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Cnidaria, Hydrozoa, Hydroida : Hydroids from the Western Pacific (Philippines, Indonesia and New Caledonia) I : Sertulariidae (Part 1)

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SUMMARY

This paper presents the first part of a study of large collections of Hydroida (Cnidaria : Hydrozoa) in the Muséum national d'Histoire naturelle, Paris, originating from various expeditions in the Philippines, the eastern part of the Malay Archipelago, the Chesterfield Islands, New Caledonia and the Loyalty Islands. In this first part, genera of the family Sertulariidae Lamouroux, 1812, are reviewed, including new species of the genera *Abietinaria* Kirchenpauer, 1884 (1 new species), *Dictyocladium* Allman, 1888 (1 new species), *Gonaxia* nov. gen. (20 new species and a new variety), *Sertularella* Gray, 1848 (8 new species and a new subspecies), *Symplectoscyphus* Marktanner-Turneretscher, 1890 (6 new species and a new subspecies), and *Thyroscyphus* Allman, 1877 (1 new species). In addition to other, already known species from those genera, species of *Caminothujaria* Von Campenhausen, 1896, *Cnidoscyphus* Splettstösser, 1929, *Dynamena* Lamouroux, 1812, *Geminella* Billard, 1925, *Hydrallmania* Hincks, 1868, and *Idiellana* Cotton & Godfrey, 1942, are recorded. Many of the records are considerable range extensions or constitute new records for the Chesterfield Islands, New Caledonia and Loyalty Islands regions. Additional species and genera will be treated in a second part. Noteworthy is the occurrence of the curious new genus *Gonaxia* with many new species from the New Caledonia area, producing its gonothecae in intimate contact with the axis and its secondary tubules. Remarkable also is the occurrence of two northern Atlantic shallow water hydroids, *Hydrallmania falcata* (Linnaeus, 1758) and *Diphasia attenuata* (Hincks, 1861), the latter to be fully described in the sequel to this report, from deep water of the New Caledonia region. In zoogeographic context, the present study reveals a considerable degree of endemism in the deeper water hydroid fauna of the seas bordering New Caledonia and the Loyalty Islands, a phenomenon also observed amongst other groups of marine animals. Further zoogeographic comments will be postponed until a larger part of this highly interesting collection has been fully studied.

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RÉSUMÉ

Cnidaria, Hydrozoa, Hydroida : Hydroïdes du Pacifique ouest (Philippines, Indonésie et Nouvelle-Calédonie). I : Sertulariidae (1ère partie).

Cet article est la première partie d'une étude des grandes collections d'Hydroïdes (Cnidaria : Hydrozoa) déposées au Muséum national d'Histoire naturelle à Paris et provenant de diverses campagnes faites aux Philippines, en Indonésie, aux îles Chesterfield, au voisinage de la Nouvelle-Calédonie et aux îles Loyauté. Dans cette première partie, les genres de la famille Sertulariidae Lamouroux, 1812, sont passés en revue et un genre nouveau, *Gonaxia*, est décrit. Trente-sept espèces et deux sous-espèces sont décrites comme nouvelles : une espèce dans le genre *Abietinaria* Kirchenpauer, 1844, une autre dans le genre *Dictyocladium* Allman, 1888, 20 espèces et une variété dans le genre *Gonaxia* gen. nov., 8 espèces et une sous-espèce dans le genre *Sertularella* Gray, 1848, 6 espèces et une sous-espèce dans le genre *Symplectoscyphus* Marktanner-Turneretscher, 1890, enfin une espèce dans le genre *Thyroscyphus* Allman, 1877. Par ailleurs, de nombreuses espèces des genres *Caminothujaria* Von Campenhausen, 1896, *Cnidoscyphus* Splettstösser, 1929, *Dynamena* Lamouroux, 1812, *Geminella* Billard, 1925, *Hydrallmania* Hinck, 1868, and *Idiellana* Cotton & Godfrey, 1942, qui n'avaient jamais encore été signalées dans la région étudiée, y sont trouvées pour la première fois. Ces récoltes étendent considérablement les distributions géographiques de beaucoup d'espèces et nombreuses sont celles signalées pour la première fois des îles Chesterfield, de la Nouvelle-Calédonie et des îles Loyauté. D'autres genres et espèces seront traités dans une seconde partie, à venir, de ce travail. Il est intéressant de souligner la présence, dans la zone de la Nouvelle-Calédonie, du curieux nouveau genre *Gonaxia* dont les gonothèques sont en contact étroit avec l'axis et ses tubules secondaires. Remarquable aussi est la présence de deux espèces nord-atlantiques d'eau côtière, *Hydrallmania falcata* (Linnaeus, 1758) et *Diphasia attenuata* (Hincks, 1861); des spécimens de cette dernière, récoltés dans les eaux profondes de la Nouvelle-Calédonie, vont être décrits en détail dans un autre article. Au plan de la biogéographie, la présente étude montre un endémisme considérable parmi les Hydroïdes des mers baignant la Nouvelle-Calédonie et les îles Loyauté, phénomène déjà signalé pour d'autres groupes marins. Des remarques biogéographiques approfondies seront faites plus tard, lorsque la majeure partie des récoltes actuellement en cours d'examen sera étudiée.

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INTRODUCTION

The study of the rich collections of exotic, chiefly Indo-west Pacific, hydroids in the Muséum national d'Histoire naturelle was started in 1988, when a first lot of unidentified Pacific hydroids was sent to the author by Dr Michel SEGONZAC, Director of the Centre national de Tri d'Océanographie biologique (CENTOB), Brest. This collection, though small, proved to be extraordinarily interesting because of the presence of a number of undescribed species. Further information made it clear that a much larger collection, chiefly from the seas around New Caledonia, was present in the Muséum national d'Histoire naturelle, Paris, the study of which was enthusiastically welcomed by Dr Alain CROSNIER of ORSTOM (Institut français de Recherche pour le Développement en Coopération), situated at the Muséum. As the collections proved to be very large and rich, sorting took quite some time; furthermore it became necessary to study additional material, both in the Paris Museum and in The Natural History Museum [formerly British Museum (Natural History)], London. At the invitation of ORSTOM, the author (and his wife) spent two months in Paris for sorting purposes, for a detailed study of A. BILLARD's slide collection, and for the use of the large library of the Muséum. Various trips to The Natural History Museum, London, have been made in the course of this investigation, both for the study of specimens and for the use of the marvellous libraries there.

The author hopes to continue his study of the extremely rich collections and to publish further contributions as the result of such studies. It has become clear from investigations of other animal groups that the fauna of the New Caledonia area presents very special biogeographical problems, as for instance the high degree of endemism. This is also borne out by the hydroid fauna, presenting a large number of unique and undescribed species. Nevertheless biogeographical conclusions based on this hydroid material will be postponed until a large portion of the available collections has been studied.

The material has been deposited in the collections of the Muséum national d'Histoire naturelle, Paris (all the holotypes and a representative collection), The Natural History Museum, London (a representative collection) and the Nationaal Natuurhistorisch Museum (National Museum of Natural History, incorporating the Rijksmuseum van Natuurlijke Historie), Leiden, The Netherlands (schizoholotypes, paratypes and a representative collection). Deposition of the material is indicated in the paragraph "Material examined" of the discussion of each species.

LIST OF ABBREVIATIONS

BMNH	British Museum (Natural History), now The Natural History Museum, London, U. K.
CENTOB	Centre national de Tri d'Océanographie biologique, Brest, France.

CC	Otter trawl (shrimps).
CP	Beam trawl.
DC	Charcot dredge.
DR	Rocky bottom dredge.
DW	Waren dredge
KG	Usnel box-corer.
MNHN	Muséum national d'Histoire naturelle, Paris, France.
RMNH	Rijksmuseum van Natuurlijke Historie, now Nationaal Natuurhistorisch Museum (National Museum of Natural History), Leiden, The Netherlands.
SAM	South African Museum, Cape Town, Republic of South Africa.
ZSM	Zoologische Staatssammlung München, Munich, Republic of Germany.

LIST OF STATIONS AND SPECIES COLLECTED

This list contains all stations that yielded hydroid samples used for the present report.

VALDIVIA Expedition. **Saint Paul Island.**

Station 165, south of St Paul, 38°40'S-77°39'E, 680 m, 03.01.1899 : *Symplectoscyphus paulensis* Stechow, 1923.

TERRA NOVA Expedition. **New Zealand.**

Station 91, off Three Kings Islands, 300 fms (= 549 m), 26.07.1911 : *Gonaxia constricta* (Totton, 1930).

R.V. *"Africana II"*. **South-west Indian Ocean.**

Station AFR 1248 IIN, 36°48'S-52°08'E, 400 m, 09.07.1961 : *Symplectoscyphus paulensis* Stechow, 1923.

R.V. *"Monarch"*. **North Eastern Atlantic.**

48°04'N-09°23'W, 1000 fms (= 1828 m), 1950 : *Symplectoscyphus bathyalis* Vervoort, 1972.

R.V. *"Africana II"*. **Moçambique.**

Station ABD 8C, 24°40'S-35°28'E, 347 m, 18.08.1964 : *Symplectoscyphus paulensis* Stechow, 1923.

R.V. *"Vauban"*. **New Caledonia.**

Station 3, drague 3, 22°17'S-167°12'E, 390 m, 23.05.1978 : *Thyroscyphus scorpioides* sp. nov.

CORINDON 2. **Indonesia (Makassar Strait).**

Station 207, 00°14.9'S-117°51.7'E, 150 m, 31.10.1980 : *Idiellana pristis* (Lamouroux, 1816).
Station 258, 01°56.8'S-119°17.3'E, 30 m, 06.11.1980 : *Idiellana pristis* (Lamouroux, 1816).
Station 263, 01°56.8'S-119°16.7'E, 80 m, 06.11.1980 : *Idiellana pristis* (Lamouroux, 1816).
Station 266, 01°56.6'S-119°15.8'E, 95 m, 07.11.1980 : *Sertularella acutidentata acutidentata* Billard, 1919.
Station 293, 02°37.7'S-117°49.4'E, 45 m, 10.11.1980 : *Cnidoscyphus torresii* (Busk, 1852).

CHALCAL 1. **Chesterfield Islands.**

Station DC 30, 19°31.10'S-158°30.60'E, 150-180 m, 19.07.1984 : *Gonaxia anonyma* sp. nov.
Station DC 34, 19°52.10'S-158°20.10'E, 37 m, 21.07.1984 : *Sertularella* cf. *tenella* (Alder, 1856).

LAGON. **New Caledonia.**

Station 114, 22°23.6'S-166°49.6'E, 37 m, 22.08.1984 : *Idiellana pristis* (Lamouroux, 1816).

Station 120, 22°28.1'S-166°43.7'E, 46 m, 23.08.1984 : *Idiellana pristis* (Lamouroux, 1816).

Station 129, 22°30.5'S-166°47.2'E, 45 m, 23.08.1984 : *Idiellana pristis* (Lamouroux, 1816).

Station 382, 22°30.4'S-167°14.1'E, 57 m, 22.01.1985 : *Dynamena quadridentata* (Ellis & Solander, 1786).

Station 394, 22°44.1'S-167°05.8'E, 309 m, 23.01.1985 : *Sertularella helenae* sp. nov.

Station 397, 22°38.5'S-167°10.6'E, 125 m, 23.01.1985 : *Sertularella novaecaledoniae* sp. nov.

Station 444, 18°15.3'S-162°58.8'E, 300-350 m, 28.02.1985 : *Gonaxia ampullacea* sp. nov., *Sertularella areyi* Nutting, 1904.

Station 475, 18°35.7'S-163°11.2'E, 415-460 m, 02.03.1985 : *Gonaxia ampullacea* sp. nov.

Station 491, 18°56.0'S-163°20.0'E, 450-460 m, 03.03.1985 : *Sertularella crenulata* Nutting, 1905, *Symplectoscyphus* cf. *pseudodivaricatus* Ralph, 1961.

Station 500, 19°04.3'S-163°30.5'E, 225 m, 04.03.1985 : *Gonaxia amphorifera* sp. nov., *Symplectoscyphus johnstoni tropicus* ssp. nov.

Station DW 1065, 19°58.1'S-163°51.2'E, 28 m, 23.10.1989 : *Dictyocladium biseriale* sp. nov.

Station DW 1146, 19°08.3'S-163°30.9'E, 176-185 m, 28.10.1989 : *Sertularella sinensis* Jäderholm, 1896.

Station DW 1148, 19°06.5'S-163°30.1'E, 220 m, 28.10.1989 : *Gonaxia amphorifera* sp. nov.

Station DW 1149, 19°04.5'S-163°29.5'E, 230-235 m, 28.10.1989 : *Gonaxia amphorifera* sp. nov., *Sertularella areyi* Nutting, 1904.

MUSORSTOM 3. **Philippines.**

Station DR 117, 12°31.2'N-120°39.3'E, 92-97 m, 03.06.1985 : *Caminothujaria molukkana* Von Campenhausen, 1896, *Dynamena cornicina* McCrady, 1859, *Geminella ceramensis* Billard, 1925, *Sertularella areyi* Nutting, 1904, *S. quadridens cornuta* Ritchie, 1909.

Station CP 121, 12°08.3'N-121°17.3'E, 84-73 m, 03.06.1985 : *Idiellana pristis* (Lamouroux, 1816).

Station CP 124, 12°02.6'N-121°35.3'E, 123-120 m, 04.06.1985 : *Caminothujaria molukkana* Von Campenhausen, 1896.

Station CP 131, 11°36.6'N-121°43.0'E, 120-122 m, 05.06.1985 : *Caminothujaria molukkana* Von Campenhausen, 1896, *Cnidoscyphus torresii* (Busk, 1852), *Sertularella quadridens cornuta* Ritchie, 1909.

Station CP 134, 12°01.1'N-121°57.3'E, 92-95 m, 05.06.1985 : *Cnidoscyphus torresii* (Busk, 1852), *Idiellana pristis* (Lamouroux, 1816).

Station CP 142, 11°47.0'N-123°01.5'E, 27-26 m, 06.06.1985 : *Cnidoscyphus torresii* (Busk, 1852).

BIOCAL. **New Caledonia.**

Station DW 08, 20°34.35'S-166°53.90'E, 435 m, 12.08.1985 : *Gonaxia complexa* sp. nov., *G. scalariformis* sp. nov., *Sertularella anguina* sp. nov., *S. paucicostata* sp. nov.

Station CP 31, 23°07.26'S-166°50.45'E, 850 m, 29.08.1985 : *Gonaxia errans* sp. nov.

Station DW 33, 23°09.71'S-167°10.27'E, 675-680 m, 29.08.1985 : *Sertularella bipectinata* sp. nov., *S. catena* (Allman, 1888), *S. novaecaledoniae* sp. nov., *Symplectoscyphus bathypacificus* sp. nov.

Station DW 36, 23°08.64'S-167°10.99'E, 650-680 m, 29.08.1985 : *Sertularella bipectinata* sp. nov., *S. catena* (Allman, 1888), *S. diaphana* (Allman, 1885), *S. novaecaledoniae* sp. nov., *S. paucicostata* sp. nov., *Symplectoscyphus bathyalis* Vervoort, 1972, *S. bathypacificus* sp. nov., *S. commensalis* sp. nov., *S. johnstoni tropicus* ssp. nov., *S. tuba* Totton, 1930, *S. watsonae* sp. nov.

Station DW 37, 22°59.99'S-167°15.65'E, 350 m, 30.08.1985 : *Sertularella areyi* Nutting, 1904, *S. helenae* sp. nov., *Symplectoscyphus commensalis* sp. nov.

Station DW 44, 22°47.30'S-167°14.30'E, 440-450 m, 30.08.1985 : *Sertularella paucicostata* sp. nov.

Station CP 45, 22°47.34'S-167°14.80'E, 430-465 m, 30.08.1985 : *Thyroscyphus scorpioides* sp. nov.

Station DW 46, 22°53.05'S-167°17.08'E, 570-610 m, 30.08.1985 : *Sertularella leiocarpa* (Allman, 1888).

Station DW 51, 23°05.27'S-167°44.95'E, 700-680 m, 31.08.1985 : *Gonaxia errans* sp. nov., *Sertularella novaecaledoniae* sp. nov., *Symplectoscyphus pedunculatus* (Billard, 1919), *S. pseudocolumnarius* sp. nov.

Station CP 52, 23°05.79'S-167°46.54'E, 600-540 m, 31.08.1985 : *Sertularella bipectinata* sp. nov., *S. novaecaledoniae* sp. nov., *S. paucicostata* sp. nov., *Symplectoscyphus commensalis* sp. nov.

Station DW 66, 24°55.43'S-168°21.67'E, 515-505 m, 03.09.1985 : *Gonaxia scalariformis* sp. nov.

Station CP 75, 22°18.65'S-167°23.30'E, 825-860 m, 04-05.09.1985 : *Sertularella pseudocostata* sp. nov.

Station CP 78, 22°16.25'S-167°15.53'E, 445-450 m, 05.09.1985 : *Sertularella pseudocostata* sp. nov.

Station CP 84, 20°43.49'S-167°00.27'E, 210-150 m, 06.09.1985 : *Symplectoscyphus johnstoni tropicus* ssp. nov.

Station CP 110, 22°12.38'S-167°06.43'E, 275-320 m, 09.09.1985 : *Gonaxia sinuosa* sp. nov.

MUSORSTOM 4. **New Caledonia**.

Station CP 153, 19°04.20'S-163°21.20'E, 235 m, 14.09.1985 : *Gonaxia amphorifera* sp. nov., *Sertularella billardi* sp. nov., *S. diaphana* (Allman, 1885), *Symplectoscyphus johnstoni tropicus* ssp. nov.

Station CP 155, 18°52.80'S-163°19.50'E, 570 m, 15.09.1985 : *Gonaxia amphorifera* sp. nov., *G. compacta* sp. nov., *Symplectoscyphus johnstoni subtropicus* Ralph, 1961, *S. johnstoni tropicus* ssp. nov.

Station DW 156, 18°54.00'S-163°18.80'E, 530 m, 15.09.1985 : *Gonaxia amphorifera* sp. nov., *G. ampullacea* sp. nov., *G. bulbifera* sp. nov., *G. robusta* sp. nov.

Station CP 158, 18°49.30'S-163°15.00'E, 620 m, 15.09.1985 : *Gonaxia amphorifera* sp. nov., *G. ampullacea* sp. nov., *G. anonyma* sp. nov., *G. intermedia* sp. nov.

Station DW 162, 18°35.00'S-163°10.30'E, 535 m, 16.09.1985 : *Gonaxia amphorifera* sp. nov., *G. ampullacea* var. *densa* var. nov., *Sertularella billardi* sp. nov.

Station DW 163, 18°33.80'S-163°11.50'E, 350 m, 16.09.1985 : *Gonaxia ampullacea* sp. nov., *G. elegans* sp. nov., *G. intermedia* sp. nov., *Sertularella billardi* sp. nov.

Station DW 164, 18°33.20'S-163°13.00'E, 250 m, 16.09.1985 : *Abietinaria immersa* sp. nov.

Station CP 171, 18°57.80'S-163°14.00'E, 435 m, 17.09.1985 : *Gonaxia intermedia* sp. nov., *Sertularella acutidentata acutidentata* Billard, 1919.

Station CP 172, 19°01.20'S-163°16.00'E, 330 m, 17.09.1985 : *Gonaxia intermedia* sp. nov., *Sertularella areyi* Nutting, 1904.

Station CC 174, 19°00.30'S-163°18.50'E, 385 m, 17.09.1985 : *Symplectoscyphus johnstoni tropicus* ssp. nov.

Station CP 179, 18°56.60'S-163°13.70'E, 480 m, 18.09.1985 : *Gonaxia intermedia* sp. nov.

Station CP 180, 18°56.80'S-163°17.70'E, 450 m, 18.09.1985 : *Gonaxia intermedia* sp. nov.

Station CP 190, 19°06.30'S-163°29.50'E, 215 m, 19.09.1985 : *Geminella ceramensis* Billard, 1925, *Gonaxia amphorifera* sp. nov., *Symplectoscyphus johnstoni tropicus* ssp. nov.

Station CP 193, 18°56.30'S-163°23.20'E, 415 m, 19.09.1985 : *Gonaxia amphorifera* sp. nov., *Sertularella billardi* sp. nov., *S. crenulata* Nutting, 1905.

Station CP 194, 18°52.80'S-163°21.70'E, 550 m, 19.09.1985 : *Gonaxia compacta* sp. nov., *G. elegans* sp. nov., *G. intermedia* sp. nov.

Station CP 195, 18°54.80'S-163°22.20'E, 470 m, 19.09.1985 : *Sertularella billardi* sp. nov.

Station DW 197, 18°51.30'S-163°21.00'E, 560 m, 20.09.1985 : *Gonaxia compacta* sp. nov., *G. crassa* sp. nov.

Station CC 201, 18°55.80'S-163°13.80'E, 500 m, 20.09.1985 : *Gonaxia ampullacea* sp. nov.

Station DW 205, 22°38.50'S-167°06.80'E, 140-160 m, 27.09.1985 : *Gonaxia pachyclados* sp. nov.

Station DW 207, 22°39.00'S-167°07.40'E, 235 m, 28.09.1985 : *Geminella ceramensis* Billard, 1925, *Gonaxia sinuosa* sp. nov.

Station DW 212, 22°47.40'S-167°10.50'E, 380 m, 28.09.1985 : *Sertularella leiocarpoides* sp. nov., *Symplectoscyphus* cf. *commensalis* sp. nov.

Station CP 215, 22°55.70'S-167°17.00'E, 520 m, 28.09.1985 : *Sertularella bipectinata* sp. nov., *S. novaecaledoniae* sp. nov.

Station CP 216, 22°59.50'S-167°22.00'E, 515 m, 29.09.1985 : *Gonaxia intermedia* sp. nov., *G. similis* sp. nov.

Station CP 217, 23°03.60'S-167°27.00'E, 850 m, 29.09.1985 : *Gonaxia elegans* sp. nov.

Station DW 220, 22°58.50'S-167°38.30'E, 550 m, 29.09.1985 : *Sertularella acutidentata profunda* ssp. nov., *S. bipectinata* sp. nov., *S. diaphana* (Allman, 1885), *S. novaecaledoniae* sp. nov., *S. paucicostata* sp. nov., *Symplectoscyphus commensalis* sp. nov.

Station DW 222, 22°57.60'S-167°33.00'E, 440 m, 30.09.1985 : *Gonaxia compacta* sp. nov., *Symplectoscyphus* cf. *commensalis* sp. nov.

Station DW 223, 22°57.00'S-167°30.00'E, 560 m, 30.09.1985 : *Sertularella novaecaledoniae* sp. nov.

Station DW 234, 22°15.40'S-167°08.30'E, 365 m, 02.10.1985 : *Sertularella leiocarpoides* sp. nov.

Station CP 237, 22°12.00'S-167°16.50'E, 630 m, 02.10.1985 : *Gonaxia intermedia* sp. nov., *Sertularella billardi* sp. nov.

Station CP 238, 22°13.00'S-167°14.00'E, 510 m, 02.10.1985 : *Sertularella paucicostata* sp. nov.

SMIB 2. **New Caledonia**.

Station DW 15, 22°53'S-167°11'E, 375-402 m, 18.09.1986 : *Sertularella novaecaledoniae* sp. nov.

MUSORSTOM 5. **Chesterfield Islands**.

Station DC 375, 19°52.20'S-158°29.70'E, 300 m, 20.10.1986 : *Gonaxia perplexa* sp. nov.

CHALCAL 2. **New Caledonia**.

Station DW 76, 23°40.50'S-167°45.20'E, 470 m, 30.10.1986 : *Gonaxia persimilis* sp. nov., *G. stricta* sp. nov.

Station DW 80, 23°26.70'S-168°01.80'E, 160 m, 31.10.1986 : *Gonaxia sinuosa* sp. nov., *Sertularella sinensis* Jäderholm, 1896.

Station DW 83, 23°20.30'S-168°05.50'E, 200 m, 31.10.1986 : *Symplectoscyphus effusus* sp. nov., *S. johnstoni tropicus* ssp. nov.

BIOGEOCAL. **New Caledonia** and **Loyalty Islands**.

Station KG 201, 22°40.42'S-166°32.72'E, 595 m, 07.04.1987 : *Sertularella leiocarpa* (Allman, 1888).

Station CP 214, 22°43.09'S-166°27.19'E, 1665-1590 m, 09.04.1987 : *Hydrallmania falcata* (Linnaeus, 1758), *Sertularella geodiae* Totton, 1930.

Station KG 219, 22°38.81'S-166°33.63'E, 570 m, 10.04.1987 : *Sertularella anguina* sp. nov.

Station DW 291, 20°34.47'S-166°54.33'E, 510-520 m, 27.04.1987 : *Gonaxia persimilis* sp. nov.

Station DW 307, 20°35.38'S-166°55.25'E, 470-480 m, 01.05.1987 : *Gonaxia complexa* sp. nov., *Sertularella areyi* Nutting, 1904.

MUSORSTOM 6. **Loyalty Islands**.

Station DW 391, 20°47.35'S-167°05.70'E, 390 m, 13.02.1989 : *Gonaxia complexa* sp. nov., *G. scalariformis* sp. nov., *G. similis* sp. nov.

Station DW 392, 20°47.32'S-167°04.60'E, 340 m, 13.02.1989 : *Gonaxia similis* sp. nov.

Station DW 397, 20°47.35'S-167°05.17'E, 380 m, 13.02.1989 : *Gonaxia similis* sp. nov.

Station DW 398, 20°47.19'S-167°05.65'E, 370 m, 13.02.1989 : *Gonaxia complexa* sp. nov., *G. persimilis* sp. nov., *G. similis* sp. nov.

Station DW 399, 20°41.80'S-167°00.20'E, 282 m, 14.02.1989 : *Gonaxia persimilis* sp. nov., *G. similis* sp. nov.

Station CP 400, 20°42.18'S-167°00.40'E, 270 m, 14.02.1989 : *Sertularella areyi* Nutting, 1904.

Station DW 406, 20°40.65'S-167°06.80'E, 373 m, 15.02.1989 : *Gonaxia complexa* sp. nov., *Sertularella helenae* sp. nov.

Station DW 407, 20°40.70'S-167°06.60'E, 360 m, 15.02.1989 : *Gonaxia complexa* sp. nov.

Station DW 420, 20°29.27'S-166°43.35'E, 600 m, 16.02.1989 : *Sertularella tenella* (Alder, 1856).

Station DW 421, 20°26.27'S-166°40.17'E, 245 m, 16.02.1989 : *Gonaxia scalariformis* sp. nov.

Station DW 422, 20°26.20'S-166°40.31'E, 257 m, 16.02.1989 : *Gonaxia similis* sp. nov.

Station DW 423, 20°25.85'S-166°40.50'E, 280 m, 16.02.1989 : *Gonaxia similis* sp. nov.

Station DW 428, 20°23.54'S-166°12.57'E, 420 m, 17.02.1989 : *Gonaxia scalariformis* sp. nov.

Station DW 446, 20°54.33'S-167°18.59'E, 360 m, 19.02.1989 : *Gonaxia similis* sp. nov.

Station DW 447, 20°54.90'S-167°19.87'E, 460 m, 19.02.1989 : *Gonaxia scalariformis* sp. nov.

Station DW 448, 20°55.66'S-167°22.34'E, 410 m, 19.02.1989 : *Gonaxia similis* sp. nov.

Station DW 451, 20°59.00'S-167°24.50'E, 330 m, 20.02.1989 : *Gonaxia similis* sp. nov.

Station DW 457, 21°00.42'S-167°28.71'E, 353 m, 20.02.1989 : *Sertularella helenae* sp. nov.

Station DW 458, 21°00.93'S-167°29.96'E, 400 m, 20.02.1989 : *Sertularella anguina* sp. nov., *S. helenae* sp. nov.

Station DW 461, 21°06.00'S-167°26.20'E, 240 m, 21.02.1989 : *Gonaxia complexa* sp. nov., *G. persimilis* sp. nov.

Station CP 464, 21°02.30'S-167°31.60'E, 430 m, 21.02.1989 : *Gonaxia similis* sp. nov., *Sertularella anguina* sp. nov., *S. helenae* sp. nov.

Station DW 471, 21°08.00'S-167°54.10'E, 460 m, 22.02.1989 : *Sertularella helenae* sp. nov.

Station DW 473, 21°08.80'S-167°55.30'E, 236 m, 22.02.1989 : *Sertularella areyi* Nutting, 1904, *S. quadridens cornuta* Ritchie, 1909.

Station DW 474, 21°08.80'S-167°55.50'E, 260 m, 22.02.1989 : *Sertularella areyi* Nutting, 1904.

Station DW 475, 21°08.95'S-167°55.40'E, 236 m, 22.02.1989 : *Sertularella quadridens cornuta* Ritchie, 1909.

Station DW 477, 21°07.98'S-167°54.69'E, 550 m, 22.02.1989 : *Sertularella quadridens cornuta* Ritchie, 1909.

Station DW 478, 21°08.96'S-167°54.28'E, 400 m, 22.02.1989 : *Sertularella areyi* Nutting, 1904, *S. helenae* sp. nov.

Station DW 485, 21°23.48'S-167°59.33'E, 350 m, 23.02.1989 : *Gonaxia similis* sp. nov.

CALSUB. **New Caledonia** and **Loyalty Islands**.

Plongée 15, 20°37.1'S-166°58'E, 545-327 m, 06.03.1989 : *Gonaxia scalariformis* sp. nov.

SMIB 4. **New Caledonia**.

Station DW 40, 24°46.2'S-168°08.7'E, 260 m, 07.03.1989 : *Gonaxia sinuosa* sp. nov.

Station DW 50, 23°42.2'S-168°00.8'E, 295 m, 09.03.1989 : *Sertularella quadridens cornuta* Ritchie, 1909.

Station DW 52, 23°40.6'S-168°00.5'E, 250 m, 09.03.1989 : *Symplectoscyphus johnstoni tropicus* ssp. nov.

Station DW 53, 23°40.1'S-167°59.9'E, 270 m, 09.03.1989 : *Sertularella areyi* Nutting, 1904, *S. helenae* sp. nov.

Station DW 55, 23°21.4'S-168°04.5'E, 260 m, 09.03.1989 : *Geminella ceramensis* Billard, 1925, *Gonaxia crassicaulis* sp. nov., *G. sinuosa* sp. nov., *Sertularella areyi* Nutting, 1904, *S. helenae* sp. nov., *Symplectoscyphus johnstoni tropicus* ssp. nov., *S. ralphae* sp. nov.

Station DW 57, 23°21.5'S-168°04.6'E, 260 m, 09.03.1989 : *Gonaxia sinuosa* sp. nov., *Sertularella areyi* Nutting, 1904, *Symplectoscyphus effusus* sp. nov., *S. ralphae* sp. nov.

Station DW 59, 22°58.0'S-167°22.5'E, 650 m, 10.03.1989 : *Gonaxia crassicaulis* sp. nov., *G. sinuosa* sp. nov.

New Caledonia.

Passe de la Dumbea, small overhang, crevices, H. ZIBROWIUS, 16.03.1989 (no exact depth record) : *Geminella ceramensis* Billard, 1925.

SMIB 5. **New Caledonia.**

Station DW 71, 23°41.3'S-168°00.7'E, 265 m, 07.09.1989 : *Gonaxia sinuosa* sp. nov.

Station DW 72, 23°42.0'S-168°00.8'E, 400 m, 07.09.1989 : *Symplectoscyphus* cf. *commensalis* sp. nov., *S. effusus* sp. nov., *S. ralphae* sp. nov.

Station DW 85, 22°20.0'S-169°42.9'E, 260 m, 13.09.1989 : *Symplectoscyphus effusus* sp. nov.

Station DW 93, 22°20.0'S-168°42.3'E, 255 m, 13.09.1989 : *Gonaxia crusgalli* sp. nov., *G. similis* sp. nov., *Sertularella areyi* Nutting, 1904.

Station DW 95, 22°59.7'S-168°19.8'E, 200 m, 14.09.1989 : *Geminella ceramensis* Billard, 1925, *Gonaxia similis* sp. nov., *G. sinuosa* sp. nov., *Sertularella areyi* Nutting, 1904, *Symplectoscyphus johnstoni tropicus* ssp. nov.

Station DW 101, 23°21.2'S-168°04.9'E, 270 m, 14.09.1989 : *Dictyocladium biseriale* sp. nov., *Geminella ceramensis* Billard, 1925, *Gonaxia crusgalli* sp. nov., *G. sinuosa* sp. nov., *Sertularella areyi* Nutting, 1904, *S. helenae* sp. nov., *Symplectoscyphus effusus* sp. nov., *S. johnstoni tropicus* ssp. nov., *S. ralphae* sp. nov.

Station DW 102, 23°19.6'S-168°04.7'E, 305 m, 14.09.1989 : *Sertularella areyi* Nutting, 1904.

SMIB 6. **New Caledonia.**

Station DW 111, 19°03.9'S-163°29.7'E, 240-245 m, 02.03.1990 : *Gonaxia amphorifera* sp. nov.

Station DW 114, 19°01.2'S-163°28.8'E, 255-265 m, 02.03.1990 : *Symplectoscyphus johnstoni tropicus* ssp. nov.

Station DW 135, 19°02.8'S-163°18.7'E, 250-260 m, 04.03.1990 : *Sertularella sinensis* Jäderholm, 1896.

SYSTEMATIC ACCOUNT

Family SERTULARIIDAE Lamouroux, 1812

Part I

In this first part, all genera of Sertulariidae in the New Caledonia collection are included, with the exception of the genera *Diphasia* L. Agassiz, 1862, and *Salacia* Lamouroux, 1816. For purely practical reasons the species of these genera, along with additions to the present report, are discussed in a future paper also dealing with the Syntheciidae Marktanner-Turneretscher, 1890.

Genus ***ABIETINARIA*** Kirchenpauer, 1884

The genus *Abietinaria* Kirchenpauer [1884 : 29-31; type, by original designation (KIRCHENPAUER, 1884 : 31), *Sertularia abietina* Linnaeus, 1758] is here considered to consist of the following species :

Abietinaria abietina (Linnaeus, 1758) (= *Sertularia abietina* Linnaeus, 1758 : 808; including the varieties *A. abietina* var. *abietiformis* Kirchenpauer, 1884 : 32; *A. abietina* var. *minor* Kirchenpauer, 1884 : 32, and *A. abietina* var. *purpurea* Kirchenpauer, 1884 : 32).

Abietinaria alexanderi Nutting, 1904 : 120-121, pl. 35 figs 5-8.

Abietinaria alternitheca (Kudelin, 1914) (= *Diphasia alternitheca* Kudelin, 1914 : 441-443, figs 154-156).

