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Bryozoa: Lepraliomorpha and other Ascophorina, mainly from New Caledonian waters

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ABSTRACT

This paper describes a fauna of 98 species of ascophorine bryozoans from 1984-89 MUSORSTOM cruises, mainly in the New Caledonian EEZ. Ten of the species occur solely in the Philippines and some species occur in both regions. The fauna is noteworthy for its endemism (57 of the 84 New Caledonian species, i.e., 68%, are endemic) and its high taxonomic novelty, the latter contributing to a clearer appreciation of the taxonomic limits of some genera and families. Two new families (Phorioppniidae, Buffonellodidae), 54 new species, and 16 new genera are described, mostly from New Caledonia; some, from elsewhere, are the consequence of systematic revision. The new genera are: *Xynexecha* (Exechonellidae), *Parkermavella* (Bitectiporidae), *Phorioppnia*, *Oppiphorina*, *Punctiscutella* (Phorioppniidae), *Haswelliporina*, *Mosaicoporina* (Porinidae), *Wrigiana*, *Ijimaia* (Calwelliidae), *Ipsibuffonella*, *Maiabuffonella* (Buffonellodidae), *Macrocamera* (Eminoeciidae), *Pseudoplatyglena* (Euthyrisellidae), *Richbunea* (Celleporidae), *Lifuella* (Phidoloporidae), and *Ptoboroa* (Batoporidae). The most speciose family in the collection is the Phidoloporidae, represented by 7 genera and 19 species. The most speciose genus in the collection is, remarkably, the little-known deep-sea genus *Siphonicytara*, with 6 species, all new, which more than doubles the number of species previously described. Ten of the species in the New Caledonian fauna studied here are shared only with New Zealand, and 4 only with the Philippines.

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RÉSUMÉ

Bryozoa: Lepraliomorpha et autres Ascophorina, essentiellement des eaux néo-calédoniennes.

Ce travail décrit une faune de 98 espèces de Bryozoaires Ascophorina, recueillies lors des campagnes MUSORSTOM de 1984 à 1989, essentiellement autour de la Nouvelle-Calédonie. Dix de ces espèces n'ont été récoltées qu'aux Philippines, certaines étant communes aux deux régions. Cette faune est remarquable par son endémisme (57 des 84 espèces néo-calédoniennes, soit 68 %, sont endémiques) et son pourcentage élevé en nouveaux taxons, qui ont permis une meilleure délimitation taxinomique de certains genres et familles. Deux nouvelles familles (Phorioppniidae et Buffonellodidae), 54 espèces nouvelles et 16 nouveaux genres sont décrits, pour la plupart de Nouvelle-Calédonie ; la création de certains d'entre eux, provenant d'autres régions, est la conséquence du travail de révision systématique entrepris. Les nouveaux genres sont les suivants : *Xynexecha* (Exechonellidae), *Parkermavella* (Bitectiporidae), *Phorioppnia*, *Oppiphorina*, *Punctiscutella* (Phorioppniidae), *Haswelliporina*, *Mosaicoporina* (Porinidae), *Wrigiana*, *Ijimaia* (Calwelliidae), *Ipsibuffonella*, *Maiabuffonella* (Buffonellodidae), *Macrocamera* (Eminoeciidae), *Pseudoplatyglena* (Euthyrisellidae), *Richbunea* (Celleporidae), *Lifuella* (Phidoloporidae) et *Ptoboroa* (Orbituliporidae). La famille Phidoloporidae présente, dans la collection, la plus riche diversité spécifique, avec 7 genres et 19 espèces. Le genre le plus riche en espèces dans la collection est paradoxalement un genre profond et peu connu, *Siphonicytara*, avec 6 espèces, toutes nouvelles, ce qui correspond à plus du double du nombre des espèces précédemment décrites. Dix des espèces de la faune néo-calédonienne appartiennent aussi à celle de Nouvelle-Zélande, et quatre seulement à celle des Philippines.

INTRODUCTION

This work completes the systematic description of the ascophorine bryozoans collected during recent MUSORSTOM cruises (1984-1989) mainly in New Caledonian waters. Most of the species dealt with in this account may be referred to as lepralioid, i.e., having a cryptocystidean shield with an underlying compensation sac (ascus), but some other ascophorines are also described, not having been previously sorted from the samples. Some of these were physically attached to lepralioid colonies. Following GORDON (1989a), the Ascophorina are regarded as including the Cribrilinidae and related families. VOIGT & HILLMER (1983) have demonstrated the cribrilinid affinities of certain gymnocystal ascophorines (infraorder Hippothoomorpha) and GORDON and VOIGT (1996) have presented evidence that the Cribrilinidae (infraorder Cribriomorpha) are the stem group for some (possibly all) umbonuloid-shielded ascophorines and those lepralioid-shielded taxa that may be derived from them. There is evidence that, in those Cretaceous Cribrilinidae *sensu lato* that had a reduced costal shield, there must have been an ascus proximal to the small area of flexible frontal membrane under the costal area in order for the hydrostatic mechanism to operate. This ascus is retained in gymnocystal and lepralioid ascophorines and is inferred to occur or have been present in those umbonuloid species which have a much-reduced area of umbonuloid shield. Thus the ascus appears to be a symplesiomorphy linking all the ascophorine infraorders.

Some of the species reported on here were collected during the MUSORSTOM 3 cruise to the Philippines, but the vast majority come from New Caledonian waters. Previous reports in this present series have dealt with 40 species of Ascophorina from New Caledonia (GORDON & D'HONDT, 1991; GORDON, 1993a; GORDON & BRAGA, 1994). The present report describes 98 species, of which 84 pertain to the New Caledonian fauna, making a total of 123 New Caledonian ascophorine species taken by these cruises, of which 77 (63%) were new to science. This report also recognises two new families and 16 new genera. This level of diversity has been helpful in evaluating a number of generic boundaries and the relationships between certain lepralioid families.

LIST OF STATIONS

Philippines

ESTASE 2

Station DR 07. — 28.11.1984, 05°56.79'N, 126°14.38'E, 890 m: *Haswelliporina ?venusta.*

MUSORSTOM 3

Station CP 87. — 31.5.1985, 14°00.6'N, 120°19.6'E, 191-197 m: *Conescharellina breviconica.*

Station CP 100. — 1.6.1985, 14°00.0'N, 120°17.6'E, 189-199 m: *Conescharellina breviconica, Conescharellina catella.*
Station CP 101. — 1.6.1985, 14°00.15'N, 120°19.25'E, 194-196 m: *Conescharellina breviconica.*
Station CP 102. — 1.6.1985, 14°00.8'N, 120°17.8'E, 192 m: *Characodoma* sp., *Conescharellina breviconica, Conescharellina catella.*
Station CP 106. — 2.6.1985, 13°47.0'N, 120°30.3'E, 640-668 m: *Conescharellina breviconica, Cruceschareliina japonica.*
Station DR 117. — 3.6.1985, 12°31.3'N, 120°39.5'E, 92-97 m: *Tetraplaria ventricosa, Actisecos regularis, Haswelliporina quinaria, Hemismittoidea ?ennea, Parasmittina serrula, Parasmittina marginata, Parasmittina* sp., *Fedora platydiscus, Characodoma areolata, Characodoma biavicularia, Characodoma glabra, Characodoma parva, Lifuella calyciformis, Reteporellina cruciformis, Triphyllozoon gracile, Conescharellina catella.*
Station CP 139. — 6.6.1985, 11°53.0'N, 122°14.0'E, 240-267 m: *Reteporellina spiramina.*

New Caledonia

BIOCAL

Station DW 08. — 12.8.1985, 20°34.35'S, 166°53.90'E, 435 m: *Haswelliporina multiaviculata, Semihaswellia umbrella, Siphonicytara vittata.*
Station KG 22. — 28.8.1985, 22°46.44'S, 166°19.93'E, 2050 m: *Terminocella perlucens, Mucropetraliella philippinensis.*
Station DW 33. — 29.8.1985, 23°09.71'S, 167°10.27'E, 675 m: Gen. sp. indet., *Haswelliporina multiaviculata, Siphonicytara armata, Siphonicytara vittata, Buffonellodes crosnieri, Ipsibuffonella repens, Galeopsis mimicus.*
Station DW 36. — 29.8.1985, 23°08.64'S, 167°10.99'E, 650 m: *Siphonicytara vittata, Galeopsis mimicus.*
Station DW 38. — 30.8.1985, 22°59.74'S, 167°15.31'E, 360 m: *Tetraplaria* sp., *Phorioppnia nova, Haswelliporina vaubani, Gigantopora oropiscis, Siphonicytara excentrica, Buffonellaria regenerata, Schedocleidochasma* sp., *Rhynchozoon ligulatum, Reteporella defensa, Reteporellina granulosa.*
Station DW 44. — 30.8.1985, 22°47.30'S, 167°14.30'E, 440 m: *Siphonicytara vittata, Iodictyum blandum, Reteporellina spiramina.*
Station DW 46. — 30.8.1985, 23°00.43'S, 167°28.76'E, 775 m: *Emballotheca rara, Lagenipora* sp., *Iodictyum trochus.*
Station DW 51. — 31.8.1985, 23°05.27'S, 167°44.95'E, 700 m: *Haswelliporina multiaviculata, Siphonicytara vittata.*
Station DW 65. — 3.9.1985, 24°47.90'S, 168°09.09'E, 275 m: *Parkermavella minuta.*
Station DW 66. — 3.9.1985, 24°55.43'S, 168°21.67'E, 515 m: *Oppiphorina epaxia, Haswelliporina multiaviculata, Mosaicoporina uniserialis, Mawatarius secundus, Hemismittoidea ennea, Parasmittina glabra, Parasmittina erecta, Smittina asymmetrica, Yrbozoon ringens, Buffonellaria erecta, Buffonellaria regenerata, Galeopsis pentagonus, Iodictyum trochus, Reteporellina spiramina, Harpago dissidens, Trochosodon* sp.
Station CP 67. — 3.9.1985, 24°55.44'S, 168°21.55'E, 500 m: *Parasmittina erecta, Smittina asymmetrica, Galeopsis mimicus, Richbunea gracilis.*
Station DW 70. — 4.9.1985, 23°24.70'S, 167°53.65'E, 965 m: *Haswelliporina multiaviculata, Siphonicytara glabra, Onchoporoides moseleyi.*
Station CP 75. — 4.9.1985, 22°18.65'S, 167°23.30'E, 825 m: *Haswelliporina multiaviculata, Galeopsis mimicus.*
Station DW 82. — 6.9.1985, 20°30.65'S, 166°50.30'E, 440 m: *Hippothyris caledonica.*
Station CP 84. — 6.9.1985, 20°43.49'S, 167°00.27'E, 210 m: *Hippothoa calciophilia, Smittina abyssicola.*
Station DS 98. — 7.9.1985, 21°24.10'S, 166°29.76'E, 2365 m: *Ichthyaria simplex.*
Station KG 101. — 8.9.1985, 21°26.51'S, 166°24.43'E, 1790 m: *Ptoboroa gelasina.*
Station CP 108. — 9.9.1985, 22°02.55'S, 167°05.68'E, 335 m: *Xynexecha pulchra, Phorioppnia cookae, Haswelliporina multiaviculata, Reteporella concinnoides, Reteporella defensa.*
Station CP 109. — 9.9.1985, 22°10.03'S, 167°15.22'E, 495 m: *Haswelliporina multiaviculata, Buffonellaria erecta.*

MUSORSTOM 4

Station DW 149. — 14.9.1985, 19°07.60'S, 163°22.70'E, 165 m: *Conescharellina atalanta.*
Station DW 150. — 14.9.1985, 19°07.50'S, 163°22.10'E, 110 m: *Conescharellina atalanta.*

Station DW 151. — 14.9.1985, 19°07.00'S, 163°22.00'E, 200 m: *Haswelliporina multiaviculata*, *Mucropetraliella serrata*, *Iodictyum* sp.
Station DW 185. — 18.9.1985, 19°06.20'S, 163°29.50'E, 235 m: *Haswelliporina vaubani*, *Haswelliporina quinaria*, *Wrigiana strepsis.*
Station DW 187. — 18.9.1985, 19°08.30'S, 163°29.30'E, 65-120 m: *Calyptotheca* sp., *Pseudoplatyglena mirabilis*, *Osthimosia* sp.
Station DW 220. — 29.9.1985, 22°58.50'S, 167°38.30'E, 505-550 m: *Haswelliporina multiaviculata.*
Station DW 223. — 30.9.1985, 22°57.00'S, 167°30.00'E, 545-560 m: *Rhynchozoon ligulatum.*
Station DW 231. — 1.10.1985, 22°33.70'S, 167°10.50'E, 75 m: *Hippomenella avicularis*, *Rhynchozoon tubulosum*, *Reteporella concinnoides.*

CHALCAL 2
Station DW 72. — 28.10.1986, 24°54.50'S, 168°22.30'E, 527 m: *Microporella lineata.*
Station DW 76. — 30.10.1986, 23°40.50'S, 167°45.20'E, 470 m: *Siphonicytara vittata*, *Galeopsis mimicus*, *Reteporella defensa.*
Station DW 78. — 30.10.1986, 23°41.30'S, 167°59.60'E, 233-360 m: *Macrocamera erecta.*
Station DW 81. — 31.10.1986, 23°19.60'S, 168°03.40'E, 311 m: *Haswelliporina multiaviculata.*

BIOGEOCAL
Station KG 210. — 9.4.1987, 22°44.00'S, 166°30.97'E, 1190 m: *Domosclerus* sp., *Cruceschareliina aster.*
Station KG 211. — 9.4.1987, 22°41.80'S, 166°32.53'E, 975 m: *Cruceschareliina aster.*
Station CP 232. — 12.4.1987, 21°33.81'S, 166°27.07'E, 760-790 m: *Tetraplaria orospinea*, *Haswelliporina multiaviculata*, *Siphonicytara granulosa*, *Cruceschareliina aster.*
Station DW 253. — 16.4.1987, 21°31.75'S, 166°28.73'E, 310-315 m: *Phorioppnia cookae*, *Oppiphorina epaxia*, *Reteporella* sp.
Station CP 260. — 17.4.1987, 21°00.00'S, 167°58.34'E, 1820-1980 m: *Bryosartor* sp., *Semihaswellia ?umbrella*, *Siphonicytara mosaica*, *Ichthyaria simplex*, *Cruceschareliina aster.*
Station KG 261. — 18.4.1987, 21°02.04'S, 167°02.32'E, 1508 m: *Ichthyaria simplex.*
Station KG 262. — 18.4.1987, 21°02.26'S, 167°02.03'E, 1380 m: *Cruceschareliina aster.*
Station CP 265. — 18.4.1987, 21°04.09'S, 167°00.40'E, 1760-1870 m: *Tetraplaria orospinea*, *Siphonicytara mosaica*, *Onchoporoides moseleyi.*
Station KG 267. — 18.4.1987, 21°02.20'S, 166°58.76'E, 1935 m: *Cruceschareliina aster.*
Station CP 272. — 19.4.1987, 21°00.04'S, 166°56.94'E, 1615-1710 m: *Onchoporoides moseleyi.*
Station CP 273. — 20.4.1987, 21°01.53'S, 166°57.41'E, 1920-2040 m: *Ichthyaria simplex.*
Station KG 275. — 20.4.1987, 21°05.80'S, 166°53.14'E, 1959 m: Fam., gen., sp. indet., *Ichthyaria simplex*, *Trochosodon* sp.
Station KG 287. — 27.4.1987, 20°43.01'S, 166°52.53'E, 1560 m: *Ichthyaria simplex.*
Station CP 290. — 27.4.1987, 20°36.91'S, 167°03.34'E, 920-760 m: *Reteporellina projecta.*
Station DW 307. — 1.5.1987, 20°35.38'S, 166°55.25'E, 470-480 m: *Kladapheles gammadeka*, *Richbunea gracilis.*
Station DW 313. — 2.5.1987, 20°58.95'S, 166°59.04'E, 1640-1600 m: *Ichthyaria simplex.*
Station KG 316. — 2.5.1987, 20°48.33'S, 166°53.29'E, 1660 m: *Onchoporoides moseleyi, Conescharellina catella.*
Station CP 317. — 2.5.1987, 20°48.12'S, 166°53.16'E, 1630-1620 m: *Riscodopa* sp., *Ichthyaria simplex*, *Trochosodon* sp., *Cruceschareliina aster.*

MUSORSTOM 6
Station DW 405. — 14.2.1989, 20°29.75'S, 166°41.00'E, 520 m: *Haswelliporina multiaviculata.*
Station CP 419. — 16.2.1989, 20°41.65'S, 167°03.70'E, 283 m: *Haswelliporina quinaria*, *Hippothyris caledonica*, *Parkermavella fidelis*, *Smittoidea maunganuiensis multiporosa*, *Galeopsis pentagonus*, *Iodictyum bicuspidatum*, *Iodictyum trochus*, *Reteporella defensa*, *Reteporella ferox.*
Station DW 421. — 16.2.1989, 20°26.27'S, 166°40.17'E, 245 m: *Haswelliporina quinaria*, *Galeopsis pentagonus*, *Iodictyum illinguum, Reteporella defensa.*
Station DW 431. — 18.2.1989, 20°22.25'S, 166°10.00'E, 21 m: *Puellina harmeri*, *Microporella* sp., *Reteporella orstomia.*

Station CP 465. — 21.2.1989, 21°03.55'S, 167°32.25'E, 480 m: *Haswelliporina multiaviculata*, *Siphonicytara mosaica*.
Station DW 489. — 24.2.1989, 20°48.87'S, 167°05.86'E, 700 m: *Galeopsis lageniporoides*.

SMIB 4
Station DW 37. — 7.3.1989, 24°54.50'S, 168°22.30'E, 540 m: *Haswelliporina multiaviculata*, *Riscodopa parva*, *Galeopsis mimicus*.
Station DW 38. — 7.3.1989, 24°54.50'S, 168°22.00'E, 510 m: *Galeopsis pentagonus*.

SYSTEMATIC ACCOUNT

Suborder ASCOPHORINA Levinsen, 1909

Infraorder CRIBRIOMORPHA Harmer, 1926

Superfamily CRIBRILINOIDEA Hincks, 1879

Family CRIBRILINIDAE Hincks, 1879

Genus and species indet.

Fig. 1

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 33, 675 m.

DESCRIPTION. — Colony presumably encrusting, known only from three ancestrulae partially encrusted by zooids of *Buffonellodes crosnieri* sp. nov. on a bivalve shell. Ancestrulae relatively large, 0.77-0.81 mm long, 0.56-0.72 mm wide, oval, a smooth sloping gymnocyst bordering a field of c. 20 costae; these tapering, with short pinnae whose tips fuse with those of adjacent pinnae leaving spaces between; no pelmatidia (lumen pores). Orifice longer than wide, narrowing proximally, the proximal rim rounded; no condyles; a pair of tubercles present on the distal rim.

REMARKS. — No autozooids are present and it is not possible to identify the species.

Superfamily BIFAXARIOIDEA Busk, 1884

Family BIFAXARIIDAE Busk, 1884

Genus ***DOMOSCLERUS*** Gordon, 1988

TYPE SPECIES. — *Domosclerus piscis* Gordon, 1988.

Domosclerus sp.

Figs 2-3

MATERIAL EXAMINED. — **New Caledonia**. BIOGEOCAL: stn KG 210, 1190 m.

DESCRIPTION. — Small ancestrulate colony 3.6 mm long with the bases of two branches arising from the fronts of zooids. Stem biserial, the zooids alternating back to back. Zooids 0.66-0.75 mm long, c. 0.25 mm wide at the orifice. Frontal shield with sparsely scattered pores over the frontal/distal half of each zooid, either side of a median suture, with fewer pores laterally; peristome not projecting beyond the plane of the frontal shield. Internal primary zooidal chamber low-walled, entirely lacking costae. Some zooids with an adventitious avicularium on the

lateral wall proximally, somewhat projecting. A pair of small avicularia present at the corners of the peristomial orifice; cross-bars lacking from all avicularia. Presumed ancestrula narrow, tapering, evidently transformed into a kenozooid after post-ancestrula zooids formed; kenozooidal orifice flanked by a pair of avicularia.

REMARKS. — Although not identifiable to species, the sole specimen is clearly not conspecific with any of the three *Domosclerus* species reported from New Caledonian waters by GORDON (1993a), as these all had a pair of suboral costae beneath the peristomial rim. The type species, *D. piscis*, lacks such costae, but the primary zooidal chamber is proportionately higher-walled than in the present specimen. The low wall resembles the condition in *Aberrodomus* Gordon, but that genus has avicularia with cross-bars.

Superfamily CATENICELLOIDEA Busk, 1852

Family CATENICELLIDAE Busk, 1852

Subfamily DITAXIPORINAE Stach, 1935

Genus ***BRYOSARTOR*** Gordon & Braga, 1994

TYPE SPECIES. — *Bryosartor sutilis* Gordon & Braga, 1994.

Bryosartor ?sutilis Gordon & Braga, 1994
Figs 4-6

[?]*Bryosartor sutilis* Gordon & Braga, 1994: 59, fig. 1 a-f.

MATERIAL EXAMINED. — **New Caledonia**. BIOGEOCAL: stn CP 260, 1820-1980 m.

DISTRIBUTION. — Southern New Caledonia and northern Norfolk Ridge, 425-1980 m.

REMARKS. — A single incomplete segment was found amongst bryozoan specimens from BIOGEOCAL Stn CP 260 which may represent a second species of *Bryosartor*. Comprising only four complete zooids, these are proportionately slightly longer (0.58-0.68 mm long) and more slender (0.26-0.30 mm wide, with a branch width of 0.38 mm) than the zooids in the type material. The lateral pore-chambers are more widely separated in the new specimen, the costal field is shorter in proportion to zooid length, and the proximal gymnocystal pore is more regularly rounded. The new specimen also represents a depth-range extension. Only more material will determine if this specimen represents a new species.

It should be noted that there is an error in the figure given by GORDON and BRAGA (1994) for the maximum number of zooids in a segment of *B. sutilis* - it should be 16, not 6.

Infraorder HIPPOTHOOMORPHA Gordon, 1989a

Superfamily HIPPOTHOOIDEA Busk, 1859

Family HIPPOTHOIDAE Busk, 1859

Genus ***HIPPOTHOA*** Lamouroux, 1821

TYPE SPECIES. — *Hippothoa divaricata* Lamouroux, 1821.

Hippothoa calciophilia Gordon, 1984

Fig. 7

Hippothoa calciophilia Gordon, 1984: 108, fig. 10 A, pl. 42 A-C. — Ryland & Hayward, 1992: 247, fig. 13 a-b.

Material examined. — **New Caledonia**. Biocal: stn CP 84, 210 m.

Distribution. — New Caledonia: northern Norfolk Ridge, 210 m. New Zealand: Raoul Island (Kermadec Islands), 10-60 m. Australia: Heron Island and Low Isles (Great Barrier Reef), 0-28 m.

Remarks. — This species characteristically occurs on calcareous substrata. Barnacle plates and oyster valves have been previously reported; in the present case the sole colony in the collection co-occurred with *Smittina abyssicola* on the dorsal surface of an erect fenestrate colony of the bryozoan *Smittipora* sp. The midfrontal carina noted by Gordon (1984) in Kermadec *H. calciophilia* is somewhat more developed in the present material, which also has predator boreholes in both autozooids and ovicells.

Infraorder UMBONULOMORPHA Gordon, 1989a

Superfamily ARACHNOPUSIOIDEA Jullien, 1888

Family EXECHONELLIDAE Harmer, 1957

Genus ***XYNEXECHA*** nov.

Diagnosis. — Colony erect, cylindrical, from an encrusting base. Zooids with a tubular peristome and flared rim, the frontal shield comprising a central, evenly perforated area separated from an imperforate (save for areolar pores) periphery by a row of pores that are frequently larger. No avicularia or ovicells. Colony base mostly comprising kenozooids with perforate frontals.

Type Species. — *Xynexecha pulchra* sp. nov.

Xynexecha pulchra sp. nov.

Figs 8-9

Material examined. — **New Caledonia**. Biocal: stn CP 108, 335 m.

Types. — *Holotype*: from Biocal Stn CP 108, 22°02.55'S, 167°05.68'E, 335 m, MNHN-Bry 20021. *Paratype*: same locality as the holotype, MNHN-Bry 19959.

Description. — Colony comprising an erect cylindrical stem from a small encrusting base. Stem ~1.3-1.4 mm diameter, not including projecting peristomes, with zooids arranged more or less in whorls of 4 alternating with the proximal and distal ends of zooids in whorls above and below. Zooids large, 0.84-1.57 mm long and 0.75-1.03 mm wide, with a tubular peristome 0.37-0.45 mm long that has a slightly flared circular to subelliptical rim 0.28-0.36 mm across (outer diameter). Frontal shield comprising a slightly convex evenly perforated umbonuloid field centrally, surrounded by a weakly tubercular imperforate area that has several simple areolae along its margin; seen laterally, the umbonuloid shield appears supported by small buttresses a little above the surrounding cryptocyst, the pores between the buttresses generally transversely elongated. Exterior surface of peristome weakly tubercular like the proximolateral cryptocyst. Primary orifice transversely elliptical (~0.28 mm wide), with no condyles. No oral spines or avicularia. Dimorphic orifices and/or ovicells not apparent in the sole specimen. Simple uniporous mural septula occur in the lateral zooidal walls. The base of the colony comprises

mainly kenozooids. These are smaller in diameter than autozooids; they have a small umbonuloid frontal shield centrally but lack orifices and peristomes.

DISTRIBUTION. — New Caledonia: northern Norfolk Ridge, 335 m.

REMARKS. — *Xynexecha* differs from other Recent exechonellids in its erect mode of growth, the occurrence of kenozooids in the encrusting colony base, and in the form of the frontal shield with its distinct, slightly raised umbonuloid area. Some species attributed to *Exechonella* Duvergier, 1924 have tubular peristomes (e.g., *Lagenipora tuberculata* MacGillivray, 1883, and erect *Tubucellaria marginata* MacGillivray, 1895 - see GORDON, 1984), but the frontal shield is not zoned and the pores are initially relatively large and rimmed. In contrast, the type species of *Exechonella*, *E. grandis* (Duvergier, 1921), lacks a tubular peristome, though it does have a raised rim and large frontal pores. It also has an occasional tiny avicularium near the zooidal margin like that in its congener *E. antillea* (Osburn) (see COOK, 1985; FRANSEN, 1986).

Superfamily LEPRALIELLOIDEA Vigneaux, 1949

Family LEPRALIELLIDAE Vigneaux, 1949

Genus ***KLADAPHELES*** Gordon, 1993b

TYPE SPECIES. — *Kladapheles gammadeka* Gordon, 1993b.

Kladapheles gammadeka Gordon, 1993b

Figs 10-11

Kladapheles gammadeka Gordon, 1993b: 208, figs 13-14.

MATERIAL EXAMINED. — **New Caledonia**. BIOGEOCAL: stn DW 307, 470-480 m.
Norfolk Island. N.Z. Oceanographic Institute, NIWA, unregistered slide of material from NZOI Stn G10, southern Norfolk Ridge, 970 m depth.

DISTRIBUTION. — New Caledonia between Ouvéa and Lifou, 470-480 m; southern Norfolk Ridge, 970 m.

REMARKS. — Ovicells are lacking from both the type and BIOGEOCAL specimens, but a re-examination of bryozoan material from the type locality has yielded a specimen with a single ovicell. This forms a smooth-surfaced bulge distal to the orifice, flush with the surface of the fertile zooid but raised somewhat above the next zooid in the series and somewhat offset from it. Membranes and opercula are lacking, but it appears that the ovicellular opening is below the level of the zooidal operculum. In the sole MUSORSTOM specimen one of the adventitious avicularia is larger than the others in the colony but of the same general form.

Infraorder LEPRALIOMORPHA Gordon, 1989a

Superfamily SMITTINOIDEA Levinsen, 1909

Family BITECTIPORIDAE MacGillivray, 1895

Genus ***HIPPOTHYRIS*** Osburn, 1952

TYPE SPECIES. — *Hippothyris emplastra* Osburn, 1952.

Hippothyris caledonica sp. nov.

Fig. 12

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 82, 440 m.
MUSORSTOM 6: stn CP 419, 283 m.

TYPES. — *Holotype*: part of a colony from MUSORSTOM 6 Stn CP 419, 20°41.65'S, 167°03.70'E, 283 m, MNHN-Bry 20030.
Paratypes: MNHN-Bry 19969 from the same locality as the holotype; MNHN-Bry 19970 and MNHN-Bry 20033, both from BIOCAL Stn DW 82, 20°30.65'S, 166°50.30'E, 440 m.

DESCRIPTION. — Colony encrusting, forming multiple layers. Zooids large, 0.96-1.18 mm long and 0.66-0.94 mm wide (periancestrular zooids as small as ~0.66 mm × 0.40 mm), subquadrate to subhexagonal, the frontal shield with 3-4 rows of pseudopores surrounding an extensive imperforate area suborally; ca. 3-4 small areolae distributed along each lateral margin. Orifice wider than long, attaining 0.25 mm width in the largest zooids, with a gently concave proximal rim and tiny condyles in the corners. No oral spines. Avicularia paired, adjacent to the orifice, with a very thin cross-bar and an acute rostrum that is directed distally. Ovicell subglobular, at least two-thirds of the frontal area with scattered pores and secondary calcification encroaching distally. Ancestrula resembling later zooids, ~0.56 mm long and 0.40 mm wide.

DISTRIBUTION. — New Caledonia: between Ouvéa and Lifou, 283-440 m.

REMARKS. — *Hippothyris* is a small genus, but the number of known species is slowly increasing, especially from the New Zealand-New Caledonian region. The type species is known from Baja California and north Chile (OSBURN,1952; MOYANO,1991); *H. austrinus* occurs off central Chile (MOYANO, 1991); and *H. aganactete* and *H. ordinaria* are neozelanic (GORDON, 1984, 1989a). All are characterised by large zooids, similar orifices, and an imperforate suboral area.
Hippothyris caledonica differs from the other species in its paired oral avicularia. The present material encrusts three-dimensional substrata mostly comprising homotrematid and other Foraminifera, leaving cavities beneath.

Genus *PARKERMAVELLA* nov.

DIAGNOSIS. — Colony encrusting. Zooids lepralioid, the frontal shield imperforate, with marginal areolar pores only. Orifice with a proximal sinus. Articulated oral spines occur distally. One or more adventitious avicularia occur near the orifice or elsewhere on the frontal shield including the lateral margin. Ovicell prominent or subimmersed, the ectooecial calcification smooth, with numerous perforations that may be rimmed. Secondary calcification, sometimes incorporating small avicularia may encroach upon the distolateral margin of the ovicell.

TYPE SPECIES. — *Lacerna incurvata* Uttley & Bullivant, 1972.

REMARKS. — A new genus is necessary for *Schizomavella*-like species with an imperforate frontal shield and only marginal areolae - the type species of *Schizomavella*, *Lepralia auriculata* Hassall, 1842, and related European species have evenly perforated shields (HAYWARD & RYLAND, 1979). The late Shane PARKER of the South Australian Museum, before his untimely death in 1992, suggested such a new genus. *Parkermavella* is named in honour and recognition of Shane and his work. Apart from the type species, *Parkermavella* includes, *inter alia*, the following Australasian species: *Schizoporella punctigera* MacGillivray, 1883; *Hippomenella curvata* Uttley & Bullivant, 1972 (syn. *Schizomavella trachoma* Gordon, 1989a); *Schizomavella schizoporelloides* Gordon, 1984; and *Schizomavella virago* Gordon, 1989a.

Parkermavella fidelis sp. nov.

Figs 13-14

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 6: stn CP 419, 283 m.

TYPE. — *Holotype*: MUSORSTOM 6: stn CP 419, 20°41.65'S, 167°03.70'E, 283 m, MNHN-Bry 20046. No separate paratypes.

DESCRIPTION. — Colony encrusting, the zooids variable in size and shape from quadrate to elongate-oval; 0.66-1.13 mm long and 0.37-0.96 mm wide, the calcareous surface smooth to tubercular. Areolar pores 3-7, along each lateral margin. Orifice with a broadly U-shaped median sinus, flanked by flattened condyles on the shoulders. Articulated oral spines 5-6. A somewhat columnar, suboral avicularium occurs immediately proximal to the sinus, the palatal surface slanted to face somewhat distally; the rostrum rounded, with a complete cross-bar. Ovicell prominent, smooth, with numerous ectooecial pores; apparently closed by the zooidal operculum. At the proximal end of several zooids is a raised structure with a central concavity; it appears avicularian but in every case it is sealed frontally and typical avicularian structures are not evident.

DISTRIBUTION. — New Caledonia: Loyalty Islands, 283 m.

REMARKS. — The unique holotype specimen of *Parkermavella fidelis* is part of a formerly sheet-like encrustation occurring on a branching stem of *Haswelliporina quinaria* sp. nov. Thus the underside of the colony is largely free of any contact with the substratum. The species name *fidelis* (Latin, faithful) alludes to the geographic distribution of the species in the Loyalty Islands.

Parkermavella minuta sp. nov.

Fig. 15

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 65, 275 m.

TYPE. — *Holotype*: a unique, tiny colony, now fragmented into two parts, from BIOCAL Stn DW 65, 24°47.90'S, 168°09.09'E, 275 m, MNHN-Bry 20052. No separate paratypes.

DESCRIPTION. — Colony encrusting, small. Zooids small, 0.18-0.47 mm long and 0.13-0.32 mm wide, the calcareous frontal shield lightly textured, imperforate, with 3-6 areolar pores along each lateral margin. Orifice with a small rounded sinus, the entrance to which may be slightly constricted, the condyles flattened on the lateral shoulders; articulated oral spines 8, extending almost right around the margin of the anter. Avicularia adventitious, small and oval-shaped, one occurring in the centre of the frontal shield directed proximally and usually another interzooidally, with a thin, minutely ligulate crossbar, the rostrum with lateral shelves constricting the central space. Ovicell subimmersed, with small scattered pores and tubercles, the female orifice flanked by 2 pairs of spines.

DISTRIBUTION. — New Caledonia: northern Norfolk Ridge, 275 m.

REMARKS. — Only a single colony 2.2 mm across was found in the collection. Although very small, at least one mature ovicell is present, indicating that the species probably does not attain a significant size.

Family SMITTINIDAE Levinsen, 1909

Genus *SMITTOIDEA* Osburn, 1952

TYPE SPECIES. — *Smittoidea prolifica* Osburn, 1952.

Smittoidea maunganuiensis multiporosa ssp. nov.

Figs 16-17

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 6: stn CP 419, 283 m.

TYPES. — *Holotype*: a preserved colony from MUSORSTOM 6 Stn CP 419, 20°41.65'S, 167°03°70'E, 283 m, MNHN-Bry 20002.

Paratypes: MNHN-Bry 20003, a preserved colony, and MNHN-Bry 20062, a slide, both from the same locality as the holotype.

DESCRIPTION. — Colony encrusting, producing elevated lamellae beyond the immediate area of substratum. Zooids 0.84-1.71 mm long and 0.49-1.34 mm wide, the zooids mostly elongate-rectangular in shape. Frontal shield lightly undular-tubercular, imperforate frontally with numerous marginal areolae. Orifice with a short peristome laterally and proximally; no oral spines. Lyrula not very broad, the alae short to moderately developed, flanked by acicular condyles directed toward the alae. Operculum more or less semicircular with a broadly arcuate proximal edge. Suboral avicularium relatively small, suboval in shape, directed proximally, unequally divided by a cross-bar with a tiny ligula on the rostral side. Ovicell prominent, subglobular, the ectooecium smooth with numerous pores.

DISTRIBUTION. — New Caledonia: north side of Lifou Island, 283 m.

REMARKS. — The present material is very similar to the New Zealand species *Smittoidea maunganuiensis* (Waters). It differs, however, in a number of minor characters that collectively warrant recognition as a new subspecies. These comprise a low peristome between the orifice and the avicularium, the more oval shape of the avicularium, the lack of orificial spines in young marginal zooids, the more numerous ectooecial pores, and the lack of encroaching secondary calcification around the margin of the ovicell.

Genus ***HEMISMITTOIDEA*** Soule & Soule, 1973

TYPE SPECIES. — *Hemismittoidea corallinea* Soule & Soule, 1973.

Hemismittoidea ennea sp. nov.

Figs 18-19, ?20

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 66, 515 m.
?**Philippines**. MUSORSTOM 3: stn DR 117, 97-92 m.

TYPE. — *Holotype*: fragments of the same colony from BIOCAL Stn DW 66, 24°55.43'S, 168°21.67'E, 515 m, MNHN-Bry 20071. No separate paratypes.

DESCRIPTION. — Colony encrusting. Zooids small, 0.45-0.55 mm long and 0.26-0.40 mm wide, the frontal shield evenly and lightly textured with small polygonal ridges and depressions, with 7-9 conspicuous areolar pores along the margins. A thin raised peristome present, with a median U-shaped sinus and 9 small spine bases around the distal margin (the actual spines lacking from the present material). Primary orifice with a medium-sized alate lyrula, flanked by acicular condyles directed towards the alae. At the base of the peristome on 1 side is an avicularium; this is directed proximolaterally towards the adjacent margin; the distal half to two-thirds of the acute rostral rim minutely serrate, the palate calcified, a crossbar completely lacking. Ovicell prominent, emplaced upon the frontal shield of the distal zooid, the ectooecium initially smooth, becoming covered with secondary calcification between the numerous small pores which become sunken; the two most proximal pairs of oral spines are retained on each side of the fertile orifice.

DISTRIBUTION. — New Caledonia: northern Norfolk Ridge, 515 m. ?Philippines: Mindoro Strait, 92-97 m.

REMARKS. — *Hemismittoidea ennea* has more oral spines than any other species of the genus, i.e., nine (greek, *ennea*). The ovicell differs from other congeners in being evenly covered with secondary calcification. The unique, fertile holotype colony is unusual in having avicularia that lack a crossbar. It is possible that this is because of breakage, but they do not appear broken; nevertheless, all other species of *Hemismittoidea* have

crossbars, as do most smittinids. It is this feature that prevents us from including, with certainty, a small infertile colony of a *Hemismittoidea* from MUSORSTOM 3 Stn DR 117 in the Philippines. It includes periancestrular and later zooids; there are 8-9 oral spines and greatly resembles zooids of *H. ennea* but the avicularia have ligulate crossbars (Fig. 20). If this colony had occurred at the same New Caledonian station as the holotype of *H. ennea*, then we would be more confident of conspecificity.

Genus *PARASMITTINA* Osburn, 1952

TYPE SPECIES. — *Lepralia jeffreysi* Norman, 1876.

Parasmittina glabra sp. nov.

Figs 21-22, ?23-24

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 66, 515 m.

TYPES. — *Holotype*: a small colony from BIOCAL Stn DW 66, 24°55.43'S, 168°21.67'E, 515 m, MNHN-Bry 20063.

Paratypes: 3 fragments from the same locality in a separate well on the holotype slide.

DESCRIPTION. — Colony encrusting. Zooids 0.35-0.58 mm long and 0.20-0.52 mm wide, with smooth frontal shield and 5-9 conspicuous round areolar pores along the margins. Frontal shield rising to a peristomial rim that has a median sinus and 7-8 distal spine bases (spines not attached in the present material). Primary orifice with a medium-sized alate lyrula (~0.041 mm wide) and a pair of subacute non-acicular condyles directed towards the alae. Avicularia paired, 1 either side of the peristome, each directed lateroproximally towards the adjacent margin; with a tiny semicircular opesia separated by the crossbar from a minutely and irregularly serrate acute rostrum. Ovicell prominent, emplaced upon the distal frontal shield, the ectooecial surface almost smooth, with numerous pores that have slightly raised rims.

DISTRIBUTION. — New Caledonia: northern Norfolk Ridge, 515 m.

REMARKS. — From the same station is additional material (three fragments from another colony) that may belong to the same species (Figs 23-24). Though infertile, it is extremely similar in general appearance and orificial characteristics (6-7 oral spines, however), but differs in its slightly larger zooidal size and therefore proportionately wider lyrula (~0.085 mm) (Fig. 24), and the fact that one of the paired avicularia is frequently directed distally (Fig. 23).

Parasmittina marginata (Canu & Bassler, 1929)

Figs 25-26

Smittina trispinosa - OKADA, 1929: 28, text-fig. 13. Non Johnston, 1838.
Smittina reticulata - CANU & BASSLER, 1929: 337, pl. 39, figs 9-10. Non J. MacGillivray, 1842.
Smittina ophidiana var. *marginata* Canu & Bassler, 1929: 339, pl. 29, figs 4-5.
[?] *Smittina trispinosa* var. *munita* Canu & Bassler, 1929: 341, pl. 41, fig. 5.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3: stn DR 117, 97-92 m.

DISTRIBUTION. — Japan, Mutsu Bay, Honshu. Philippines, 18-969 m.

REMARKS. — This species is distinctively characterised by the long, narrow and curving, near-midfrontal avicularium that is proximally directed. It is very similar to *Smittoidea pacifica* Soule & Soule, 1973; this species, which has also been illustrated by RYLAND and HAYWARD (1992), has a similar, though much shorter,

avicularium that is placed somewhat more suborally, and in the median position that is characteristic of species of *Smittoidea*. Nevertheless, both species share the characteristically shaped avicularian crossbar which is "angled slightly forward, and may be thickened at the ends so that the opesial premandibular area of the rostrum is reduced to a circle" instead of a semicircle.

Parasmittina serrula Soule & Soule, 1973

Fig. 27

Parasmittina serrula Soule & Soule, 1973: 386, fig. 3 D-F. — GORDON, 1984: 96, pl. 35 B-C. — WINSTON, 1984: 23, fig. 45. — RYLAND & HAYWARD, 1992: 272, figs 23 e-f, 24 a.
Smittina raigii - RHO & SEO, 1986: 40, pl. 10, figs 3-4. Non Audouin, 1826.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3: stn DR 117, 97-92 m.

DISTRIBUTION. — Hawaiian Islands (type locality on Maui), 3-130 m. Belize and Jamaica, ~15 m. Kermadec Ridge, 55-318 m. Heron Island (Great Barrier Reef), < 20 m. Mindoro Strait, Philippines, 92-97 m. Southern South Korea (no depth given).

REMARKS. — The present material, newly recorded from the Philippines, closely matches published descriptions and illustrations of *P. serrula* from other localities, though differing in details. There is some variation in lyrula width throughout its range, being narrower in Caribbean and Hawaiian populations and wider in Great Barrier Reef and Philippine samples. The present material lacks giant avicularia and the smaller avicularia are not as high-sided as previously described - the latter possibly a consequence of the degree of secondary calcification.

Parasmittina erecta sp. nov.

Figs 28-29

Parasmittina sp. Gordon, 1985: 171, fig. 19.

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 66, 515 m. — Stn CP 67, 500 m.
New Zealand. NZOI Stn K795, 350 m.

TYPES. — *Holotype*: part of a colony from BIOCAL Stn DW 66, 24°55.43'S, 168°21.67'E, 515 m, MNHN-Bry 20069.
Paratypes: MNHN-Bry 20070, from the same location as the holotype; MNHN-Bry 20065, from BIOCAL Stn CP 67, 24°55.44'S, 168°21.55'E, 500 m.

DESCRIPTION. — Colony erect, dichotomously branching in 1 plane, the zooids facing on 1 side only; branch width 0.39-0.94 mm, the zooids in 2-4 series; distance between dichotomies 1.20-2.25 mm. Zooids 0.52-0.66 mm long and 0.24-0.34 mm wide, the frontal shield more or less smooth and imperforate centrally, with ~4-7 areolar pores along each lateral margin. Peristome with a median sinus, bordered distally by 6 oral spines. Primary orifice with a variable medium to broad alate lyrula flanked by curved condyles. Avicularia single or paired, variable in length and orientation; generally the rostrum is narrow and acute with small denticulations and directed proximally; if an avicularium is short (~ half the length of the longer avicularia) and adjacent to the peristome, it may be directed laterally toward the secondary orifice; if placed more proximally, it may be directed proximally or distally or obliquely toward the peristome. Ovicell relatively large, emplaced on the distal frontal shield, with numerous pores in the smooth ectooecium. Dorsal surface faintly textured, with lines marking the zooidal boundaries.

DISTRIBUTION. — New Caledonia: northern Norfolk Ridge, 500-515 m. New Zealand: southern end of Kermadec Ridge, 350 m.

REMARKS. — GORDON's (1985) record of this species from the southern Kermadec Ridge was based on a single worn fragment. Nevertheless, close comparison of the Kermadec and Philippine colonies confirms that they are conspecific.

Parasmittina sp.

Figs 30-31

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 3: stn DR 117, 97-92 m.

DESCRIPTION. — A single young colony only 1.26 mm diameter, encrusting, the marginal zooids tending to suberect, the ancestrula occluded. Largest zooidal dimensions 0.28-0.34 mm long, 0.18-0.26 mm wide. Frontal shield more or less smooth, rising to a suboral peristome with a median U-shaped pseudosinus. Areolar pores sparse, usually only 1-2. Primary orifice with a broad alate lyrula; no condyles. Oral spines 6. Adventitious avicularia single or paired, small and oval with a low, lightly crenulated rostral rim, the mandibular pivots considerably projecting, approaching each other quite closely; avicularia set near the lateral margins of the zooid where the peristome starts to rise, directed obliquely laterally.

REMARKS. — It has not been possible to determine the species from such a small specimen, but the small oval avicularia are very distinctive and generally rare in *Parasmittina* species, so it should be possible to relate the specimen to larger, fertile colonies should they be discovered.

Genus *SMITTINA* Norman, 1903

TYPE SPECIES. — *Lepralia landsborovii* Johnston, 1847.

Smittina asymmetrica sp. nov.

Figs 32-34

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 66, 515 m. — Stn CP 67, 500 m.

TYPES. — *Holotype*: dome-shaped colony from BIOCAL Stn CP 67, 24°55.44'S, 168°21.55'E, 500 m, MNHN-Bry 20005.

Paratypes: MNHN-Bry 20067, and MNHN-Bry 20061, both from BIOCAL Stn DW 66, 515 m.

DESCRIPTION. — Colony encrusting, able to form multiple layers by frontal budding, resulting in a dome-shaped colony 9 mm diameter and 5 mm high. Zooids subquadrate to subhexagonal, sometimes wider (0.45-1.01 mm) than long (0.60-0.98 mm); at the growing margin the frontal shield appears convex and higher than the lateral margins, rising to an elevated peristomial orifice. Later in ontogeny the margins become raised vertically to the level of the peristomial rim; as a consequence the frontal shield appears considerably sunken and the hypostegal coelom is relatively spacious. Frontal shield varies from lightly textured at the colony margin to somewhat tubercular in the older parts; evenly, but not densely, perforated by relatively large pseudopores. Peristomial orifice subpyriform with a spatulate suboral avicularium set in the peristomial sinus; beneath is a very broad lyrula whose alae almost touch the adjacent acicular condyles. No oral spines. Ovicell large, prominent, occupying most of the frontal area and hypostegal coelom of the next distal zooid, the peristomial orifice angled asymmetrically to one side, as is the outer of two suboral avicularia set within it; the innermost avicularium is aligned with the zooidal axis; ovicellular ectooecium regularly and evenly perforated.

DISTRIBUTION. — New Caledonia: northern Norfolk Ridge, 500-515 m.

REMARKS. — *Smittina asymmetrica* is a very striking species insofar as zooidal characters are concerned, notably the raised margins and asymmetrical female peristomial orifice with two suboral avicularia, the one above the other.

Smittina abyssicola (Harmer, 1957)

Figs 35-36

Porella abyssicola Harmer, 1957: 946, pl. 65, figs 8-10.

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn CP 84, 210 m.

DISTRIBUTION. — Indonesia: Halmahera, Mollucca Islands, 1089 m. New Caledonia: Loyalty Islands, 210 m.

REMARKS. — The present material occurs on the abfrontal side of a fenestrate species of the bryozoan *Smittipora* sp. Although infertile, it accords very well with HARMER's (1957) description and illustrations, including of the elevated peristome, broad lyrula, and ligulate avicularian crossbar.

Family MAWATARIIDAE Gordon, 1990

Genus *MAWATARIUS* Gordon, 1990

TYPE SPECIES. — *Prostomaria inexspectabilis* Gordon, 1985.

Mawatarius secundus sp. nov.

Figs 37-41

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 66, 515 m.

TYPES. — *Holotype*: a branching, fertile, colony fragment from BIOCAL Stn DW 66, 24°55.43'S, 168°21.67'E, 515 m, MNHN-Bry 20043.

Paratype: two fragments, one ancestrulate, from the same locality as the holotype, MNHN-Bry 20055.

DESCRIPTION. — Colony erect, uniserial, dichotomously branching in 1 plane. Zooids 0.66-0.87 mm long and 0.36-0.47 mm wide, mostly all facing in the same frontal direction; from a position adjacent to the proximal end of the orifice, each zooid produces a daughter zooid (or 2 zooids at bifurcations) at an angle - thus the orientation of the zooids imparts a zigzag appearance to each branch. Frontal shield densely and minutely granular, with sparse pseudopores and faint longitudinal ridges. A secondary orifice, composed of a short peristomial rim, is fluted around the inner face of the rim and has a pseudosinus. At a deeper level, not readily visible frontally, is the primary orifice, with an anvil-shaped lyrula; the adjacent corners of the poster slightly projecting and flattened, forming condylar surfaces. Nor oral spines or avicularia. Ovicell appearing as a small bulge externally, the surface calcification resembling that of the frontal shield, opening into the peristome above the primary orifice. Ancestrular zooid erect and claviform, proximally tapering.

DISTRIBUTION. — New Caledonia: northern Norfolk Ridge, 515 m.

REMARKS. — *Mawatarius secundus* is only the second species of the genus (hence the specific name) to be described. It differs from the type species in having a deeper poster and prominent lyrula and the zooidal orifices mostly facing in the same direction (alternate orifices in *M. inexspectabilis* in some cases face at right angles to each other).

Although the ancestrula is present in one of the paratype fragments of *M. secundus*, it was not attached to any substratum. It otherwise resembles that of the type species which has a short chitinous ring at the proximal end attaching it to a flat pad of calcium carbonate. There are no accessory rootlets or encrusting kenozooids.

Family PETRALIELLIDAE Harmer, 1957

Genus *MUCROPETRALIELLA* Stach, 1936

TYPE SPECIES. — *Lepralia ellerii* MacGillivray, 1869.

Mucropetraliella philippinensis (Canu & Bassler, 1929)

Fig. 42

Petraliella philippinensis Canu & Bassler, 1929: 261, pl. 35, figs 3-11.
Mucropetraliella philippinensis - HARMER, 1957: 710, pl. 45, figs 19-21. — DUMONT, 1981: 635. — WINSTON, 1986: 21. — D'HONDT, 1986: 705.

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn KG 22, 2050 m.

DISTRIBUTION. — Red Sea, < 30 m. Japan, 73-146 m. Philippines, 34-621 m. Sumbawa Island, Indonesia, 0-36 m. New Caledonia, 40-2050 m.

REMARKS. — The specimen from BIOCAL Stn KG 22 was represented by a single tiny infertile colony. The depth at which it was taken is greater than indicated by previous records. HARMER (1957) described the orificial sinuses as almost closed, whereas they are rather more open in the present specimen, but this is a character likely to vary. Certainly the lyrula is characteristically short and wide in the BIOCAL specimen, conforming to HARMER's description, but there are also bases of four small oral spines, not previously reported for *M. philippinensis*. These spines are extremely short, however, occurring low within the orifice and are easily overlooked. The BIOCAL specimen does have the characteristic paired lateral avicularia and the arc of small avicularia distal to the orifice, but lacks the occasional larger avicularia.

On the underside of the sole colony in the collection is an ancestrula of the catenicellid bryozoan *Terminocella perlucens* (Harmer) - it is identical to later zooids in morphology and is separated by a thin chitinous joint from a short calcified stalk attached to the substratum. This represents a new station record for *T. perlucens*, reported earlier by GORDON (1993a) from four other BIOCAL stations (505-1395 m).

Mucropetraliella serrata (Livingstone, 1926)

Fig. 43

Petralia vultur var. *serrata* Livingstone, 1926: 95, pl. 6, figs 7-10.
Mucropetraliella serrata - HARMER, 1957: 718, pl. 46, fig. 8, text-fig. 6. — D'HONDT, 1986: 705.

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4: stn DW 151, 200 m.

DISTRIBUTION. — New Caledonia, north of Belep Islands, 200 m, and Chesterfield Bank, 15-19 m. Also Sri Lanka, Philippines, Torres Strait, Queensland, Great Barrier Reef, 0-201 m.

REMARKS. — Only one small colony fragment occurred in the collection. It may have been transported from a shallower depth.

Genus *RISCODOPA* Gordon, 1989a

TYPE SPECIES. — *Mucropetraliella cotyla* Cook & Chimonides, 1981.

Riscodopa parva Gordon, 1989a

Riscodopa parva Gordon, 1989a: 57, pl. 30, figs C-E.

MATERIAL EXAMINED. — **New Caledonia**. SMIB 4: stn DW 37, 540 m.

DISTRIBUTION. — New Zealand: northwest slope of North Island, Challenger Plateau, Bounty Trough, 477-4059 m. Norfolk Ridge: New Caledonia to Norfolk Island, 540-831 m.

REMARKS. — A single colony 3.19 mm diameter occurred in the collection. This is only the second record of this abyssal species, which thus ranges from 24°54.5'S to 45°21.1'S.

