpful, and the poor illustrations give only an inadequate representation of the species. The present material has been compared with the type specimen (BMNH reg. no. 1945.8.4.3.) and all specimens are alike in possessing an avicularium with a particularly slender rostrum. Four of the specimens listed originated from the southern region of the Patagonian Shelf, the fifth from Marion Island, a considerable eastward extension of the species known geographical range.

Cellaria tenuirostris (Busk)

(Fig. 9A–B)

Salicornaria tenuirostris Busk 1852: 17 (part).
Cellaria tenuirostris: Hastings 1947: 226, pl. 3, figs A, B; Gordon 1984: 58, pl. 18, fig. B; 1986: 74, pl. 29, figs A, B.

Material. Discovery stns 929, 933, 934, 935, 1563. Terra Nova stns 91, 144.

Description. Colonies developing small tufts up to 20 mm high; internodes up to 6 mm long, 0·5–1·0 mm wide, gently curved basally, straight distally; nodes secured with knotted rhizoids. Autozooids disposed in up to 12 vertical rows, with hexagonal areolation, but becoming decidedly rhombic in broader, especially fertile, regions of each branch. Cryptocyst very finely granular, concave medially; mural rims pronounced; cryptocyst ridges well developed, thickened, curving smoothly towards each other and meeting proximally. Opesia in distal half of autozooid, but with proximal border situated close to midline; wider than long, distal border constituting a semicircle, proximal developed as a gently convex, slightly projecting lip; a short, bluntly rounded denticle projects from each proximal corner. Ovicell completely immersed, aperture a narrow, transverse oval. Avicularia frequent; as long as autozooids, with broadly triangular rostrum, hooked distally and projecting slightly from the frontal plane of the branch; condyles short, not meeting medially.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length	0·39 ± 0·03	Opesia length 0·05 ± 0·003
Autozooid width	0·28 ± 0·03	Opesia width 0·09 ± 0·007
Length avic. rostrum	0·20 ± 0·02 ($n = 10$)	

Remarks. This species has been redescribed and figured by Gordon (1984, 1986) who notes that it is the most abundant cellariid in northern New Zealand waters and has a wide latitudinal distribution along the western rim of the Pacific. It was reported from Kerguelen by d'Hondt (1984). Southwest Atlantic records of *C. tenuirostris* were shown by Hastings (1947) to be referable to *C. scoresbyi* Hastings. The few specimens of *C. tenuirostris* described here, with one exception, all originate from a number of Discovery and Terra Nova stations in northern New Zealand. The exception is a single specimen from Marion Island (stn. 1563) which is quite clearly typical *C. tenuirostris*. Interestingly, specimens of *C. scoresbyi* were also obtained from Marion Island.

Cellaria variabilis (Busk)

(Fig. 9C–D)

Salicornaria variabilis Busk 1884, 89, pl. 12, figs 3, 9.
Cellaria variabilis: Waters 1905: 234.

Material. Discovery stns 1321, 1902, WS84, WS95, WS221, WS222, WS243, WS776, WS836.

Description. Colony developing diffuse tufts, up to 45 mm high in present material; internodes slender, slightly curved basally, straight distally, 5–8 mm long, with maximum width 1·5 mm; branching dichotomously, each dichotomy approximately a tuning-fork shape, nodes consisting of bundles of tubular rootlets on inner, axial, face of each internode. Autozooids in six to eight alternating longitudinal series, with rhomboidal areolation; typically rhombic or rhombic/hexagonal outline, but at base of colony especially, often with true hexagonal shape. Cryptocyst granular, concave medially, with well-developed lateral ridges extending most of length, curving slightly but not meeting proximally. Opesia situated in distal half of autozooid, but distant from distal wall, equivalent to one-ninth total autozooid length; reniform, with rounded proximal lip projecting slightly from frontal plane, a bluntly rounded, forwardly projecting denticle in each proximal corner. Ovicell aperture transversely oval, with short, wide, quadrangular, proximal lip. Avicularia replacing autozooids in

normal sequence, as large as autozooids, rostrum a short, broad, triangular shape, half length of cystid and not extended distally; condyles slender, but well-developed, fusing medially.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length	0·48 ± 0·03	Opesia length	0·05 ± < 0·01
Autozooid width	0·29 ± 0·02	Opesia width	0·11 ± 0·01
Length avic. rostrum	0·21 ± 0·01 (n = 10)		

Remarks. This species, characterized particularly by its short, broad avicularium, was recorded by Busk (1884) from the coast of Chile, from the Patagonian Shelf, and from Kerguelen. It was recorded from Cape Horn by Waters (1905), and subsequently listed by d'Hondt and Redier (1977) and d'Hondt (1984) from Kerguelen. The present material originated from the Patagonian Shelf, with a single specimen from the west end of the Magellan Strait.

Cellaria sp.

(Fig. 10A–B)

Material. National Antarctic Expedition, Winter Quarters, McMurdo Sound.

Description. Internode slender, 0·5 mm wide, curved. Autozooids in whorls of four; elongate hexagonal, 0·5–0·6 × 0·35 mm; mural rims visible as thin raised ridges. Cryptocyst coarsely granular, flat or slightly concave medially, with well-marked ridges developed as a complete oval enclosing about half of the frontal surface area of the autozooid. Opesia in distal half of autozooid; distal edge forming a semi-circle; with a blunt, projecting denticle in each proximal corner. Avicularia and ovicells not present.

Remarks. Only a single internode of this species was found, measuring 7 mm, including an ancestrula. It is perhaps an undescribed species; it is unlike any species known from the Ross Sea, or adjacent subantarctic waters. However, the specimen represents a juvenile colony only, its complete ontogeny is thus unknown, and neither ovicells nor avicularia had been developed. Consequently, it is best not to assign a specific name until a more extensive sample may be collected. The entire cryptocyst ridge is similar to that of *Cellariaeforma coronata* Rogick, and her figure (1956, pl. 8, fig. C) is very similar to the present specimen. Unfortunately, Rogick also had limited material and it is not possible to decide with certainty whether this specimen may be assigned to her species.