Abietinaria anguina Trask, 1857 (= *Sertularia anguina* Trask, 1857 : 112, pl. 5 fig. 1; *Sertularia labrata* Murray, 1860a : 250-251, pl. 11 fig. 2; *Abietinaria Tilesii* Kirchenpauer, 1884 : 34-35, pl. 14 fig. 3; *Thuiaria coei* Nutting, 1901a : 185, pl. 26 figs 1-3).

Abietinaria annulata (Kirchenpauer, 1884) (= *Thuiaria annulata* Kirchenpauer, 1884 : 26, pl. 13 fig. 5).

Abietinaria compressa (Merezhkovskii, 1878) (= *Sertularia compressa* Merezhkovskii, 1878b : 446, pl. 17 figs 17-19).

Abietinaria crassiparia Naumov, 1960 : 390, fig. 280.

Abietinaria cruciformis Antsulevich, 1987 : 91-93, fig. 26.
Abietinaria derbeki (Kudelin, 1914) (= *Diphasia derbeki* Kudelin, 1914 : 449-452, figs 160-165).
Abietinaria elsaeoswaldae Stechow, 1923c : 115-116.
Abietinaria expansa Fraser, 1938b : 112, pl. 16 fig. 1.
Abietinaria filicula (Ellis & Solander, 1786) [= *Sertularia filicula* Ellis & Solander, 1786 : 57 (no. 32), pl. 6 figs c, C].
Abietinaria fusca (Johnston, 1847) (= *Sertularia fusca* Johnston, 1847 : 70-71, figs 6, 10c, 11).
Abietinaria gagarae Naumov, 1960 : 391-392, figs 281-282.
Abietinaria gigantea (Clark, 1876) (= *Thuiaria gigantea* Clark, 1876a : 230, pl. 10 figs 63-64; *Abietinaria urceolus* Naumov, 1960 : 377-379, figs 266-267).
Abietinaria gracilis Nutting, 1904 : 120, pl. 35 figs 1-2.
Abietinaria greenei (Murray, 1860) (= *Sertularia greenei* Murray, 1860b : 504).
Abietinaria inconstans (Clark, 1876) (= *Sertularia inconstans* Clark, 1876a : 222-223, pl. 9 figs 51-52; *Thuiaria costata* Nutting, 1901a : 187, pl. 26 figs 4-9; *Abietinaria amphora* Nutting, 1904 : 119, pl. 34 figs 2-4).
Abietinaria interversa (Pictet & Bedot, 1900) (= *Monopoma interversa* Pictet & Bedot, 1900 : 26-27, pl. 6 fig. 1).
Abietinaria juniperus Kirchenpauer, 1884 (= *Abietinaria Juniperus* Kirchenpauer, 1884 : 33, pl. 14 fig. 2).
Abietinaria kincaidi (Nutting, 1901) (= *Thuiaria elegans* Nutting, 1901a : 187, pl. 25 figs 1-3; *Thuiaria kincaidi* Nutting, 1901b : 789).
Abietinaria laevimarginata (Ritchie, 1907) (= *Sertularia laevimarginata* Ritchie, 1907b : 507-508, pl. 26 figs 5-6).
Abietinaria macrotheca Naumov, 1960 : 379-380, figs 269-270.
Abietinaria melo Kirchenpauer, 1884 (= *Abietinaria Melo* Kirchenpauer : 33-34, pl. 14 fig. 4).
Abietinaria merkii Kirchenpauer, 1884 (= *Abietinaria Merkii* Kirchenpauer : 35, pl. 14 fig. 1).
Abietinaria pacifica Stechow, 1923d : 197-198, fig. F[1].
Abietinaria pulchra (Nutting, 1904) (= ? *Diphasia pulchra* Nutting, 1904 : 111, pl. 31 figs 1-3).
Abietinaria raritheca Naumov, 1960 : 392-393, figs 283-284.
Abietinaria rigida Fraser, 1911 : 61-62, pl. 5 figs 1-3.
Abietinaria smirnovi (Kudelin, 1914) (= *Diphasia smirnovi* Kudelin, 1914 : 414-415, fig. 143, pl. 4 fig. 4).
Abietinaria spasskii (Fenyuk, 1947) (= *Diphasia spasskii* Fenyuk, 1947 : 9, fig. 9).
Abietinaria spiralis Naumov, 1960 : 398-399, fig. 290.
Abietinaria thuiarioides (Clark, 1876) (= *Sertularia thuiarioides* Clark, 1876a : 223-224, pl. 7 figs 38-39; *Abietinaria koltuni* Naumov, 1960 : 394-395, fig. 286).
Abietinaria traski (Torrey, 1902) (= *Sertularia traski* Torrey, 1902 : 69-70, pl. 9 fig. 83).
Abietinaria trigona Antsulevich, 1987 : 90-91, fig. 25.
Abietinaria turgida (Clark, 1876) (= *Thuiaria turgida* Clark, 1876a : 229-230, pl. 10 figs 58-61).
Abietinaria variabilis (Clark, 1876) (= *Sertularia variabilis* Clark, 1876a : 221-222, pl. 8 figs 40-48, pl. 9 figs 49-50; *Abietinaria cartilaginea* Kirchenpauer, 1884 : 36, pl. 14 fig. 6).

An undescribed species occurs in the New Caledonia collection.

Abietinaria immersa sp. nov.

Fig. 1a-d

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4 : stn DW 164, 18°33.20'S-163°13.00'E, 250 m, 16.09.1985 (type locality) : four colonies 60-65 mm high, 1 without hydrocladia, with thick main stem and many detached hydrocladia and some gonothecae. Five schizoholotype slides no. 384. Holotype a 60 mm high colony with detached gonothecae (MNHN-Hy. 998, also 1 schizoholotype slide); 2 schizoholotype slides and 1 slide of 2 gonothecae (RMNH-Coel. 25753); 1 paratype colony (RMNH-Coel. 25754) and 1 paratype colony and 1 slide (BMNH 1989. 11.24.1).

DESCRIPTION. — Colony pinnate, with erect, strongly developed axis, bearing alternately arranged c. 25 mm long hydrocladia in one plane, pointing laterally and slightly upwards. Axis monosiphonic in upper part only, rest of axis polysiphonic by development, probably from stolons that are missing, of thick secondary tubules running parallel to axis; axial hydrothecae projecting from mass of secondary tubules. No division of axis into internodes visible; conspicuous apophyses supporting hydrocladia present; these alternately arranged in two opposite rows, two consecutive apophyses being separated by three hydrothecae : one axillary, one on opposite side and one on same side nearly opposite consecutive apophysis. Hydrotheca on opposite side, being subaxillary to following apophysis, with strongly thickened perisarc on adcauline side (fig. 1a).

Hydrocladia flattened in plane of branching, with nearly completely immersed hydrothecae arranged alternately on both sides; basal portion of hydrocladium with distinct hinge attached to apophysis; hinge allowing slight rotating movement of hydrocladium. Hydrocladial hydrothecae of same shape as axial hydrothecae opposite apophyses; there are consequently three types of hydrothecae : axillary, subaxillary and hydrocladial (fig. 1a).

Hydrocladial hydrothecae almost completely immersed, only fraction of distal part (one-third to one-fourth) free, elongated, nearly tubular, free part slightly tapering. Adnate part of adcauline wall smoothly rounded basally; floor of hydrotheca with conspicuous, rounded peg and hole permitting passage of coenosarc (fig. 1b). Thin strip of perisarc runs from tip of peg towards abcauline wall of hydrotheca; in proximal part of hydrocladium and in axis distal part of strip thickened to form inwardly projecting lamella; adcauline part of hydrotheca in these regions with proximally widening sheath of perisarc (fig. 1c). Subaxillary hydrothecae differ from hydrocladial hydrothecae by thickening of adnate part of adcauline wall; thickening also includes basal portion. Axillary hydrothecae slender, slightly curved, free for about one-half to one-third of its depth. Fused part of adcauline wall running into conspicuous, downward projecting peg bordering oval fenestra (fig. 1a). All hydrothecae with circular rim almost parallel to length axis of stem or hydrocladium; circular closing lid visible in some hydrothecae only and there attached to adcauline portion of rim. There are no renovations and few hydrothecae appear to be damaged.

Perisarc fairly strong along walls of hydrothecae and hydrocladia, slightly thicker on axis, particularly at apophysis; yellowish.

Coenosarc visible in primary axis and hydrocladia, forming single strand (fig. 1b). Remnants only of hydranths observed; counts of tentacles could not be made. Hydranths attached inside hydrotheca at hollow part of bottom

TABLE 1. — Measurements of *Abietinaria immersa* sp. nov., in µm.

	MUSORSTOM 4 Stn DW 164 (slide no. 384)
Axis, diameter at base	1,625 - 1,875
Subaxillary hydrotheca, length abcauline wall	355 - 410
length free part adcauline wall	295 - 320
length adnate part adcauline wall	740 - 800
total depth	845 - 850
maximal diameter	295 - 320
diameter at rim	205 - 215
Axillary hydrotheca, length abcauline wall	355 - 370
length free part adcauline wall	520 - 560
length adnate part adcauline wall	925 - 995
total depth	960 - 1,075
maximal diameter	245 - 250
diameter at rim	85 - 205
Hydrocladial hydrotheca, length abcauline wall	355 - 370
length free part adcauline wall	150 - 295
length adnate part adcauline wall	960 - 995
total depth	910 - 960
maximal diameter	310 - 320
diameter at rim	230 - 235
Gonotheca, approximate length	4,125 - 4,230
maximal diameter	1,885 - 2,125
diameter at aperture	630 - 670

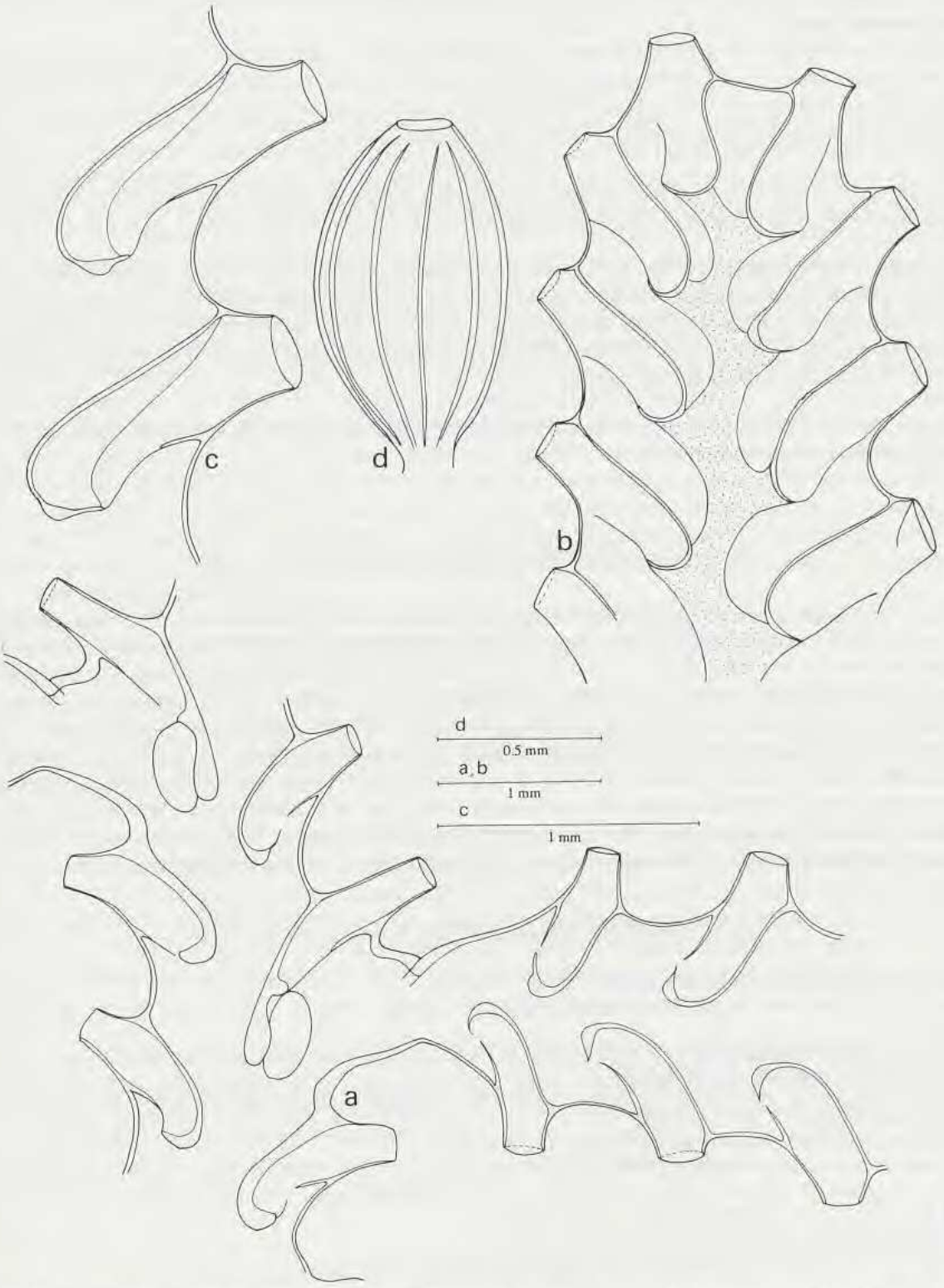

FIG. 1. — *Abietinaria immersa* sp. nov., holotype, MUSORSTOM 4, Stn DW 164 : **a,** monosiphonic part of axis with two apophyses and basal part of a hydrocladium; **b**, distal part of hydrocladium with strand of coenosarc; **c**, two hydrothecae from proximal part of hydrocladium with sheath of perisarc at adnate part adcauline wall; **d**, detached gonotheca with longitudinal ribs. a-d, slide no. 384.

plate; two strands of tissue are seen to run upwards inside hydrotheca and are attached to inside of upper portions of ad- and abcauline walls.

Gonothecae found detached from colonies but apparently they insert in two rows on axis at apophyses. Gonotheca large, ovoid, c. 1.5 times as long as broad, attached by means of short, broad pedicel; distally with circular, smooth aperture, no lid has been observed. Surface of gonotheca with 10 longitudinal, raised ribs with sharp edges (fig. 1d); all gonothecae empty. Perisarc of gonotheca strong.

DISTRIBUTION. — *Abietinaria immersa* has been observed at a single locality (MUSORSTOM 4, Stn DW 164) at the reefs northwest of New Caledonia (Grand Passage, type locality), depth 250 m.

REMARKS. — The present new species resembles *Abietinaria gigantea* (Clark, 1876) in the immersed condition of the hydrothecae but it has a quite different build of colony and the gonothecae are distinctly different, those of *A. immersa* being longitudinally ribbed and those of *A. gigantea* being quite smooth. Ribbed gonothecae also occur in *Abietinaria turgida* (Clark, 1876), but here the number of ribs is 4 or 5 while there are considerable differences in structure of axis and hydrothecae.

ETYMOLOGY. — The specific name *immersa*, from the latin verb *immergo, immersum* to dip under, refers to the immersed condition of the hydrothecae.

Genus *CAMINOTHUJARIA* Von Campenhausen, 1896

This genus has been retained for such species of Sertulariidae that have hydrothecae of the *Sertularella*-type (i.e. with four marginal cusps at the hydrothecal rim) and that have those hydrothecae arranged in pairs and in verticils composed of three or four hydrothecae. The type of the genus is *Caminothujaria molukkana* (= *moluccana*) Von Campenhausen, 1896; a second species has been described by STECHOW (1923 : 203) as *Caminothujaria sagamina*, the descriptions being based exclusively on previous descriptions by INABA (1890, as *Sertularia* sp. no. 22) and by JÄDERHOLM (1919, as *Sertularia distans*). Though this species has the arrangement of hydrothecae characteristic of species of the genus *Sertularia* Linnaeus, 1758 (in its present, restricted form) both authors explicitly mention four marginal cusps at the hydrothecal rim; the exact nature of the opercular apparatus, as well as the gonothecae, remaining unknown. The inclusion of this second species in *Caminothujaria* Von Campenhausen, 1896, seems questionable but must temporarily be maintained pending the discovery of additional material.

Caminothujaria molukkana Von Campenhausen, 1896

Caminothujaria molukkana Von Campenhausen, 1896a : 104, 106.
Caminothujaria moluccana - VON CAMPENHAUSEN, 1896b : 306, 314, pl. 15 fig. 8. — HARTLAUB, 1901b : 35. — BILLARD, 1904 : 36.
Thuiaria divergens Whitelegge, 1899 : 371-372, pl. 23 figs 1-3.
Sertularia indomalayica Stechow, 1919 : 158.
Sertularella singularis Billard, 1920a : 14-16, fig. 1; 1924 : 59. — STECHOW, 1923c : 109. — VAN SOEST, 1976 : 84.
Tridentata indomalayica - STECHOW, 1922 : 149.
Dictyocladium singulare - STECHOW, 1923d : 170.
Caminothuiaria moluccana - BILLARD, 1924 : 59.
Sertularella moluccana - BILLARD, 1924 : 59; 1925b : 167, 222, figs 28-29, pl. 7 fig. 19. — VANNUCCI MENDES, 1946 : 569, pl. 4 fig. 39. — VANNUCCI, 1951: 111, 115, 116.
Sertularia sigmagonangia Hargitt, 1924 : 495, pl. 5 fig. 20.
Dictyocladium aberrans Nutting, 1927 : 214-215, pl. 41 figs 4-5.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3 : stn DR 117, 12°31.2'N-120°39.3'E, 92-97 m, 03.06.1985 : fragment of stem, c. 18 mm long, hydrothecae triseriate, no gonothecae, made up in slide no. 474 (RMNH-Coel. 25755). — Stn CP 124, 12°02.6'N-121°35.3'E, 123-120 m, 04.06.1985 : single colony c. 120 mm high in 2 parts; 1 young gonotheca. Basal part of hydrocaulus with branch. Some hydrothecae of basal parts of hydrocladia triseriate, rest strictly

opposite [MNHN-Hy. 999, also slide (no. 317) of some hydrocladia]. Two slides no. 317 of parts of axis with hydrocladia (BMNH 1989.11.24.2 and RMNH-Coel. 25756). — Stn CP 131, 11°36.6'N-121°43.0'E, 120-122 m, 05.06.1985 : single colony 60 mm high with 50 mm long branch and some fragments; no gonothecae. Fragment in 2 parts on 2 slides no. 1670 (all RMNH-Coel. 26651).

SHORT DESCRIPTION (based on material from MUSORSTOM 3, Stn CP 124). — Axis erect (in 2 parts), 120 mm high, basally polysiphonic and with a clump of stolonal fibres, distally monosiphonic and slightly geniculate. Axial hydrothecae arranged in groups of three at base of alternate apophyses supporting hydrocladia : one axillary, one subaxillary or a small distance under apophysis and one opposite apophysis. Axial hydrothecae and hydrocladia on one plane with exception of axillary hydrothecae that are slightly turned towards front of colony. Arrangement of groups of hydrothecae consistent along whole length of axis. Hydrocladial hydrothecae arranged in pairs, and in verticils of three and four; pairs of hydrothecae in general plane of colony; verticils in intermediate position. Usually verticils occur in older hydrocladia and at base of such hydrocladia, but this is no fixed rule : hydrocladia may start with a pair of alternate hydrothecae that may be followed by a verticil of three or four. No such verticils observed along axis in present material. Upper part of axis forked; branch distinctly produced by several secondary tubules running parallel to axis proximally. Hydrothecae uniform; adcauline wall free for slightly more than half total length; contiguous portion of hydrotheca slightly swollen, distal portion curving away at almost right angle, gradually narrowing, rim with four low but acute cusps (two laterals, one ad-, one abcauline); closing apparatus frequently complete, when closed forming fairly low roof; plates rounded at apex, slightly furrowed. Renovations of hydrothecal border usually frequent and quite regular. Adnate portion of adcauline hydrothecal wall of axial hydrothecae with considerable perisarcal extension growing in direction of adcauline wall of opposite hydrotheca, often forked, one of forks reaching opposite wall (apparently not forming complete septum but a ring inside axis through which pass the strands of coenosarc).

Hydrocladia set off from internode by circular constriction, no distinct node has been observed. Length of hydrocladia up to 15 mm, number of pairs (and verticils) of hydrothecae maximally 12.

Soft tissue and hydranths in poor condition.

One gonotheca present on one of upper hydrocladia, springing from internode close to pair of hydrothecae, length c. 700 µm, elongated ovoid, narrowing towards both ends. No distinct pedicel observed; apex of hydrotheca with three cusps surrounding a small, circular aperture. Surface of gonotheca, with exception of apical and basal portions, transversally furrowed.

DISTRIBUTION. — *Caminothujaria molukkana* is chiefly known from the seas of the eastern part of the Malay Archipelago and the Philippines (VON CAMPENHAUSEN, 1896a, b; BILLARD, 1925b; HARGITT, 1924, as *Sertularia sigmagonangia*; NUTTING, 1927, as *Dictyocladium aberrans*), usually from intermediate depths, but occasionally at great depth (1105 fms = 2021 m, NUTTING, 1927). Additional specimens originate from Funafuti Atoll, Ellice Islands, Pacific (WHITELEGGE, 1899, as *Thuiaria divergens*; no distinct depth record). The present specimens originate from Mindoro Strait, Philippines, depth 92-123 m. So far the species has not been recorded from the New Caledonia area.

REMARKS. — The present material agrees closely with BILLARD's (1925b) excellent description of colonies from the eastern part of the Malay Archipelago and therefore it has not been described in detail. There can be no reasonable doubt that the species described by HARGITT, 1924, as *Sertularia sigmagonangia*, by NUTTING, 1927, as *Dictyocladium aberrans* and by WHITELEGGE, 1899, as *Thuiaria divergens* all belong to *Caminothujaria molukkana*, to which species had already been brought *Sertularella singularis* of BILLARD (1920a).

Genus *CNIDOSCYPHUS* Splettstösser, 1929

This genus has been retained to include the following three species :

Cnidoscyphus aequalis (Warren, 1908) (= *Thyroscyphus aequalis* Warren, 1908 : 344-346, fig. 23, pl. 48 figs 38-40).

Cnidoscyphus marginatus (Allman, 1877) (= *Obelia marginata* Allman, 1877 : 9-10, pl. 6 figs 1-2; *Campanularia insignis* Allman, 1888 : 19-20, pl. 9 figs 1-2).

Cnidoscyphus torresii (Busk, 1852) (= *Laomedea Torresii* Busk, 1852 : 402; *Thyroscyphus simplex* Allman, 1888 : 25, pl. 13 figs 1-2; *Thyroscyphus regularis* Jäderholm, 1896 : 9, pl. 1 fig. 8).

SPLETTSTÖSSER's description of the genus, though including the three species listed above, contains no reference to a type; as I have been unable to locate any previous type designation in the literature, *Laomedea Torresii* Busk, 1852 [= *Cnidoscyphus torresii* (Busk, 1852)] is here designated as the type of the genus.

Cnidoscyphus macrotheca Kramp, 1947, is identical with *Sertularella cylindritheca* (Allman, 1888) and should be excluded from *Cnidoscyphus*.

The genus is well differentiated from *Thyroscyphus* Allman, 1877 (type, by monotypy, *Thyroscyphus ramosus* Allman, 1877) by a number of morphological details, principally concerning the localization of the (large) nematocysts. Though it has been incorporated in *Thyroscyphus* by BOUILLON (1985 : 176) I believe the differences indicated by SPLETTSTÖSSER (1929) to be of sufficient importance to keep both genera separate.

Only one species occurs in the present collection.

Cnidoscyphus torresii (Busk, 1852)[1]

Laomedea Torresii Busk, 1852 : 402.
Campanularia Torresii - BALE, 1884 : 52, pl. 11 fig. 3.
Thyroscyphus simplex Allman, 1888 : 25, pl. 13 figs 1-2.
Thyroscyphus regularis Jäderholm, 1896 : 9, pl. 1 fig. 8. — STECHOW, 1913b : 12.
Thyroscyphus Torresii - JÄDERHOLM, 1903 : 273, pl. 12 fig. 6; 1916 : 5. — REDIER, 1963 : 22, fig. 5.
Thyroscyphus torresi - STECHOW & MÜLLER, 1923 : 466.
Cnidoscyphus torresii - SPLETTSTÖSSER, 1929 : 70-82, 125-126, figs 68-77, map 2. — PENNYCUIK, 1959 : 156.
Cnidoscyphus torresi - VERVOORT, 1941 : 204-205, fig. 1. — EDWARDS, 1973 : 587.
Not *Thyroscyphus torresii* - MAYAL, 1973 : 61-62, figs 47-48 (= *Thyroscyphus longicaulis* Splettstösser, 1929).

MATERIAL EXAMINED. — **Makassar Strait.** CORINDON 2 : stn 293, 02°37.7'S-117°49.4'E, 45 m, 10.11.1980 : fragments of several colonies, c. 70 mm high, no gonothecae (MNHN-Hy. 1000; BMNH 1989.11.24.3). Slide no. 437 (RMNH-Coel. 25757).

Philippines. MUSORSTOM 3 : stn CP 131, 11°36.6'N-121°43.0'E, 120-122 m, 05.06.1985 : five colonies up to 60 mm high and several fragments; gonothecae present. With *Modeeria rotunda* (Quoy & Gaimard, 1827) and *Lafoea dumosa* (Fleming, 1820). Three slides no. 1684 (all RMNH-Coel. 26655). — Stn CP 134, 12°01.1'N-121°57.3'E, 92-95 m, 05.06.1985 : single 10 mm high stem with 4-5 hydrothecae, all in slide no. 464 (RMNH-Coel. 25758). — Stn CP 142, 11°47.0'N-123°01.5'E, 27-26 m, 06.06.1985 : single 80 mm high fragment and 1 hydrocladium with a single hydrotheca. No gonothecae (MNHN-Hy. 1001). Slide no. 842, top part with single hydrotheca (RMNH-Coel. 25759).

DISTRIBUTION. — *Cnidoscyphus torresii* is chiefly known from the Indian Ocean coasts of Western Australia, from the Timor and Arafura Seas (including Aru Islands), from Torres Strait, from the seas of the Malay Archipelago and from the South China Sea (cf. SPLETTSTÖSSER, 1929; VERVOORT, 1941). The present records are from Makassar Strait (CORINDON 2, Stn 293), from Mindoro Strait (MUSORSTOM 3, Stns CP 131 and CP 134) and from Sibuyan Sea, Philippines (MUSORSTOM 3, Stn CP 142), depths varying between 26 and 122 m.

REMARKS. — This species was fully described by SPLETTSTÖSSER (1929) and later on commented upon by VERVOORT (1941); the present material, in agreement with those descriptions and generally fragmented, has not been described in detail here. Hydranths are present in the CORINDON 2 material and that from MUSORSTOM 3, Stn CP 134, indicating that these specimens were obtained alive; gonothecae are present in the colonies from MUSORSTOM 3, Stn CP 142. Slides nos 437, 464 and 842 were compared in the BMNH slide collection with slides labelled *Thyroscyphus regularis* Jäderholm, and found to be identical : BMNH 1964.8.7.104, Mergui Archipelago, Stn 25/26, STIMPSON and BROWN 1907 and 1964.8.7.103, Mergui Archipelago, Stn 23, J.R. (= James RITCHIE) 1909. (Cf. note on page 125 of SPLETTSTÖSSER, 1929).

[1] See note on page 276.

Genus *DICTYOCLADIUM* Allman, 1888

DIAGNOSIS. — Colonies flabellate, monosiphonic throughout, axis irregularly pseudo-dichotomously branched, forming irregular, scorpioid sympodium; gonothecae springing from branch a short distance above bifurcation, clasped between the two branches and as a result with furrow on both sides of basal portion. Hydrothecae rather cylindrical, with major part of adcauline wall adnate, distal portion slightly curved, rim with three acute cusps: one adcauline and two laterals near abcauline side of hydrotheca. Closing apparatus composed of three flaps. Hydrothecae either alternate or sub-opposite; in species with sub-opposite hydrothecae alternate "pairs" staggered to front and back of colony, creating the impression of the presence of four rows of hydrothecae, in colonies with alternate hydrothecae this arrangement is indistinct and only visible in the older parts of the colony. Gonothecae placed at base of inner surface of branch, globular, with extremely short pedicel and apical tube with slightly flaring aperture. A helical fold furrows exterior of gonotheca, starting at the funnel and curving downwards, gradually petering out on basal part of gonotheca; fold with distinct hyaline flap. There is probably sexually dimorphism of the gonothecae.

The type of *Dictyocladium* Allman (1888 : 76-77), by monotypy, is *Dictyocladium dichotomum* Allman (1888 : 77, pl. 36 figs 2, 2a) (= *Sertularia monilifera* Hutton, 1873 : 257 = *Thuiaria cerastium* Allman, 1876 : 271, pl. 18 figs 3-4, and probably also identical with *Sertularella reticulata* Kirchenpauer, 1884 : 40, pl. 15 figs 4, 4a-b). A second species is described below as *Dictyocladium biseriale* sp. nov.

The generic diagnosis given above excludes *Dictyocladium flabellum* Nutting, 1904, and *Dictyocladium coactum* Stechow, 1923, from the genus.

Dictyocladium flabellum Nutting (1904 : 105-106, pl. 28 figs 1-3) has a colony structure comparable to that of *D. monilifer* (Hutton, 1873) and *D. biseriale* sp. nov., but the hydrotheca has a four-flapped operculum and the hydrothecal rim four (low) cusps. The gonotheca, though placed basally at inner surface of branch, lacks the helical fold.

Dictyocladium coactum Stechow (1923c : 106-107) also has a four flapped operculum and four cusps at the hydrothecal rim. Though the arrangement of the hydrothecae along the axis resembles the condition observed in *D. monilifer*, the colony structure is quite different, the gonothecae are differently placed and also differ in shape and structure.

I doubt whether or not *D. flabellum* and *D. coactum* should be considered conspecific; anyhow their generic position at the moment is uncertain. Most likely new genera of Sertulariidae should be instituted for their reception but I refrain from doing so without having actually studied material of both species.

Dictyocladium biseriale sp. nov.

Fig. 2a-d

MATERIAL EXAMINED. — **New Caledonia.** SMIB 5 : stn DW 101, 23°21.2'S-168°04.9'E, 270 m, 14.09.1989 (type locality) : c. 10 large, pseudo-dichotomously branched, monosiphonic colonies up to 50 mm high with many gonothecae and some fragments; 2 slides no. 1056. One colony c. 30 mm high with gonothecae is holotype (MNHN-Hy. 1003), rest of material paratypes [MNHN-Hy. 1003; BMNH 1989.11.24.5 and RMNH-Coel. 25761 (including 2 slides)].

LAGON : stn DW 1065, 19°58.1'S-163°51.2'E, 28 m, 23.10.1989 : fragmented colony c. 30 mm high with some gonothecae (MNHN-Hy. 1002), mixed with other hydroids; 2 slides no. 1057, 1 BMNH 1989.11.24.4, the other RMNH-Coel. 25760.

DESCRIPTION. — Colony loose, flabellate, c. 50 x 50 mm, axis and branches monosiphonic throughout, repeatedly pseudo-dichotomously branched (fig. 2a), forming irregular, scorpioid sympodium, irregularity being brought about by secondary ramifications of branches. Branches may end in tendrils that may anastomose with other branches, usually by entering aperture of hydrotheca and establishing continuity of coenosarc. Distance between branches 8-10 mm.

Hydrothecae at first sight alternate and biserially arranged in single plane; on closer examination axis between hydrothecae slightly twisted so that successive 'pairs' of hydrothecae face front and back of colony, components of a

'pair' widely spaced. This arrangement, however, is mainly demonstrated by perisarc of axis passing in front of or at back of 'pairs'. Hydrotheca fairly elongated tubiform, slightly widening basally; distal portion gently curving outwards. Adnate portion of adcauline wall c. 3 to 4 times as long as free portion (without renovations), smoothly curved, at hydrothecal floor with curved, thickened portion and small hole to permit passage of coenosarc. Abcauline hydrothecal wall concave in upper third, internally with perisarcal knob some distance above end of adcauline hydrothecal wall; hydrothecal floor oblique. Distal free portion of hydrotheca slightly narrowing; hydrothecal rim apparently fragile, damaged in majority of hydrothecae, with three fairly acute cusps separated by semicircular embayments (fig. 2c). Renovations of hydrothecal margin frequent, in some cases doubling length of hydrotheca, either of same diameter throughout or narrowing slightly towards rim (fig. 2d). Opercular apparatus not observed but believed to be composed of three triangular plates; fragments of opercular apparatus occasionally adhere to rim of renovated hydrothecae. Distance between hydrothecae such that curved end of adnate part adcauline hydrothecal wall is at level of axil formed by free part of adcauline wall and wall of branch (axis) of preceding hydrotheca (on opposite side of branch).

Gonotheca globular, slightly longer than wide, placed in axil of bifurcation of axis, with extremely short pedicel attached at base of 'branch' (fig. 2b), apically with short funnel with slightly flaring, circular aperture. Surface of gonotheca deeply furrowed by spiral fold, starting at small platform on which funnel is placed and descending in c. 15-17 turns. After passing middle of gonotheca fold becomes less deep and gradually peters out (fig. 2b). Fold with hyaline frill, distinctly visible apically, gradually narrowing and in middle region of gonotheca gradually disappearing. Gonotheca strongly pressed in axil and as a result with two longitudinal furrows in basal portion interrupting the weak undulations of gonothecal wall. Places where gonothecae have been shed or will eventually develop are clearly marked and visible because of interruption of perisarc and occasional knob-shaped coenosarcal growth (fig. 2b).

Perisarc strong, yellowish, scarcely taking any haematoxyline stain, particularly thick at axil of bifurcation and along walls of branches; adnate part of adcauline wall also fairly thick. Periderm along abcauline wall and apical free portion of hydrotheca thin and brittle.

All specimens inspected are without any living tissue; colonies apparently dead when collected.

TABLE 2. — Measurements of *Dictyocladium biseriale* sp. nov. in µm.

	SMIB 5 Stn DW 101 (slide no. 1057) paratype
Axis, diameter at bifurcation	260 - 280
Hydrotheca, length abcauline wall, excl. renovations	370 - 405
length abcauline wall including renovations	590 - 705
length free part adcauline wall, excl. renovations	110 - 170
length adnate part adcauline wall	435 - 450
total depth, excluding renovations	405 - 505
maximal diameter	125 - 150
diameter at rim	85 - 105
Gonotheca, length, including funnel	1,410 - 1,475
maximal diameter	1,150 - 1,195
funnel, length	170
diameter at aperture	135

DISTRIBUTION. — The type locality (SMIB 5, Stn DW 101) is at the extreme northwestern end of the Norfolk Ridge, depth 270 m; the second locality (LAGON, Stn DW 1065) inside the northern lagoon of New Caledonia, depth 28 m.