Riscodopa sp.

MATERIAL EXAMINED. — **New Caledonia**. BIOGEOCAL: stn CP 317, 1630-1620 m.

DESCRIPTION. — Colony tiny, discoidal, ~1.35 mm diameter. Zooids somewhat shield-shaped, with a U-shaped arrangement of relatively large drop-shaped foramina on the frontal shield, with another foramen suborally at the open end of the U. Orifice evidently lacking a lyrula or denticles, the operculum high-arched (0.098-1.30 mm long) with a straight proximal rim. No obvious oral spines. A pair of lateral-oral avicularia adjacent to the orifice, the mandible similar in shape to the operculum but half the length. Ancestrular zooid central, the opesial diameter 0.18 mm. Ovicells not present.

DISTRIBUTION. — New Caledonia: South Loyalty Basin near Lifou, 1620-1630 m.

REMARKS. — Only a single tiny colony occurred in the collection. It had become dried and, as a consequence, was collapsed by surface-tensional effects during dehydration. Thus the zooidal features are somewhat distorted. The overall form of the colony is as for the other two species of the genus, but the paucity, size, and distribution of frontal pseudopores is unusual. More specimens are needed to characterise this species adequately.

Superfamily SCHIZOPORELLOIDEA Jullien, 1883

Family SCHIZOPORELLIDAE Jullien, 1883

Genus *HIPPOMENELLA* Canu & Bassler, 1917

TYPE SPECIES. — *Lepralia mucronelliformis* Waters, 1899.

Hippomenella avicularis (Livingstone, 1926)

Fig. 44

Lepralia tuberculata var. *avicularis* Livingstone, 1926: 93, pl. 5, figs 1-3.
Hippomenella spatulata Harmer, 1957: 1095, pl. 72, figs 27, 31. — POWELL, 1967: 378, text-fig. 106 a-f, pl. 17, fig. d. — D'HONDT, 1986: 735, pl. 8, fig. 6. — RHO & SEO, 1986: 40, pl. 9, figs 1-3.
Hippomenella avicularis - HAYWARD & COOK, 1983: 81, fig. 19G.

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4: stn DW 231, 75 m.

DISTRIBUTION. — Cheju-do, southern South Korea (depth not given); New Caledonia, Loyalty Islands and Chesterfield Plateau, 0-75 m; Australia: Surprise Shoal, Great Barrier Reef, 51 m (type locality), and Port Jackson, New South Wales; South Africa: eastern continental shelf and slope, 90-780 m.

REMARKS. — The present material comprised one small infertile colony fragment.

Family LANCEOPORIDAE Harmer, 1957

Genus ***EMBALLOTHECA*** Levinsen, 1909

TYPE SPECIES. — *Eschara quadrata* MacGillivray, 1880.

Emballotheca rara sp. nov.

Figs 45-46

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 46, 775 m.

TYPES. — *Holotype*: a single preserved colony from BIOCAL Stn DW 46, 23°00.43'S, 167°28.76'E, 775 m, MNHN-Bry 19996.

Paratypes: MNHN-Bry 19997, a preserved colony, and MNHN-Bry 20044, three dried colonies on a slide, all from the same locality as the holotype.

DESCRIPTION. — Colony encrusting, forming a small multilamellate nodule up to ~6 mm high and 5 mm diameter, over the underlying substrate (frequently a small coral fragment), the oldest zooids occurring at the apex of the nodule. Zooids 0.71-1.00 mm long and 0.47-0.98 mm wide, somewhat quadrate in outline, frequently parallel-sided, a thin raised line of calcification indicating the boundary between zooids. The presence of long buds at the colony margin indicates multizooidal budding. Some zooids lack orifices. Zooidal frontal shield evenly perforated by small pseudopores except for two areas suborally and proximally. Inconspicuous areolar pores, a little larger than pseudopores, occur along the lateral margins. Orifice wider (0.20-0.32 mm) than long, with a variably convex proximal rim and a pair of long, horizontal, acicular condyles. No oral spines. Avicularia tiny, borne singly beside the orifice or on either side, with a thin, complete cross-bar, the rostrum rounded, directed obliquely towards the centre of the frontal shield. Ovicells relatively large, occupying two-thirds of the frontal shield of the distal zooid, though not especially conspicuous; the skeletal surface perforated much like the frontal shield except for an imperforate area midproximally, and, on the most mature ovicell in the colony, at least one of the thin raised ridges characteristic of the family and genus. Ovicells contain single embryos, 0.28 mm maximum diameter.

DISTRIBUTION. — Northern Norfolk Ridge, 775 m.

REMARKS. — The nodular form of the colony and the tiny lateral-oral avicularia are distinctive features of this species.

Genus ***CALYPTOTHECA*** Harmer, 1957

TYPE SPECIES. — *Schizoporella nivea* var. *wasinensis* Waters, 1913.

Calyptotheca sp.

Figs 47-48

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4: stn DW 187, 65-120 m.

DESCRIPTION. — Unique juvenile colony encrusting a segment of the bryozoan *Nellia tenella* (Lamarck). Zooids 0.32-0.53 mm long and 0.20-0.42 mm wide, separated by thin raised ridges. Zooidal frontal shield more or less evenly perforated by pseudopores, with low ridges between the pores; marginal areolae the same size as pseudopores, sparsely distributed at the corners of the zooid. Orifice with a broad shallow sinus and tiny condyles. No oral spines. Avicularia and ovicells absent from the young colony.

DISTRIBUTION. — Northern New Caledonia, near Belep Islands, 65-120 m.

REMARKS. — Without ovicells and avicularia, it is impossible to comment further on the affinities of this species. On the basis of the morphology of the neanic zooids it could equally be a species of *Hippoporina*.

Family TETRAPLARIIDAE Harmer, 1957

Genus *TETRAPLARIA* Tenison-Woods, 1879

TYPE SPECIES. — *Tetraplaria australis* Tenison-Woods, 1879.

Tetraplaria orospinea sp. nov.

Figs 49-52

MATERIAL EXAMINED. — **New Caledonia**. BIOGEOCAL: stn CP 232, 760-790 m. — Stn CP 265, 1760-1870 m.

TYPES. — *Holotype*: a colony segment from BIOGEOCAL Stn CP 232, 21°33.81'S, 166°27.07'E, 760-790 m, MNHN-Bry 20028.

Paratype: encrusting base and a detached segment of the same colony from BIOGEOCAL Stn CP 265, 21°04.09'S, 167°00.40'E, 1760-1870 m, MNHN-Bry 20037.

DESCRIPTION. — Colony erect, jointed, from a small encrusting base. Encrusting basal zooids 0.56-0.81 mm long and 0.28-0.55 mm wide, the frontal shield granular and evenly perforated with pseudopores except suborally. Orifice a little wider than long, with a short rounded median sinus and inconspicuous flattened condyles at the corners; bases of 6 oral spines around the distal rim. Erect parts of colony arising from interzooidal kenozooids, the segments at least up to ~5 mm long and 0.85 mm diameter and comprising up to 16 zooids; these not arranged in distinct longitudinal series but forming a clockwise spiral up the segment. Erect zooids relatively large, 0.81-1.22 mm long and 0.41-0.74 mm wide, the frontal shield and orifice as for the encrusting zooids, except that oral spines may be reduced to 4 in number. No avicularia. Ovicells or dimorphic orifices not encountered in the limited material.

DISTRIBUTION. — New Caledonia: South Loyalty Basin, 760-1870 m.

REMARKS. — Although only limited material of this species occurred in the collection (two segments and an encrusting base), it is distinctive enough to be recognised as new. It is readily distinguished from other species by the relatively large size of the zooids and especially the small oral spines, apparently unique in the genus, occurring both in encrusting and erect zooids.

Tetraplaria ventricosa (Haswell, 1881)

Figs 53-54

Onchopora ventricosa Haswell, 1881: 36, pl. 1, fig. 3.
Tetraplaria ventricosa - HARMER, 1957: 1053, pl. 69, figs 1-4 (*cum syn.*). — D'HONDT, 1986: 706. — HAYWARD, 1988: 318.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3: stn DR 117, 97-92 m.

DISTRIBUTION. — Philippines, Indonesia, Timor, Andaman Islands, Sri Lanka, Seychelles, Mauritius, India, Queensland, New Caledonia, Fiji, 0-97 m.

REMARKS. — HARMER (1957) included a number of species in the synonymy of *T. ventricosa*, but these probably need checking. For example, the present material accords very well with *Diploecium simplex* Kirkpatrick, 1888, but the orificial sinus of this species seems narrower, and the zooids less ventricose, than indicated by HARMER for *T. ventricosa*. HARMER also suggested that *Onchopora mutica* Busk, 1855 might be a senior synonym of *T. ventricosa*, but regarded the small holotype specimen of *O. mutica* as being inadequate to provide clear evidence of conspecificity. Scanning electron micrographs of the uncoated holotype [micrographs kindly supplied by P.J. CHIMONIDES, The Natural History Museum, London] suggests that *O. mutica* is indeed a senior synonym of *T. ventricosa* but not of *D. simplex*. Careful SEM comparisons need to be made between all of the species attributed to *T. ventricosa*. This is beyond the scope of the present study, so HARMER's synonymy is provisionally accepted here.

Tetraplaria sp.

Figs 55-56

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 38, 360 m.

DESCRIPTION. — Colony evidently erect and articulated, the sole specimen in the collection being proximally tapered; this segment almost 0.45 mm long and ~0.91 mm diameter, comprising approximately 30 zooids (some incomplete) arranged more or less in 5 longitudinal series. Zooids relatively broad, generally transversely diamond-shaped, 0.56-0.75 mm long and 0.56-0.81 mm wide. Frontal shield evenly perforated by pseudopores except immediately suborally and along the lateral margins. Orifice with a wide-V-shaped sinus that may be somewhat rounded, with condylar processes at the corners. No oral spines *per se*, but some orifices appear to have had 2-4 tiny ephemeral spines, judging from the tiny holes around the distal margin or some orifices. Avicularia and ovicells not present.

DISTRIBUTION. — New Caledonia: northern Norfolk Ridge, 360 m.

REMARKS. — The sole specimen almost certainly represents a new species but we hesitate to name it on the basis of the limited material.

Family PHORIOPPNIIDAE nov.

DIAGNOSIS. — Colony erect and branching, with circular stems from an encrusting base or with articulated segments and basally rooted. Zooids with a pseudoporous lepralioid frontal shield and raised margins. Areolar pores small, sparse, commonly paired proximally. Zooidal orifice with a wide poster, condyles weak or absent. Articulated oral spines absent. No avicularia. Female zooids, orifices, and ovicells sometimes enlarged, the ectooecial surface punctuated like the zooidal frontal shield and covered by the epitheca of the hypostegal coelom.

REMARKS. — A new family is proposed for the following four genera: *Phorioppnia* gen. nov. (Holocene), *Quadriscutella* Bock & Cook, 1993 (Oligocene-Holocene), *Punctiscutella* gen. nov. (Oligocene), and *Oppiphorina* gen. nov. (Holocene). Justification for this family is given below.

Genus ***PHORIOPPNIA*** nov.

TYPE SPECIES. — *Phorioppnia cookae* sp. nov.

DIAGNOSIS. — Colony erect, rod-like, non-articulated, the direction of zooidal budding producing longitudinal rows trending clockwise up the stem. Zooidal frontal shield evenly, though sometimes sparsely, pseudoporous, with small areolar pores at the proximolateral corners and raised interzooidal ridges. Orifices dimorphic. The

zooidal orifice lacking obvious condyles, the poster tapering and rounded. No oral spines. No avicularia. Ovicells prominent though not large, the ectooecial surface resembling the frontal shield, the maternal orifice transversely broadly elliptic, the ovicell closed by the broad maternal operculum.

Phorioppnia cookae sp. nov.

Figs 57-59

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn CP 108, 335 m. BIOGEOCAL: stn DW 253, 310-315 m.

TYPES. — *Holotype*: a single fertile stem from BIOGEOCAL Stn DW 253, 21°31.75'S, 166°28.73'E, 310-315 m, MNHN-Bry 20058.

Paratypes: MNHN-Bry 19961, an ancestrulate colony with three stems, attached to a hydroid, from BIOCAL Stn CP 108, 22°02.55'S, 167°05.68'E, 335 m; MNHN-Bry 20059, three stems from the same locality as the holotype.

DESCRIPTION. — Colony erect, comprising unbranched rod-like stems, 0.67-1.10 mm diameter. Up to 3 stems arise from a common periancestrular base; the longest stem in the collection (detached) is 1 cm long. Cross sections of the stems show them to be quadriserial but the zooids are not arranged in parallel longitudinal series; rather the series slant slightly obliquely in a clockwise direction around the axis. Ancestrula 0.64 mm long and 0.38 mm wide, longitudinally oval in outline, semierect and attached by ?extrazooidal calcification that envelopes a hydroid stem. Periancestrular zooids 0.66 mm long and ~0.46 mm wide. Postancestrular zooids organised into stems immediately beyond the periancestrular zooids, large, as small as 0.67 mm long near the ancestrular region, generally 1.22-1.43 mm long and 0.62-0.75 mm wide; frontal shield lepralioid, evenly, if somewhat sparsely, perforated by pseudopores, the proximolateral part of the shield appearing somewhat sunken in relation to the raised zooidal margin. Areolar pores a little larger than the pseudopores are sparse; one pair occurs proximally, and 2-3 occur along each lateral margin, usually at the widest part of the zooid and adjacent to the orifice. Orifice somewhat pyriform, the rounded poster about one-third the orificial length, not clearly delimited from the anter by any condyles. No oral spines. No avicularia. Female zooids about the same size as autozooids but the orifice extremely broad and elliptical, with a somewhat thicker, upturned proximal rim. Ovicell somewhat prominent and recumbent, wider than long, the skeletal surface punctuated like the frontal shield, the opening closed by the maternal operculum.

DISTRIBUTION. — New Caledonia: South Loyalty Basin, 310-335 m.

REMARKS. — There are a number of ascophorines in the southwestern Pacific that have hippoporine orifices, i.e., with a broad rounded poster, and evenly pseudoporous frontal shields, several of which have been attributed to *Hippoporina* (e.g., BROWN, 1952; POWELL, 1967; GORDON, 1984, 1989a). As GORDON (1994) has pointed out, however, *Hippoporina*, newly included in the Bitectiporidae, has characteristic 'smittinid' ovicells, with both ovicellular layers calcified and unfused and relatively large foramina in the ectooecium. This is in contrast to 'schizoporellid' ovicells in which both ovicellular layers may be fused and/or the ectooecial surface resembles the pseudoporous frontal shield. Accordingly, most, if not all, of the southwest Pacific species previously attributed to *Hippoporina* need reclassifying (cf. BOCK & COOK, 1993).

BOCK and COOK (1993) included their new genus *Quadriscutella* in the Euthyrisellidae, noting a resemblance to *Tropidozoum* Harmer which also has articulated colonies, raised zooidal margins, and dimorphic orifices. On the other hand, there are significant differences between these two genera, as BOCK and COOK also pointed out (viz, the methods of branching and brooding and the presence of an extrazooidal basal coelom in *Tropidozoum*). The type genus of Euthyrisellidae, *Euthyrisella* Bassler, is so very different from *Quadriscutella*, however, that we are persuaded to conclude that any similarities to that family are superficial, especially since there are species in the MUSORSTOM collections that appear even further unrelated to the Euthyrisellidae but have morphological characters in common with *Quadriscutella*.

One such example is *Phorioppnia cookae*. It is evidently related to *Quadriscutella*, which it resembles in having a sparsely perforated frontal shield, raised zooidal margins, similarly distributed areolar pores (especially the proximal pair), and dimorphic orifices. By contrast, *Quadriscutella* typically has enlarged female zooids and ovicells (not just orifices), composite orificial rims in autozooids, and kenozooidal branch points (not seen in the limited New Caledonian material). On the basis of these distinctions, we have no hesitation in establishing a new genus, *Phorioppnia*. [*Phorioppnia* is an anagram of *Hippoporina*.]

Another erect hippoporine species in the MUSORSTOM collection, *Hippoporina epaxia* Gordon, 1984, though lacking dimorphic orifices, has raised zooidal margins and appears related. A new genus, *Oppiphorina*, is established for it (see below). There are some similarities between *O. epaxia* and the articulated species *Quadriscutella punctata* Bock & Cook, 1993 which, though it has branch-site kenozooids, lacks the reproductive dimorphism and characteristic 'tetra-composite' orifices of the other species of *Quadriscutella*. Accordingly, we propose ***Punctiscutella*** gen. nov., with the type species *Punctiscutella punctata* (Bock & Cook, 1993).

On the basis of these four genera, we propose a new family, Phorioppniidae (Oligocene-Holocene), distributed from New Caledonia and the Kermadec Ridge to the Challenger Plateau (New Zealand) and southeastern Australia.

Phorioppnia cookae is named for Patricia L. COOK (Research Associate, The Museum of Victoria, Melbourne) in recognition of her outstanding contribution to a knowledge of Bryozoa.

Phorioppnia nova sp. nov.

Figs 60-61

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 38, 360 m.

TYPES. — *Holotype*: a single stem from BIOCAL Stn DW 38, 22°59.74'S, 167°15.31'E, 360 m, MNHN-Bry 20056.

Paratype: MNHN-Bry 20054, from the same locality as the holotype.

DESCRIPTION. — Colony erect, rod-like, 0.8-0.9 mm diameter, the zooids arranged in 6 series, each series slanting slightly obliquely in a clockwise direction up the stem. Zooids 0.73-1.07 mm long and 0.39-0.66 mm wide; frontal shield mostly evenly, though sparsely, pseudoporous, the areolae about the same size as the pseudopores and distributed as in *P. cookae*, the lateral rims raised slightly. Orificial characters as for *P. cookae*, except for smaller dimensions. Ovicells not present.

DISTRIBUTION. — New Caledonia: northern Norfolk Ridge southwest of the Île des Pins, 360 m.

REMARKS. — Although infertile, the single fragment of this species very closely resembles *P. cookae*, even in the way the longitudinal series of zooids trends gently clockwise up the stem (in contrast to those of *Oppiphorina*, for example). The zooids of *P. nova* are smaller than those of *P. cookae*, however; postancestrular zooids (the only ones available in the limited material of *P. nova*) do not overlap in zooidal length, and scarcely overlap in zooidal width.

Genus ***OPPIPHORINA*** nov.

TYPE SPECIES. — *Hippoporina epaxia* Gordon, 1984.

DIAGNOSIS. — Colony erect, rod-like, non-articulated, from an encrusting base; the direction of zooidal budding producing longitudinal rows trending anticlockwise up the stem. Zooids with an evenly pseudoporous frontal shield and slightly elevated interzooidal ridges. Orifice with a broad rounded poster barely delimited from the anter by a pair of weak condyles. No oral spines. No avicularia. Ovicells subimmersed but prominent, more or less evenly perforated and resembling the zooidal cryptocyst, closed by the zooidal operculum.

Oppiphorina epaxia (Gordon, 1984)

Figs 62-64

Hippoporina epaxia Gordon, 1984: 76, pl. 25 C-D.

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 66, 515 m.
BIOGEOCAL: stn DW 253, 310-315 m.

DISTRIBUTION. — New Zealand: Raoul and Curtis Islands (Kermadec Ridge), 18-440 m. New Caledonia: South Loyalty Basin and northern Norfolk Ridge, 310-515 m.

REMARKS. — A new genus is introduced here for *Hippoporina epaxia* Gordon, 1984, distinguished from *Hippoporina sensu stricto* by the 'pseudoporous' ectooecium and erect rod-like growth. *Oppiphorina epaxia* begins life as an encrusting colony of ramifying biserial 'runners'; zooids in the encrusting phase can produce ovicells (GORDON, 1984). In contrast to *Phorioppnia*, zooidal orifices are not dimorphic and the direction of zooidal budding is such that the longitudinal rows slant slightly obliquely anticlockwise up the stem. *Oppiphorina epaxia* resembles *Punctiscutella punctata* (see above) in zooidal and ovicellular characters, but lacks the branch-site kenozooids and articulations of that genus and species.

Hippoporina powelli Gordon, 1989a may possibly be included in *Oppiphorina*, but until ovicells are found in this species the generic attribution remains uncertain.

Oppiphorina is an anagram of *Hippoporina*.

Family, genus and species indet.

Fig. 65

MATERIAL EXAMINED. — **New Caledonia**. BIOGEOCAL: stn KG 275, 1959 m.

DESCRIPTION. — Colony erect, rod-like, the stem quadriserial, more or less circular in cross section. Zooids large, weakly calcified and fragile, 1.07-1.13 mm long and 0.32-0.42 mm wide, alternating in back-to-back pairs; frontal shield convex, the surface somewhat tubercular and imperforate except for a broadly transversely crescentic band of pores across the middle of the shield. Evidently a pair of similar-sized areolar pores proximally, and 1-2 such pores along each lateral margin. Orifice relatively large, subcircular, the broad poster barely delimited from the anter by a pair of tiny structures at the sides of the orifice. No oral spines. No avicularia. Ovicells not seen.

REMARKS. — The sole material comprises a few tiny stem fragments. The orifice and operculum are hippoporine but it is not possible to ascribe the specimen to a family with any certainty.

Family PORINIDAE d'Orbigny, 1852

REMARKS. — The relationships of the family Porinidae to other lepralioid ascophorines is uncertain. Although porinids are characterised by erect colonies of spiraminate zooids, the family is currently best accommodated in the superfamily Schizoporelloidea. Frontal shields of porinids are pseudoporous, with the pores completely penetrating the shield, as in schizoporellids. The ovicells also appear similar, insofar as the outer layer of ovicellular calcification resembles that of the frontal shield with which it is continuous. Two other families, the Margarettidae and Siphonicytaridae, have a similar colony form and have ascopores that externally resemble the spiramina of porinids. The Porinidae appear to be related more closely to the former of these two families, which shares a similar type of frontal shield. Overall, the Porinidae and Margarettidae have more in common with schizoporelloidean families like Tetraplariidae and Phorioppniidae than the Siphonicytaridae, which have only a marginally areolate frontal shield and, though lepralioid, are constructed more like the umbonuloid family Tessaradomidae.

Genus *HASWELLIPORINA* nov.

TYPE SPECIES. — *Haswellina multiaviculata* Gordon, 1984.

DIAGNOSIS. — Colony erect, branching, from a small encrusting base that includes at least a few autozooids, no rootlets. Branches cylindrical, the zooids quincuncial or regularly whorled, with both peristomes and spiramina tubular and projecting. Frontal shield externally not regularly pseudoporous, the pores tending to be small, and denser near the zooidal margins. Primary orifice with weak, rounded sinus. Small scattered avicularia associated with frontal shields and peristomes. Ovicells peristomial, somewhat concealed but detectable externally as bulges. Pore-chambers tubular, especially axially.

REMARKS. — A new genus is established here for *Haswellina sensu* GORDON (1984). *Haswellina* Livingstone, with type species *Myriozoum australiensis* Haswell, 1881, was interpreted by UTTLEY (1956) to be both generically and specifically distinct from *Spiroporina vertebralis* Stoliczka, 1865 and GORDON (1984) followed him in this. Previously, CANU (1913), BASSLER (1935), and BROWN (1952) among others, synonymised *S. vertebralis* and *M. australiensis*. UTTLEY (1956) rejected this synonymy, treating *Spiroporina* as a junior synonym of *Porina* d'Orbigny, 1852, but retaining *Haswellina* as a genus of Schizoporellidae. BROWN's (1952) concept of *Spiroporina* was based, not on STOLICZKA's (1865) Miocene species, but on Recent New Zealand species belonging to *Galeopsis* Jullien *in* JULLIEN & CALVET, 1903 (see GORDON 1984). It is now clear that UTTLEY (1956) made the same error concerning *Haswellina*.

Thanks to the courtesy of Dr Norbert VÁVRA, the opportunity was taken to examine the type specimen of *Spiroporina vertebralis* Stoliczka, held at the Naturhistorisches Museum, Vienna. Non-type specimens of *Porina gracilis* (Lamarck) (courtesy of the late Shane PARKER, South Australian Museum, Adelaide) and of so-called *Haswellina australiensis* (Haswell) (courtesy of Mary Spencer Jones, Natural History Museum, London) were also examined. The conclusions from this examination are:

1. *Spiroporina vertebralis* and *Haswellina australiensis* are not conspecific, as UTTLEY (1956) rightly asserted, but they are congeneric. The latter species differs primarily in that the peristomial avicularia occur only on the projecting proximal rim; in *S. vertebralis* the rim scarcely projects and the avicularia occur around the entire rim.

2. *Spiroporina* Stoliczka, 1865 may be considered a synonym of *Porina* d'Orbigny, 1852, as BROWN (1958) rightly concluded. *Spiroporina* differs only in having zooids in whorls - in every other respect the genera are identical. BROWN (1958) went so far as to reduce *S. vertebralis* to a subspecies of *Porina gracilis*. In our opinion, *Porina vertebralis* and *P. australiensis* may be considered full species.

3. There still remain, however, species that resemble *Porina* but present a distinct "facies". For these species a new genus, *Haswelliporina*, is established here. The most immediately obvious, though variable, distinction is that of pseudopore size and density, so that *Haswelliporina* zooids appear less obviously porous that those of *Porina* in which they are coarser and more evenly distributed. Also, in *Haswelliporina* both the peristomes and spiraminal pores are tubular and projecting, with only a few avicularia in the actual peristomial rim, and the colony base is slightly more extensive, incorporating encrusting autozooids, than we have seen in *Porina* species.

Apart from the type species, the following species are here included in *Haswelliporina*: *Haswelliporina quinaria* sp. nov., *Haswellina vaubani* d'Hondt, 1986, *Spiroporina brevitubulata* Harmer, 1957, *S. venusta* Harmer, 1957.

Haswelliporina multiaviculata Gordon, 1984

Fig. 66

Haswellina multiaviculata Gordon, 1984: 74, pl. 25, A; 1985: 177, fig. 27.

MATERIAL EXAMINED. — **New Zealand**. N.Z. Oceanographic Institute: stns K795, southern Kermadec Ridge, 350 m, and K840 (*holotype* slide H-273), near Macauley Island, 398-412 m.

New Caledonia. BIOCAL: stn DW 08, 435 m. — Stn DW 33, 675 m. — Stn DW 51, 700 m. — Stn DW 66, 515 m. — Stn DW 70, 965 m. — Stn CP 75, 825 m. — Stn CP 108, 335 m. — Stn CP 109, 495 m.
MUSORSTOM 4: stn DW 151, 200 m. — Stn DW 220, 505-550 m.
CHALCAL 2: stn DW 81, 311 m.
BIOGEOCAL: stn CP 232, 760-790 m.
MUSORSTOM 6: stn DW 405, 520 m. — Stn CP 465, 480 m.
SMIB 4: stn DW 37, 540 m.

DESCRIPTION. — Colony erect, dendroid, attaining > 22 mm in height and > 17 mm lateral spread (as indicated by the largest specimens in the collection). Stems up to 2.5 mm thick at the base; branch tips are 0.5 mm minimum diameter, with zooids arranged in quincunx in 6 longitudinal series. Zooids ~0.74-0.88 mm long and ~0.56 mm wide, the frontal shield relatively smooth, moderately perforated by pseudopores, with no clear boundaries between zooids. Zooidal peristomes up to 0.49 mm long, generally shorter, with an internal peristomial diameter of 0.094-1.13 mm; the spiraminal opening as a short tube ~1.32-0.30 mm proximal to the base of the peristome where it curves into the frontal shield. Primary orifice suborbicular, a little wider (0.11) than long. Adventitious avicularia common, of 2 kinds - tiny sessile or papilliform subcircular ones (occasionally borne at the tips of long projections), and larger ones (~0.13 -0.15 mm) with long acute rostra; both kinds may occur on the peristomes, with 2-3 set into or just below the rim. Ovicells peristomial, appearing externally as a bulge in the frontal shield distal to each fertile peristome.

DISTRIBUTION. — New Caledonia: D'Entrecasteaux Reefs to Loyalty Islands and northern Norfolk Ridge, 311-965 m. New Zealand: Kermadec Ridge, 350-412 m; Three Kings Islands, 205-516 m.

REMARKS. — There are numerous colonies and fragments in the MUSORSTOM samples, giving a more complete picture of the characters of this species than indicated in the limited New Zealand material, hence a full description is given above. There are some differences in the New Caledonian material - zooids are a little larger overall with longer peristomes, and the distance between the spiraminal opening and peristome base greater than in the Kermadec specimens. On the other hand, orificial width, length of the larger avicularia, and internal diameters of zooids and peristomes are the same in the New Caledonian and Kermadec populations. We therefore conclude that they are conspecific. *Haswelliporina multiaviculata* has a similar surface appearance to *H. brevitubulata* (Harmer) which, however, lacks acute-mandibled avicularia.

Haswelliporina vaubani (d'Hondt, 1986)

Figs 67-68

Haswellina vaubani d'Hondt, 1986: 729, pl. 1, figs 5-6.

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 38, 360 m.
MUSORSTOM 4: stn DW 185, 235 m.

DESCRIPTION. — Colony erect, branching, the branches in the present material 6-serial, 0.75-0.87 mm diameter, some curving outwards and upwards. Zooids whorled, the length of each zooid (0.69-0.75 mm) equivalent to the distance between whorls, the maximum external width of each zooid being the branch circumference divided by the numbers of whorls (i.e., 0.39-0.46 mm wide). Frontal shield perforated by numerous small pseudopores, often in small sulci, that penetrate the innermost thin layer of calcification surrounding the zooidal coelom. Zooidal peristomes tubular, projecting 0.18-0.35 mm from the zooidal surface, the internal diameter 0.13-0.15 mm; at the base of the peristome a short tubular spiramen. Peristomial rim incorporating 2-3 tiny acute avicularia with complete crossbar; similar avicularia occur sparsely on the frontal shield, along with occasional larger spatulate avicularia directed proximally. Zooidal pore-chambers tubular, most obviously expressed axially in cross-sections and at growing tips.

DISTRIBUTION. — New Caledonia: d'Entrecasteaux Reefs, 235-460 m.

REMARKS. — The present material adds to the description given by D'HONDT (1986), who described material with larger zooids in only four series. It is superficially similar in external appearance to *H. multiaviculata* but may easily be distinguished by its whorled zooids and spatulate adventitious avicularia.

Haswelliporina quinaria sp. nov.

Figs 69-70

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3: stn DR 117, 97-92 m.
New Caledonia. MUSORSTOM 4: stn DW 185, 235 m.
MUSORSTOM 6: stn CP 419, 283 m. — Stn DW 421, 245 m.

TYPES. — *Holotype*: a single dried colony from MUSORSTOM 6 Stn CP 419, 20°41.65'S, 167°03.70'E, 283 m, MNHN-Bry 20010.
Paratypes: MNHN-Bry 19965, 19966, 20109, all from the same locality as the holotype. — MNHN-Bry 20106, from MUSORSTOM 3 Stn DR 117, 12°31.3'N, 120°39.5'E, 97-92 m.

DESCRIPTION. — Colony erect (the largest colony 19 mm high), with cylindrical stems dichotomously branching at irregular intervals and angles (frequently at right angles), stem diameter between zooidal peristomes 0.45-0.70 mm (depending on the number of zooids in each whorl) in younger parts of branches, thickening to ~1.15 mm near the base of the colony. Zooids generally arranged in whorls of 5, sometimes 4 (especially for ovicelled zooids), or even 3, the zooids in each whorl alternating with those above and below; zooids ~0.84-0.96 mm long and ~0.35 mm wide. Frontal shield lepralioid, the inner face evenly perforated, the pore diameter greater in the innermost skeletal layer; externally initially relatively smooth and sparsely perforated with tiny pseudopores, with a single row of slightly larger areolar pores along the common interzooidal furrow; becoming more densely porous and lacking interzooidal boundaries in older zooids. Primary orifice subpyriform, longer (0.14 mm) than wide (0.10 mm), with no clear distinction between anter and poster owing to a lack of condyles. Peristome initially a low ridge encircling the primary orifice, with longitudinal ridges on its inner face; becoming very long (up to 0.49 mm along the dorsal side) and tubular, typically with 3 evenly spaced small acute-mandibled avicularia, apically directed, in the peristomial rim; maximum rim diameter (including avicularia) 0.25 mm. At the base of the peristome, on its proximal side is a short-tubed circular spiramen. Tiny adventitious avicularia, frequently papilliform, occur sparsely on the frontal shield and the side of the peristomial tube, each with an acute rostrum and complete cross-bar. Ovicells peristomial, visibly externally as densely perforated bulges distal to each of the zooidal peristomes in the same whorl.

DISTRIBUTION. — Philippines: Mindoro Strait, 92-97 m. New Caledonia: north of the Belep Islands and between Ouvéa and Lifou, 235-283 m.

REMARKS. — *Haswelliporina quinaria* is very similar to *H. vaubani* (d'Hondt, 1986) discovered at 450-460 m south of the d'Entrecasteaux Reefs, but *H. vaubani* has zooids that attain a larger size and relatively large spatulate avicularia borne frontally. Such avicularia are absent from all of the many colonies and colony fragments of *H. quinaria* in the samples.

Haswelliporina ?venusta (Harmer, 1957)

Figs 71-73

Spiroporina venusta Harmer, 1957: 851, pl. 56, fig. 12.

MATERIAL EXAMINED. — **Philippines**. ESTASE 2: stn DR 07, 890 m.

DESCRIPTION. — Sole colony erect, branching, from a small encrusting base 5 mm diameter that is mostly kenozooidal/aviculiferous with some incorporated autozooids; maximum length of colony 12 mm. Main stem and branches thick throughout - ranging from 1.96 mm above the base to a minimum thickness of 1.39 mm. Zooids

not whorled; zooid length and width difficult to determine externally; zooidal internal diameter maximally 0.34 mm. Frontal shield with small, scattered pseudopores of which some are in short, thin sulci. Zooidal peristomes extending not more than 0.30 mm from frontal surface, the rim relatively thin when new, with c. 3 tiny oval avicularia set below the rim; internal diameter of peristome 0.15 mm. Spiramen opening c. 0.15-0.19 mm proximal to the base of the peristome, on a slight eminence, not a tubular projection. Avicularia of two sizes: small oval avicularia about the same diameter as the spiramen opening (c. 0.047-0.056 mm), and larger oval/subspatulate avicularia 0.13-0.19 mm long, both kinds with a complete crossbar and well-developed palate. Ovicells not detected.

DISTRIBUTION. — Indonesia: near Halmahera, 1089 m. Philippines, 890 m.

REMARKS. — HARMER's (1957) description was based on a sole fragment, mostly comprising the small encrusting base. As a consequence (and because the sole holotype specimen cannot be borrowed), it is not possible to be certain of conspecificity with the Philippine specimen which is further developed. Importantly, both specimens have the same two kinds of avicularia, of the same form and dimensions, and the distance between the spiramen opening and the base of the peristome is the same. In contrast, the internal diameter of the peristome in the Indonesian specimen, as measured from HARMER's illustration, is only c. two-thirds that of the Philippine one.

Genus *MOSAICOPORINA* nov.

TYPE SPECIES. — *Porina tricephala* Gordon, 1985.

DIAGNOSIS. — Colony branching, erect and cylindrical or repent and uniserial. Zooidal frontal shield perforated by small pseudopores, the surface minutely mosaic-like and with scattered papillae, some of which may be aviculiferous. Peristomes long, incorporating the spiraminal tube, the peristomial rim with tiny kenozooids and/or avicularia. Primary orifice with sinusoid poster. Ovicell presumed to be peristomial.

Mosaicoporina uniserialis sp. nov.

Figs 74-75

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 66, 515 m.

TYPE. — *Holotype*: unique colony fragment from BIOCAL Stn DW 66, 24°55.43'S, 168°21.67'E, 515 m, MNHN-Bry 20107. No separate paratypes.

DESCRIPTION. — Colony repent, branching and uniserial, raised above the substratum by conical extensions of the basal wall beneath the peristomial area, each zooid producing at least 2 daughter zooids (sometimes 4) by distal budding. Zooids long (0.94-1.23 mm), nearly parallel-sided and 0.37-0.40 mm wide. Frontal shield sparsely but evenly perforated by small pseudopores, the surface (including the basal surface) minutely but distinctively mosaic-like, with flattened polygonal areas delimited by a shallow network of grooves; scattered papillae occur frontally and laterally, but not basally. Zooidal peristome fairly long (up to 0.6 mm), flaring a little at the rim, the internal transverse diameter at the rim up to 0.15-0.18 mm; spiraminal tube incorporated into the peristome and opening at the rim; the rim edge with up to 8 holes, evidently representing the tiny chambers of kenozooids. Primary orifice with a sinusoid poster; no condyles. Avicularia not apparent. Ovicells not present.

DISTRIBUTION. — New Caledonia: northern Norfolk Ridge, 515 m.

REMARKS. — A new genus is introduced here for two species of Porinidae that are characterised by the distinctive minutely mosaic surface of the frontal shield as well as the incorporation of the spiraminal tube into the peristome. The type species, known only from a single station north of Raoul Island on the Kermadec Ridge, is

semi-erect, with triserial branches fusing with the substratum wherever they come into contact with it. The colony of *M. tricephala* occurs on small calcareous fragments; early astogeny results in an erect stem attached directly to the substratum with neither rootlets nor lateral spread of encrusting zooids. The unique holotype colony of *M. uniserialis* is not affixed to a substratum, so the method of attachment is unknown.

Genus *SEMIHASWELLIA* Canu & Bassler, 1917

TYPE SPECIES. — *Porina proboscidea* Waters, 1889.

Semihaswellia umbrella sp. nov.

Figs 76-77

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 08, 435 m.
BIOGEOCAL: stn CP 260, 1820-1980 m.

TYPES. — *Holotype*: fragment of a fertile colony from BIOCAL stn DW 08, 20°34.35'S, 166°53.90'E, 435 m, MNHN-Bry 20111.
Paratype: an infertile colony from the same locality, MNHN-Bry 19964.

DESCRIPTION. — Colony erect and branching (maximally 7-8 mm high in the present material), the single stem attached directly to the substratum without rootlets or basally encrusting zooids, the top of the stem with four branches arising near each other, curving outwards in half umbrella-like fashion, the zooids opening on the lower face. Stem 1.37-1.51 mm diameter, the branches 1.09-1.23 mm diameter, the zooids arranged in 2-3 longitudinal series. Zooids very large, 1.50-2.76 mm long and 0.66-0.94 mm wide, the frontal shield lepralioid, the outer surface densely granular with sparse pseudopores and slightly larger areolar pores along the interzooidal furrows. Zooidal peristomes very prominent, up to 1.36 mm long (generally shorter), with flaring circular rims 0.47-0.57 mm external diameter, the internal peristomial diameter 0.20-0.34 mm; outer surface of peristomial tube granular, with low longitudinal ridges that continue onto the rim giving it a slightly corrugated appearance. Spiraminal tube prominent, extending to 0.38 mm long, with a circular opening 0.094-0.113 mm internal diameter. Primary orifice with a sinusoid poster and no condyles, 0.28-0.34 mm wide. Ovicell fairly prominent, subglobular, 0.72 mm wide, occurring behind the peristome and opening into it.

DISTRIBUTION. — New Caledonia: Loyalty Islands, 435-1980 m.

REMARKS. — It is not certain if the colony fragment from BIOGEOCAL station CP 260 belongs to this species. It has the same overall branch and zooidal dimensions; however, the branching is somewhat more open and there are avicularia, which are lacking in the type specimens. The avicularia are subcircular with a broadly triangular rostral area and delicate cross-bar. They occur singly adjacent to some of the spiramina.

Semihaswellia is a little-known genus. Apart from the type species (*S. proboscidea*), there are currently two nominal Recent species (*S. sinuosa* Canu & Bassler, 1928: Gulf of Mexico; *S. sulcosa* Canu & Bassler, 1930: Galápagos) and three nominal fossil species (*S. exilis*, *S. tripora*, and ?*S. clara* - all species of CANU & BASSLER, 1920 from the Paleogene of North America). With the exception of *S. sulcosa*, it is likely that none of them is congeneric with the type species, but all need thorough study using modern techniques. *Semihaswellia proboscidea* was collected at 823 m depth off St Thomas in the U.S. Virgin Islands by the *"Challenger"* Expedition. It has not been collected since. Scanning electron micrographs (courtesy of Mr P.J. CHIMONIDES, The Natural History Museum, London) show that the New Caledonian material is unquestionably congeneric. The specimen from BIOGEOCAL Stn CP 232 resembles the *"Challenger"* material even more closely in having avicularia; these, however, do not occur dorsally, as in *S. proboscidea* (according to WATERS, 1899), and occur closer to the spiramen.

Family ACTISECIDAE Harmer, 1957

Genus *ACTISECOS* Canu & Bassler, 1927

TYPE SPECIES. — *Actisecos regularis* Canu & Bassler, 1927.

Actisecos regularis Canu & Bassler, 1927

Figs 78-81

Actisecos regularis Canu & Bassler, 1927: 11, pl. 1, fig. 13. — CANU & BASSLER, 1929: 517, pl. 66, figs 1-4, text-fig. 215. — HARMER, 1957: 856, pl. 60, figs 12, 16. — COOK, 1966: 208.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3: stn DR 117, 97-92 m.

DISTRIBUTION. — Philippines, 84-104 m. Indonesia, 82-88 m.

REMARKS. — The affinities of the Actisecidae are not clear. Superficially, the zooids, their orifices, and peristomes resemble those of some species of *Exechonella*, and HARMER (1957) described the operculum as 'membraniporine'. An ultrastructural examination was made of the interior of the frontal shield in the present material to ascertain whether or not it is umbonuloid. Apart from a faint line indicating a ring scar, there is no convincing trace of umbonuloid microstructure. The genus and family are provisionally included in the superfamily Schizoporelloidea until more information is forthcoming.

HARMER (1957) described the ancestrula as somewhat conical, which it is in the present material. The orifice is subcircular, with a median cusp on the proximal rim.

Family GIGANTOPORIDAE Bassler, 1935

Genus *GIGANTOPORA* Ridley, 1881

TYPE SPECIES. — *Gigantopora lyncoides* Ridley, 1881.

Gigantopora oropiscis sp. nov.

Figs 82-83

[?]*Gigantopora polymorpha* - GORDON, 1984: 78, pl. 26, D. Non Busk, 1884.

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 38, 360 m.
New Zealand. N.Z. Oceanographic Institute, NIWA, unregistered slide of material from NZOI Stns K826, K828, K840, northern Kermadec Ridge, 390-490 m.

TYPE. — *Holotype*: unique specimen from BIOCAL Stn DW 38, 22°59.74' S, 167°15.31' E, 360 m, MNHN-Bry 20031. No separate paratypes.

DESCRIPTION. — Colony erect, presumably from an encrusting base, the unique holotype specimen comprising a single stem 7.8 mm long and 2.09 mm diameter (including projecting peristomes), the zooids arranged in 4-5 longitudinal series. Zooids large, 0.94-1.34 mm long (measured from one proximal corner to the proximal edge of the avicularium on the same side) and 0.67-0.96 mm wide, the lateral rims slightly thickened and raised. Frontal shield evenly perforated by pseudopores in the proximal half, tending to imperforate and minutely

tubercular suborally. Primary orifice subcircular, ~0.21 mm diameter, the poster about one-third the length, delimited from the anter by small condyles. Peristomial complex conspicuous, comprising a frontally very broad bridge with a surface of small tubercles; at each side of the peristomial bridge is an avicularium - each is somewhat frontally directed, toward the apex of the peristome, with an acute rostrum and complete cross-bar, a narrow palatal cleft continuing under the cross-bar; externally, the avicularian chamber has several pores frontolaterally; between the proximal edge of the peristome and the frontal shield is a subhemispherical spiramen that is little seen when zooids are viewed *en face*. Ovicell somewhat recumbent on the distal zooid, with a relatively thick bounding rim; the skeletal surface tubercular and imperforate centrally, but with a number of pores peripherally.

DISTRIBUTION. — New Caledonia: northern Norfolk Ridge southwest of the Île des Pins, 360 m. New Zealand: northern Kermadec Ridge, 390-490 m.

REMARKS. — The present material is distinguished from other species of *Gigantopora* in the southwest Pacific by the broad frontal extent of the peristomial bridge that largely conceals the spiramen when zooids are viewed *en face*, as well as by details of the avicularia and ovicell. The New Caledonian specimen resembles infertile encrusting New Zealand material from the northern Kermadec Ridge mistakenly attributed by GORDON (1984) to *Gigantopora polymorpha* (Busk). The Kermadec material resembles *G. oropiscis* in zooidal and orificial dimensions, in the lack of a non-protruding spiraminal rim, and in the general appearance of the zooids and peristomial orifice. The frontal extent of the peristomial bridge is proportionately not as great as in the New Caledonian specimen; also the avicularian palatal cleft is mostly quite open in the Kermadec zooids, except for one zooid in which it is as narrow as in *G. oropiscis*. On balance, we conclude that the Kermadec specimens are probably conspecific, and reflect differences between zooids in encrusting and erect parts of colonies. Only the finding or more material from both areas will settle the matter.

The species name, *oropiscis*, is derived from the Latin *os*, *oris*, mouth, and *piscis*, fish, alluding to the resemblance of the peristomial orifice to the gaping mouth of a fish.

Family MICROPORELLIDAE Hincks, 1879

Genus *MICROPORELLA* Hincks, 1877

TYPE SPECIES. — *Eschara ciliata* Pallas, 1766.

Microporella lineata Canu & Bassler, 1929

Microporella lineata Canu & Bassler, 1929: 332, pl. 40, fig. 5. — GORDON, 1984: 102, pl. 39, A.

MATERIAL EXAMINED. — **New Caledonia**. CHALCAL 2: stn DW 72, 527 m.

DISTRIBUTION. — Philippines, near Luzon, 192 m. New Caledonia, northern Norfolk Ridge, 527 m. New Zealand, Kermadec Ridge, 140-500 m.

REMARKS. — This is only the third record of this species, which extends from 13°20'N to 33°02'S, and 192-527 m. It is easily distinguished by its uniserial colony form.

Microporella sp.

Figs 84-88

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 6: stn DW 431, 21 m.

DESCRIPTION. — Colony encrusting. Zooids 0.33-0.42 mm long and 0.22-0.28 mm wide, the frontal shield evenly distributed with small tubercles and pseudopores. Orifice with a smooth proximal rim and 6 oral spines.

Ascopore denticulate, non-reticulated. Avicularia single, originating adjacent to the ascopore but appearing more proximally when ontogeny is complete, almost at the half-way point near the lateral margin and directed laterally. Ovicell not encountered.

DISTRIBUTION. — New Caledonia: west of Ouvéa Island, 21 m.

REMARKS. — This species is represented by a single tiny ancestrulate colony occurring on *Reteporella orstomia* sp. nov. It greatly resembles the specimen illustrated by GORDON (1984) from the Kermadec Ridge that was attributed to *Microporella ciliata*. This species, which has been accorded a wide distribution around the world is, however, unlikely to be found beyond ports and harbours in the Australasian region. Both the Kermadec and Ouvéa specimens were infertile. It is likely that, when fertile material of this species is found, it will provide evidence that this represents a new species.

It is interesting to note that in newly developed zooids the pseudopores are reticulate, as in *Fenestrulina*. The proximal rim of the orifice may also have minute irregularities, but these denticulations are smoothed over as ontogeny is completed.

INCERTAE SEDIS

Family CALWELLIIDAE MacGillivray, 1887

Genus *ICHTHYARIA* Busk, 1884

TYPE SPECIES. — *Ichthyaria oculata* Busk, 1884.

Ichthyaria simplex sp. nov.

Figs 228-230

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DS 98, 2365 m.
BIOGEOCAL: stn CP 260, 1820-1980 m. — Stn KG 261, 1508 m. — Stn CP 273, 1920-2040 m. — Stn KG 275, 1959 m. — Stn KG 287, 1560 m. — Stn DW 313, 1640-1600 m. — Stn CP 317, 1630-1620 m.

TYPES. — *Holotype*: an alcohol-preserved, ovicelled, incomplete colony (ancestrula and rootlets lacking) from BIOGEOCAL Stn DW 313, 20°58.95'S, 166°59.04'E, 1640-1600 m, MNHN Bry-19991.

Paratypes: two small colonies in the same container as the holotype and from the same locality, MNHN Bry-19994; other colonies from BIOCAL Stn DS 98, 21°24.10'S, 166°29.76'E, 2365 m, MNHN Bry-19995; BIOGEOCAL Stn CP 260, 21°00.00'S, 167°58.34'E, 1820-1980 m, MNHN Bry-19992; BIOGEOCAL Stn KG 287, 20°43.01'S, 166°52.53'E, 1560 m, MNHN Bry-19993.

DESCRIPTION. — Colony erect, unilaminar and biserial, unbranched, exceedingly delicate and flaccid, to 8 mm high, not including rhizoids, maximum width 0.80 mm and a thickness of c. 0.17 mm. The sides of the colony more or less parallel except where it tapers proximally towards the ancestrula. Zooids alternating, 0.77-1.16 mm long and 0.37-0.39 mm wide, increasing in length along the colony distally, with a high-arched orifice that has a straight proximal rim. Distal to the orifice is a median short stumpy, non-articulated spine flanked by a pair of septular pores on each side. The septular pores continue along the lateral margins, connecting the visceral and hypostegal coeloms. Proximal to the orifice is a pair of windows in the frontal calcification; these may be unequal, or even single in zooids near the ancestrula. Presumed ascopore large, open, off-centre. At the junction where three zooids abut, 3-4 interzooidal communication pores can be seen in face view in the lateral wall, between two of the zooids, which slants at a low angle at this point. Ovicell large, recumbent on the frontal face of the distal zooid, 0.54 mm long and 0.41 mm wide, the endooecium lightly calcified, the ectooecium entirely membranous, opening widely above the zooidal operculum. Rhizoids, originating from septular pores, descend the lateral margins of the

colony on both sides, converging with those from the ancestrula to form a tangle of dichotomously forking rootlets.

DISTRIBUTION. — New Caledonia, Loyalty Basin and around Lifou, 1508-2365 m.

REMARKS. — Zooids typically have an oval hole in the frontal shield on the side adjacent to the median axis. At first it was thought these were predator bore-holes, but they appear to occur in each zooid. It is difficult to be certain but they appear to be ascopores. Certainly the suboral pores are not ascopores, being of the same construction as the lateral septular pores and occluded with tissue centrally.

Five species of *Ichthyaria* are recognised here - the type species and *I. profunda* d'Hondt, 1981 both occur in deep water off Uruguay, and *I. plana* (David & Pouyet, 1986) occurs in the western Indian Ocean. *Onchopora grimaldii* Jullien & Calvet, 1903 and *O. picoensis* Jullien & Calvet, 1903 each have a toothed crescentic ascopore but the pattern of budding is characteristic of *Ichthyaria*. Insofar as the shape of the ascopore is a variable character in microporellid genera, we regard the pattern of budding as having greater taxonomic significance and so include the two species of JULLIEN and CALVET in *Ichthyaria*, but both species need re-examining. *Ichthyaria simplex* represents the first record of the genus in the Pacific. Unusually, however, *I. simplex* has an offset oval ascopore, whereas *I. oculata* and *I. plana* have a circular ascopore (HARMER, 1902; DAVID & POUYET, 1986) and *I. profunda* has a slit-like ascopore.

The Calwelliidae are not very speciose. Five genera have been accepted in recent years (*Calwellia* W. Thomson, 1858; *Ichthyaria* Busk, 1884; *Malakosaria* Goldstein, 1882; *Onchoporella* Busk, 1884; *Onchoporoides* Ortmann, 1890) and two more are introduced below. *Onchoporoides* is monotypic and none of the others has more than five species. The genera are reasonably well circumscribed with the possible exception of *Ichthyaria* and *Onchoporoides*. The latter could be viewed as a laterally expanded *Ichthyaria*. *Onchopora plana* David & Pouyet, 1986 (here included in *Ichthyaria*, *Onchopora* being a junior synonym of *Margaretta* Gray), links the two genera. It is 2-3-serial and also has a circular ascopore. There has been some doubt over the generic allocation of *Calwellia uniserialis* Powell, 1967. GORDON (1989a) pointed out similarities with *Ichthyaria* - the species is here included in a new genus introduced below.

One other species, *Brettia ijimai* Okada, 1921, attributed by SILÉN (1941) and subsequent authors to the savignyellid genus *Halysisis*, represents a new, sixth, genus of Calwelliidae. Thanks to the courtesy of Dr Ji Eun SEO (Woosuk University, Republic of Korea), it has been possible to examine material of this species, which OKADA (1921, p. 26, text-fig. 4) illustrated very well. The species is uniserial and branching, lightly calcified, with a sinus instead of an ascopore. The presence of a pair of uncalcified windows adjacent to the sinus and a typical calwelliid ovicell (i.e., calcified endooecium and membranous ectooecium) give evidence of a calwelliid affinity. For this species, which ranges from Korea through Japan to the Bonin (Ogasawara) Islands, we propose the new generic name *Ijimaia*, and the new combination *Ijimaia ijimai* (Okada).

Genus ***WRIGIANA*** nov.

TYPE SPECIES. — *Wrigiana strepsis* sp. nov.