Cellariaeforma aurorae (Livingstone)

(Fig. 10C–D)

Cellaria aurorae Livingstone 1928: 36, pl. 4, fig. 7, text fig. 8.
Cellariaeforma parvimuralis Rogick 1956: 241, pl. 7, figs C–H.
Cellariaeforma aurorae: Moyano 1969: 48, pl. 2, figs 7–15, pl. 3, figs 16–19.

Material. Discovery stns 167, 175, 190, 599, 1652, 1660, Terra Nova stn. 314.

Description. Colonies stout, candelabriform; internodes commonly 10 mm long, but may exceed 20 mm, 2 mm wide. Autozooids in whorls of six to eight; branches divide dichotomously, with autozooid series continuous across the nodes which, in later ontogeny are reinforced by intertwined chitinous rhizoids, developing from the autozooids distal to the dichotomy and growing proximally; in late ontogeny a simple fracture joint develops across the base of each dichotomy. Autozooids broadly hexagonal, with raised and thickened mural rims; cryptocyst coarsely granular, flat or

with a slight median concavity, no cryptocyst ridges. Opesia in distal half of autozooid, close to but distinct from terminal wall; rectangular in outline, the distal border and sides straight, the proximal edge developed as a squared, slightly projecting lip; a pair of short, triangular denticles proximally, opposed by an equally pronounced distal pair linked by a low ridge. Ovicell completely immersed, marked by a pair of low ridges extending from the distal corners of the opesia to the distal wall of the autozooid enclosing a convex area of calcification, distal to which the transversely oval aperture is partly occluded by a rectangular lip with sharply cuspidate corners. Avicularia infrequent, each wedged in at the boundaries of three autozooids; surface area equivalent to the opesia of an autozooid; triangular, or irregularly quadrangular in outline; rostrum oblique to long axis of branch, narrowly crescentic, projecting slightly and obscuring the short, paired condyles.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length	0·65 ± 0·05	Opesia length	0·07 ± 0·006
Autozooid width	0·46 ± 0·04	Opesia width	0·16 ± 0·006

Remarks. Cellariaeforma aurorae is an endemic Antarctic species. It seems to be widely distributed in Antarctic waters, and occurs along the Scotia Arc as far north as Signy Island, but has not been found off South Georgia.

Stomhypselosaria watersi sp. nov.

(Fig. 11)

Cellaria dubia: Waters 1904: 37, pl. 2, fig. 12.

Material. Discovery stns 167, 363, 366, WS243. Terra Nova stn. 316. National Antarctic Expedition, 7.8.1902, 18.5.1903, 3.6.1903.

Description. Colony erect, with slender, cylindrical internodes, forming diffuse tufts up to 20 mm high; branching dichotomously at intervals of about 5 mm, the branches curved basally, up to 0·7 mm wide; anchored by chitinous rootlets. Autozooids arranged in whorls of three; lozenge-shaped, separated by raised sutures. Cryptocyst coarsely granular, depressed just proximal to opesia; developing paired ridges extending from distal border of opesia, on each side, proximally for about two-thirds frontal length of autozooid. Opesia situated in middle of frontal surface, equivalent to one-fifth total autozooid length, as wide as long, arched distally, with straight, slightly reflected proximal lip; a pair of widely-spaced, inconspicuous denticles just visible above lip. Ovicell immersed, with large, quadrangular aperture opening immediately distal to opesia; covered by a convex, granular hood, with overhanging, medially peaked lip. Avicularia present at dichotomies only, close to the axil, typically one on each side of the plane of the two branches; cystid as large as autozooid, with a transversely orientated elliptical rostrum; opesia extensive, condyles short and knoblike, mandible semi-elliptical.

Measurements. Means and standard deviation of 20 values, mm:

Autozooid length	0·81 ± 0·05	Opesia length	0·15 ± 0·01
Autozooid width	0·55 ± 0·06		

Remarks. Waters (1904) gave no description of his single specimen of this species, but his illustration is sufficiently clear to show that the *Belgica* species was quite unlike *Cellaria dubia* (Busk). Fortunately, the specimen is still extant in the collections of the

Manchester Museum, and proves to be identical to the species here recorded from the Discovery Investigations collections.

Stomhypselosaria watersi is similar to *S. condylata* Canu and Bassler, 1927, recently redescribed by Gordon (1984), but differs in its broader autozooids and less well developed cryptocystal ridges. Gordon (1984) states that *Stomhypselosaria* lacks avicularia (and indeed Canu and Bassler (1927) make no reference to them in their diagnosis of the genus) but his illustration (pl. 18, fig. C) shows what appears to be an avicularium, similar to that of *S. watersi*, in the axil of the branch dichotomy. Waters' (1904) specimen was collected from the Bellingshausen Sea. The present material suggests a wide distribution for this species, from the Ross Sea to Signy Island and the South Sandwich Isles, with a single record (WS243) for the southern Patagonian Shelf. D'Hondt (1984) reported *S. condylata* from Kerguelen, and describes an axial avicularium similar to that of *S. watersi*.

Paracellaria wandeli (Calvet)

(Fig. 12C)

Cellaria wandeli Calvet 1909: 23, pl. 2, figs 3–6; Rogick 1956: 236, pl. 7, figs A, B.
Paracellaria wandeli: Moyano 1969: 59, pl. 1, fig. 6, pl. 7, figs 33, 35, 36; Androsova 1972 a: 337; 1972 b: 97.

Material. Discovery stns 175, 190, 1948, WS482. Terra Nova stns 194, 340. BANZARE stn. 39.