REMARKS. — There can be no reasonable doubt that the material from the two widely separated localities is conspecific; there is complete conformity in colony structure, shape of the hydrothecae and place and shape of the

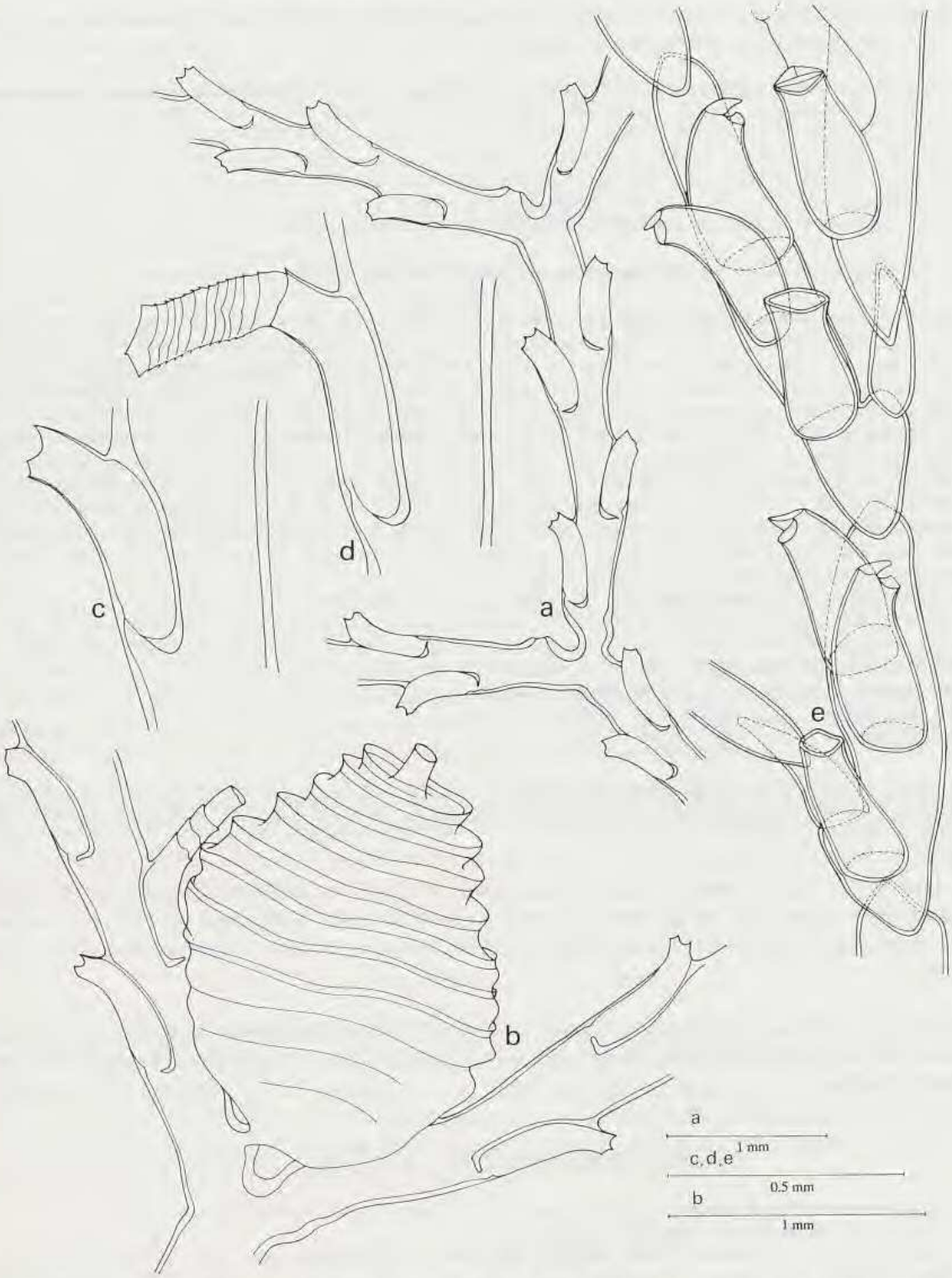

FIG. 2 a-d. — *Dictyocladium biseriale* sp. nov., paratype, SMIB 5, Stn DW 101 : **a**, part of axis to show bifurcation; **b**, gonotheca at bifurcation; **c**, hydrotheca; **d**, repeatedly renovated hydrotheca.

FIG. 2 e. — *Hydrallmania falcata* (Linnaeus, 1758), BIOGEOCAL, Stn CP 214, part of primary hydrocladium.

a-d, slide no. 1056; e, slide no. 584.

gonothecae. The fact that the hydrothecae are not placed in pairs distinguishes this new species from the type of the genus that has the hydrothecae arranged in sub-opposite pairs.

ETYMOLOGY. — From the latin words *bi* (two, twice) and *series* (row) : having the hydrothecae arranged in two rows.

Genus ***DYNAMENA*** Lamouroux, 1812

Dynamena cornicina McCrady, 1859

Dynamena cornicina McCrady, 1859 : 204-205. — BILLARD, 1925b : 188, fig. 40, pl. 7 fig. 23; 1926 : 97; 1933 : 14, fig. 5. — LELOUP, 1932 : 159; 1935 : 39, figs 22-23; 1937a : 106, 116, 117, fig. 9; 1937b : 5, 36; 1938b : 15, fig. 10; 1940b : 17; 1960 : 228. — BLACKBURN, 1938 : 319; 1942 : 113. — VANNUCCI-MENDES, 1946 : 562, pl. 4 figs 33-34; 1949 : 242. — VANNUCCI, 1951 : 107, 108, 110, 111, 112, 115, 117. — VERVOORT, 1946a : 307; 1967 : 40, fig. 11; 1968 : 103. — BUCHANAN, 1957 : 365. — PENNYCUIK, 1959 : 192. — YAMADA, 1959 : 58. — MILLARD, 1964 : 29, fig. 9; 1975 : 261, fig. 86A-E; 1978 : 191 et seq. — REES & THURSFIELD, 1965 : 125. — VAN GEMERDEN-HOOGEVEEN, 1965 : 25. — HIROHITO, 1969 : 18. — GRAVIER, 1970 : 116. — REDIER, 1971a : 144. — SCHMIDT, 1972 : 36, 41, 42, 43, 45. — MILLARD & BOUILLON, 1974 : 7. — COOKE, 1975 : 194, pl. 3 figs 3-4; 1977 : 95, fig. 21. — WEDLER, 1975 : 332 et seq. — MERGNER & WEDLER, 1977 : 16, pl. 4 fig. 27a-b, pl. 7 fig. 49. — GARCÍA CORRALES, AGUIRRE INCHAURBE & GONZÁLEZ MORA, 1980 : 12, fig. 3. — FLÓREZ GONZÁLEZ, 1983 : 120, photo 27.
Sertularia complexa Clarke, 1879 : 245-246, pl. 4 figs 26-28.
Sertularia moluccana Pictet, 1893 : 50, pl. 2 figs 42-43.
Desmoscyphus palkensis Thornely, 1904 : 119, pl. 2 fig. 7A-B.
Sertularia densa Stechow, 1919 : 93, fig. J.
Sertularia cornicina - BENNITT, 1922 : 250. — JARVIS, 1922 : 338. — FRASER, 1938a : 9, 54; 1938b : 110; 1938c : 135; 1943 : 92; 1947 : 10; 1948 : 247. — DEEVEY, 1954 : 270.
Tridentata cornicina - STECHOW, 1922 : 149; 1923d : 204.
Sertularia dubia Hargitt, 1924 : 494-495, pl. 5 fig. 19.
Dynamena disticha - CALDER, 1991 : 93-96, fig. 50.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3 : stn DR 117, 12°31.2'N-120°39.3'E, 92-97 m, 03.06.1985 : twelve mm high colony without gonothecae, together with *Geminella ceramensis* Billard, 1925 (slide no. 502; MNHN-Hy. 1004).

DISTRIBUTION. — Species with a worldwide distribution in tropical and subtropical waters. Many localities in waters of the eastern part of the Malay Archipelago are given by BILLARD, 1925b; from the Philippine region, the species is mentioned by HARGITT (1924, as *Sertularia dubia*). The species lives in the littoral zone down to a depth of c. 60 m.

REMARKS. — The only specimen in the collection is a 12 mm high, apparently young colony from the Philippines. The lack of additional records is certainly due to the fact that the majority of the material inspected is from deep water sites.

Dynamena quadridentata (Ellis & Solander, 1786).

Sertularia quadridentata Ellis & Solander, 1786 : 57 (no. 33), pl. 5 figs g, G. — LAMARCK, 1816 : 121.
Pasythea (Sertularia) quadridentata - LAMOUROUX, 1812 : 183.
Pasythea quadridentata - LAMOUROUX, 1816 : 156, pl. 3 fig. 8a, B. — THORNELY, 1900 : 456. — BILLARD, 1924 : 55. — GRAVELY, 1927 : 14, pl. 2 fig. 6. — HARGITT, 1927 : 509, pl. 1 fig. 2. — NUTTING, 1927 : 226. — GRAVIER, 1970 : 116.
Pasythea nodosa Hargitt, 1908 : 117, figs 13-15. — STECHOW, 1913a : 144; 1913b : 14, 150, figs 129-130. — BILLARD, 1924a : 55. — RHO & CHANG, 1974 : 141. — RHO, 1977 : 261, 418, pl. 67 no. 73, pl. 78 no. 73.
Pasya quadridentata - STECHOW, 1922 : 148; 1923d : 166. — FRASER, 1938a : 9, 50; 1938b : 110; 1938c : 134; 1939 : 176; 1943 : 92; 1944 : 252-253, pl. 53 fig. 237; 1948 : 239.

Pasya nodosa - STECHOW, 1922 : 148; 1923b : 12; 1923d : 166.
Pasya elongata Stechow & Müller, 1923 : 469, pl. 27 fig. 8.
Dynamena gibbosa Billard, 1925a : 650, fig. 2G.
Dynamena quadridentata - BILLARD, 1925b : 194, 222, fig. 42. — TREBILCOCK, 1928 : 23. — LELOUP, 1932 : 160; 1934 : 13. — BLACKBURN, 1938 : 320; 1942 : 113. — VERVOORT, 1946a : 308; 1968 : 41, 103, fig. 19. — BUCHANAN, 1957 : 365, fig. 14. — PENNYCUIK, 1959 : 193. — YAMADA, 1959 : 57. — RALPH, 1961a : 790, fig. 13e; 1966 : 159. — REDIER, 1964b : 137; 1966 : 7, pl. 1 figs 1, 3. — MAMMEN, 1965 : 49, fig. 83. — HIROHITO, 1969 : 20, fig. 14. — SHEPHERD & WATSON, 1970 : 140. — MILLARD & BOUILLON, 1973 : 70; 1974 : 8. — WEDLER, 1975 : 333 et seq. — MILLARD, 1975 : 266, fig. 87G-J; 1978 : 191 et seq. — MERGNER & WEDLER, 1977 : 18, pl. 4 fig. 26. — FLÓREZ GONZÁLEZ, 1983 : 120, photo 28. — BANDEL & WEDLER, 1987 : 38. — GIBBONS & RYLAND, 1989 : 411-414, figs 29-30. — CALDER, 1991 : 96-98, fig. 51.
Dynamena quadridentata var. *elongata* Billard, 1925b : 195, fig. 43. — LELOUP, 1938b : 16, fig. 11. — REDIER, 1966 : 87, pl. 1 figs 2, 4. — PENNYCUIK, 1959 : 193. — YAMADA, 1959 : 57.
Dynamena quadridentata var. *nodosa* - BILLARD, 1925b : 195, fig. 43E. — LELOUP, 1935 : 43, fig. 25. — MILLARD, 1958 : 186, fig. 6b; 1964 : 31. — YAMADA, 1959 : 57.
Dynamena (Pasya) quadridentata - STECHOW, 1925a : 223.
Pasythea dubia Hargitt, 1927 : 511, pl. 1 fig. 5.
Dynamena quadridentata var. *nodosa* f. *peculiaris* Leloup, 1935 : 43, fig. 25.
Dynamena quadridentata f. *typica* - VANNUCCI-MENDES, 1946 : 559, pl. 3 figs 27, 28, 31; 1949 : 241. — VANNUCCI, 1951 : 107, 108, 110, 112, 115, 117.
Dynamena quadridentata f. *flabellata* Vannucci-Mendes, 1946 : 561, pl. 3 fig. 32; 1949 : 242, pl. 2 fig. 34. — VANNUCCI, 1950 : 108, 110, 115, 117.
Dynamena dubia - YAMADA, 1959 : 58.
Dynamena thankasseriensis Mammen, 1965 : 48, fig. 82.

MATERIAL EXAMINED. — **New Caledonia**. LAGON : stn 382, 22°30.4'S-167°14.1'E, 57 m, 22.01.1985 : some 5 mm high colonies on coral fragments; no gonothecae, no slide (RMNH-Coel. 25762).

DISTRIBUTION. — This species has a worldwide distribution in tropical, subtropical and temperate parts of Atlantic, Pacific and Indian Oceans. It has been reported from the Loyalty Islands by THORNELY (1900, as *Pasythea quadridentata*) and REDIER (1966, as *Dynamena quadridentata* var. *elongata*); it has also been observed at various shallow water localities around New Caledonia (REDIER, 1966, as *Dynamena quadridentata* var. *elongata*).

REMARKS. — The long list of synonyms illustrates the great variability of the present species, a phenomenon commented upon by BILLARD (1925b) and more recently by CALDER (1991). The material recorded here is in full agreement with BILLARD's (1925b) account of Indonesian specimens of the typical form of this species; it is sterile and has not been redescribed in detail.

Genus *GEMINELLA* Billard, 1925

This genus was originally instituted by BILLARD (1925b : 54) at the subgeneric level for *Sertularella ceramensis* Billard, 1925. It has been retained here as a separate genus for such species of the Sertulariidae that have a three-cusped hydrothecal rim and opposite hydrothecae (i.e. becoming opposite in the course of development). The opercular apparatus is composed of three triangular flaps that close to form a roof-shaped structure comparable to that found in *Symplectoscyphus*. *Geminella* is a monotypic genus; *Geminella subtilis* Vannucci-Mendes, 1946, does not belong here (see Remarks under *Geminella ceramensis*).

Geminella ceramensis Billard, 1925

Fig. 3a-e

Sertularella ceramensis Billard, 1925a : 649.
Sertularella (Geminella) ceramensis - BILLARD, 1925b : 170-171, fig. 30, pl. 7 fig. 20.
Geminella ceramensis - VAN SOEST, 1976 : 82.
Not *Geminella ceramensis* - VANNUCCI MENDES, 1946 : 570, pl. 4 figs 40-41; 1951 : 110, 116.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3 : stn DR 117, 12°31.2'N-120°39.3'E, 92-97 m, 03.06.1985 : colonies 3-10 mm high with 2 gonothecae on Bryozoa and other hydroids. Slides no. 475 (BMNH 1989.11.24.6) and 2 slides no. 502 (MNHN-Hy. 1004; RMNH-Coel. 25763, with rest of sample). With *Monostaechas quadridens* McCrady, 1859, *Dynamena cornicina* McCrady, 1859, and *Sertularella areyi* Nutting, 1904.

New Caledonia. MUSORSTOM 4 : stn CP 190, 19°06.30'S-163°29.50'E, 215 m, 19.09.1985 : branched and anastomosing colonies on wormtubes, 8-10 mm high, as well as some detached colonies. No gonothecae. Two slides no. 542 of detached colonies (BMNH 1989.11.24.7; RMNH-Coel. 25764, rest sample MNHN-Hy. 1005). With *Symplectoscyphus johnstoni tropicus* ssp. nov. — Stn DW 207, 22°39.00'S-167°07.40'E, 220-235 m, 28.09.1985 : c. 10 mm high fragment; no gonothecae. All in slide no. 853 (RMNH-Coel. 25765).

SMIB 4 : stn DW 55, 23°21.4'S-168°04.5'E, 260 m, 09.03.1989 : small, c. 20 mm high colonies on sponges, corals and Bryozoa; no gonothecae observed. Five slides no. 757 (MNHN-Hy. 1006, 2 slides + rest sample; BMNH 1989.11.24.8, 2 slides; RMNH-Coel. 25766, 1 slide). With *Sertularella areyi* Nutting, 1904.

SMIB 5 : stn DW 95, 22°59.7'S-168°19.8'E, 200 m, 14.09.1989 : several tangled colonies c. 10x10 mm and some fragments. No gonothecae; slide no. 968 (MNHN-Hy. 1007, rest sample RMNH-Coel. 25767), with *Sertularella areyi* Nutting, 1904, and *Monostaechas quadridens* McCrady, 1859. — Stn DW 101, 23°21.2'S-168°04.9'E, 270 m, 14.09.1989 : fragmentary colonies c. 8x8 mm; no gonothecae, no slide (MNHN-Hy. 1008).

Passe de la Dumbea (S.W. New Caledonia), small overhang, crevices, H. ZIBROWIUS coll., 16.03.1989 (no exact depth record) : small fragment, c. 2 mm high, on Bryozoa, with hydrotheca of *Clytia* sp. Slide no. 992 (RMNH-Coel. 25768).

DESCRIPTION (based on all material). — Irregularly branched, slender stems c. 10 mm high rising from creeping stolon, with many primary and secondary branches, occasionally anastomosing and forming loose, bushy masses or an irregular reticulum. Individual stems rising from creeping stolon, monosiphonic, divided into long internodes carrying individual hydrothecae or pairs of hydrothecae; nodes marked by perisarcal constriction (fig. 3a). Primary branches develop from stem directly under axial hydrotheca or pair of hydrothecae (fig. 3d), giving rise in same fashion to secondary branches. Axis, primary or secondary branches may end in tendril and (or) fuse with other branches. Usually one hydrotheca or one (sub)opposite pair of hydrothecae per internode; the axis may begin directly with a pair of hydrothecae on first internode or first and occasionally also second internode have a single hydrotheca (fig. 3a, b). When two isolated hydrothecae are present in basal part of stem these are on opposite sides of axis. Pairs of hydrothecae not strictly opposite, but rather more subopposite (fig. 3c), becoming more closely opposite along axis.

Hydrotheca with enlarged, but not swollen, basal portion, gradually narrowing towards rim. Abcauline hydrothecal wall straight or slightly concave. Free part of adcauline wall as long as adnate portion to c. 1.5 times that length; straight or smoothly convex. Adnate part slightly curved; hydrothecal floor straight, not touching inside abcauline wall, but with large circular opening to permit passage of coenosarc. End of adnate part with slender peg. Hydrothecal rim with three acute cusps, one adcauline and two laterals near abcauline side. Opercular apparatus composed of three triangular plates, when closed forming graceful roof, present in many hydrothecae (fig. 3c). Cusps at hydrothecal rim slightly everted; renovations of hydrothecal border common, as many as five having been counted (fig. 3d-e).

Hydranths present in material from SMIB 4, Stn DW 55, and well preserved in slide no. 757. There are 14-16 tentacles; contracted polyps show distinct abcauline caecum attached to inside hydrothecal wall by means of fine ligament.

Two damaged gonothecae occur at MUSORSTOM 3, Stn DR 117. Gonothecae barrel-shaped, basally fairly suddenly narrowing into distinct pedicel attaching gonotheca to internode immediately below hydrotheca. Wall of gonotheca undulated (not furrowed, fig. 1e), apical portion damaged, contents lost.

DISTRIBUTION. — *Geminella ceramensis* was originally described from two localities in the Malay Archipelago, viz. Ceram Sea, 02°28.5'S-131°03.3'E (type locality), depth 118 m, and Bay of Bima, Sumbawa, c. 250 m depth. The occurrence of this species in Philippine waters (MUSORSTOM 3, Stn DR 117, Mindoro Strait, 92-97 m) is not surprising. However, it was also found around New Caledonia, being obtained at the reefs northwest of New Caledonia, near Grand Passage (MUSORSTOM 4, Stn CP 190), at the reefs fringing the southwestern part of New Caledonia (MUSORSTOM 4, Stn DW 207; Passe de la Dumbea) and at the extreme northwestern part of the Norfolk Ridge (SMIB 4, Stn DW 55; SMIB 5, Stns DW 95 and DW 101). The depths at New Caledonian localities varied between 200 and 270 m. These are the first New Caledonian records.

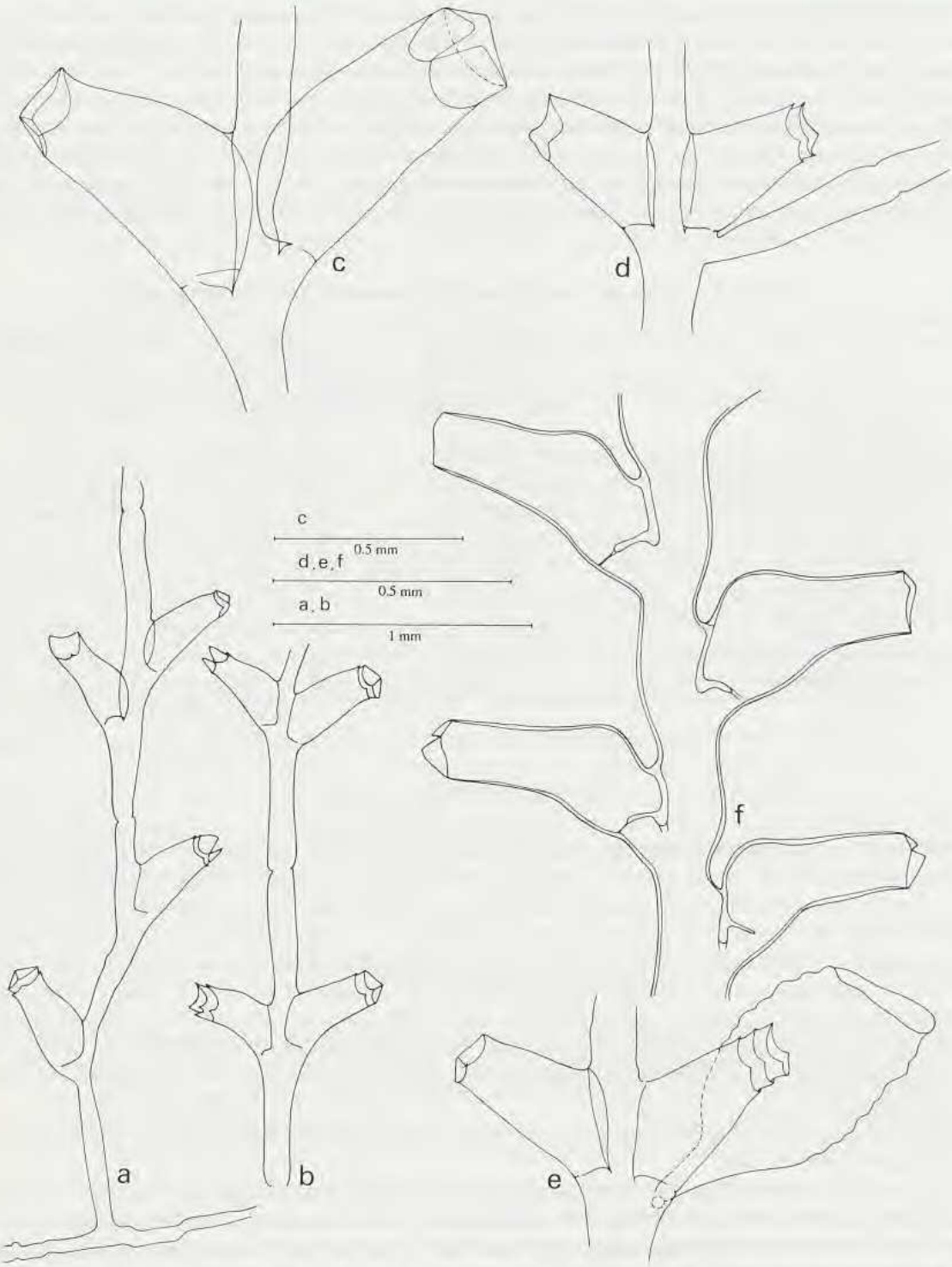

FIG. 3 a-e. — *Geminella ceramensis* Billard, 1925, MUSORSTOM 3, Stn DR 117 : **a,** basal part of axis with dispersed hydrothecae; **b**, part of axis with (sub)opposite hydrothecae; **c**, pair of subopposite hydrothecae; **d**, sidebranch springing from axis under one pair of hydrothecae on axis; **e**, (damaged) gonotheca and its insertion on axis.

FIG. 3 f. — *Gonaxia amphorifera* sp. nov., paratype, MUSORSTOM 4, Stn CP 153, part of hydrocladium.
a-c, slide no. 475; d-e, slide no. 502; f, slide no. 1017.

REMARKS. — The available specimens correspond with BILLARD's account of this species. The gonotheca is previously undescribed, and the two present in the collection are both damaged. However, they are certainly barrel-shaped with a short pedicel and undulated walls, probably truncate at the apex and there with a (circular ?) lid.

The specimens described by VANNUCCI-MENDES (1946, 1951) as *Geminella ceramensis* from off the Brazilian coasts do not belong here. VANNUCCI-MENDES' observation of a three-valved opercular apparatus probably is incorrect, the author perhaps being misled by the sharp fold in the adcauline opercular flap. Moreover, there are considerable differences in the shape of the hydrothecae, that are said to have an internal, abcauline septum. This species, as well as *Geminella subtilis* Vannucci Mendes, 1946 : 572, pl. 4 figs 42-43, probably belong in *Sertularia*.

TABLE 3. — Measurements of *Geminella ceramensis* Billard, 1925, in µm.

	MUSORSTOM 3 Stn DR 117 (slide no 502)	SMIB 4 Stn DW 55 (slide no. 757)	Malay Archipelago BILLARD, 1925
Internodes, length	1,105 - 1,325	910 - 1,105	1,055 -1,400
diameter at node	80 - 90	65 - 75	80 - 115
Hydrotheca, length abcauline wall	235 - 280	250 - 265	300 - 330
length free part adcauline wall	55 - 260	215 - 230	230 - 280
length adnate part adcauline wall	160 - 190	215 - 220	205 - 245
total depth	310 - 335	340 - 360	
maximal diameter	170 - 200	175 - 190	
diameter at rim	125 - 140	110 - 125	115 - 125
Distance between pairs of hydrothecae, base to base	1,130 - 1,280	865 - 975	
Gonotheca, approximate length	630		
maximal diameter	310		

Genus *GONAXIA* gen. nov.

DESCRIPTION. — Sertulariids with erect, usually thick and polysiphonic, occasionally forked axis, attached to fixed object (other hydroids, shells, rocks) by means of strong stolons, usually forming a small, flat disk. Colony regularly pinnate; axis with biserially arranged, alternate hydrothecae and distinct apophyses supporting straight hydrocladia with a varied number of alternate, biseriate hydrothecae; all hydrothecae, both of hydrocladia and axis, strictly in one plane. Hydrocladia set off from apophysis by perisarcal constriction and (usually) a twist, alternately directed left or right and to a varied degree also upwards, with usually 3 hydrothecae between two successive hydrocladia of which one is axillary, one on opposite side and the third on same side as axillary hydrotheca, the almost opposite apophysis supporting next hydrocladium. Irregularities in this arrangement occur : a larger number of axial hydrothecae being present between two successive hydrocladia or two successive apophyses only have their axillary hydrothecae.

Thickness of axis increasing by increase in diameter and/or by development of secondary tubules running upwards parallel to primary axis.

Hydrothecae tubiform, usually with swollen basal portion, pointing away from hydrocladium or axis, either perpendicularly or directed obliquely upwards; basal part to varied degree sunken into hydrocladium or axis. Fused portion of adcauline hydrothecal wall usually thickened, running into a distinct knob before turning abcaudally to form hydrothecal floor. This floor with distinct circular hole to permit passage of coenosarc. Hydrothecal aperture perpendicular to hydrothecal length axis, rim with three cusps of varied development, of which one is abcauline, and two laterals near adcauline part of hydrotheca. Marginal cusps separated by shallow, rounded embayments. Opercular apparatus composed of three triangular flaps, attached in marginal embayments and closing to form a low roof. Opercular plates deciduous, only visible in young hydrothecae and at protected places of the colony. Axillary hydrothecae usually of slightly different shape and with conspicuous peg at end of fused part adcauline wall.

Hydranth where observed small, attached to hydrothecal base and when contracted with small abcauline caecum. Occasionally a filament is seen to run from body of hydranth to inside of abcauline hydrothecal wall.

Gonothecae develop on the axis, either at the base of the hydrotheca or directly from secondary tubules and of greatly varied shape. They may be elongated spindle-shaped, narrowing apically as well as proximally and attached to axis by means of a disc-shaped 'foot', or are present as elongated tubiform structures integrated into the net of secondary tubes covering the axis and apparently formed by these secondary tubules. Some species have gonothecae intermediate between these extremes, being partly invested, partly free, while in others there appears to be sexual dimorphism; those of one sex being free, those of the opposite sex being (partly) invested by secondary tubes. The nature of the gonophore could be observed in some species where it proved to be sessile and styloid.

TYPE (by original designation). — *Gonaxia ampullacea* sp. nov.

ETYMOLOGY. — The generic name *Gonaxia* has been chosen to indicate the intimate relation between the gonothecae and the axis. Gonotheca comes from the greek words *gonos* (seed, offspring) and *theka* (container, sheath); axis from the latin noun *axis* (axle, pole). Gender feminine.

REMARKS. — The shape of the colony is not unlike that observed in many species of *Abietinaria*; there are, however, three usually distinct hydrothecal cusps as is also observed in *Symplectoscyphus*. In contradistinction to the latter the position of the cusps is different : two laterals at the adcauline part of the rim, one at its abcauline end. In *Symplectoscyphus* there are a distinct adcauline cusp and two laterals in the abcauline part. A three-flapped closing apparatus is usually present in both genera. In *Gonaxia* the closing apparatus is highly deciduous but such an apparatus is initially present and is shed during further development of the hydrotheca; the place of the marginal cusps is slightly irregular in certain species. In *Symplectoscyphus* the gonothecae is usually ovoid with spirally arranged frills or grooves and is invariably free. In such species of *Gonaxia* that have free gonothecae these are smooth. The mode of development of coalesced gonothecae directly from and in intimate contact with the secondary tubules is unique in the Sertulariidae.

Besides the type, the following species are allotted to this new genus : *Gonaxia amphorifera* sp. nov.; *G. ampullacea* var. *densa* nov. var.; *G. anonyma* sp. nov.; *G. bulbifera* sp. nov.; *G. compacta* sp. nov.; *G. complexa* sp. nov.; *G. constricta* (Totton, 1930); *G. crassa* sp. nov.; *G. crassicaulis* sp. nov.; *G. crusgalli* sp. nov.; *G. elegans* sp. nov.; *G. errans* sp. nov.; *G. intermedia* sp. nov.; *G. pachyclados* sp. nov.; *G. perplexa* sp. nov.; *G. persimilis* sp. nov.; *G. robusta* sp. nov.; *G. scalariformis* sp. nov.; *G. similis* sp. nov.; *G. sinuosa* sp. nov., and *G. stricta* sp. nov.