DIAGNOSIS. — Colony erect, dichotomously branching, jointed, anchored by rootlets. Zooids with a narrow caudate portion proximally; strictly biserial in internodes and budded more or less back to back, but the dilated part of the zooid may be skewed so that the zooids in a branch face more or less in the same direction. Orifice semicircular, with short oral tubercles, and suboral foramina and an ascopore. Ovicell conspicuous, opening above the operculum, the ectooecium entirely membranous.

Wrigiana strepsis sp. nov.

Figs 231-233

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4: stn DW 185, 235 m.

TYPES. — *Holotype*: an alcohol-preserved colony 11 mm high, from MUSORSTOM 4 Stn DW 185, 19°06.20'S, 163°29.50'E, 235 m, MNHN Bry-19960. No other types.

DESCRIPTION. — Colony erect, dichotomously branching, jointed, anchored by rootlets, attaining 11 mm height and 12 mm lateral spread. Zooids 0.67-1.14 mm long (including cauda, 0.07-0.41 mm long) and 0.20-0.23 mm wide, somewhat claviform in shape with a tapering caudal portion. Zooids biserial, arranged more or less back to back, with the proximal half or more of each zooid base attached to the dorsal side of its parent, but the zooids often skewed so as to face somewhat in the same direction, though this is variable. New branches originate with a single zooid that has a very short caudal portion and chitinous joint proximally. This zooid originates behind the orifice or on a distolateral shoulder of the parent zooid. The second zooid of a branch is budded back-to-back from the first via a long caudal portion attached to almost the entire proximal half of the parent zooid. Both the parent and first daughter zooids of a branch bud zooids distally, re-establishing branch biseriality. Orifice semicircular, high-arched, with 4 distal spine-like tubercles; suborally, a pair of foramina and a median ascopore. Ovicell conspicuous, c. 0.33 mm long and 0.32 mm wide, the entooecium with longitudinal striations, the endooecium entirely membranous.

DISTRIBUTION. — New Caledonia, east of the Belep Islands, 235 m.

REMARKS. — It is clear that *Calwellia uniserialis* Powell, 1967 belongs to this genus. As POWELL (1967) pointed out, although the branches appear uniserial, each zooid has a tubular caudal portion that occurs along the dorsal side of the alternate zooidal dilatation to insert on the zooid below. Zooids in the branches face the same way, adding to the impression of uniseriality. *Wrigiana uniserialis* (Powell) comb. nov. is known only from 549 m depth in the vicinity of the Three Kings Islands, New Zealand, thus the genus ranges from the Belep Islands to the Three Kings Islands.

In having a narrow caudal portion to the zooid, *Wrigiana* resembles *Calwellia* which, however, has zooids arranged back to back in regularly alternating decussate pairs. The name *Wrigiana* is derived from the Anglo-Saxon noun *wrigian*, turn, twist, wry, alluding to the frequent skewing of the zooidal dilatation. The name of the type species, *strepsis*, is a Greek feminine noun meaning a turning or twisting.

Genus *ONCHOPOROIDES* Ortmann, 1890

TYPE SPECIES. — *Carbasea moseleyi* Busk, 1884.

Onchoporoides moseleyi (Busk, 1884)

Carbasea moseleyi Busk, 1884: 56, pl. 33, fig. 4. — LEVINSEN, 1909: 75, 264.
Flustra moseleyi - JELLY, 1889: 102.
Onchoporoides moseleyi - ORTMANN, 1890: 12. — GORDON, 1989a: 64, pl. 35 A (*cum syn.*).

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 70, 965 m.
BIOGEOCAL: stn CP 265, 1760-1870 m. — Stn CP 272, 1615-1710 m. — Stn KG 316, 1660 m.

DISTRIBUTION. — New Caledonia and northern Norfolk Ridge, 965-1870 m; New Zealand (Kermadec Ridge to Solander Trough), 526-2677 m.

REMARKS. — The specimen from BIOGEOCAL Stn KG 316, Loyalty Basin, is the northernmost record of this monotypic genus, of which the type locality is the Kermadec Ridge northwest of Macauley Island.

Family BUFFONELLODIDAE nom. nov.

DIAGNOSIS. — Colony encrusting. Zooids with an imperforate frontal shield. Orifice with a median sinus or broad poster; the latter may have a median convexity. Avicularium adventitious, single, borne suborally or

frontally on the shield, the crossbar complete. Ovicell with a smooth imperforate endooecium and membranous ectooecium.

REMARKS. — A new family name is introduced here to replace the Buffonellidae Jullien, 1888, based on *Buffonella* Jullien, 1888, preoccupied by *Buffonella* Keferstein, 1868 (Amphibia). The Buffonellodidae is related to the Lacernidae Jullien, 1888 (see PARKER & GORDON, 1992), from which it differs in lacking frontal-shield pores, and possibly the Eminooeciidae Hayward & Thorpe, 1988, which differs in ovicellular and other details. Included genera are *Aimulosia* Jullien, 1888, *Buffonellodes* Strand, 1928, *Ipsibuffonella* gen. nov. (see below), and *Maiabuffonella* gen. nov. (type species *Buffonellodes madrecilla* Gordon, 1989a, characterised by a personate ovicell and laterofrontal avicularium).

Genus ***BUFFONELLODES*** Strand, 1928

TYPE SPECIES. — *Buffonella rimosa* Jullien, 1888.

Buffonellodes crosnieri sp. nov.

Figs 1, 89-90

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 33, 675 m.

TYPES. — *Holotype*: an encrusting colony on a piece of bivalve shell from BIOCAL Stn DW 33, 23°09.71'S, 167°10.27'E, 675 m, MNHN-Bry 20191; gold-coated.

Paratypes: parts of the same colony, MNHN-Bry 20179, uncoated.

DESCRIPTION. — Colony encrusting, somewhat linear in form, with a pluriserial lobe extending outward from the ancestrular region on each side. Ancestrula occluded in present material but evidently had a small opesia encircled by spines, 0.37 mm long and larger overall than the two immediately succeeding daughter zooids (one middistal, the other extending laterally to the right of where the ancestrula and other daughter zooid join) which range from 0.30-0.32 mm long and 0.20-0.26 mm wide; later zooids can attain 0.75 mm long and 0.70 mm wide. Frontal shield smooth, rising to the peristome that surrounds the orifice. Interrupting the peristomial ridge distally are 3 articulated spines. Primary orifice with a median, shallow V-shaped sinus flanked by ledge-like condyles. A median suboral avicularium present, set in the peristomial rim, oval in shape with a complete crossbar, the chamber symmetrically developed from concealed septular pores on each side. Ovicell somewhat recumbent on the distal zooid, with a smooth presumed endooecium and membranous ectooecium. Small basal pore-chambers present around the distolateral margins.

DISTRIBUTION. — New Caledonia, southwest of Île des Pins, 675 m.

REMARKS. — Unlike *B. rimosa*, several species, including *B. crosnieri*, have a low peristome surrounding the orifice. *Buffonellodes crosnieri* also differs in its linear colony form, the small shallow sinus, and the triplet of oral spines.

The species is named for Alain CROSNIER, in recognition of his unstinting efforts in bringing the results of the MUSORSTOM cruises to publication.

Genus ***IPSIBUFFONELLA*** nov.

TYPE SPECIES. — *Ipsibuffonella repens* sp. nov.

DIAGNOSIS. — Colony encrusting, uni- to pluriserial. Zooidal frontal shield imperforate. Areolar pores lacking. Orifice with a broad arcuate poster, condyles scarcely developed. No peristome or oral spines. Avicularium

suboral, median. Ovicell globular, the endooecium smooth, imperforate; ectooecium membranous; ovicell not closed by zooidal operculum.

REMARKS. — *Ipsibuffonella* is established for *I. repens* sp. nov. from the northern part of the Norfolk Ridge near New Caledonia. The genus differs from *Buffonellodes* chiefly in lacking articulated oral spines and a distinct orificial sinus flanked by ledge-like condyles.

Ipsibuffonella repens sp. nov.

Figs 91-92

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 33, 675 m.

TYPES. — *Holotype*: Preserved colony from BIOCAL Stn DW 33, 23°09.71'S, 167°10.27'E, 675 m, MNHN-Bry 19971.

Paratypes: MNHN-Bry 19972 (preserved) and MNHN-Bry 20042 (dried), both from the same location as the holotype.

DESCRIPTION. — Colony encrusting, ramifying, uni- to pluriserial, seldom exceeding more than 4 zooids across. Zooids relatively long, sometimes claviform with a caudate proximal portion; 0.88-1.4 mm long, and 0.54-0.75 mm wide across the dilated portion of the zooid. Frontal shield smooth, imperforate, quite convex with the sides sloping to the interzooidal furrow or the substratum where the zooidal margin may flatten a little at the edge. No marginal areolar pores, but a tiny pair of pseudopores is associated with the avicularian umbo, 1 on either side; in transparency, the avicularium chamber is seen to originate from a tiny, concealed, uniporous septulum a little beyond each pseudopore. Orifice a little wider than long, with a broad arcuate poster; no separate condyles *per se*, the proximal edges of the distal oral rim serving as foci of articulation where they encounter the lateral corners of the poster. No oral spines. Suboral avicularium median, occurring on the distal face of an associated umbo, with a rounded rostrum and thin crossbar. Ovicell prominent, a little longer than wide, the endooecial surface smooth, imperforate, the ectooecium membranous; not closed by the zooidal operculum.

DISTRIBUTION. — New Caledonia: northern Norfolk Ridge, south of Île des Pins, 675 m.

REMARKS. — *Ipsibuffonella* differs from *Buffonellodes sensu lato* in the uniseriality of parts of the colony (hence *ipsi-*, from *ipsos*, Greek, ivy) and the particular combination of zooidal characters. For example, the type species of *Buffonellodes*, *B. rimosa* Jullien, 1888, has, by contrast, oral spines, marginal areolae, an orificial sinus, and well-developed condyles (GORDON, 1984; HAYWARD, 1991).

Several colonies occurred on the inner concave surface of a bivalve shell. Microscopic examination of several alcohol-preserved zooids by transmitted-light microscopy revealed stages of spermatogenesis in one colony; other colonies had well-developed embryos in the ovicells. The colonies were collected in the month of August (1985).

Family EMINOOECIIDAE Hayward & Thorpe, 1988

Genus *MACROCAMERA* nov.

TYPE SPECIES. — *Macrocamera erecta* sp. nov.

DIAGNOSIS. — Colony erect and rigid, dichotomously branching, the zooids facing on one side. Zooidal frontal shield imperforate, with sparse areolar pores. Orifice with a wide V-shaped poster delimited from the anter by condyles. No oral spines. Suboral avicularium present, the crossbar complete. Female zooid with somewhat wider orifice; ovicell huge, the ectooecial surface resembling the frontal shield; not closed by the zooidal operculum.

Macrocamera erecta sp. nov.

Figs 93-94

MATERIAL EXAMINED. — **New Caledonia**. CHALCAL 2: stn DW 78, 233-360 m.

TYPES. — *Holotype*: a fertile colony (preserved) from CHALCAL 2 Stn DW 78, 23°41.30'S, 167°59.60'E, 233-360 m, MNHN-Bry 19968.

Paratypes: a fertile colony (MNHN-Bry 19973) and a slide of dried branch fragments (MNHN-Bry 20029), both from the same locality as the holotype.

DESCRIPTION. — Colony erect, rigid, dichotomously branching from a short base up to 4.0 mm diameter; from the base arises a short stem ~3-4 mm high and ~2.5 mm diameter that branches outwards more than upwards, dichotomising at intervals of 2.8-4.0 mm; the branches between axils narrowing from 1.62 mm (near main stem) to 0.79 mm (outermost) diameter. Zooids in 4-7 (rarely more) longitudinal series, facing on the underside of the branches, i.e., facing the substratum. Zooids 0.47-0.68 mm long and 0.32-0.40 mm wide (range of maximum widths), the frontal shield lightly creased with short low ridges and depressions, imperforate, with up to 5 small areolar pores placed irregularly on the shield between the margins and the centre; newly formed zooids clearly delineated by thin raised lines along the interzooidal boundaries. Orifice about as wide (0.11-0.13 mm) as long, with a broad V-shaped poster separated from the anter by condyles, each with a transverse furrow. No oral spines. A median suboral avicularium present, the crossbar complete, the opesia a transverse slit, the rostral area almost an equilateral triangle the rostral foramen near-circular; directed proximally. No other avicularia. Female zooids always occurring at the extreme lateral margins of branches and facing laterally; ovicell huge, up to 0.56 mm wide and long, deep-bodied, displacing the chamber of the next zooid in the series; the calcareous surface like that of the frontal shield, the secondary calcification and outer epitheca continuous with those of the distal zooid; female orifice typically a little wider (0.13-0.15 mm) than autozooidal orifices; ovicellular opening not closed by the zooidal operculum. Abfrontal branch surface marked by thin lines (vibices) delineating zooidal boundaries.

DISTRIBUTION. — New Caledonia: northern Norfolk Ridge, 233-360 m.

REMARKS. — *Macrocamera* is established for the above new species from New Caledonia and for *Schizomavella pansa* from Fiordland, New Zealand (243-253 m). *Macrocamera pansa* comb. nov., though infertile, is clearly very similar to the type species, differing in zooidal details (more areolar pores, avicularium a little further from the orifice) and in the pattern of branching. Though a new genus is clearly required, the family placement poses some difficulty. The branching habit and huge ovicell are reminiscent of the Phorioppniidae (see earlier in this paper), but all phorioppniids recognised here have zooids opening all around the stem, none has avicularia, and all have at least some pseudopores in the frontal shield. The family Eminooeciidae was established by HAYWARD and THORPE (1988) for *Eminooecia* Hayward & Thorpe, 1988 and *Isoschizoporella* Rogick, 1960, together embracing five Antarctic species. Morphological features cited as characteristic of the family included a non-pseudoporous frontal shield, adventitious avicularia, and the association of the ovicell with "avicularian polymorphs or inferred homologues". The latter structures appear not to be homologous, however. Although avicularian chambers may develop concurrently alongside the ovicell in *Isoschizoporella*, the distal avicularium chamber is not continuous with the ovicellular coelom. It is evident from their illustrations that the ovicell in *Eminooecia* is indeed the ovicellular coelom - "Distally, the two layers of the ovicell are widely separated" (HAYWARD & THORPE, 1988: page 7, fig. 2); the avicularian chamber illustrated in their figure 5 (*Ibid.*, page 13) is separate from the ovicellular coelom enclosed between the endooecial and ectooecial layers. A further significant distinction between *Eminooecia* and *Isoschizoporella* is that the ectooecium is wholly calcified in the former but frontally membranous in the latter. In this regard, *Isoschizoporella* more closely resembles buffonellodids (see above), even though they lack avicularia associated with the ovicell. Although *Macrocamera* lacks a capacious ovicellular coelom, it is here tentatively allied with *Eminooecia* on the basis of similarities in the frontal shield, the suboral avicularium, external ovicellular calcification, and erect habit.

The generic name is derived from the Greek *makros*, long, and *kamara* (Latin, *camera*), a chamber.

Superfamily EUTHYRISELLOIDEA Bassler, 1953

Family EUTHYRISELLIDAE Bassler, 1953

Genus *PSEUDOPLATYGLENA* nov.

TYPE SPECIES. — *Pseudoplatyglena mirabilis* sp. nov.

DIAGNOSIS. — Colony erect, cellariiform, with chitinous joints, the circular stems with a median abaxial non-projecting keel. Zooidal frontal shield imperforate with conspicuous marginal areolae. Orifice with broad subconvex poster and stout blunt condyles, with a broad suboral subhypostegal coelom protected by a stout crescentic bar supported by buttresses. No oral spines. No avicularia. Ovicell unknown.

Pseudoplatyglena mirabilis sp. nov.

Figs 95-102

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4: stn DW 187, 65-120 m.

TYPES. — *Holotype*: a preserved 10-mm-long colony fragment with a single branch dichotomy, from MUSORSTOM 4 Stn DW 187, 19°08.30'S, 163°29.30'E, 65-120 m, MNHN-Bry 19962.

Paratype: a dry 6-mm-long fragment with part of a branch dichotomy, from the same locality as the holotype, MNHN-Bry 20032.

DESCRIPTION. — Colony erect, cellariiform, jointed, with dichotomous branching. Branches circular, 0.56-0.83 mm diameter, each nearly parallel-sided, with the proximal end abruptly tapering to a single chitinous joint; proximal to the joint is a calcified zooidal chamber that appears to pertain to the zooid distal to the joint. Zooids 0.73-1.01 mm long and 0.24-0.16 mm wide, arranged more or less in 6 longitudinal series. Frontal shield lepralioid, imperforate, the calcareous surface minutely granular/papillate frequently with a low continuous or discontinuous median ridge; lateral margins sloping into an interzooidal furrow in which are variably sized areolae, generally conspicuous. Abaxially there is a median longitudinal ridge; this is flush with the zooidal surface and therefore non-projecting, but on either side is a conspicuous furrow with areolae and deep-set septular pores; the cavity of each furrow is not longitudinally continuous, being crossed by transverse ridges associated with each zooid. Zooidal orifice longer than wide, laterally indented where stout blunt condyles occur, separating the broad subconvex poster from the high-arched anter. The proximal rim of the orifice comprises a stout crescentic bar that is supported by 3-5 buttresses shortly radiating proximally. Beneath this arrangement is a relatively large subhypostegal coelom. Oral spines lacking. No avicularia. Ovicells not present.

DISTRIBUTION. —New Caledonia: north of the Belep Islands, 65-120 m.

REMARKS. —*Pseudoplatyglena* is established here for a new genus whose affinities appear to lie with the Euthyrisellidae. Superficially, *P. mirabilis* remarkably resembles some of the species of the Cretaceous genus *Platyglena* Marsson. This genus was characterised by erect, mostly articulated, colonies; some species were characterised by a suboral costal field superficially resembling the crescentic buttressed suboral bar in *Pseudoplatyglena mirabilis*, and others had a similar median longitudinal ridge on the frontal shield.

Pseudoplatyglena differs significantly, however, in having a strictly lepralioid shield with no trace of costae. Instead, there are features which would seem to ally the genus with some among the Euthyrisellidae, especially *Tropidozoum* Harmer. These include the cellariiform habit, the shape of the orifice (cf. *T. cellariiforme* Harmer), the investing coelom and epitheca around the chitinous joints, the abfrontal keel, and the subhypostegal coelom. The abfrontal keel of *Pseudoplatyglena* differs insofar as it lacks the separate kenozooidal chambers on either side, however; instead, the coeloms adjacent to the keel are merely lateral extensions of the frontal hypostegal coeloms.

There is also no organic connection, via septula, between visceral and hypostegal coeloms as in several of the euthyrisellid genera.

Superfamily SIPHONICYTAROIDEA Harmer, 1957, superfam. nov.

Family SIPHONICYTARIDAE Harmer, 1957

Genus ***SIPHONICYTARA*** Busk, 1884

TYPE SPECIES. — *Siphonicytara serrulata* Busk, 1884.

Siphonicytara armata sp. nov.
Figs 103-105

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 33, 675 m.

TYPES. — *Holotype*: a rooted colony from BIOCAL Stn DW 33, 23°09.71'S, 167°10.27'E, 675 m, MNHN-Bry 19989.
Paratype: part of a colony from the same locality, MNHN-Bry 20114.

DESCRIPTION. — Colony erect, comprising slightly curving, basally rooted, unbranched cylindrical stem to at least 24 mm high and 1.73 mm diameter (not including zooidal peristomes); no discernible abfrontal side. Zooids 8-11-serial in the thickest part of the stem (as at the apex), 0.96-1.16 mm long and ~0.47 mm wide, the zooidal surface granular. The arrangement of orifices, ascopores, areolae, and ridges are best appreciated by examining the stem apex. Here the peristomial orifice (internal diameter 0.15-0.17 mm) is surrounded by a more or less triangular arrangement of ridges and flanked by 3-4 deeply sunken areolar septula. Proximal to the peristome the ascopore, with an areolar pore either side, is set in the middle of a subcircular to heart-shaped ridge; the centre-to-centre-distance from ascopore to peristomial orifice 0.39-0.43 mm; distal half of the ascopore with a hooded surround. Operculum D-shaped, with a small proximal projection at each lateral corner Avicularia single or paired both distolateral and proximolateral to the orifice (thus 2-4 per zooid, and more or less aligned in longitudinal series up the stem), circular in outline, 0.103 mm diameter, with a near-median cross-bar. Ancestrula 1.04 mm long, subtubular, tapering proximally, lacking avicularia and a ridge between the orifice and ascopore.

DISTRIBUTION. — New Caledonia: south of Île des Pins, 675 m.

REMARKS. — *Siphonicytara armata* is distinguished from the other New Caledonian species described below by the lack of a clear abfrontal surface and the disposition of the avicularia. It resembles the Philippine species *S. insolita* (Canu & Bassler, 1929) in the type of avicularia, but those of *S. insolita* are directed laterally outward instead of towards the peristome.

Siphonicytara excentrica sp. nov.
Fig. 106

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 38, 360 m.

TYPE. — *Holotype*: BIOCAL Stn DW 38, 22°59.74'S, 167°15.31'E, 360 m, MNHN-Bry 20122. No separate paratypes.

DESCRIPTION. — Colony an erect cylindrical stem (incomplete in the unique holotype specimen) 1.2 mm diameter (not including zooidal peristomes); an abfrontal side weakly discernible. Zooids 8-serial, 0.90-0.98 mm

long and ~0.39 mm wide with a lightly textured non-granular surface. Peristomial orifice with an internal diameter of 0.15-0.17 mm, mostly placed asymmetrically within the surrounding ridge system owing to the occurrence of a relatively large avicularium on one side; at least one series of zooids (on the side interpreted to be abfrontal) has symmetrical peristomes flanked by a pair of avicularia. Conspicuous areolar pores occur lateral (when one avicularium is present) and proximolateral to the peristome. Ascopore set in a transversely narrow area bounded by a ridge that is continuous or lacking along one side; the distal side of the ascopore slightly hooded; the centre-to-centre distance from ascopore to peristomial orifice 0.45-0.57 mm. Avicularia suboval, 0.20-0.28 mm long, on one or both sides of the peristome, directed to the peristomial orifice and facing obliquely laterally, with a cross-bar delimiting a small opesia from a relatively large palate.

DISTRIBUTION. — New Caledonia: south of Île des Pins, 360 m.

REMARKS. — *Siphonicytara excentrica* is readily distinguished by the occurrence of asymmetrically placed peristomes on a majority of the zooids.

Siphonicytara glabra sp. nov.

Figs 107-108

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 70, 965 m.

TYPES. — *Holotype*: a branching fragment from BIOCAL Stn DW 70, 23°24.70'S, 167°53.65'E, 965 m, MNHN-Bry 20124.

Paratype: from same locality as holotype, MNHN-Bry 20117.

DESCRIPTION. — Colony erect, bifurcating at intervals (5.5 mm in the limited material available, which allows for only 1 measurement), the stem and branches somewhat lensoid in cross section, 0.83-0.98 mm diameter, with a distinct abfrontal surface that is slightly flattened. Zooids 4-serial, 0.81-0.94 mm long and ~0.47-0.53 mm wide, the surface glabrous, becoming finely granular in the oldest zooids. Peristomial orifice (internal diameter 0.13-0.16 mm) bounded by ridges distally and proximally but not laterally; with lateral areolae along each side proximally, the most distal ones often replaced by 1-2 avicularia. Ascopore with a small areolar pore on 1 or both sides, together set between distal and proximal ridges and sometimes a lateral one; the centre-to-centre distance from ascopore to peristomial orifice 0.35-0.41 mm; distal side of ascopore slightly hooded. Avicularia suboval, relatively small, 0.094-0.17 mm long and initially subcolumnar, on 1 or both sides of the orifice (not attached to the peristome) or lacking, directed more or less distally, facing proximofrontally, with a complete crossbar. Abfrontally, there is a sinuously zigzag median longitudinal ridge to which all frontal transverse ridges connect. In the adjacent area between each peristome and the median ridge is an avicularium, similar to those on the frontal side but facing more distinctly proximally and with a more pointed apex.

REMARKS. — *Siphonicytara glabra* resembles *S. vittata* sp. nov. in colony form and in the arrangement of zooids. It differs in having a mostly glabrous zooidal surface, more numerous frontal avicularia, and more proximally directed abfrontal avicularia.

Siphonicytara vittata sp. nov.

Figs 109-111

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 08, 435 m. — Stn DW 33, 675 m. — Stn DW 36, 650 m. — Stn DW 44, 440 m. — Stn DW 51, 700 m.

CHALCAL 2: stn DW 76, 470 m.

TYPES. — *Holotype*: a preserved rooted colony from BIOCAL Stn DW 44, 22°47.30'S, 167°14.30'E, 440 m, MNHN-Bry 19990.

Paratypes: MNHN-Bry 20119, MNHN-Bry 20123, and MNHN-Bry 20128, all from BIOCAL Stn DW 08, 20°34.35'S, 166°53.90'E, 435 m; MNHN-Bry 20113, from the same locality as the holotype; and MNHN-Bry 20129, from CHALCAL 2 Stn DW 76, 23°40.50'S, 167°45.20'E, 470 m.

DESCRIPTION. — Colony erect, bifurcating at intervals of 2.5-9.6 mm, the stems 0.50-1.32 mm diameter (not including zooidal peristomes), with a distinct abfrontal surface that is slightly flattened; basally, the colony is anchored by rootlets that issue from pores on the abfrontal surface only. Zooids mostly 4-serial, in longitudinal series, becoming 6-serial in the thickest stems, 0.68-0.98 mm long and ~0.30-0.49 mm wide, the calcareous surface textured with light irregular ridging. Frontally, the peristomial orifices (internal diameter 0.10-0.15 mm) and ascopores occur between parallel sinuous ridges that are transversely continuous and typically without connecting longitudinal ridges; the arrangement of peristomes is such that they occur in regular series both longitudinally and obliquely; peristomes of the zooids flanking the abfrontal surface are longer and curve round to face more or less frontally. Conspicuous areolar pores occur in a collective furrow on each side proximolateral to every peristome; although slightly offset, the vitta-like furrows off all the zooids in a vertical series are more or less aligned. Ascopore circular, not hooded, with an areolar pore on each side, the centre-to-centre distance from ascopore to peristomial orifice 0.31-0.42 mm. Avicularia very rare frontally. Abfrontally, there is an irregular zigzag ridge to which the frontal transverse ridges join; between that ridge and each adjacent peristome is a small suboval avicularium ~1.23 mm long, slightly elevated, with the rostrum directed laterally outwards, the palate facing obliquely laterally or proximolaterally towards the stem axis.

DISTRIBUTION. — New Caledonia: near Lifou, and south of Île des Pins, 435-700 m.

REMARKS. — *Siphonicytara vittata* resembles *S. formosa* Harmer, 1957, which, however, can achieve a larger size, has longitudinal ridges frontally (i.e., ridges completely surround the peristomes and ascopores), and proportionately larger abfrontal avicularia.

Siphonicytara granulosa sp. nov.

Figs 112-113

MATERIAL EXAMINED. — **New Caledonia**. BIOGEOCAL: stn CP 232, 760-790 m.

TYPE. — *Holotype*: a stem fragment 10 mm long, from BIOGEOCAL Stn CP 232, 21°33.81'S, 166°27.07'E, 760-790 m, MNHN-Bry 20118. No separate paratypes.

DESCRIPTION. — Colony erect, cylindrical and slightly curving, the unique holotype stem 0.73-0.94 mm diameter (not including peristomes); no discernible abfrontal surface. Zooids 1.02-1.28 mm long and ~0.50-0.62 mm wide, the calcareous surface granular; arranged in 5 longitudinal series. Peristomes (internal diameter 0.15-0.17 mm) proportionately longer than in the other New Caledonian species, in a subhexagonal area bounded by low ridges, with 4-6 areolar cavities proximolaterally. Ascopore completely bounded by a ridge, not hooded, with 1-2 areolar pores on each side, the centre-to-centre- distance from ascopore to peristomial orifice 0.47-0.64 mm. Avicularia sporadic, generally occurring singly on a ridge adjacent to a peristome, ~0.12 mm long, the rostrum directed towards the peristome, the palate obliquely proximofrontally.

DISTRIBUTION. — New Caledonia: off the coast near the town of Thio, 760-790 m.

REMARKS. — *Siphonicytara granulosa* is distinguished from *S. armata*, which it most resembles, by its more slender colony form, proportionately longer peristomes, and fewer avicularia.

Siphonicytara mosaica sp. nov.

Figs 114-117

MATERIAL EXAMINED. — **New Caledonia**. BIOGEOCAL: stn CP 260, 1820-1980 m. — Stn CP 265, 1760-1870 m. MUSORSTOM 6: stn CP 465, 480 m.

TYPES. — *Holotype*: branching fragment from BIOGEOCAL Stn CP 265, 21°04.09'S, 167°00.40'E, 1760-1870 m, MNHN-Bry 20127.

Paratypes: MNHN-Bry 20115, from BIOGEOCAL Stn CP 260, 21°00.00'S, 167°58.34'E, 1820-1980 m; MNHN-Bry 20126, from MUSORSTOM 6 Stn CP 465, 21°03.55'S, 167°32.25'E, 480 m.

DESCRIPTION. — Colony erect, dichotomously branching, the stems delicate, only 0.37-0.49 mm diameter. Zooids 2-4-serial, 1.00-1.24 mm long and ~0.22-0.30 mm wide, the peristomes facing laterally or frontally such that there is an abfrontal surface characterised by the absence of peristomes but no other features; zooidal surface distinctively sculptured by a mosaic of polygonal ridges that continue onto the peristome. Stems regularly annulate, the transverse ridges separating peristomes from ascopores being continuous; no longitudinal ridges. Peristomes (internal diameter 0.11-0.13 mm) somewhat projecting, flanked on each side by a linear row of 4-5 areolae. Ascopore circular, not hooded, set immediately proximal to a transverse ridge and with a relatively extensive zooidal surface proximal to it; centre-to-centre distance from ascopore to peristomial orifice 0.37-0.43 mm. No avicularia.

DISTRIBUTION. — New Caledonia: South Loyalty Basin, 480-1980 m.

REMARKS. — This is the most delicate of all known *Siphonicytara* species. In its annular transverse ridges it resembles *S. symetrica* David & Pouyet, 1986 from south of Madagascar, which differs, however, in its larger size and in having avicularia and a smooth zooidal surface.

Superfamily MAMILLOPOROIDEA Canu & Bassler, 1927

Family ASCOSIIDAE Jullien, 1883*

DIAGNOSIS. — Colony discoidal to conical, the basal surface concave. Zooids recumbent to suberect, radiating from the central ancestrular region, the frontal shield imperforate. Orifice with a broad poster delineated by a pair of condyles. No oral spines. Avicularia, if present, typically adjacent to the orifice; the crossbar complete. Ovicell, if present, not unusually large, imperforate, closed by the zooidal operculum. Basal surface of colony composed of the basal or proximobasal parts of autozooids.

REMARKS. — *Ascosia* Jullien, 1883 is usually included in the family Mamilloporidae Canu & Bassler. The type genus of that family, *Mamillopora* Smitt, 1873, while also having discoidal or domed colonies, differs in its minutely perforated enlarged ovicells and dimorphic orifices. JULLIEN's (1883: page 526, as Ascosidae) introduction of the family Ascosiidae appears to have been completely overlooked by later authors, otherwise it would almost certainly have continued in use. For example, SILÉN (1947) argued that the related genus *Fedora* Jullien, 1882 should be excluded from the Mamilloporidae but did not suggest an alternative family. Similarly, LAGAAIJ (1963) declined to suggest a family for *Fedora*. *Mamillopora*, by contrast with *Ascosia*, has enlarged, densely perforated ovicells. In our opinion, the Ascosiidae should be recognised as a separate family of the superfamily Mamilloporoidea, introduced by D'HONDT (1985). Other putative mamilloporid genera should possibly be included in the Ascosiidae but, until there has been a general restudy and redescription of all related genera, we prefer not to comment further.

Genus ***FEDORA*** Jullien, 1883

TYPE SPECIES. — *Fedora edwardsi* Jullien, 1883.

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*This work, though with a publication date of 1882, was not published until 1883. According to Zoological Record for that year (page Moll. 97), JULLIEN's paper was "Read at the Meeting of 26th December, 1881, but not yet received in print at Berlin before August, 1883, and the plates have not yet been seen by the Recorder [Prof. E. VON MARTENS]".

Fedora platydiscus sp. nov.
Figs 118-120

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3: stn DR 117, 97-92 m.

TYPE. — *Holotype*: unique infertile colony from MUSORSTOM 3 Stn DR 117, 12°31.3'N, 120°39.5'E, 97-92 m, MNHN-Bry 20035.

DESCRIPTION. — Colony discoidal, flattened, 3.60 mm maximum diameter. Zooids recumbent, radiating outwards from the central ancestrular region; 0.45-0.72 mm long and 0.20-0.47 mm wide, the frontal shield densely tubercular, the tubercles themselves with minute papillae. Orifice elongate, almost twice as long (0.11-0.17 mm) as wide, the broad rounded poster delimited from the anter by a pair of small angled condyles; orifice laterally flanked by tubercles. Articulated oral spines absent. Avicularia absent. Ovicells not present. Ancestrular opesia (or broken frontal shield?) 0.18 mm long, surrounded by 8 periancestrular zooids. Basal surface of colony somewhat nodular, with convexities indicating the basal surfaces of individual zooids. Zooidal budding taking place from a distobasal pore-chamber on each zooid.

DISTRIBUTION. — Philippines: Mindoro Strait, 92-97 m.

REMARKS. — We are not certain about the generic placement of the present species, which may represent a new genus. The two previously known living species of *Fedora* [*Myriozoum ovum* Smitt, 1873 is unlikely to be conspecific; cf. SILÉN 1947] have more or less conical colonies, but LAGAAIJ (1963) noted some variation in *F. nodosa* Silén from ovoid and spindle shapes to hemispherical and that colonies started life as encrustations on small objects. *Fedora* is the nearest genus in terms of overall morphological characters, especially in the tuberculate frontal shield, lack of ovicells, and the distobasal pore-chambers. SILÉN (1947) called the latter 'special chambers' and speculated on their purpose. LAGAAIJ (1963), observing an apparent rootlet emerging from one chamber, concluded that they give rise to anchoring rhizoids. This is possible, but they must soon become obliterated by the new autozooids that develop around them. In the flattened colony form, *F. platydiscus* is more reminiscent of *Ascosia*, but in that genus the zooids are suberect, with ovicells and proximobasal budding, and lack the distobasal pore-chambers.

The name of the new species is derived from the Greek *platys*, flat, and *diskos*, plate. It should be noted in passing that the spelling of the type species of *Fedora* is given twice by JULLIEN (1883) as *Edwarsi* (*sic*), above the formal description and in the table on page 527, but as *Edwardsi* in the plate captions on page 529. We conclude, therefore, that *Edwarsi* is a *lapsus calami* for *edwardsi*, presumably named for Henri MILNE EDWARDS.

Family CLEIDOCHASMATIDAE Cheetham & Sandberg, 1964

REMARKS. — We here include this family in the superfamily Mamilloporoidea on the basis of the zooidal frontal shield and the shape of the orifice. Although the ovicell, when present, in mamilloporids and ascosiids is closed by the zooidal operculum and the colony form is largely different, a relationship with cleidochasmatids is suggested by the genus *Fedorella* Silén, 1947. This monotypic genus has a similar colony form to *Fedora* but a typically cleidochasmatid ovicell (i.e., minutely porous and tuberculate and not closed by the zooidal operculum). [Puzzlingly, COOK and LAGAAIJ (1976: page 321) listed *Fedorella* among genera with 'frontal' zooidal astogeny (i.e., like *Conescharellina*), but SILÉN's (1947) description and illustrations indicate otherwise.] D'HONDT (1981) also noted a similarity between the orifices in *Characodoma* Maplestone, 1900 (a senior synonym of *Cleidochasma* Harmer, 1957) and *Fedora*. As pointed out by COOK and BOCK (1996), *Characodoma* can be erect and conical from basally encrusting colonies (see also HARMER, 1957).

SOULE *et al.* (1991) revised *Cleidochasma sensu lato*, introducing a number of new genera of Cleidochasmatidae. Several of these have phidoloporid orifices (with a beaded distal arch) and ovicells (with a labellum), however, and should be excluded from the Cleidochasmatidae, as suggested by GORDON (1993b).

Genus *CHARACODOMA* Maplestone, 1900

TYPE SPECIES. — *Schizoporella excubans* Waters, 1881, by synonymy with *Characodoma halli* Maplestone, 1900 (see COOK & BOCK, 1996).

Characodoma areolata (Canu & Bassler, 1929)

Figs 121-122

Gemelliporella areolata Canu & Bassler, 1929: 309, pl. 34, figs 5-6.
Cleidochasma areolatum - HARMER, 1957: 1046, pl. 71, figs 19-21.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3: stn DR 117, 97-92 m.

DISTRIBUTION. — Philippines, 42-969 m; Indonesia (Makassar Strait), 59-320 m.

REMARKS. — *Characodoma areolata* is represented in the collection by a single specimen. It is a compressed pisiform colony that appears to have encrusted a tiny piece of substratum that is now largely enclosed by it. It closely matches CANU and BASSLER's (1929: pl. 34, fig. 6) illustration, which shows occasional small flattened kenozooidal chambers (possibly loci of frontal budding) associated with some zooids, also present in the MUSORSTOM specimen. The zooids (0.50-0.70 mm long and 0.37-0.51 mm wide) and orifice (0.16-0.19 mm long) overlap in range with those of CANU and BASSLER's specimens or are slightly larger; the avicularium is 0.20-0.25 mm long, rounded at both ends, and with a thin crossbar that may frequently be broken, giving the appearance of mandibular pivots. No zooid had two avicularia on the same side of the orifice, but one zooid has a small avicularium on the opposite side of the orifice from the large one (as seems also indicated in CANU & BASSLER's pl. 34, fig. 5).

Characodoma biavicularia (Canu & Bassler, 1929)

Figs 124-126

Gemellipora biavicularia Canu & Bassler, 1929: 312, pl. 34, fig. 7.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3: stn DR 117, 97-92 m. Also USNM 8067, holotype of *Gemellipora biavicularia* Canu & Bassler, 1929, *"Albatross"* Stn 5179.

DESCRIPTION. — Colony encrusting to erect, the latter up to 6.2 mm long, circular to lensoid or almost bilamellar in cross section, 5-6 zooids across (1.98 mm) at the widest part. Zooids 0.56-0.75 mm long, 0.33-0.58 mm wide. Frontal shield evenly granular-tubercular, with up to 10 or more areolar pores along each margin. Orifice distinctly cleidridiate, 0.16-0.19 mm long, tapering proximally. Avicularia of two sizes, the larger lateral-oral, 0.15-0.19 mm long, directed proximally towards the centre of the frontal shield; the rostrum almost an equilateral triangle, as is the proximal part of the mandible that lies across the rostrum, the remainder of the mandible being long and setiform; its total length 0.39 mm. The smaller avicularium suboral, not present on every zooid and may be wanting over an extensive area of the colony; orientated transversely, the tiny semicircular mandible 0.04 mm long. Ovicell globular, densely and evenly perforated.

DISTRIBUTION. — Philippines, 38-104 m.

REMARKS. — The MUSORSTOM material comprises one encrusting and three erect specimens. One of the latter (uncoated) is well preserved, with intact opercula and mandibles. The erect specimens closely resemble CANU and BASSLER's (1929) sole illustration, showing two sizes of avicularia, the larger one lateral-oral, the smaller one suboral. Zooidal dimensions in the present material are larger than cited by CANU and BASSLER, but the species appears very variable. In the present material the emplacement of the larger of the two avicularia varies from laterally adjacent to the orifice to a position subjacent to the sinus. The type specimen from the Smithsonian

Institution appears superficially different in overall zooidal morphology but it is likely this arises from the degree of secondary calcification. HARMER (1957) recorded putative *C. biavicularia*, with delicate erect rooted colonies, in *"Siboga"* samples, but his illustrations indicate a different species in our opinion. Contrary to CANU and BASSLER's description he shows the suboral avicularium as the larger of the two and with an acute mandible.

Characodoma glabra sp. nov.

Fig. 123

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3: stn DR 117, 97-92 m.

TYPE. — *Holotype*: colony encrusting a small piece of shell from MUSORSTOM 3 Stn DR 117, 12°31.3'N, 120°39.5'E, 97-92 m, MNHN-Bry 20050. No separate paratypes.

DESCRIPTION. — Colony encrusting. Zooids 0.37-0.56 mm long and 0.20-0.64 mm wide, each separated from adjacent zooids by a thin marginal groove; frontal shield smooth with sparse granulations and small sparse marginal areolar pores. Orifice 0.11-0.13 mm long, the deep rounded poster almost one third the orificial length, separated from the larger anter by lateral indentations with tiny condylar points. Avicularia 0.066-0.075 mm long, paired or, more usually, single, lateral to the orifice and directed proximofrontally, the crossbar very delicate, the rostrum acute. Ovicell relatively small (0.17-0.21 mm wide), the endooecium relatively thick, its outer surface with small spiky tubercles and small sparse perforations; ectooecium membranous.

DISTRIBUTION. — Philippines, Mindoro Strait, 92-97 m.

REMARKS. — This species is distinguished by the mostly smooth frontal shield, the size and arrangement of the avicularia, and the relatively small, coarse-surfaced ovicell.

Characodoma parva sp. nov.

Fig. 127

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3: stn DR 117, 97-92 m.

TYPE. — The sole colony from MUSORSTOM 3 Stn DR 117, 12°31.3'N, 120°39.5'E, 97-92 m, MNHN-Bry 20051. No separate paratypes.

DESCRIPTION. — Colony small, compressed-pisiform in shape. Zooids very small, 0.26-0.34 mm long and 0.28-0.34 mm wide, the frontal shield coarsely surfaced, with blunt tubercles and relatively large areolae. Orificial poster one-fourth the total orificial length of 0.09-0.11 mm, widely V-shaped, delimited from the larger anter by small condyles. Avicularia paired or single, comprising a suboral one set transversely, the rostral and opesial rims rounded; and frequently and additional one adjacent to the orifice, the acute rostrum directed obliquely proximally toward the lateral margin; the crossbars in both kinds of avicularia relatively stout. Ovicell 0.16-0.21 mm wide, the endooecium with the numerous small tubercles and pores evenly distributed, the ectooecium membranous.

DISTRIBUTION. — Philippines, Mindoro Strait, 92-97 m.

REMARKS. — This species is distinguished by its small colonial and zooidal dimensions and the shape and disposition of the avicularia.

Characodoma sp.

Fig. 128

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3: stn CP 102, 192 m.

DESCRIPTION. — Colony fragment encrusting. Zooids 0.47-0.62 mm long and 0.41-0.57 mm wide, the frontal shield somewhat irregularly surfaced in the proximal half where there are small scattered areolar pores, and granular all over. Orifice a little longer than wide, ovoid in shape, with only the small condylar points differentiating the anter from the broad poster. No avicularia, but a pair of relatively areolar cavities either side of the orifice can appear superficially like tiny avicularia under transmitted light. Ovicells not seen.

DISTRIBUTION. — Philippines, 192 m.

REMARKS. — Only a tiny infertile fragment of this species occurred in the collection. Despite the broad orificial poster, it appears to be a species of *Characodoma*.

Genus ***YRBOZOON*** Gordon, 1989b

TYPE SPECIES. — *Yrbozoon ringens* Gordon, 1989b.

Yrbozoon ringens Gordon, 1989b

Figs 129-131

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 66, 515 m.

DISTRIBUTION. — Norfolk Ridge from New Zealand (South Maria Ridge, 1024-1049 m) to New Caledonia (northern Norfolk Ridge, 515 m).

REMARKS. — Four small colony fragments, two ovicellate or partly so, represent only the second record of this genus and species. They are identical to the sole New Zealand specimen except in the number of oral spines or tubercles, being only two instead of 4-5.

GORDON (1989b) included *Yrbozoon* in the Celleporidae, in which it is very much on the fringe. Having now seen several cleidochasmatids in the MUSORSTOM samples it is apparent that the ovicell of *Yrbozoon* is very similar to that of *Cleidochasma*, comprising a reticulate (but not perforate, however) endooecium and membranous ectooecium. The presence of oral spines in *Yrbozoon* is exceptional in the superfamily Mamilloporoidea, which may indicate that the affinities of *Yrbozoon* lie elsewhere; it may be noted that some of the spines in *Y. ringens* from New Zealand are merely long tubercles and the others appear to be non-articulated. Thus, even including *Yrbozoon* in the Mamilloporoidea need not preclude 'absence of articulated oral spines' as a superfamily characteristic.

Superfamily CELLEPOROIDEA Johnston, 1838

Family CELLEPORIDAE Johnston, 1838

Genus ***BUFFONELLARIA*** Canu & Bassler, 1917

TYPE SPECIES. — *Hippothoa divergens* Smitt, 1873.

Buffonellaria erecta sp. nov.

Figs 132-133

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 66, 515 m. — Stn CP 109, 495 m.

TYPE. — *Holotype*: unique colony, 5.5 mm long, from BIOCAL Stn DW 66, 24°55.43'S, 168°21.67'E, 515 m, MNHN-Bry 20040. No separate paratypes.

DESCRIPTION. — Colony erect, rigid, branching shortly in 1 plane, the stem subcylindrical with zooids facing all around, or partly encrusting the stem of an erect bryozoan and erect parts arising from this. Zooids somewhat porcellanous, 0.50-0.74 mm long and 0.32-0.47 mm wide, the frontal shield imperforate, with tiny sparse areolar pores along the margins. Orifice slightly sunken, wider (0.14-0.15 mm) than long, with a disproportionately small and narrow U-shaped sinus with flattened adjacent orificial shoulders. A suboral avicularium present to 1 side of the sinus, set transversely, with a crossbar, the acute rostrum directed laterofrontally. Ovicell initially recumbent, becoming subimmersed, the tabulate area of endooecium large with marginal pores and short associated furrows, all but the tabula becoming encroached upon by secondary calcification.

DISTRIBUTION. — New Caledonia, northern Norfolk Ridge, 495-515 m.

REMARKS. — This species is uniquely distinguished among living species of the genus by its erect habit; the combination of small sinus, asymmetrical avicularium, and endooecial tabular pores are also distinctive. The encrusting Philippine species *B. indistincta* Canu & Bassler, 1929 has a similar ovicell and suboral avicularium, but has a broader, V-shaped sinus and 1-2 small lateral-oral avicularia additional to the transverse one.

Buffonellaria regenerata Powell, 1967

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 38, 360 m. — Stn DW 66, 515 m.

DESCRIPTION. — Colony thinly encrusting. Zooids hyaline, 0.38-0.70 mm long and 0.26-0.37 mm wide, somewhat elongate-rectangular in outline, the frontal shield smooth, imperforate, with no marginal areolar pores, but a small pore proximal to each avicularium. Orifice high-arched, longer (0.084-0.095 mm) than wide, the median sinus very shallow and rounded, flanked by straight shoulders with a small condyle angled across each corner. Avicularia paired, lateral-oral, the crossbar thin, the rostrum rounded, directed obliquely laterofrontally. Ovicell recumbent, the endooecium smooth, exposed in the distal half of the ovicell, the proximal face of the ovicell comprising a transverse band distal to the opening.

DISTRIBUTION. — New Caledonia, northern Norfolk Ridge, 360-515 m. New Zealand, Kermadec Ridge and Three Kings Islands to Cook Strait and Kahurangi Shoals, 10-240 m.

REMARKS. — The present material is very similar to colonies previously described from the New Zealand region. There are minor differences in the depth of the orificial sinus and degree of secondary calcification around the ovicell, and a suboral ridge is normally present in the New Zealand material. Nevertheless, these characters are subject to variation and we conclude that the New Caledonian specimens are not sufficiently distinct to warrant subspecific recognition. Several zooids in the New Caledonian material have bore-holes in the frontal shield. These are 0.037 mm diameter; the predator species is not known.

Genus ***OSTHIMOSIA*** Jullien, 1888

TYPE SPECIES. — *Cellepora eatonensis* Busk, 1881.

Osthimosia sp.

Figs 134-136

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4: stn DW 187, 65-120 m.

DESCRIPTION (Based on juvenile colonies only). — Colony pisiform, the zooids suberect, squat and barrel-shaped, about 0.28 mm long (0.47 mm including the peristome) and 0.26 mm wide. Frontal shield smooth, with a few areolar pores along each margin. Primary orifice 0.094-0.113 mm wide, orbicular with a small rounded-V-shaped sinus proximally; distinct condyles not present. Peristome encircling the primary orifice, rising to an avicularian column on either side; each avicularium ovoid in shape, with a thin crossbar and a small subacute triangular rostrum; the avicularium surface facing proximolaterally toward the orifice. No other avicularia. Ovicells not present. Ancestrula initially tatiform, subsequently developing a peristome around the former opesia.

DISTRIBUTION. — New Caledonia, northeast of the Belep Islands, 65-120 m.

REMARKS. — Two tiny infertile colonies, one ancestrulate, occurred on stem segments of the quadricellariid bryozoan *Nellia tenella* (Lamarck, 1816). In zooidal characters they resemble specimens from the Kermadec Ridge and New Zealand continental shelf attributed to *Osthimosia bicornis* (Busk, 1881) (GORDON, 1984, 1989a), but which, because of orificial characters, may represent an undescribed species.

Genus *LAGENIPORA* Hincks, 1877

TYPE SPECIES. — *Celleporella lepralioides* Norman, 1868.

Lagenipora sp.

Fig. 137

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 46, 775 m.

DESCRIPTION (Based on a juvenile colony only). — Colony encrusting, the zooids radiating somewhat linearly from the ancestrular region. Zooids recumbent, ~0.38 mm long (including peristome) and 0.25 mm wide, the frontal shield smooth, with a few areolar pores around the margin. Primary orifice 0.06 mm wide, with a broad rounded sinus and non-projecting simple condylar surfaces angled in the corners. Peristome long and tubular, incorporating a median suboral avicularium tube opening at the peristomial rim which flares outwards. 1-2 additional small adventitious avicularia occur near the lateral margins of the frontal shield. Vicarious avicularia and ovicells not seen.

DISTRIBUTION. — New Caledonia, south of Île des Pins, 775 m.

REMARKS. — It is not possible to ascribe the single tiny colony (epizoic on a branch of a buguloidean bryozoan) to a described species. It corresponds to none of the New Zealand region species, which all lack similar adventitious avicularia on the frontal shield.

Genus *GALEOPSIS* Jullien *in* JULLIEN & CALVET, 1903

TYPE SPECIES. — *Galeopsis rabidus* Jullien *in* JULLIEN & CALVET, 1903.

Galeopsis mimicus Gordon, 1989

Figs 138-140

Galeopsis mimicus Gordon, 1989a: 68, pl. 3 D-E.

MATERIAL EXAMINED. — **New Zealand**. New Zealand Oceanographic Institute, holotype H-513, paratype P-729.
New Caledonia. BIOCAL: stn DW 33, 675 m. — Stn DW 36, 650 m. — Stn CP 67, 500 m. — Stn CP 75, 825 m.
CHALCAL 2: stn DW 76, 470 m.
SMIB 4: stn DW 37, 540 m.

DISTRIBUTION. — New Zealand, off the Westland coast, 297-520 m. New Caledonia, South Loyalty Basin to northern Norfolk Ridge, 470-825 m.

REMARKS. — The New Caledonian material gives additional information about this species. Whereas in New Zealand colonies occurred only on aboral spines of *Spatangus multispinus* Mortensen, the present colonies occur on axes of small gorgonians. The shape of the orifice and sinus are identical throughout the range, as is that of the ovicell, which has a characteristically long proximal face with a short labellum. A colony from BIOCAL Stn CP 75 has a relatively large basal disc for this species (2.96 mm maximum diameter) and a colony from CHALCAL 2 Stn DW 76 has rare spatulate avicularia - these are 0.16-0.19 mm long, with a small, very short opesia and a relatively broad round rostrum with an extensive palatal shelf.

Galeopsis pentagonus (d'Orbigny, 1842)

Vincularia pentagona d'Orbigny, 1842, pl. 10, figs 4-6; 1847: 21.
Spiroporina pentagona - BROWN, 1952: 213, figs 148, 149 (*cum syn.*).
Galeopsis pentagonus - GORDON, 1984: 116, pl. 46, A-C (*cum syn.*); 1985: 178, fig. 29; 1989a: 69. — MOYANO, 1985: 90, pl. 1, figs 1-6 (*cum syn.*).

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 66, 515 m.
MUSORSTOM 6: stn CP 419, 283 m. — Stn DW 421, 245 m.
SMIB 4: stn DW 38, 510 m.

DISTRIBUTION. — New Caledonia, 245-515 m. New Zealand, widespread from 40-549 m (also Lower Oligocene to Pleistocene). Tasmania (Late Miocene to present day). Juan Fernandez Island. Magellanic South America, Falkland Islands (Îles Malouines).

REMARKS. — The New Caledonian colonies from MUSORSTOM 6 Stn CP 419 (20°41.65'S) constitute the northernmost record of this long-lived austral species.

Galeopsis lageniporoides sp. nov.

Figs 141-142

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 6: stn DW 489, 700 m.

TYPES. — *Holotype*: a coated colony, now in two fragments, from MUSORSTOM 6 Stn DW 489, 20°48.87'S, 167°05.86'E, 700 m, MNHN-Bry 20041.
Paratype: an unnumbered colony in a separate well of the holotype slide, from the same locality as the holotype.