Description. Colony erect, jointed, rather diffuse; internodes cylindrical, straight or irregularly curved, up to 15 mm long, with maximum width of 1 mm; nodes forming simple fracture joints, secured by bundles of chitinous rootlets; present material up to 40 mm high. Autozooids arranged in alternating longitudinal series, forming whorls of six opening around entire periphery of branch; elongate, hexagonal, separated by raised, crenulate ridges. Cryptocyst evenly and deeply concave, finely granular. Opesia near distal end of autozooid, longer than wide, comprising about one-quarter total autozooid length; lateral and distal edges forming a slightly flared, crenulate rim; proximal border convex, forming a prominent lip, with a stout, rounded denticle projecting from each corner. Ovicell completely immersed, visible as a small, simple, rounded aperture immediately distal to opesia. Avicularia frequent, intercalated in longitudinal autozooidal series; cystid roughly lozenge-shaped, with raised, triangular, disto-laterally directed rostrum in distal half; condyles well-developed, almost meeting medially.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length 0·70 ± 0·03	Opesia length 0·13 ± < 0·01
Autozooid width 0·25 ± 0·01	

Remarks. Paracellaria wandeli is an endemic Antarctic species, widely distributed in Antarctic shelf waters, including the coasts of Australian Antarctic Territory, the Ross Sea and the Palmer Archipelago.

Paracellaria calveti (d'Hondt)

(Fig. 12D)

Mawsonia calveti d'Hondt 1984: 103, pl. 2, figs 1–3.

Material. Discovery stn. 1948, two small colonies.

Description. Colony erect, slender; internodes cylindrical, straight or irregularly curved, secured by chitinous rootlets; jointed, producing lateral branches at irregular intervals, with simple fracture joints reinforced by chitinous rootlets; internodes of present material up to 6 mm long, with maximum width of 0·5 mm. Autozooids arranged in eight alternating longitudinal series, opening around whole periphery of branch; hexagonal, with the distal end rounded. Cryptocyst irregularly granular, concave medially, with a median longitudinal ridge extending from just proximal to opesia, and paired, curved lateral ridges, almost meeting proximally, and developed on each side of the opesia as narrow, triangular sectioned lobes which in later ontogeny fuse medially to form a slender curved bar. Opesia situated in distal half of autozooid; about one-fifth total autozooid length, almost semi-circular, distal rim crenellate and slightly projecting; the convex proximal edge forming a slightly reflected lip; two short, rounded, widely-spaced denticles present. Ovicell not present. Avicularia described by d'Hondt (1984); not developed in present material.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length 0·54 ± 0·06	Opesia length 0·08 ± < 0·01
Autozooid width 0·38 ± 0·02	

Remarks. This species was recently described from the south Indian Ocean, between Marion and Crozet Islands, by d'Hondt (1984). Dr d'Hondt has kindly confirmed the identity of the Discovery specimens, which originated from a single station in the South Shetland Isles. D'Hondt's type material comprised a single unjointed colony which, with its striking lateral processes, seemed appropriately placed in *Mawsonia* Livingstone (= *Swanomia* nom. nov.). However, the Discovery material consisted of a larger, jointed colony, with the internodes marked by simple fracture joints, reinforced by chitinous rhizoids. This feature, the small size of the avicularia, and the widely-spaced opesial denticles, are characteristic of *Paracellaria* Moyano, to which *Mawsonia calveti* d'Hondt is accordingly assigned. The opesia occupies a much smaller area of the frontal surface in *Paracellaria* than in *Mawsonia*, in which, also, the denticles are linked by a transverse ridge and massively thickened.

Paracellaria cellarioides sp. nov.

(Fig. 12A–B)

Material. HOLOTYPE: BMNH reg. no. 1988.4.20.8, Discovery stn. WS871. Other material: Discovery stn. WS840.

Description. Colony erect, slender, cylindrical, anchored by chitinous rootlets; jointed, dividing dichotomously and forming simple fracture joints reinforced by bundles of chitinous tubes. Largest complete colony 50 mm high; internodes 5 mm long at colony base, to 20 mm or more distally, with maximum width of 1 mm prior to dichotomy. Autozooids in alternating longitudinal series, disposed in spiral whorls of eight around the branch axis; elongate hexagonal, separated by distinct thickened sutures. Cryptocyst deeply concave and smoothly calcified immediately proximal to opesia; elsewhere coarsely granular, with paired longitudinal ridges, developed on each side of the opesia as projecting lobes with triangular section and crenellate edge. Opesia situated in distal half of the autozooid, comprising about one-quarter total autozooid length; slightly longer than wide, narrowed and arched distally; proximal edge convex, developed as a reflected lip, continuous with a projecting, crenellate distal rim; two widely spaced, conical, proximal denticles. Ovicell completely immersed, indicated by a

rounded, triangular aperture at distal end of autozooid, partly occluded by a semielliptical proximal lip. Avicularia frequent, smaller than autozooids and intercalated within longitudinal autozooid series: cryptocyst shallowly concave, shield-shaped; rostrum broadly triangular, distally directed, projecting from frontal plane at an acute angle; opesia small, quadrangular, with a projecting, nodular columella partly occluding its lumen; condyles well developed, but not meeting medially.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length	0·47 ± 0·03	Opesia length	0·10 ± < 0·01
Autozooid width	0·36 ± 0·03		
Length avic, rostrum	0·16 ± 0·01		

Remarks. Like *P. calveti*, this species develops projecting trifaceted processes on each side of the opesia, which do not, however, fuse medially. In this feature it is certainly reminiscent of the Antarctic genus *Mawsonia* (= *Swanomia* nom. nov.). However, again like *P. calveti*, it differs from *Mawsonia* species in its relatively smaller avicularia, in its opesia, which occupies only the distal third of the frontal surface of the autozooid, and in its jointed colony. *P. cellarioides* differs from *P. calveti* most strikingly in its longer, narrower opesia. It was collected from two stations off the southern Patagonian Shelf, and may be assumed not to occur in Antarctic waters.