Key to the species of *Gonaxia*

1. All hydrothecae (axial, axillary and hydrocladial) with frontally and backwardly directed hollow spine on proximal portion (figs 18e, 20a-b). [Gonothecae of both sexes completely free from secondary tubules, elongated ovoid, usually inserting on frontal aspect of hydrocladial apophyses] ..... ***Gonaxia crusgalli***
— Proximal portion of hydrotheca externally smooth, without frontally directed spine..... 2

2. Perisarc strongly developed, yellowish, forming curved shield behind fused, proximal portion of each hydrotheca (adnate part adcauline hydrothecal wall); these curved shields internally connected by longitudinal perisarcal trabecula, leaving free a central channel. Hydrothecal floor on front and back with triangular perisarcal plate. Perisarcal structure best visible in peripheral (younger) parts of colony. [Presumed male gonothecae completely free from secondary tubules, elongated ovoid, on frontal part of colony, inserting at hydrothecal base or in between on axis] ..... ***Gonaxia crassicaulis***
— No internal perisarcal trabecula present, though development of perisarc may be conspicuous..... 3

3. Hydrotheca completely or almost completely immersed in axis or internode; in incompletely immersed hydrotheca length of free portion of adcauline hydrothecal wall inferior to that of adnate part. Large colonies with thick axis and considerably flattened hydrocladia **4**

— Proximal portion of hydrothecae only immersed in axis or internode or immersion indistinct; free portion of adcauline hydrothecal wall considerably longer than adnate part. Development of axis and hydrocladia varied **5**

4. Hydrocladial hydrothecae, with exception of a few basal hydrothecae, completely immersed. Development of perisarc conspicuous, particularly at the back of axial and hydrocladial hydrothecae, investing that part of hydrotheca as curved, yellowish shield. [Female gonothecae arranged in longitudinal row along frontal aspect of colony, large, sack-shaped, coalesced with secondary tubules for considerable length] .. ***Gonaxia crassa***

— Hydrothecae, with exception of axillary hydrothecae, immersed for one half to two-thirds of total length; adnate part of adcauline hydrothecal wall curved, with thickened perisarc, not expanding on both sides of hydrotheca. [Presumed female gonothecae free from secondary tubules, on frontal aspect of colony, elongated ovoid, inserting on axis by means of broad, circular foot] ..... ***Gonaxia pachyclados***

5. Hydrothecae with considerably swollen, more or less quadrangular proximal portion, distal part of hydrotheca narrowed, tubiform, pointing away from axis or hydrocladium perpendicularly or slightly downwards. Perisarc of adnate part adcauline hydrothecal wall and at hydrothecal floor thick **6**

— Hydrothecae differently shaped; though proximal portion may be strongly swollen it is never quadrangular, distal portion of hydrotheca never resulting from narrowing or contraction **7**

6. Hydrothecae well spaced, floor of hydrotheca above (occasionally at level of) axil formed by hydrocladial or axial wall and free part adcauline wall of preceding hydrotheca (on opposite side). Proximal part hydrotheca swollen but not inflated; development of perisarc moderate. [Presumed female gonothecae inseparable from secondary tubules from which they originate; apertures at end of slight conical elevations arranged in one row on frontal aspect of axis] ..... ***Gonaxia anonyma***

— Hydrothecae closely packed, floor of hydrotheca below axil formed by wall of axis or hydrocladium and free part adcauline hydrothecal wall; proximal portion of hydrotheca inflated, protruding frontally and dorsally and also resulting in broadly rounded proximal part of abcauline hydrothecal wall and ensuing part of hydrocladial or axial wall. [Gonothecae on frontal part of axis as blister-like, sack-shaped bodies, arranged in longitudinal row, partly overlapping each other, covered by some accessory tubules and apparently resulting from primary axis. Abortive female gonothecae observed to develop from apex of hydrothecae of certain (male) colonies] ..... ***Gonaxia compacta***

7. Proximal portion of axial and hydrocladial hydrothecae following general direction of axis or hydrocladium, scarcely swollen; distal portion of hydrothecae suddenly curving outwards, resulting in (rounded) flexure of abcauline hydrothecal wall and 'hunch' in proximal part of free portion adcauline wall; behind 'hunch' there is a deep axillary pocket with rounded bottom. Hydrothecae closely packed. [Gonothecae of both sexes elongated ovoid, free from secondary tubules, on frontal aspect of colony, inserting on hydrocladial apophyses and standing away from axis] ..... ***Gonaxia sinuosa***

— Hydrothecae occasionally slightly curved but never with sharply curved distal portion, from insertion onwards pointing away from axis or hydrocladium. Packing of hydrothecae varied **8**

8. Proximal portion of all hydrothecae swollen or inflated, resulting in convexities on proximal part of abcauline and free part adcauline hydrothecal walls **9**
— Proximal portion of hydrotheca not swollen or inflated, either slightly widened (hydrothecal walls more or less straight and narrowing towards apex) or hydrotheca from insertion onwards cylindrical with nearly parallel walls, straight or slightly curved downwards **11**

9. Mode of swelling of proximal part hydrothecae varied; however, there is always a 'pocket' with rounded bottom at the axil between wall of axis or hydrocladium and free part adcauline hydrothecal wall **10**
— Proximal portion of hydrotheca swollen and inflated; pocket behind free part adcauline hydrothecal wall closed, V-shaped; hydrothecae closely packed, no free part of wall of hydrocladium visible. [Gonothecae as in *G. ampullacea*] ..... ***Gonaxia ampullacea*** var. ***densa***

10. Proximal part hydrothecae swollen though not inflated : enlargement of this part results in bulging (convexity) of the proximal parts of abcauline and of (free part) adcauline wall. Packing of hydrothecae along hydrocladia much varied. [Female gonothecae in close contact with and covered by secondary tubules, large, sack-shaped, on frontal part of axis; apical portion turned away from axis, apertures in two rows. Male gonothecae composed of row of elongated 'blisters' apically strongly narrowed. Abortive gonotheca seen to develop from certain hydrothecae] ..... ***Gonaxia amphorifera***
— Proximal part hydrothecae inflated, resulting in bulging (convexity) of proximal parts ab- and adcauline hydrothecal walls and in bulging frontal and dorsal walls of this proximal part. [Female gonothecae on frontal part of axis, gradually emerging from secondary tubules, distal portion of each gonotheca only slightly elevated, apertures roughly in double rows. Male gonothecae blister-like bodies, scarcely elevated from secondary tubules, apertures in one row. Both types covered by fine accessory tubules] ..... ***Gonaxia ampullacea***

11. Hydrothecae large, c. 0.80-0.85 mm deep, cylindrical. [Presumed female gonothecae on both sides of axis, composed of adnate, elongated bodies springing from secondary tubules; apical portions free and pointing away from axis] ..... ***Gonaxia robusta***
— Hydrothecae smaller, either of uniform diameter or narrowing from widened base onwards **12**

12. Hydrothecae without widened base, cylindrical or slightly curved and of equal diameter throughout **13**
— Hydrothecae with widened base and narrowing towards aperture **14**

13. Hydrothecae widely spaced, directed away from slightly geniculate axis or hydrocladium almost rectangularly; free portion adcauline hydrothecal wall with characteristic elevation ('shoulder') at axil with wall of hydrocladium and with constriction distally of that point. [Gonothecae unknown] ..... ***Gonaxia constricta***
— Hydrothecae less widely spaced, cylindrical to slightly downward curved. Upper parts hydrocladia with distinct internodal septa. [Gonothecae imperfectly known, those observed cylindrical, standing away from axis and attached by means of broad base to hydrocladial apophysis, leaving large cicatrise when shed] ..... ***Gonaxia complexa***

14. Hydrothecae long and thin, total depth 4 to 5 times maximal diameter **15**
— Hydrothecae less slender, total depth 2 to 3 times maximal diameter **19**

15. Total depth of (hydrocladial) hydrothecae 600-750 µm **16**
— Total depth of (hydrocladial) hydrothecae 400-500 µm. Proximal portion of hydrotheca narrowing, apical portion cylindrical. [Presumed male gonothecae elongated sack-shaped,

fused with axis or secondary tubule over greater part of length, apically with tapering funnel with small aperture. Presumed female gonothecae standing away from axis but attached by means of broad base, elongated ovoid with wide aperture] ..... ***Gonaxia bulbifera***

16. Gracefully built colony with widely spaced, slender hydrothecae, either completely cylindrical or widening from slightly enlarged basal portion onwards; axis and (or) hydrocladium occasionally geniculate **17**

— Colony fairly robust; hydrothecae, though of same depth, wider, proximal portion enlarged, distal two-thirds of hydrotheca fairly suddenly narrowed, strictly cylindrical. [Presumed male gonothecae produced by secondary tubules on both sides of axis, sack-shaped; distal portion narrowing into small aperture, turned away from axis; borders between individual gonothecae indistinct] ..... ***Gonaxia perplexa***

17. [Gonothecae on frontal aspect of colony, large, elongated ovoid, attached by means of disk to hydrocladial apophysis, completely free from accessory tubules; males with large, females with small circular apical aperture] ..... ***Gonaxia scalariformis***

— [Gonothecae on frontal aspect of colony, the female gonothecae elongated ovoid and separate, the male gonothecae with a tendency for fusion at their basal portion and thus forming a complex from which a number of elongate, ovoid bodies with a small apical aperture, emerge]. Hydrothecae generally slightly smaller than those of *G. scalariformis*; hydrocladia with a number of internodal septa **18**

18. Hydrothecal diameter at rim 150-210 µm; hydrothecae inserting on distinct apophysis of axis or hydrocladium, rather more tapering towards apex than being contracted and cylindrical; hydrocladial internodes with regular, oblique septa ..... ***Gonaxia persimilis***

— Hydrothecal diameter at rim 130-160 µm; hydrothecae narrowed beyond slightly widened base and cylindrical onward, axis or hydrocladium not forming a distinct apophysis. Hydrocladial septa only occasionally present ..... ***Gonaxia similis***

19. Proximal portion of hydrotheca enlarged, distal portion consequently narrowing towards rim **20**

— Proximal portion of hydrotheca scarcely widened, distal part of hydrotheca contracted, cylindrical **21**

20. Proximal portion of hydrotheca with distinct widening : proximal free part adcauline hydrothecal wall convex, abcauline wall initially slightly bulging, then smoothly curving outwards. [Female gonothecae almost completely coalesced, on frontal part of axis, only small part of apical zone free, alternately turned left and right. Male gonothecae as in *G. ampullacea*. Gonothecae of both sexes heavily invested by a fine matting of accessory tubules] ..... ***Gonaxia intermedia***

— Proximal portion of hydrotheca scarcely widened though of greater diameter than distal part; free part adcauline hydrothecal wall straight or with minor proximal swelling, abcauline wall with fairly abrupt curve halfway its length. [Female gonothecae springing from single large accessory tube on front of axis, tube-shaped, basally coalesced with tube and neighbouring gonothecae; apical part narrowing, with wide circular aperture, curved away from axis] ..... ***Gonaxia elegans***

21. Hydrothecae small, 350-500 µm deep, usually (at least axial and axillary hydrothecae) curved; basal portion more or less parallel to axial and hydrocladial length axis and distal part curving away at angle of c. 45 degrees. Hydrocladia set off from apophyses by means of constriction and twist, thin, not geniculate, only occasionally with nodes. [Gonothecae unknown] ..... ***Gonaxia errans***

— Hydrothecae fairly large, 635-715 µm deep, straight and tubular, pointing away from axis or internode at angle of c. 60 degrees. Hydrocladia set off from axial apophyses by minor perisarcal constriction, thick, with well developed perisarc, slightly geniculate between insertion of fairly closely packed hydrocladial hydrothecae, that are separated by a ring of differently stained hydrocladial perisarc (particularly visible in stained slides). [Gonothecae unknown] ..... ***Gonaxia stricta***

Gonaxia amphorifera sp. nov.

Figs 3f, 4a-c, 5a-d, 6a-b, 8a

MATERIAL EXAMINED. — **New Caledonia**. LAGON : stn 500, 19°04.3'S-163°30.5'E, 225 m, 04.03.1985 : c. 60 mm high stem; no gonothecae, mixed with *Diphasia* spp., partly attached to stem (MNHN-Hy. 1009). Slide no. 868 (RMNH-Coel. 25769). — Stn DW 1148, 19°06.5'S-163°30.1'E, 220 m, 28.10.1989 : three colonies 80-110 mm high, with male gonothecae along stems; 2 slides no. 1031 (all MNHN-Hy. 1013). — Stn DW 1149, 19°04.5'S-163°29.5'E, 235 m, 28.10.1989 : forked colony c. 50x50 mm and 2 incomplete stems; male gonothecae present along stem; slide no. 1032 (all BMNH 1989.11.24.12).

MUSORSTOM 4 : stn CP 153, 19°04.20'S-163°21.20'E (type locality), 235 m, 14.09.1985 : c. 25 colonies, 60-80 mm high, some forked, some with gonothecae. Many loose hydrocladia. One 45 mm high stem with gonothecae is the holotype (MNHN-Hy. 1010), the remaining specimens, including those on slides, are paratypes (3 MNHN-Hy. 1010; 3 BMNH 1989.11.24.9, rest RMNH-Coel. 25770). Slides nos 856 (3; 1 MNHN-Hy. 1010; 2 RMNH-Coel. 25770), 1016 (4; 1 BMNH 1989.11.24.9; 3 RMNH-Coel. 25770) and 1017 (MNHN-Hy. 1010). — Stn CP 155, 18°52.80'S-163°19.50'E, 500-570 m, 15.09.1985 : stem 35 mm high and some detached hydrocladia; no gonothecae (MNHN Hy 1011). Slide no. 885 (RMNH-Coel. 25771). — Stn DW 156, 18°54.00'S-163°18.80'E, 530 m, 15.09.1985: two stem fragments, 15 and 25 mm high, the larger with gonothecae on stem (BMNH 1989.11.24.10). Slide no. 873 of smaller fragment (RMNH-Coel. 25772). — Stn CP 158, 18°49.30'S-163°15.00'E, 630 m, 15.09.1985: c. 50 mm high stem without gonothecae; slide no. 880 of hydrocladium (all RMNH-Coel. 25773). — Stn DW 162, 18°35.00'S-163°10.30'E, 525 m, 16.09.1985 : four stem fragments, smallest (10 mm high) with male gonothecae (MNHN-Hy. 1012). Slide no. 1020 (RMNH-Coel. 25774). — Stn CP 190, 19°06.30'S-163°29.50'E, 215 m, 19.09.1985 : five fragments 15-40 mm high and some hydrocladia; may well all be part of same colony, 3 slides no. 859 (colonies and 1 slide RMNH-Coel. 25775; 2 slides BMNH 1989.11.24.11). — Stn CP 193, 18°56.30'S-163°23.20'E, 415 m, 19.09.1985 : one colony 40 mm high, gonothecae on front of stem, coalesced; slide no. 886 (all RMNH-Coel. 25776).

SMIB 6 : stn DW 111, 19°03.9'S-163°29.7'E, 240-245 m, 02.03.1990 : two colonies 60-80 mm high and 2 smaller colonies, no gonothecae; 2 slides no. 1631 (all RMNH-Coel. 25777).

DESCRIPTION (largely based on specimens from MUSORSTOM 4, Stn CP 153). — Species resembling *Gonaxia ampullacea* in colony structure : axis strong, upright, monosiphonic in upper region (fig. 4a), basally strongly polysiphonic by development of many secondary tubules running parallel to main axis; axis occasionally forked, flattened basally and probably attached to solid substrate (rock, corals, etc.). Hydrocladia initially alternately arranged along axis, leaving axis at almost right angle, slightly curved, with 15-20 pairs of hydrothecae, placed on distinct apophyses; between two successive apophyses with 3 hydrothecae, one of which is axillary (fig. 4a). Particularly in lower regions of axis hydrocladia are shed, so that regular arrangement is interrupted and hydrocladia are separated by greater number of hydrothecae. No internodes visible on axis or hydrocladia, though perisarcal constrictions do occur from time to time. There is invariably one at base of hydrocladium, where it is slightly twisted (fig. 5c).

All hydrothecae alternately arranged in one plane with axis and hydrocladia, diverging from axis or hydrocladium; apical portion making angle of 60 to 90 degrees with length axis of stem or hydrocladium. Hydrothecae of three types : axial, axillary and hydrocladial. Axial and hydrocladial hydrothecae of similar shape, distinctly swollen proximally (though never so strongly as in *G. ampullacea*) and with tubular distal portion (fig. 3f), those of axis slightly smaller, 'axil' between free part adcauline wall and wall of hydrocladium (in hydrocladial hydrothecae) generally much deeper than that between corresponding part hydrothecal wall and wall of axis in axial hydrothecae (fig. 5b). Free part adcauline wall 1.5 to 2 times as long as adnate part, this part with

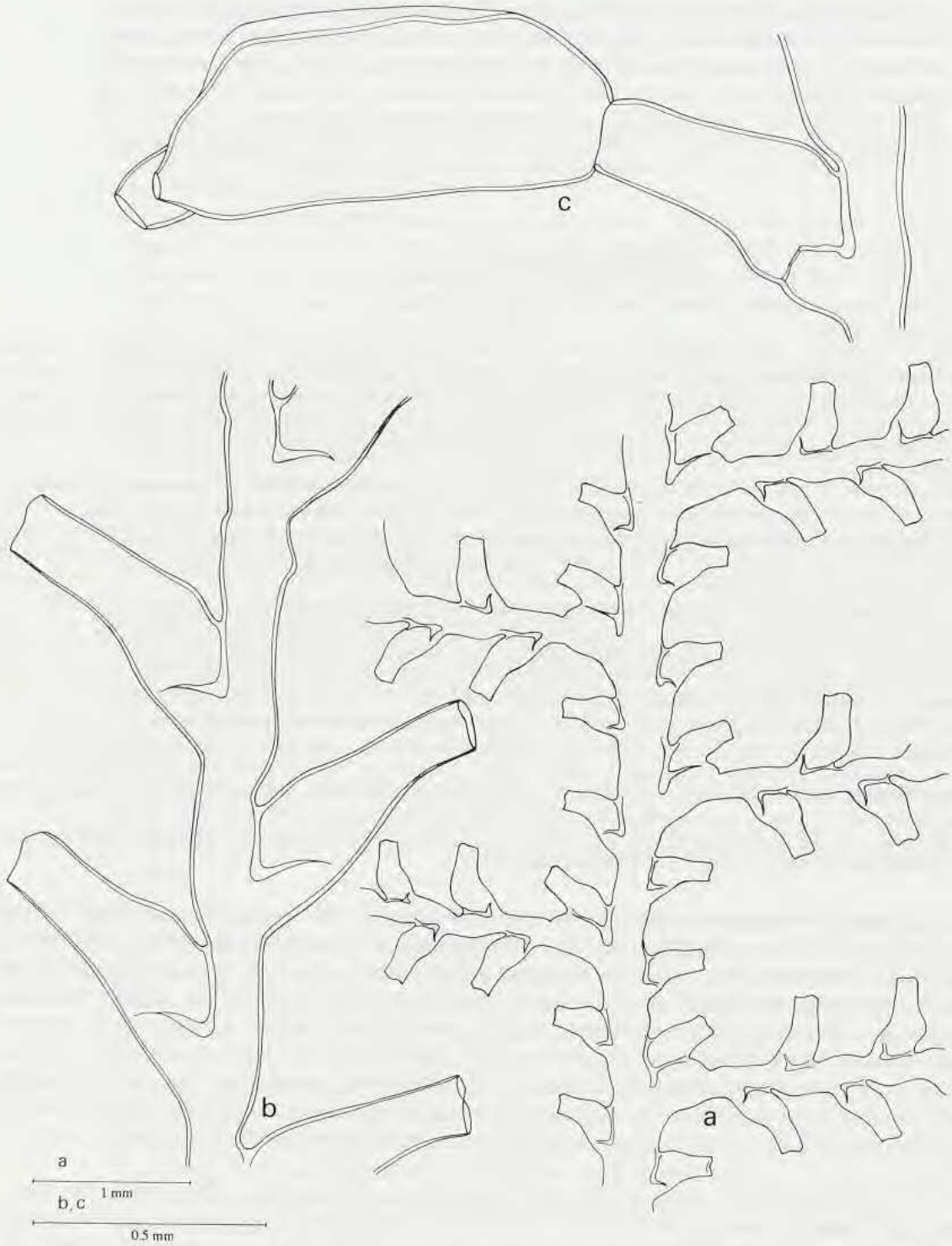

FIG. 4. — *Gonaxia amphorifera* sp. nov. : **a**, paratype, MUSORSTOM 4, Stn CP 153, distal part of colony. — **b**, MUSORSTOM 4, Stn CP 158, part of hydrocladium. — **c**, MUSORSTOM 4, Stn CP 156, abortive gonotheca developing from hydrotheca.

a, slide no. 1016; b, slide no. 880; c, slide no. 873.

thickened knob and rectangular flexure at hydrothecal floor (fig. 6a). Free part adcauline wall convex proximally, straight distally, parallel (or almost so) with distal part abcauline wall. Abcauline wall halfway its length either with slight flexure (fig. 6a) or shallow curve (fig. 5b), leading to convex proximal part of abcauline hydrothecal wall. Axillary hydrothecae with almost tubular free portion (occasionally proximal part adcauline wall slightly convex), in axil of large apophysis with weakly indicated foramen; at flexure of adnate part adcauline wall with considerably lengthened perisarcal peg (figs 5d, 6b). Hydrothecal rim initially with three fairly sharp cusps, one abcauline and two laterals near adcauline side of hydrotheca, closing apparatus composed of three triangular plates attached in shallow embayments between marginal cusps and when closed forming low roof. This arrangement only visible in youngest (highest) parts of complete colonies and in some axillary hydrothecae (fig. 5d); closing apparatus apparently largely deciduous, not visible in majority of hydrothecae, where marginal cusps are weathered down to broadly rounded, shallow prominences, many hydrothecae having almost circular aperture.

Hydranths present in majority of hydrothecae, small, attached to flexed portion of hydrothecal bottom, with rounded proboscis and 12 tentacles.

Gonothecae borne on one side (front) of axis, originating from secondary tubules. There are two types, probably representing female and male sexes, found on separate colonies. Female gonothecae closely packed, large, sack-shaped, narrowing towards apex and there with circular opening apparently without lid; apical portions turned away from axis, apertures in two rows; body of gonothecae covered by some secondary tubules (fig. 5a). Gonothecal aperture at end of short, broad tube, circular, fairly wide. These gonothecae contain two or three developing eggs or embryos. 'Male' gonothecae in one row composed of small number (5 to 8) of lengthened, sack-shaped bodies, apically strongly narrowed and there with small opening (fig. 5b). Body of gonothecae covered by many accessory tubules. These presumed male gonothecae are all empty.

The specimen from MUSORSTOM 4, Stn CP 158, differs from the remaining specimens in the following details :

1. — Hydrocladium thin, slightly geniculate, hydrothecae more widely separated, occasionally traces of internodal separations (incomplete septa and constrictions of perisarc) visible (fig. 8a).

2. — Hydrothecae long and slender (figs 4b, 8a), proximally with distinct though moderate swelling, distally tubiform, directed upwards and laterally, length axis making angle of c. 45 degrees with axis of hydrocladium. There is a rounded embayment between wall of hydrocladium and free part adcauline hydrothecal wall; this part of adcauline wall 2.5 to 3 times the length of fused portion, proximally convex, distally almost straight. Abcauline wall with indistinct flexure at about one-third its length from orifice; distal portion straight, proximal portion straight to slightly convex. Hydrothecal orifice usually with three distinct, obtuse cusps, one adcauline and two laterals near abcauline border. Many hydrothecae show signs of repair.

DISTRIBUTION. — The present records are all from a restricted area in the Pacific (northern lagoon of New Caledonia, near Grand Passage). The depth records are between 215 and 570 m.

REMARKS. — The 25 mm high stem from MUSORSTOM 4, Stn CP 156, is remarkable because of the presence of female gonothecae on both sides of the stem. On the front of the colony there are 12 gonothecae arranged in one row with the apertures alternately turned left and right; the basal gonotheca is smaller and has two openings at the end of diverging funnels. On the backside there are two gonothecae. All gonothecae are considerably elevated from the accessory tubules from which they originate. The 15 mm long stem fragment on slide 873 has one (small) gonotheca with two apertures developing from one of the hydrothecae (fig. 4c).

The shape of the hydrothecae varies in development of the swollen proximal portion, the length of the tubiform distal portion and the direction of that portion. Moreover, there is variability in the distance over which the hydrothecae are separated. In the specimens from MUSORSTOM 4, Stn CP 158, discussed above the hydrothecae are fairly slender, the swelling of the proximal part is moderate, the length of the distal portion is considerable in comparison with the remaining material and the axis of the hydrotheca makes an angle of c. 45 degrees with the hydrocladial length axis, consequently the hydrothecae point obliquely upwards and laterally. The hydrothecae are fairly widely spaced so that a large portion of the axis remains visible. In the specimen from MUSORSTOM 4, Stn CP 193, the shape and direction of the hydrothecae is almost identical but the hydrothecae are more densely packed, leaving a much smaller portion of the axis visible.

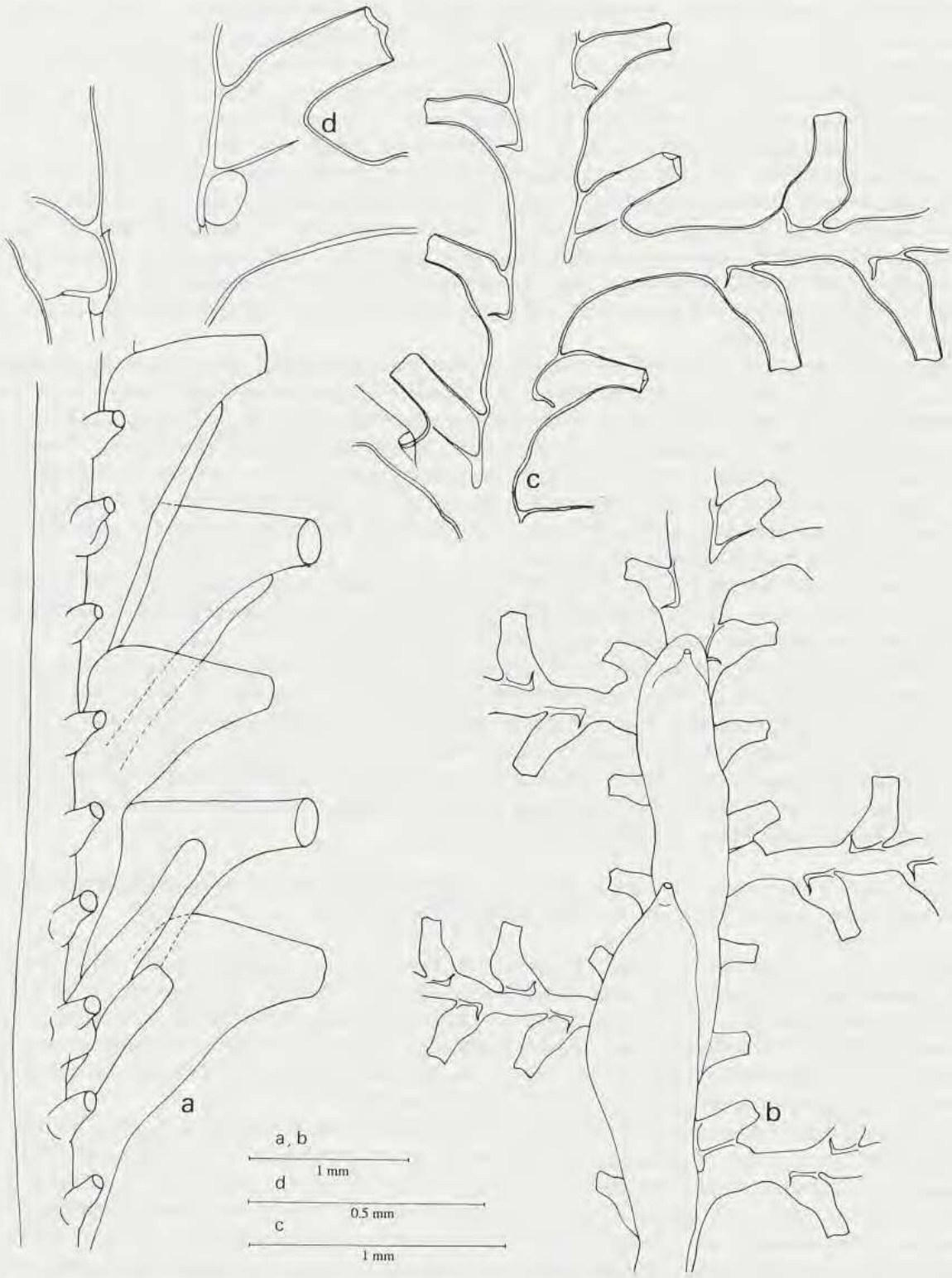

FIG. 5. — *Gonaxia amphorifera* sp. nov., paratypes, MUSORSTOM 4, Stn CP 153 : **a**, female gonothecae, lateral view, semi-diagrammatic; **b**, male gonothecae, frontal view; **c**, origin of hydrocladium on axis; **d**, axillary hydrotheca.
a, slide no. 1016; b, slide no. 856; c, d, slide no. 1017.

ETYMOLOGY. — From the latin noun *amphora* (pitcher, flask, bottle) and the greek verb *phero* (to bear), referring to the shape of the hydrothecae.

TABLE 4. — Measurements of *Gonaxia amphorifera* sp. nov. in µm.

	MUSORSTOM 4 Stn SP 153 (slides no. 856, 1016 and 1017)	MUSORSTOM 4 Stn CP 158 (slide no. 880)
Stem, diameter at base	1,500 - 3,000	
Stem hydrotheca, length abcauline wall	260 - 290	
length free part adcauline wall	280 - 290	
length adnate part adcauline wall	190 - 205	
total depth	385 - 405	
maximal diameter	200 - 215	
diameter at rim	95 - 110	
Axillary hydrotheca, length abcauline wall	200 - 215	
length free part adcauline wall	295 - 320	
length adnate part adcauline wall	250 - 260	
total depth	435 - 450	
maximal diameter	150 - 175	
diameter at rim	95 - 110	
Hydrocladium, diameter at base	160 - 185	160 - 165
Hydrocladial hydrotheca, length abcauline wall	310 - 350	340 - 405
length free part adcauline wall	360 - 375	405 - 435
length adnate part adcauline wall	150 - 185	150 - 175
total depth	430 - 445	520 - 540
maximal diameter	190 - 230	185 - 220
diameter at rim	110 - 125	135 - 140
Female gonotheca, approximate length	2,175 - 2,385	
approximate diameter	865 - 975	
diameter aperture	260 - 370	
'Male' gonotheca, approximate length	1,625 - 1,955	
approximate diameter	590 - 665	
diameter aperture	60 - 75	

Gonaxia ampullacea sp. nov.

Figs 6c, 7a-c, 9a-c

MATERIAL EXAMINED. — **New Caledonia.** LAGON : stn 444, 18°15.3'S-162°58.8'E, 300-350 m, 28.02.1985 : c. 20 colonies up to 50 mm high, with *Diphasia* sp. and *Synthecium* sp. growing on axis. Some colonies strongly forked, some with male or female gonothecae; 2 slides no. 857 (5 colonies MNHN-Hy. 1014; 5 colonies BMNH 1989.11.24.17; remaining colonies and slides RMNH-Coel. 25778). — Stn 475, 18°35.7'S-163°11.2'E, 415-460 m, 02.03.1985 : single 60 mm high colony; no gonothecae. Slide no. 865 of hydrocladium; no. 1014 of top part (all MNHN-Hy. 1015).

MUSORSTOM 4 : stn DW 156, 18°54.00'S-163°18.80'E, 530 m, 15.09.1985 : ten mm long stem with male gonothecae and 3 stem fragments, 35-55 mm; without gonothecae; slide no. 1038 of hydrocladium (all RMNH-Coel. 25779). — Stn CP 158, 18°49.30'S-163°15.00'E, 630 m, 15.09.1985 : c. 40 mm high stem with female gonothecae, in two parts on slide no. 353A; slide no. 879 of hydrocladium (all RMNH-Coel. 25780). Also 35 mm high stem fragment with some hydrocladia; slide no. 1015 of hydrocladium (all BMNH 1989.11.29.13). — Stn DW 163, 18°33.80'S-163°11.50'E, 350 m, 16.09.1985 (type locality) : five colonies 40-75 mm high, 1 forked, and many fragments; male and female gonothecae present. A 70 mm high colony is holotype (MNHN-Hy. 1016; slide no. 1040, schizoholotype, RMNH-Coel. 25781), rest of material paratypes, including slide no. 1039 (RMNH-Coel. no. 25781). One paratype MNHN-Hy. 1016; 1 BMNH 1989.11.24.14; remaining paratypes and fragments RMNH Coel. 25781). In addition schizoparatype slide no. 400 of hydrocladium (MNHN-Hy. 1016). — Stn CC 201, 18°55.80'S-163°13.80'E, 500 m, 20.09.1985 : single 8 mm long hydrocladium made up in slide no. 374 (RMNH-Coel. 25782).

DESCRIPTION (mainly based on material from MUSORSTOM 4, Stn DW 163). — Colony composed of main axis and pinnately arranged hydrocladia, alternately pointing left and right and leaving axis almost perpendicularly. Distal part of axis monosiphonic, proximal portion polysiphonic by presence of fairly thick accessory tubules, running upwards parallel to axis. Axis and hydrocladia with two rows of alternately arranged hydrothecae, all in one plane with main axis and hydrocladia. Hydrocladia placed on conspicuous apophyses, between two consecutive apophyses (one right, one left) there are three axial hydrothecae, one axillary, one on opposite side and one on same side as apophysis and almost opposite next apophysis (fig. 7a). This arrangement is occasionally interrupted by presence of larger number of hydrothecae between consecutive apophyses. No division into internodes visible on axis or hydrocladium, though hydrocladium is set off from apophysis by distinct perisarcal constriction and occasionally a slight twist (fig. 7c). Number of hydrothecal pairs along hydrocladium varies between 9 and 13.

Hydrothecae of axis, axil of apophysis and hydrocladium slightly different in shape and size. Hydrocladial hydrotheca more or less flask-shaped, with inflated proximal portion and narrowed, almost tubular distal part, pointing away from hydrocladium at angle of c. 45 degrees. Mode of inflation varied, both in same colonies as well as between colonies from various stations, but inflation always apparent, particularly by presence of fairly deep depression or cleft between wall of hydrocladium and proximal part of free adcauline hydrothecal wall (figs 6c, 7b, 9a, c). Mode of inflation also influences shape of free portion adcauline hydrothecal wall, which may show slight to very pronounced bulge. Adnate portion adcauline wall straight, with distinct peg at hydrothecal base; bottom plate with large circular hole to permit passage of coenosarc; edges of hole thickened and visible on proximal part hydrothecal wall (fig. 9a). Abcauline hydrothecal wall with broadly rounded proximal swelling to nearly flat (figs. 6c, 9a). Hydrothecal orifice circular, with three rounded, indistinct cusps : one abcauline and two laterals on adcauline side. None of hydrothecae inspected with opercular apparatus, which appears to be deciduous. Axial hydrothecae almost as those on hydrocladia, but cleft between axial wall and proximal part adcauline hydrothecal wall less deep, usually present as rounded embayment. Axillary hydrotheca tubular, free part adcauline wall almost straight, as is also abcauline wall; peg at hydrothecal floor considerable, pointing downwards (fig. 7c). Apophysis near peg at hydrothecal floor with oval thin spot (fenestra) (fig. 7a). There are no renovations of the hydrothecal border as observed in *Sertularella* or *Symplectoscyphus*, but many hydrothecae show evidence of having been repaired after being damaged.

Hydranths have been observed in the type material, being attached to solid part of hydrothecal bottom; hydranths rather small compared to internal volume of hydrotheca.

Gonothecae occur on frontal part of colony and are produced by secondary tubules that obscure almost completely underlying axis and hydrothecae. Female gonothecae shaped as elongated bodies emerging from secondary tubules, apical portion well defined, gradually narrowing, with circular opening, elevated some distance from tubules, apertures placed more or less distinctly in two rows. Proximal portion of gonotheca gradually merging with tubule (fig. 9b). In specimens inspected there usually are several gonothecae in longitudinal sequence showing distinct tendency to merge. Male gonothecae also on frontal aspect of axis, shaped as shallow, oval blister-like bodies with a small aperture in distal portion, occasionally placed on small elevation and arranged in one irregular row, comparable to those of *Gonaxia amphorifera*. Gonothecae of both sexes but particularly the male gonothecae covered by fine accessory tubules. All gonothecae appear to be empty.

Perisarc strong, fairly thick along walls of axis and hydrocladia, but thickness rather varied in various lots.

DISTRIBUTION. — All specimens originate from a restricted area of the Pacific around the extreme northern reefs of New Caledonia, near Grand Passage, occurring at depths between 300 and 625 m.

REMARKS. — This species is principally characterized by the shape of the hydrothecae, that are distinctly inflated. Though the degree of inflation is varied, it is always there. There is a deep cleft between the proximal portion of the adcauline hydrothecal wall and the wall of the hydrocladium, the length of the fused part of the adcauline hydrothecal wall being reduced. Furthermore the shape of the female gonothecae is distinctive.

ETYMOLOGY. — The specific name *ampullacea* is a reference to the shape of the hydrotheca and has been derived from the latin *ampullaceus*, flask-like.