DESCRIPTION. — Colony encrusting, linear, 2-3 zooids across and branching. Zooids 0.51-0.62 mm long and 0.26-0.28 mm wide, the frontal shield smooth and imperforate with small sparse areolar pores. Orifice suborbicular with a broad shallow sinus delimited by blunt rounded condyles. Lateral-oral avicularia small, ovoid, with a rounded rostrum directed laterally outwards or proximolaterally, the avicularia borne at the corners of a high peristome that forms a bridge across the orifice leaving a large spiraminal opening; the proximofrontal face of the peristomial bridge fairly broad. 1-2 additional avicularia are borne adventitiously near the lateral margins. Ovicell recumbent, with a crescentic or triangular exposure of endooecium with tiny distal pores and associated grooves; the proximal face of the ovicell fairly broad, with a labellum on the lower edge.

DISTRIBUTION. — New Caledonia, north of Lifou, 700 m.

REMARKS. — Neither of the two colonies in the collection is attached to a substratum, which appears to have been a hydroid stem. The larger of the colonies, now in two pieces, was 5.15 mm long and 0.54-0.64 mm wide.

Superficially, this species resembles a species of *Lagenipora* because of the high aviculiferous peristome. No *Lagenipora* species, however, has an ovicellular labellum or a peristomial spiramen.

Genus *RICHBUNEA* nov.

DIAGNOSIS. — Colony erect, branching, the zooids facing on one side. Primary orifice with broad sinus and small condyles, concealed by a tall peristome with an irregular rim in which is set 1-2 columnar avicularia. Large spatulate avicularia may occur frontally and abfrontally. Ovicells recumbent, becoming somewhat immersed in secondary calcification, with a broad tabulate area.

TYPE SPECIES. — *Osthimosia incomposita* Gordon, 1984.

REMARKS. — A new genus is established here for two species of erect celleporids that have long, irregularly rimmed, aviculiferous peristomes and broadly tabulate ovicells. The type species from the Kermadec Ridge, initially included in *Osthimosia*, was later transferred to *Buchneria* Harmer, 1957 (GORDON, 1985), with the suggestion that it might represent a new genus. It has since been established that the type species of *Buchneria*, with an umbonuloid frontal shield, differs in several significant respects from *O. incomposita* (GORDON, 1989c), and a new genus appears justified. Comparison is invited with *Spigaleos* Hayward, 1992, which also forms erect branching colonies with the zooids facing on one side, but the type and only species, *S. horneroides* Waters, has peristomial orifices flush with the colony surface, and median, sessile avicularia. *Richbunea* is an anagram of *Buchneria*. At present, the new genus is known only from the Kermadec and Norfolk Ridges at depths of 135-500 m.

Richbunea gracilis sp. nov.

Figs 143-144

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn CP 67, 500 m.
BIOGEOCAL: stn DW 307, 470-480 m.

TYPES. — *Holotype*: a single colony from BIOCAL Stn CP 67, 24°55.44'S, 168°21.55'E, 500 m, MNHN Bry-20039.

DESCRIPTION. — Colony erect, slender, sparsely branching, the zooids in two longitudinal zigzagging series, with a pair of orifices on one side (one near the branch axis, the other, slightly beyond it, projecting outward laterally) alternating with a similar pair on the other side. Branch width between peristomes 0.46-0.60 mm. Zooids c. 0.67-0.71 mm long and 0.23 mm wide, the surface smooth, with 2-5 small areolar pores along each margin. Primary orifice suborbicular, with a broad shallow sinus separated from the anter by a small pair of rounded condyles, concealed from frontal view by a tall peristome. Peristomial rim irregular, with several processes and a proximal pseudosinus that descends as a sinus groove down the inside of the peristome. A small, columnar avicularium projecting from the peristomial rim next to the pseudosinus, with a complete crossbar and acute triangular rostrum directed frontally. No other avicularia. Ovicell prominent, recumbent, with a large frontal endooecial tabula. Abfrontal surface smooth, with a thin median line, indicating zooidal lateral boundaries, zigzagging along the branch axis. Zooids near the colony base have occluded orifices.

DISTRIBUTION. — New Caledonia between Ouvéa and Lifou, and northern Norfolk Ridge, 470-500 m.

REMARKS. — *Richbunea gracilis* superficially resembles a species of Phidoloporidae, especially in its erect habit and *Iodictyum*-like peristomes, but it lacks a beaded primary orifice and the ovicell is distinctively celleporid. It differs from the type species, *R. incomposita* comb. nov., in its slender colony form with fewer zooidal rows, single columnar avicularium, and absence of spatulate avicularia.

Family PHIDOLOPORIDAE Gabb & Horn, 1862

Genus ***LIFUELLA*** nov.

TYPE SPECIES. — *Lepralia multidentata* Thornely, 1905.

DIAGNOSIS. — Colony encrusting to calyciform. Zooids porcellanous, the frontal shield imperforate, with small areolar pores or these lacking. Orifice with a broadly arcuate poster delimited from the anter by inwardly directed condyles, the distal arch not beaded. Articulated oral spines present in both infertile and fertile zooids. Adventitious avicularia, when present, frequently lateral-oral; the crossbar complete. Ovicell subimmersed, the ectooecium imperforate, usually covered by a smooth layer of secondary calcification; the ovicellular entrance usually widely open, not closed by the zooidal operculum.

REMARKS. — A new genus is established here for the largely tropical to warm-temperate species previously attributed to *Hippoporella*. There has been some debate over the relationships between numerous smooth-shielded, warm-water ascophorines with arcuate posters, the species being variously attributed to *Hippoporella* Canu, 1917, *Lepraliella* Levinsen, 1917, *Hippoporina* Neviani, 1895 *sensu* CANU & BASSLER, 1920, *Cleidochasma* Harmer, 1957, and *Brodiella* Uttley & Bullivant, 1972 (e.g., HARMER, 1957; POWELL, 1967; HAYWARD & COOK, 1983; GORDON, 1984; COOK, 1985). HAYWARD and COOK (1983: 104) commented concerning *Hippoporella* that "this genus includes many tropical species ... that seem to have little in common with the boreal-arctic type species". We agree, hence the establishment of *Lifuella*, named for the type locality of the following species. The putative species of *Hippoporella* with a beaded oral arch should probably be included in *Stephanollona* Duvergier, 1921 (see GORDON, 1994).

Lifuella calyciformis (Philipps, 1900)

Fig. 145

Lepralia calyciformis Philipps, 1900: 446, pl. 43, figs 9, 9a.
Hippoporella calyciformis - HARMER, 1957: 1097, pl. 73, figs 1-5. — HAYWARD, 1988: 322, pl. 10c.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3: stn DR 117, 97-92 m.

DISTRIBUTION. — New Caledonia, Lifou. Torres Strait. Indonesia, 0-34 m. Philippines, 49-97 m. Mauritius.

REMARKS. — The single specimen in the collection is infertile and the oral spines were detached, but it otherwise closely matches the illustrations of PHILIPPS (1900), HARMER (1957), and HAYWARD (1988), who shows the ligula on the avicularian crossbar. The present specimen has the paired lateral-oral avicularia as shown by PHILIPPS and HAYWARD but these may also occur proximal to the orifice and a third avicularium may occur distally.

Genus ***SCHEDOCLEIDOCHASMA*** Soule, Soule & Chaney, 1991

TYPE SPECIES. — *Schedocleidochasma porcellaniforme* Soule, Soule & Chaney, 1991.

***Schedocleidochasma* sp.**

Fig. 150

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 38, 360 m.
Philippines. Holotype specimen of *Hippoporina planulata* Canu & Bassler, 1929 (Smithsonian Institution, Department of Paleobiology, registration no. 8086, from *"Albatross"* Stn 5147, 38 m, Sulu Archipelago).

DESCRIPTION. — Colony encrusting. Zooids very small, 0.19-0.32 mm long and 0.13-0.28 mm wide, the frontal shield glabrous, even or with low ridges, wholly imperforate except for a single tiny areolar pore near the mid-proximal margin. Orifice longer (0.058-0.077 mm) than wide with a distinct rounded-U-shaped sinus with tiny condylar processes at the entrance; 6 spines bases around the distal rim. No avicularia. Ovicells not seen.

DISTRIBUTION. — New Caledonia, near Île des Pins, 360 m.

REMARKS. — Insofar as the sole colony in the collection is infertile, it resembles *Hippoporina planulata* Canu & Bassler, 1929 (= *Metacleidochasma planulata* comb. nov.). Both species have small, vitreous zooids that are strongly reflective. The orifices of *M. planulata*, however, have beaded rims and lack adjacent oral spines. [*Metacleidochasma planulata*, incidentally, is identical to *M. ovale* Soule, Soule & Chaney, 1991, from Hawaii and thus a senior synonym]. Although not noted in the holotype specimen by CANU & BASSLER (1929), an avicularium was seen that is identical to thus illustrated in *M. ovale*.

Genus ***RHYNCHOZOON*** Hincks, 1895

TYPE SPECIES. — *Lepralia bispinosa* Johnston, 1847.

Rhynchozoon tubulosum (Hincks, 1880)

Figs 146-147

Mucronella (?) *tubulosa* Hincks, 1880: 383, pl. 17, fig. 7.
Rhynchozoon tubulosum - HARMER, 1957: 1064, pl. 65, figs 16-19. — GORDON, 1984: 125, pl. 52, C-E. — HAYWARD, 1988: 336 (part). — D'HONDT, 1986: 703. — RYLAND & HAYWARD, 1992: 294, fig. 32 c-e.

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4: stn DW 231, 75 m.

DISTRIBUTION. — Sri Lanka. Indonesia, 0-52 m. Philippines, 13-275 m. Queensland. New Caledonia, Chesterfield Islands and Île des Pins, 15-75 m. Kermadec Ridge, Curtis and Raoul Islands, 18-60 m.

REMARKS. — RYLAND and HAYWARD (1992) have commented on the limitations of HARMER's (1957) synonymy of this Indo-Pacific species.

Rhynchozoon ligulatum sp. nov.

Figs 148-149

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 38, 360 m.
MUSORSTOM 4: stn DW 223, 545-560 m.

TYPES. — *Holotype*: a dried colony from BIOCAL Stn DW 38, 22°59.74'S, 167°15.31'E, 360 m, MNHN Bry-20020.
Paratypes: an alcohol-preserved colony from MUSORSTOM 4 Stn DW 223, 22°57.00'S, 167°30.00'E, 545-560 m, MNHN Bry-19998, and a gold-coated colony from the same station, MNHN Bry-20077.

DESCRIPTION. — Colony encrusting, the dorsal surface with short stout basal-wall processes supporting the colony above the substratum in places. Zooids relatively large, 0.74-0.94 mm long and 0.59-0.86 mm wide, with an undular-nodular surface. Primary orifice transversely elongate-oval, with a beaded distal rim and a small pair of rounded condyles that separate the anter from the poster. Surrounding the orifice is a peristome composed of several stout tubercles. Secondary calcification can reduce their relative height; otherwise, with lateral fusion (with some gaps between) they can form a palisade around the orifice, concealing the suboral mucro. Zooidal surfaces with abundant small oval avicularia; these have a crossbar with a stout ligula and an upturned rostral rim. Larger avicularia absent. Ovicells somewhat immersed in secondary calcification, each with a very broad, descending labellum.

DISTRIBUTION. — New Caledonia, southwest of Île des Pins, 360-560 m.

REMARKS. — This distinctive species is easily recognisable from the abundant small ligulate avicularia.

Genus *IODICTYUM* Harmer, 1933

TYPE SPECIES. — *Retepora phoenicea* Busk, 1884.

Iodictyum bicuspidatum sp. nov.

Figs 151-154

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 6: stn CP 419, 283 m.

TYPES. — *Holotype*: an ovicelled branch fragment, gold-coated, from MUSORSTOM 6 Stn CP 419, 20°41.65'S, 167°03.70'E, 283 m, MNHN-Bry 20074.

Paratype: colony fragments, from the same locality as the holotype, MNHN Bry-20183.

DESCRIPTION. — Colony non-pigmented, erect, branching more or less in one plane, exceeding 2 cm in height. Not strictly fenestrate, but anastomoses occur. Branches mostly 2-3-serial, with branch widths ranging from 0.43-2.13 mm. Primary orifice nearly circular, just a little wider than long, without beading of the rim or a proximal sinus. Zooids 0.71-0.84 mm long (orifice to orifice) and c. 0.29-0.43 mm wide, mostly discrete, especially in young branches, clearly outlined by ridges along the zooidal boundaries. Zooidal skeletal surface smooth or faintly subgranular, with 1-2 pairs of marginal pores in the proximal half. Zooids lacking ovicells have a tubular, somewhat projecting peristome that has blunt denticulations around the rim, and a median descending groove that ends in a pseudosinus at the beginning of the shaft. Ovicelled zooids have incompletely tubular peristomes, the distal rim being occupied by an ovicell that is initially prominent and subglobular but later appears recumbent owing to secondary calcification. The frontal face of the ovicell is completely smooth apart from a faint midfrontal depression. There is no labellum. Avicularia occasional, large, borne frontally on ovicelled or non-ovicelled zooids in the median row(s). They occupy most of the frontal surface from which they project prominently. The crossbar is complete but, unusually, the opesia behind the crossbar is narrow to the point of obliteration. The rostrum is lingulate in shape, slightly narrowing in the middle, before expanding and rising distally in a pair of smooth rounded cusps. A palatal shelf occupies about the rostral area. The mandible exactly fits the shape of the rostrum. Dorsal branch surface entirely lacking avicularia, but with transverse vibices.

DISTRIBUTION. — New Caledonia, northwest of Lifou, 283 m.

REMARKS. — *Iodictyum bicuspidatum* is most easily distinguished by its large bicuspid (hence the species name) frontal avicularia. Both this species and the following two species are unusual in being both white and largely non-fenestrate. HARMER (1934), in the most comprehensive treatment of tropical erect phidoloporids to date, described 11 species of *Iodictyum* from Indonesian waters. Of these, only three species were white and only one, pigmented, was open-branched.

A commensal organism, probably a hydrozoan, may be associated with this species. Some of the colony fragments have slit-like gaps in the calcification along zooidal margins, indicating that stolons of the epizoite are mostly covered over by the calcification of the bryozoan. Circular openings at zooidal corners, larger than areolar pores, indicate where hydroid stems emerged.

Iodictyum blandum sp. nov.

Figs 155-157

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 44, 440 m.

TYPES. — *Holotype*: unique colony from BIOCAL Stn DW 44, 22°47.30'S, 167°14.30'E, 440 m. No separate paratypes.

DESCRIPTION. — Colony reticulate, shaped overall like a convex clam shell, the zooids opening on the concave face, 11 mm high; unpigmented. Zooids 2-3-serial in trabeculae 0.58-1.04 mm wide. Fenestrae ranging from 0.59-2.60 mm long and 0.20-0.66 mm wide. Both faces of the colony and the zooidal surfaces glabrous, relatively smoothly textured, and blandly lacking many distinctive features. Primary orifice lacking beading on distal rim. Peristome with internal diameter of c. 0.094-0.113 mm, with peristomial sinus in proximal rim the descends as a spiramen within the rim; some peristome rims with crenulations. Avicularia rare; occasional relatively large avicularia occur proximolateral to the peristome, the long acute rostrum directed past the pseudosinus. No fenestral avicularia. Ovicell fairly immersed, with a short labellum and lateral flanges, and a short slit-like pore extending onto the labellum. Abfrontal surface of colony lightly textured, with thin ramifying vibices and rare avicularia like the acute suboral ones frontally.

DISTRIBUTION. — New Caledonia: west of Île des Pins, 440 m.

REMARKS. — This species is characterised by its particularly bland appearance, including the striking paucity of polymorphs.

Iodictyum illinguum sp. nov.

Figs 158-160

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 6: stn DW 421, 245 m.

TYPES. — *Holotype*: an ovicelled colony, gold-coated, from MUSORSTOM 6 Stn DW 421, 20°26.27'S, 166°40.17'E, 245 m, MNHN Bry-20182.
Paratype: colony fragment, from the same locality as the holotype, MNHN Bry-20048.

DESCRIPTION. — Colony non-pigmented, generally hyaline, erect, branching more or less in one plane, the only complete colony 1 cm in height. Branches mostly biserial, triserial in places, with branch widths ranging from 0.33-1.10 mm. Primary orifice and peristomes as in *I. bicuspidatum*. Zooids 0.71-0.90 mm long (orifice to orifice) and c. 0.33-0.41 mm wide, the frontal shield and boundaries (including the presence of a commensal organism) appearing as in *I. bicuspidatum*. Ovicells also more or less identical, but with a longer and more apparent median depression. Large avicularia occasional frontally, situated in a concavity of each zooid that bears one, with a tapering triangular rostrum, and a short narrow opesia behind the crossbar. Similar avicularia are commoner abfrontally, with generally one on each dorsal kenozooid between transverse vibices.

DISTRIBUTION. — New Caledonia, northeast of Ouvéa, 245 m.

REMARKS. — This species is remarkably similar to *I. bicuspidatum* in colonial and zooidal morphology, but may be readily distinguished on the basis of the avicularia - those of *I. bicuspidatum* being raised, linguiform, bicuspid, and lacking abfrontally, whereas those of *I. illinguum* are depressed, triangular, and present abfrontally. The species name *illinguum* alludes to the lack of an ovicellular labellum.

Iodictyum trochus sp. nov.

Figs 161-164

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 46, 775 m. — Stn DW 66, 515 m.
MUSORSTOM 6: stn CP 419, 283 m.

TYPES. — *Holotype*: a relatively large flabellate colony fragment preserved in alcohol, from MUSORSTOM 6 Stn CP 419, 20°41.65'S, 167°03.70'E, 283 m, MNHN Bry-19985.

Paratypes: colony fragments from the same locality as the holotype, MNHN Bry-20184; a colony fragment from BIOCAL Stn DW 66, 24°55.43'S, 168°21.67'E, 515 m, MNHN Bry-20084.

DESCRIPTION. — Colony non-pigmented, attaining 28 mm height from a basal stem c. 2.0 mm diameter, branching more or less in one plane, with anastomoses, in a flabellate manner. Branches 2-4 serial, with branch widths ranging from 0.41-1.40 mm. Primary orifice orbicular with no beading. Zooids c. 0.59-0.66 mm long (orifice to orifice) and c. 0.28-0.37 mm wide (internal chamber width c. 0.22 mm), with indistinct boundaries and a lightly textured surface calcification. Each zooid has a single minute pore frontally, usually adjacent to an occasional small oval avicularia that is set transversely. It has thin crossbar and orbicular opesia, and a proportionately larger rostrum with a semicircular palatal shelf. Zooids have long, projecting peristomes with circular orifices. These are striking in appearance, with a circlet of short denticulate ridges inside the rim. The denticles from these ridges vary somewhat in the extent to which they project, but each is acute and directed at angle towards the orifice interior. Beneath the medioproximal pair of denticles a sinus groove, not externally obvious, descends the full length of the peristome to the primary orifice. A rare avicularium may be incorporated into the peristomial rim; this is long and acute, curving with the rim on one side where denticles are lacking; the crossbar is a ridge, with a sunken opesia on one side and an elongate palatal foramen on the other beyond which is a palatal groove. Ovicells difficult to see; set near the bottom of the peristomial tube and largely concealed by secondary calcification. Dorsal branch surface evenly and lightly rugose with smooth depressions and ridges and occasional obliquely set vibices ridges; no abfrontal avicularia.

DISTRIBUTION. — New Caledonia, northwest of Lifou, south of Île des Pins, and Norfolk Ridge, 283-775 m.

REMARKS. — The radiate peristomial openings of this species are particularly striking and are alluded to in the epithet *trochus*, from Greek *trochos*, a wheel. One other noteworthy characteristic of this species is the intimate association of a commensal epibiont, which forms a ramifying stolon along the frontal axis of each branch. The stolons are covered over by zooidal calcification but gaps in this are apparent, along with circular openings, nearly the same size as the small oval avicularia, at zooidal margins. The association between commensal begins immediately after larval settlement. The ancestrula is sac-shaped, with an opesia in the distal half surrounded by a circlet of five short spines. Periancestrula zooids have ramifying calcified tubes closely adherent to them.

A colony fragment from BIOCAL Stn DW 46 doubtfully belongs to this species. The peristome is more expanded distally, the sinus is apparent at the rim, the frontal zooidal surface has polygonal depressions, and frontal avicularia are not apparent.

Iodictyum sp.

Figs 165-166

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4: stn DW 151, 200 m.

DESCRIPTION. — Colony reticulate, pigmented. Zooids 2-3-serial in trabeculae 0.43-0.57 mm wide. Fenestrae ranging from 1.24-1.36 mm long and 0.73-0.75 mm wide. Frontal shield relatively smooth with 3-5 areolar pores distributed around its surface. Primary orifice with no beading of the distal rim; poster with a broad rounded sinus medially, separated from the anter by a pair of stout condyles. Peristomial rim raised, lacking spines or crenulations, with a conspicuous pseudosinus and short sinus groove flanked and defined inwardly by a pair of stout tubercles. Avicularia of two kinds: a subcircular avicularium on the frontal shield of most zooids, and a larger sublingulate avicularium on the zooids that occur at the proximal end of each fenestra; the avicularium broader proximally, with a subparallel rostrum that has an extensive palate and is truncated at the tip. Ovicells not seen. Frontal calcification conceals the ramifying stolons of symbiotic hydroids; the openings of the erect hydroid stems visible at the edges of zooids as circular holes intermediate in size between areolar pores and the round avicularia. Abfrontal surface of colony fairly smooth, with thin vibices. No avicularia on the inner sides of fenestrae, only the lateral areolar pores of autozooids.

DISTRIBUTION. — New Caledonia, north of Belep Islands, 200 m.

REMARKS. — This species was represented only by a small, infertile fragment, now in two pieces, one of which is gold-coated. It appears to have been transported from shallower water. The overall colour is pale pink but some peristomes give evidence that the colour in life was deep magenta.

It is probable that the species is new, but the fragment lacks ovicells and is too small to name formally.

Genus *RETEPORELLA* Busk, 1884

TYPE SPECIES. — *Reteporella flabellata* Busk, 1884.

REMARKS. — *Reteporella* is here regarded as encompassing the genus *Sertella* Jullien *in* JULLIEN & CALVET, 1903.

Reteporella concinnoides sp. nov.

Figs 167-171

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn CP 108, 335 m.
MUSORSTOM 4: stn DW 231, 75 m.
MUSORSTOM 6: stn DW 421, 245 m.

TYPES. — *Holotype*: an alcohol-preserved colony from BIOCAL Stn CP 108, 22°02.55'S, 167°05.68'E, 335 m, MNHN Bry-19983.

Paratypes: an alcohol-preserved colony, MNHN Bry-19982, and same dried colony fragments, some gold-coated, MNHN Bry-20193, from the same locality as the holotype. Some dried colony fragments, some gold-coated, from MUSORSTOM 4 Stn DW 231, 22°33.70'S, 167°10.50'E, 75 m, MNHN Bry-20192.

DESCRIPTION. — Colony fenestrate, starting more or less evenly calyciform, then developing more on one side while curving inwardly; the two largest colonies attaining a height of 28 mm and a lateral spread of 35 mm. Within-colony variation is apparent between the two stations, with the deeper-water colonies (BIOCAL Stn CP 108) having a more open construction than a colony from MUSORSTOM 4 Stn DW 231. Thus, two sets of measurements follow, with those from the shallower station given first, separated by a slash from those for the deeper station. Fenestral length: 0.69-1.53 mm, averaging 1.18 mm / 0.97-2.43 mm, averaging 2.03 mm. Fenestral width: 0.26-0.74 mm / 0.41-1.33 mm. Trabecular width: 0.41-0.77 mm / 0.35-0.71 mm. Zooid length (orifice to orifice): c. 0.24-0.31 mm / 0.35-0.45 mm. Zooidal boundaries mostly merge, even in developing zooids, though frontal vibices occur occasionally; zooidal frontal calcification smooth though lightly textured, with inconspicuous small sparse tubercles. Primary orifice beaded, the proximal rim obscured by a short broad lyrula. Peristomial orifice with 6 oral spines (up to 8 in a specimen from MUSORSTOM 6 Stn DW 421) in developing zooids; some of these remain even in well-calcified parts of branches. The proximal rim of the orifice has 3-4 parallel ridges, mostly at the opesial end of the small avicularium that is on the frontal side of the peristome. This is acute and generally slightly curved, adjacent to a conspicuous spiraminal pore. Two kinds of avicularia occur frontally on zooids. An occasional large avicularium, originating adjacent to the small labial avicularium, curves across the front of the zooid at an angle. This is acute with an acute mandible, and a long narrow palatal foramen. More numerous small avicularia occur scattered on the front of zooids; these are narrow, acute, and set at various angles. Ovicell generally immersed in secondary calcification, with a short fissure visible frontally that does not extend onto the well-developed, parallel-sided labellum. Abfrontal surface of branches evenly and lightly rugose with sparse vibices; clusters of sunken small acute avicularia occur abfrontally at each end of a fenestra, as well along the inner face of every fenestra adjacent to 2-3 larger elongate avicularia that have conspicuously toothed rostral margins and an irregularly shaped opesia.

DISTRIBUTION. — New Caledonia, Sarcelle Passage and offshore from Yate, 75-335 m.

REMARKS. — *Reteporella concinnoides* is very similar to *R. concinna* (Gordon, 1984), in colonial, zooidal, and peristomial morphology. The obvious distinguishing feature is the form of the large avicularia, those of *R. concinna* having a conspicuously toothed rostrum that projects directly outwards without curving.

Reteporella defensa sp. nov.

Figs 172-175

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 38, 360 m. — Stn CP 108, 335 m.
CHALCAL 2: stn DW 76, 470 m.
MUSORSTOM 6: stn CP 419, 283 m. — Stn DW 421, 245 m.

TYPES. — *Holotype*: a flabellate colony in the form of a horizontal crescent, attached to the substratum, from MUSORSTOM 6 Stn DW 421, 20°26.27'S, 166°40.17'E, 245 m, MNHN Bry-19974, in alcohol.

Paratypes: four colonies from the same station, not shaped like the holotype but in the same container, from the same locality, MNHN Bry-19975-19978. Dried colony fragments from BIOCAL Stn CP 108, 22°02.55'S, 167°05.68'E, 335 m, MNHN Bry-19979; from CHALCAL 2 Stn DW 76, 23°40.50'S, 167°45.20'E, 470 m, MNHN Bry-20078; and from MUSORSTOM 6 Stn CP 419, 20°41.65'S, 167°03.70'E, 283 m, MNHN Bry-20076 and 20180.

DESCRIPTION. — Colony dendroid; in most of the colonies in the collection it is in the form of a horizontal fan, at right angles to the relatively short 'trunk' by which it is attached to the substratum, with the zooidal orifices facing the substratum; only 1 colony grew straight out from the substratum; colony size up to 42 mm high and 36 mm across. The colony has numerous major branches, all in one plane, joined by short cross-connections that have avicularia but no feeding zooids; in the central part of a colony the branches are 0.59-1.40 mm wide, the cross-connections 0.37-0.62 mm wide. Zooids c. 0.63-0.71 mm long (orifice to orifice), the calcareous surface smooth or faintly textured and somewhat undular, with varices roughly indicating zooidal boundaries. Oral spines 6 in developing zooids, with 0-3 being retained in more calcified zooids; these may be simple or bifurcates, or strikingly cervicorn. The proximal rim of the peristome includes a transversely set oval avicularium with a toothed rostrum; subjacent to the opesia is a labial pore. A pair of oral spines or spine bases frequently flanks the avicularium, even in ovicelled zooids. Apart from a few small areolar pores, the frontal shield is well-endowed with avicularia, which are of two kinds. On some zooids are 1-2 small oval avicularia like the peristomial avicularium, usually elevated, with a denticulate rostral rim. Much more common is an elongate boat-shaped avicularium, with an extensive flat palate and raised rims, that occurs in a range of orientations and sizes from quite small to very large, the latter lying diagonally across the entire frontal surface of the zooid; the opesia is narrow and slit-like, the suboval/subtriangular palatal foramen occupies about one-third the length of the palate, with a small pore beyond; the entire avicularium is raised just above the surface of the autozooid, with the low palatal rims each terminating in an upturned point so that there is a gap distally where the rostral tip would be; the mandible does not project beyond the palate. Ovicell cucullate, with a transverse or subcircular apical foramen in the ectooecium, revealing the endooecial tabula beneath; the entire ovicell becoming soon encroached up by secondary calcification from adjacent zooids. Abfrontal surface divided into irregular sectors by vibices; within each sector are several small pores and small to medium-sized avicularia like the frontal boat-shaped ones. The presence of an ectosymbiotic hydroid is evidenced by the calcified tubes (mostly concealed) and tube openings on the frontal sides of branches.

DISTRIBUTION. — New Caledonia, Ouvéa and Lifou Islands, southeastern New Caledonia, and northern Norfolk Ridge, 245-470 m.

REMARKS. — This species is instantly recognisable by its abundant, distinctively shaped avicularia, and cross branches lacking autozooids. Additionally, however, *R. defensa* is characterised by cervicorn oral spines and cucullate ovicells with a tabula, both features being apparently unique in the genus.

Reteporella ferox sp. nov.

Figs 176-178

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 6: stn CP 419, 283 m.

TYPES. — *Holotype*: a single large colony from MUSORSTOM 6 Stn CP 419, 20°41.65'S, 167°03.70'E, 283 m, MNHN Bry-19981.

Paratype: coated fragment from the holotype colony, MNHN-Bry 20081.

DESCRIPTION. — Colony erect, non-fenestrate, with a few main axes from which dichotomous branches arise, attaining 27 mm height. Main stem maximally 1.3 mm across, the smallest branches biserial, 0.36 mm across. Zooids lacking distinct boundaries between them, the overall surface more or less smooth with gentle irregularities and small sparse areolar pores. Occasional larger round pores between zooids presumably belonging to an epibiotic hydroid in life. Peristomial orifices typically with 5 spine bases (2 on one side, 3 on the other) or these obliterated by secondary calcification; internal diameter of orifice 0.11-0.15 mm wide. Proximal rim with a small oval avicularium medially, the cross-bar with tiny processes on each side, the rostral rim with a few denticulations; the peristomial side of the avicularium with a small cusp. Small avicularia scattered sparsely over the frontal surface of the colony, these with a narrowly tapering acute rostrum. Larger avicularia conspicuous near or at the branch margins; these with the opesial area obliterated by calcification and the distal half (most of the rostrum) serrated and down-curved. Ovicells appearing externally as bulges, generally completely covered by secondary calcification; a small part of the endooecial exposure may be visible proximally. The abfrontal surface of the colony like the frontal surface or a little more crinkly, with tiny scattered pores, and some of the small acute avicularia along the margins.

DISTRIBUTION. — New Caledonia, northeast of Lifou, 283 m.

REMARKS. — *Reteporella ferox* is most easily distinguished by the distinctive large lateral avicularia with toothed, down-curved rostra. Where these are common the branch margins appear quite jagged, hence the specific name *ferox*, Latin, fierce.

Reteporella orstomia sp. nov.

Figs 179-180

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 6: stn DW 431, 21 m.

TYPES. — *Holotype*: an alcohol-preserved colony from MUSORSTOM 6 Stn DW 431, 20°22.25'S, 166°10.00'E, 21 m, MNHN Bry-19984.

Paratypes: dried colony fragments from the same locality as the holotype, MNHN Bry-20082 and 20185.

DESCRIPTION. — Colony erect, to 16 mm high, more or less open-branched but with narrow cross-connections that contain few or no autozooids. Branch width near the originally calyciform base of the colony c. 0.93-1.22 mm, reducing to 0.31-0.75 mm in the distal half. Cross-connections are 0.20-0.34 mm thick. Zooids 0.37-0.47 mm long (orifice to orifice), outlined by thin vibices, with faintly textured, smooth frontal calcification in which are a few small pores. Peristome relatively well developed in neanic zooids, especially laterally, and with 1-2 short processes, the height of the peristome becoming reduced as secondary calcification thickens the frontal shield; the proximal rim of the peristome has a median sinus that descends as a slit-like sinus tube. There is no labial avicularium or pore (spiramen). Frontal avicularia of two kinds, both large, absent from some parts of colonies but occurring in clusters in others. One kind projects frontally in the centre of the zooid, with an acute triangular rostrum that is upturned at the tip; the opesia is short and narrow, the palatal foramen relatively large and suboval. The other, slightly sunken, is on one side of the zooid and directed proximally; the opesia and palatal are as in the other avicularium, but the rostrum is subspatulate, narrowing in the middle before expanding distally,

where it is truncate with upturned tips on each side; its mandible is likewise abruptly truncate. There are no small avicularia. Ovicell with a median longitudinal fissure that does not extend onto the labellum which is turned inward somewhat. Abfrontal surface of branches lightly rugose, with thin vibices and scattered small pores, but no avicularia.

DISTRIBUTION. — New Caledonia, Beautemps-Beaupré Atoll north of Ouvéa, 21 m.

REMARKS. — This species is relatively nondescript, but may be distinguished reasonably easily by the presence of two kinds of large frontal avicularium and the complete absence of abfrontal avicularia.

Reteporella sp.

Figs 181-184

MATERIAL EXAMINED. — **New Caledonia**. BIOGEOCAL: stn DW 253, 310-315 m.

DESCRIPTION. — Sole colony fragment 4 mm long, with 2 broken bifurcations; branch width 0.62-0.85 mm. Colony surface, including abfrontally, regularly dimpled. Zooidal boundaries completely obscured. Peristomes slightly raised above frontal surface, somewhat pyriform with a smooth inner rim; interior diameter of peristome 0.094 mm; a median spiraminal pore delimited by a pair of tubercle-like processes that fuse at their tips; no sinus groove or incorporated avicularium. Oral spines not seen. Tiny oval avicularia occur sparsely on the colony surface, with a short stubby ligula on the rostral side of the crossbar. Ovicell mostly concealed by dimpled secondary calcification, the ectooecial surface smooth with a median slit in its frontal face, the labellum truncate with no lateral flanges. No other characters discernible.

DISTRIBUTION. — New Caledonia, off east coast, NE of Thio, 310-315 m.

REMARKS. — Owing to the small size of the colony fragment it is not possible to determine whether the species is reticulate or open-branching. Its dimpled surface invites comparison with the genus *Malleatia* Jullien *in* JULLIEN & CALVET, 1903, characterised by "ponctuations cupuliformes". Apart from the surface sculpturing, particular similarities with *Malleatia rara* include: mostly concealed ovicell with a short slit frontally and short truncate labellum, apparent absence of oral spines, and small round adventitious avicularia. Details of the peristome differ, however, in that *M. rara* has a median suboral avicularium, so that the labial spiramen tube is offset to one side. In this, *M. rara* resembles *Reteporella malleatia* (Gordon, 1984) from the Kermadec Ridge, which also has oral spines. Thanks to the courtesy of Dr Peter J. HAYWARD (University of Wales, Swansea), it is possible to compare the type species of *Reteporella* (*R. flabellata* Busk, 1884) with *Malleatia rara*. His unpublished scanning electron micrographs of *R. flabellata* show that it has an irregularly beaded distal rim like that of *M. rara*, the form of the ovicell is more or less identical, and the frontal shields of both species are umbonuloid (as in some other phidoloporids - pers. obs., DPG). *Reteporella flabellata* lacks a peristomial avicularium, having instead a median or submedian spiraminal opening (so-called labial pore) like that in the present specimen from BIOGEOCAL Stn DW 253. Overall, then, it is apparent that there is no consistent correlation between the presence of frontal-shield dimpling and the characters of the primary orifice and peristome. Both *Malleatia rara* and the present New Caledonian specimen can be included in *Reteporella* Busk.

Genus ***RETEPORELLINA*** Harmer, 1933

TYPE SPECIES. — *Retepora denticulata* Busk, 1884.

Reteporellina cruciformis sp. nov.

Figs 185-187

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3: stn DR 117, 97-92 m.

TYPES. — *Holotype*: parts of a dried single colony from MUSORSTOM 3 Stn DR 117, 12°31.3'N, 120°29.5'E, 97-92 m, MNHN Bry-20080.

DESCRIPTION. — Colony erect, dichotomously branching, the longest fragment 8 mm high. Branches 0.43-0.84 mm wide, the zooids in 3-4 longitudinal rows, 5 before bifurcations. Zooids 0.41-0.45 mm long (orifice to orifice) and 0.20-0.22 mm wide, with a smooth surface and distinct boundaries. Zooidal peristome long and tubular on non-ovicelled zooids, especially the lateral ones, with an spout-like rim. Primary orifice suborbicular, with a beaded distal rim and a small pair of condyles. The inner rim of the peristomial orifice has a median pseudosinus, that descends as a sinus groove down the inside of the spout where it is flanked by a pair of stout tubercles. At a lower level within the peristome, on the distal face, is another pair of stout tubercles. When seen frontally, the two pairs of tubercles, though at different levels and incompletely cruciform, appear to oppose one another. Neanic parts of colonies may consist entirely of zooids lacking ovicells and frontal avicularia. In contrast, mature parts of colonies have clusters of zooids (ovicelled and non-ovicelled) which each have a large, spatula-shaped, labial avicularium. This tends to curve around in front of the peristomial rim and are directed obliquely forward with the palate facing distally. The avicularian opesia is more or less obliterated; the palatal foramen is elongate-oval, and the rostral rim is roundly subtruncate with the outer corners produced slightly, giving a bicuspid appearance. A similar avicularium, more obviously bicuspid, occurs along the outer lateral margin of many zooids, descending the branch with the rostrum pointing proximally, the palate facing laterofrontally. Ovicells recumbent, becoming covered distally by secondary calcification, with a short rounded labellum beyond which the lateral processes curve round almost to fuse proximally; the median fissure does not extend as far as the labellum. Abfrontal side of branches with the lightly cobbled surface crossed by vibices. A moderately large avicularium occurs below most branch axils, raised or flush with the surface.

DISTRIBUTION. — Philippines, Mindoro Strait, 92-97 m.

REMARKS. — *Reteporellina cruciformis* resembles *R. idmoneoides* Harmer, 1934 and the following new species in having projecting peristomes and large labial avicularia, but may be distinguished from both by the cruciform arrangement of internal peristomial tubercles and the shape of the lateral avicularia.

Reteporellina spiramina sp. nov.

Figs 188-191

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3: stn CP 139, 240-267 m.
BIOCAL: stn DW 44, 440 m. — Stn DW 66, 515 m.

TYPES. — *Holotype*: the largest of five dried colony fragments from BIOCAL Stn DW 66, 24°55.43'S, 168°21.67'E, 515 m, MNHN Bry-20085.
Paratypes: dried colony fragments from MUSORSTOM 3 Stn CP 139, 11°53.0'N, 122°14.0'E, 240-267 m, MNHN Bry-20189, and from BIOCAL Stn DW 44, 22°47.30'S, 167°14.30'E, 440 m, MNHN Bry-20047.

DESCRIPTION. — Colony erect, tending to have one main, curving stem from which dichotomous branches arise, the longest fragment c. 11 mm. Branches 0.43-1.01 mm wide, the zooids in 2-3 (mostly 3) longitudinal rows, 4 before bifurcations. Zooids 0.57-0.78 mm long (orifice to orifice) and c. 0.31 mm wide, with a lightly granular-tubercular surface and distinct boundaries. Zooidal peristome projecting, especially on marginal zooids, the rim irregular; the distal rim of the youngest zooids may bear 3 articulated spines whose bases are discernible in many older zooids. In the middle of the proximal rim of the peristomial orifice is the entrance to a spiraminal tube that descends through a narrow ridge down the inside of the peristome. A large labial avicularium, more or less identical to that of the preceding species, occurs with the same orientation and position in front of the peristome of some zooids, both ovicelled and non-ovicelled. A different-shaped large avicularium occurs along the outer lateral margin of many zooids and below branch axils; this is elongate with gently tapering sides and a rounded rostral tip directed proximally; there is a small palatal foramen by the crossbar, a smaller foramen near the rostral tip, with a

palatal shelf in-between. On the side opposite the avicularium is a concavity of the same size that accommodates the folded-back mandible. Ovicells recumbent, becoming covered laterally by secondary calcification, with a narrow labellum onto which the long median fissure extends; lateral processes do not fuse proximally. Abfrontal branch surface granular, with vibices.

DISTRIBUTION. — Philippines, south of Mindoro, 240-267 m. New Caledonia, Île des Pins and northern Norfolk Ridge, 440-515 m.

REMARKS. — The spiraminal tube and shape of the lateral avicularia distinguish *R. spiramina* from the preceding species.

Reteporellina granulosa sp. nov.

Figs 192-193

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 38, 360 m.

TYPES. — *Holotype*: a single, broken, branch fragment from BIOCAL Stn DW 38, 22°59.74'S, 167°15.31'E, 360 m, MNHN Bry-20079.

DESCRIPTION. — Colony erect, branching dichotomously, the sole fragment (now in two pieces) 6 mm long. Branch width 0.48-0.69 mm, the zooids in 2-3 longitudinal rows. Zooids 0.65-0.79 mm long (orifice to orifice), the surface coarsely granular with thin vibices, the zooidal boundaries not clearly delimited. Zooidal peristome projecting only moderately in marginal zooids, tending to be shortened and lost through secondary calcification, the rim somewhat scalloped by short ridges just inside the rim. No labial pore or avicularium; a median sinus groove occurs down the midline. A large avicularium occurs on the front of a number of zooids, ovicelled and non-ovicelled; this is directed proximally or at a slight angle; the rostrum is elongate-triangular with an extensive palate and small, narrow palatal foramen; the opesia is minute, beyond which there is a subtriangular concavity to accommodate the folded-back mandible. A similar avicularium occurs on the abfrontal surface, behind many of the peristomes. Ovicell recumbent, pyriform, becoming covered by secondary calcification; the median fissure is confined almost entirely to the short, triangular labellum, beyond which the long lateral processes converge below. Abfrontal surface coarsely granular with thin vibices.

DISTRIBUTION. — New Caledonia, southwest of Île des Pins, 360 m.

REMARKS. — This species is distinguished particularly by the characters of the ovicellular labellum and frontal avicularium.

Reteporellina projecta sp. nov.

Figs 194-195

MATERIAL EXAMINED. — **New Caledonia**. BIOGEOCAL: stn CP 290, 920-760 m.

TYPES. — *Holotype*: a very small colony fragment from BIOGEOCAL Stn CP 290, 20°36.91'S, 167°03.34'E, 760-920 m, MNHN Bry-20190.

DESCRIPTION. — Colony erect, branching, the zooids more or less in 2 series, with the interpolation of additional zooids just before a bifurcation. Branch width 0.45-0.6 mm between peristomes which project alternately to left and right of the branch axis. Zooidal width (best determined from the abfrontal side) 0.28-0.33 mm. Peristomes of variable length, the median and near-median ones shorter than the lateral ones that extend up to 0.50 mm from the branch surface. Frontal shield and peristomes with a light granular-tubercular texture. Primary orifice lacking beading of the distal rim. Peristomial orifice bordered by 7 spines distally; on the proximofrontal rim a labial suture descends to a labial pore (spiramen). Typically a small oval avicularium near the base of the peristome on the frontal shield; another such avicularium can occur proximally on the shield; these

can later become occluded. No other avicularia seen. Ovicells not present. Abfrontal surface textured like the frontal side, separated from the frontal surface by a thin varix coursing down the outer side of each lateral zooid; with occasional small round avicularia, these tending to be raised slightly above the surrounding surface.

DISTRIBUTION. — New Caledonia, north of Lifou, 760-920 m.

REMARKS. — Although the sole fragment is small and infertile it is very distinctive and easily recognisable among the relatively small number of described species of *Reteporellina*. The distinctive features are peristomial, i.e., strongly projecting, with seven distal spines, and a long labial suture.

Genus ***TRIPHYLLOZOON*** Canu & Bassler, 1917

TYPE SPECIES. — *Retepora monilifera* MacGillivray, 1860.

Triphyllozoon gracile sp. nov.
Figs 196-200

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3: stn DR 117, 92-97 m.

TYPES. — *Holotype*: the largest stem in a welled slide of fragments from MUSORSTOM 3 Stn DR 117, 12°31.3'N, 120°39.5'E, 92-97 m, MNHN-Bry 20049.
Paratypes: the remaining fragments in the same slide, from same locality as holotype, MNHN-Bry 20049.

DESCRIPTION. — Colony erect, branching, the branches slender, minimally 0.41 mm across, widening to 0.85 mm before a bifurcation. Zooids 2-3-serial, c. 0.45-0.52 mm long, the frontal shield sparsely and lightly granular-tubercular, with no obvious boundaries and small sparse areolar pores. Distal rim of primary orifice lacking beading. Peristomial orifice outwardly symmetrical, with a pair of small oval avicularia with denticulate rostral rim flanking a median spiraminal pore; notwithstanding the outward symmetry, a sinus groove descends to one side of an asymmetrical lyrula internally that has a small ala on one side only. Additional small oval avicularia are scattered sparsely on the frontal surface of branches; occasional larger suboval avicularia with parallel sides occur along the outer margins of the most lateral zooids; no spatulate or munitiform avicularia. Ovicells occurring in vertical rows of 3 or more along the branch axis; trilobed stigma with short lateral arms, the median arm ascending to the apex of the ovicell which is submucronate; proximal edge of ovicell truncate with no lateral flanges. Abfrontal surface separated from the frontal surface by a varix coursing along the sides of the most lateral zooids; the surface like that frontally, with numerous similar avicularia, especially the larger ones, occurring with small pores along the outer edges.

REMARKS. — Because the fragments are broken it is not possible to affirm whether the species is open-branching or loosely fenestrate. If it is fenestrate, it must have the largest fenestrae or open appearance of any species. The symmetrical arrangement of peristomial avicularia is very distinctive, allowing for easy recognition of the species.

Superfamily CONESCHARELLINOIDEA Levinsen, 1909

Family LEKYTHOPORIDAE Levinsen, 1909

Genus ***HARPAGO*** Gordon, 1989

TYPE SPECIES. — *Harpago minutus* Gordon, 1989b.

Harpago dissidens sp. nov.

Figs 201-204

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 66, 515 m.

TYPES. — *Holotype*: a single colony from BIOCAL Stn DW 66, 24°55.43'S, 168°21.67'E, 515 m, MNHN-Bry 20036. No paratypes.

DESCRIPTION. — Sole colony somewhat conical in overall shape, the outline broken by the projecting peristomes, 2.04 mm high and potentially (but for broken peristomes) 2.26 mm maximum diameter. Zooids more or less whorled around the colony axis, the zooids in one whorl nearly alternating with those above and below. Zooids somewhat inflated in appearance, tapering to an outwardly projecting tubular peristome. Frontal shield smooth, glabrous, with 4-5 tiny areolar pores along each margin. Primary orifice 0.15 mm long and 0.19 mm wide with a more-or-less V-shaped sinus flanked and defined by a stout .pair of condyles angled across the proximal corners of the orifice. No peristomial or other avicularia. Ovicells large, sac-like, with an extensive smooth tabular area bordered by a low rim and with a pair of pores at the peristomial end of the tabula. At the broad growing apex of the colony is a small central area of ?extrazooidal calcification in which are tiny septular pores.

DISTRIBUTION. — New Caledonian waters: northern Norfolk Ridge, 515 m.

REMARKS. — It is unfortunate that the sole colony lacks the earliest-formed zooids for it is not possible to be certain if it was encrusting or rooted. In its overall form it closely resembles *Harpago minutus*, but lacks the dimpled calcification of that species and, more importantly, has an ovicellular tabula. This latter feature may be adequate for generic distinction from *Harpago*.

Family BATOPORIDAE Neviani, 1900

REMARKS. — The name Batoporidae Neviani, 1900 has priority over Orbituliporidae Canu & Bassler, 1923.

Genus *PTOBOROA* nov.

TYPE SPECIES. — *Batopora pulchrior* Gordon, 1989a.

DIAGNOSIS. — Colony conical to claviform, with a single axial tube proximally. Zooids more or less alternating in whorls with short, laterally projecting peristomes. Primary orifice circular or nearly so, with a broad rounded poster separated from the anter by a pair of angular condyles; with a pore incorporated into the peristomial rim middistally. Adventitious avicularia tiny, suboval with a pair of mandibular pivots, not associated with the peristome. Ovicell prominent, recumbent, the broad endooecium convex, smooth, the ectooecium laterally calcified, frontally membranous.

REMARKS. — When describing *Batopora pulchrior*, GORDON (1989a) suggested that a new genus might be required for this and some other species that do not strictly conform to either *Batopora* Reuss or *Lacrimula* Cook. A new genus is established here, therefore, for *B. pulchrior*, *B.* sp. (D'HONDT, 1986), and the following new species. It differs from the type species of *Batopora* in being claviform and in lacking interzooidal kenozooids, and from the type species of *Lacrimula* in lacking dimorphic orifices and perforated ovicells.

Ptoboroa is an anagram of *Batopora*.

Ptoboroa gelasina sp. nov.

Figs 205-207

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn KG 101, 1790 m.

TYPES. — *Holotype*: unique colony from BIOCAL Stn KG 101, 21°26.51'S, 166°24.43'E, 1790 m, MNHN-Bry 20038. No separate paratypes.

DESCRIPTION. — Sole colony claviform, comprising a club-like dilatation of autozooids tapering to a narrow axial tube; colony length 1.28 mm, dilatation width 0.92 mm, internal diameter of axial tube 0.11 mm. Entire colony surface dimpled, with reticulate patterning, zooidal boundaries not evident and areolar pores tiny, sporadic. Primary orifice circular, the broad rounded poster occupying the proximal third, separated from the anter by a small pair of condylar ridges angles proximally. Peristomial rim low, with a circular pore middistally. Adventitious avicularia tiny, sparsely distributed, the rim nearly circular, the rostral and opesial areas separated by a pair of mandibular pivots. Ovicells not present.

REMARKS. — The unique holotype specimen is very similar to the type species, *Ptoboroa pulchrior* comb. nov. in most respects. One difference, apart from the dimpled colony surface, is that the axial tube is simple and hollow, whereas in *P. pulchrior* it has internal radial partitions, the significance of which is unknown.

Family CONESCHARELLINIDAE Levinsen, 1909

Genus *CONESCHARELLINA* d'Orbigny, 1852

TYPE SPECIES. — *Conescharellina angustata* d'Orbigny, 1852.

Conescharellina breviconica Canu & Bassler, 1929

Figs 208-211, 214

Conescharellina breviconica Canu & Bassler, 1929: 491, pl. 69, figs 10-17, text-figs 206 G-H, 207 G.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3: stn CP 87, 191-197 m. — Stn CP 100, 189-199 m. — Stn CP 101, 194-196 m. — Stn CP 102, 192 m. — Stn CP 106, 640-668 m.

DESCRIPTION. — Colony conical, the cone becoming proportionately higher as the colony grows, such that in young colonies the base exceeds the height by c. 15% and in old colonies by c. 10%; the largest colony 3.09 mm diameter and 3.00 mm high. Zooidal orifices arranged quincuncially, their peristomes projecting only around the periphery of the base where they appear as truncated cones. Colony surface with a light granular-tubercular texture, the ridges between peristomes rounded, somewhat tubercular apically in small colonies. Zooidal dimensions as measured at the flat colony base: c. 0.62 mm × 0.20 mm (small colony) to 0.77 mm × 0.40 mm (largest colony). Primary orifice ranges from 0.10-1.66 mm × 0.084-0.13 (small colony) to 0.13-0.19 mm × 0.11-0.17 (largest colony); shape suborbicular, the proximal margin broadly or roundly V-shaped, flanked by a small pair of condyles that may be lacking in some colonies (presumably because of abrasion), set within a smooth thin peristomial rim. Small sparse areolar pores occur between orifices. Avicularia suborbicular, occurring between orifices in interzooidal areas, though not with consistent regularity, with a thin, near-median cross-bar that is often broken. Colony base nearly flat, comprising an outer row of radially arranged autozooids surrounded a "cancellate" (kenozooidal) area that is proportionately smaller (30% of diameter) in the smallest colonies than in large colonies (42-56% of diameter).

DISTRIBUTION. — Central Philippines between 10° and 14°N, 58-969 m.

REMARKS. — This species has not been described since its introduction and so is redescribed here. CANU & BASSLER (1929) gave bottom temperatures for two of the *"Albatross"* stations at which this species occurred, citing 14.3°C at 216 m and 10.4°C at 969 m.

Conescharellina catella Canu & Bassler, 1929

Figs 212-213, 215

Conescharellina catella Canu & Bassler, 1929: 485, pl. 68, figs 8-10, text-fig. 206 C-D. — Harmer, 1957: 732, pl. 47, fig. 5, text-fig. 70 B.

Material examined. — **Philippines**. Musorstom 3: stn CP 100, 189-199 m. — Stn CP 102, 192 m. — Stn DR 117, 92-97 m.
New Caledonia. Biogeocal: stn KG 316, 1660 m.

Distribution. — East of Korea, Sea of Japan, Philippines, Indonesia, 35-421 m; Loyalty Islands, 1660 m.

Remarks. — The present material matches very well the descriptions of Canu and Bassler (1929) and Harmer (1957), except that the radial zooidal rows are slightly oblique in some of our specimens. Our material typically also shows a slight ligulation of the avicularian cross-bar, not mentioned by the previous authors. The largest colony in the collection (from Musorstom 3 Stn CP 102) was 2.89 mm high and 2.64 mm basal diameter. A colony from Biogeocal Stn KG 316 occurred in much deeper water than previously recorded. It resembles the other material except for the lack of avicularia between some of the orifices.