Paracellaria elephantina sp. n.

(Fig. 12E)

Material. HOLOTYPE: BMNH reg. no. 1988.4.20.9. Discovery stn. 1948.

Description. Colony erect, slender, cylindrical. The single sample comprised an unbranched specimen 6·5 mm high with maximum width of 0·7 mm. Autozooids arranged in six alternating longitudinal series, opening around the entire periphery of the branch; hexagonal, rounded distally, separated by thickened, raised ridges. Cryptocyst coarsely granular, concave medially; with low, curving lateral ridges meeting proximally, and developed on each side of the opesia as short, projecting, triangular sectioned processes. Opesia in distal half of autozooid, almost twice as long as wide, comprising about one-fifth total autozooid length; distal edge narrowly arched, with a smooth, slightly projecting rim; proximal border with a pronounced, convex lip, on each side of which a short, bluntly rounded denticle projects. Ovicells not present. Avicularia frequent, intercalated within autozooid rows; cystid very much smaller than autozooid, roughly hexagonal, with a broadly triangular, proximo-laterally directed rostrum, at an acute angle to frontal plane; condyles well developed, almost meeting medially.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length	0·47 ± 0·03	Opesia length	0·10 ± 0·02
Autozooid width	0·34 ± 0·02		

Remarks. A single specimen of *P. elephantina* was collected from stn. 1948, in the South Shetlands, together with *P. calveti*. It differs from that species in its particularly elongate opesia, and in lacking fused opesial processes, and is distinguished from both *P. calveti* and *P. cellarioides* by its small, broadly triangular avicularia, which are constantly proximo-laterally directed.

Swanomia nom. nov.

Dr P. D. Taylor has pointed out (pers. comm.) that the bryozoan genus *Mawsonia* Livingstone, 1928 is preoccupied by the fish genus *Mawsonia* Woodward, 1907. This may be rectified simply by establishing the anagram *Swanomia* as a *nomen novum* for *Mawsonia* Livingstone, type species *Cellaria membranacea* Thornely, 1924.

Swanomia brevimandibulata (Moyano)

(Dig. 13E)

Mawsonia brevimandibulata Moyano 1969: 51, pl. 1, fig. 5, pl. 4, figs 20, 21, pl. 5, figs 22–29; Androsova 1972 b: 97.

Material. Discovery stns 175, 187, 190, WS482. Terra Nova stns 194, 336, 339.

Description. Colony erect, internodes cylindrical, straight or slightly curved, branching dichotomously at frequent intervals, anchored by chitinous rootlets; largest specimen in present material an almost complete colony 50 mm high, with maximum width 2 mm. Autozooids hexagonal, separated by deep, distinct grooves, in regular, alternating longitudinal series; disposed around whole branch axis in whorls of up to 13. Branches with frequent presumed growth checks, giving a nodular appearance. Cryptocyst with thick, densely nodular calcification, depressed proximal to opesia, with well-marked, paired, longitudinal ridges, developed on each side of the opesia as short, projecting lobes with crenellate edges. Opesia occupying about half total frontal surface of autozooid, almost twice as long as wide; arched, with straight proximal border, rounded proximal corners, and a pair of thick, proximal denticles, linked by a ridge with concave edge. Ovicell immersed, visible as a low, thickened, projecting hood above a narrow, semi-elliptical aperture. Avicularia frequent, replacing autozooids in normal sequence; rostrum shortly triangular, projecting slightly from branch surface, not extending distally to beyond level of adjacent autozooids; condyles thickened, but not fusing medially, opesia narrow.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length	0·56 ± 0·05	Opesia length	0·17 ± 0·01
Autozooid width	0·44 ± 0·03	Length avic. rostrum	0·30 ± 0·03

Remarks. The present specimens originate from the Antarctic Peninsular region, close to the type locality for the species, and from the Ross Sea. *S. brevimandibulata* has also been reported from the coast of Adelie Land (Androsova, 1972 b), and may be regarded as an endemic Antarctic species.

Swanomia membranacea (Thornely)

(Fig. 13C–D)

Cellaria membranacea Thornely 1924: 9, fig. 2.
Mawsonia membranacea: Livingstone 1928: 39; Rogick 1956: 247, pls 9 F–M, 10A; Moyano 1969: 55, pl. 1, figs 2, 4, pl. 6, figs 31 and 32.
Mawsonia extensalata Rogick 1956: 244, pls 8, D–F, 9, A–E; Moyano 1969: 56, pl. 6, fig. 30; Androsova 1972 a: 338, fig. 13; 1972 b: 97.

Material. Discovery stns 187, 190, 363, 1644, 1648, 1651, 1652, 1658, 1660. Terra Nova stns 194, 295, 316, 339. National Antarctic Expedition 27.1.1902; W.Q. No. 10 Hole.

Description. Colony erect, slender, cylindrical, straight or irregularly curved; branching dichotomously at infrequent intervals, with periodic growth checks imparting a nodulated appearance. Largest fragments in present material 50 mm long, with maximum diameter of 3 mm. Autozooids in regular, alternating longitudinal series, disposed around whole axis of branch in whorls of up to 13; initially hexagonal, later more rounded as calcification thickens, separated by well-marked grooves. Cryptocyst deeply concave, with coarsely nodular calcification, developing thickened ridges lateral to the opesia, which may be produced as projecting lobes with scalloped or crenellate edges; these appear to break off readily, when the bases become thickened and rounded. Opesia longer than wide, narrow, occupying almost half total frontal length of autozooid; proximal border with two thick, knoblike denticles projecting from its lip, closely spaced and linked by a low ridge. Ovicell immersed, visible as a narrow; transversely oval aperture, overhung by a short projecting hood. Avicularia frequent, replacing autozooids in normal series; rostrum elongate, triangular, extending distally beyond the level of the two adjacent autozooids; cryptocyst concave, nodular, with elongate oval opesia which is progressively reduced by thickening cryptocystal calcification to a small, rounded foramen just distal to the prominent lateral condyles; edges of rostrum erect, crenellate, frequently projecting noticeably from surface of branch.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length	0·64 ± 0·04	Opesia length	0·24 ± 0·01
Autozooid width	0·44 ± 0·03	Length avic. rostrum	0·56 ± 0·01