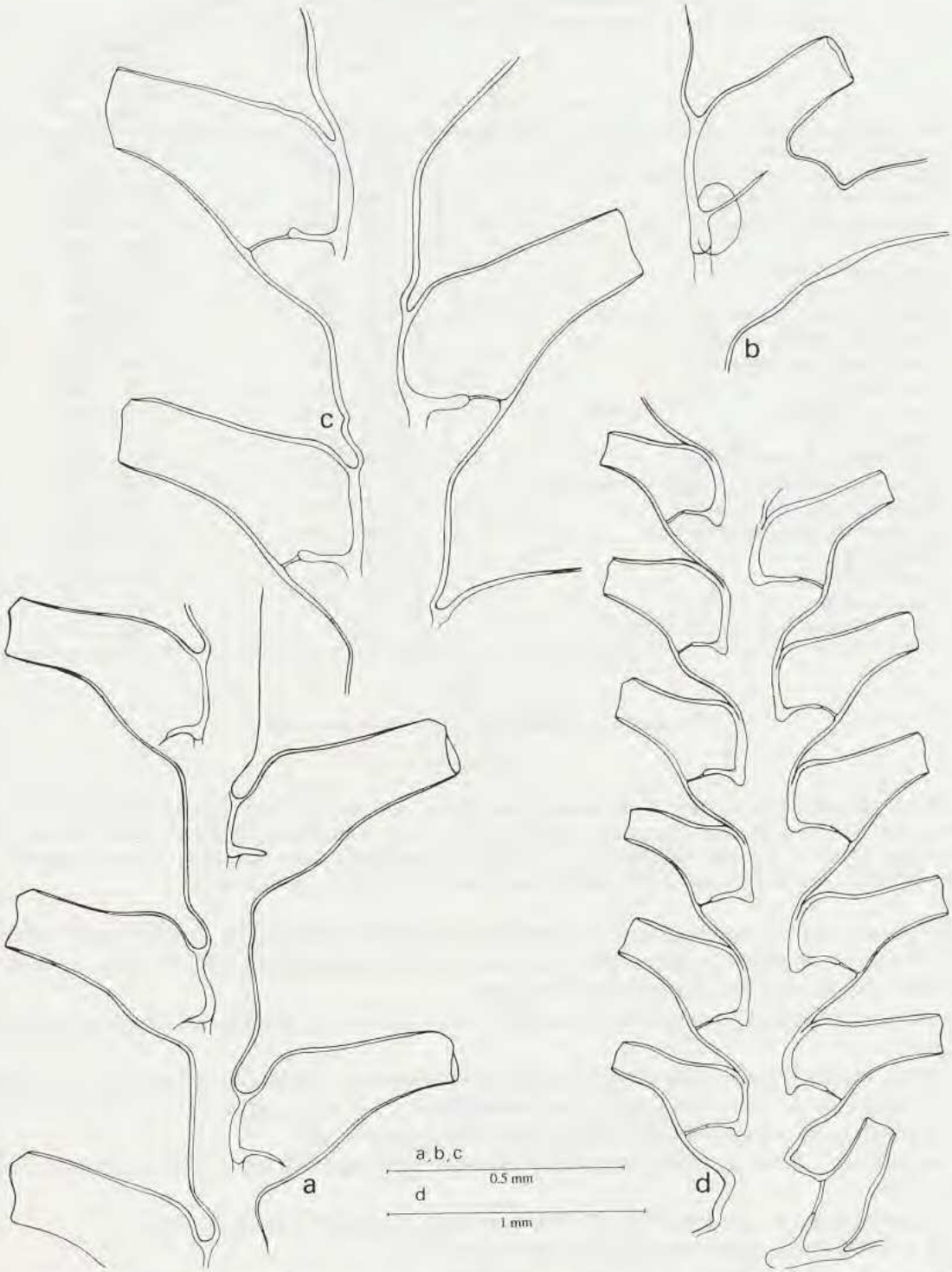

FIG. 6 a-b. — *Gonaxia amphorifera* sp. nov., paratype, MUSORSTOM 4, Stn CP 153 : **a**, part of hydrocladium; **b**, axillary hydrotheca.

FIG. 6 c. — *Gonaxia ampullacea* sp. nov., MUSORSTOM 4, Stn CP 158, part of hydrocladium.

FIG. 6 d. — *Gonaxia ampullacea* var. *densa* var. nov., MUSORSTOM 4, Stn DW 162, part of hydrocladium with axillary hydrotheca.

a, b, slide no. 1016; c, slide no. 353; d, slide no. 877.

TABLE 5. — Measurements of *Gonaxia ampullacea* sp. nov. in µm.

	LAGON Stn 475 (slide no. 1014)	MUSORSTOM 4 Stn CP 163 (slide no. 1039) paratype
Stem, diameter at base	1,000 - 1,500	900 - 1,400
Stem hydrotheca, length abcauline wall	305 - 390	310 - 320
length free part adcauline wall	340 - 420	325 - 400
length adnate part adcauline wall	230 - 245	235 - 280
total depth	475 - 530	450 - 465
maximal diameter	265 - 275	200 - 210
diameter at rim	105 - 120	105 - 110
Axial hydrotheca, length abcauline wall	200 - 295	295 - 340
length free part adcauline wall	335 - 450	310 - 355
length fused part adcauline wall	270 - 280	260 - 275
total depth	445 - 555	525 - 545
maximal diameter	170 - 230	155 - 170
diameter at rim	105 - 140	105 - 110
Hydrocladium, diameter at base	185 - 220	250 - 280
Hydrocladial hydrotheca, length abcauline wall	375 - 385	370 - 405
length free part adcauline wall	475 - 505	445 - 520
length adnate part adcauline wall	105 - 110	110 - 125
total depth	505 - 520	525 - 545
maximal diameter	325 - 340	250 - 275
diameter at rim	120 - 150	135 - 140
Pairs of hydrothecae per hydrocladium	8 - 11	14 - 16

Gonaxia ampullacea var. *densa* nov. var.

Figs 6d, 8b

MATERIAL EXAMINED. — **New Caledonia.** MUSORSTOM 4 : stn DW 162, 18°35.00'S-163°10.30'E, 525 m, 16.09.1985 (type locality) : six stem fragments 8-25 mm high, all with gonothecae. Slide no. 1021 of 25 mm high stem with male gonothecae is holotype (MNHN-Hy. 1017, also 1 paratype). Slide no. 877 of stem fragment without gonothecae (RMNH-Coel. 25783, also 2 paratypes). One paratype in BMNH 1989.11.24.15.

DESCRIPTION. — Though packing and swelling of the hydrothecae in *Gonaxia ampullacea* is varied, it is so extreme in the above mentioned material that it has been considered advisable to record it as a separate variety, differing from the typical form by the following characters :

1. Hydrothecae strongly inflated basally, particularly noticeable along the basal part of the adcauline hydrothecal wall (fig. 6d).

2. Hydrothecae closely packed; the axil between proximal adcauline hydrothecal wall and wall of hydrocladium being completely closed, both walls touching for some distance; no hydrocladial wall visible along nearly the whole of its length (with exception of the extreme base and top) (figs 6d, 8b).

3. Perisarc strongly developed along axis and hydrocladia, particularly visible in adnate portions of adcauline hydrothecal wall.

4. Hydrocladia thicker in var. *densa* than observed in colonies recorded as *Gonaxia ampullacea*.

There is no difference in shape or development of the gonothecae.

DISTRIBUTION. — This variety has been observed at one locality in the Pacific off the northernmost reefs of New Caledonia, near Grand Passage, at a depth of 525 m.

ETYMOLOGY. — The name *densa* meaning closely packed, has been coined because of the close arrangement of the hydrothecae and is taken from the latin word *densus* meaning dense or close.

FIG. 7 a-c. — *Gonaxia ampullacea* sp. nov. : **a-b**, LAGON, Stn 475 : **a**, distal part of colony; **b**, part of hydrocladium. — **c**, MUSORSTOM 4, Stn CP 158, basal part of hydrocladium with axillary hydrotheca.
FIG. 7 d. — *Gonaxia anonyma* sp. nov., MUSORSTOM 4, Stn CP 158, part of hydrocladium.
a, slide no. 1014; b, slide no. 865; c, slide no. 353A; d, slide no. 353B.

FIG. 8 a. — *Gonaxia amphorifera* sp. nov., MUSORSTOM 4, Stn CP 158, part of hydrocladium.
FIG. 8 b. — *Gonaxia ampullacea* var. *densa* nov. var., MUSORSTOM 4, Stn DW 162, distal part of colony.
FIG. 8 c. — *Gonaxia compacta* sp. nov., MUSORSTOM 4, Stn CP 194, abortive gonothecae developing from hydrothecae. a, slide no. 880; b, slide no. 877; c, slide no. 1027.

FIG. 9. — *Gonaxia ampullacea* sp. nov. : **a**, schizoholotype, MUSORSTOM 4, Stn DW 163, part of hydrocladium. — **b**, MUSORSTOM 4, Stn CP 158, female gonothecae, frontal view. — **c**, LAGON, Stn 475, part of hydrocladium.
a, slide no. 1040; b, slide no. 353A; c, slide no. 865.

TABLE 6. — Measurements of *Gonaxia ampullacea* var. *densa* nov. var., in µm.

	MUSORSTOM 4 Stn CP 162 (slide no. 877)
Stem, diameter at base	
Axial hydrotheca, length abcauline wall	275 - 305
length free part adcauline wall	370 - 385
length adnate part adcauline wall	290 - 295
total depth	480 - 495
maximal diameter	250 - 265
diameter at rim	105 - 125
Axillary hydrotheca, length abcauline wall	275 - 295
length free part adcauline wall	490 - 495
length adnate part adcauline wall	310 - 325
total depth	570 - 580
maximal diameter	265 - 275
diameter at rim	110 - 125
Hydrocladium, diameter at base	230 - 240
Hydrocladial hydrotheca, length abcauline wall	370 - 380
length free part adcauline wall	445 - 530
length adnate part adcauline wall	35 - 150
total depth	540 - 575
maximal diameter	280 - 335
diameter at rim	135 - 150

Gonaxia anonyma sp. nov.

Figs 7d, 10a-c, 11a-b, 12a

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4 : stn CP 158, 18°49.30'S-163°15.00'E, 630 m, 15.09.1985 : c. 15 mm high colony, in 2 parts in slide no. 353B; no gonothecae (RMNH-Coel. 25784).

Chesterfield Islands. CHALCAL 1 : stn DC 30, 19°31.10'S-158°30.60'E, 150-180 m, 19.07.1984 (type locality) : fragments of at least 3 specimens, the largest c. 90 mm, with female gonothecae on stem; slides nos 854 (3) and 1030. Holotype is a 75 mm long specimen with female gonothecae (in 2 parts; MNHN-Hy. 1018); the remaining specimens, including the slides, are paratypes (MNHN-Hy. 1018, slide no. 854 of paratype; BMNH 1989.11.24.16, slide no. 854 of paratype; RMNH-Coel. 25785, 1 colony and slides nos 854 & 1030).

DESCRIPTION. — Species greatly resembling *Gonaxia ampullacea*, so much so that it suffices to indicate the differences :

1. General structure of colonies identical, but diameter of axis and hydrocladia larger in *G. anonyma* (fig. 11a).

2. Hydrothecae proximally enlarged, though not inflated as in *G. ampullacea*; proximal portion more or less quadrangular (figs 10a, 11b), distal portion cylindrical, pointing away from axis or hydrocladium at almost right angle. Free part of adcauline wall of hydrotheca slightly concave to almost straight; abcauline wall with characteristic flexure at about half its length. As in *G. ampullacea* there are no complete renovations of the hydrothecal margin (as in *Sertularella* and *Symplectoscyphus*) but many hydrothecae show signs of repair after sustaining damage. Hydrothecae regularly and evenly spaced, base of hydrocladial hydrotheca at level of axil between adcauline hydrothecal wall and wall hydrocladium of preceding hydrotheca (on opposite side; figs 7d, 10c).

3. Female gonothecae in one series along axis, with strong tendency to fuse and not sharply separated from accessory tubules from which they originate; gonothecal mass shaped like a tube with irregularly undulated walls, from which arise at regular intervals conical projections with a circular apical aperture without lid (fig. 12a). Conical projections arranged in one row. All gonothecae inspected appear to be empty; they are considered female because of their similarity to undubitable female gonothecae of *G. ampullacea* or *G. amphorifera*.

No hydranths have been observed in this material.

DISTRIBUTION. — The type locality is on the Chesterfield-Bellona platform (Coral Sea) close to the Chesterfield Islands; additional material originates from the northwest of New Caledonia (Grand Passage).

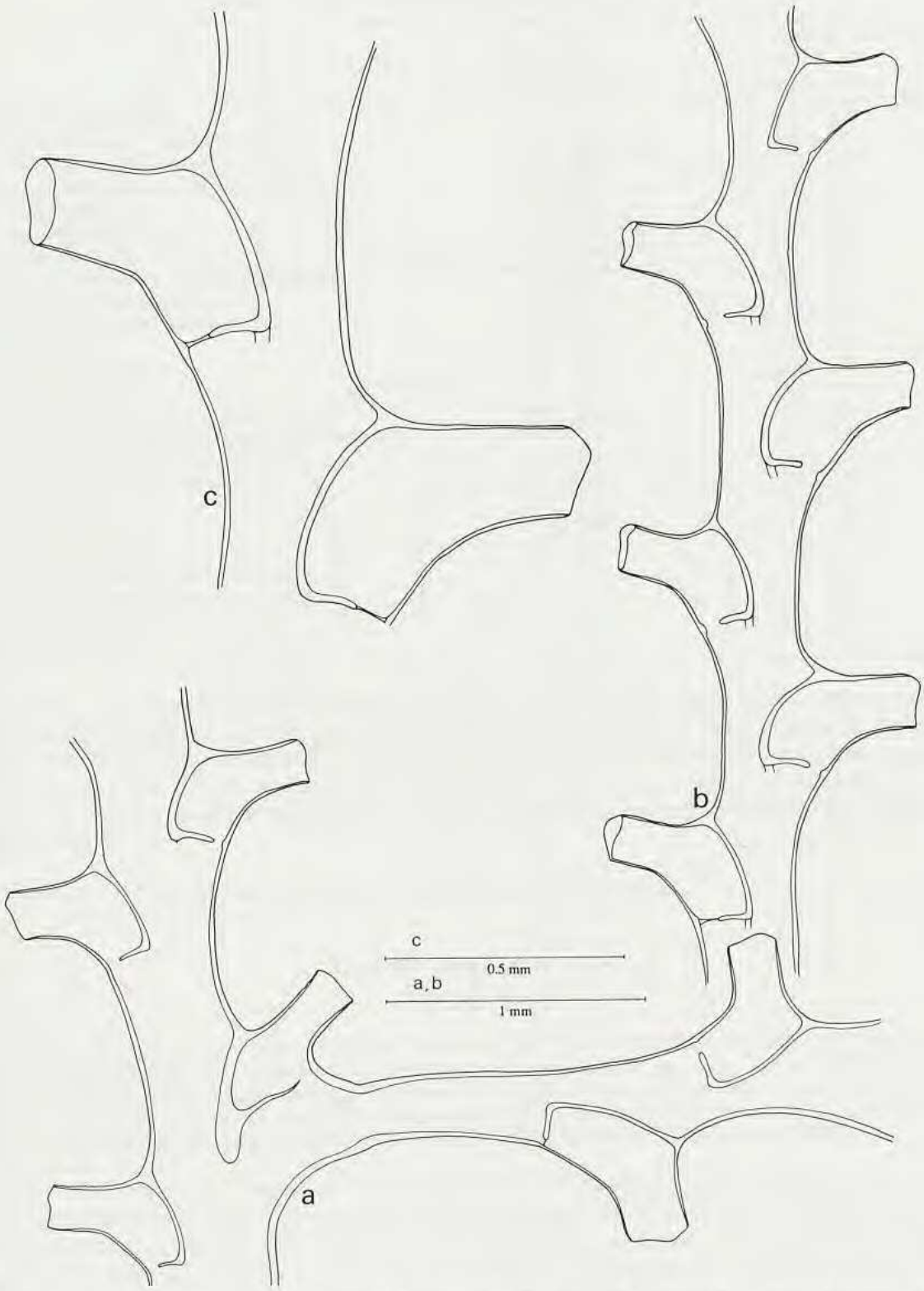

FIG. 10. — *Gonaxia anonyma* sp. nov., paratype, CHALCAL 1, Stn DC 3 : **a**, monosiphonic part of axis and base of hydrocladium; **b**, part of hydrocladium; **c**, two hydrothecae from hydrocladium.
a, slide no. 854; b, c, slide no. 1030.

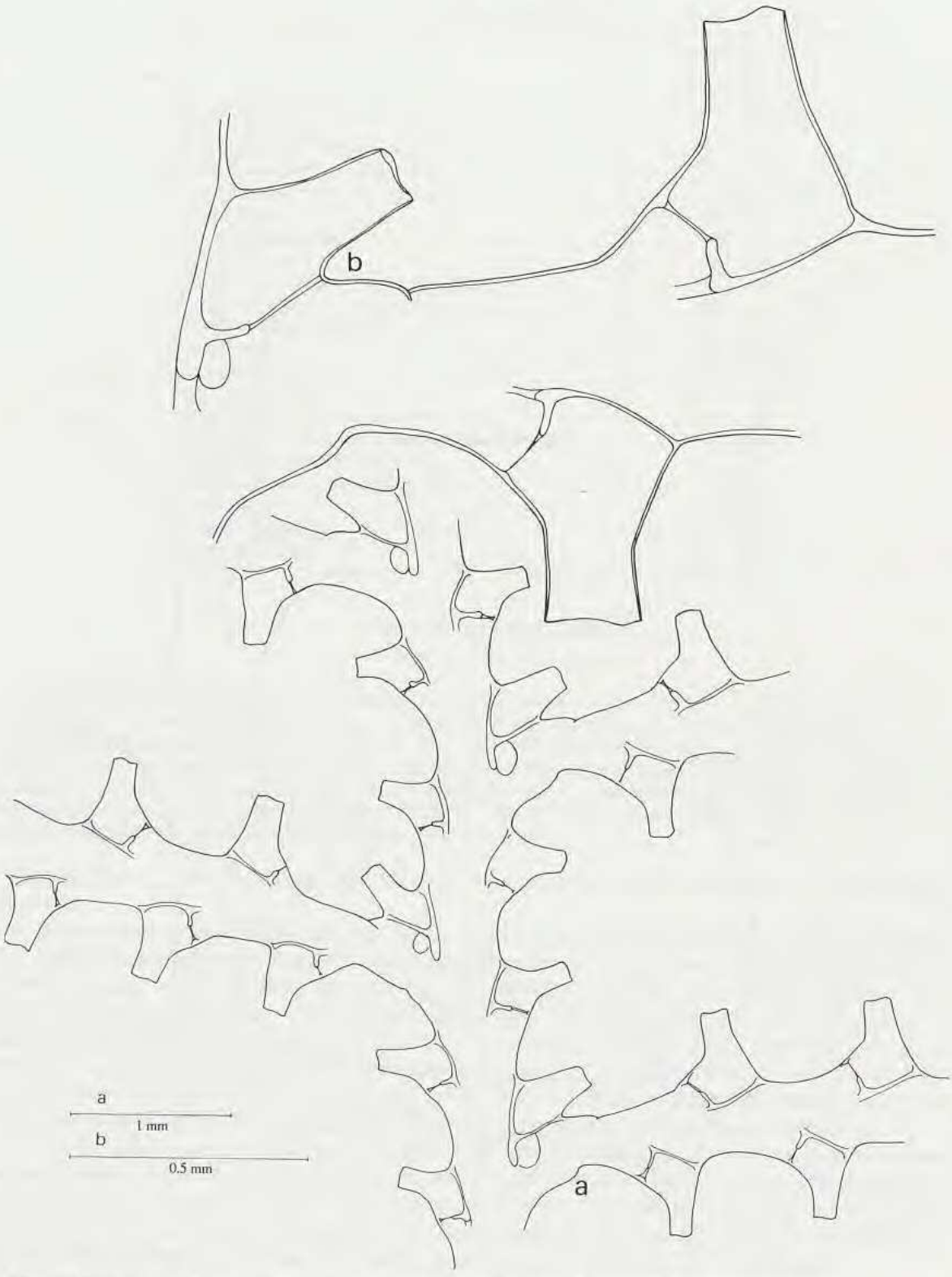

FIG. 11. — *Gonaxia anonyma* sp. nov., MUSORSTOM 4, Stn CP 158 : **a**, top part of colony; **b**, basal part of hydrocladium with axillary hydrotheca.
a, b, slide no. 353B.

TABLE 7. — Measurements of *Gonaxia anonyma* sp. nov., in µm.

	MUSORSTOM 4 Stn CP 158 (slide no. 353B)	CHALCAL 1 Stn DC 30 (slide no. 1030)
Stem, diameter at base		750 - 950
Stem hydrotheca, length abcauline wall	275 - 295	370 - 385
length free part adcauline wall	290 - 320	345 - 370
length adnate part adcauline wall	290 - 295	335 - 355
total depth	420 - 475	555 - 575
maximal diameter	220 - 250	235 - 250
diameter at rim	120 - 150	170 - 185
Axillary hydrotheca, length abcauline wall	220 - 230	275 - 290
length free part adcauline wall	280 - 295	20 - 345
length adnate part adcauline wall	390 - 435	460 - 480
total depth	495 - 505	540 - 560
maximal diameter	215 - 225	215 - 230
diameter at rim	110 - 135	160 - 165
Hydrocladium, diameter at base	280 - 295	220 - 230
Hydrocladial hydrotheca, length abcauline wall	340 - 375	375 - 400
length free part adcauline wall	400 - 415	310 - 355
length adnate part adcauline wall	265 - 310	345 - 360
total depth	520 - 555	575 - 585
maximal diameter	310 - 320	245 - 265
diameter at rim	150 - 165	175 - 185
Pairs of hydrothecae per hydrocladium	8 - 14	18 - 20
Female gonotheca, approximate length		2,170
maximal diameter		825 - 870
diameter at rim		175 - 215

REMARKS. — In spite of slight differences in the dimensions of the material from the two stations listed above there is so much conformity in structure and shape of the hydrothecae that specific identity can not be denied. In the MUSORSTOM 4, Stn CP 158, specimen (fig. 7d) the hydrocladial hydrothecae are slightly more closely packed than in the CHALCAL 1, Stn DC 30, specimen (fig. 10b). This species is not only characterized by the shape of the hydrothecae but also by the almost total fusion of the female gonothecae, forming an elongated tube with a number of separate funnels.

ETYMOLOGY. — From the greek *anonymos*, meaning nameless or unknown.

Gonaxia bulbifera sp. nov.

Figs 12b, 13a-b

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4 : stn DW 156, 18°54.00'S-163°18.80'E, 530 m, 15.09.1985 (type locality) : c. 10 mono- and polysiphonic colonies 15-40 mm high and some fragments, many gonothecae. With *Zygophylax* sp. Slides nos 531 (3) and 1010 (2). One 35 mm high colony with gonothecae is holotype (MNHN-Hy. 1019); rest of material, including slides, are paratypes (3 paratypes MNHN-Hy. 1019; 2 paratypes BMNH 1989.11.24.18; slides and rest paratypes RMNH-Coel. 25786, one of slides no. 531 is schizoholotype).

DESCRIPTION (based on holotype and schizoholotype). — Axis strong, upright, with pinnately arranged, alternate hydrocladia in one plane, monosiphonic in small colonies (fig. 13a), basally polysiphonic and distally monosiphonic in larger colonies. Axis originally divided into internodes, marked by constrictions of perisarc and occasionally by septa, in polysiphonic parts of stem indistinct by development of secondary tubules, running parallel to main axis and obscuring internodes and axial hydrothecae. Internodes, where present, with three hydrothecae, one axillary and two 'free' hydrothecae; hydrocladium inserting on distinct, bulbous apophysis under axillary hydrotheca.

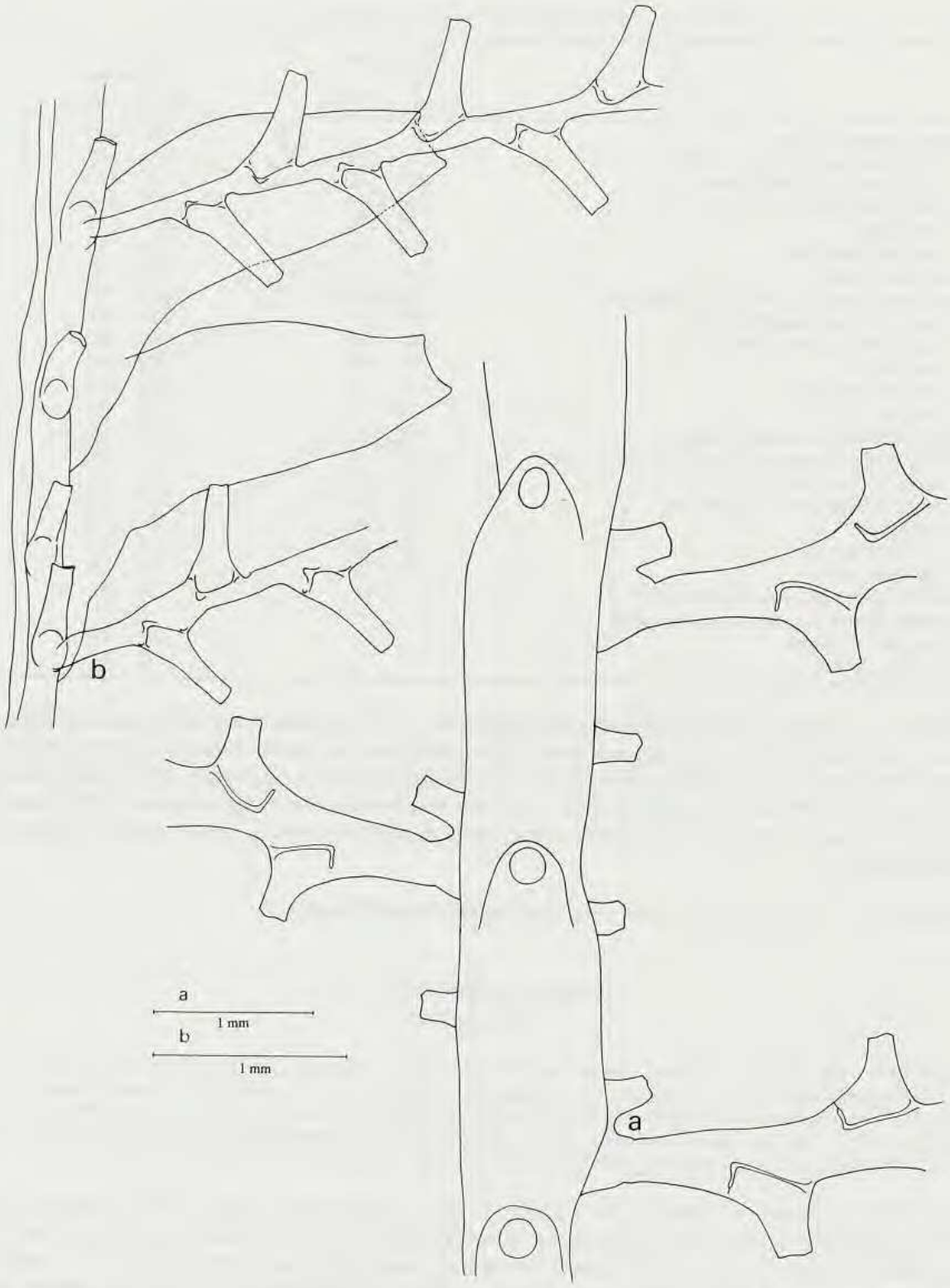

FIG. 12 a. — *Gonaxia anonyma* sp. nov., paratype, CHALCAL 1, Stn DC 30, frontal view of stem with female gonothecae.
FIG. 12 b. — *Gonaxia bulbifera* sp. nov., MUSORSTOM 4, Stn DW 156, lateral view of stem with female gonothecae.
a, slide no. 1030; b, slide no. 1010.

Axillary hydrothecae slightly deformed, cylindrical, with large perisarcal peg at basal part of adnate portion adcauline wall (fig. 13b); remaining axial hydrothecae with renovations to compensate for the presence of secondary tubules.

Hydrocladia 8-10 mm long, with up to 20 alternately arranged hydrothecae, placed on indistinctly defined internodes, usually only marked by perisarcal constrictions; first internode of hydrocladium slightly longer than those following.

Hydrothecae in principal cylindrical, with tubular distal portion. Adcauline wall straight or slightly convex in proximal part; adnate part of adcauline wall slightly curved, at hydrothecal floor with distinct peg; hydropore wide. Abcauline hydrothecal wall with more or less distinctly marked flexure at lower third, where hydrotheca becomes wider and slightly swollen (fig. 13b). Hydrothecal rim damaged in majority of hydrothecae, when in perfect state with three indistinct cusps (one abcauline, two lateral adcaulines); closing apparatus apparently deciduous, not observed on any of hydrothecae.

Periderm fairly strong, particularly on internodes and hydrocladial apophysis, thinning out along hydrothecal wall.

Hydranths present in some hydrothecae, though badly preserved, small, with c. 16 tentacles. A ligamentum runs from a small 'caecum' to a point in lower third of inside abcauline hydrothecal wall; hydranth attached to curved portion of adnate part adcauline hydrothecal wall.

Two types of gonothecae have been observed : a type (1) with a distinct funnel with a small opening (presumed male) and a type (2) where such funnel is absent and the sack-shaped gonotheca presents a larger aperture (presumed female). Both types are empty so that sex could not be ascertained. Both types of gonothecae usually are associated with secondary tubules and are present on front of colony; presumed male gonothecae occasionally also observed on backside of colony (fig. 13a).

Gonotheca of type 1 elongated sack-shaped, fused with axis or secondary tubule over greater part of its length, apically produced into tapering funnel with small aperture at its end (fig. 13a).

TABLE 8. — Measurements of *Gonaxia bulbifera* sp. nov., in µm.

	MUSORSTOM 4 Stn DW 156 paratype (slide no. 531)	MUSORSTOM 4 Stn DW 156 paratype (slide no. 1010)
Stem internode, length	1,035 - 1,185	
diameter at node	120 - 140	
Axillary hydrotheca, length abcauline wall	310 - 320	
length free part adcauline wall	330 - 340	
length adnate part adcauline wall	220 - 260	
total depth	450 - 460	
maximal diameter	125 - 160	
diameter at rim	95 - 105	
Hydrocladial internode, length	405 - 445	
diameter at node	75 - 80	
Hydrocladial hydrotheca, length abcauline wall	360 - 385	
length free part adcauline wall	370 - 390	
length adnate part adcauline wall	160 - 190	
total depth	465 - 480	
maximal diameter	170 - 185	
diameter at rim	100 - 110	
Gonotheca (type 1), length	1,410 - 1,520	
height, including funnel	925 - 1,085	
diameter aperture	80 - 95	
Gonotheca (type 2), length		1,845 - 1,930
maximal diameter		695 - 715
diameter aperture		240 - 280

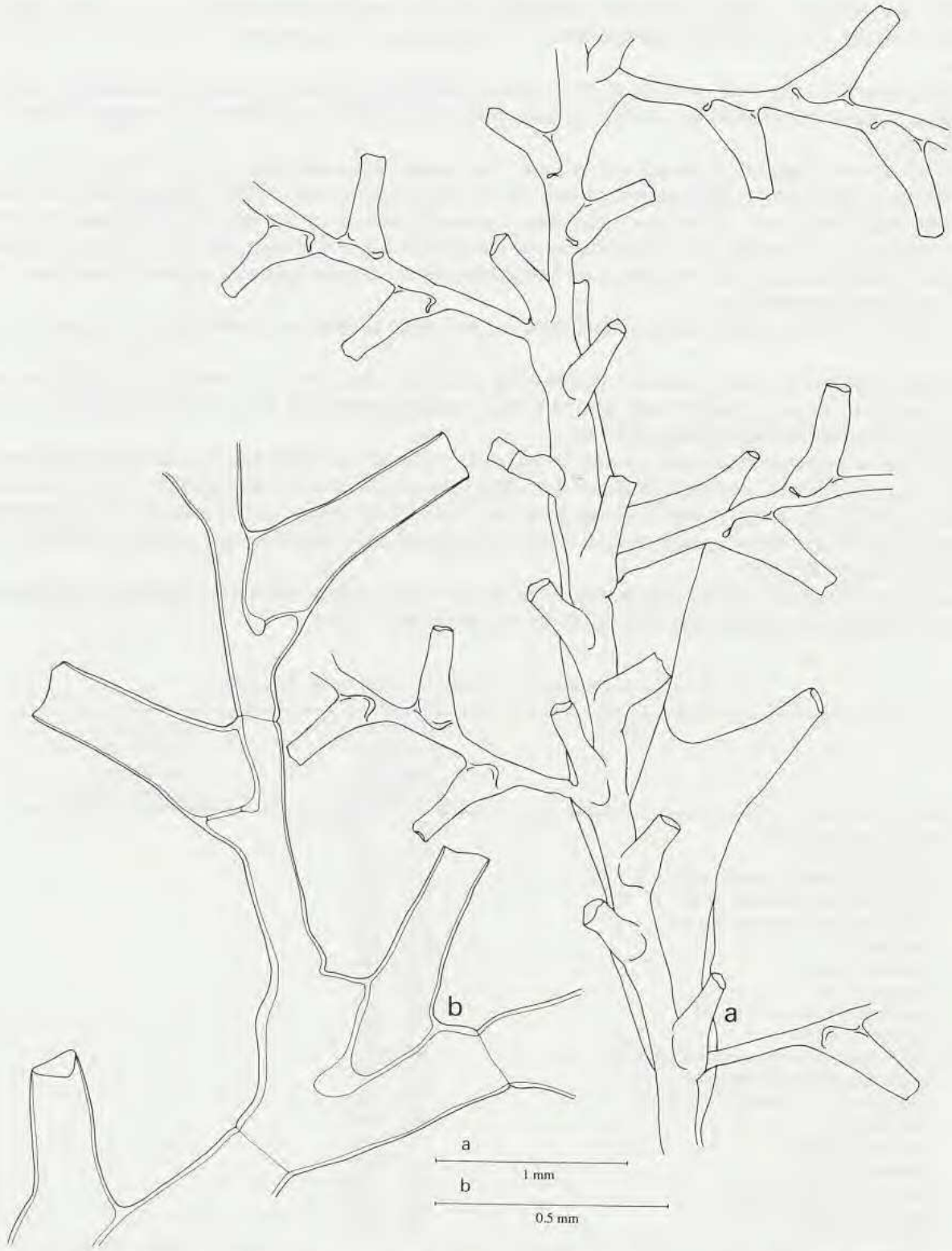

FIG. 13. — *Gonaxia bulbifera* sp. nov., schizoholotype, MUSORSTOM 4, Stn DW 156 : **a**, frontal view of colony with male gonothecae on backside; **b**, insertion of hydrocladium on axis, with axillary hydrotheca.
a, b, slide no. 531.

Gonotheca of type 2 stands away from axis or secondary tubule, though attached to it by means of broad base, in shape elongated ovoid to sack-shaped, apically with fairly wide opening (fig. 12b).