This species is one of several that have zooidal orifices opening along the longitudinal ridges ("costules", in the terminology of Canu and Bassler, 1929), separated by furrows in which there are avicularia. This species is particularly characterised, however, by its offset ovicells that are produced to one side of the ridge and lie partly across a furrow. This character is shared by other species, including *C. striata* Silén, 1947 and *C. brevirostris* Silén, 1947. It is likely that ovicellular displacement is a generic-level character but, at this stage of our knowledge, in the apparent absence of correlated characters, it is not possible to be certain. Ovicells are usually lacking from conescharellinid colonies, but ovicellular displacement can be inferred from the position of the pore, distal to the peristomial orifice, from which ovicells are produced, the pore also being displaced. Notwithstanding, a colony from Biogeocal Stn KG 316 has some of these pores in a median position while others are displaced.

Conescharellina atalanta sp. nov.

Figs 216-218

Material examined. — **New Caledonia**. Musorstom 4: stn DW 149, 165 m. — Stn DW 150, 110 m.

Types. — *Holotype*: colony from Musorstom 4 Stn DW 149, 19°07.60'S, 163°22.70'E, 165 m, MNHN-Bry 20099, gold-coated.
Paratypes: 16 ethanol-preserved colonies from Musorstom 4 Stn DW 150, 19°07.50'S, 163°22.10'E, 110 m, MNHN-Bry 20019.

Description. — Colony a low cone, wider (2.59-3.45 mm) than high (1.43-2.28 mm), the zooidal orifices distributed in subregular radial rows between which are avicularia. Orifices 0.066-0.104 mm diameter, distinctly smaller towards the apex, with thin, fragile condyles defining a U-shaped sinus. Avicularia subcircular to ovoid 0.058-0.094 mm long, with thin, complete cross-bars; avicularia overlapping the autozooidal orifices in size such that, in an eroded colony with orificial condyles and avicularian crossbars lacking, it may be difficult discriminating between orifices and avicularia. Basal surface with an extensive cancellate area occupying 61-70 % of the basal diameter, surrounded by a relatively narrow zone of autozooidal walls. Tiny oval avicularia 0.037 mm long present inside the rims of several cancellae, the cross-bar complete.

Distribution. — New Caledonia, near Belep Islands, 110-165 m.

Remarks. — The species name is derived from the Greek *atalantos*, equal in weight or equal to, alluding to the near similarity in size of orifices and frontal avicularia.

Key characters to look for in quickly discriminating this species from others of the genus are the overlap in dimensions of zooidal orifices and frontal avicularia in combination with the large cancellate area basally.

Genus *TROCHOSODON* Canu & Bassler, 1927

TYPE SPECIES. — *Trochosodon linearis* Canu & Bassler, 1927.

Trochosodon sp.

Figs 219-220

MATERIAL EXAMINED. — **New Caledonia**. BIOGEOCAL: stn KG 275, 1959 m. — Stn CP 317, 1630-1620 m.

DESCRIPTION. — Colony small, comprising a small, somewhat flattened, central subdiscoidal area 1.11 mm across (minimum colony diameter) composed primarily of 4 autozooids with concave peristomial openings; between each pair of peristomes another, projecting, autozooid and peristome may occur, depending on the stage of growth; width of zooidal projection at the point where it projects from the central area c. 0.37-0.43 mm. Entire colony surface granular-tubercular. Primary orifice with a small U-shaped sinus delimited and flanked by a small pair of condyles. Adapical surface with tiny rootlet pores and suborbicular avicularia, the latter 0.094 mm long with complete cross-bars.

DISTRIBUTION. — New Caledonia: South Loyalty Basin, 1620-1959 m.

REMARKS. — This tiny species is probably new but additional material is needed before it can be properly characterised.

Genus *CRUCESCHARELLINA* Silén, 1947

TYPE SPECIES. — *Cruceschareilina japonica* Silén, 1947.

Cruceschareilina japonica Silén, 1947

Figs 221-223

Cruceschareilina japonica Silén, 1947: 44, text-figs 28-31, pl 1, figs 11-12.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3: stn CP 106, 640-668 m.

DISTRIBUTION. — Kyushu, Japan, 175 m. Central Philippines, 640-668 m.

REMARKS. — A single colony 7 mm maximum length occurred in the collection. This appears to be only the second colony known of the species. It is well preserved and accords in every detail with SILÉN's (1947) description and illustrations, except that the expanded ends of the branches are slightly less expanded than in SILÉN's specimen. The Japanese colony was obtained from a shallower depth, with a recorded bottom temperature of 13.7°C.

Cruceschareilina jugalis Gordon, 1989a, from New Zealand, differs primarily in lacking crescentic kenozooidal openings ('lunoecia'); the primary orifice is proportionately narrower, the avicularian cross-bars are slightly thicker, and there are no elongate avicularia. *Cruceschareilina decussis* (Canu & Bassler, 1929), from the Philippines and Indonesia, has a more regular colony form with narrower branches, the mandibles of the large avicularia are more spatulate, the peristomial margins can vary in shape, and lunoecia, if present, are rare.

Crucescharellina aster sp. nov.

Figs 224-227

MATERIAL EXAMINED. — **New Caledonia**. BIOGEOCAL: stn KG 210, 1190 m. — Stn KG 211, 975 m. — Stn CP 232, 760-790 m. — Stn CP 260, 1820-1980 m. — Stn KG 262, 1380 m. — Stn KG 267, 1935 m. — Stn CP 317, 1630-1620 m.

New Zealand. NZOI: stn F874, 1357 m. — Stn F879, 1267 m. — Stn U198, 1573 m.

TYPES. — *Holotype:* a large colony from BIOGEOCAL Stn KG 267, 21°02.20'S, 166°58.76'E, 1935 m, MNHN-Bry 20096.

Paratypes: two gold-coated colonies from BIOGEOCAL Stn CP 232, 21°33.81'S, 166°27.07'E, 760-790 m, MNHN-Bry 20091. Three colonies from NZOI Stn F879, 37°25.50'S, 177°30.00'E, 1267 m, registration no. P-1089.

DESCRIPTION. — Colony stellate, in the form of a 6-rayed star, the longest radius of which is 3.81 mm (tip of "arm" to centre of colony); "arms" biserial, the zooids alternating; "arm" width at midlength 0.50-0.64 mm. Colony surface granular-tubercular in the centre, smooth elsewhere. Zooid length 0.71-0.79 mm, measured from peristome to peristome. Primary orifice and operculum suborbicular, c. 0.14 mm wide, with a median U-shaped sinus defined and flanked by a pair of condyles. A median pore distally from which ovicells (not seen) presumably bud. Small circular avicularia scattered sparsely on both colony surfaces, 0.037-0.047 mm diameter, with complete cross-bars. Small rootlet pores of the same diameter present centrally on the "apical" surface.

DISTRIBUTION. — New Caledonia, 760-1980 m. New Zealand, 1267-1573 m.

REMARKS. — This is a very striking species. When large numbers occur in a sample the overall visual effect is one of clusters of snowflakes. The regularly stellate colony form immediately distinguishes this species from the others in the genus.

DISCUSSION

A total of 98 species of ascophorine bryozoans is herein recorded, mostly from the infraorder Lepraliomorpha as defined by GORDON (1989a), of which 10 species occurred only at Philippine stations. The most speciose families are: Phidoloporidae, 19 species; Smittinidae, 9 species; Celleporidae, 8 species; and Porinidae, Siphonicytaridae and Conescharellinidae, 6 species each. The most speciose genera are *Siphonicytara* (6 species), *Characodoma*, *Iodictyum*, and *Reteporella* (5 species each), and *Haswelliporina* and *Reteporellina* (4 species each). Of the 84 species occurring in New Caledonian waters it is striking how many are endemic to the area - 57 species (68%). Ten species are shared only with New Zealand (*Parasmittina erecta*, *Oppiphorina epaxia*, *Haswelliporina multiaviculata*, *Riscodopa parva*, *Gigantopora oropiscis*, *Onchoporoides moseleyi*, *Yrbozoon ringens*, *Buffonellaria regenerata*, *Galeopsis mimicus*, *Crucescharellina aster*) (especially in deeper water and along the Kermadec Ridge), 4 species are shared only with the Philippines (*Hemismittoidea ennea*, *Haswelliporina quinaria*, *Reteporellina spiramina*, *Conescharellina catella*), and 13 others have a wider Indo-Pacific distribution.

The diversity of *Siphonicytara* species is quite striking. Only 5 extant species of this distinctive genus have been described previously: one Malagasy, one Philippine, the remainder Indonesian. The New Caledonian fauna more than doubles the number of species.

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REFERENCES

AUDOUIN, J.V., 1826. — Explication sommaire des planches de polypes de l'Égypte et de la Syrie, publiées par Jules-César Savigny. Pp. 225-244. *In : Description de l'Égypte, ou recueil des observations et des recherches qui ont été faites en Égypte pendant l'Expédition de l'Armée française ... Histoire naturelle.* Tome 1, 4e partie. Imprimerie Impériale, Paris. 339 p.

BASSLER, R.S., 1935. — *Fossilium catalogus, I: Animalia, Pars 67 - Bryozoa. Generum et genotyporum. Index et bibliographica.* W. Junk, Gravenhage. 229 p.

BASSLER, R.S., 1953. — *Treatise on invertebrate paleontology. Part G. Bryozoa.* Geological Society of America & University of Kansas Press, New York. i-xiii + 253 p.

BOCK, P.E. & COOK, P.L., 1993. — *Quadriscutella* gen. nov. (Bryozoa, Cheilostomata) from the Tertiary and Recent of Victoria and South Australia. *Alcheringa*, **17**: 159-171.

BROWN, D.A., 1952. — *The Tertiary Polyzoa of New Zealand.* Trustees of the British Museum (Natural History), London. vii-xii + 405 p.

BROWN, D.A., 1958. — Fossil cheilostomatous Polyzoa from southwest Victoria. *Memoirs of the Geological Survey of Victoria*, **20**: 1-90.

BUSK, G., 1852. — An account of the Polyzoa, and sertularian zoophytes, collected in the voyage of the Rattlesnake, on the coasts of Australia and the Louisiade Archipelago, &c. In: J. MACGILLIVRAY, *Narrative of the voyage of H.M.S. Rattlesnake, commanded by the late Captain Owen Stanley ... 1846-1850 ...* T.W. Boone, London. Vol. **1**: 343-402, pl. 1 (Appendix No. IV).

BUSK, G., 1855. — Zoophytology. *Quarterly Journal of Microscopical Science*, **3**: 320-324, pls 3-4.

BUSK, G., 1859. — *A monograph of the fossil Polyzoa of the Crag.* The Palæontographical Society, London. 136 p.

BUSK, G., 1881. — Descriptive catalogue of the species of *Cellepora* collected on the "Challenger" Expedition. *Journal of the Linnean Society*, Zoology, **15**: 341-356.

BUSK, G., 1884. — Report on the Polyzoa collected by H.M.S. Challenger during the years 1873-76. Part 1. - The Cheilostomata. *Report on the Scientific Results of the Voyage of H.M.S. Challenger*, Zoology, **10** (30): i-xxiv, 1-216, pls 1-36.

CANU, F., 1913. — Études morphologiques sur trois nouvelles familles de Bryozoaires. *Bulletin de la Société Géologique de France*, sér. 4, **13**: 132-147.

CANU, F., 1917. — Bryozoaires. *Revue critique de Paléozoologie*, **21**: 29-37.

CANU, F. & BASSLER, R.S., 1917. — A synopsis of American Early Tertiary cheilostome Bryozoa. *Bulletin of the United States National Museum*, **96**: 1-87, pls 1-6.

CANU, F. & BASSLER, R.S., 1920. — North American Early Tertiary Bryozoa. *Bulletin of the United States National Museum*, **106**: (Vol. 1) i-xx, 1-879, (Vol. 2) 1-162 pls.

CANU, F. & BASSLER, R.S., 1923. — North American later Tertiary and Quaternary Bryozoa. *Bulletin of the United States National Museum*, **125**: i-viii, 1-302, pls 1-47.

CANU, F. & BASSLER, R.S., 1927. — Classification of the cheilostomatous Bryozoa. *Proceedings of the United States National Museum*, **69** (14): 1-42, pl. 1.

CANU, F. & BASSLER, R.S., 1928. — Fossil and Recent Bryozoa of the Gulf of Mexico region. *Proceedings of the United States National Museum*, **72** (14): 1-199, pls 1-34.

CANU, F. & BASSLER, R.S., 1929. — Bryozoa of the Philippine region. *Bulletin of the United States National Museum*, **100**: i-xi, 1-685, pls 1-94.

CANU, F. & BASSLER, R.S., 1930. — The bryozoan fauna of the Galapagos Islands. *Proceedings of the United States National Museum*, **76** (13): 1-78, pls 1-14.

CHEETHAM, A.H. & SANDBERG, P.A., 1964. — Quaternary Bryozoa from Louisiana mudlumps. *Journal of Paleontology*, **38**:1013-1046.

COOK, P.L., 1966. — Some "sand fauna" Polyzoa (Bryozoa) from eastern Africa and the northern Indian Ocean. *Cahiers de Biologie marine*, **7**: 207-223, pls 1-2.

COOK, P.L., 1985. — Bryozoa from Ghana: a preliminary survey. *Annales du Musée Royal de l'Afrique Centrale* (Sciences zoologiques), **238**: 1-315.

COOK, P.L. & BOCK, P.E., 1996. — *Characodoma* Maplestone, a senior synonym of *Cleidochasma* Harmer (Cleidochasmatidae). Pp. 81-88. *In*: D.P. GORDON, A.M. SMITH, & J.A. GRANT-MACKIE (eds), *Bryozoans in space and time*. National Institute of Water & Atmospheric Research, Wellington. 442 p.

COOK, P.L. & CHIMONIDES, P.J., 1981. — Morphology and systematics of some rooted cheilostome Bryozoa. *Journal of Natural History*, **15**: 97-134.

COOK, P.L. & LAGAAIJ, R.A., 1976. — Some Tertiary and Recent conescharelliniform Bryozoa. *Bulletin of the British Museum (Natural History), Zoology*, **29**: 317-376, pls 1-8.

DAVID, L. & POUYET, S., 1986. — Bryozoaires abyssaux des campagnes Safari (Océan Indien). *Annales de l'Institut océanographique*, n. sér., **62**: 141-191.

DUMONT, J.P.C., 1981. — A report on the cheilostome Bryozoa of the Sudanese Red Sea. *Journal of Natural History*, **15**: 623-637.

DUVERGIER, J., 1921. — Note sur les Bryozoaires du Néogène de l'Aquitaine. *Actes de la Société Linnéenne de Bordeaux*, **72**: 145-181, pls 1-4.

DUVERGIER, J., 1924. — Deuxième note sur les Bryozoaires du Néogène de l'Aquitaine. *Actes de la Société Linnéenne de Bordeaux*, **75**: 145-190, pls 1-6.

FRANSEN, C.H.J.M., 1986. — Caribbean Bryozoa: Anasca and Ascophora Imperfecta of the inner bays of Curaçao and Bonaire. *Studies on the Fauna of Curaçao and other Caribbean Islands*, **68**: 1-119.

GABB, W.M. & HORN, G.H., 1862. — The fossil Polyzoa of the Secondary and Tertiary Formations of North America. *Journal of the Academy of Natural Sciences of Philadelphia*, **5**: 111-179, pls 19-21.

GOLDSTEIN, J.R.Y., 1882. — Some new species of Bryozoa from the Marion Islands, with notes on *Bicellaria grandis*. *Transactions and Proceedings of the Royal Society of Victoria*, **18**: 39-46, pls 1-2.

GORDON, D.P., 1984. — The marine fauna of New Zealand: Bryozoa: Gymnolaemata from the Kermadec Ridge. *Memoirs. New Zealand Oceanographic Institute*, **91**: 1-198.

GORDON, D.P., 1985. — Additional species and records of gymnolaemate Bryozoa from the Kermadec region. *NZOI Records*, **4**: 159-183.

GORDON, D.P., 1988. — The bryozoan families Sclerodomidae, Bifaxariidae, and Urceoliporidae and a novel type of frontal wall. *New Zealand Journal of Zoology*, **15**: 249-290.

GORDON, D.P., 1989a. — The marine fauna of New Zealand: Bryozoa: Gymnolaemata (Cheilostomida Ascophorina) from the western South Island continental shelf and slope. *Memoirs. New Zealand Oceanographic Institute*, **97**: 1-158.

GORDON, D.P., 1989b. — New and little-known genera of cheilostome Bryozoa from the New Zealand region. *Journal of Natural History*, **23**: 1319-1339.

GORDON, D.P., 1989c. — New and little-known deep-sea taxa of umbonulomorph Bryozoa and their classification. *New Zealand Journal of Zoology*, **16**: 215-267.

GORDON, D.P., 1990. — The Tertiary bryozoan family Prostomariidae - morphology and relationships. *Memoirs of the Museum of Victoria*, **50**: 467-472.

GORDON, D.P., 1993a. — Bryozoa: The ascophorine infraorders Cribriomorpha, Hippothoomorpha and Umbonulomorpha. *In*: A. CROSNIER (ed.), Résultats des Campagnes MUSORSTOM, Vol. 11. *Mémoires du Muséum national d'Histoire naturelle*, **158**: 299-347.

GORDON, D.P., 1993b. — Bryozoan frontal shields: studies on umbonulomorphs and impacts on classification. *Zoologica Scripta*, **22**: 203-221.

GORDON, D.P., 1994. — Tertiary bryozoan genera in the present-day Australasian fauna - implications for classification and biogeography. *Invertebrate Taxonomy*, **8**: 283-298.

GORDON, D.P. & BRAGA, G., 1994. — Bryozoa: Living and fossil species of the catenicellid subfamilies Ditaxiporinae Stach and Vasignyellinae nov. *In*: A. CROSNIER (ed.), Résultats des Campagnes MUSORSTOM, Vol. 12. *Mémoires du Muséum national d'Histoire naturelle*, **161**: 55-85.

GORDON, D.P. & HONDT, J.-L. D', 1991. — Bryozoa: The Miocene to Recent family Petalostegidae. Systematics, affinities, biogeography. *In* A. CROSNIER (ed.), Résultats des Campagnes MUSORSTOM, Vol. 8. *Mémoires du Muséum national d'Histoire naturelle*, **151**: 91-123.

GORDON, D.P. & VOIGT, E., 1996. — The kenozooidal origin of the ascophorine hypostegal coelom and associated frontal shield: 89-107 *In*:: D.P. GORDON, A.M. SMITH, & J.A. GRANT-MACKIE (eds), *Bryozoans in space and time*. National Institute of Water & Atmospheric Research, Wellington. 442 p.

HARMER, S.F., 1902. — On the morphology of the Cheilostomata. *Quarterly Journal of Microscopical Science*, n. s., **46**: 263-350, pls 15-18.

HARMER, S.F., 1926. — The Polyzoa of the Siboga Expedition. Part 2. Cheilostomata Anasca. *Siboga-Expeditie*, **28b**: i-viii, 181-501, pls 13-34.

HARMER, S.F., 1933. — The genera of Reteporidae. *Proceedings of the Zoological Society, London*, **1933**: 615-627.

HARMER, S.F., 1934. — The Polyzoa of the Siboga Expedition. Part 3. Cheilostomata Ascophora. I. Family Reteporidae. *Siboga-Expeditie*, **28c**: i-vii, 503-640, pls 35-41.

HARMER, S.F., 1957. — The Polyzoa of the Siboga Expedition. Part 4. Cheilostomata Ascophora. II. *Siboga-Expeditie*, **28d**: i-xv, 641-1147, pls 42-74.

HASSALL, A.H., 1842. — Remarks on the genus *Lepralia* of Dr. Johnston with descriptions of six undescribed species. *Annals and Magazine of Natural History*, **9**: 407-414.

HASWELL, W.A., 1881. — On some Polyzoa from the Queensland coast. *Proceedings of the Linnean Society of New South Wales*, **5**: 33-44, pls 1-3.

HAYWARD, P.J., 1988. — Mauritian cheilostome Bryozoa. *Journal of Zoology, London*, **215**: 269-356.

HAYWARD, P.J., 1991. — Systematic studies on some Antarctic and sub-Antarctic Ascophora (Bryozoa: Cheilostomata). *Zoological Journal of the Linnean Society*, **101**: 299-335.

HAYWARD, P.J., 1992. — Some Antarctic and sub-Antarctic species of Celleporidae (Bryozoa, Cheilostomata). *Journal of Zoology, London*, **226**: 283-310.

HAYWARD, P.J. & COOK, P.L., 1983. — The South African Museum's *Meiring Naude* cruises. Part 13. Bryozoa II. *Annals of the South African Museum*, **91**: 1-161.

HAYWARD, P.J. & THORPE, J.P., 1988. — A new family of cheilostome Bryozoa endemic to Antarctica. *Zoological Journal of the Linnean Society*, **93** : 1-18.

HAYWARD, P.J. & RYLAND, J.S., 1979. — British ascophoran bryozoans. Keys and notes for the identification of the species. *Synopses of the British Fauna*, n. s., **14**: 1-312.

HINCKS, T., 1877. — On British Polyzoa, Part II. Classification. *Annals and Magazine of Natural History*, ser. 4, **20**: 520-532.

HINCKS, T., 1879. — On the classification of the British Polyzoa. *Annals and Magazine of Natural History*, ser. 5, **3**: 153-164.

HINCKS, T., 1880. — *A history of the British marine Polyzoa*. Van Voorst, London. Vol. 1, cxli, 601 p., Vol. 2, 83 pls.

HINCKS, T., 1895. — Index [*to* Marine Polyzoa: Contributions towards a general history]. London. vi p. [issued privately.]

HONDT, J.-L. D', 1981. — Bryozoaires Cheilostomes bathyaux et abyssaux provenant des campagnes océanographiques américaines (1969-1972) de "l'Atlantis II", du "Chain" et du "Knorr" (Woods Hole Oceanographic Institution). *Bulletin du Muséum national d'Histoire naturelle*, sér. 4, **3**, A (1): 5-71.

HONDT, J.-L. D', 1985. — Contribution à la systématique des Bryozoaires Eurystomes. Apports récents et nouvelles propositions. *Annales des Sciences naturelles*, Zoologie sér. 13, **7**: 1-12.

HONDT, J.-L. D', 1986. — Bryozoaires de Nouvelle-Calédonie et du Plateau des Chesterfield. *Bulletin du Muséum national d'Histoire naturelle*, sér. 4, **8**, A (4): 697-756.

JELLY, E.C., 1889. — *A synonymic catalogue of the recent marine Bryozoa*. Dulau & Co., London. xv, 322 p.

JOHNSTON, G., 1838. — *A history of the British zoophytes*. W.H. Lizars, Edinburgh, London & Dublin. xii, 341 p., 44 pls.

JOHNSTON, G., 1847. — *A history of the British zoophytes*. 2nd edn. Van Voorst, London. Vol. 1, xvi, 488 p., Vol. 2, 74 pls.

JULLIEN, J., 1883. — Dragages du *Travailleur*. Bryozoaires. Espèces draguées dans l'océan Atlantique en 1881. *Bulletin de la Société Zoologique de France*, **7**: 497-529, pls 13-17.

JULLIEN, J., 1888. — Bryozoaires. *Mission scientifique du Cap Horn*, **6** (Zoologie 3): 1-92, pls 1-15.

JULLIEN, J. & CALVET, L., 1903. — Bryozoaires provenant des campagnes de l'Hirondelle (1886-1888). *Résultats des Campagnes scientifiques accomplies par le Prince Albert I*, **23**: 1-188, pls 1-18.

KIRKPATRICK, R., 1888. — Polyzoa of Mauritius. *Annals and Magazine of Natural History*, ser. 6, **1**: 72-85, pls 7-10.

KEFERSTEIN, W., 1868. — Ueber die Batrachier Australiens. *Archiv für Naturgeschichte*, **34**: 253-290, pls 1-4.

LAGAAIJ, R., 1963. — New additions to the bryozoan fauna of the Gulf of Mexico. *Publications of the Institute of Marine Science, University of Texas*, **9**: 162-236.

LAMARCK, J.B.P.A., 1815-22. — *Histoire naturelle des animaux sans vertèbres ... précédée d'une introduction offrant la détermination des caractères essentiels de l'animal, sa distinction du végétal et des autres corps naturels, enfin, l'exposition des principes fondamentaux de la zoologie*. Verdière, Paris. [In 7 vols, Bryozoa in vol. 2 (1816), 568 p.]

LAMOUROUX, J.V.F., 1821. — *Exposition méthodique des genres de l'ordre des polypiers, avec leur description et celles des principales espèces figurées dans 84 planches; les 63 premières appartenant à l'Histoire naturelle des Zoophytes d'Ellis et Solander*. V. Agasse, Paris. viii, 115 p., 84 pls.

LEVINSEN, G.M.R., 1909. — *Morphological and systematic studies on the cheilostomatous Bryozoa*. National Forfatteres Forlag, Copenhagen. i-vii + 431 p., 24 pls.

LEVINSEN, G.M.R., 1917. — Bryozoa. *In*: Danmark-Ekspeditionen til Grønlands Nordøstkyst, 1906-1908, III. *Meddelelser om Grønland*, **43**: 432-472, pls 19-24.

LIVINGSTONE, A.A., 1926. — Studies on Australian Bryozoa. No. 3. Report upon the Bryozoa collected on the Great Barrier Reef, Queensland, in 1925, by W.E.J. Paradice, Lieutenant Surgeon on H.M.A.S. "Geranium". *Records of the Australian Museum*, **15**: 79-99.

MACGILLIVRAY, J., 1842. — Catalogue of the marine zoophytes of the neighbourhood of Aberdeen. *Annals and Magazine of Natural History*, **9**: 462-469.

MACGILLIVRAY, P.H., 1860. — Notes on the cheilostomatous Polyzoa of Victoria and other parts of Australia. *Transactions of the Philosophical Institute of Victoria*, **4**: 159-168, pls 2-3.

MACGILLIVRAY, P.H., 1869. — Descriptions of some new genera and species of Australian Polyzoa; to which is added a list of species found in Victoria. *Transactions and Proceedings of the Royal Society of Victoria*, **9**: 126-148.

MACGILLIVRAY, P.H., 1887. — A catalogue of the marine Polyzoa of Victoria. *Transactions and Proceedings of the Royal Society of Victoria*, **23**: 187-224.

MACGILLIVRAY, P.H., 1880. — [Polyzoa.]. *In*: F. MCCOY (ed.), *Prodromus of the Zoology of Victoria*. Vol. 1, Decade 4: 21-40, pls 35-38; Decade 5: 27-52, pls 41-50. Government Printer, Melbourne.

MACGILLIVRAY, P.H., 1883. — Descriptions of new, or little-known, Polyzoa. Part II. *Transactions and Proceedings of the Royal Society of Victoria*, **19**: 130-138, pls 1-3.

MACGILLIVRAY, P.H., 1895. — A monograph of the Tertiary Polyzoa of Victoria. *Transactions of the Royal Society of Victoria*, n. s., **4**: 1-166, pls 1-22.

MAPLESTONE, C.M., 1900. — Further descriptions of the Tertiary Polyzoa of Victoria. - Part 4. *Proceedings of the Royal Society of Victoria*, n. s., **13**: 1-9, pls 1-2.

MOYANO, G.H.I., 1985. — Briozoos marinos chilenos V. Taxa nuevos o poco conocidos. *Boletin de la Sociedad de Biología de Concepción*, **56**: 79-114.

MOYANO, G.H.I., 1991. — Bryozoa marinos chilenos VIII: Una síntesis zoogeográfica con consideraciones sistemáticas y la descripción de diez especies y dos géneros nuevos. *Gayana Zoología*, **55**: 305-389.

NEVIANI, A., 1895. — Briozoi neozoici di alcune località d'Italia. 1. *Bolletino della Societa Romana per gli studi Zoologici*, **4**:109-123.

NEVIANI, A., 1900. — Briozoi neogenici delle Calabrie. *Palaeontographica italica*, **6**: 115-266, pls 16-19.

NORMAN, A.M., 1868. — Notes on some rare British Polyzoa, with descriptions of new species. *Quarterly Journal of Microscopical Science*, n. s., **8**: 212-222, pls 5-7.

NORMAN, A.M., 1876. — Crustacea, Tunicata, Polyzoa, Echinodermata, Actinozoa, Foraminifera, Polycystina, and Spongida. Pp. 101-115. *In*: J.G. JEFFREYS, Preliminary report of the biological results of a cruise in H.M.S. Valourous to Davis Strait in 1875. *Proceedings of the Royal Society of London*, **25**: 177-237.

NORMAN, A.M., 1903. — Notes on the natural history of East Finmark. Polyzoa. *Annals and Magazine of Natural History*, ser. 7, **11**: 567-598, pls 1-13.

OKADA, Y., 1921. — Notes of some Japanese chilostomatous Bryozoa. *Annotationes zoologicae japonenses*, **10**: 19-32.

OKADA, Y., 1929. — Cheilostomatous Bryozoa of Mutsu. *Scientific Reports of the Tôhoku University*, ser. 4 (Biology), **4**: 11-35.

ORBIGNY, A.D. D', 1835-47. — *Voyage dans l'Amérique méridionale ... exécuté pendant ... 1826-33 par A.D. d'Orbigny, &c.* P. Bertrand, Paris; V. Levrault, Strasbourg. 7 Tom. + Atlas. [Zoophytes *in* Tom. V, 4, pp. 7-28, pls 1-13. Text, pp. 7-28, Livr. 89 (1847); pls 1, 3, 5, Livr. 56 (1841); pls 2, 6-8, Livr. 57 (1842); pls 4, 9, 10, 12, 13, Livr. 58 (1842); pl. 11, Livr. 59 (1842). Dates as given by SHERBORN & WOODWARD, 1901.]

ORBIGNY, A.D. D', 1851-54. — *Paléontologie française. Descriptions des Mollusques et Rayonnés fossiles. Terrains Crétacés, V. Bryozoaires*. Victor Masson, Paris. [Pp. 1-188 (1851); pp. 185 bis-472 (1852); pp. 473-984 (1853); pp. 985-1192 (1854); pls 600-800. Dates as given by SHERBORN, 1899.]

ORTMANN, A., 1890. — Die japanische Bryozoenfauna. Bericht über die von Herrn Dr. L. Döderlein in Jahre 1880-81 gemachten Sammlungen. *Archiv für Naturgeschichte*, **54**: 1-74, pls 1-4.

OSBURN, R.C., 1952. — Bryozoa of the Pacific coast of America Part 2, Cheilostomata-Ascophora. *Allan Hancock Pacific Expeditions*, **14**: 271-611.

PALLAS, P., 1766. — *Elenchus zoophytorum sistens generum adumbrationes generaliores et specierum cognitarum succinctas descriptiones cum selectis auctorus synonymis*. Petrum van Cleef, Hagae-Comitum. i-xxviii + 451 p.

PARKER, S.A. & GORDON, D.P., 1992. — A new genus of the bryozoan superfamily Schizoporelloidea, with remarks on the validity of the family Lacernidae Jullien, 1888. *Records of the South Australian Museum*, **26**: 67-71.

PHILIPPS, E.G., 1900. — Report on the Polyzoa collected by Dr. Willey from the Loyalty Isles, New Guinea and New Britain. *Arthur Willey's Zoological Results*, **4**: 357-530, pls 34-53.

POWELL, N.A., 1967. — Polyzoa (Bryozoa) - Ascophora - from north New Zealand. *Discovery Reports*, **34**: 199-393, pls 1-17.

RHO, B.J. & SEO, J.E., 1986. — A systematic study on the marine bryozoans in Cheju-do. *Korean Journal of Zoology*, **29**: 31-60.

RIDLEY, S.O., 1881. — Polyzoa. *In*: Account of the zoological collections made during the survey of H.M. S. Alert in the Straits of Magellan and on the coast of Patagonia. *Proceedings of the Zoological Society of London*, **1881**: 44-61, pl. 6.

ROGICK, M.D., 1960. — Studies on marine Bryozoa. 13. Two new genera and new species from Antarctica. *The Biological Bulletin*, **119**: 479-493.

RYLAND, J.S. & HAYWARD, P.J., 1992. — Bryozoa from Heron Island, Great Barrier Reef. *Memoirs of the Queensland Museum*, **32**: 223-301.

SHERBORN, C.D., 1899. — On the dates of the "Paléontologie Française" of d'Orbigny. *Geological Magazine*, ser. 4, **6**: 223-225.

SHERBORN, C.D. & WOODWARD, BB., 1901. — Notes on the dates of publication of the natural history portions of some French voyages. - Part I. 'Amérique méridionale'; 'Indes orientales'; 'Pôle Sud' ('Astrolabe' and 'Zélée'); 'La Bonite'; 'La Coquille'; and 'l'Uranie et Physicienne'. *Annals and Magazine of Natural History*, ser. 7, **7**: 388-392.

SILÉN, L., 1941. — Cheilostomata Anasca (Bryozoa) collected by Prof. Dr. Sixten Bock's expedition to Japan and the Bonin Islands 1914. *Arkiv för Zoologi*, **33**, A (12): 1-130, pls 1-9.

SILÉN, L., 1947. — Conescharellinidae (Bryozoa Gymnolaemata) collected by Prof. Dr. Sixten Bock's expedition to Japan and the Bonin Islands 1914. *Arkiv för Zoologi*, **39**, A (9): 1-61, pls 1-5.

SMITT, F.A., 1873. — Floridan Bryozoa, collected by Count L.F. de Pourtales. Part II. *Kongliga Svenska Vetenskaps-Akademiens Handlingar*, **11** (4): 1-83, pls 1-13.

SOULE, D.F. & SOULE, J.D., 1973. — Morphology and speciation of Hawaiian and eastern Pacific Smittinidae (Bryozoa, Ectoprocta). *Bulletin of the American Museum of Natural History*, **152**: 365-440.

SOULE, J.D., SOULE, D.F. & CHANEY, H.W., 1991. — New tropical Pacific and Indian Ocean Cleidochasmatidae (Cheilostomata: Ascophora). *In*: F.P. BIGEY & J.-L. D'HONDT (eds), *Bryozoaires actuels et fossiles: Bryozoa living and fossil. Bulletin de la Société des Sciences Naturelles de l'Ouest de la France*, Mémoire h. s. **1**: 465-486.

STACH, L.W., 1935. — The genera of Catenicellidae. *Proceedings of the Royal Society of Victoria*, n. s., **47**: 389-396.

STACH, L.W., 1936. — Studies on Recent Petraliidae (Bryozoa). *Records of the Australian Museum*, **19**: 355-379.

STOLICZKA, F., 1865. — Paläontologie von Neu-Zeeland. Beiträge zur Kenntniss der fossilen Flora und Fauna der Provinzen Auckland und Nelson. IV. Fossile Bryozoen aus dem tertiären Grünsandsteine der Orakei-Bay bei Auckland. *Reise der Osterreichischen Fregatte Novara*, Geologisher Theil, **1** (2): 89-158, pls 17-20.

STRAND, E., 1928. — Miscellanea nomenclatorica zoologica et paleontologica. *Arkiv für Naturgeschichte*, **92**, A (8): 36-37.

TENISON-WOODS, J.E., 1879. — On some Australian Tertiary fossil corals and Polyzoa. *Journal and Proceedings of the Royal Society of New South Wales*, **12**: 57-61, 1 pl.

THOMSON, W.T.C., 1858. — On new genera and species of Polyzoa from the collection of Professor W.H. Harvey, Trinity College, Dublin. Part 1. *Proceedings of the Dublin University Zoological and Botanical Association*, **1**: 77-93.

THORNELY, L.R., 1905. — Report on the Polyzoa collected by Professor Herdman, at Ceylon, in 1902. *Report to the Government of Ceylon on the Pearl Oyster Fisheries of the Gulf of Manaar*, **4** (Suppl. Rep. 26): 107-130, pl. 1.

UTTLEY, G.H., 1956. — Remarks on the bryozoan genera *Spiroporina* Stoliczka and *Haswellina* Livingstone and their genotypes. *Transactions of the Royal Society of New Zealand*, **84**: 29-31.

UTTLEY, G.H. & BULLIVANT, J.S., 1972. — Biological results of the Chatham Islands 1954 Expedition. Part 7. Bryozoa Cheilostomata. *Memoirs. New Zealand Oceanographic Institute*, **57**: 1-61. [*Bulletin of the New Zealand Department of Scientific and Industrial Research*, **139** (7).]

VIGNEAUX, M., 1949. — Révision des Bryozoaires néogènes du Bassin d'Aquitaine et essai de classification. *Mémoires de la Société Géologique de France*, n. s., **28**: 1-153, pls 1-11.

VOIGT, E. & HILLMER, G., 1983. — Oberkretazische Hippothoidae (Bryozoa Cheilostomata) aus dem Campanium von Schweden und dem Maastrichtium der Niederlande. *Mitteilungen aus dem Geologisch-Paläontologisches Institut der Universität Hamburg*, **54**: 169-208.

WATERS, A.W., 1881. — On fossil chilostomatous Bryozoa from south-west Victoria, Australia. *Quarterly Journal of the Geological Society of London*, **37**: 309-347, pls 14-18.

WATERS, A.W., 1889. — Supplementary report on the Polyzoa collected by H.M.S. Challenger during the years 1873-1876. *Report of the Scientific Results of the Voyage of H.M.S. Challenger*, Zoology, **31** (79): 1-41, pls 1-3.

WATERS, A.W., 1899. — Bryozoa from Madeira. *Journal of the Royal Microscopical Society*, **1899**: 6-16, pl. 3.

WATERS, A.W., 1913. — The marine fauna of British East Africa and Zanzibar, from collections made by Cyril Crossland, M.A., B.Sc., F.Z.S., in the years 1901-1902. Bryozoa-Cheilostomata. *Proceedings of the Zoological Society, London*, **1913**: 458-537, pls 64-73.

WINSTON, J.E., 1984. — Shallow-water bryozoans of Carrie Bow Cay, Belize. *American Museum Novitates*, **2799**: 1-38.

WINSTON, J.E., 1986. — An annotated checklist of coral-associated bryozoans. *American Museum Novitates*, **2859**: 1-39.

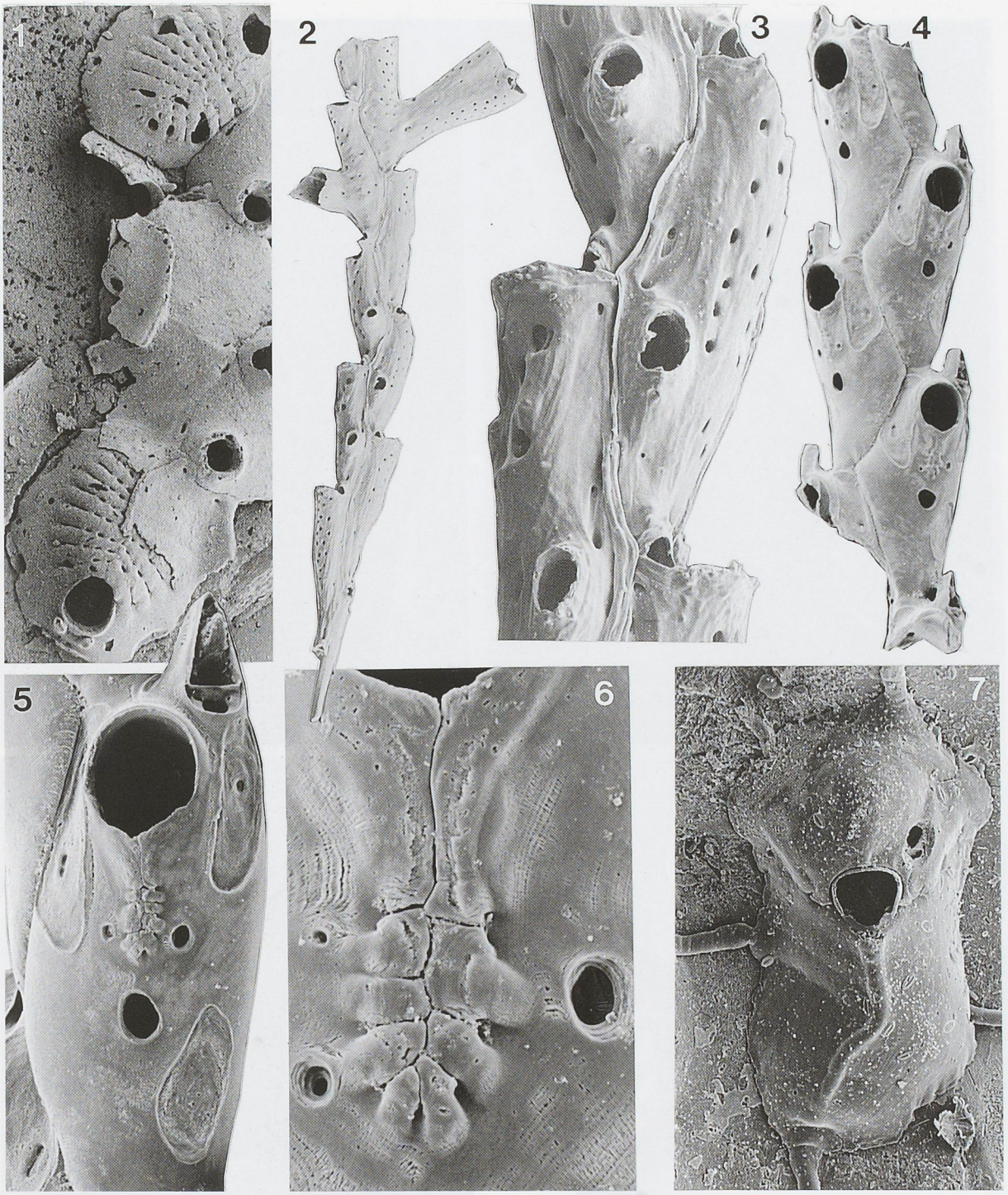
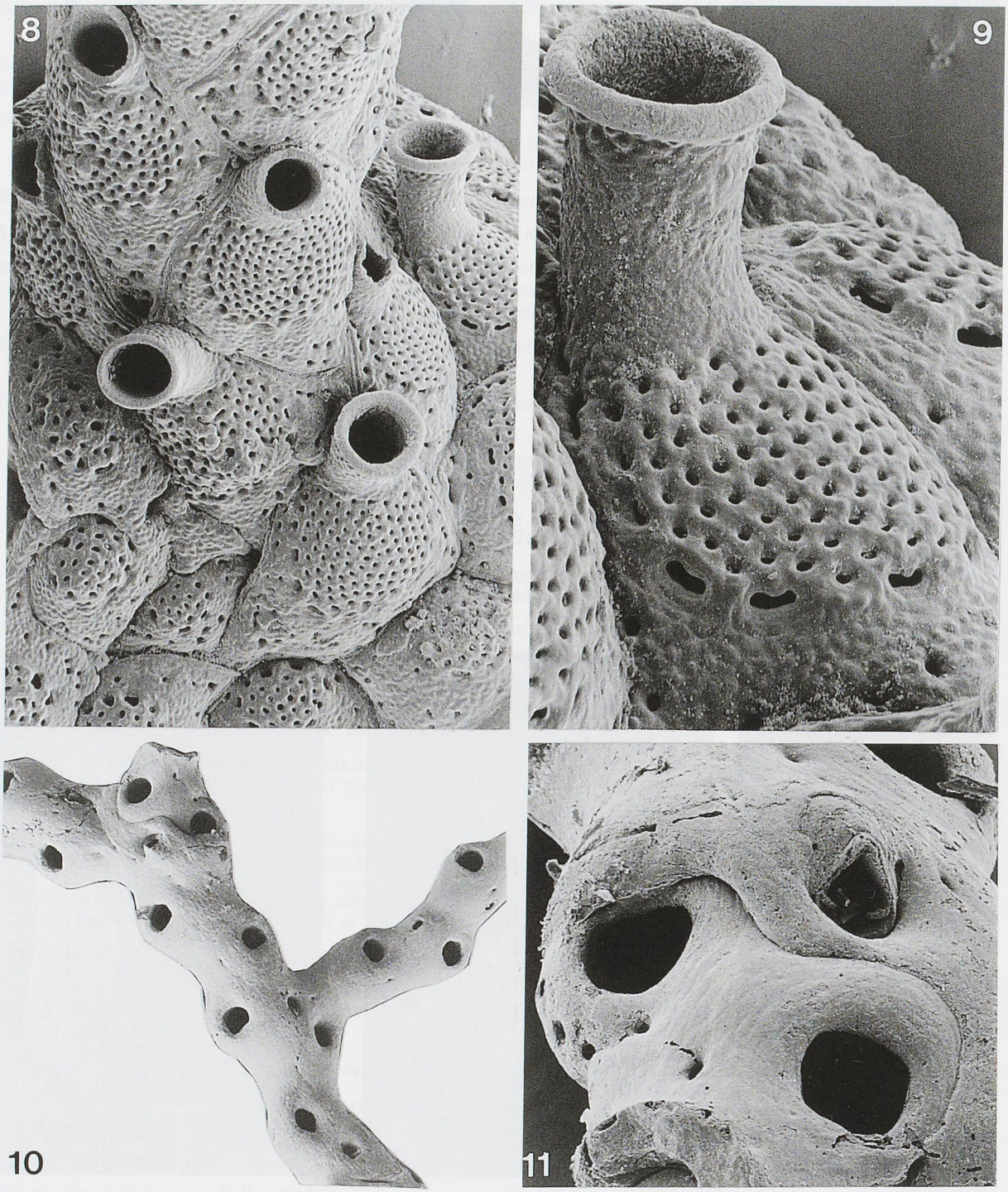


FIG. 1. — Indeterminate cribrilinid ancestrulae, partially overgrown by zooids of *Buffonellodes crosnieri* sp. nov. (x 47). BIOCAL Stn DW 33.

FIGS 2-3. — *Domosclerus* sp.: **2**, Lateral view of small colony (x 28). **3**, Same (x 112). BIOGEOCAL Stn KG 210.

FIGS 4-6. — *Bryosartor ?sutilis* Gordon & Braga: **4**, Single broken segment (x 53). **5**, Single zooid (x 140). **6**, Costal field of a different zooid (x 496). BIOGEOCAL Stn CP 260.

FIG. 7. — *Hippothoa calciophilia* Gordon (x 153). BIOCAL Stn CP 84.



FIGS 8-9. — *Xynexecha pulchra* sp. nov.: **8**, Base of colony, showing kenozooids and the beginning of an erect cylindrical stem (x 94). **9**, A single zooid, with its distinctive frontal-shield morphology and spout-like peristome (x 179). BIOCAL Stn CP 108.

FIGS 10-11. — *Kladapheles gammadeka* Gordon: **10**, Branching colony fragment (x 25). **11**, Oral view of orifices and an avicularium (x 103). BIOGEOCAL Stn DW 307.

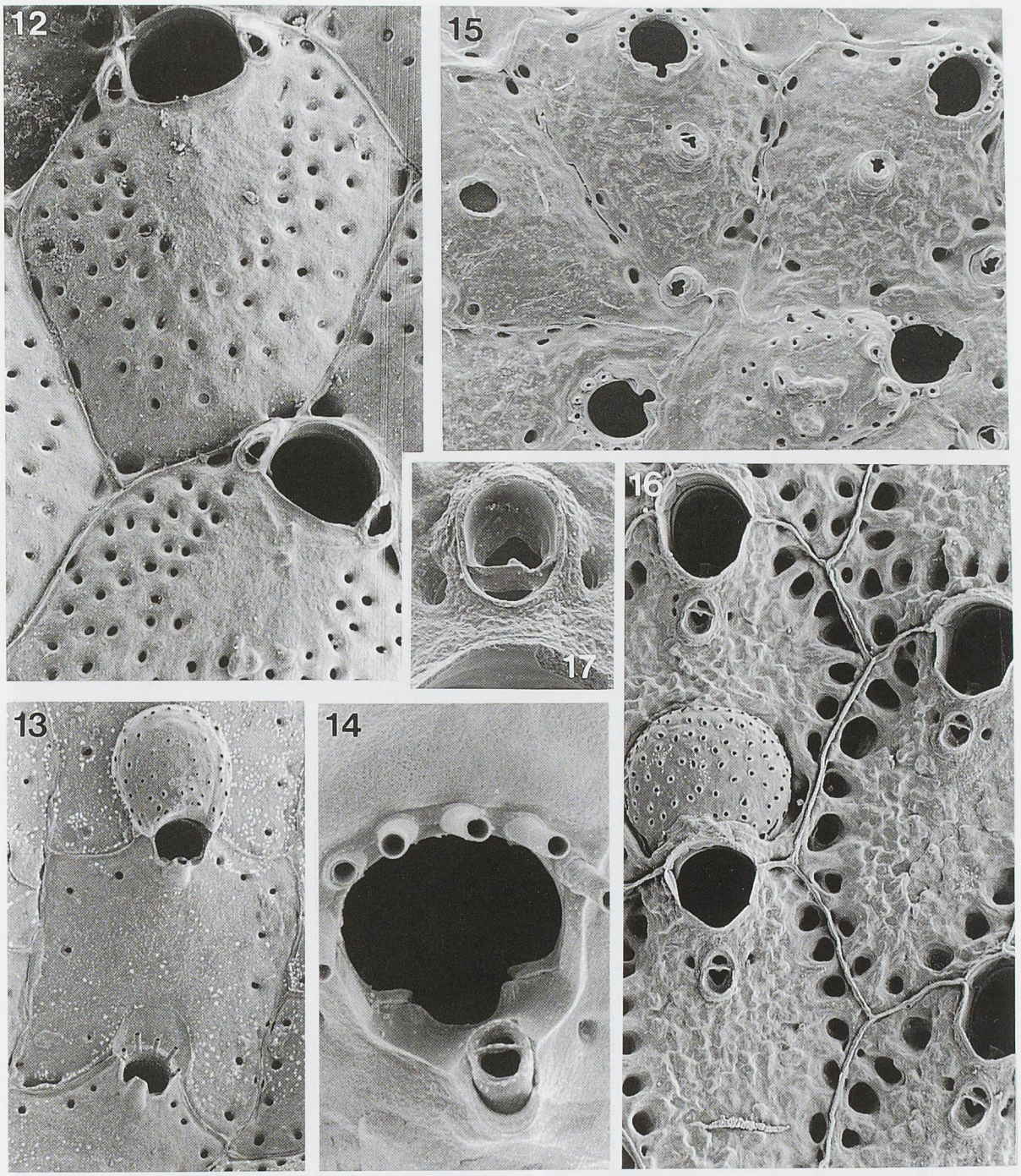
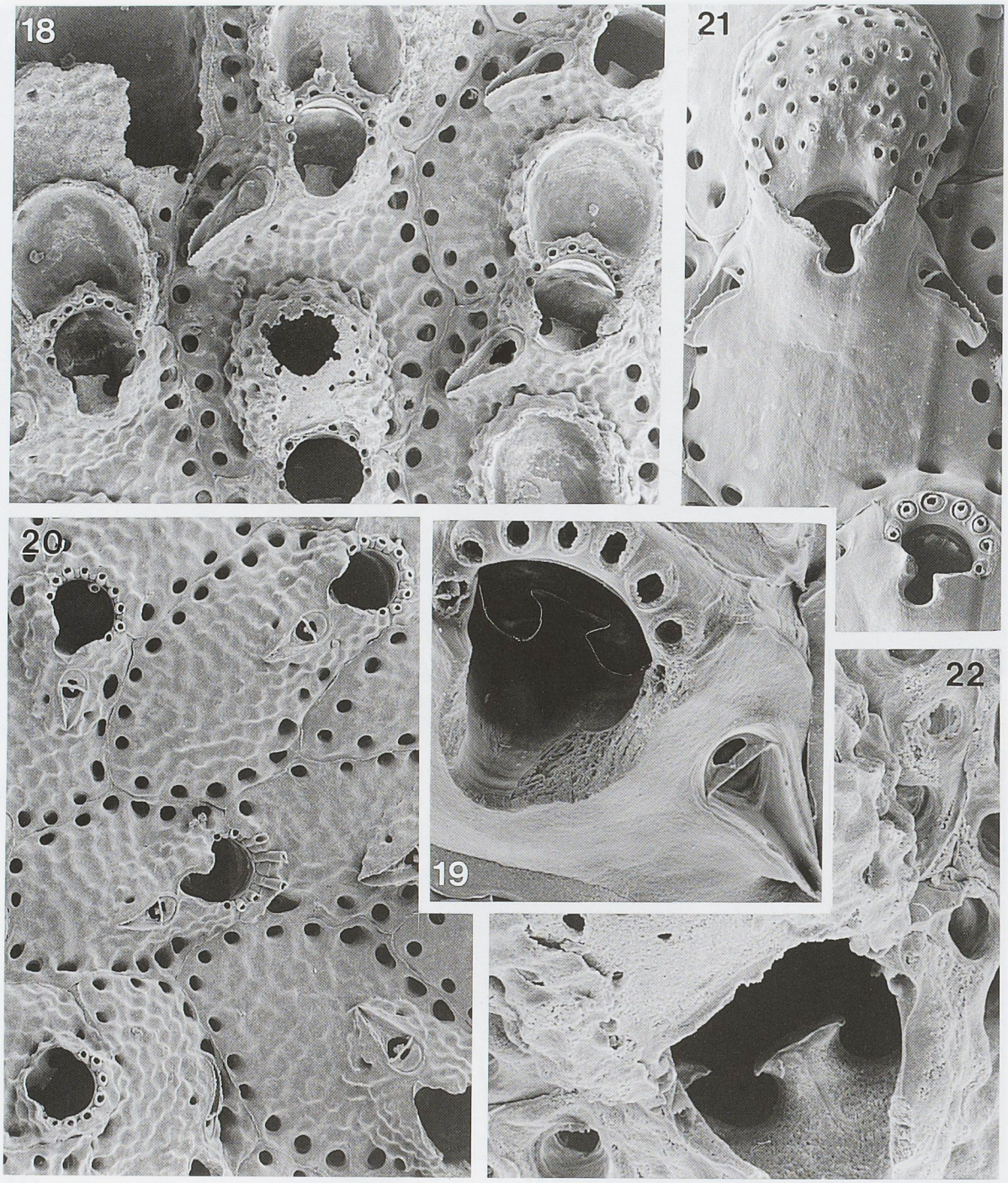


FIG. 12. — *Hippothyris caledonica* sp. nov. (x 70). BIOCAL Stn DW 82.