Remarks. Although Rogick (1956) gave detailed descriptions of both *Mawsonia membranacea* and her new species *Mawsonia extensalata* she failed to demonstrate clear distinctions between the two taxa, apart from the lateral cryptocystal extensions of *M. extensalata.* In other details the morphology of both species seemed identical and the measurements of the two overlapped in all cases. Unfortunately, Rogick had very little material of both 'species'. The large samples in the Discovery collections indicate a complete intergradation between the two morphotypes; as noted also by Androsova (1972 b), large colonies appeared as typical '*extensalata*' distally, while proximally the characteristic 'wings' had been lost, leaving only thickened ridges, and the autozooids conformed completely with typical *membranacea.* Accordingly, *Mawsonia extensalata* Rogick is here considered to be a junior subjective synonym of *Swanomia membranacea* (Thornely).

This is an endemic Antarctic species. The present material originates from stations in the Ross Sea and Antarctic Peninsula. It has been widely reported from Antarctic shelf seas.

Larvapora mawsoni (Livingstone)

(Fig. 13A–B)

Cellaria mawsoni Livingstone 1928: 32, pl. 4, figs 3, 5, pl. 6, fig. 4, text fig. 5.
Larvapora mawsoni: Moyano 1970: 157, figs 3, 4.

Material. Discovery stns 190, 187, 599, 1660. Terra Nova stns 295, 339. BANZARE stns 39, 90. National Antarctic Expedition 8.2.1902.

Description. Colony developing large, brittle, folded bilaminar sheets, exceeding 10 cm^2 in present material. Autozooids elongate, rectangular, separated by distinct raised edges. Cryptocyst flat, granular. Opesia semi-circular, half as wide as autozooid, but only one-tenth as long; distal border raised as a projecting hood, acute to frontal plane of autozooid, typically developing a pair of short, projecting processes; proximal border straight, developing a prominent lip, with a widely-spaced pair of denticles, one situated close to each proximal corner. Ovicell immersed, visible as a domed swelling distal to the autozooid, with a transversely elongate aperture divided longitudinally by two calcified struts. Avicularia infrequent, usually present at division of autozooid rows, almost as large as autozooid, tapered proximally, truncate distally; opesia small, oval; rostrum slender, almost parallel-sided, supporting a narrow, distally rounded mandible.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length	1·32 ± 0·15	Opesia length	0·17 ± 0·02
Autozooid width	0·72 ± 0·06		

Remarks. Larvapora mawsoni is an endemic Antarctic species.

Melicerita blancoae Lopez Gappa

(Fig. 14B)

Melicerita blancoae Lopez Gappa 1981: 127, figs 1–7.

Material. Discovery stns WS81, WS82, WS84, WS85, WS93, WS228, WS231, WS243, WS482, WS840.

Description. Colony bilaminar, forming thin, flat blades, dividing dichotomously at irregular intervals; largest fragment in present material 25 mm × 8 mm. Autozooids regularly hexagonal, becoming less regular towards colony margins; arranged in alternating transverse rows, each row terminating at the colony margin, on each side, with an enlarged autozooid, or with an irregular kenozooid bearing a small, circular opesia. Autozooid cryptocyst concave, finely granular. Opesia situated in distal half of autozooid, its proximal border more or less on the midline; semicircular, half width of autozooid, and about one-fifth as long, rim raised and prominent in early ontogeny; paired distal and proximal denticles present, short, triangular. Ovicell completely immersed, indicated by a narrow, lozenge-shaped aperture, and, proximally, two sieve-like areas of porous calcification. No avicularia.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length	0·60 ± 0·03
Autozoid width	0·46 ± 0·02

Remarks. Melicerita blancoae was described by Lopez Gappa (1981) from a single station on the southern Patagonian Shelf. The Discovery specimens originate from the same general area, including the Falkland Isles and Burdwood Bank.

Melicerita latilaminata Rogick

(Fig. 14A)

Melicerita latilaminata Rogick 1956: 248, pl. 10, B–J, pl. 11, A–F; Moyano 1969: 57, pl. 7, fig. 34, Androsova 1972 b: 98.

Material. Discovery stns 175, 190, WS482, 1660. Terra Nova stns 295, 340. National Antarctic Expedition 24.4.1903, 3.6.1903, 18.6.1903.

Description. Colony bilaminar, forming thin, flat, dichotomously branching blades, anchored by chitinous rootlets; largest fragment in present material 22 mm × 7 mm.

Autozooids hexagonal, flat, separated by thin, raised ridges; arranged in alternating, transverse rows which curve slightly towards the colony margins. Cryptocyst finely granular, slightly concave medially, becoming convex towards opesia and towards proximal end of autozooid. Opesia in distal half of autozooid, narrowly crescentic, about half total autozooid width, but only one-tenth as long; convex proximal rim slightly raised, forming a definite lip; a prominent, thick, blunt condyle in each proximal corner. Ovicell completely immersed, not evident in frontal view, its presence indicated by a narrow, curved aperture, about one-third width of opesia, at distal end of autozooid. Avicularia infrequent; cystid about half area of autozooid, in the form of an irregular quadrilateral or polygon; cryptocyst depressed, with prominently raised rostrum supporting a slender semi-elliptical mandible. The edge of the colony branch consists of the lateral walls of the marginal autozooids.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length 0·57 ± 0·03
Autozooid width 0·33 ± 0·01

Remarks. M. latilaminata is an endemic Antarctic species. The present specimens were collected from the Ross Sea, the Palmer Archipelago and the South Shetlands, a geographical range encompassing the records of previous authors.