Both types of gonothecae occur on separate, otherwise identical colonies and probably represent both sexes.

DISTRIBUTION. — Recorded from a single locality in Grand Passage at the northwestern tip of New Caledonia, depth 530 m.

REMARKS. — Species with distinct affinities with *Gonaxia scalariformis* but with more slender hydrothecae and different gonothecae.

ETYMOLOGY. — The specific name *bulbifera* refers to the bulbous character of the gonothecae (latin noun *bulbus* meaning swelling) found on the front of the axis (greek verb *phero* meaning to bear).

Gonaxia compacta sp. nov.

Figs 8c, 14a-b, 15a

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4 : stn CP 155, 18°52.80'S-163°19.50'E, 500-570 m, 15.09.1985 (type locality) : thirty mm high stem with several hydrocladia (holotype, MNHN-Hy. 1020); no gonothecae (slide no. 1041, schizoholotype, RMNH-Coel. 25787). — Stn CP 194, 18°52.80'S-163°21.70'E, 550 m, 19.09.1985 : one 75 mm high colony with male gonothecae, a stem fragment and many loose hydrocladia (paratypes). Young gonothecae develop from hydrothecae. Two slides no. 1027 (1 paratype and one of slides no. 1027, RMNH- Coel. 25788; remaining paratypes on second slide no. 1027, BMNH 1989.11.24.19. — Stn DW 197, 18°51.30'S-163°21.00'E, 560 m, 20.09.1985 : four stems 30-70 mm high with basal disk attached to rock fragments and some detached hydrocladia. Male gonothecae along some of stems and young gonothecae developing from hydrothecae; slides nos 875 and 884 (all RMNH-Coel. 25789). — Stn DW 222, 22°57.60'S-167°33.00'E, 410-440 m, 30.09.1985 : single hydrocladium 12 mm long in slide no. 874A (RMNH-Coel. 25790).

DESCRIPTION (based on all material available). — Robust, 7-8 cm high, erect species with strong axis, basally c. 2.5 mm in diameter, thinning out fairly rapidly distally, with pinnately arranged, alternate hydrocladia of 10-12 mm length, leaving axis almost perpendicularly. Structure of colony almost as in *Gonaxia amphorifera* and *G. ampullacea*; axis strongly polysiphonic by presence of many accessory tubules running upwards parallel to axis and obscuring exact structure of primary tube. Basal part of axis attached to rock fragments by means of strongly sclerotized attachment disk; higher parts of axis, though still polysiphonic, more or less transparent and here arrangement of hydrocladia can be seen. Axial hydrothecae not greatly different from those of hydrocladia described below. Hydrocladia placed on distinct and large apophyses, three hydrothecae between two successive hydrocladia (one left, one right, one axillary and tubiform). Hydrocladium basally with distinct twist, marked by oblique perisarcal constriction, probably permitting some movement of hydrocladium (fig. 14a). Hydrothecae alternately arranged along fairly thick hydrocladium, thick walled, distinctly swollen proximally and narrowed fairly suddenly; distal portion more or less tubiform; angle of exit variable, 90-60 degrees (fig. 14a, b). Succeeding hydrothecae of same side separated by rounded gap; there is no deepened axil between adcauline hydrothecal wall and wall of hydrocladium (as in *G. ampullacea*), but this part of hydrocladium usually broadly rounded (fig. 14b). Free portion adcauline wall usually slightly concave to almost straight; abcauline wall with point of flexure at about half its length, proximal part strongly convex, rounded. Adnate part adcauline wall and hydrothecal floor strongly sclerotized, thick, with large rounded peg at end of adnate wall; hydrothecal floor at right angle to this, usually straight part of hydrotheca. Large hole present in hydrothecal bottom, walls of hole visible on lateral parts of hydrotheca. Aperture of hydrotheca with three rounded, fairly indistinct hydrothecal cusps, one abcauline and two laterals on adcauline side (fig. 14b). None of hydrothecae in all material present has a closing apparatus. Many hydrothecae show signs of repair after sustaining damage, usually involving the complete tubiform distal part of hydrothecae, in which case hydrotheca shows ring-shaped cicatrise.

Hydranths present in majority of hydrothecae, strongly contracted, attached to hydrothecal base only; no ligament running upwards towards inside abcauline hydrothecal wall has been observed.

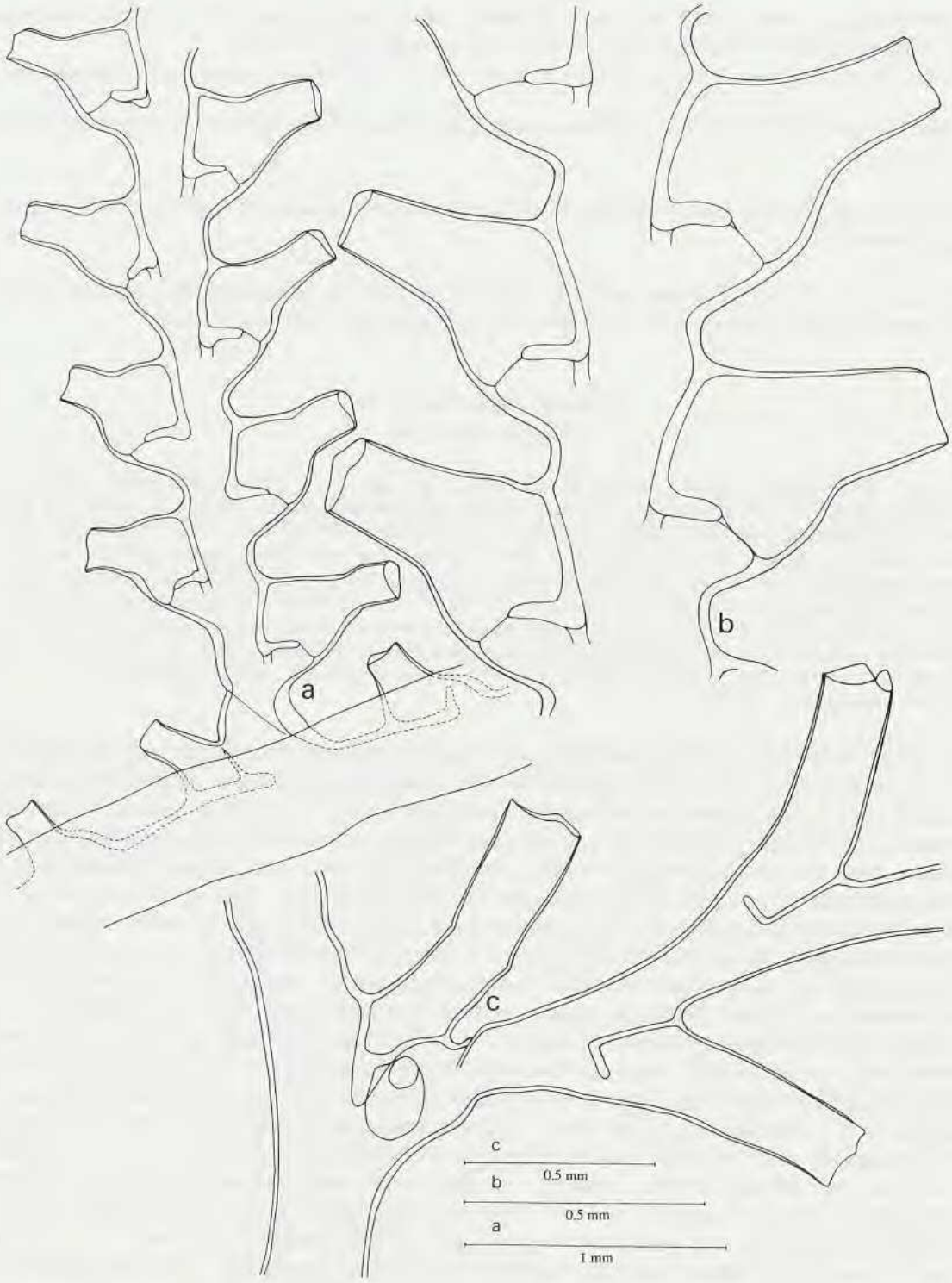

FIG. 14 a-b. — *Gonaxia compacta* sp. nov. : **a**, schizoholotype, MUSORSTOM 4, Stn CP 155, insertion of hydrocladium on axis; **b**, paratype, part of hydrocladium.
FIG. 14 c. — *Gonaxia complexa* sp. nov., BIOCAL, Stn DW 08, axillary hydrotheca and insertion of hydrocladium on axis. a, slide no. 1041; b, slide no. 1027; c, slide no. 333B.

Perisarc particularly strongly developed in this species when compared to other members of the genus, yellowish; it is thick along walls of hydrocladium and hydrothecae (especially adnate part of adcauline hydrothecal wall) and thins out along distal portion of hydrotheca.

Only mature male gonothecae have been observed, occurring on frontal aspect of (polysiphonic) axis of part of material as blister-like, sack-shaped bodies, arranged in a longitudinal row, partly overlapping each other and covered by some accessory tubules (fig. 15a). Aperture at end of slight elevation, small, rounded. Each gonotheca contains an elongated mass of developing spermatocytes; gonotheca appears to originate from primary axis.

No female gonothecae were seen, but small, (abortive?) and apparently female gonothecae develop from some of hydrothecae (fig. 8c); these more or less elongate gonothecae are all empty and have a single, circular terminal aperture. They occur on colonies with otherwise normal male gonothecae along axis.

TABLE 9. — Measurements of *Gonaxia compacta* sp. nov., in µm.

	MUSORSTOM 4 Stn CP 155 (slide no. 1041) schizoholotype	MUSORSTOM 4 Stn CP 194 (slide no. 1027) paratype
Hydrocladium, diameter at base	220 - 235	
Hydrocladial hydrotheca, length		
abcauline wall	355 - 415	
length free part adcauline wall	355 - 420	
length adnate part adcauline wall	265 - 340	
total depth	510 - 520	
maximal diameter	280 - 310	
diameter at rim	135 - 155	
Number of pairs of hydrothecae	13 - 14	
Male gonotheca, approximate length		1,625
approximate diameter		600
diameter aperture		75 - 95
Female (?) gonotheca, length		760 - 1,130
diameter		370 - 410
diameter aperture		250 - 300

DISTRIBUTION. — Nearly all material originates from a restricted area in the Pacific near Grand Passage at the extreme northwestern reefs of New Caledonia. A single hydrocladium was obtained from a station south of Île des Pins, off southeastern New Caledonia (MUSORSTOM 4, Stn DW 222).

REMARKS. — This species is remarkable because of the strong development of the perisarc, the plump hydrothecae with swollen proximal portion and the broadly rounded end of the space separating two succeeding hydrothecae on the same side of a hydrocladium.

ETYMOLOGY. — From the latin word *compactus* meaning thick, firm.

Gonaxia complexa sp. nov.

Figs 14c, 15b-e, 16a-c

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn DW 08, 20°34.35'S-166°53.90'E, 435 m, 12.08.1985 (type locality) : c. 10 colonies, 50-80 mm high and many fragments. One of colonies with forked axis, some with spent gonothecae. One 50 mm high colony holotype (MNHN-Hy. 1021), rest are paratypes (3 paratypes MNHN-Hy. 1021; 3 paratypes BMNH 1989.11.24.20, rest of paratypes and fragments RMNH-Coel. 25791). Slides nos 333B, 377C (both RMNH-Coel. 25791), 526 (MNHN-Hy. 1021) and 528 (BMNH 1989.11.24.20)

BIOGEOCAL : stn DW 307, 20°35.38'S-166°55.25'E, 470-480 m, 01.05.1987 : single 35 mm high stem and some fragments; no gonotheca, all in 2 slides no. 908 (RMNH-Coel. 25792).

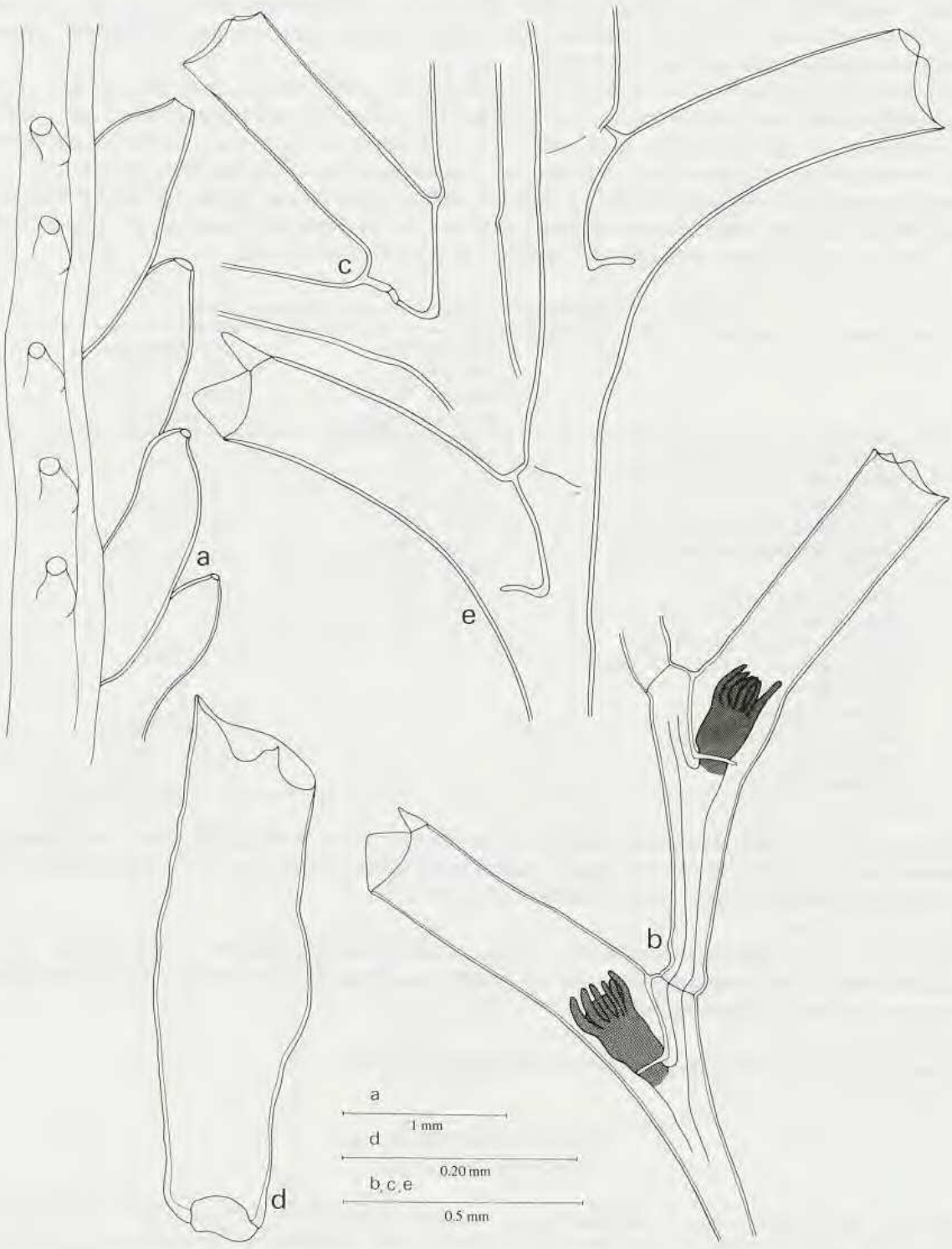

FIG. 15 a. — *Gonaxia compacta* sp. nov., paratype, MUSORSTOM 4, Stn CP 194, lateral view of stem with male gonothecae.
FIG. 15 b-e. — *Gonaxia complexa* sp. nov. : **b-d**, BIOCAL, Stn DW 08 : **b**, two hydrothecae from top part of colony; **c**, axillary hydrotheca; **d**, damaged female (?) gonotheca. — **e**, MUSORSTOM 6, Stn DW 461, two hydrothecae from top part of colony.
a, slide no. 1027; b-d, slide no. 528; e, slide no. 935.

Loyalty Islands. MUSORSTOM 6 : stn DW 391, 20°47.35'S-167°05.70'E, 390 m, 13.02.1989 : single 40 mm high stem in 2 parts (MNHN-Hy. 1022); 3 slides no. 909 (RMNH-Coel. 25793), no gonothecae. A few hydrothecae of *Modeeria rotunda* (Quoy & Gaimard, 1827) on stem. — Stn DW 398, 20°47.19'S-167°05.65'E, 370 m, 13.02.1989 : two colonies 35 and 60 mm high, with gonothecae, and some fragments (BMNH 1989.11.24.21). Slide no. 1003 (RMNH-Coel. 25794). — Stn DW 406, 20°40.65'S-167°06.80'E, 373 m, 15.02.1989 : c. 50 up to 80 mm high colonies and some fragments; spent gonothecae observed (10 colonies MNHN Hy. 1023; 10 colonies BMNH 1989.11.24.22, rest RMNH-Coel. 25795, also 4 slides no. 714 under that number). — Stn DW 407, 20°40.70'S-167°06.60'E, 360 m, 15.02.1989 : six colonies up to 50 mm high and some fragments (1 colony MNHN-Hy. 1024; 1 colony BMNH 1989.11.24.23, rest RMNH-Coel. 25796), no gonothecae. Two slides no. 728 (RMNH-Coel. 25796). — Stn DW 461, 21°06.00'S-167°26.20'E, 240 m, 21.02.1989 : single 10 mm long hydrocladium, slide no. 935 (RMNH-Coel. 25797).

DESCRIPTION (based on specimens from BIOCAL, Stn DW 08). — Axis basally polysiphonic, top part of colonies monosiphonic, indistinctly divided into internodes by slightly oblique perisarcal constrictions, visible only in monosiphonic part. Hydrocladia pinnately arranged, springing from distinct stem apophyses alternately pointing left and right (fig. 16a). Usually three hydrothecae between two successive hydrocladia (one axillary, fig. 15c, one on opposite side and one above axillary hydrotheca); occasionally two hydrocladia, one left, one right placed above each other (fig. 16a). Secondary tubes running parallel to axis soon obscure arrangement of apophyses; axillary hydrothecae may become lengthened when partly covered by secondary tubes, those tubes communicating with primary axis by means of circular holes, particularly visible at stem apophyses. Basal part of axis flattened, apparently serving attachment to fixed objects (stones, coral fragments), diameter of polysiphonic base c. 0.8 mm. Internodes on hydrocladia distinct, separated by perisarcal constrictions and occasionally by thin, oblique septa, each with one hydrotheca, alternately pointing left or right and strictly in one plane (fig. 15b). Proximal portion of each hydrocladium with distinct perisarcal twist (fig. 14c). Occasionally secondary hydrocladia spring from apophysis bearing primary hydrocladium, pointing towards front of colony (same general direction as remnants of gonothecae, see below).

Hydrotheca tubular, occasionally slightly curving downwards, pointing away from the internode at an angle of c. 50 degrees; diameter constant over whole length of hydrotheca, but basally, near insertion of hydrotheca, with slight constriction on adcauline side (figs 15b, 16b-c, not present in all hydrothecae). Adnate portion of adcauline wall c. one third length of free adcauline wall, with sharp flexure at hydrothecal bottom, point of flexure marked by slight perisarcal thickening. Hydrothecal floor open, leaving large hydropore permitting passage of coenosarc; no perisarcal ring being present. Hydrothecal rim slightly thickened, particularly in renovated hydrothecae, number of renovations 2 or 3. Hydrothecal rim with three blunt cusps (one abcauline, two laterals), separated by shallow, rounded embayments. Closing apparatus composed of three small, triangular flaps attached to embayments of rim, when closed forming shallow roof, present in only few hydrothecae (fig. 15b). Periderm firm, particularly on internodes, thinning out along hydrothecal walls, though hydrothecae still quite firm.

Hydranths small, completely retracted; hypostome rounded, number of tentacles 12-14 (fig. 15b).

Only remnants of spend gonothecae present, occurring on frontal aspect of colony and pointing forward under angle of c. 90 degrees, attached by means of broad base to axial internode at base of axillary hydrotheca, leaving large, oval cicatrise when absent. Gonotheca shaped as elongated body with irregularly wrinkled walls;

TABLE 10. — Measurements of *Gonaxia complexa* sp. nov., in µm.

	BIOCAL Stn DW 08 (slide no. 333B)	MUSORSTOM 6 Stn DW 461 (slide no. 935)
Internode, length	590 - 775	630 - 650
diameter at node	95 - 135	130 - 150
Hydrotheca, length abcauline wall	575 - 590	540 - 565
length free part adcauline wall	480 - 555	520 - 585
length adnate part adcauline wall	175 - 235	215 - 240
total depth	650 - 740	715 - 760
diameter at rim	215 - 230	195 - 215
maximal diameter	230 - 235	175 - 195

perisarc basally fairly thick, but rapidly thinning along gonothecal walls, apex ruptured in gonothecae present in BIOCAL, Stn DW 08, material (fig. 15d).

DISTRIBUTION. — Fairly deep Pacific waters east of New Caledonia and off the Loyalty Islands, depth range 240-435 m.

REMARKS. — The BIOCAL, Stn DW 08, specimens agree to a certain extent with *Gonaxia constricta* (Totton, 1930) (= *Symplectoscyphus constrictus* Totton, 1930), as described by that author and by RALPH (1961a), but there are distinct differences. TOTTON's Terra Nova specimens of *S. constrictus* so far have been the only specimens available, consequently RALPH's description and measurements of that species must also be based on TOTTON's holotype. In the Terra Nova specimens (that are incomplete) the stems are fairly strongly geniculate; in the BIOCAL specimens axis and hydrocladia are straight and the hydrothecae do not diverge as strongly from the internode (fig. 15e) as they do in the Terra Nova material of *S. constrictus* (fig. 17a). The hydrothecae in the Terra Nova material also are slightly larger. They agree, however, in the place of the cusps at the hydrothecal rim (one abcauline, two laterals) and the presence of a slight though distinct constriction at the hydrothecal bottom. Hydrothecal renovations may obscure the structure of the hydrothecal rim, particularly in axillary hydrothecae.

There is variability in the curvature of the hydrothecae. In the same colony almost straight hydrothecae occur along with slightly curved hydrothecae. The fragment from MUSORSTOM 6, Stn DW 461, has smoothly curved hydrothecae along the whole of the (single) hydrocladium (fig. 15e).

ETYMOLOGY. — The specific name *complexa* refers to the difficulties encountered in determining the generic position of this species. From the latin word *complexus*, meaning tangled, involved.

Gonaxia constricta (Totton, 1930)

Figs 16d, 17a

Symplectoscyphus constrictus Totton, 1930 : 181, fig. 31, pl. 1 fig. 3. — RALPH, 1961a : 800, fig. 14f. — STEPAN'YANTS, 1979 : 69, 70.

MATERIAL EXAMINED. — **New Zealand.** TERRA NOVA EXPEDITION : stn 91, off Three Kings Islands, New Zealand, 300 fms (= 549 m), 26.07.1911, four colonies, the highest c. 75 mm (BMNH 1929.10.28.100, TOTTON's slide also bearing that number) and additional slide made from 2 loose hydrocladia (slide no. 946, schizoholotype, RMNH-Coel. 25460).

DESCRIPTION (that of colony taken from TOTTON, 1930, and RALPH, 1961). — Erect stems c. 75 mm high, basally polysiphonic by presence of accessory tubes, apically largely monosiphonic; division into internodes obscured by secondary tubules. Hydrocladia alternately and pinnately arranged; between two successive hydrocladia there are two free hydrothecae, in addition there is an axillary hydrotheca at base of each hydrocladium. Hydrocladia weakly to distinctly geniculate, internodes only occasionally marked by septum, usually only by (weak) perisarcal constriction, slightly longer than overall length of hydrotheca (fig. 17a).

Hydrothecae tubular, with slightly swollen basal portion, not quite perpendicular to hydrocladial length axis, but leaving internode under angle of c. 80 degrees. Abcauline hydrothecal wall almost straight, with minor convexity at about half its length, running smoothly into wall of internode. Adnate part adcauline wall slightly less than half length of free part of that wall, with perpendicular curve at thecal base and there with distinct notch. Hydrothecal floor not closed : a perisarcal ledge runs from end of abcauline hydrothecal wall into thecal cavity leaving a narrow passage. Free part of adcauline hydrothecal wall straight, with well marked constriction almost at its base (cf. fig. 16d) and a distinctly flattened portion in the angle between free part adcauline wall and wall of axis or hydrocladium. Rim of hydrotheca with three blunt and low cusps, in majority of hydrothecae formed as one median abcauline and two lateral adcauline cusps, between which remnants of opercular plates may be observed. Some hydrothecae, nevertheless, appear to have a distinct median adcauline cusp and two abcauline laterals.

Hydranths well preserved in the schizoholotype, large, with 12-14 tentacles and a large, globular hypostome (fig. 16d). Hydranth attached inside hydrotheca by means of circular tissue strand (visible in optical section as

FIG. 16 a-c. — *Gonaxia complexa* sp. nov., BIOCAL, Stn DW 08 : **a**, top part of colony; **b**, part of hydrocladium; **c**, three hydrothecae from hydrocladium.
FIG. 16 d. — *Gonaxia constricta* (Totton, 1930), TERRA NOVA, Stn 91, hydrotheca with its hydranth.
a, slide no. 333B; b-c, slide no. 526; d, slide no. 946.

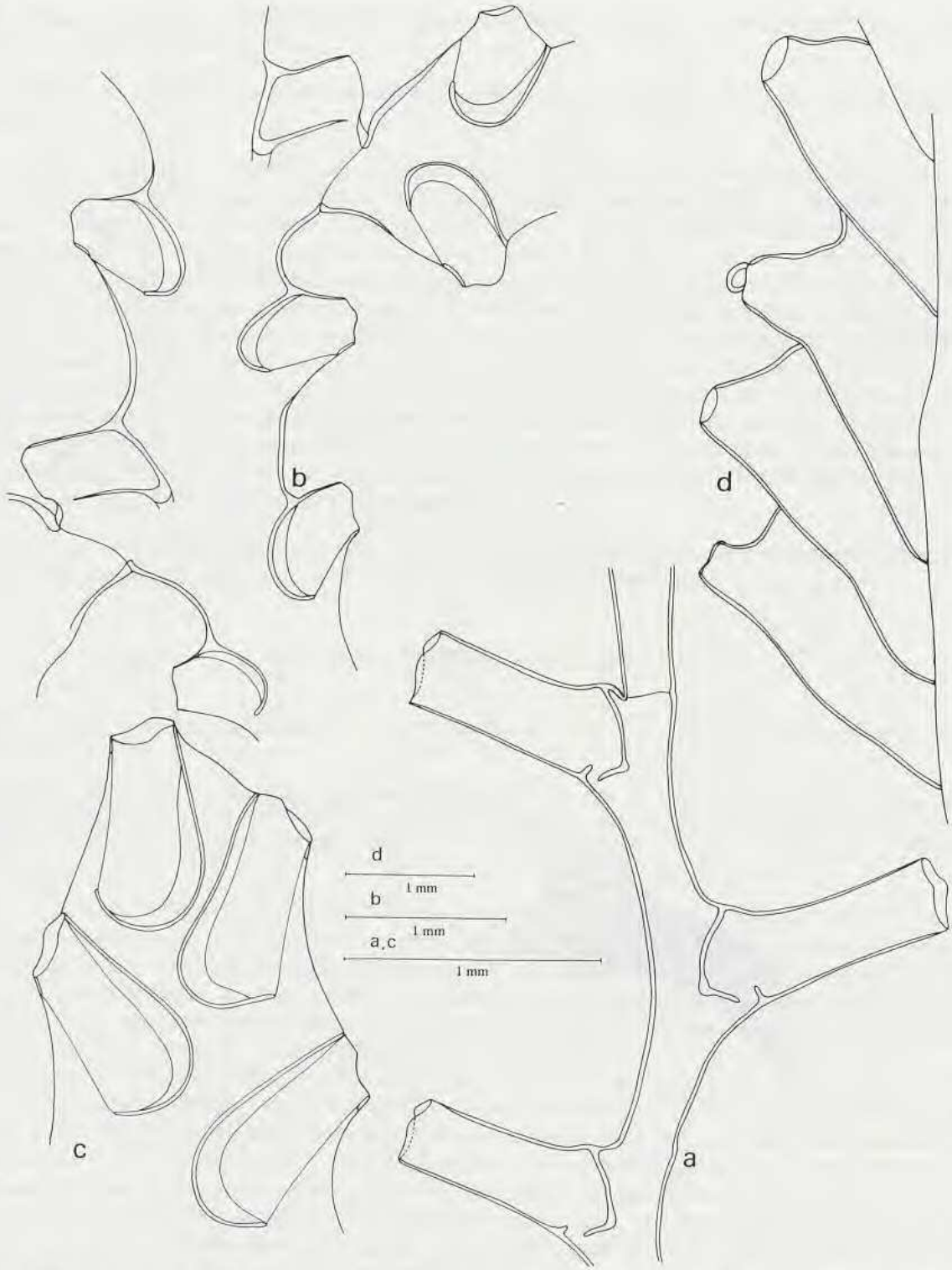

FIG. 17 a. — *Gonaxia constricta* (Totton, 1930), TERRA NOVA, Stn 91, part of hydrocladium.
FIG. 17 b-d. — *Gonaxia crassa* sp. nov., schizoholotype, MUSORSTOM 4, Stn DW 197 : **b**, top part of colony with insertion of two hydrocladia; **c**, top part of hydrocladium; **d**, female gonothecae, lateral view (semi-diagrammatic). a, slide no. 946; b, slide no. 1042; c-d, slide no. 858.

ad- and abcauline strands) attaching base of hydranth to base of theca. There is no oblique tissue strand running upwards as is seen in *Symplectoscyphus*. Perisarcal plate forming floor of hydrothecal cavity appears to be horseshoe-shaped, with sides attached to internal lateral surfaces of part of internode supporting hydrotheca; peridermal strand of tissue is seen to descend through cavity formed by both arms of horseshoe into cavity of internode.

No gonothecae were observed in the holotype but a circular hole or cicatrise occurs on some of the internodes where gonothecae may have been attached.

TABLE 11. — Measurements of *Gonaxia constricta* (Totton, 1930), in µm.

	TERRA NOVA Stn 91 (RALPH, 1961)	TERRA NOVA, Stn 91 (slide no. 946) schizoholotype
Internode, length		865 - 975
diameter at node		185 - 200
Hydrotheca, length adcauline wall	630	650 - 695
length free part adcauline wall	620 - 650	605 - 690
length adnate part adcauline wall	250	295 - 320
total depth	750	815 - 850
diameter at rim	230 - 250	250 - 260
maximal diameter	270	355 - 355

DISTRIBUTION. — Previously recorded only from off Three Kings Islands, New Zealand, depth 300 fms (548 m) (TOTTON, 1930; RALPH, 1961).

REMARKS. — Though this species is not represented in the New Caledonia collection it is included here because of its distinct affinities with the many species of the genus *Gonaxia* found in the New Caledonia material; it evidently belongs in that genus.

Gonaxia crassa sp. nov.

Figs 17b-d, 18a-b

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4 : stn DW 197, 18°51.30'S-163°21.00'E, 560 m, 20.09.1985 (type locality) : large, at least 140 mm high colony composed of axis (in 5 parts) and loose hydrocladia; gonothecae along stem (holotype, MNHN-Hy. 1025; schizoholotype BMNH 1989.11.24.24; schizoholotype RMNH-Coel. 25799). Three slides nos 858 (2) and 1042 (schizoholotypes, RMNH-Coel. 25798).

DESCRIPTION (based on holotype). — Colony robust, with erect, thick, polysiphonic axis c. 140 mm high, basal part missing but probably attached to firm substratum (rocks, etc.). Hydrocladia 20-25 mm long, straight, arranged pinnately and alternately along axis, of which only extreme distal part is monosiphonic and demonstrates structure of axial and axillary hydrothecae. Hydrocladia flattened, placed on apophyses along primary axis, separated from apophyses by oblique perisarcal constriction, probably allowing movement of hydrocladia (fig. 17b). In proximal parts of axis arrangement of hydrothecae and apophyses obscured by presence of many accessory tubules, running upwards parallel to axis and covering axial structures.

Axial and hydrocladial hydrothecae of almost identical shape, large, those of axis slightly smaller and not completely sunken into axis (fig. 17b); hydrocladial hydrothecae along length of hydrocladium gradually become completely immersed into hydrocladium (fig. 18a). In both types of hydrothecae free adcauline wall small to gradually disappearing; adnate adcauline wall strongly curved, shield-shaped, fairly thick, with basal circular hole permitting passage of periderm. A fine strand of perisarc is seen to run from end adnate part adcauline wall to end of short abcauline wall; structure of basal plate complicated by fusion of parts of extreme tip adnate adcauline wall with interior of axis or hydrocladium (fig. 18b). Axillary hydrotheca more or less tubiform, length of free part adcauline wall considerable, longer than adnate portion of that wall; adnate part basally with large perisarcal peg (fig. 17b). Hydrothecal margin with three rounded cusps, one median abcauline and two laterals near adcauline side.