FIGS 13-14. — *Parkermavella fidelis* sp. nov.: **13**, Ovicelled zooid (x 52). **14**, Autozooidal orifice (x 265). MUSORSTOM 6 Stn CP 419.

FIG. 15. — *Parkermavella minuta* sp. nov.: Several zooids; ovicell at lower right (x 134). BIOCAL Stn DW 65.

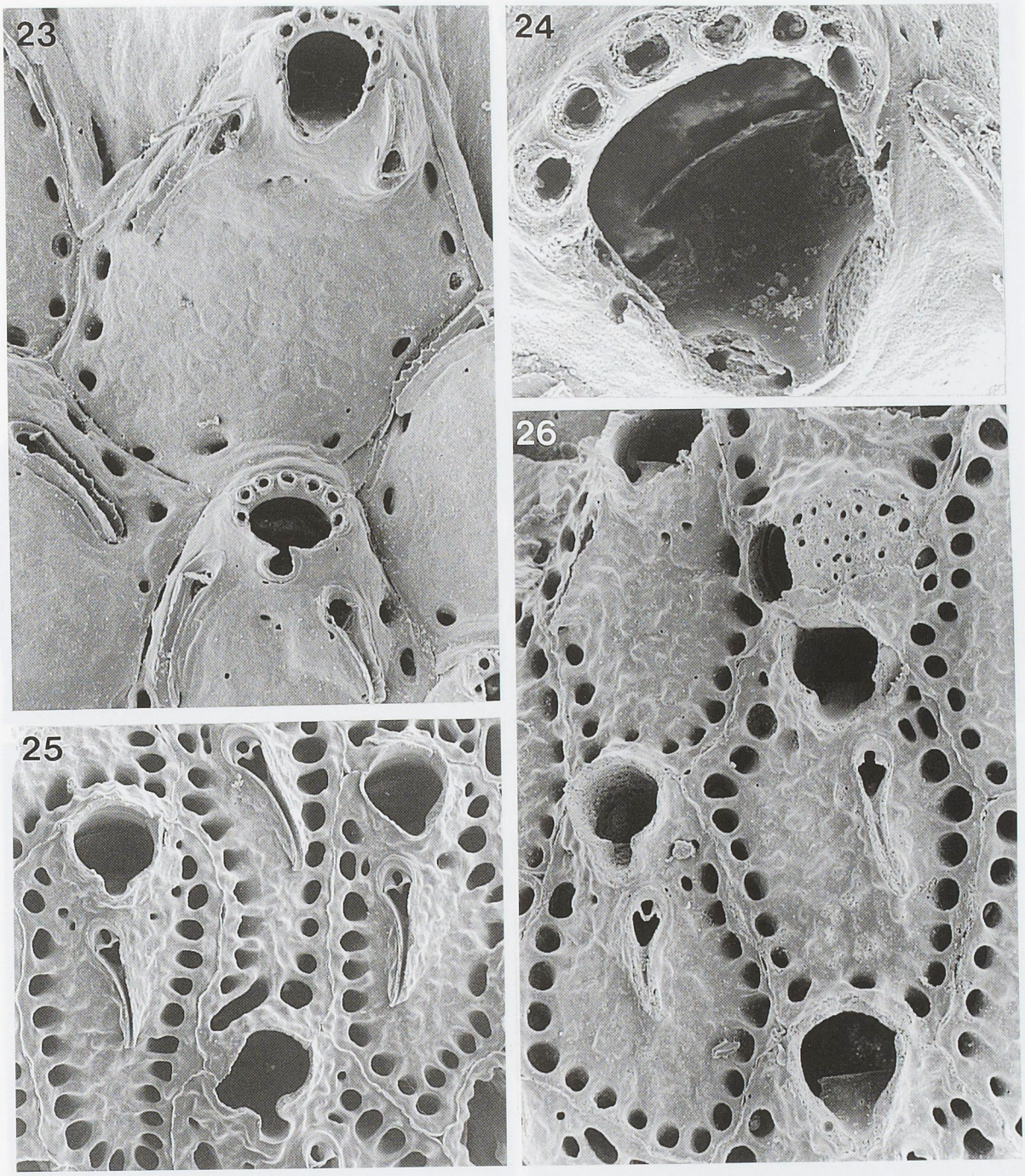
FIGS 16-17. — *Smittoidea maunganuiensis multiporosa* ssp. nov.: **16**, Several zooids, one ovicelled (x 56). **17**, Oral view of avicularium (x 215). MUSORSTOM 6 Stn CP 419.



FIGS 18-19. — *Hemismittoidea ennea* sp. nov.: **18**, Ovicelled zooids (x 98). **19**, Primary orifice and lyrula of ovicelled zooid (x 289). BIOCAL Stn DW 66.

FIG. 20. — *Hemismittoidea ?ennea*: Part of infertile colony (x 98). MUSORSTOM 3 Stn DR 117.

FIGS 21-22. — *Parasmittina glabra* sp. nov.: **21**, Ovicelled zooid (x 137). **22**, Primary orifice and lyrula (x 289). BIOCAL Stn DW 66.



FIGS 23-24. — *Parasmittina ?glabra*: **23**, Autozooids showing disposition of avicularia (x 103). **24**, Primary orifice with lyrula (x 347). BIOCAL Stn DW 66.

FIGS 25-26. — *Parasmittina marginata* (Canu & Bassler): **25**, Autozooids showing characteristically curved avicularia (x 88). **26**, Ovicelled zooid (x 109). MUSORSTOM 3 Stn DR 117.

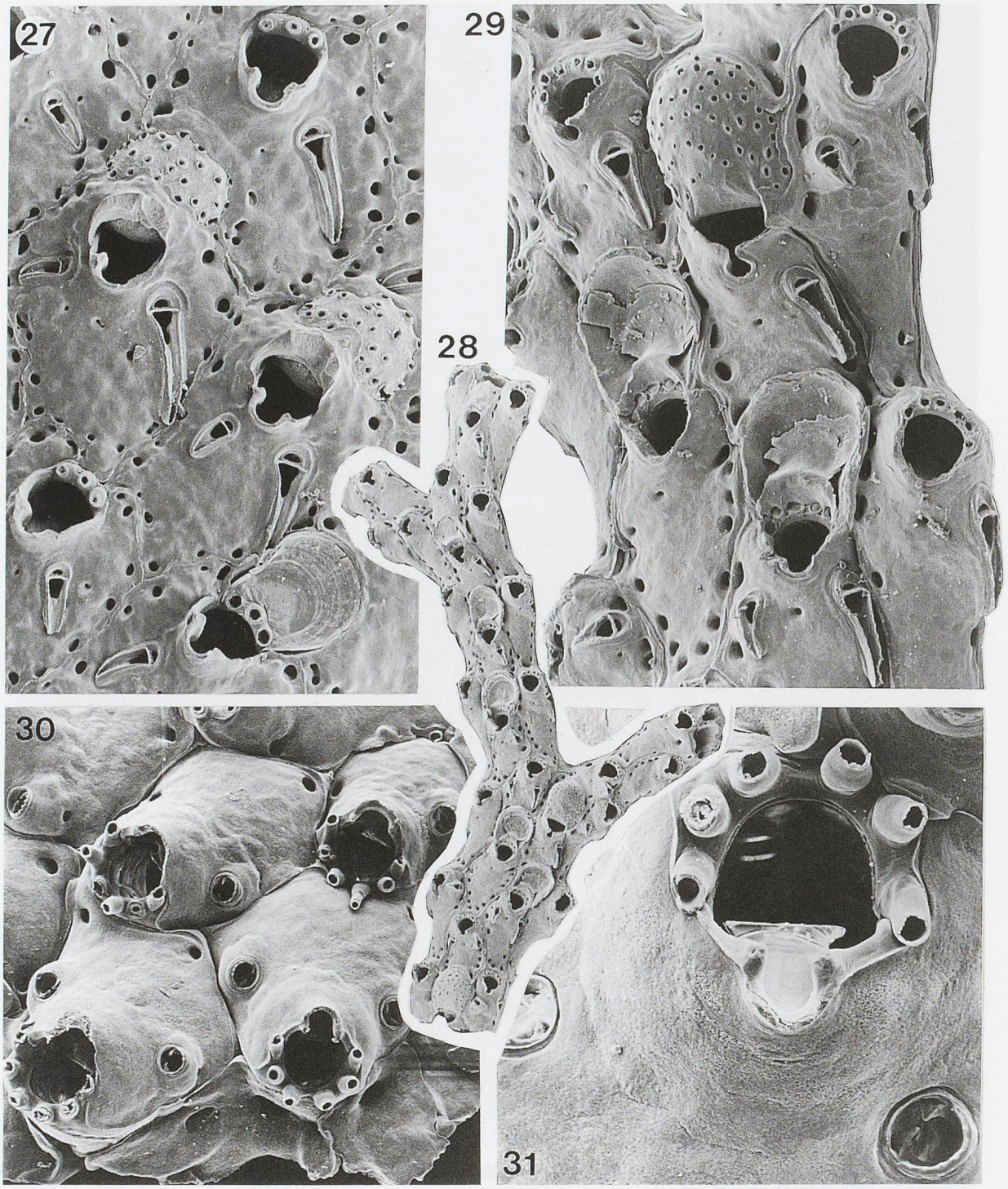
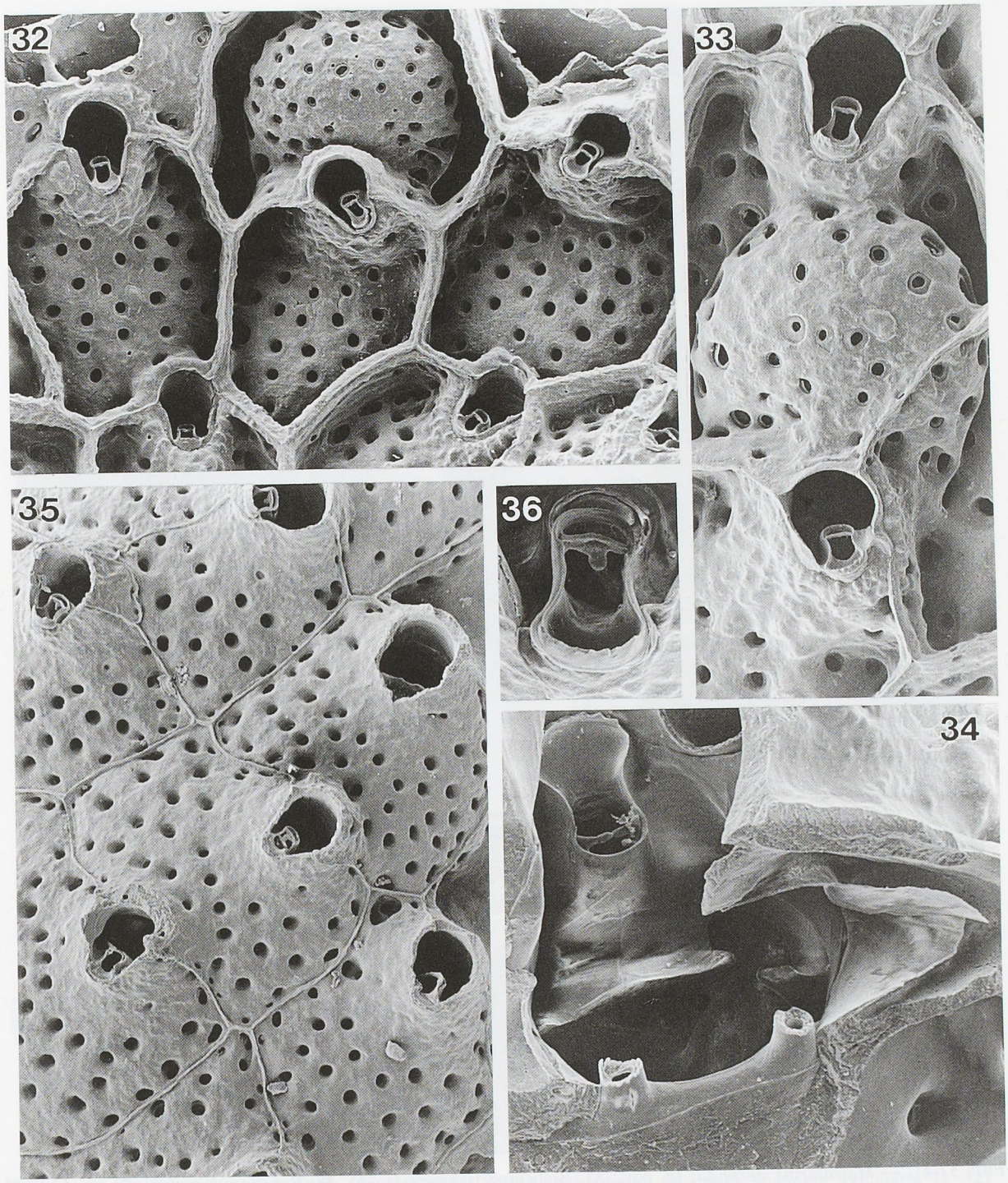
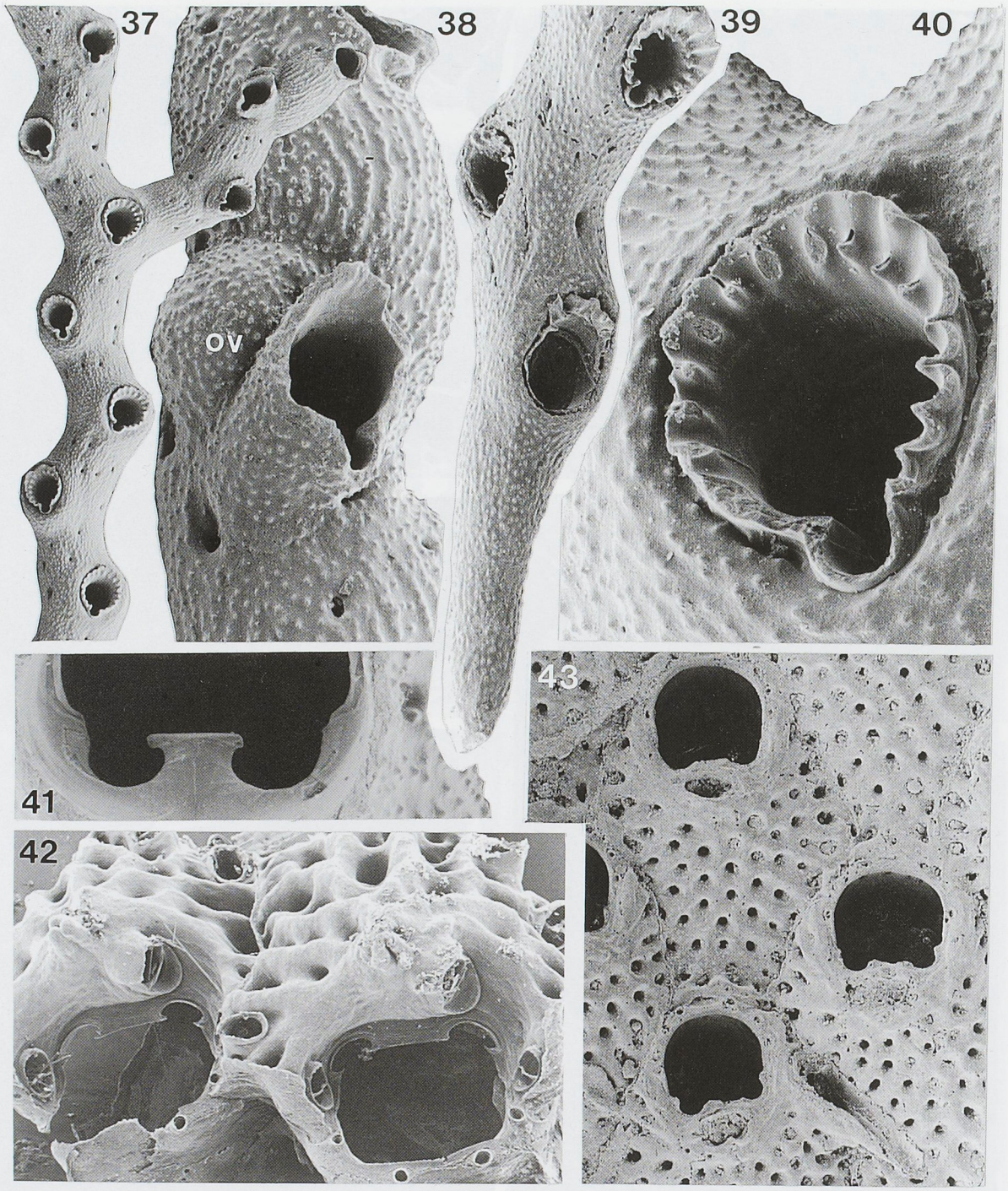


FIG. 27. — *Parasmittina serrula* Soule & Soule: Autozooids and ovicelled zooids (x 107). MUSORSTOM 3 Stn DR 117.
FIGS 28-29. — *Parasmittina erecta* sp. nov. **28**, Branching fragment (x 19). **29**, Group of zooids proximal to the lower bifurcation in fig. 28 (x 76). BIOCAL Stn DW 66.
FIGS 30-31. — *Parasmittina* sp.: **30**, Oral view of autozooids (x 149). **31**, Orifice (x 370). MUSORSTOM 3 Stn DR 117.



FIGS 32-34. — *Smittina asymmetrica* sp. nov.: **32**, Ovicelled zooid and autozooids (x 54). **33**, Close-up of another ovicell (x 97). **34**, Orifice of ovicelled zooid showing a pair of spine bases (normally concealed), part of broken ovicell (at right), lyrula, and suboral avicularium (x 221). BIOCAL Stn DW 66.

FIGS 35-36. — *Smittina abyssicola* (Harmer): **35**, Several autozooids (x 72). **36**, Close-up of suboral avicularium with ligulate cross-bar (x 304). BIOCAL Stn CP 84.



FIGS 37-41. — *Mawatarius secundus* sp. nov.: **37**, Branching fragment (x 26). **38**, Peristomial region of an ovicelled (ov) zooid (x 109). **39**, Ancestrula region of colony (x 61). **40**, Peristomial orifice (x 221). **41**, Lyrula of primary orifice (x 243). BIOCAL Stn DW 66.

FIG. 42. — *Mucropetraliella philippinensis* (Canu & Bassler): Primary orifices of two autozooids (x 54). BIOCAL Stn KG 22.

FIG. 43. — *Mucropetraliella serrata* (Livingstone): Partly eroded autozooids (x 47). MUSORSTOM 4 Stn DW 151.

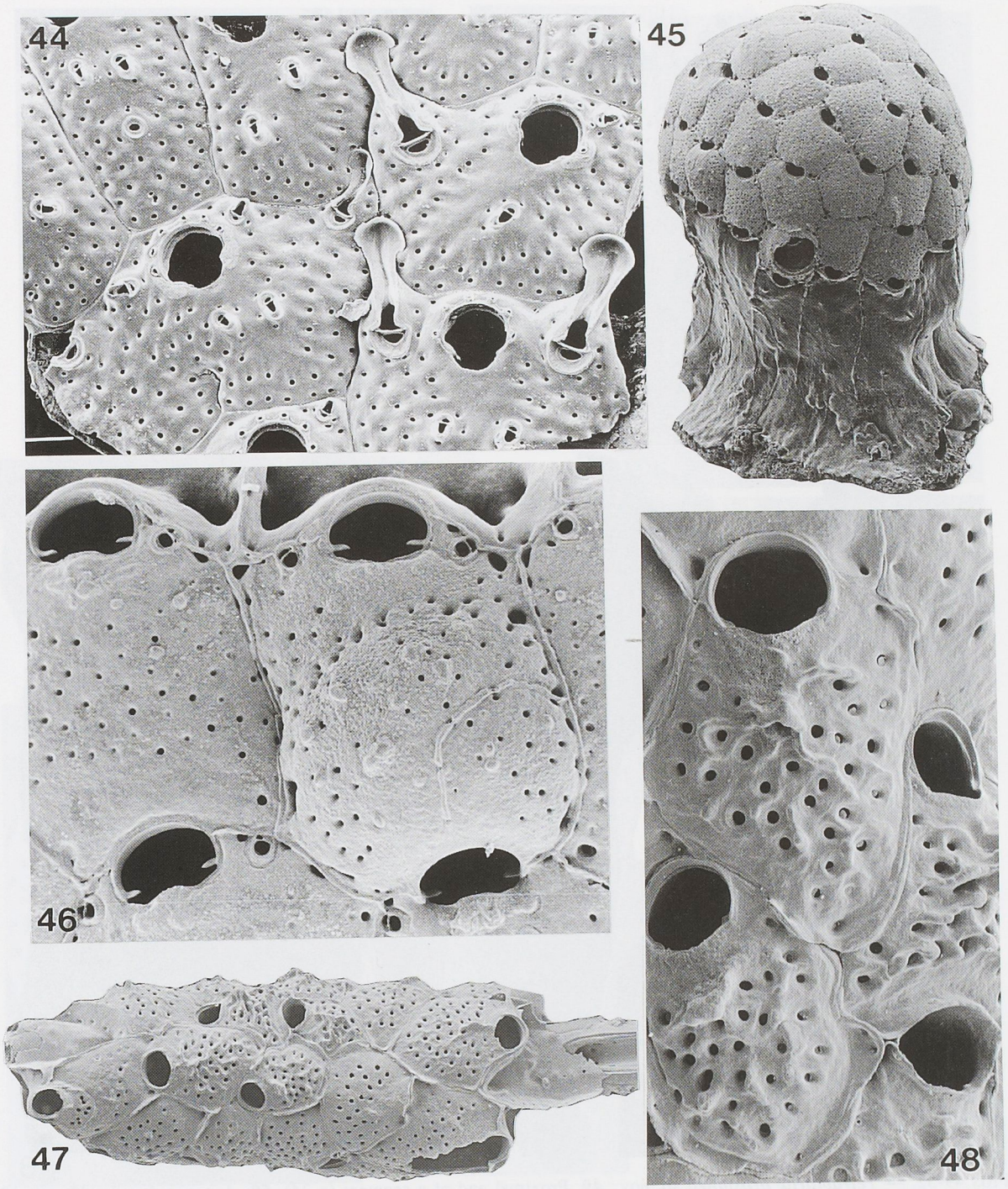
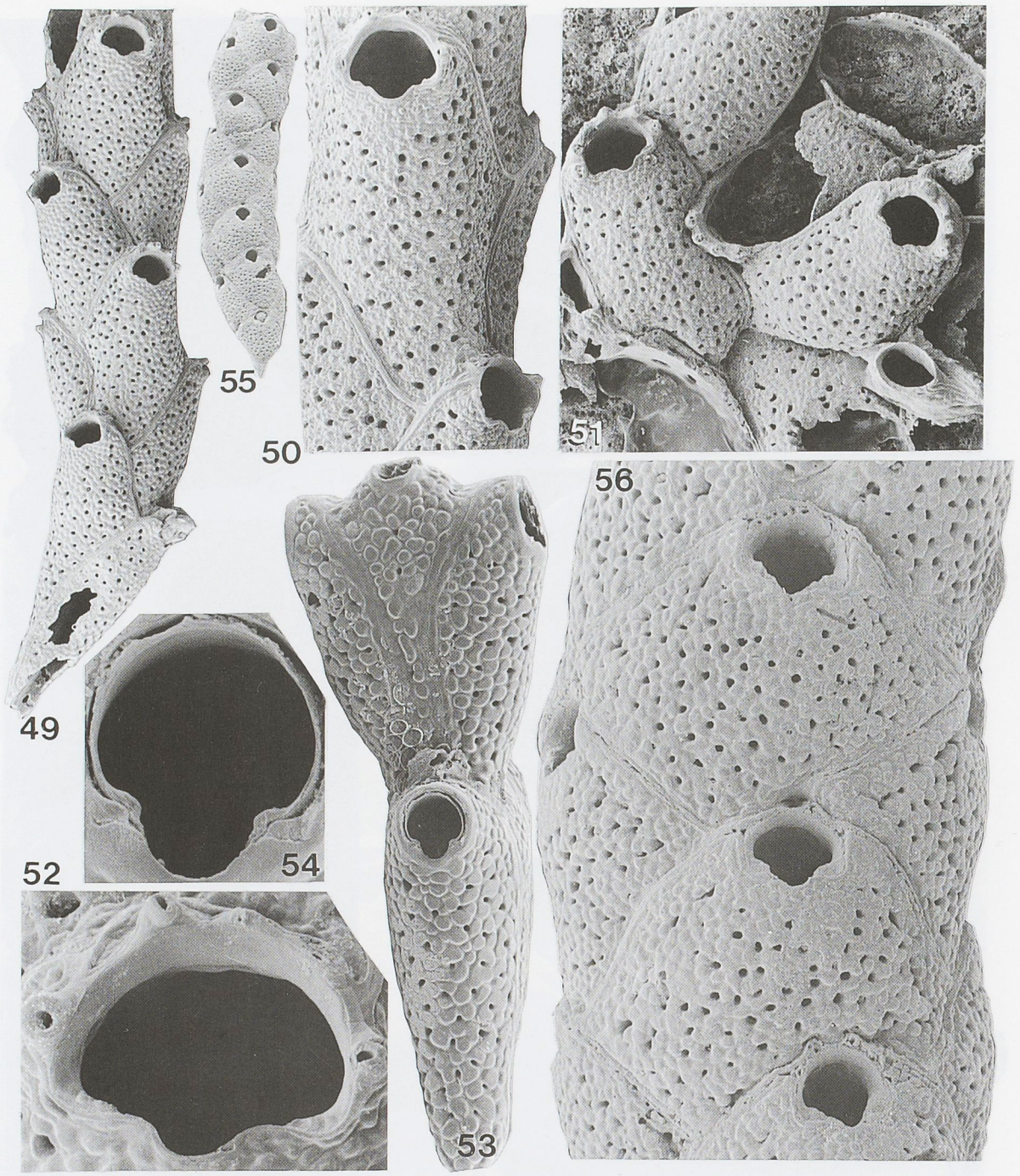


FIG. 44. — *Hippomenella avicularis* (Livingstone): Several autozooids, two with spatulate avicularia (x 52). MUSORSTOM 4 Stn DW 231.

FIGS 45-46. — *Emballotheca rara* sp. nov.: **45**, Whole colony (x 13). **46**, Autozooids and ovicell (x 74). BIOCAL Stn DW 46.

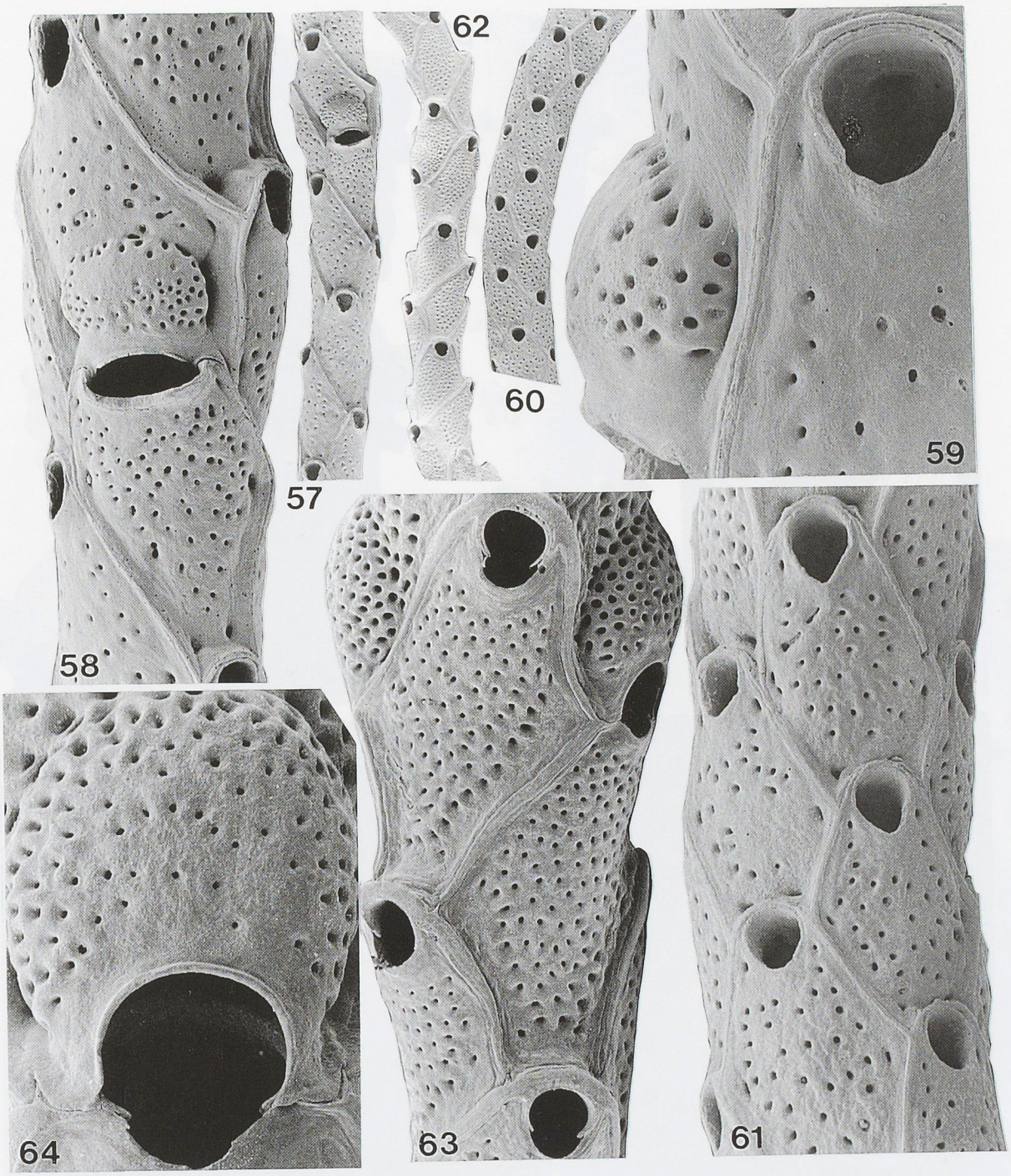
FIGS 47-48. — *Calyptotheca* sp.: **47**, Tiny colony on a branch of the cheilostomate bryozoan *Nellia tenella* (Lamarck) (x 47). **48**, Same, close-up of some autozooids (x 156). MUSORSTOM 4 Stn DW 187.



FIGS 49-52. — *Tetraplaria orospinea* sp. nov.: **49**, Proximal end of a segment (x 34). **50**, Autozooid and orifices with spine bases (x 52). **51**, Encrusting zooids at colony base (x 54). **52**, Autozooidal orifice with spine bases (x 215). BIOGEOCAL Stn CP 232.

FIGS 53-54. — *Tetraplaria ventricosa* (Haswell): **53**, Segment of opposite and decussate zooids (x 75). **54**, Orifice (x 311). MUSORSTOM 3 Stn DR 117.

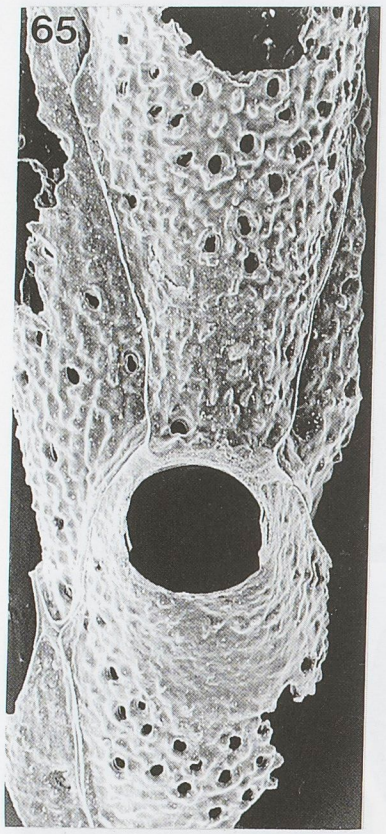
FIGS 55-56. — *Tetraplaria* sp.: **55**, Segment (x 13). **56**, Arrangement of zooids in segment (x 78). BIOCAL Stn DW 38.

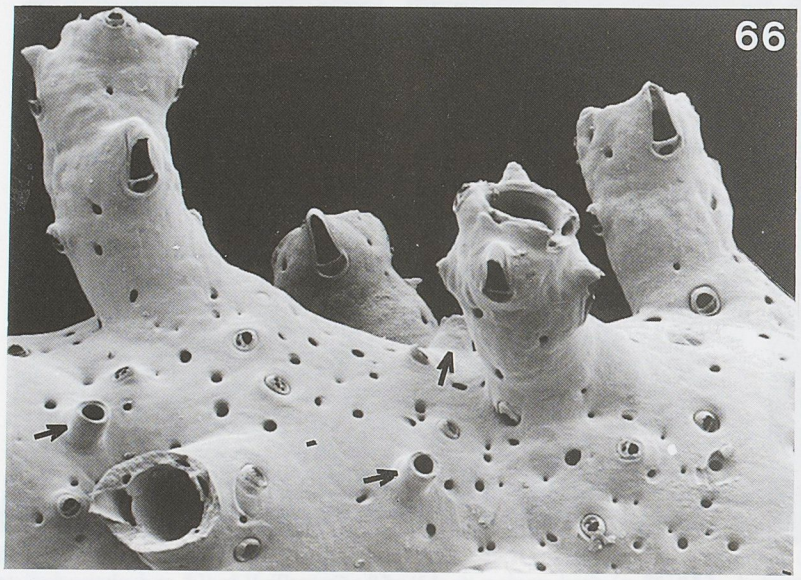


FIGS 57-59. — *Phorioppnia cookae* sp. nov.: **57**, Part of erect stem (x 13). **58**, Ovicelled zooid and skewed distal autozooid (x 44). **59**, Autozooidal orifice and profile of ovicell (x 105). BIOGEOCAL Stn DW 253.

FIGS 60-61. — *Phorioppnia nova* sp. nov.: **60**, Part of erect stem (x 13). **61**, Close-up of zooids (x 56). BIOCAL Stn DW 38.

FIGS 62-64. — *Oppiphorina epaxia* (Gordon): **62**, Part of erect stem (x 13). **63**, Autozooids and profiles of two ovicells (x 62). **64**, Ovicelled orifice (x 145). BIOCAL Stn DW 66.





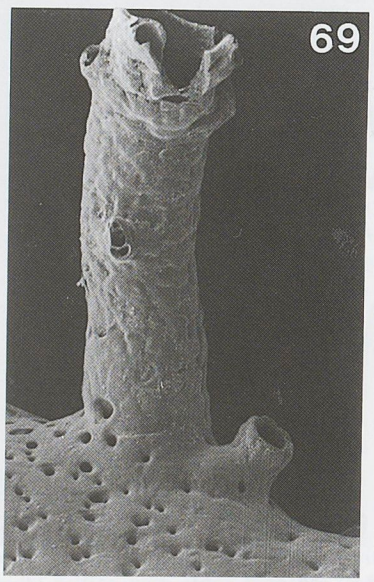


FIG. 65. — Genus and species indet.: Part of erect stem (x 101). BIOGEOCAL Stn KG 275.

FIG. 66. — *Haswelliporina multiaviculata* (Gordon): Profile of zooidal peristomes; spiramen tubes arrowed (x 78). BIOCAL Stn CP 75.

FIGS 67-68. — *Haswelliporina vaubani* (d'Hondt): **67**, Part of erect stem (x 18). **68**, Stem apex (x 56). MUSORSTOM 4 Stn DW 185.

FIG. 69. — *Haswelliporina quinaria* sp. nov.: Profile of peristome and spiramen tube (x 94). MUSORSTOM 6 Stn CP 419.

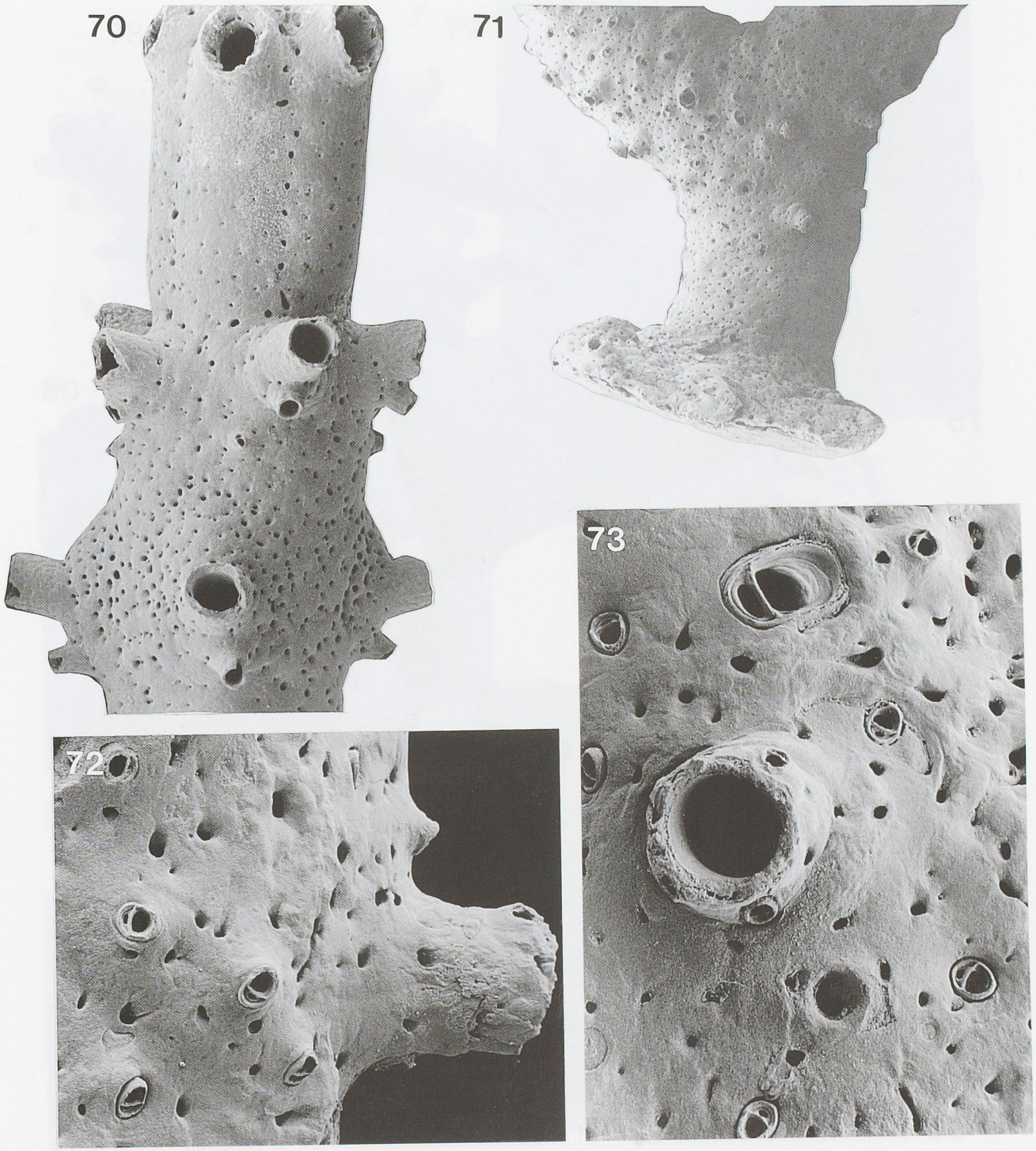
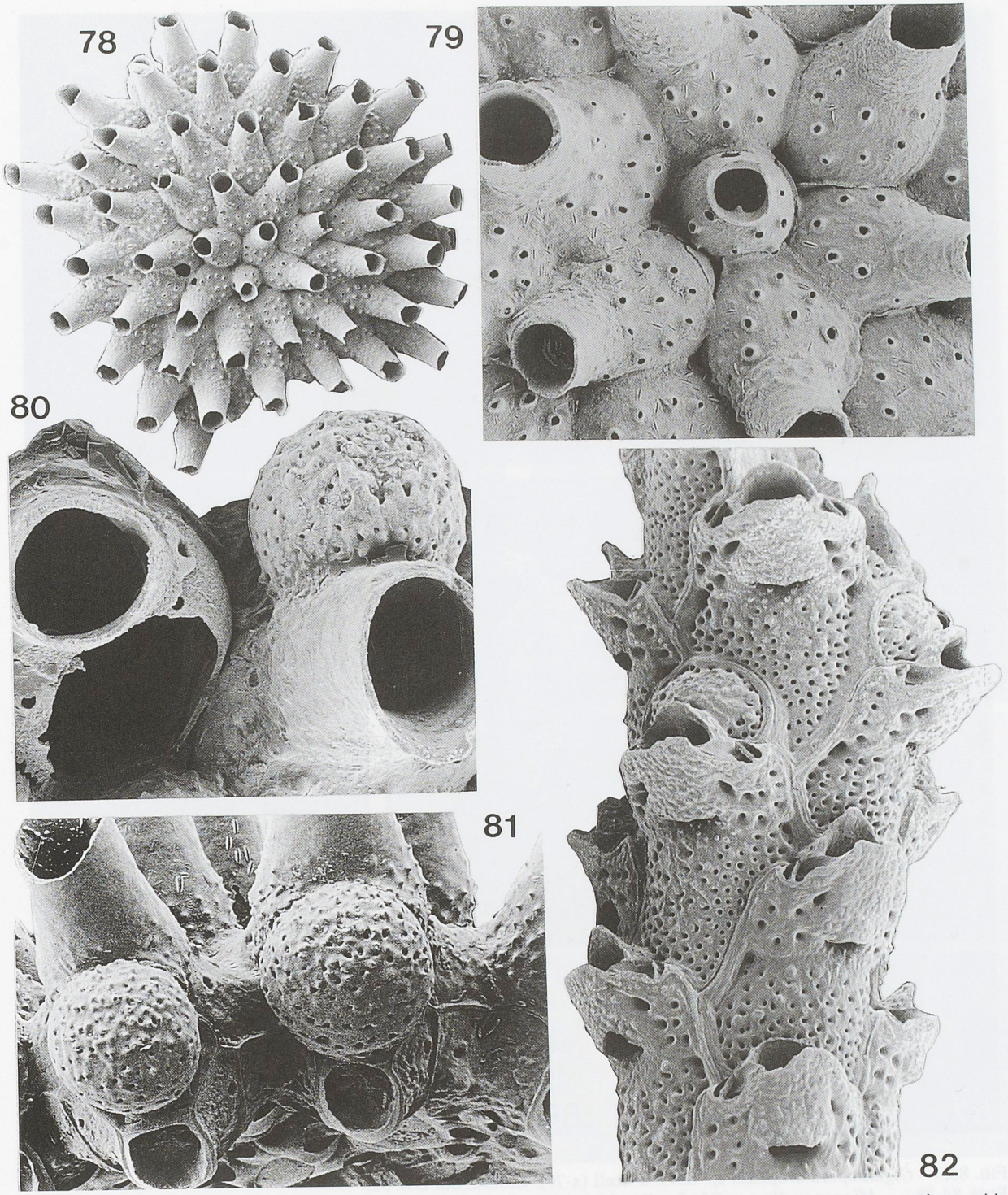


FIG. 70. — *Haswelliporina quinaria* sp. nov.: Distal part of stem, the lowest whorl of zooids ovicelled (x 55). MUSORSTOM 6 Stn CP 419.

FIGS 71-73. — *Haswelliporina ?venusta* (Harmer): **71**, Part of erect stem (x 13). **72**, Lateral view of peristome (x 106). **73**, Frontal view of peristome, spiramen, and two sizes of avicularia (x 106). ESTASE 2 Stn DR 07.

FIGS 74-75. — *Mosaicoporina uniserialis* sp. nov.: **74**, Portion of colony (x 27). **75**, Individual zooid (x 86). BIOCAL Stn DW 66.

FIGS 76-77. — *Semihaswellia umbrella* sp. nov.: **76**, Disposition of zooids (x 29). **77**, Ovicell (ov) (x 56). BIOCAL Stn DW 08.



FIGS 78-81. — *Actisecos regularis* Canu & Bassler: **78**, Whole colony (x 16). **79**, Ancestrula and periancestrular zooids (x 58). **80**, Primary orifice and ovicell (x 131). **81**, Laterobasal view of ovicells and distal pore-chambers (x 81). MUSORSTOM 3 Stn DR 117.

FIG. 82. — *Gigantopora oropiscis* sp. nov.: Part of erect stem, including ovicelled zooids (x 34). BIOCAL Stn DW 38.

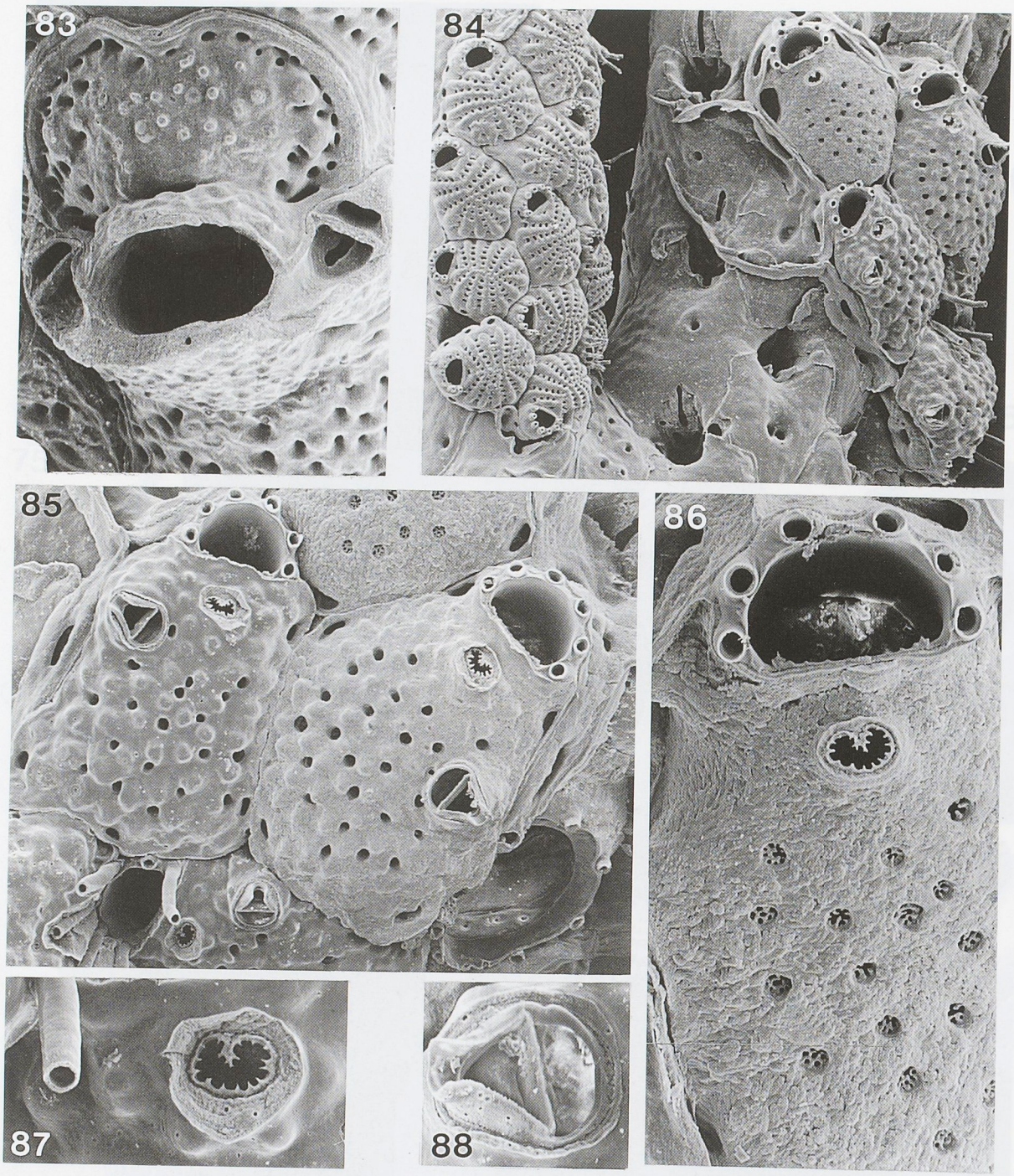
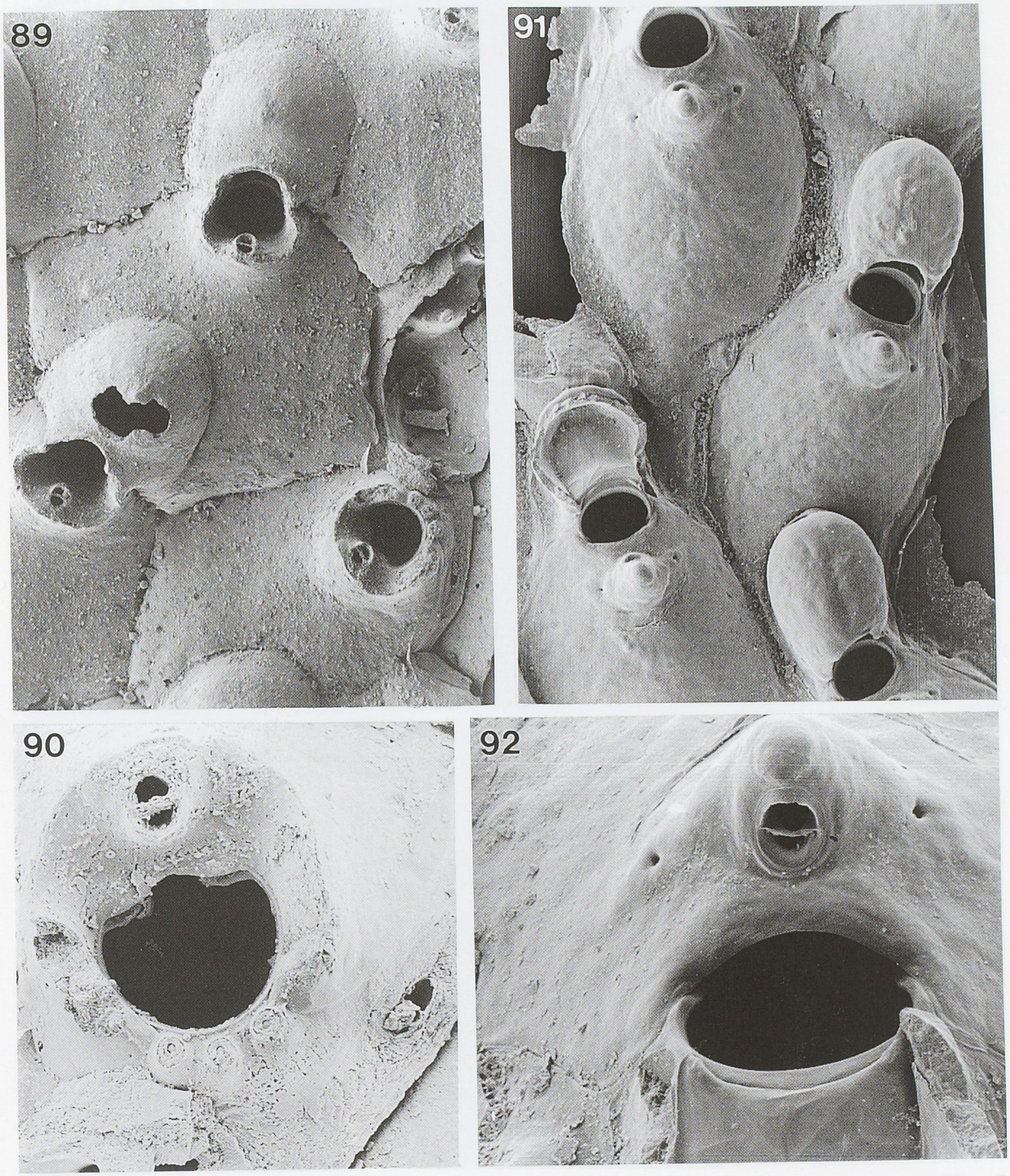


FIG. 83. — *Gigantopora oropiscis* sp. nov.: Ovicell (x 79). BIOCAL Stn DW 38.
FIGS 84-88. — *Microporella* sp.: **84**, Small colonies of *Microporella* sp. (right) and *Puellina harmeri* Ristedt (left) epizoic on *Reteporella orstomia* sp. nov. (q.v.) (x 67). **85**, Ancestrula (lower right) and autozooids (x 141). **86**, Frontal shield of developing autozooid showing reticulation of pseudopores (x 289). **87**, Ascopore (x 434). **88**, Avicularium (x 434). MUSORSTOM 6 Stn DW 431.