Melicerita obliqua (Thornely)

Aspidostoma obliquum Thornely 1924: 16, fig. 4.
Pseudocellaria obliqua: Livingstone 1928: 42.
Melicerita obliqua: Rogick 1956: 250, pl. 11, figs G–I; Androsova 1972 b: 98. Winston 1983: figs. 2, 5, 9.

Material. Discovery stns 167, 175, 363, 1648, 1652, 1660. National Antarctic Expedition 27.1.1902, 29.1.1902.

Description. Colony forming a thin, flattened, sabre-like rod, curved to a variable extent; largest specimen in present material 90 mm long, with maximum width 10 mm, ridged with presumed growth checklines at regular intervals of 5–6 mm. Autozooids regularly hexagonal in middle regions of branch, less so towards margins of colony; arranged in alternating transverse rows, terminating at the colony margins, on each side, with larger or smaller autozooids, or small kenozooids. Cryptocyst coarsely granular, deeply concave, between raised and prominent lateral walls, in early ontogeny, thicker and less concave in later ontogeny; frontal membrane brown, distinct. Opesia situated in distal half of autozooid, half length of autozooid, one-fifth as long; narrowly crescentic, with the proximal lip angular and reflected; orientated at a right-angle to disto-proximal axis in median autozooids, diverging laterally in autozooids close to colony margins. Ovicell immersed, evident as a swelling on the cryptocyst of the two distally succeeding autozooids; aperture a narrow, medially peaked slit.

Measurements. Means and standard deviations of 20 values, mm:

Autozooid length 0·85 ± 0·07
Autozooid width 0·58 ± 0·02

Remarks. This distinctive species is endemic to Antarctic waters. The present material is from the Ross Sea and from the Antarctic Peninsula, as far north as Signy Island.

Conclusion

Systematic research on southern hemisphere cold temperate and Antarctic bryozoans continues to emphasize the differences between the faunas of the Antarctic shelf seas and adjacent regions. Taxonomic re-evaluation of described Antarctic species often reveals that many of them, previously assigned to genera with predominantly non-Antarctic or even northern hemisphere distributions, should instead be regarded as constituting endemic Antarctic genera (Hayward and Thorpe 1988 d). Taxonomic revision may also improve understanding of the systematic, and possibly phylogenetic, relationships of some Antarctic species to the faunas of adjacent regions. For example, the '*Smittia*' *inclusa* of Waters (1904) was shown by Hayward and Thorpe (1987) to be a presently unique Antarctic representative of the tropical West Atlantic family Metrarabdotosidae. The present assemblage of anascan cheilostomes includes 13 genera. Of these only *Swanomia* (= *Mawsonia* Livingstone) and *Larvapora* Moyano appear to be endemic to Antarctic waters. The majority of the species described here have been assigned to just two genera, *Amphiblestrum* Gray and *Cellaria* Ellis and Solander, both of which include a large number of southern hemisphere species, several apparently limited to Antarctic shelf seas. Such richly speciose genera rarely include species which have been widely, and reliably, reported from both Antarctic and non-Antarctic localities. Frequently, they comprise what appear to be a series of vicariant species, or groups of vicariant species, successively distributed across the entire southern ocean. Distinctly different species seem to occur in the Magellanic region, along the Scotia Arc and the Palmer Archipelago, in the Antarctic shelf seas, around New Zealand, or centred upon one or more of the southern oceanic islands. In these respects, the species distributions of *Amphiblestrum* and *Cellaria* are similar to those observed in two other anascan genera, *Chaperiopsis* Uttley and *Arachnopusia* Jullien (Hayward and Thorpe 1988 b, c) both of which comprise a large number of species in the cold southern hemisphere, with geographical ranges overlapping, or isolated to varying degrees, in a circumpolar succession. There are some notable exceptions, but these are found among genera which at present do not seem to be so richly speciose. For example, the specimens of *Ellisina antarctica* described here did not seem to differ substantially across a geographic range extending from the Ross Sea to the Falkland Isles. Similarly, material referred to *Micropora brevissima* appears to be genuinely the same species in the Magellan Strait, the Falkland Isles and the Ross Sea. However, in so far as the geographical range of a species can be known or inferred from the comparatively few records available for most, it seems increasingly probable that very few species widely distributed within Antarctic waters will be found to occur equally widely, if at all, in non-Antarctic regions. It is possible that species distributed along part or all of the Scotia Arc may be found to occur in adjacent regions off the southern edge of the Patagonian Shelf (*Stomhypselosaria watersi* is a good example), but a wider distribution, to the southern oceanic islands and New Zealand, should be viewed with doubt, as probably incorporating at least two distinct species.

The amount of published information for most cold southern hemisphere bryozoan faunas is very small indeed. For example, Bryozoa have been recorded from Tristan da Cunha on just two occasions; a few species were described by Busk (1884), and even fewer in a paper by Vigeland (1958). Over vast areas the only information available derives from one or two dredgings conducted by the Challenger expedition. Thus, it would be premature to draw any conclusions regarding the historical biogeography or phylogeny of cold southern hemisphere bryozoans until much more systematic information has been made available .