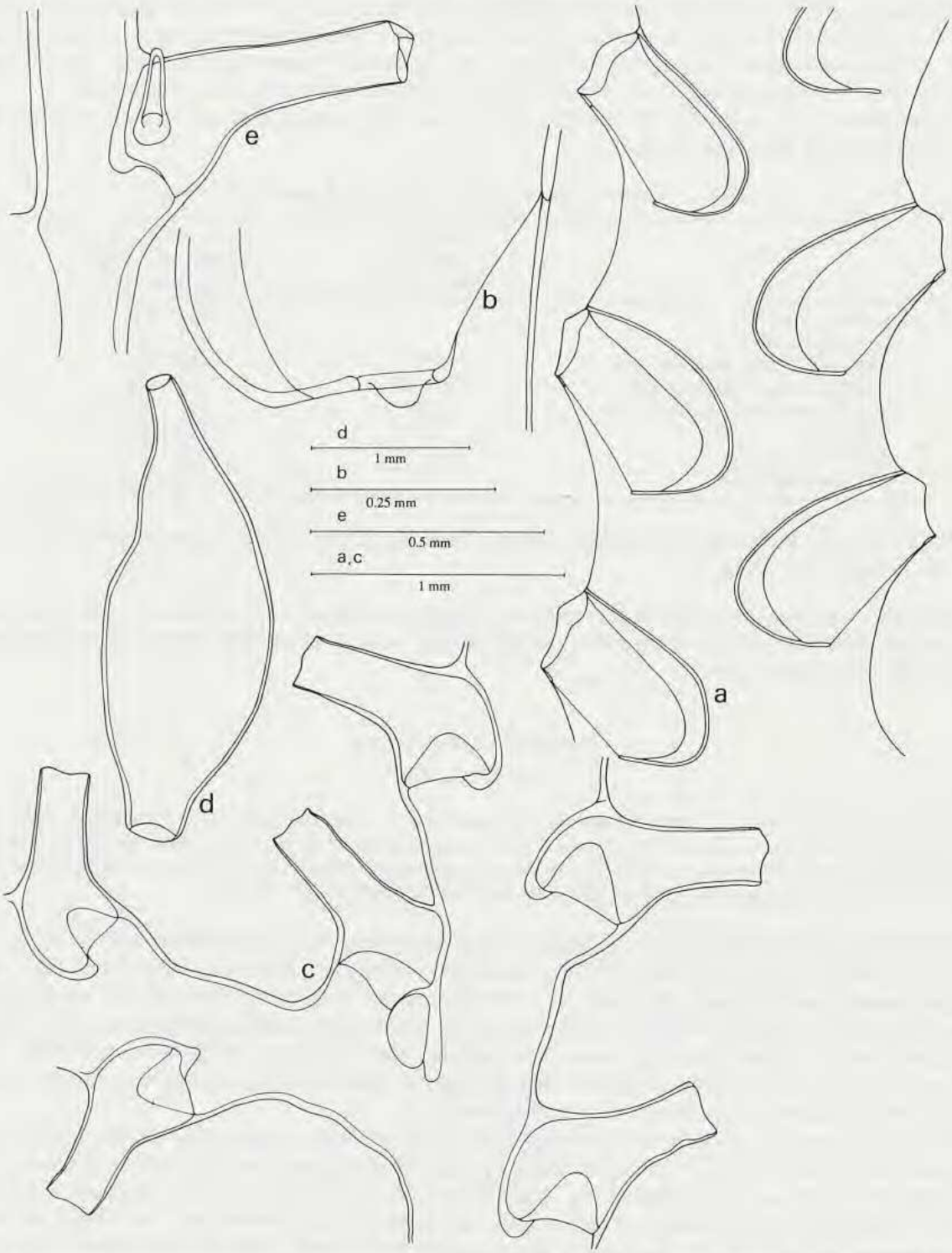

FIG. 18 a-b. — *Gonaxia crassa* sp. nov., schizoholotype, MUSORSTOM 4, Stn DW 197 : **a**, part of hydrocladium; **b**, bottom part of hydrocladial hydrotheca.

FIG. 18 c-d. — *Gonaxia crassicaulis* sp. nov., schizoholotype, SMIB 4, Stn DW 55 : **c**, top part of axis with insertion of hydrocladium; **d**, male gonotheca.

FIG. 18 e. — *Gonaxia crusgalli* sp. nov., schizoholotype, SMIB 5, Stn DW 101, hydrotheca.

a-b, slide no. 858; c-d, slide no. 1052; e, slide no. 1047.

No opercular apparatus has been observed, though it seems likely that it has been present initially and has been shed. All hydrothecae only contain remnants of hydranths, attached to curved portion of adnate adcauline wall.

Female gonothecae arranged in longitudinal row along frontal aspect of axis, large, sack-shaped, coalesced for considerable part of length; apical portion free, curving away from body of gonothecae, with circular opening; apertures of respective gonothecae more or less alternate, arranged in two longitudinal rows. Some of gonothecae still with circular lid (fig. 17d), occasionally a single gonotheca occurs on backside of colony. All gonothecae contain strand of tissue in which two or three developing eggs or planulae can be observed.

Perisarc of colony thick and strong, yellowish, particularly along axis and wall of gonothecae.

TABLE 12. — Measurements of *Gonaxia crassa* sp. nov., in µm.

	MUSORSTOM 4 Stn DW 197 (slide no. 1042)	MUSORSTOM 4 Stn DW 197 (slide no. 858)
Hydrocaulus, diameter at base (not from slide)	2,100	
Axial hydrotheca, length abcauline wall	150 - 240	
length free part adcauline wall	325 - 410	
length adnate part adcauline wall	370 - 585	
total depth	605 - 780	
maximal diameter	390 - 415	
diameter at rim	240 - 305	
Axillary hydrotheca, length abcauline wall	85 - 195	
length free part adcauline wall	435 - 540	
length adnate part adcauline wall	475 - 565	
total depth	760 - 890	
maximal diameter	410 - 435	
diameter at rim	260 - 345	
Hydrocladium, diameter at base		650 - 715
Hydrocladial hydrotheca, length abcauline wall		65 - 110
total depth		780 - 870
maximal diameter		435 - 475
diameter at rim		280 - 305

DISTRIBUTION. — The present material originates from a single locality in Grand Passage in the Pacific northwest of the northernmost reefs of New Caledonia.

REMARKS. — A very well characterized species of this genus which is distinguished by the completely immersed hydrocladial hydrothecae.

ETYMOLOGY. — From the latin word *crassus* (thick, robust), referring to the condition of axis and hydrocladia.

Gonaxia crassicaulis sp. nov.

Figs 18c-d, 19a-b

MATERIAL EXAMINED. — **New Caledonia**. SMIB 4 : stn DW 55, 23°21.4'S-168°04.5'E, 260 m, 09.03.1989 (type locality) : two fine colonies 80 and 85 mm high and a number of detached hydrocladia. Many gonothecae along stem; 85 mm high colony is holotype (MNHN-Hy. 1026), the other paratype (RMNH-Coel. 25799). Slide no. 713 of 3 hydrocladia and 2 slides no. 1052 of top part and isolated male gonothecae of holotype (schizoholotypes, RMNH-Coel. 25799). — Stn DW 59, 22°58.0'S-167°22.5'E, 650 m, 10.03.1989 : sixty mm high colony and 2 hydrocladia 20 mm long, 1 with *Synthecium* sp. (BMNH 1989.11.24.25). Slide no. 867 of loose hydrocladia and 867A of 3 hydrocladia of colony (RMNH-Coel. 25800).

DESCRIPTION (mainly from holotype). — Axis c. 80 mm high, unbranched, with pinnately and alternately arranged, c. 25 mm long, straight hydrocladia, pointing obliquely upwards. General structure of colony as in *Gonaxia crassa* and *G. pachyclados*, but with differences in shape of hydrothecae and development of perisarc. Axis

monosiphonic only in highest part (fig. 19a); greater part of axis strongly polysiphonic, at base c. 4 mm thick. In monosiphonic part of colony hydrocladia are seen to insert on conspicuous apophyses from which they are separated by means of distinct perisarcal constriction (figs 18c, 19a); number of pairs of hydrothecae along hydrocladium c. 25. Colony appears to be broken basally but was probably attached to solid object (rock or coral) by means of stolonal fibres.

Three types of hydrothecae present : axial, axillary and hydrocladial. Axial and hydrocladial hydrothecae only differing in size, large, with conspicuously swollen basal portion sunken in axis or hydrocladium and tubular apical portion fairly abruptly curving away from basal portion, leaving axis or hydrocladium under axis of c. 80 degrees (fig. 18c). Basal part of hydrotheca rather suddenly narrowing into tubular distal part, this part of hydrotheca not tapering. Abcauline hydrothecal wall with broadly rounded concavity in basal third; distal part straight. Free portion adcauline wall straight, slightly concave or straight with basal concavity, c. 1.25-1.50 times as long as adnate part adcauline wall. This adnate part usually broadly curved, thick, with rounded peg at hydrothecal bottom. Peg connected with internal side abcauline wall by means of fine, slightly curved bottom plate, at meeting point with abcauline wall with distinct elevation. Axillary hydrothecae long, straight, with slightly swollen basal part (fig. 18c). Both ad- and abcauline walls straight. Adnate part hydrothecal wall considerably lengthened basally; basal part swollen, fenestra large, oval. Hydrothecal rim of all hydrothecae with three broadly rounded cusps, one abcauline and 2 laterals near adcauline border. Closing apparatus usually missing or represented by single triangular plate at protected spots (e.g., axillary hydrothecae).

TABLE 13. — Measurements of *Gonaxia crassicaulis* sp. nov., in µm.

	SMIB 4 Stn DW 55 (slide no. 1052)	SMIB 4 Stn DW 59 (slide no. 867A)
Axis, diameter at base	3,500	
Axial hydrotheca, length abcauline wall	505 - 560	
length free part adcauline wall	480 - 540	
length adnate part adcauline wall	420 - 445	
total depth	680 - 775	
maximal diameter	340 - 400	
diameter at rim	190 - 205	
Axillary hydrotheca, length abcauline wall	520 - 555	
length free part adcauline wall	575 - 590	
length adnate part adcauline wall	555 - 620	
total depth	760 - 815	
maximal diameter	260 - 290	
diameter at rim	175 - 185	
Hydrocladium, diameter at node	340 - 350	
Hydrocladial hydrotheca, length abcauline wall	560 - 575	505 - 530
length free part adcauline wall	540 - 555	405 - 445
length adnate part adcauline wall	345 - 385	370 - 405
total depth	775 - 800	665 - 725
maximal diameter	385 - 390	340 - 355
diameter at rim	175 - 190	185 - 190
Male gonotheca, length	3,040	
maximal diameter	1,085	
diameter aperture	195	

Development of perisarc characteristic in this species, thick along walls of axis and hydrocladia, gradually thinning out along tubular part of hydrothecae. Monosiphonic part of axis and hydrocladia with longitudinal internal perisarcal ribs connecting basal portions of adnate part adcauline hydrothecal walls, leaving free central canal for passage of coenosarc. Moreover triangular, thin, perisarcal plates occur on both sides (front and back) of hydrothecae; base of these plates at hydrothecal bottom; apex broadly rounded (fig. 19b). Perisarc yellowish; horny brown on polysiphonic parts of axis.

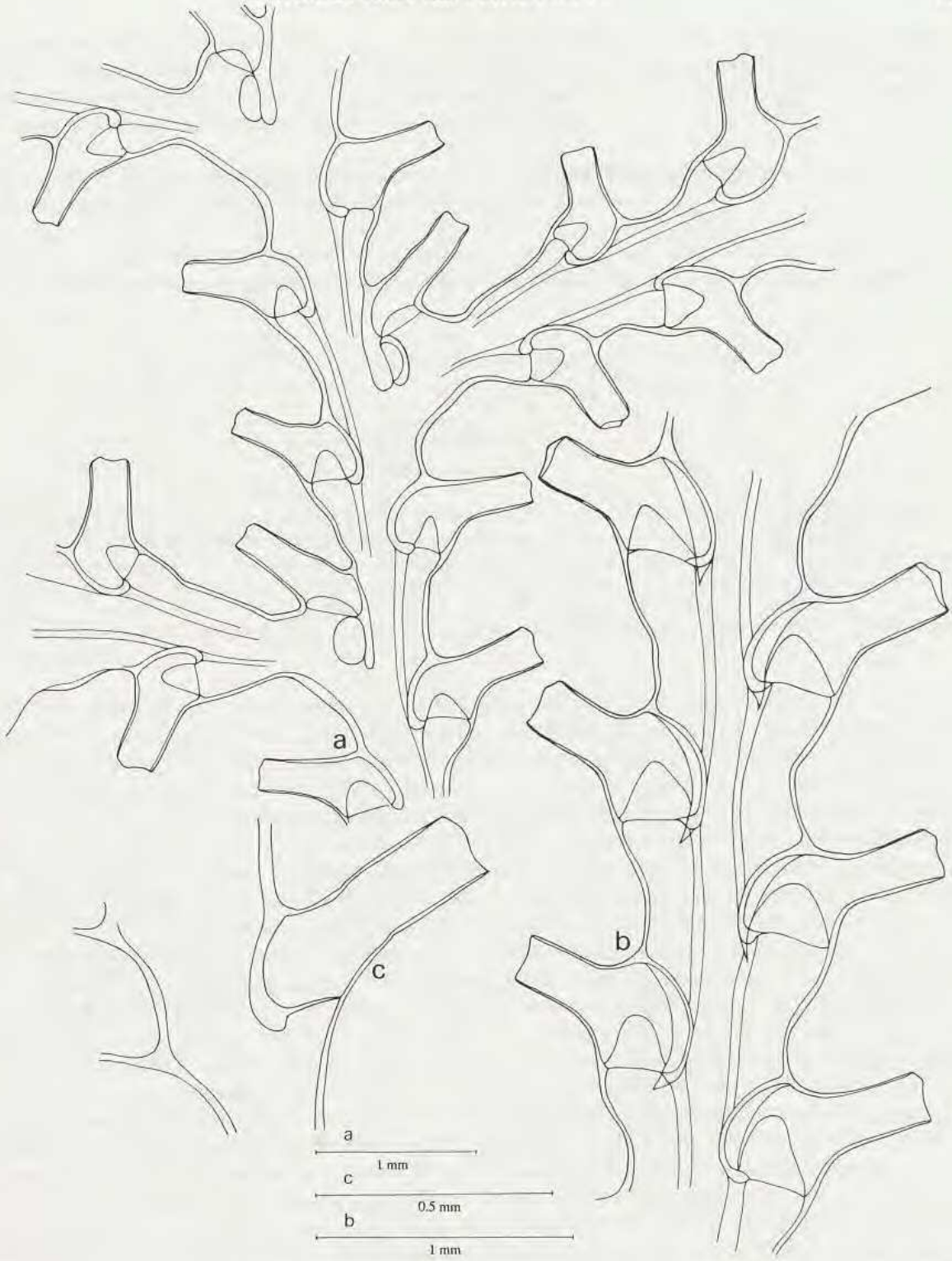

FIG. 19 a-b. — *Gonaxia crassicaulis* sp. nov., schizoholotype, SMIB 4, Stn DW 55 : **a**, top part of colony; **b**, part of hydrocladium.
FIG. 19 c. — *Gonaxia elegans* sp. nov., schizoparatype, MUSORSTOM 4, Stn CP 217, hydrocladial hydrotheca.
a, slide no. 1052; b, slide no. 713; c, slide no. 1050.

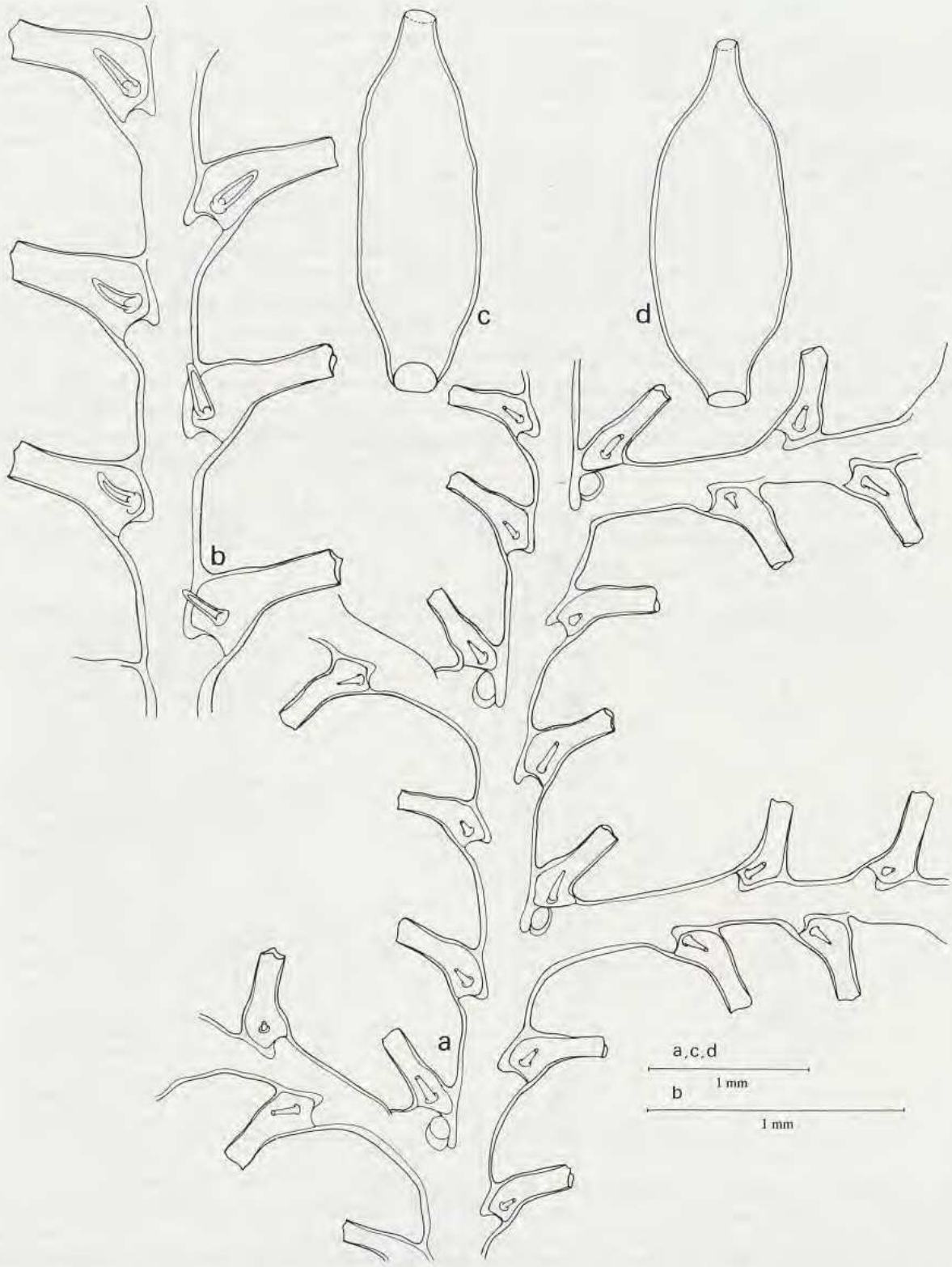

FIG. 20. — *Gonaxia crusgalli* sp. nov. : **a-b**, schizoholotype, SMIB 5, Stn DW 101 : **a**, top part of colony; **b**, part of hydrocladium. — **c-d**, SMIB 5, Stn DW 93 : **c**, female gonotheca; **d**, male gonotheca.
a-b, slide no. 1047; c-d, slide no. 1049.

Gonothecae, as in *Gonaxia pachyclados*, occur in profusion on frontal aspect of colony, inserted at bases of hydrothecae or between those bases; they point forward. Holotype with (presumed) male gonothecae, elongated ovoid, gradually tapering apically towards a small funnel with narrow aperture, probably originally closed by lid (fig. 18d). Base of gonothecae fairly wide, circular. All gonothecae empty.

DISTRIBUTION. — The type locality is at the extreme northwestern end of the Norfolk Ridge, the second locality is also at the tip of the Norfolk Ridge; depth between 260 and 650 m.

REMARKS. — Though in appearance much like *Gonaxia crassa* and *G. pachyclados*, it is distinguished directly by the curious development of the periderm inside axis and hydrocladia. The specimen from SMIB 4, Stn DW 59, has a forked axis.

ETYMOLOGY. — From the latins words *crassus* (thick, fat, stout) and *caulis* (stalk, stem).

Gonaxia crusgalli sp. nov.

Figs 18e, 20a-d, 21a

MATERIAL EXAMINED. — **New Caledonia**. SMIB 5 : stn DW 93, 22°20.0'S-168°42.3'E, 255 m, 13.09.1989 : four colonies c. 50 mm high with male and female gonothecae on stems (paratypes). Colonies heavily overgrown, e.g. by *Filellum serratum* (Clarke, 1879), *Zygophylax* sp. (with coppinia), and Bryozoa [MNHN-Hy. 1027, 1 paratype; BMNH 1989.11.24.26, 1 paratype; RMNH-Coel. 25801, 2 paratypes, 2 slides no. 956 (schizoparatypes) and slide no. 1049 (gonothecae)]. — Stn DW 101, 23°21.2'S-168°04.9'E, 270 m, 14.09.1989 (type locality) : single stem c. 30 mm high with female gonothecae (holotype) and some smaller fragments (all MNHN-Hy. 1028). Slide no. 1047, schizoholotype (RMNH-Coel. 25802).

DESCRIPTION (based on all available material). — Species in structure of colony and shape of hydrothecae much resembling *Gonaxia sinuosa* sp. nov. Axis upright, straight, not forked, not particularly strong, polysiphonic in proximal region by presence of many parallel accessory tubules, monosiphonic in distal region, bearing alternate hydrocladia, leaving axis at almost right angle and inserting on conspicuous apophyses (fig. 20a). No division into internodes visible on axis or hydrocladia, though hydrocladium may be separated from apophysis by oblique perisarcal constriction. Hydrocladia 10-18 mm long, with 10-15 pairs of alternate hydrothecae; all hydrothecae, with axis and hydrocladia, in one plane; hydrocladial apophysis with circular foramen surrounded by circular halo. Hydrothecae of three types : axial, axillary and hydrocladial. Axial and hydrocladial hydrothecae nearly similar, resembling those of *G. sinuosa*, but with longer tubiform distal portion and less sharp flexure (figs 18e, 21a). Free part adcauline wall 1.5 to twice as long as adnate part, with distinct though shallow proximal bulge, axil between that wall and wall of axis or internode wide, c. 60 degrees, rounded. Adnate part adcauline wall straight and thick, with rounded peg at hydrothecal base, continued for some distance on lateral walls of axis or hydrocladium. Hydrothecal base, as in *G. sinuosa*, strongly convex, thin. Abcauline hydrothecal wall with rounded concavity in proximal third, occasionally slightly bulging below that cavity. Hydrothecal margin with three obtuse, rounded cusps, in majority of hydrothecae observed to be composed of one median abcauline cusp and two lateral, adcauline cusps. Position of marginal cusps slightly displaced in some hydrothecae. Axillary hydrothecae almost tubular; free part adcauline wall with slight convexity proximally, adnate part strongly thickened, lengthened, with club-shaped end; hydrothecal floor straight. Abcauline hydrothecal margin straight (fig. 21a). Many hydrothecae with complete or partially present opercula, when complete composed of three triangular flaps attached in shallow embayments between hydrothecal cusps (fig. 18e). Proximal portion of all hydrothecae externally with a conspicuous spur on each side, pointing away from hydrotheca and directed slightly upwards (figs 18e, 20a-b, 21a). These spurs form a most striking characteristic of this species, being also distinctly present on axial and axillary hydrothecae, pointing outwards between accessory tubules. Spurs hollow, communicating with hydrothecal cavity through circular foramen, originally probably closed apically, but in material inspected also with open end, apparently because of damage. As hydranths in all material available are in bad condition it could not be ascertained whether or not spurs are filled with tissue.

Female and male gonothecae occur on different colonies and are arranged along front of stems, inserting on apophyses at fenestra, pointing away from colony and slightly upwards. Both types of gonothecae elongated ovoid, narrowing near base and apex; female gonotheca slightly narrowed apically with comparatively large circular opening terminally (fig. 20c); male gonothecae tapering apically into fairly narrow neck with small, circular aperture (fig. 20d). All gonothecae are spent.

Perisarc conspicuous, particularly along walls of axis and hydrocladia, thinning out gradually along hydrothecal walls. Gonothecae also with thick perisarc. Colour of perisarc yellowish, as *G. sinuosa* reluctant to stain in haematoxyline solution. Colonies dirty, covered by many epizoites, particularly Bryozoa, though sedentary hydroids also occur in profusion.

TABLE 14. — Measurements of *Gonaxia crusgalli* sp. nov., in µm.

	SMIB 5 Stn DW 101 (slide no. 1047, schizo-holotype)	SMIB 5 Stn DW 93 (slide no. 1049)
Axis, diameter at base	960	
Axial hydrotheca, length abcauline wall	450 - 475	
length free part adcauline wall	375 - 400	
length adnate part adcauline wall	280 - 290	
total depth	545 - 590	
maximal diameter	235 - 245	
diameter at rim	150 - 160	
length of spur	155 - 185	
Axillary hydrotheca, length abcauline wall	405 - 420	
length free part adcauline wall	435 - 445	
length adnate part adcauline wall	345 - 360	
total depth	575 - 620	
maximal diameter	170 - 185	
diameter at rim	140 - 150	
length of spur	175 - 205	
Hydrocladium, diameter at base	245 - 280	
Hydrocladial hydrotheca, length abcauline wall	490 - 520	
length free part adcauline wall	445 - 480	
length adnate part adcauline wall	265 - 280	
total depth	590 - 605	
maximal diameter	250 - 275	
diameter at rim	150 - 155	
length of spur	155 - 175	
Female gonotheca, length		2,390
diameter		715
diameter of aperture		195
Male gonotheca, length		2,150
diameter		780 - 800
diameter of aperture		150

DISTRIBUTION. — This species has been found at two isolated, fairly shallow localities surrounded by deeper water, one at the extreme northwestern end of the Norfolk Ridge (SMIB 5, Stn DW 101, type locality, 270 m depth), the other (SMIB 5, Stn DW 93) on the southeastern continuation of the Loyalty Ridge, south of Durand Reef, at 255 m depth.

ETYMOLOGY. — From the latin *crus* (leg) and *gallus* (cock), 'with the legs of a cock', referring to the spur at the hydrothecal base.

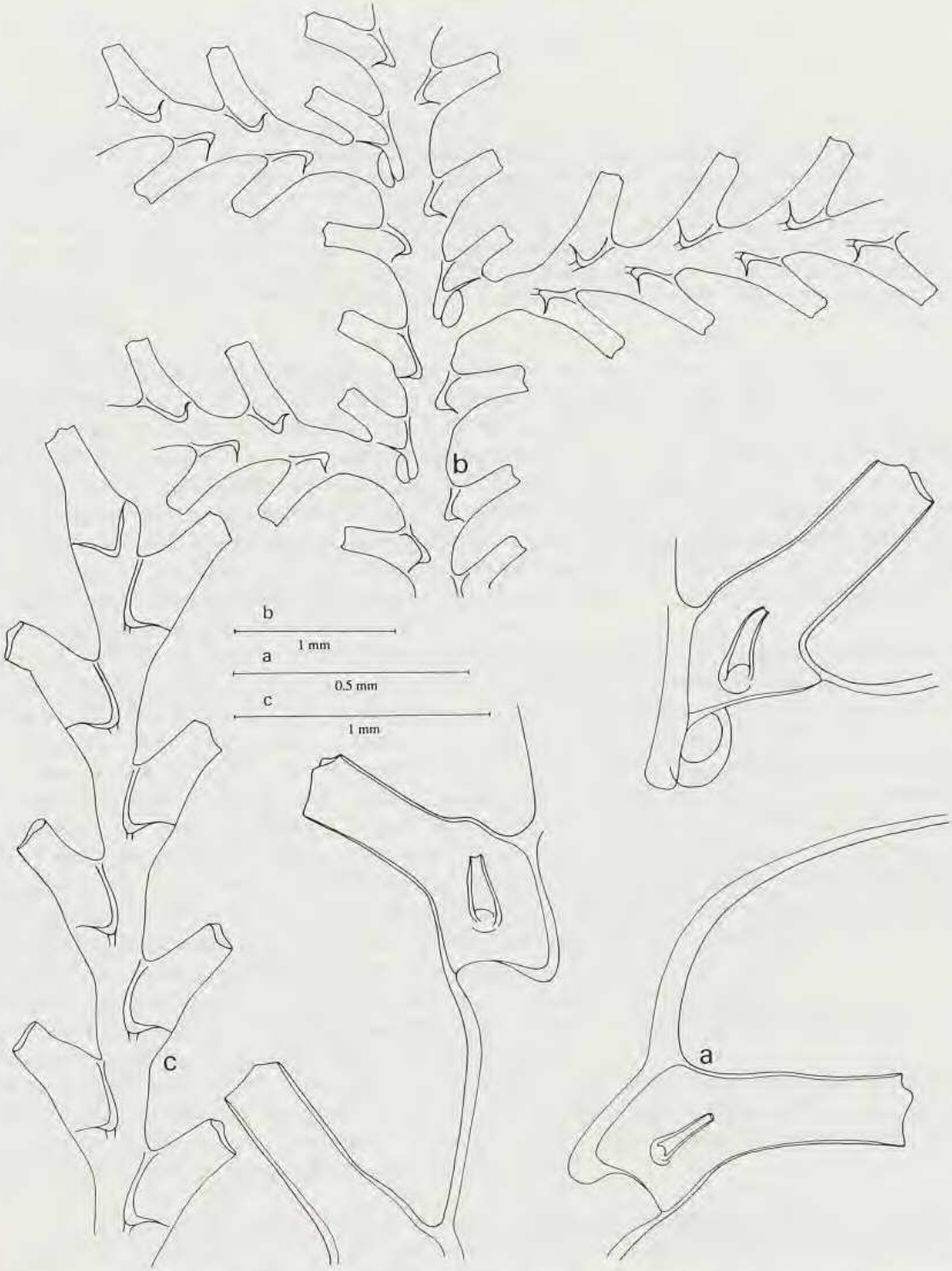

FIG. 21 a. — *Gonaxia crusgalli* sp. nov., schizoholotype, SMIB 5, Stn DW 101, part of axis with insertion of hydrocladium and axillary hydrotheca.

FIG. 21 b-c. — *Gonaxia elegans* sp. nov. : **b**, schizoparatype, MUSORSTOM 4, Stn CP 217, top part of colony. — **c**, MUSORSTOM 4, Stn CP 194, part of hydrocladium.
a, slide no. 1047; b, slide no. 1050; c, slide no. 1025.

FIG. 22. — *Gonaxia elegans* sp. nov. : **a**, schizoparatype, MUSORSTOM 4, Stn CP 217, insertion of hydrocladium on axis and axillary hydrotheca; **b**, MUSORSTOM 4, Stn CP 194, part of hydrocladium; **c**, MUSORSTOM 4, Stn CP 217, part of axis with female gonothecae, frontal view.
a, slide no. 1050; b, slide no. 1029; c, slide no. 855.

Gonaxia elegans sp. nov.

Figs 19c, 21b-c, 22a-c

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4 : stn DW 163, 18°33.80'S-163°11.50'E, 350 m, 16.09.1985 : single 40 mm high colony, no gonothecae; slide no. 1025 of hydrocladium (all RMNH-Coel. 25803). — Stn CP 194, 18°52.80'S-163°21.70'E, 550 m, 19.09.1985 : single hydrocladium 12 mm long, as slide no. 1029 (RMNH-Coel. 25804). — Stn CP 217, 23°03.60'S-167°27.00'E, 850 m, 29.09.1985 (type locality) : seven colonies and colony fragments, in addition some loose hydrocladia. Many stems with female gonothecae. Two slides no. 855 (part of stem with gonothecae and 3 hydrocladia) and slide no. 1050 of top part (schizoparatype). Holotype is a 70 mm high stem (base and top part missing) with female gonothecae; rest of material, including slides, are paratypes [MNHN-Hy. 1029, holotype, 2 paratypes, 1 slide no. 885; BMNH 1989.11.24.27, 2 paratypes; RMNH-Coel. 25805, rest paratypes, slides nos 855 (1) and 1050].

DESCRIPTION (based on holo- and paratypes). — Colony structure as in *Gonaxia amphorifera* and *G. intermedia*; colonies with upright and rigid axis, polysiphonic in basal parts, monosiphonic distally (fig. 21b), with small flattened portion basally by means of which colony was attached to solid substrate (rocks, corals, etc.). Hydrocladia pinnately and alternately arranged along axis, placed on distinct apophyses (fig. 22a), usually with three hydrothecae between two successive hydrocladia, one of which is axillary. Hydrocladia diverging from axis almost perpendicularly, slightly directed upwards and slightly curved downwards, with c. 16 pairs of alternately arranged hydrothecae, in one plane with hydrocladia and axis. Apophysis distinct though not particularly large, hydrocladium separated from apophysis by slightly oblique, indistinct perisarcal constriction. Internodes slender, hydrothecae separated by considerable interval; knob at hydrothecal base slightly above axil formed by adcauline hydrothecal wall and wall of hydrocladium, angle between both walls c. 60 degrees.

Three types of hydrothecae present : axial, axillary and hydrocladial. Axial and hydrocladial hydrothecae only differing in size, slender, free part adcauline hydrothecal wall c. twice length of adnate part, straight or with scarcely visible convexity proximally. Adnate part of adcauline wall curved, thickened, running into distinct knob at hydrothecal floor (fig. 19c), continuation of perisarc of knob on lateral wall hydrocladium usually distinct. Hydrothecal floor present as slightly convex plate; hydranth attached at extreme internal corner. Abcauline hydrothecal wall with point of flexure at c. halfway length, parts proximal and distal to this point straight. Hydrotheca slender, graceful, basal portion slightly swollen, distal portion slightly tapering, forming direct continuation of basal part without evidence of curvature (fig. 21c), in many colonies almost tubular (fig. 22b). Axillary hydrothecae tubular, occasionally slightly curved, peg at hydrothecal floor greatly lengthened, flanked by ellipsoid fenestra (fig. 22a). Hydrothecal margin with three obtuse, rounded cusps, one median abcauline and two laterals near adcauline hydrothecal wall. Hydrothecae at protected spots may bear some triangular opercular flaps; many other hydrothecae show signs of repair after sustaining damage.

Hydranths present in majority of colonies, small, contracted, tentacle number indeterminable.

Perisarc well developed, though not particularly thick, with exception of walls of axis or hydrocladium, where thickness may occasionally be considerable, hyaline, yellowish on axis.

Only female gonothecae observed, occurring on frontal part of colony and arising from wide secondary tube running length of axis. Gonothecae elongated sack-shaped bodies, fused with secondary tube or neighbouring gonothecae over part of their length, apical part free, gradually narrowing and terminally with circular opening (fig. 22c). No contents visible; perisarc of gonotheca yellowish-brown.

DISTRIBUTION. — The type locality is at the extreme northwestern end of the Norfolk Ridge, southeast of the southern extremity of New Caledonia. Isolated specimens were also recorded from the Grand Passage area, northwest of New Caledonia. The depth records are between 350 and 850 m.

REMARKS. — This species resembles both *Gonaxia amphorifera* and *G. intermedia* but differs in the shape of hydro- and gonothecae.

ETYMOLOGY. — From the latin word *elegans*, meaning tasteful, fine, referring to the elegant shape of the colonies in this species.

TABLE 15. — Measurements of *Gonaxia elegans* sp. nov., in µm.

	MUSORSTOM 4 Stn CP 217 (slide no. 1050)	MUSORSTOM 4 Stn DW 163 (slide no. 1025)	MUSORSTOM 4 Stn CP 194 (slide no. 1029)
Stem, diameter at base	1,000 - 1,500		
Axial hydrotheca, length abcauline wall	345 - 375		
length free part adcauline wall	345 - 370		
length adnate part adcauline wall	215 - 235		
total depth	495 - 525		
maximal diameter	190 - 200		
diameter at rim	105 - 125		
Axillary hydrotheca, length abcauline wall	290 - 320		
length free part adcauline wall	340 - 385		
length adnate part adcauline wall	320 - 345		
total depth	465 - 480		
maximal diameter	135 - 140		
diameter at rim	110 - 120		
Hydrocladium, diameter at base	200 - 210		
Hydrocladial hydrotheca, length abcauline wall	400 - 405	355 - 370	400 - 405
length free part adcauline wall	310 - 370	295 - 365	385 - 395
length adnate part adcauline wall	235 - 265	275 - 290	215 - 230
total depth	520 - 555	495 - 505	505 - 510
maximal diameter	190 - 205	215 - 220	215 - 220
diameter at rim	125 - 135	120 - 135	125 - 135
Female gonotheca, approximate length	1,735		
approximate diameter	435		
diameter of aperture	150		

Gonaxia errans sp. nov.