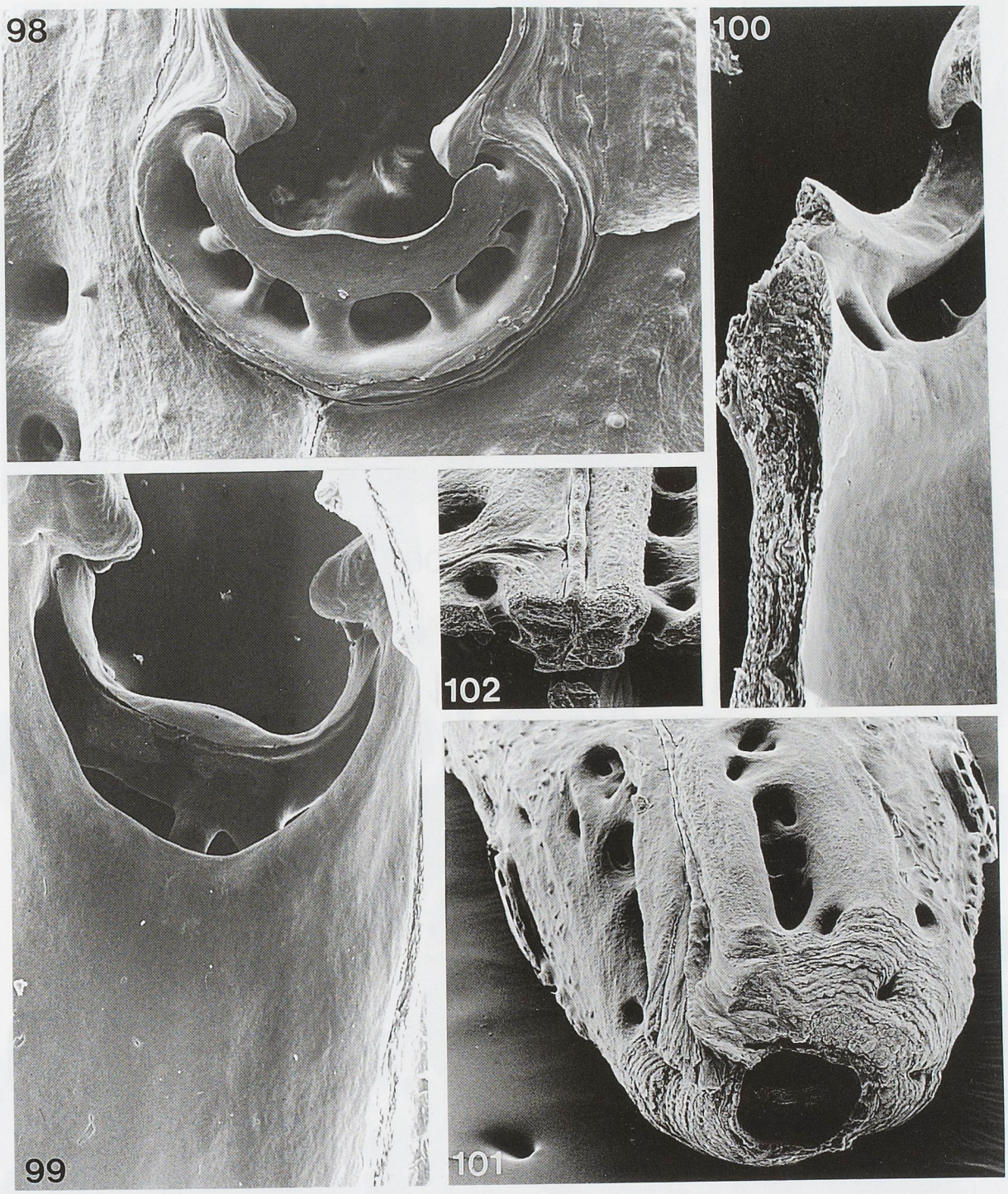


FIGS 89-90. — *Buffonellodes crosnieri* sp. nov.: **89**, Zooids, two ovicelled (x 91). **90**, Primary orifice and oral spine bases (x 270). BIOCAL Stn DW 33.

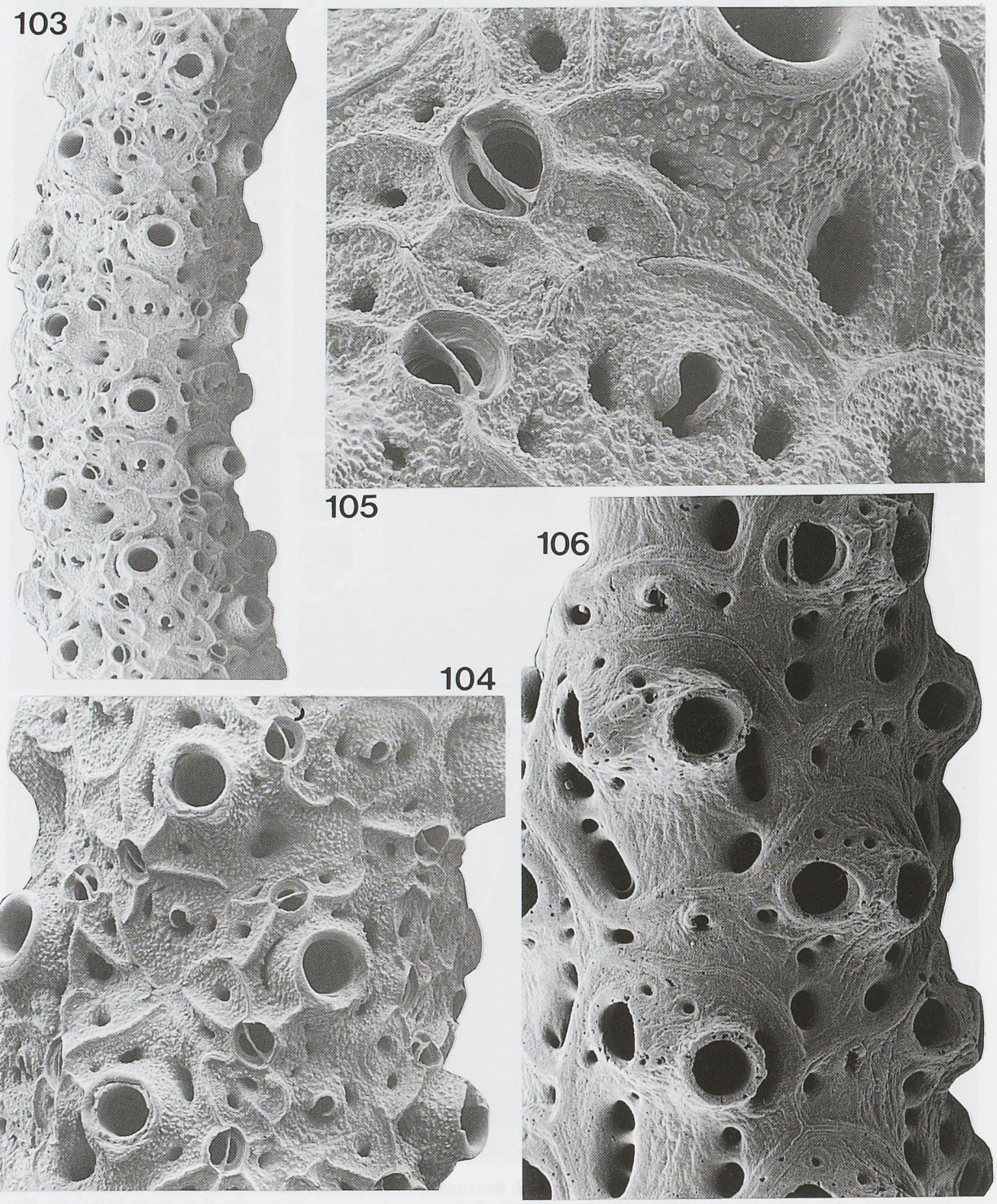
FIGS 91-92. — *Ipsibuffonella repens* sp. nov.: **91**, Biserially encrusting zooids, with ovicells (x 53). **92**, Primary orifice with broad arcuate poster (x 117). BIOCAL Stn DW 33.

FIGS 93-94. — *Macrocamera erecta* sp. nov.: **93**, Distal end of erect stem with ovicell (left) seen in profile (x 58). **94**, Ovicelled zooid and orifice with adjacent autozooids (x 83). CHALCAL 2 Stn DW 78.

FIGS 95-97. — *Pseudoplatyglena mirabilis* sp. nov.: **95**, Part of erect stem, frontal side (x 36). **96**, Abfrontal side of stem with median ridge, adjacent areolar pores, and orifices (x 152). **97**, Operculum and surrounding epithecal membrane (x 251). MUSORSTOM 4 Stn DW 187.

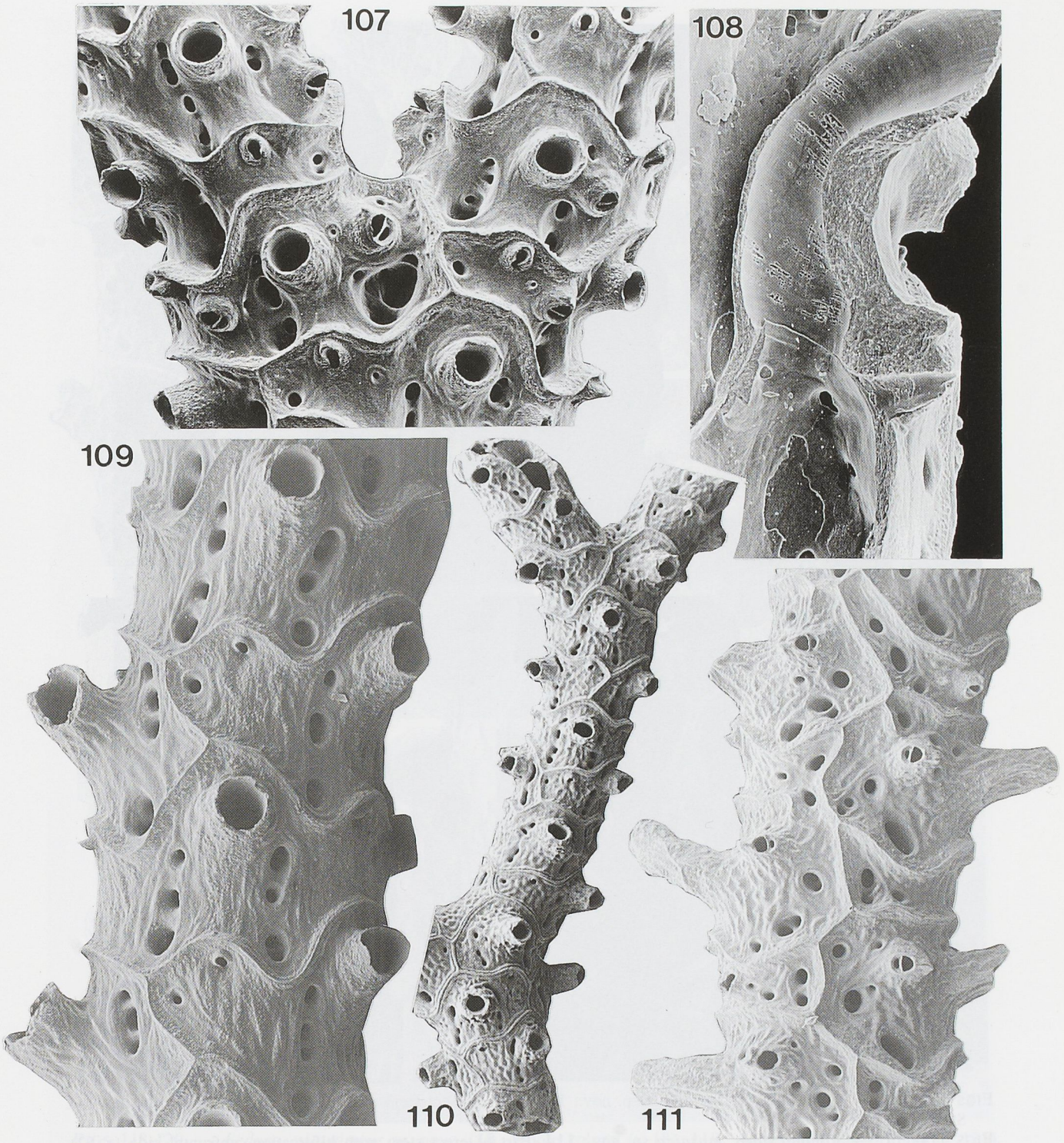


FIGS 98-102. — *Pseudoplatyglena mirabilis* sp. nov.: **98**, Proximal part of orifice, showing the broad arcuate poster and buttressed crescentic bar (x 328). **99**, Inner side of buttressed crescentic bar and frontal shield (x 432). **100**, Longitudinal section through the buttressed bar and adjacent frontal shield (x 430). **101**, Proximal end of segment from abfrontal side (x 109). **102**, Cross section through the median abfrontal keel and areolar tubes (x 200). MUSORSTOM 4 Stn DW 187.



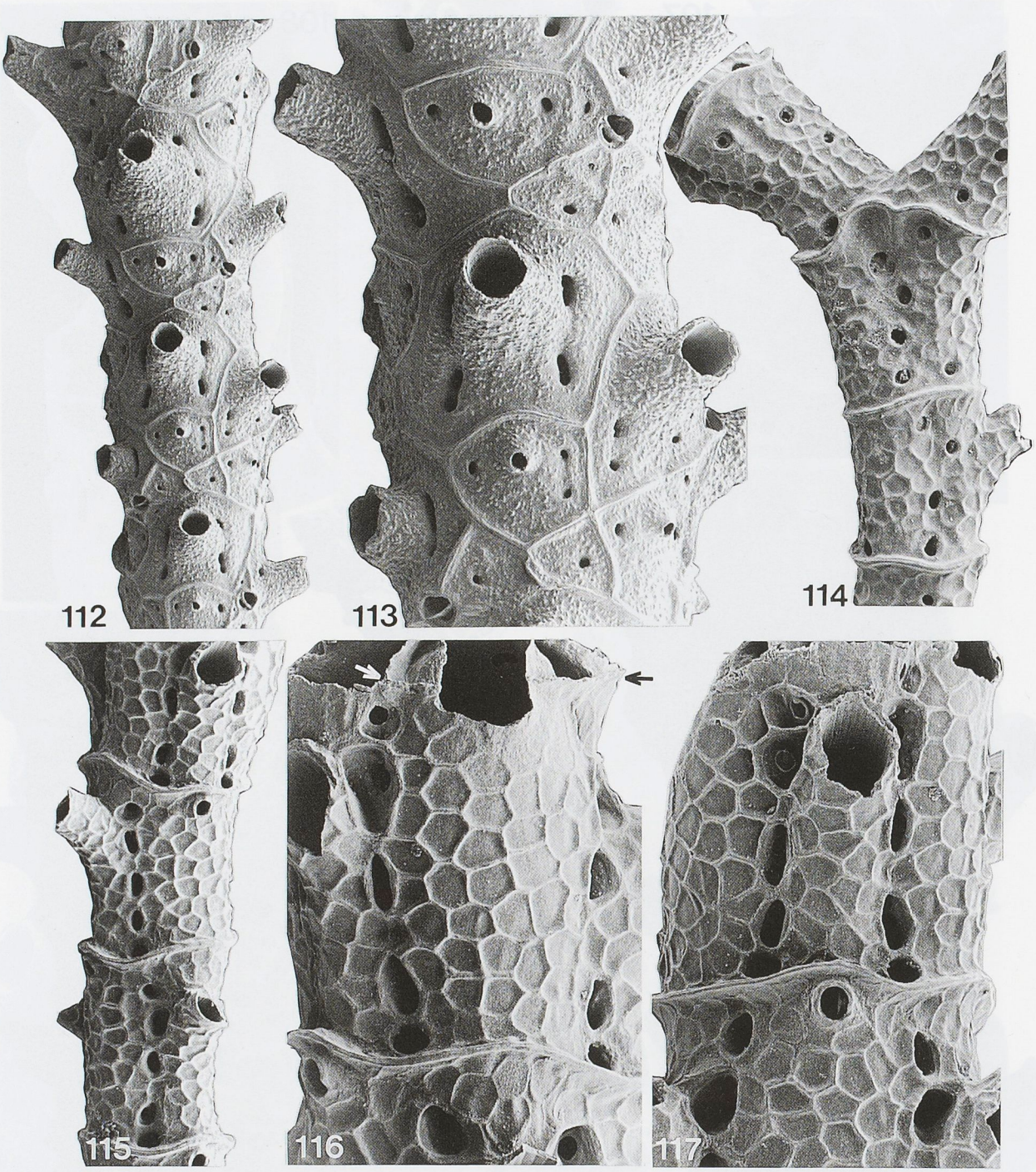
FIGS 103-105. — *Siphonicytara armata* sp. nov.: **103**, Part of erect stem (x 26). **104**, Surface features of stem (x 52). **105**, Ascopore and avicularia (x 135). BIOCAL Stn DW 33.

FIG. 106. — *Siphonicytara excentrica* sp. nov.: Surface features of stem; notice complete cross-bar on most distal avicularium, lacking in the other avicularia (x 52). BIOCAL Stn DW 38.



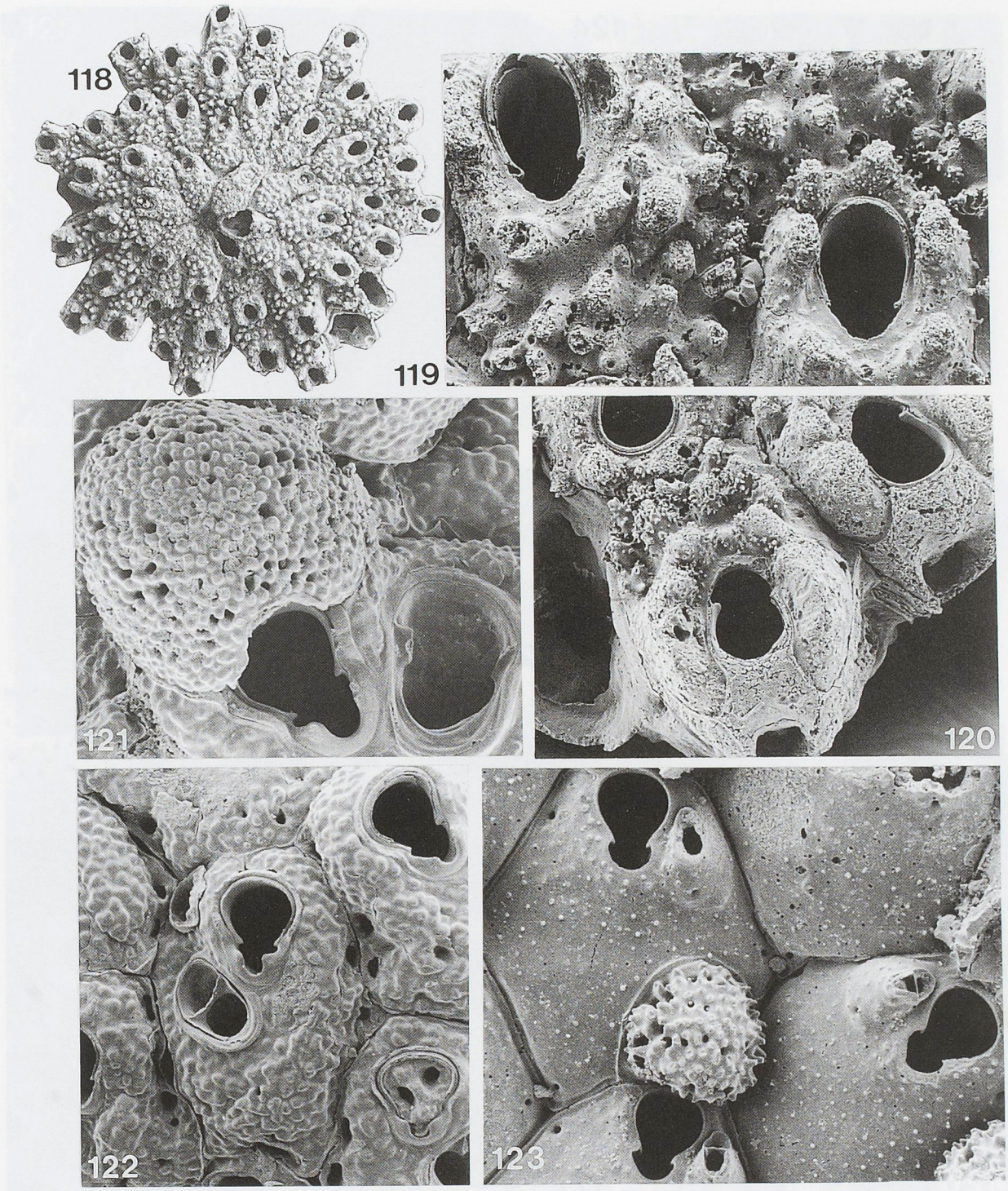
FIGS 107-108. — *Siphonicytara glabra* sp. nov.: **107**, Part of erect stem at bifurcation (x 49). **108**, Longitudinal section through peristome and ascopore (x 130). BIOCAL Stn DW 70.

FIGS 109-111. — *Siphonicytara vittata* sp. nov.: **109**, Part of stem, frontal side (x 52). **110**, Part of stem, abfrontal side (x 36). **111**, Part of erect stem with two bifurcations (x 26). BIOCAL Stn DW 08.



FIGS 112-113. — *Siphonicytara granulosa* sp. nov.: **112**, Part of erect stem (x 27). **113**, Same, (x 54). BIOGEOCAL Stn CP 232.

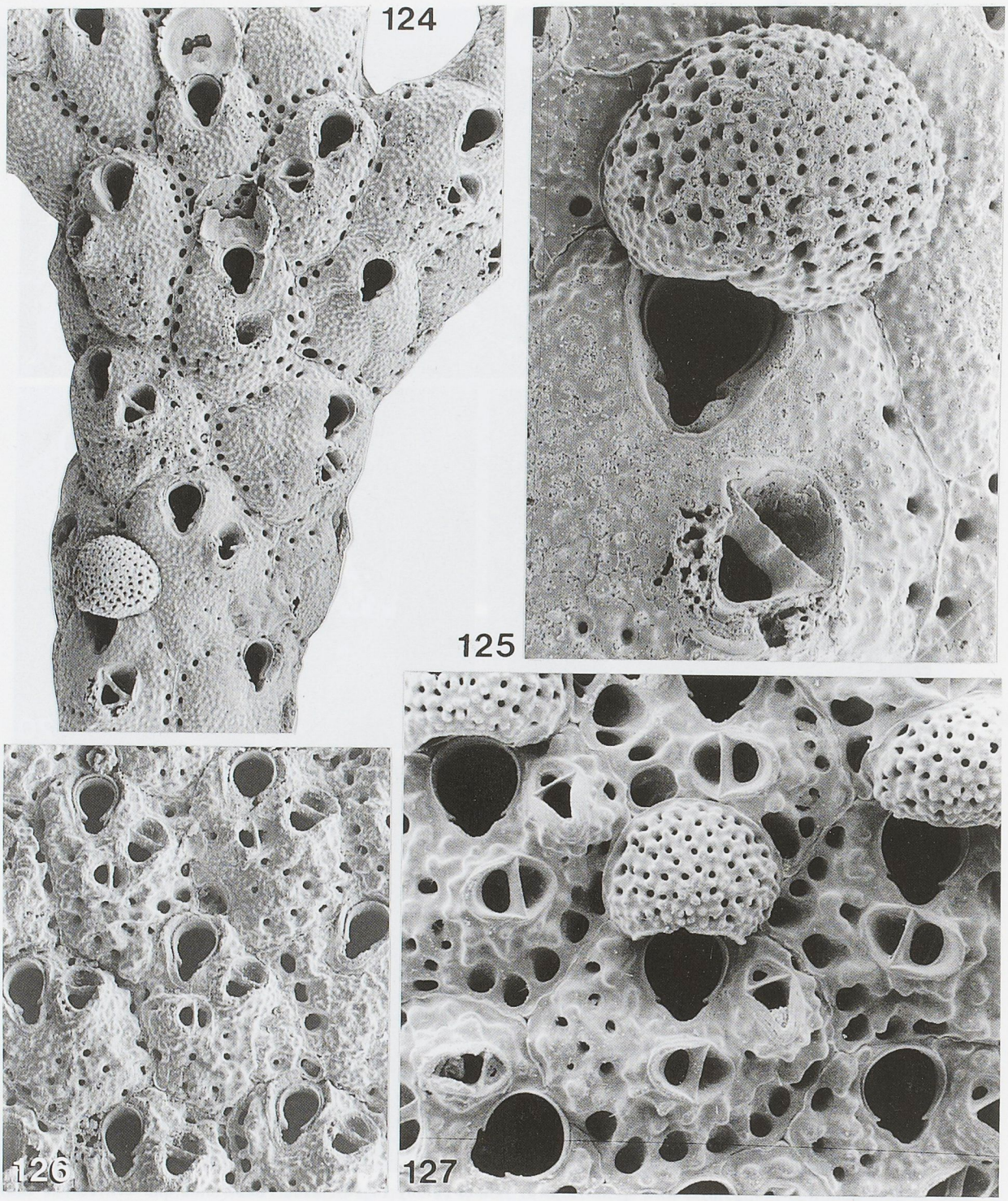
FIGS 114-117. — *Siphonicytara mosaica* sp. nov.: **114**, Part of erect stem with bifurcation, abfrontal side (x 52). **115**, Part of erect stem, frontal side (x 52). **116**, Apex of stem showing differentiation of zooid proximal to developing transverse ridge (arrows) (x 109). **117**, Apex of stem showing newly formed peristome, which lies on the proximal frontal calcification of the differentiating distal zooid; areolae and sunken septular pores present on either side of the peristome (x 93). BIOGEOCAL Stn CP 265.



FIGS 118-120. — *Fedora platydiscus* sp. nov.: **118**, Whole colony (x 18). **119**, Autozooids and orifices (x 131). **120**, Zooids at colony margin showing distal pore-chambers (x 93). MUSORSTOM 3 Stn DR 117.

FIGS 121-122. — *Characodoma areolata* (Canu & Bassler): **121**, Ovicell (x 120). **122**, Autozooids (x 87). MUSORSTOM 3 Stn DR 117.

FIG. 123. — *Characodoma glabra* sp. nov.: Autozooids and ovicell (x 118). MUSORSTOM 3 Stn DR 117.



FIGS 124-126. — *Characodoma biavicularia* (Canu & Bassler): **124**, Part of erect colony (x 41). **125**, Ovicell (x 144). MUSORSTOM 3 Stn DR 117. **126**, From USNM type specimen 8067 (part) (x 69). *"Albatross"* Stn 5179.
FIG. 127. — *Characodoma parva* sp. nov.: Ovicelled and infertile zooids (x 131). MUSORSTOM 3 Stn DR 117.

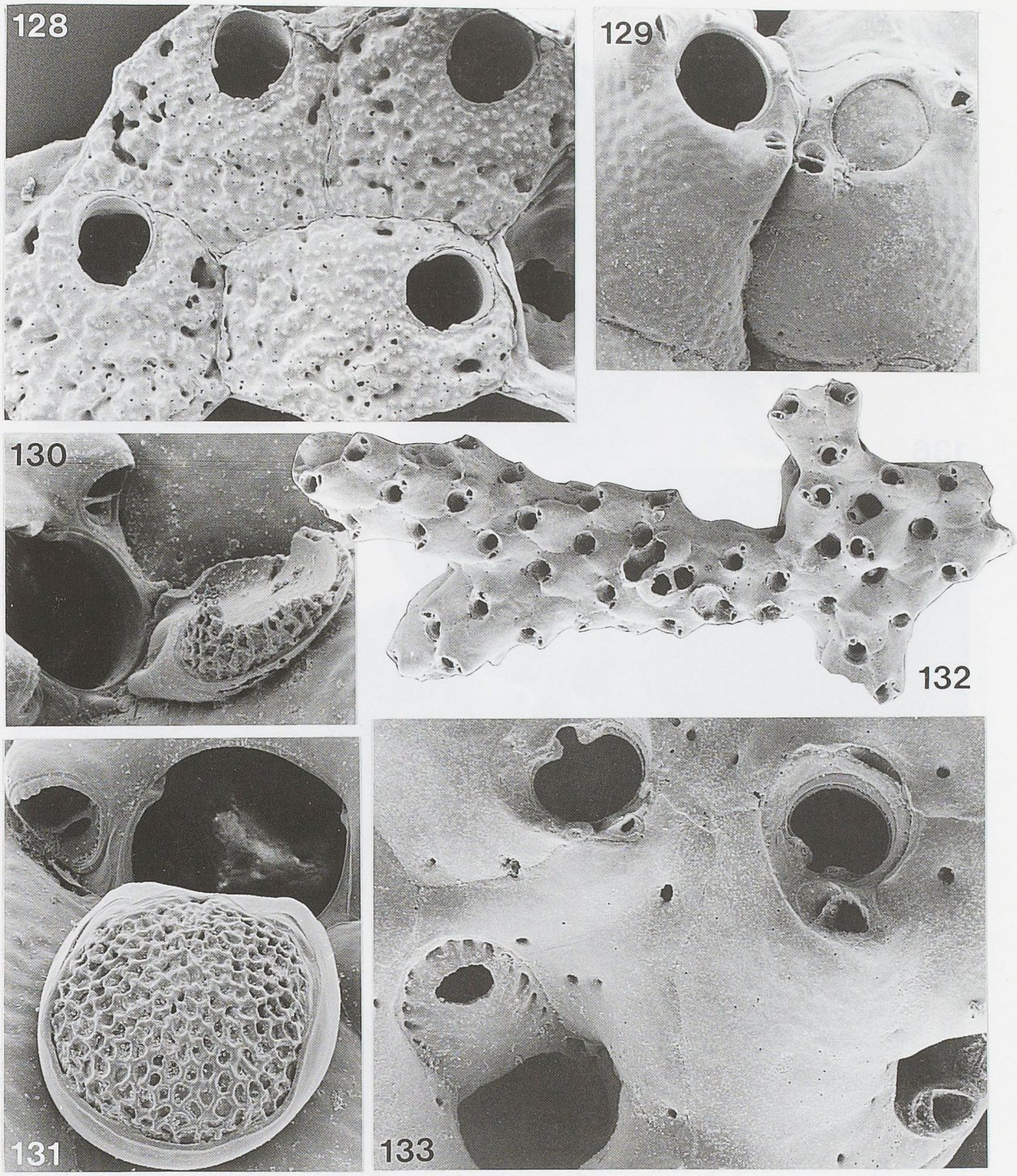
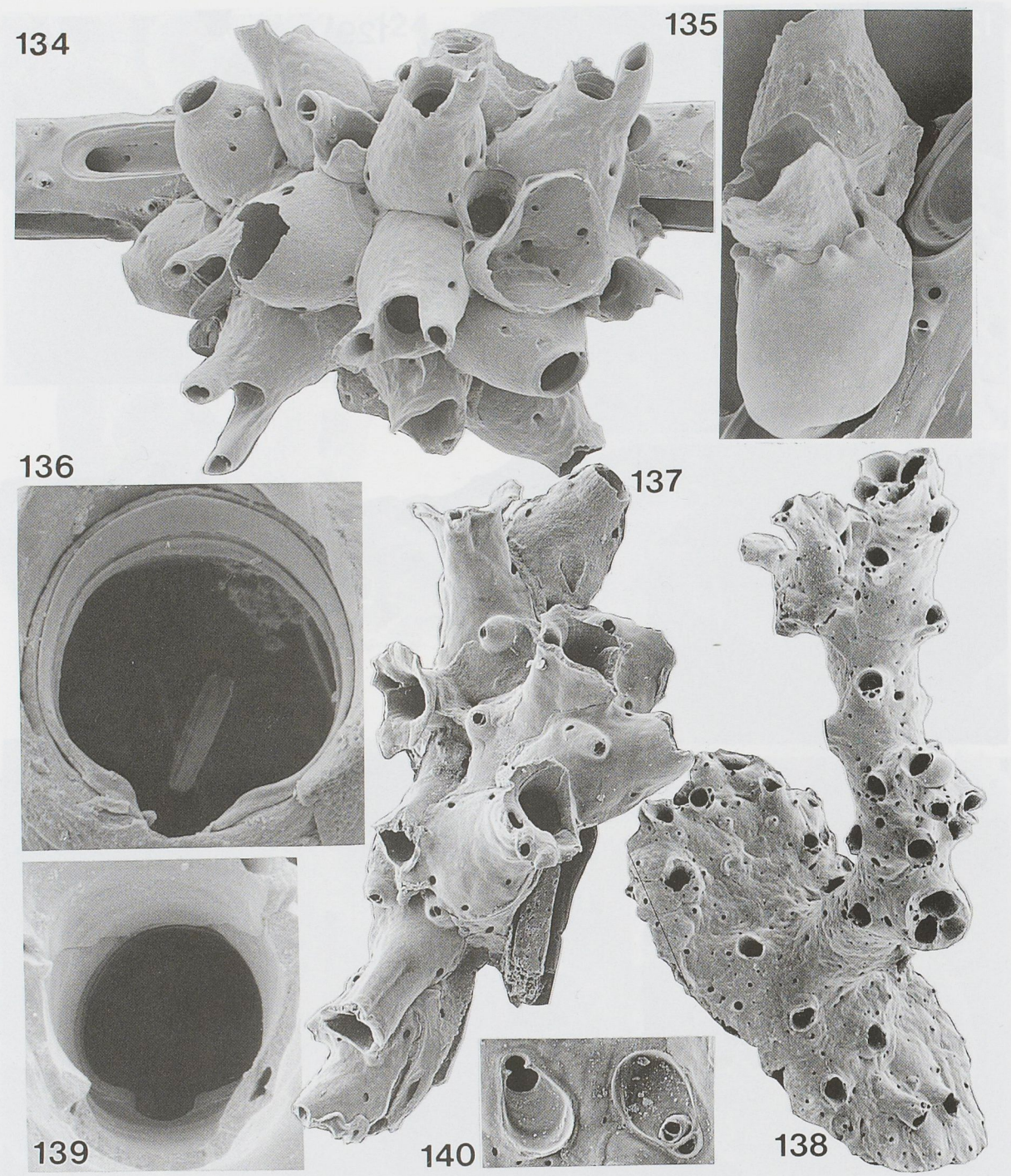


FIG. 128. — *Characodoma* sp.: Infertile zooids (x 69). MUSORSTOM 3 Stn CP 103.

FIGS 129-131. — *Yrbozoon ringens* Gordon: **129**, Two autozooids, one with an operculum in place (x 60). **130**, Profile of fractured ovicell (x 111). **131**, Ovicell, showing reticulated endooecium (x 134). BIOCAL Stn DW 66.

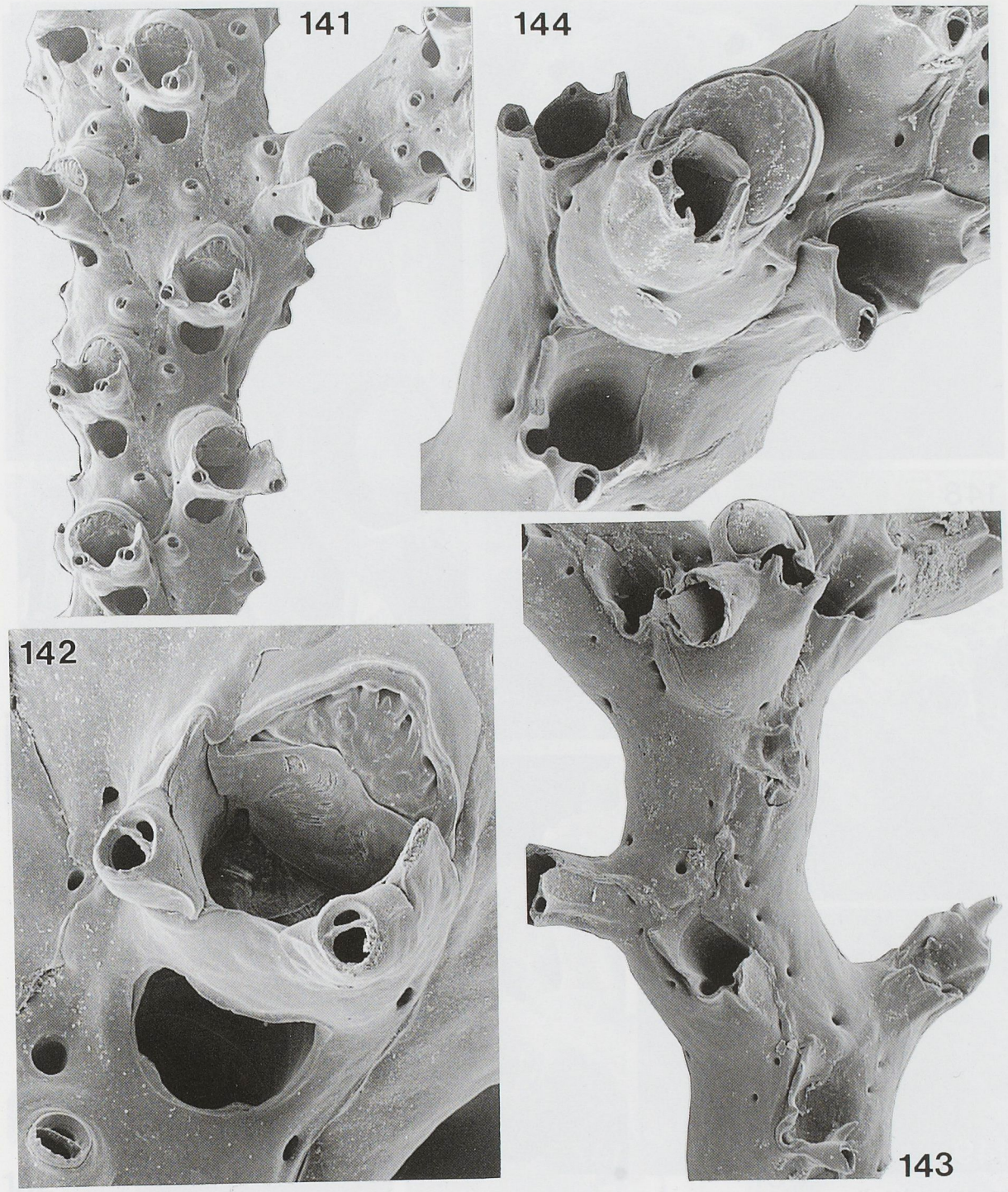
FIGS 132-133. — *Buffonellaria erecta* sp. nov.: **132**, Entire branching colony (x 18). **133**, Orifices, avicularia, and exposed ovicellular endooecium (x 124). BIOCAL Stn DW 66.



FIGS 134-136. — *Osthimosia* sp.: **134**, Whole juvenile colony on a segment of *Nellia tenella* (Lamarck) (x 77). **135**, Ancestrula and first daughter zooid, on *N. tenella* (x 134). **136**, Primary orifice (x 506). MUSORSTOM 4 Stn DW 187.

FIG. 137. — *Lagenipora* sp.: Very young colony (x 79). BIOCAL Stn DW 46.

FIGS 138-140. — *Galeopsis mimicus* Gordon: **138**, Young colony with encrusting base (x 26). **139**, Primary orifice (x 252). BIOCAL Stn CP 75. **140**, Spatulate avicularia (x 89). CHALCAL 2 Stn DW 76.



FIGS 141-142. — *Galeopsis lageniporoides* sp. nov.: **141**, Part of linear encrusting lobe (x 49). **142**, Ovicelled orifice (x 195). MUSORSTOM 6 Stn DW 489.

FIGS 143-144. — *Richbunea gracilis* sp. nov.: **143**, Part of erect branch (x 54). **144**, Ovicell and adjacent peristomes (x 92). BIOCAL Stn CP 67.

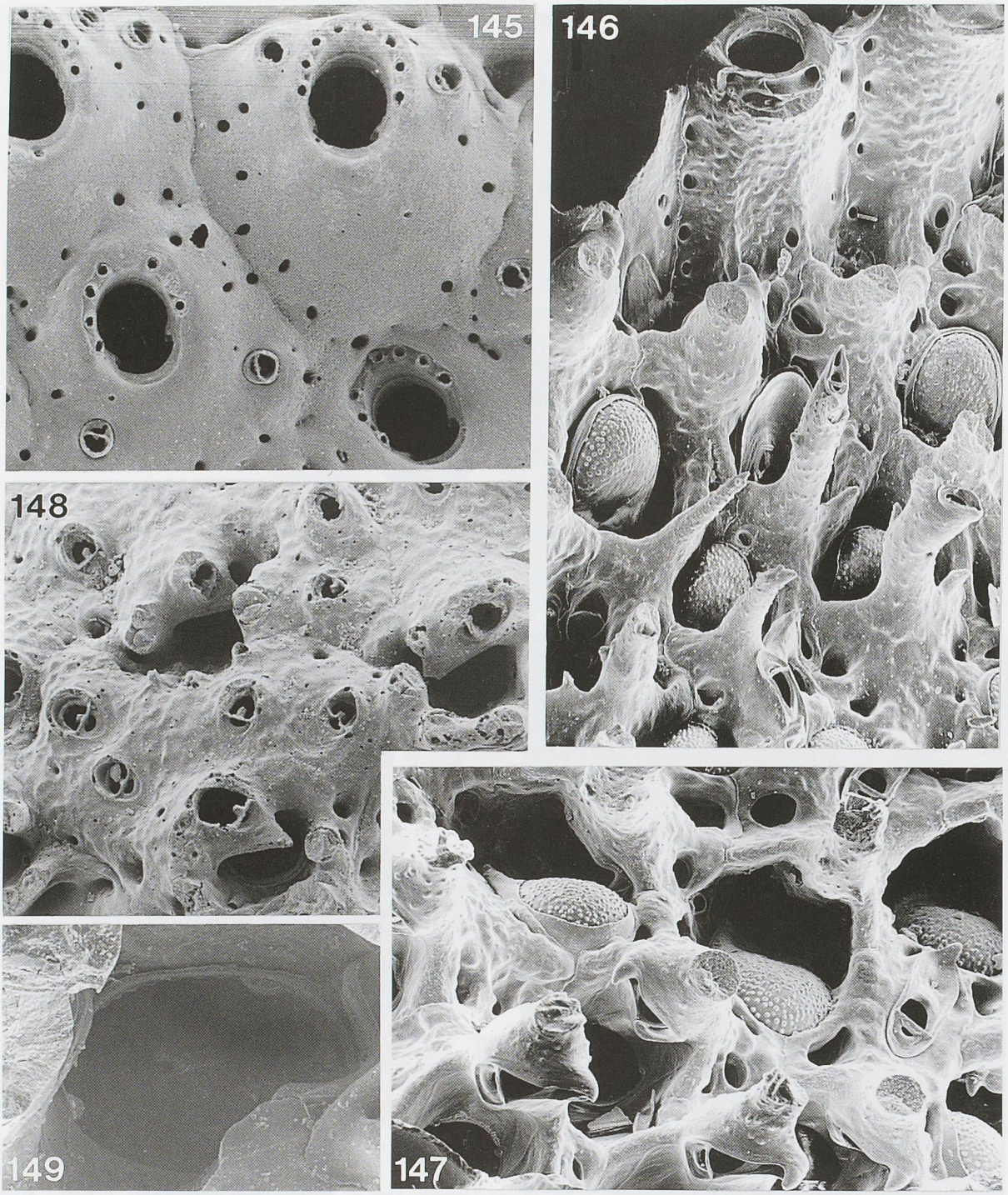


FIG. 145. — *Lifuella calyciformis* (Philipps): Autozooids (x 118). MUSORSTOM 3 Stn DR 117.

FIGS 146-147. — *Rhynchozoon tubulosum* (Hincks): **146**, Ovicelled zooids near growth margin (x 103). **147**, Orifices, tilted to show avicularia on peristomial side of mucrones (x 129). MUSORSTOM 4 Stn DW 231.

FIGS 148-149. — *Rhynchozoon ligulatum* sp. nov.: **148**, Oral view of zooids near growth margin (x 65). **149**, Primary orifice (x 235). BIOCAL Stn DW 38.

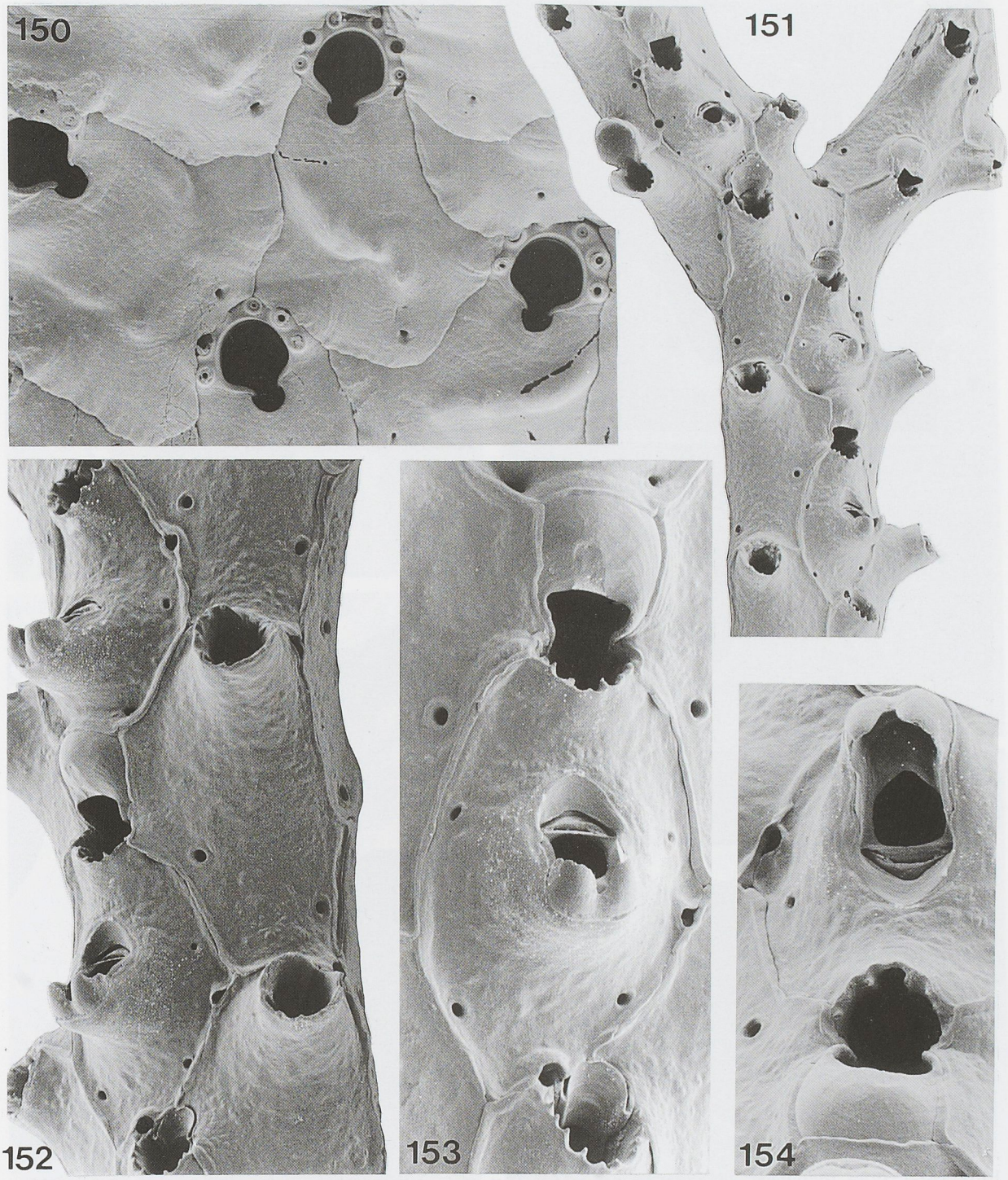
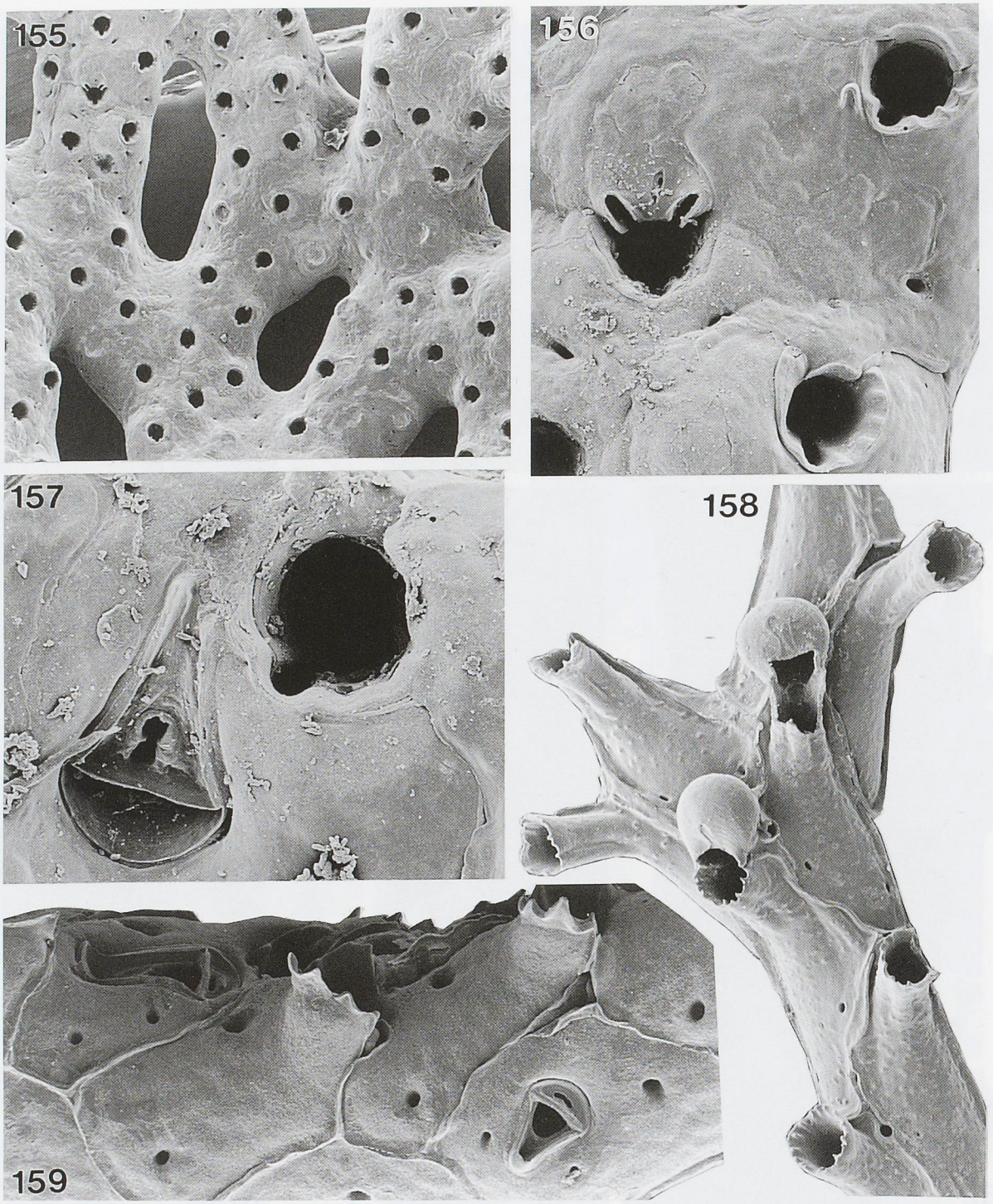


FIG. 150. — *Schedocleidochasma* sp.: Autozooids (x 163). BIOCAL Stn DW 38.

FIGS 151-154. — *Iodictyum bicuspidatum* sp. nov.: **151**, Part of erect branch (x 34). **152**, Autozooids (one ovicelled), with profiles of large avicularia (x 68). **153**, Ovicelled zooid with large avicularium (x 109). **154**, Same, oral view (x 125). MUSORSTOM 6 Stn CP 419.



FIGS 155-157. — *Iodictyum blandum* sp. nov.: **155**, Part of fenestrate colony; an ovicell at upper left (x 23). **156**, Ovicell and adjacent peristomial orifices (x 105). **157**, Large lateral-oral avicularium (x 211). BIOCAL Stn DW 44.

FIGS 158-159. — *Iodictyum illinguum* sp. nov.: **158**, Part of erect branch (x 54). **159**, Lateral view of avicularia (x 111). MUSORSTOM 6 Stn DW 421.

FIG. 160. — *Iodictyum illinguum* sp. nov.: Ovicelled peristome (x 215). MUSORSTOM 6 Stn DW 421.
FIGS 161-163. — *Iodictyum trochus* sp. nov.: **161**, Distal end of erect branch (x 145). **162**, Broken peristome, showing sinus groove (top right) (x 129). **163**, Rare peristomial avicularium (x 211). MUSORSTOM 6 Stn CP 419.