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Appendix 1: Station data

1. Discovery stations

Station no.		
27	15.3.1926	West Cumberland Bay, South Georgia. 110 m
38	19.3.1926	Off South Georgia. 0–5 m
39	25.3.1926	East Cumberland Bay, South Georgia. 179–235 m
42	1.4.1926	Off mouth of Cumberland Bay, South Georgia. 120–240 m
45	6.4.1926	South Georgia. 238–270 m
48	3.5.1926	Port William, Falkland Isles. 105–115 m
51	4.5.1926	Off Eddystone Rock, East Falkland. 105–115 m
53	12.5.1926	Hulk of 'Great Britain', Port Stanley, East Falkland. 0–2 m
72	1.6.1926	41°43.3′S, 42°20.6′W
123	15.12.1926	Off mouth of Cumberland Bay, South Georgia. 230–250 m
126	19.12.1926	53°58.5′S, 37°08′W
140	23.12.1926	Stromness Harbour to Larsen Point, South Georgia. 122–136 m
142	30.12.1926	East Cumberland Bay, South Georgia. 88–273 m
144	5.1.1927	Off mouth of Stromness Harbour, South Georgia. 155–178 m
148	9.1.1927	Off Cape Saunders, South Georgia. 132–148 m
149	10.1.1927	Mouth of East Cumberland Bay, South Georgia. 200–234 m
156	20.1.1927	Off South Georgia. 53°51′S, 36°21.5′W. 200–236 m
159	21.1.1927	Off South Georgia. 53°52.5′S, 36°08′W. 160 m
160	7.2.1927	Near Shag Rocks. 53°43.6′S, 40°57′W. 177 m
167	20.2.1927	Off Signy Island. 60°50.5′S, 46°15′W. 244–344 m
170	23.2.1927	Off Cape Bowles, Clarence Island. 61°25.5′S, 53°46′W. 342 m
175	2.3.1927	Bransfield Strait, South Shetland. 63°17.3′S, 59°48.25′W. 200 m
187	18.3.1927	Neumayr Channel, Palmer Archipelago. 259–354 m
190	24.3.1927	Bismarck Strait, Palmer Archipelago. 315 m
195	30.3.1927	Admiralty Bay, South Shetlands, 391 m
250	17.6.1927	36°09′S, 5°33′W. 300 m
363	26.2.1930	Off Zavodovski Id., South Sandwich Is. 329–278 m
366	6.3.1930	Off Cook Id., South Sandwich Is. 77–152 m
371	14.3.1930	Off Montagu Id., South Sandwich Is. 99–161 m
388	16.4.1930	Off Cape Horn. 56°19.5′S, 67°09.75′W. 121 m
456	18.10.1930	Off Bouvet Id. 40–45 m
474	12.11.1930	Off Shag Rocks, South Georgia. 199 m
482	14.11.1930	53°46.75′S, 39°04.75′W.
562	31.12.1930	67°15.5′S, 75°27′W. 113 m
599	17.1.1931	Adelaide Is., Bellingshausen Sea. 203 m
929	16.8.1932	New Zealand. 34°21′S, 172°48′E to 34°22′S, 172°49.8′E. 58–55 m

933	17.8.1932	New Zealand. 34°13′S, 172°12′E. 260 m
934	17.8.1932	New Zealand. 34°11′S, 172°10′E. 92–98 m
935	17.8.1932	New Zealand. 34°11′S, 172°08′E. 84 m
941	20.8.1932	New Zealand. 40°55.8′S, 174°46.7′E. 150 m
1321	16.3.1934	West end of Magellan Strait. 66 m
1562	7.4.1935	Marion Id. 90–97 m
1563	7.4.1935	Marion Id. 101–106 m
1564	7.4.1935	Prince Edward Id. 110–113 m
1644	16.1.1936	74°24.8′S, 164°10.3′W
1648	18.1.1936	Off Ice Barrier, Ross Sea. 78°18′S, 174°24′W. 550 m
1651	22.1.1936	Ross Sea. 77°04.3′S, 176°26.1′W. 594 m
1652	23.1.1936	Ross Sea. 75°56.2′S, 178°35.5′W. 567 m
1658	26.1.1936	Ross Sea. 76°09.6′S, 168°40′E. 520 m
1660	27.1.1936	Ross Sea. 74°46.4′S, 178°23.4′E. 351 m
1872	12.11.1936	Off Clarence and Elephant Ids. 63°29.6′S, 54°03.1′W. 247 m
1902	28.11.1936	Patagonian Shelf. 49°48′S, 67°39.5′W. 50 m
1909	30.11.1936	Burdwood Bank. 53°53.2′S, 60°29.9′W. 132 m
1948	4.1.1937	Off Clarence and Elephant Ids. 60°49.4′S, 52°40′W. 490–610 m
WS22	30.11.1926	53°38′S, 35°35′W.
WS24	10.12.1926	54°12′S, 36°28′W.
WS25	17.12.1926	Undine Harbour, South Georgia. 18–27 m
WS27	19.12.1926	Off South Georgia. 106–109 m
WS33	21.12.1926	Off South Georgia. 130 m
WS42	7.1.1927	Off South Georgia. 198 m
WS73	6.3.1927	Off Falkland Ids. 121–130 m
WS76	11.3.1927	Off Patagonian Shelf. 51°S, 62°02.5′W. 207–205 m
WS79	13.3.1927	Patagonian Shelf. 51°01.5′S, 64°59.5′W. 132–131 m
WS80	14.3.1927	Patagonian Shelf. 50°57′S, 63°37.5′W. 152–156 m
WS81	19.3.1927	Off North Island, West Falkland. 81–82 m
WS82	21.3.1927	Burdwood Bank. 54°06′S, 57°46′N. 140–144 m
WS83	24.3.1927	Off George Id, East Falkland. 137–129 m
WS84	24.3.1927	Off Sea Lion Id, East Falkland. 75–74 m
WS85	25.3.1927	Off Lively Id, East Falkland. 79 m
WS87	3.4.1927	Burdwood Bank. 54°07.5′S, 58°16′W. 96–127 m
WS88	6.4.1927	Patagonian Shelf. 54°S, 64°57.5′W. 118 m
WS90	7.4.1927	52°18′S, 68°W to 52°19.5′S, 67°57′W. 82 m
WS93	9.4.1927	Off Beaver Id, West Falkland. 133–130 m
WS95	17.4.1927	Patagonian Shelf. 48°58.25′S, 64°45′W. 109–108 m
WS97	18.4.1927	49°S, 62°W to 49°01′S, 61°56′W. 146 m
WS177	7.3.1928	Off South Georgia. 97–0 m
WS210	29.5.1928	50°17′S, 60°06′W. 161 m
WS219	3.6.1928	47°06′S, 62°12′W. 116 m
WS220	3.6.1928	Patagonian Shelf. 47°56′S, 62°38′W. 108–104 m
WS221	4.6.1928	Patagonian Shelf. 48°23′S, 65°10′W. 76–91 m
WS222	8.6.1928	Patagonian Shelf. 48°23′S, 65°W. 100–106 m
WS225	9.6.1928	Patagonian Shelf. 50°20′S, 62°30′W. 162–161 m
WS226	10.6.1928	Patagonian Shelf. 49°20′S, 62°30W. 140 m

WS227	12.6.1928	51°08′S, 56°50′W. 320 m
WS228	30.6.1928	Off Patagonian Shelf. 50°50′S, 56°58′W. 229–236 m
WS231	4.7.1928	Off Falkland Is. 50°10′S, 58°42′W. 167–159 m
WS237	7.7.1928	Off Patagonian Shelf. 46°S, 60°05′W. 150–256 m
WS239	15.7.1928	Patagonian Shelf. 51°10′S, 62°10′W. 196–193 m
WS243	17.7.1928	Patagonian Shelf. 51°06′S, 64°30′W. 144–141 m
WS244	18.7.1928	Off Patagonian Shelf. 52°S, 62°40′W. 253–247 m
WS245	18.7.1928	Off Patagonian Shelf. 52°36′S, 63°40′W. 340–290 m
WS246	19.7.1928	Off Patagonian Shelf. 52°25′S, 61°W. 267–208 m
WS247	19.7.1928	Off Falkland Is. 52°40′S, 60°05′W. 172 m
WS249	20.7.1928	Off Falkland Is. 52°10′S, 57°30′W. 166 m
WS250	20.7.1928	Off Falkland Is. 51°45′S, 57°W. 305 m
WS482	16.11.1928	63°10′S, 57°16.5′W. 125 m
WS765	17.10.1931	Patagonian Shelf. 45°07′S, 60°28.25′W. 113–118 m
WS775	3.11.1931	Patagonian Shelf.
WS776	3.11.1931	Patagonian Shelf. 46°18.25′S, 65°2.25′W. 107–99 m
WS781	6.11.1931	Off Falkland Is. 148 m
WS784	5.12.1931	Patagonian Shelf. 49°47.75′S, 61°05′W. 170–164 m
WS787	7.12.1931	48°44′S, 65°24.5′W to 48°48′S, 65°25′W. 110 m
WS792	15.12.1931	45°49′S, 62°23′W to 45°54′S, 62°04′W. 112 m
WS794	17.12.1931	Patagonian Shelf. 46°12.6′S, 60°59.25′W. 123–126 m
WS824	19.1.1932	Off Falkland Is. 50°29.25′S, 58°27.25′W. 146–137 m
WS825	28/29.1.1932	Off Falkland Is. 50°50′S, 57°15.25′W. 135–144 m
WS836	3.2.1932	Patagonian Shelf. 53°05.5′S, 67°38′W. 64 m
WS838	5.2.1932	Patagonian Shelf. 53°11.75′S, 65°W. 148–159 m
WS840	6.2.1932	Off Patagonian Shelf. 53°52′S, 61°49.25′W. 368–463 m
WS847	9.2.1932	Patagonian Shelf. 50°15.75′S, 67°57′W. 51–56 m
WS871	1.4.1932	Off Patagonian Shelf. 53°16′S, 64°12′W. 336–341 m
MS14	17.2.1925	East Cumberland Bay, South Georgia. 190–110 m
MS71	9.3.1926	East Cumberland Bay, South Georgia. 110–60 m

2. British Antarctic Expedition, Terra Nova stations.

Station no.		
90	25.7.1911	Three Kings Is., New Zealand. 183 m
91	26.7.1911	Three Kings Is., New Zealand. 549 m
144	13.9.1911	Off Cape Maria Van Diemen, New Zealand. 64–73 m
194	22.2.1911	Off Oates Land. 69°43′S, 163°24′E. 329–366 m
220	3.2.1912	Off Cape Adare. 82–92 m
295	27.1.1913	73°51′S, 172°57′E. 348 m
314	23.2.1911	Off Inaccessible Id, McMurdo Sound. 406–441 m
316	9.2.1911	Off Glacier Tongue, McMurdo Sound. 348–457 m
321	13/17.8.1911	Between Inaccessible Id. and Barne Glacier, McMurdo Sound. 180–250 m
331	14.1.1912	Entrance to McMurdo Sound. 457 m
335	20.1.1912	Granite Harbour. 300 m
336	20.1.1912	Granite Harbour. 10 m

338	23.1.1912	Ross Sea. 77°13′S, 164°18′E. 379 m
339	24.1.1912	Ross Sea. 77°5′S, 164°17′E. 256 m
340	25.1.1912	Ross Sea. 76°56′S, 164°12′E. 293 m
348	13.2.1912	Off Barne Glacier, McMurdo Sound. 366 m

3. National Antarctic Expedition

21.1.1902	Off Coulman Island.
27.1.1902	Off Ice Barrier, 174°W. 300 fm
29.1.1902	East end of Barrier. 100 fm
8.2.1902 to 6.12.1902	Collections made off winter quarters, McMurdo Sound.

4. B.A.N.Z.A.R.E.

Station no.		
39	17.1.1930	Enderby Land. 66°10′S, 49°41′E. 300 m
90	17.1.1930	Enderby Land. 66°12′S, 49°37′E. 300 m