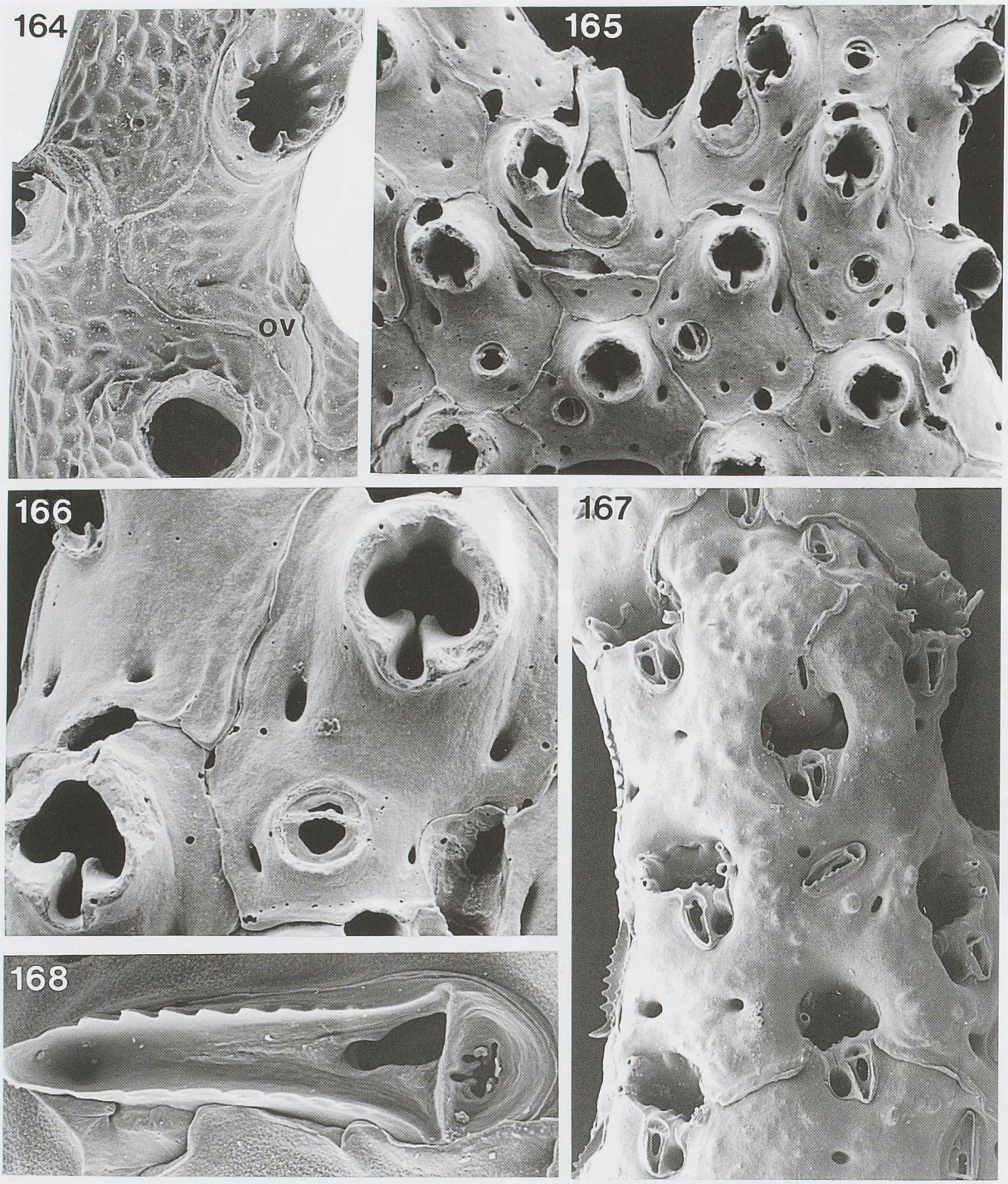
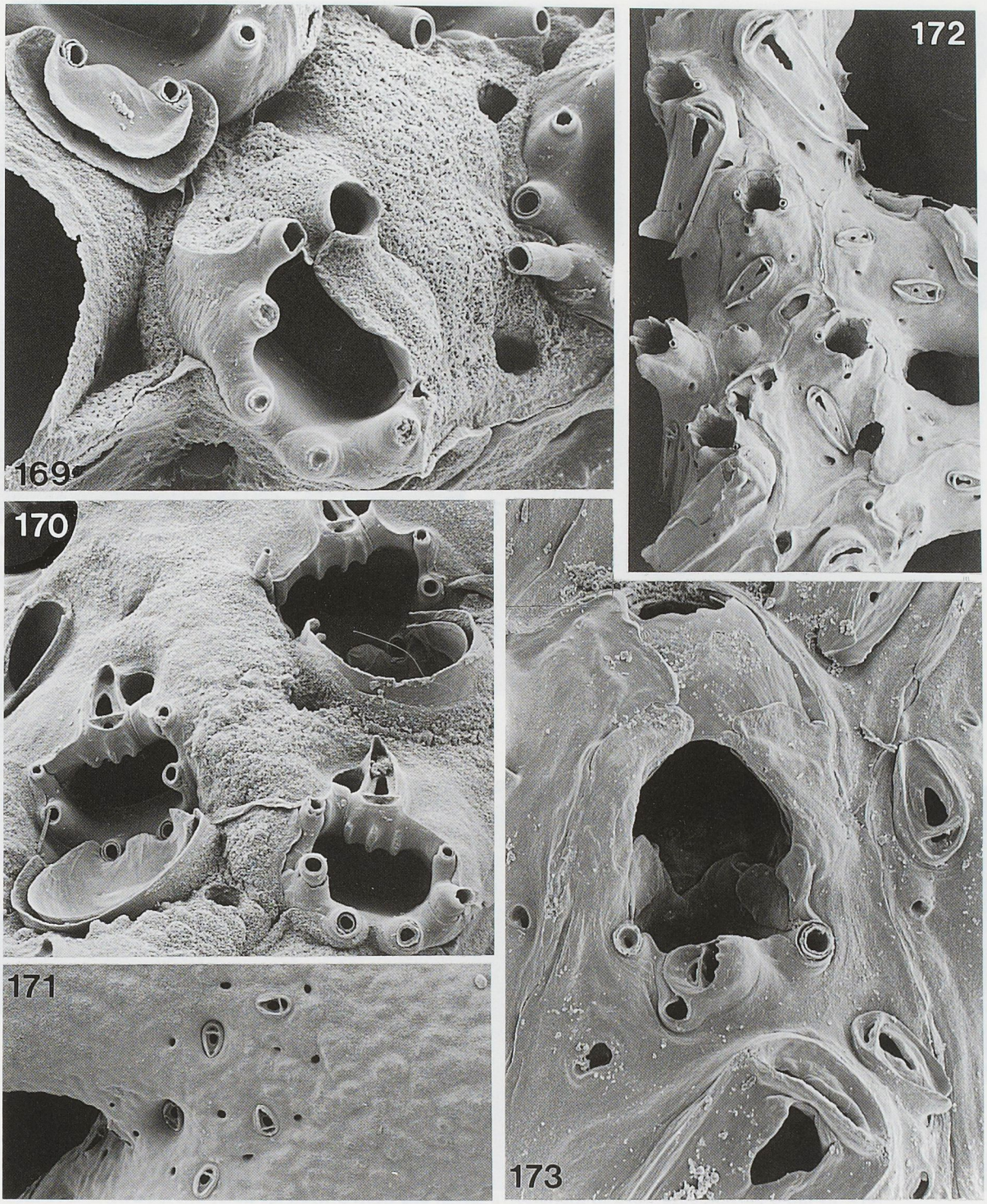


FIG. 164. — *Iodictyum ?trochus*: Partially concealed ovicell (ov) (x 103). BIOCAL Stn DW 46.

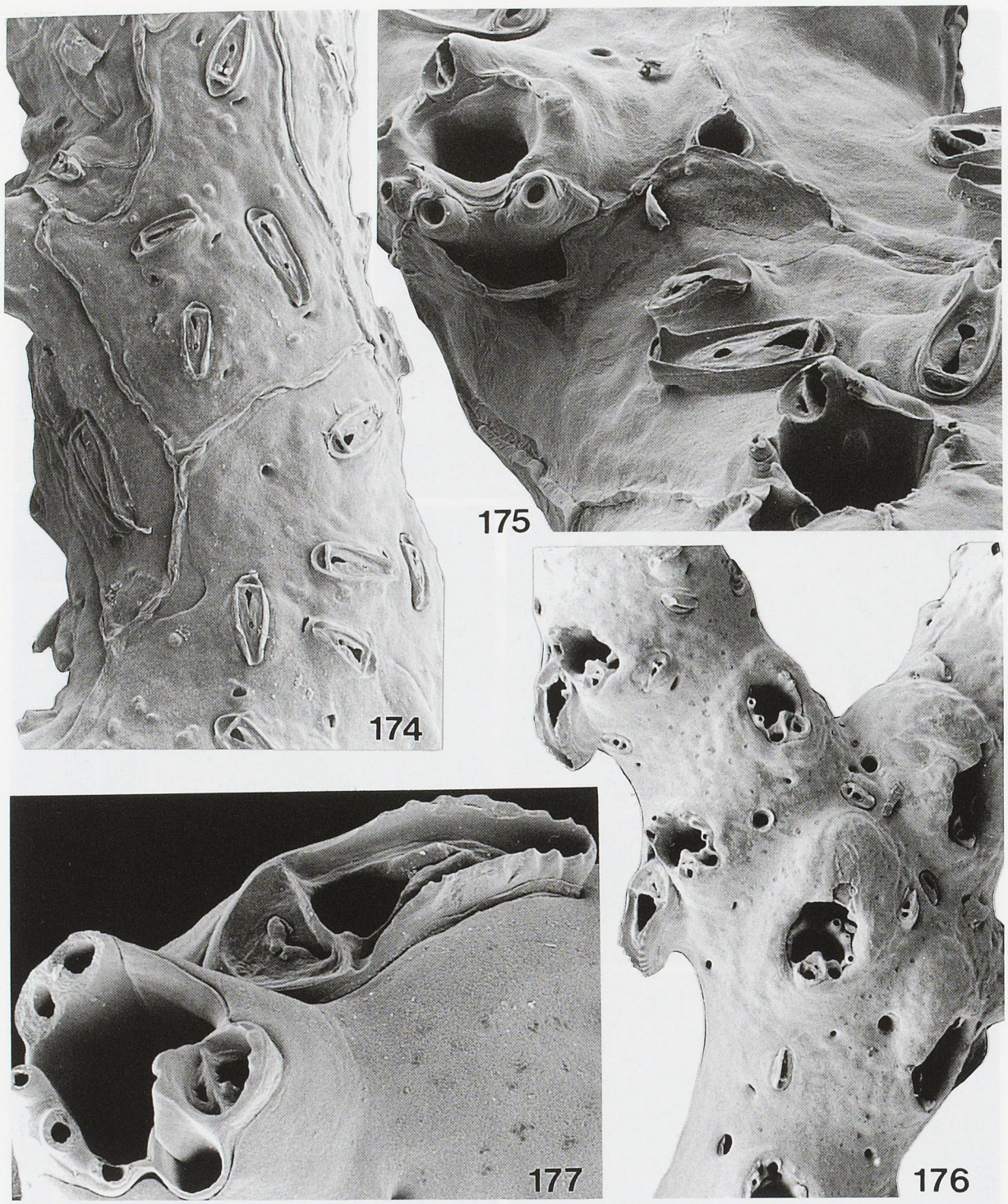
FIGS 165-166. — *Iodictyum* sp.: **165**, Part of fenestrate colony showing two subfenestral avicularia (x 78). **166**, Peristomial orifices and frontal avicularium (x 195). MUSORSTOM 4 Stn DW 151.

FIGS 167-168. — *Reteporella concinnoides* sp. nov.: **167**, Part of trabecula with ovicell (x 141). **168**, Intrafenestral avicularium (x 125). MUSORSTOM 4 Stn DW 231.



FIGS 169-171. — *Reteporella concinnoides* sp. nov.: **169-170**, Stages in skeletal morphogenesis of peristomes and ovicells (x 334, x 239). **171**, Small abfrontal avicularia (x 88). MUSORSTOM 4 Stn DW 231.

FIGS 172-173. — *Reteporella defensa* sp. nov.: **172**, Part of fenestrate colony showing large avicularia (x 59). BIOCAL Stn DW 38. **173**, Ovicell and peristomial avicularium (x 156). CHALCAL 2 Stn DW 76.



FIGS 174-175. — *Reteporella defensa* sp. nov.: **174**, Abfrontal side of trabecula (x 92). BIOCAL Stn CP 108. **175**, Oral view of peristomes and frontal avicularia (x 195). BIOCAL Stn DW 38.

FIGS 176-177. — *Reteporella ferox* sp. nov.: **176**, Part of erect branch (x 68). **177**, Lateral view of peristome and avicularium (x 268). MUSORSTOM 6 Stn CP 419.

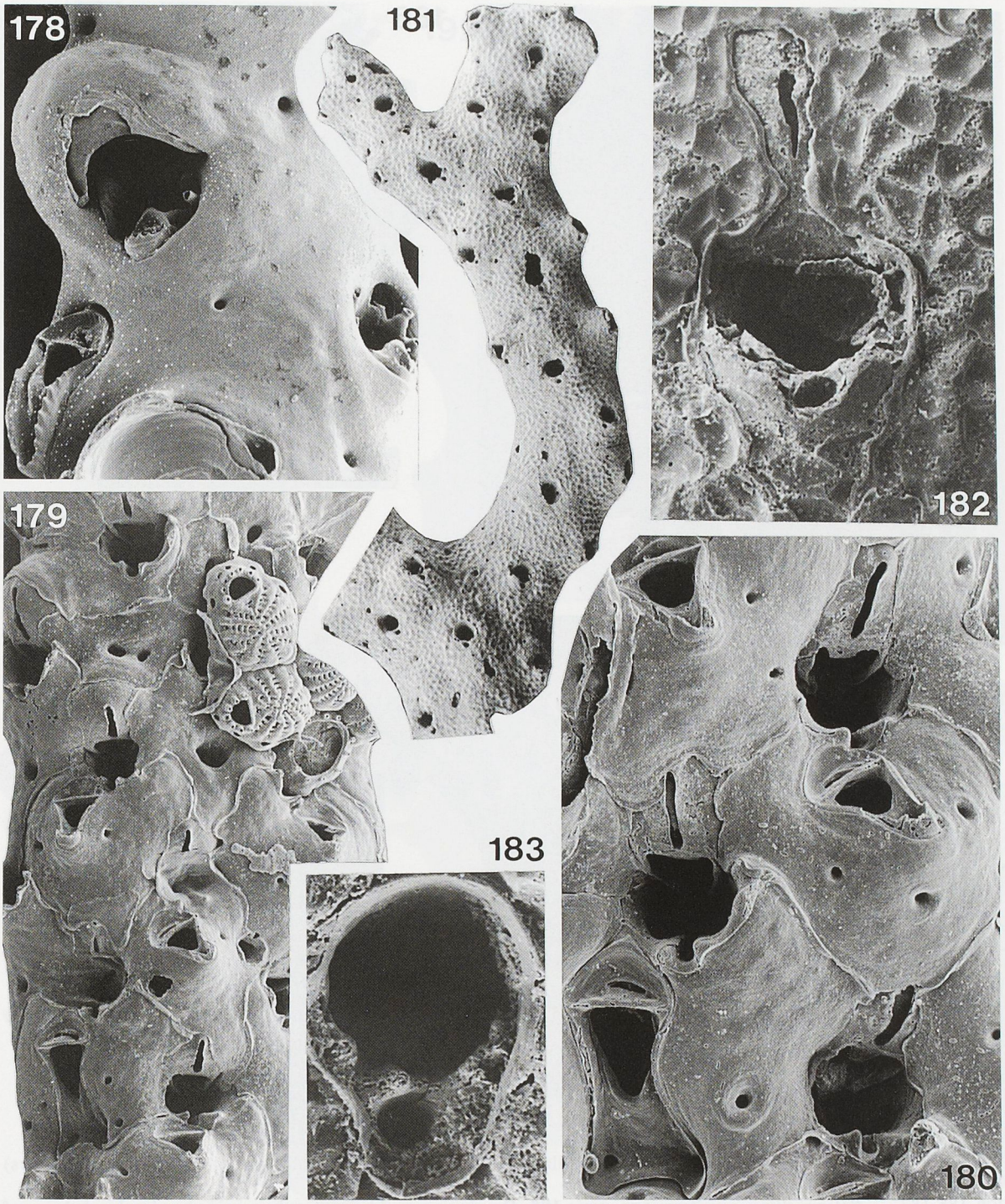


FIG. 178. — *Reteporella ferox* sp. nov.: Ovicell and lateral avicularium (x 248). MUSORSTOM 6 Stn CP 419.

FIGS 179-180. — *Reteporella orstomia* sp. nov.: **179**, Trabecula of fenestrate colony (x 77). **180**, Ovicells and frontal avicularia (x 144). MUSORSTOM 6 Stn DW 431.

FIGS 181-183. — *Reteporella* sp.: **181**, Part of erect branch (x 27). **182**, Ovicell with median slit visible (x 227). **183**, Peristomial orifice and spiramen (x 304). BIOGEOCAL Stn DW 253.

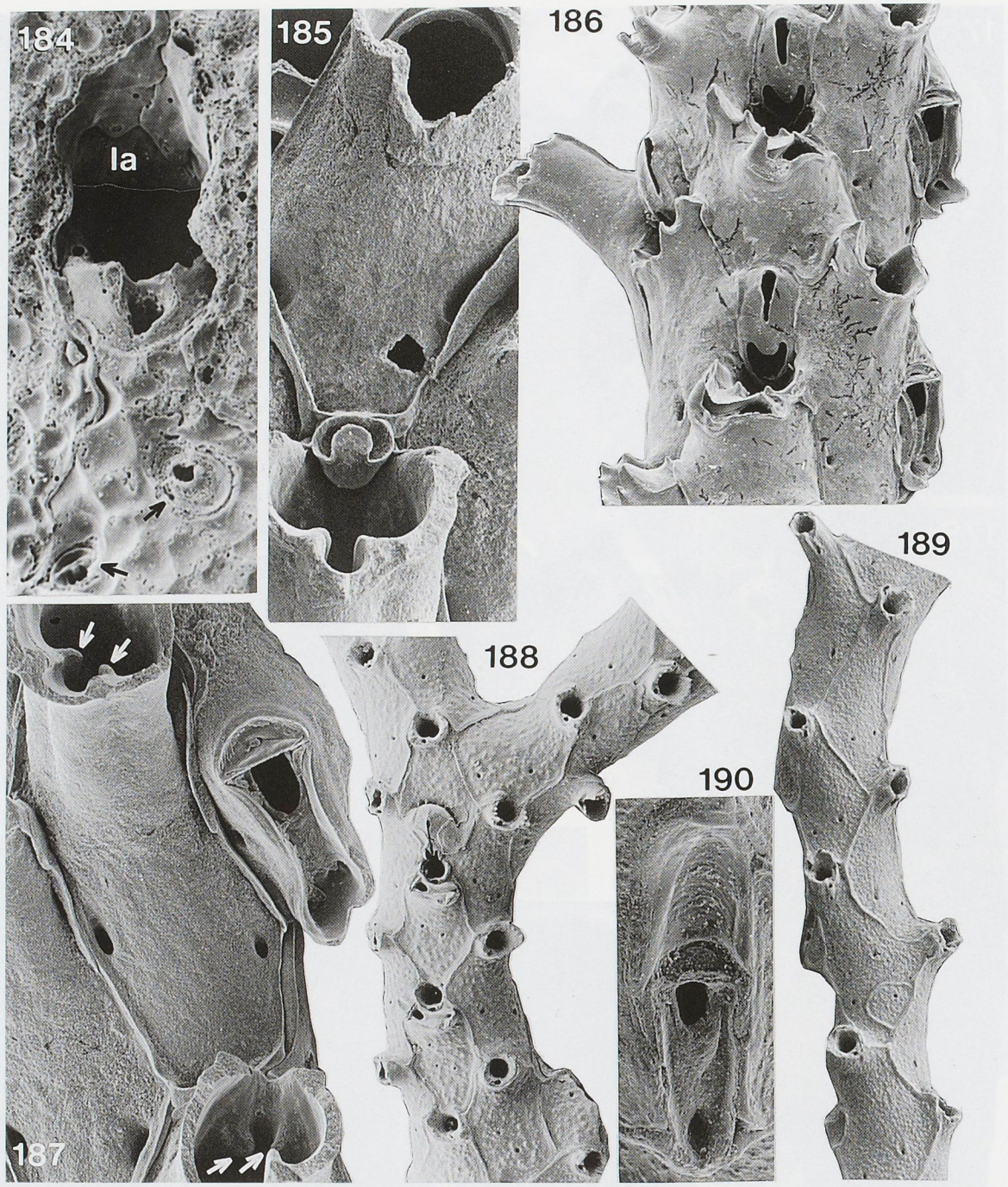


FIG. 184. — *Reteporella* sp.: Ovicelled orifice [ovicellular labellum (la) barely visible] and suboral avicularia (arrows) (x 227). BIOGEOCAL Stn DW 253.

FIGS 185-187. — *Reteporellina cruciformis* sp. nov.: **185**, Developing zooids at growth margin showing beaded rim of primary orifice (above) and ovicell anlage (below) (x 227). **186**, Part of erect branch (x 83). **187**, Zooidal peristomes with cusps (arrows) and lateral avicularium (x 173). MUSORSTOM 3 Stn DR 117.

FIGS 188-190. — *Reteporellina spiramina* sp. nov.: **188**, Part of erect branch; one ovicell present (x 33). MUSORSTOM 3 Stn CP 139. **189**, Part of erect branch with lateral avicularia (x 28). **190**, Lateral avicularium (x 144). BIOCAL Stn DW 44.

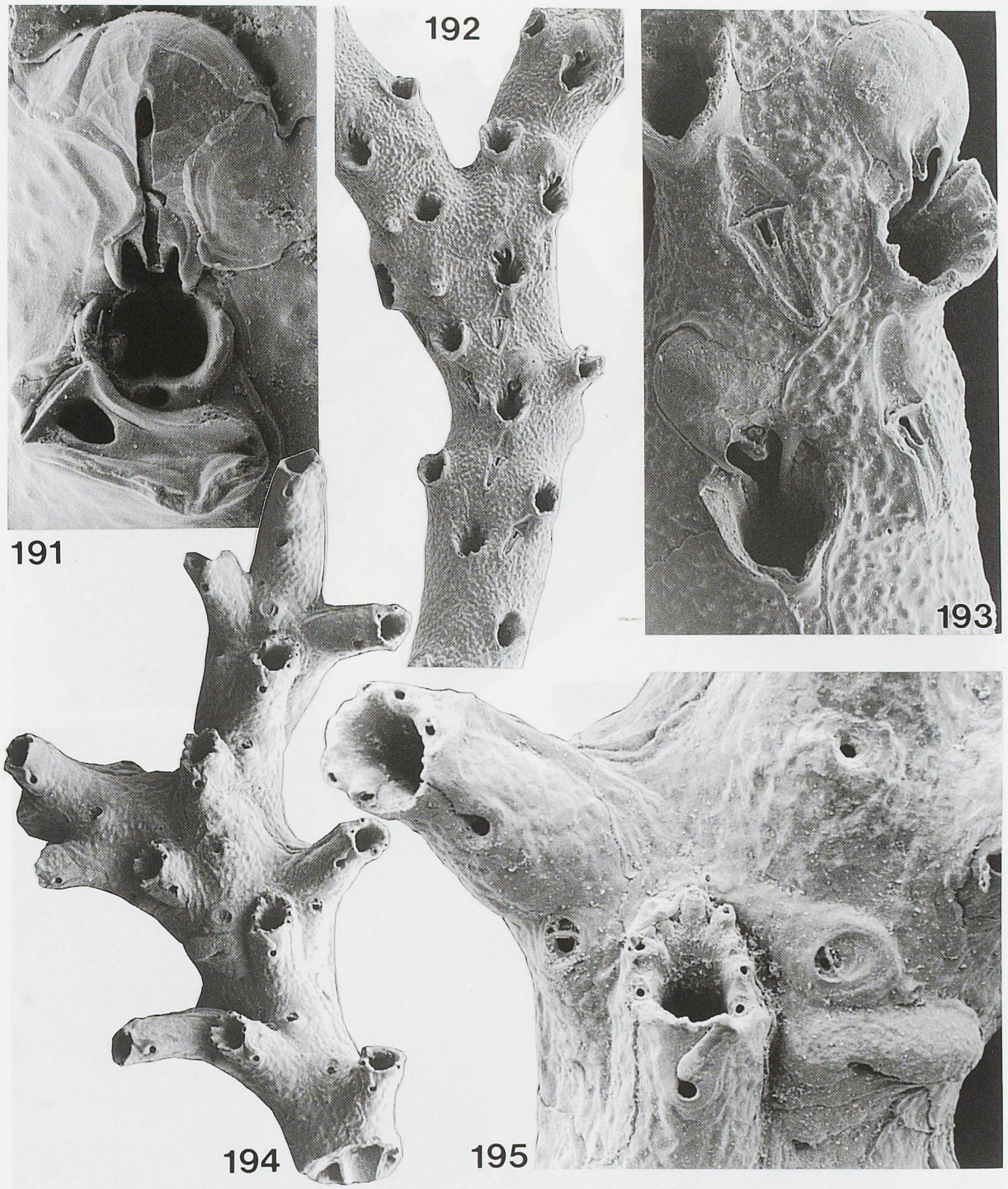
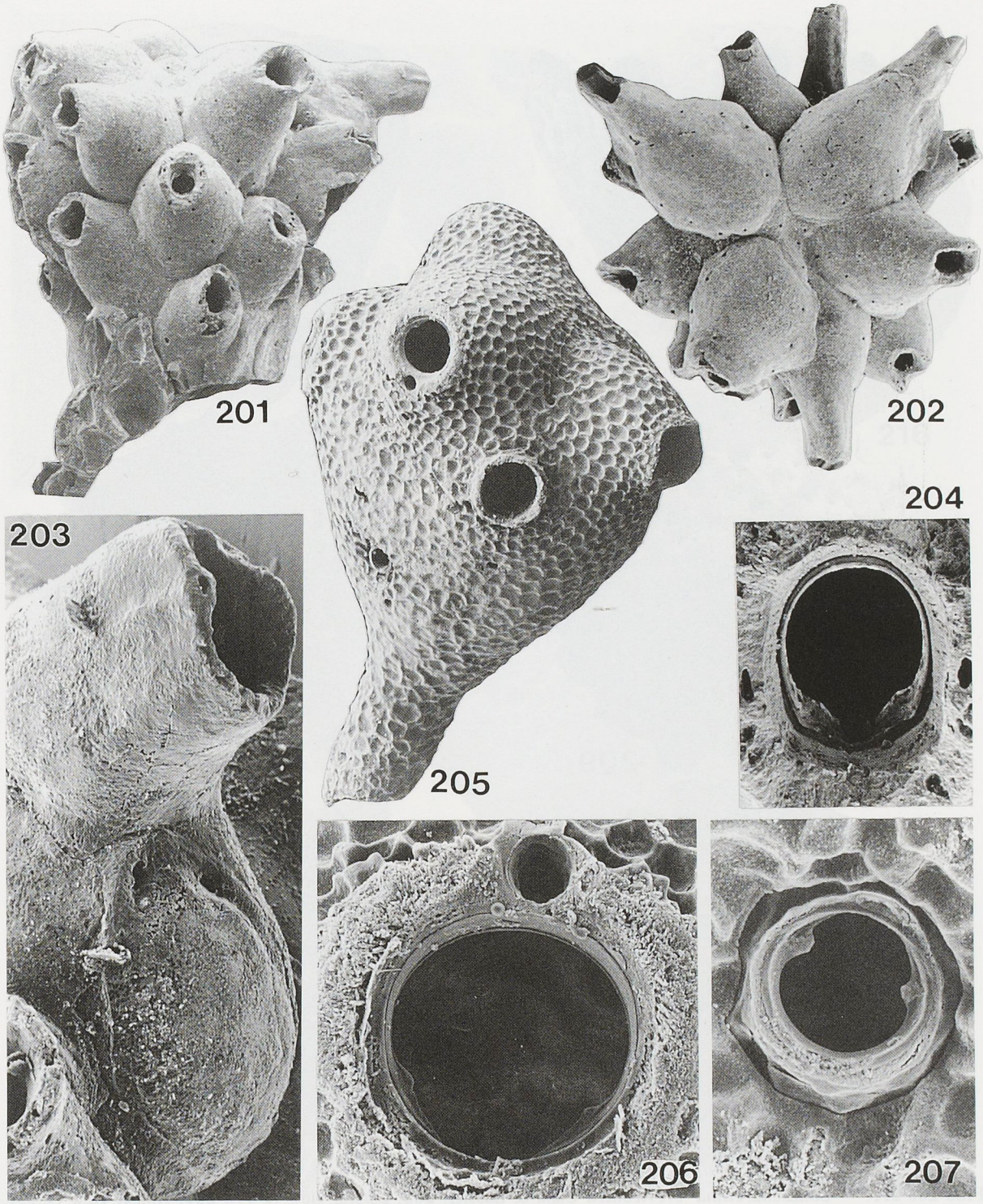


FIG. 191. — *Reteporellina spiramina* sp. nov.: Ovicell and suboral avicularium (x152). MUSORSTOM 3 Stn CP 139.

FIGS 192-193. — *Reteporellina granulosa* sp. nov.: **192**, Part of erect branch (holotype) (x 28). **193**, Ovicells and large avicularia (x 103). BIOCAL Stn DW 38.

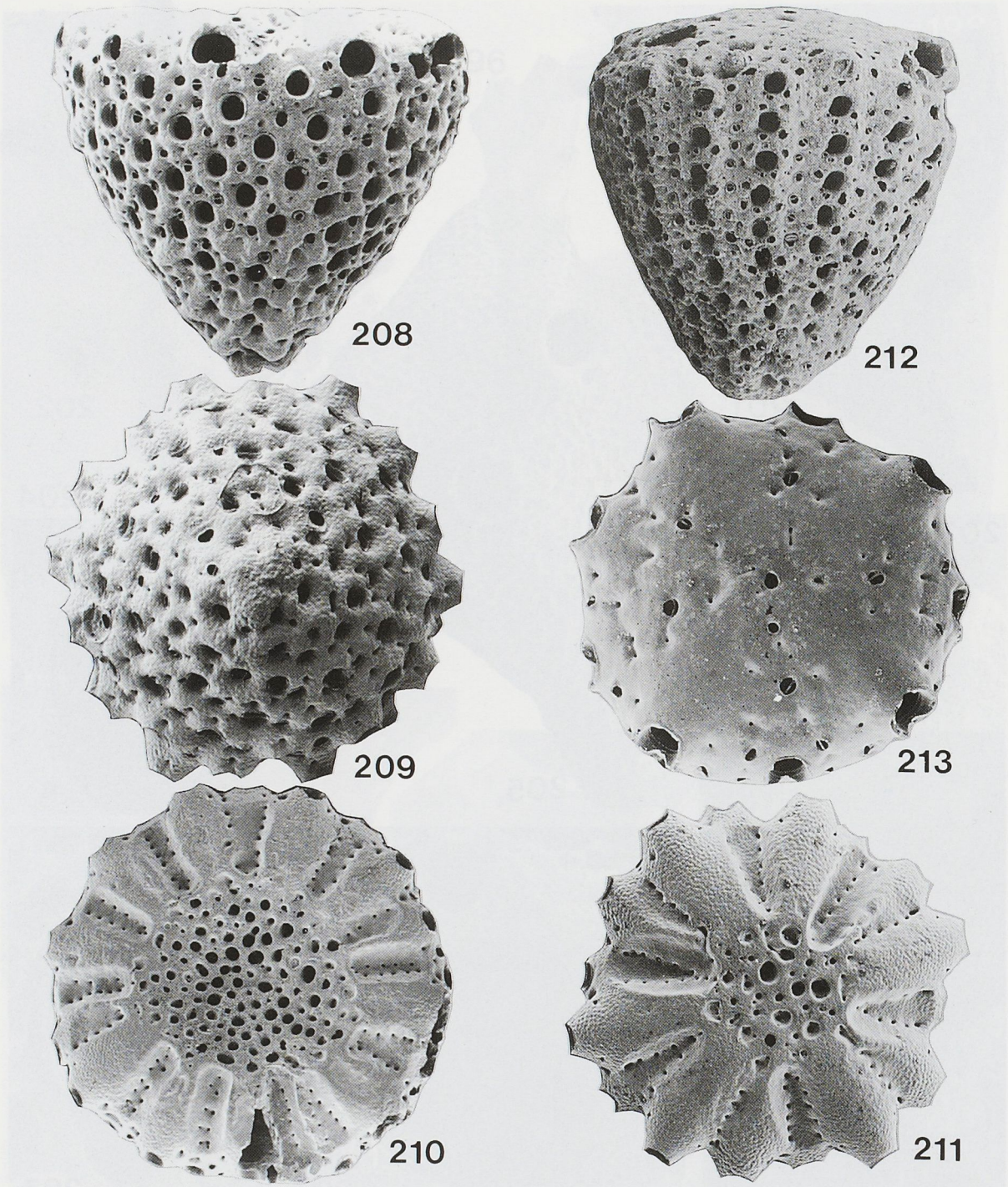
FIGS 194-195. — *Reteporellina projecta* sp. nov.: **194**, Part of erect branch (holotype) (x 32). **195**, Peristomes and avicularia (x 98). BIOGEOCAL Stn CP 290.

FIGS 196-200. — *Triphyllozoon gracile* sp. nov.: **196**, Part of erect branch (x 18). **197**, Ovicells (x 103). **198**, Ovicells (profile) and lateral avicularia (x 119). **199**, Abfrontal side of branch bifurcation (x 62). **200**, Ovicell anlage and developing peristomes (x 206). MUSORSTOM 3 Stn DR 117.



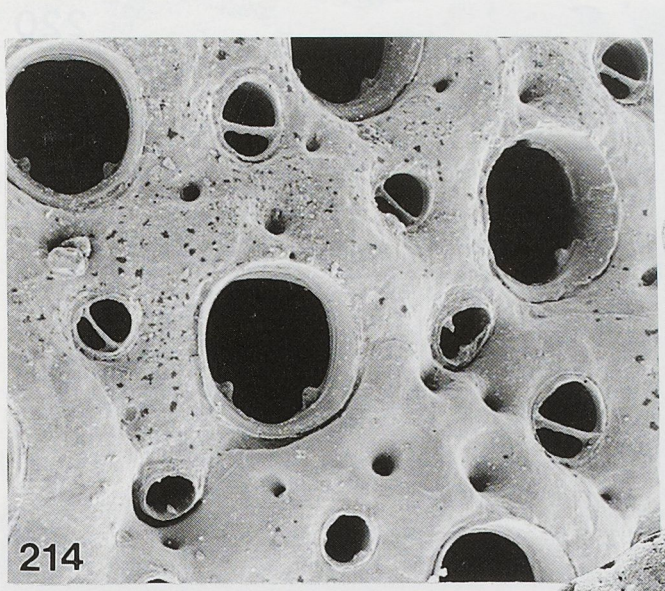
FIGS 201-204. — *Harpago dissidens* sp. nov.: **201**, Holotype colony, base broken (x 35). **202**, Same, antapical view (x 35). **203**, Broken peristome with ovicell (x 155). **204**, Primary orifice (x 217). BIOCAL Stn DW 66.

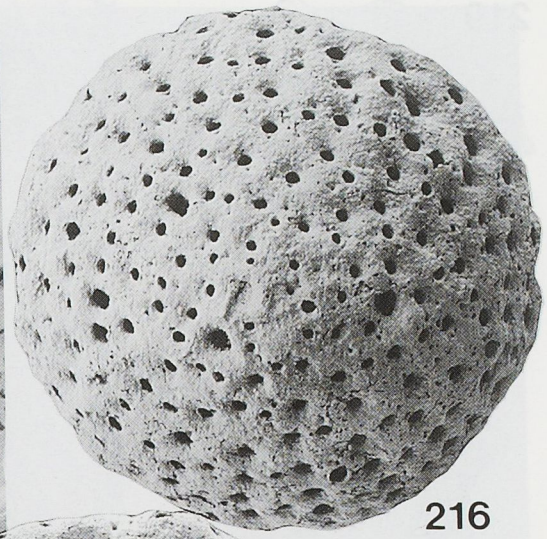
FIGS 205-207. — *Ptoboroa gelasina* sp. nov.: **205**, Holotype colony (x 66). **206**, Primary orifice with distal ovicellular pore (x 317). **207**, Avicularium (x 457). BIOCAL Stn KG 101.

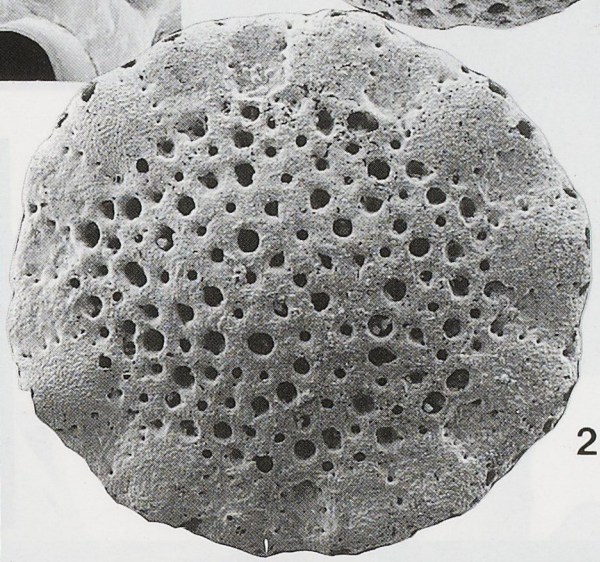


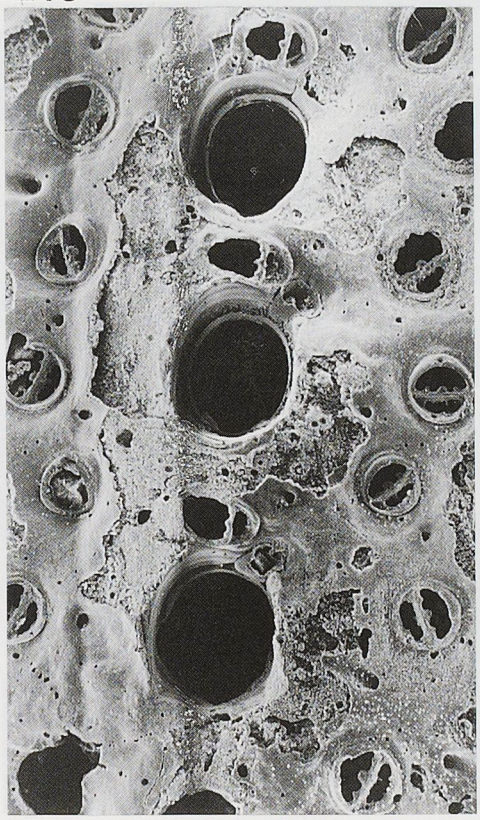
FIGS 208-211. — *Conescharellina breviconica* Canu & Bassler: **208**, Lateral view (x 19). **209**, Apical view (x 29). **210**, Basal view of older colony (x 19). MUSORSTOM 3 Stn CP 87. **211**, Basal view of small colony (x 29). MUSORSTOM 3 Stn CP 106.

FIGS 212-213. — *Conescharellina catella* Canu & Bassler: **212**, Lateral view (x 25). MUSORSTOM 3 Stn DR 117. **213**, Basal view (x 25). MUSORSTOM 3 Stn CP 102.









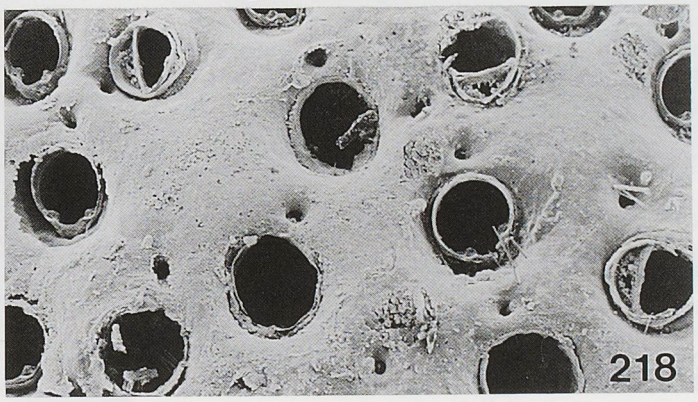
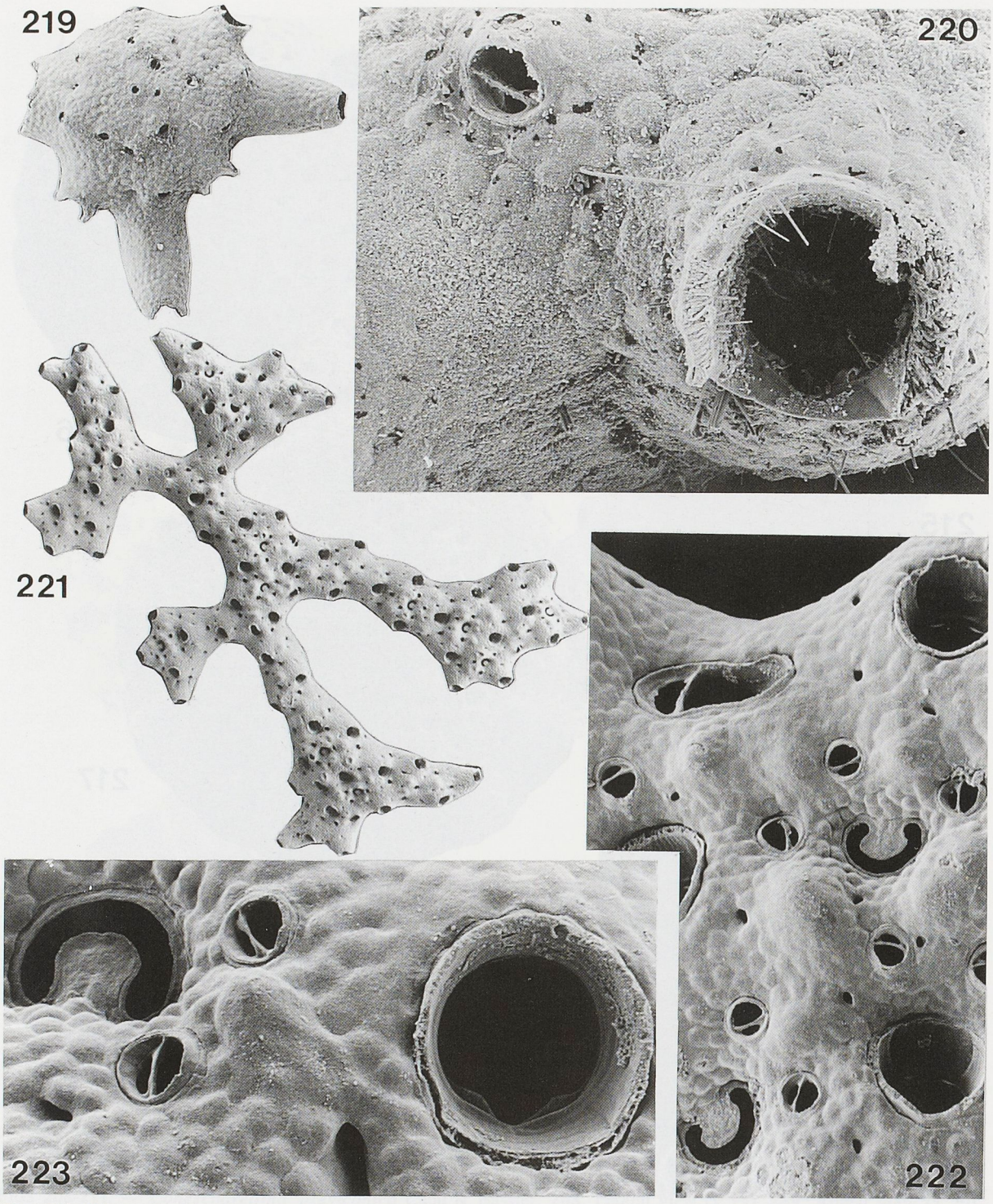
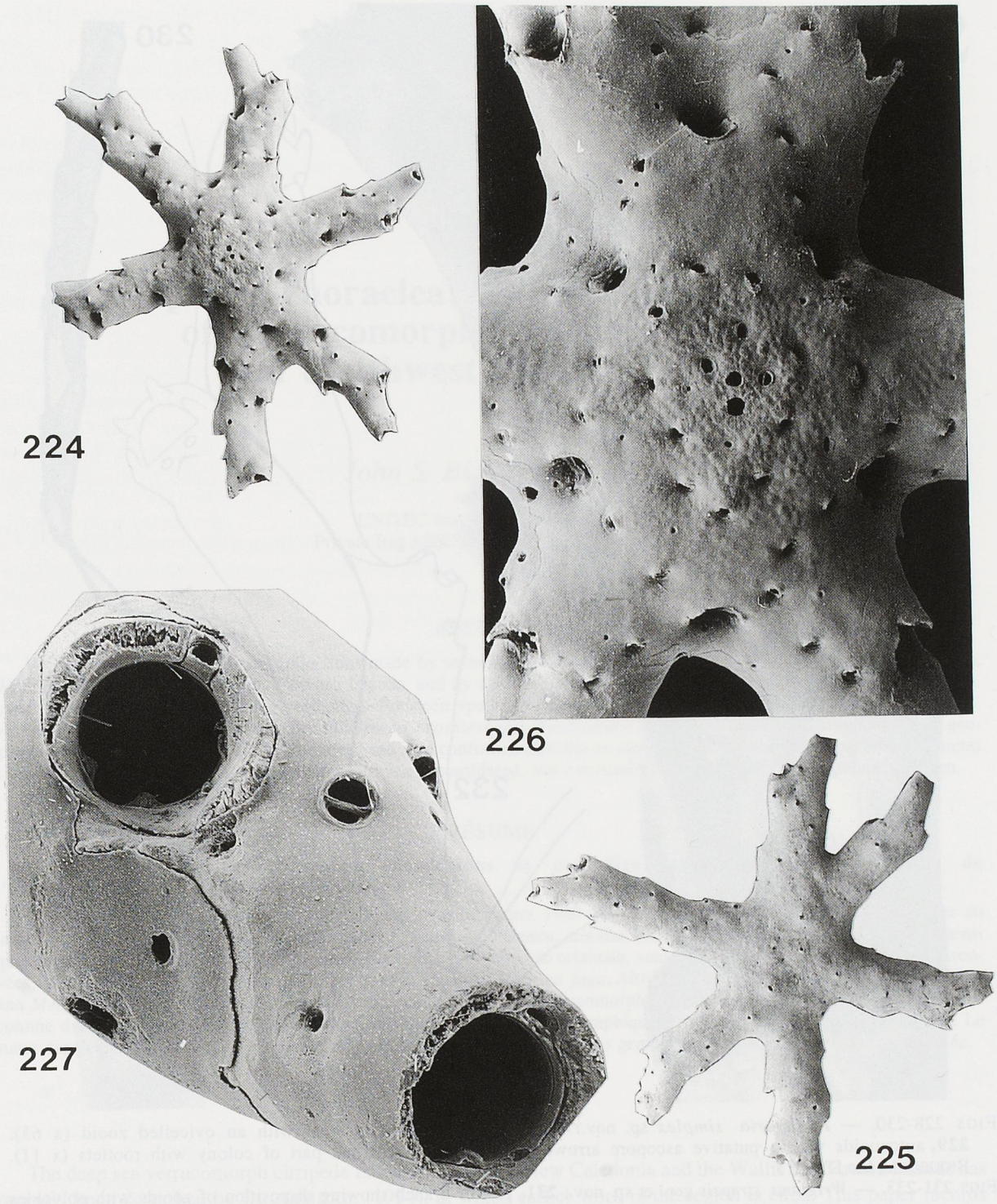


FIG. 214. — *Conescharellina breviconica* Canu & Bassler: Orifices and avicularia (x 105). MUSORSTOM 3 Stn CP 87.
FIG. 215. — *Conescharellina catella* Canu & Bassler: Orifices and avicularia (x 125) MUSORSTOM 3 Stn CP 100.
FIGS 216-218. — *Conescharellina atalanta* sp. nov.: **216**, Apical view of colony (x 26). **217**, Basal view (x 21). MUSORSTOM 4 Stn DW 150. **218**, Orifices and avicularia (x 104). MUSORSTOM 4 Stn DW 149.

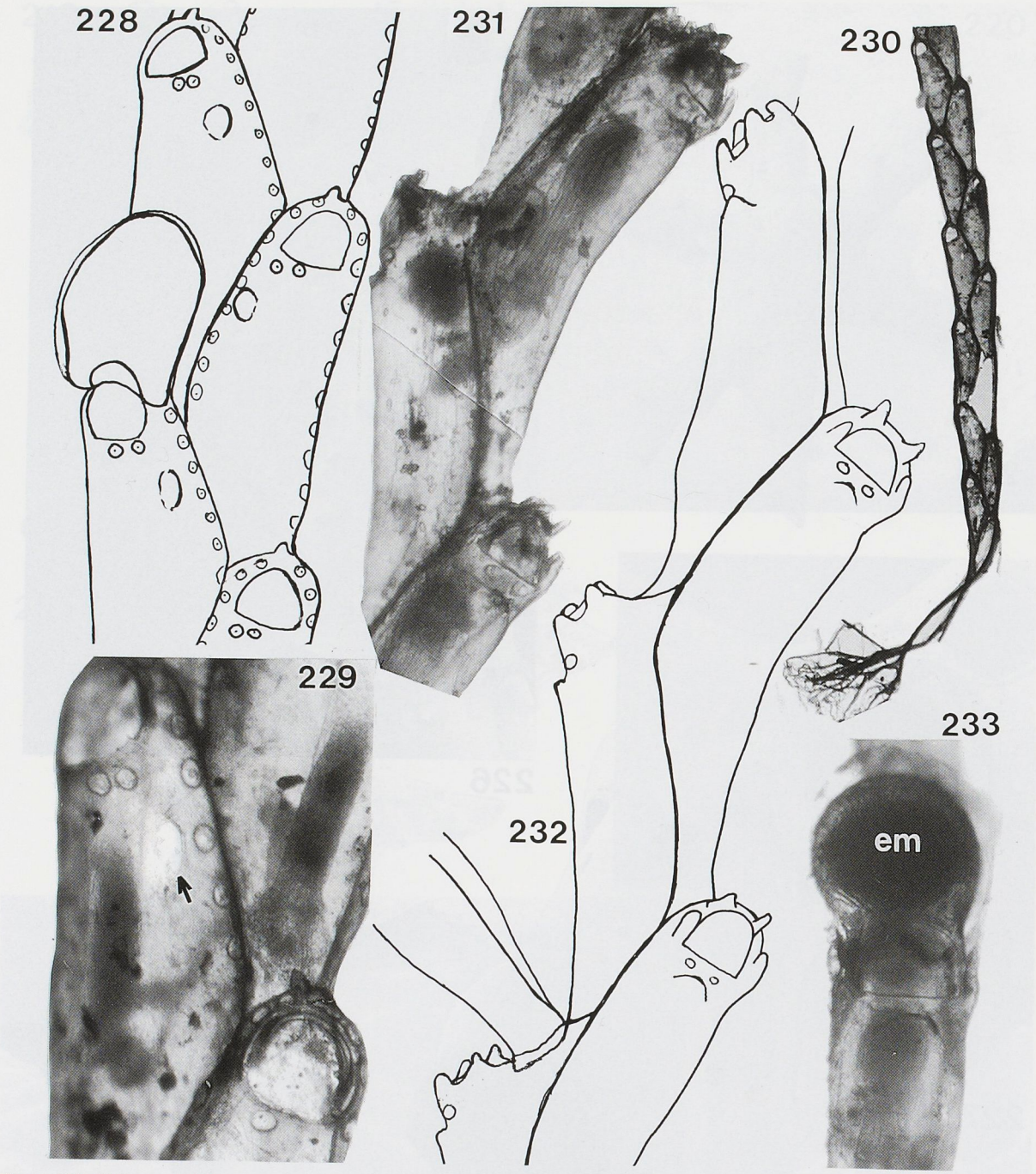


FIGS 219-220. — *Trochosodon* sp.: **219**, Small colony (x 33). **220**, Primary orifice and avicularium (x 215). BIOGEOCAL Stn KG 275.

FIGS 221-223. — *Cruceschareilina japonica* Silén: **221**, Whole colony (x 12). **222**, Large and small avicularia and 'lunoecia' (x 101). **223**, 'Lunoecium', avicularia, and primary orifice (x 212). MUSORSTOM 3 Stn CP 106.



FIGS 224-227. — *Crucescharellina aster* sp. nov.: **224**, Whole colony, orificial side (x 13). **225**, Whole colony, aborificial side (x 13). **226**, Centre of colony, orificial side (x 47). **227**, Primary orifice and avicularium (x 149). BIOGEOCAL Stn CP 232.



FIGS 228-230. — *Ichthyaria simplex* sp. nov.: **228,** portion of biserial stem with an ovicelled zooid (x 63). **229,** autozooids with a putative ascopore arrowed (x 96). **230,** proximal part of colony with rootlets (x 11). BIOGEOCAL Stn DW 313.

FIGS 231-233. — *Wrigiana strepsis* gen. et sp. nov.: **231,** part of branch showing disposition of zooids with polypides in transparency (x 95). **232,** part of stem with origin of lateral branch at lower left (x 95). **233,** zooid with ovicell and contained embryo (em) (x 88). MUSORSTOM 4 Stn DW 185.