Figs 23a-d, 24a-c

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn CP 31, 23°07.26'S-166°50.55'E, 850 m, 29.08.1985 : single colony 35 mm high, no gonothecae (paratype); all in slide no. 787 (RMNH-Coel. 25806). — Stn DW 51, 23°05.27'S-167°44.95'E, 700-680 m, 31.08.1985 (type locality) : single 20 mm long stem fragment with 8 hydrocladia, no gonothecae. All in 2 slides no. 535, 1 holotype (MNHN-Hy. 1030), 1 schizoholotype (RMNH-Coel. 25807).

DESCRIPTION (mainly based on BIOCAL, Stn DW 51, fragment). — Stem polysiphonic, upper part devoid of secondary tubes and monosiphonic; this part of stem does not show division into internodes. Stem hydrothecae alternately arranged, pointing left or right and all in one plane, tubular, with apical portion slightly narrowing, turned away from stem and diverging at angle of c. 45 degrees (figs 23a, 24a); fused part of adcauline hydrothecal wall generally longer than free part (up to twice as long); abcauline wall slightly concave. Apophyses supporting hydrocladia also alternately arranged at base of stem hydrothecae; axillary hydrotheca slightly deformed, with elongated basal portion (fig. 23b), zero to three hydrothecae between two successive apophyses (fig. 23a). Circular hole present in each apophysis near base of axillary hydrotheca, probably serving attachment of gonothecae. Hydrocladia indistinctly divided into internodes by means of weak perisarcal constrictions in axil of hydrocladial hydrothecae, nodes only occasionally developed. Distinct perisarcal twist in proximal part of first internode of hydrocladia (fig. 23a).

Shape of hydrocladial hydrothecae more or less tubular, free portion straight (fig. 23d) or slightly curved (fig. 24b), pointing away from internode at angle of c. 45 degrees, with distinct, flattened portion in axil between adcauline wall and internode. Free and adnate portions of adcauline wall of about same length; abcauline wall concave, in some hydrothecae more or less flexed. Rim of stem- and hydrocladial hydrothecae with three blunt cusps, one abcauline and two laterals, usually without renovations (fig. 24c). Some of hydrothecae with remnants

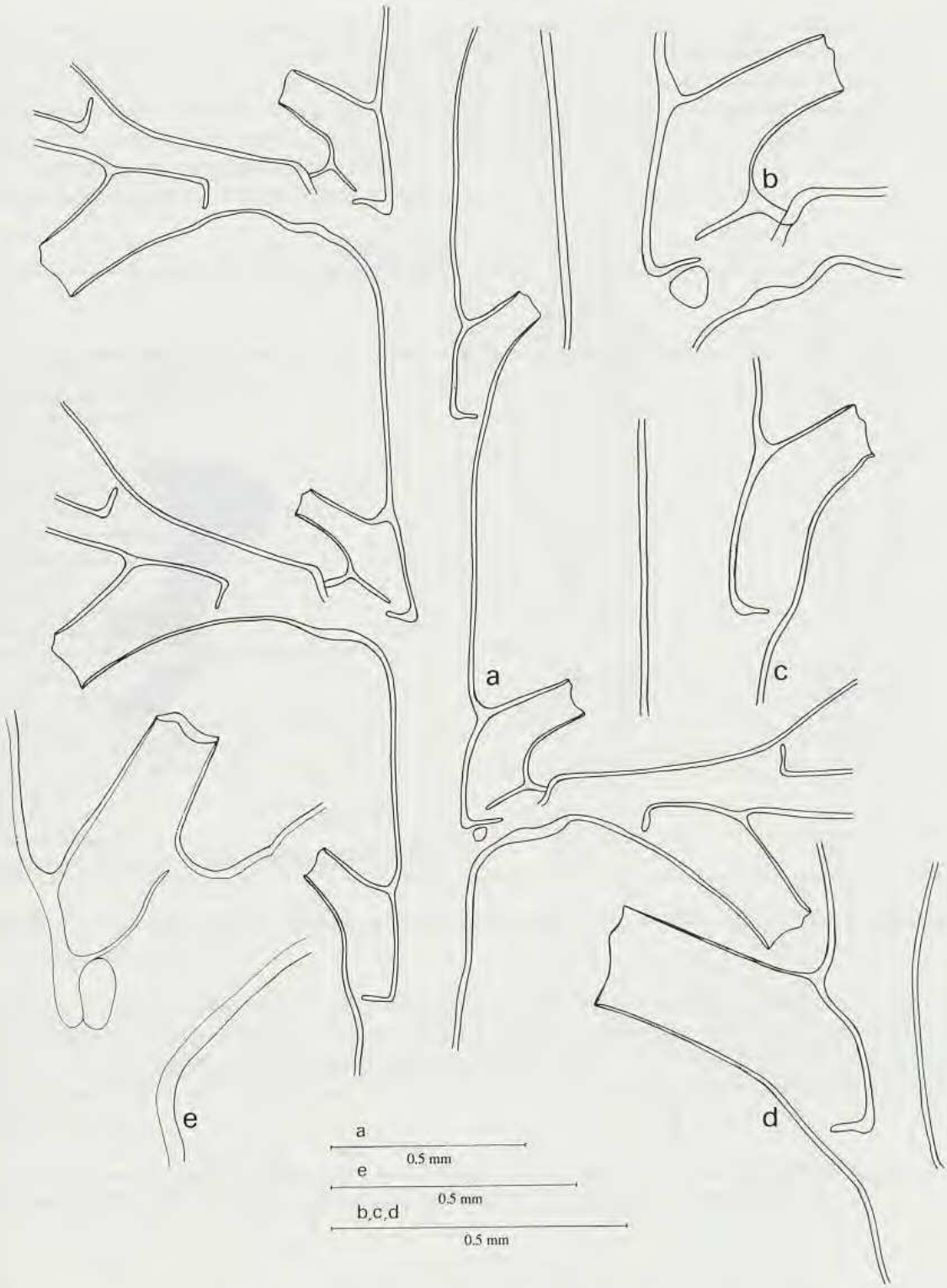

FIG. 23 a-d. — *Gonaxia errans* sp. nov., paratype, BIOCAL, Stn CP 31 : **a**, monosiphonic distal part of colony; **b**, axillary hydrotheca; **c**, stem hydrotheca; **d**, hydrocladial hydrotheca.
FIG. 23 e. — *Gonaxia intermedia* sp. nov., paratype, MUSORSTOM 4, Stn CP 172, axillary hydrotheca.
a-d, slide no. 787; e, slide no. 862.

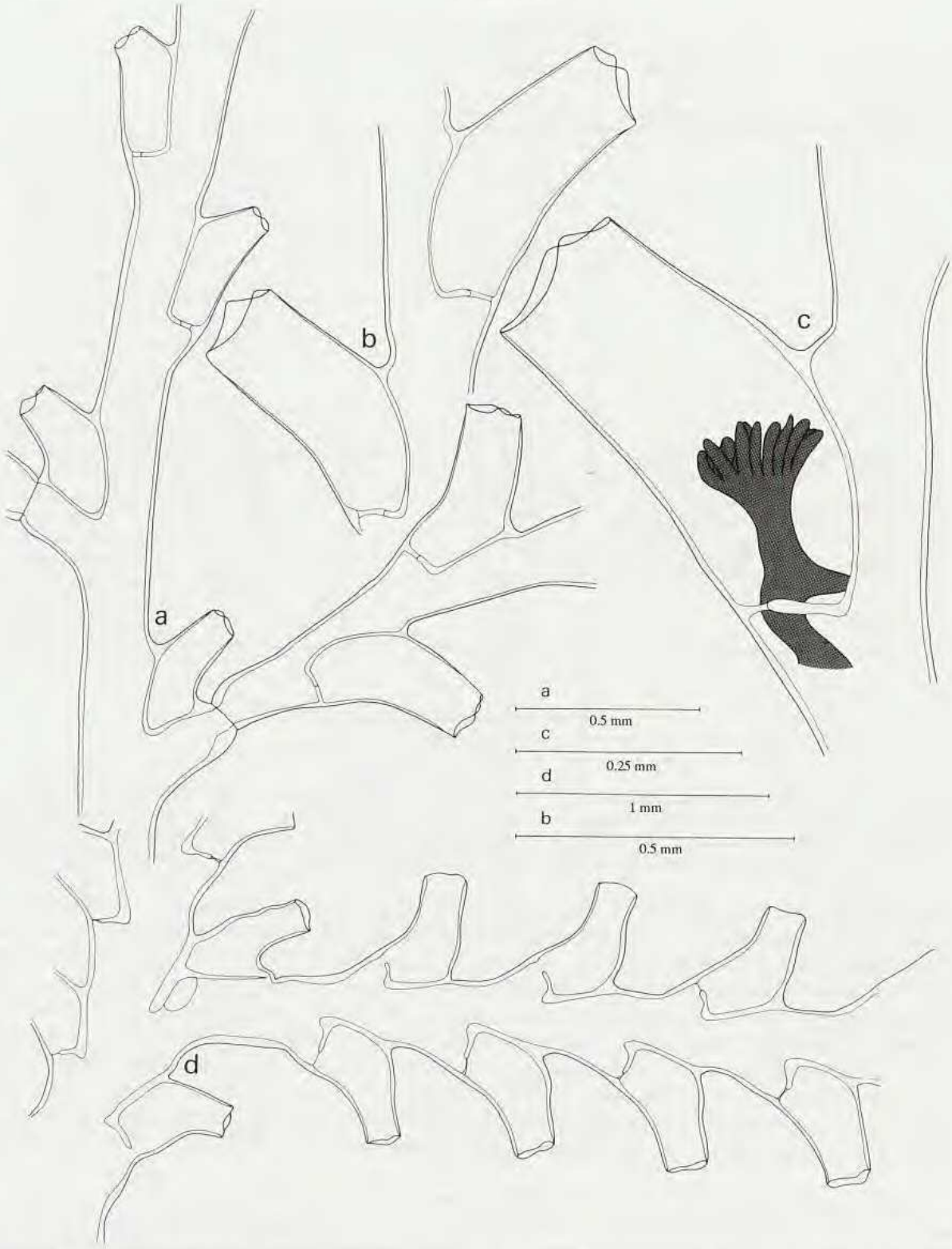

FIG. 24 a-c. — *Gonaxia errans* sp. nov., holotype, BIOCAL, Stn DW 51 : **a**, monosiphonic distal part of colony; **b**, two hydrocladial hydrothecae; **c**, hydrocladial hydrotheca with its hydranth.
FIG. 24 d. — *Gonaxia intermedia* sp. nov., paratype, MUSORSTOM 4, Stn CP 172, insertion of hydrocladium on axis. a-c, slide no. 535; d, slide no. 862.

of opercular apparatus, which is apparently deciduous and composed of three hyaline flaps closing over hydrothecal aperture to form a low roof. No internal thickening in hydrothecae; many hydrothecae damaged.

Hydranths present in majority of hydrothecae, small compared to size of hydrothecal cavity (fig. 24c), completely attached to basal fold of adcauline hydrothecal wall (consequently no ligament attaching it to inside of abcauline wall), with c. 14 tentacles armed with small nematocysts. Perisarc of colony thick on stem and hydrocladia, thinning out along hydrothecal wall.

No gonothecae have been observed, though cicatrices are present on apophyses of stem.

TABLE 16. — Measurements of *Gonaxia errans* sp. nov., in µm.

	BIOCAL Stn DW 51 (slide no. 535)	BIOCAL Stn CP 31 (slide no. 787)
Stem hydrotheca, length abcauline wall	270 - 275	285 - 320
length adnate part adcauline wall	280 - 295	260 - 280
length free part adcauline wall	110 - 140	160 - 175
total depth	360 - 435	370 - 415
diameter at rim	95 - 110	80 - 90
maximal diameter	135 - 155	110 - 125
Axial hydrotheca, length abcauline wall	190 - 205	210 - 215
length adnate part adcauline wall	265 - 280	275 - 295
length free part adcauline wall	170 - 205	190 - 220
total depth	430 - 445	445 - 450
diameter at rim	90 - 110	85 - 90
maximal diameter	135 - 140	140 - 160
Hydrocladial internode, length (constriction to constriction)	320 - 525	355 - 405
diameter at node	90 - 135	125 - 130
Hydrocladial hydrotheca, length abcauline wall	385 - 405	390 - 405
length adnate part adcauline wall	260 - 275	250 - 275
length free part adcauline wall	260 - 275	275 - 325
total depth	465 - 490	475 - 505
diameter at rim	160 - 175	150 - 155
maximal diameter	200 - 215	160 - 185
Distance between bases of hydrocladial hydrothecae	415 - 435	370 - 405

DISTRIBUTION. — Observed at two stations on the northern part of the Norfolk ridge, off the southeastern tip of New Caledonia, depth 680-850 m.

REMARKS. — The two specimens mentioned above only differ slightly in the length of the free portion of the adcauline hydrothecal wall (figs 23d, 24b-c), but are evidently conspecific. This species resembles *Gonaxia complexa* sp. nov. but differs by the shorter hydrotheca; the free portion of axial and stem hydrothecae, moreover, is distinctly curved in *G. errans*. The material from BIOCAL, Stn DW 51, has 'septa' separating apophyses from hydrocladia (fig. 24a).

ETYMOLOGY. — The specific name *errans* is a reference to the uncertain generic position of the species, which was first considered to belong to *Symplectoscyphus*. From the latin verb *erro*, to wander, to stray.

Gonaxia intermedia sp. nov.

Figs 23e, 24d, 25a-c, 26a

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4 : stn CP 158, 18°49.30'S-163°15.00'E, 630 m, 15.09.1985 : two hydrocladia, 6 and 13 mm length, made up in slide no. 353C (RMNH-Coel. 25808). — Stn DW 163, 18°33.80'S-163°11.50'E, 350 m, 16.09.1985 : two hydrocladia; slides nos 401 (RMNH-Coel. 25809) and 1024 (MNHN-Hy. 1031). — Stn CP 171, 18°57.80'S-163°14.00'E, 435 m, 17.09.1985: c. 50 colonies and colony fragments, up to

80 mm high and many loose hydrocladia. Male and female gonothecae present on stems; 5 slides no. 861 (MNHN-Hy. 1032, 10 colonies, fragments and 1 slide no. 861; BMNH 1989.11.24.28, 10 colonies, fragments and 1 slide no. 861; RMNH-Coel. 25810, rest colonies, fragments and 3 slides no. 861). — Stn CP 172, 19°01.20'S-163°16.00'E, 275-330 m, 17.09.1985 (type locality) : c. 50 colonies 10-80 mm high and many detached hydrocladia. Some colonies with *Diphasia* sp. Many predominantly female gonothecae on stems; 2 slides no. 862 and 2 slides no. 1026. One 65 mm high specimen with forked axis is holotype (MNHN-Hy. 1033); remaining colonies from this station, including slides, are paratypes (MNHN Hy 1033, 10 paratypes and 1 slide no. 862; BMNH 1989.24.29, 10 paratypes and 1 slide no. 1026; RMNH-Coel. 25811, rest paratypes, 1 slide no. 648, 1 slide no. 862 and 1 slide no. 1026). — Stn CP 179, 18°56.60'S-163°13.70'E, 480 m, 18.09.1985 : seventy mm high stem and 3 fragments, one with male gonothecae; 3 slides no. 878 (MNHN-Hy. 1034, 1 slide no. 878; BMNH 1989.11.24.30, 1 slide no. 878; RMNH-Coel. 25812, colony, fragments and 1 slide no. 878). — Stn CP 180, 18°56.80'S-163°17.70'E, 450 m, 18.09.1985 : c. 25 colonies, mainly broken, up to 80 mm high, many with female and male gonothecae. Also many fragments and detached hydrocladia. Two slides no. 860 (MNHN-Hy. 1035, 5 colonies and some fragments; BMNH 1989.11.24.31, 5 colonies and some fragments; RMNH-Coel. 25813, rest colonies and fragments, 2 slides no. 860). — Stn CP 194, 18°52.80'S-163°21.70'E, 550 m, 19.09.1985 : single hydrocladium, as slide no. 1028 (RMNH-Coel. 25814). — Stn CP 216, 22°59.50'S-167°22.00'E, 490-515 m, 29.09. 1985 : ninety mm high stem with female gonothecae and some hydrocladia (MNHN-Hy. 1036); slide no. 453 of 3 hydrocladia (RMNH-Coel. 25815). — Stn CP 237, 22°12.00'S-167°16.50'E, 630 m, 02.10.1985 : two hydrocladia 10 and 15 mm long, all in slide no. 457 (RMNH-Coel. 25816).

DESCRIPTION. — Resembling *Gonaxia amphorifera* and *Gonaxia ampullacea* in general appearance. Colony regularly pinnate, with strong, upright, occasionally forked stem along which hydrocladia are alternately arranged, each on distinct apophysis, leaving axis under almost right angle (fig. 25a). Hydrocladia long and slightly downward curved, with 26-30 pairs of hydrothecae, basal part of hydrocladium with oblique perisarcal constriction. Hydrothecae only moderately enlarged proximally (figs 25b-c, 26a); free portion adcauline hydrothecal wall straight or with minor proximal convexity, axil between this part of hydrothecal wall and wall hydrocladium not deepened, rectangular to slightly less (c. 75 degrees maximally), free portion adcauline wall as long as to c. 1.5 times longer than adnate part. Hydrothecae along hydrocladia separated by wider gap than in two previously named species; deepest part of adnate adcauline wall of succeeding (opposite) hydrotheca (the notch at hydrothecal floor) at level with axil of preceding (opposite) hydrotheca (fig. 26a) or slightly above (fig. 25b-c) (i.e. almost same condition as observed in *G. ampullacea*).

TABLE 17. — Measurements of *Gonaxia intermedia* sp. nov., in µm.

	MUSORSTOM 4 Stn CP 172 (slide no. 862)
Stem, diameter at base	1,500 - 2,000
Stem hydrotheca, length abcauline wall	320 - 335
length free part adcauline wall	275 - 290
length adnate part adcauline wall	250 - 335
total depth	415 - 450
maximal diameter	190 - 215
diameter at rim	120 - 135
Axillary hydrotheca, length abcauline wall	245 - 260
length free part adcauline wall	260 - 275
length adnate part adcauline wall	265 - 280
total depth	480 - 520
maximal diameter	160 - 175
diameter at rim	120 - 135
Hydrocladium, diameter at base	165 - 235
Hydrocladial hydrotheca, length abcauline wall	320 - 370
length free part adcauline wall	340 - 375
length adnate part adcauline wall	230 - 250
total depth	475 - 505
maximal diameter	220 - 235
diameter at apex	135 - 150

FIG. 25 a-c. — *Gonaxia intermedia* sp. nov. : **a-b,** paratype, MUSORSTOM 4, Stn CP 172 : **a,** monosiphonic distal part of colony; **b**, hydrocladial hydrothecae. — **c**, MUSORSTOM 4, Stn CP 158, part of hydrocladium.
FIG. 25 d. — *Gonaxia pachyclados* sp. nov., MUSORSTOM 4, Stn DW 205, female gonotheca.
a-b, slide no. 862; c, slide no. 353; d, slide no. 1051.

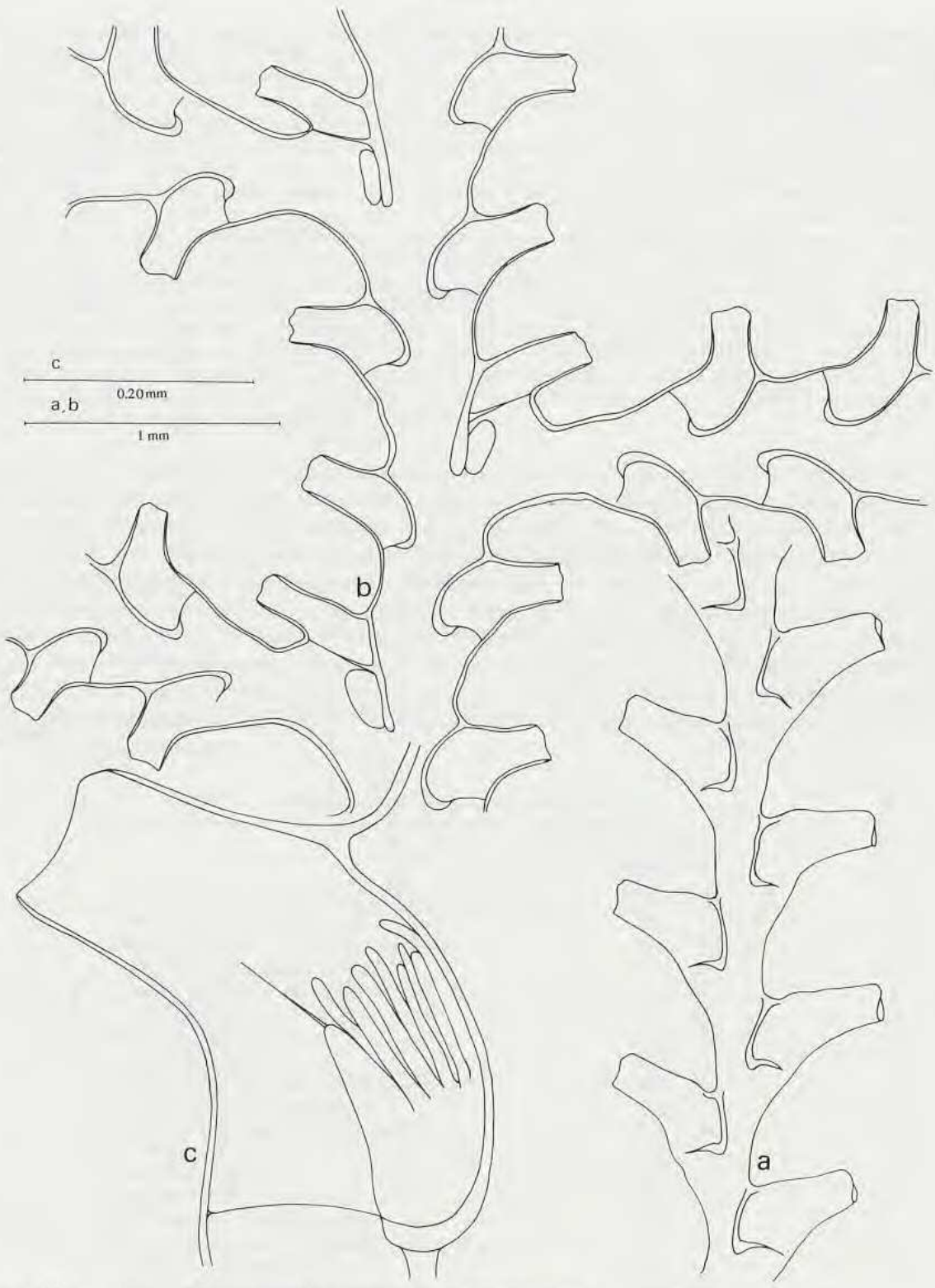

FIG. 26 a. — *Gonaxia intermedia* sp. nov., MUSORSTOM 4, Stn CP 158, part of hydrocladium.
FIG. 26 b-c. — *Gonaxia pachyclados* sp. nov., paratype, MUSORSTOM 4, Stn DW 205 : **b**, monosiphonic distal part of colony; **c**, hydrocladial hydrotheca with its hydranth.
a, slide no. 353C; b-c, slide no. 358.

Gonothecae as in *G. amphorifera* and *G. ampullacea*, but here at least female gonothecae occurring in great profusion, forming a compact zone along greater part of length of axis; gonothecae more or less in one row, almost completely adnate; apertures alternately pointing left and right, body of gonothecae covered by a profusion of fine, accessory tubules.

Perisarc moderately developed, thickest along walls of axis and hydrocladia; hydrothecae fairly thick-walled, perisarc gradually thinning out along hydrothecal walls. Perisarc of gonothecae yellowish-brown.

DISTRIBUTION. — The majority of the recorded localities, including the type locality, are off the extreme northwestern tip of New Caledonia, in the area of Grand Passage. There are two records from localities further south, viz. south of Kunie (Île des Pins) and the Pacific east of the southeastern part of New Caledonia. The depth records vary between 275 and 630 m.

REMARKS. — There are two points of major difference with *Gonaxia ampullacea* which it generally resembles, viz. the shape of the hydrothecae and the structure of the gonothecae.

1. Hydrothecae without a trace of a proximal swelling, consequently the proximal portion of the hydrotheca is differently shaped. There is no deepened ridge behind the free abcauline hydrothecal wall; the 'axil' is broadly rounded. Free part abcauline hydrothecal wall either straight or with slight proximal convexity (fig. 25b-c).

2. Female gonothecae almost completely coalesced, only small part of apical portion free, covering nearly whole of frontal aspect of axis, heavily covered by fine accessory tubules. Male gonothecae almost as in *Gonaxia ampullacea*, with a fine matting of accessory tubules.

ETYMOLOGY. — The specific name *intermedia* refers to the intermediate position of this species when compared with *Gonaxia amphorifera* and *G. ampullacea*. From the latin words *inter* (between, among) and *medius* (middle).

Gonaxia pachyclados sp. nov.

Figs 25d, 26b-c, 27a-b

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4 : stn DW 205, 22°38.50'S-167°06.80'E, 140-160 m, 27.09.1985 (type locality) : two broken, large, polysiphonic colonies with gonothecae on stem; c. 100 mm high colony (in 3 parts) holotype (2 parts MNHN-Hy. 1037; schizoholotype BMNH 1989.11.24.32), smaller colony and some loose hydrocladia (paratypes) as well as slides nos 358, 379 and 1051 of fragment, hydrocladia (paratypes) and gonothecae (all RMNH-Coel. 2817).

DESCRIPTION (based on holotype). — Colony pinnate, axis upright, strong and thick, basally c. 6 mm diameter, forked. Hydrocladia alternately arranged, up to 40 mm long with c. 40 pairs of hydrothecae, pointing laterally and slightly upwards, laterally compressed (fig. 27a), thick, with hydrothecae all in plane of ramification. Basal part of axis and ramifications strongly polysiphonic, only upper parts monosiphonic. In monosiphonic parts hydrocladia appear to insert on conspicuous apophyses (fig. 26b); between two consecutive apophyses there are three hydrothecae, one axillary, one left, one right; hydrotheca opposite apophysis with hydrothecal floor at level with axil formed by free adcauline wall and wall of axis of axillary hydrotheca (fig. 27b). No division of axis into internodes visible, nor are such internodes apparent on hydrocladia, that are separated from apophysis by slight perisarcal constriction (fig. 26b).

Three types of hydrothecae present : axial, axillary and hydrocladial. Axial and hydrocladial hydrothecae nearly similar, only differing in measurements, large, with slightly swollen basal portion and tubular, at times slightly narrowing apical portion (figs 26c, 27a). Abcauline hydrothecal wall with distinct flexure at about half its length; both proximal and distal parts nearly straight. Free part adcauline wall slightly concave to almost straight, slightly shorter than fused portion which is curved and thickened, ending proximally in rounded peg. Hydrothecal floor thin, convex and running from peg at adcauline wall towards end of abcauline wall, meeting point without thickening. Hydrothecal rim with three broadly rounded cusps, one abcauline and two laterals near adcauline border. Remnants of a closing apparatus are occasionally present; many hydrothecae also shows signs of repair after damage. Axillary

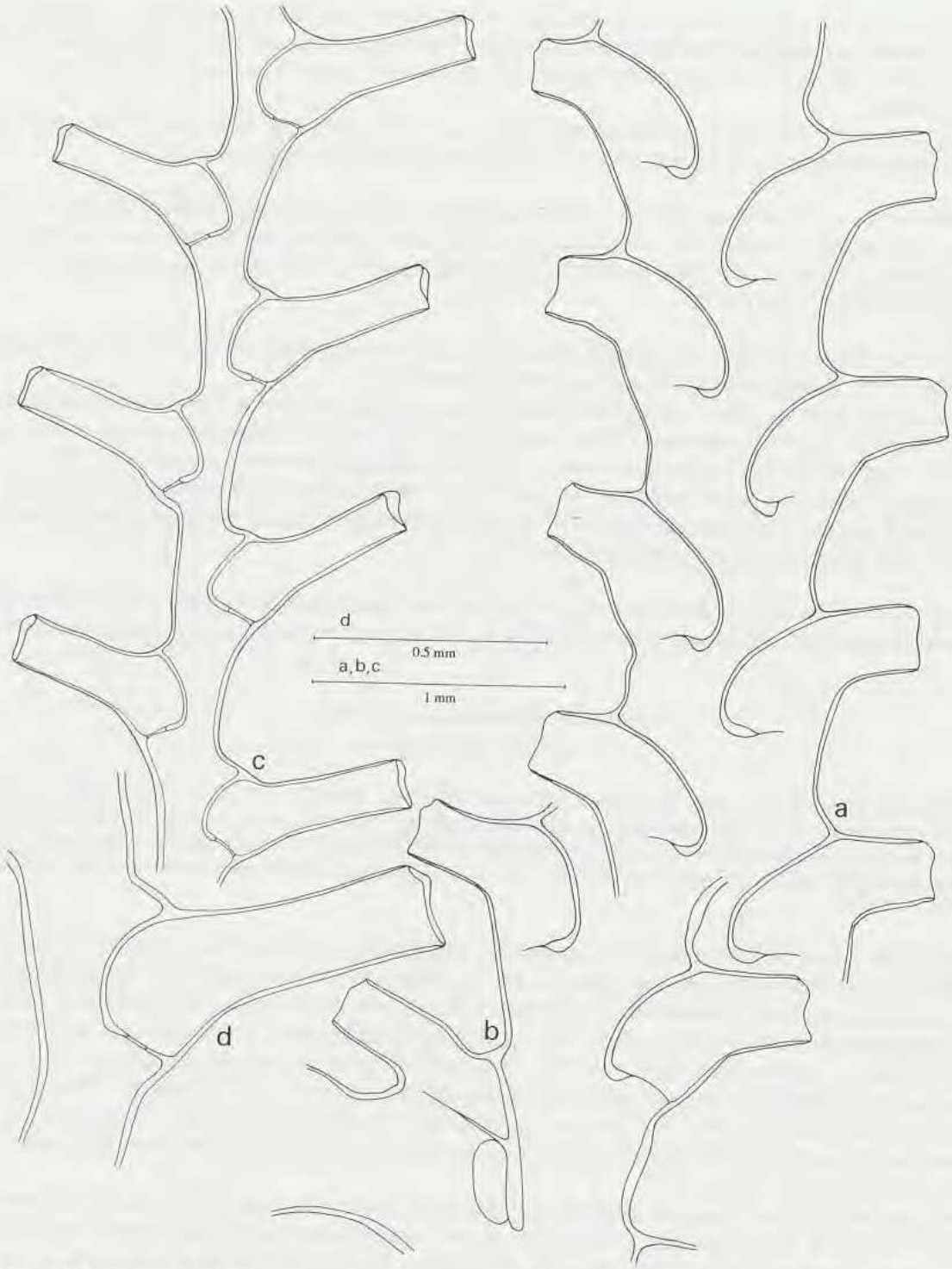

FIG. 27 a-b. — *Gonaxia pachyclados* sp. nov., MUSORSTOM 4, St. DW 205 : **a**, schizoholotype, part of hydrocladium; **b**, paratype, axillary hydrotheca.
FIG. 27 c-d. — *Gonaxia pexplexa* sp. nov., holotype, MUSORSTOM 5, Stn DC 375 : **c**, part of hydrocladium; **d**, hydrocladial hydrotheca.
a, slide no. 379; b, slide no. 358; c-d, slide no. 530.

hydrotheca tubular (fig. 27b); abcauline and free parts adcauline wall almost straight; adnate part of adcauline wall considerably thickened, extending deeply into apophysis, basal part next to large, oval fenestra. Hydrothecal floor straight, running upwards. Hydrothecal rim as in remaining hydrothecae; closing apparatus complete in some axillary hydrothecae and there seen to be composed of three more or less triangular valves, closing to form a low roof.

Gonothecae occur in profusion on frontal aspect of axis, very closely packed, inserting not only at bases of hydrothecae but also springing from stem between hydrothecae. Gonothecae large, elongated ovoid, narrowing both basally and apically. Basally they insert with broad circular foot on axis; apically they narrow into broad funnel with circular aperture, probably originally closed by circular lid (fig. 25d). All gonothecae empty and judging from their broad aperture, female.

Perisarc thick and yellowish, fairly thick on all parts of colony; thinning out gradually along walls of hydrotheca.

Hydranths present in holo- and paratype; those in paratype are best preserved (fig. 26c). Hydranths small, attached to inside of curved end of adnate part adcauline hydrothecal wall, small, with a small number of fairly thick tentacles (8-10) and with distinct abcauline caecum, attached to inside of hydrotheca by means of fine filament. All hydranths strongly contracted so that shape of proboscis could not be observed. Curved part adcauline wall apparently perforated as coenosarc is seen to continue under curved lip and to connect hydranths with strand of coenosarc inside hydrocladial internode.

TABLE 18. — Measurements of *Gonaxia pachyclados* sp. nov., in µm.

	MUSORSTOM 4 Stn DW 205 (slide no. 358) paratype	MUSORSTOM 4 Stn DW 205 (slide no. 1051)
Stem, diameter at base (taken from holotype)	6,000	
Axial hydrotheca, length abcauline wall	405 - 445	
length free part adcauline wall	335 - 340	
length adnate part adcauline wall	505 - 520	
total depth	680 - 695	
maximal diameter	295 - 320	
diameter at rim	205 - 215	
Axillary hydrotheca, length abcauline wall	355 - 370	
length free part adcauline wall	515 - 520	
length adnate part adcauline wall	660 - 705	
total depth	760 - 815	
maximal diameter	220 - 245	
diameter at rim	190 - 200	
Hydrocladium, diameter at node	465 - 470	
Hydrocladial hydrotheca, length abcauline wall	405 - 420	
length free part adcauline wall	205 - 305	
length adnate part adcauline wall	590 - 605	
total depth	680 - 710	
maximal diameter	320 - 345	
diameter at rim	205 - 220	
(Female) gonothecae, length		2,650 - 2,820
maximal diameter		780 - 870
diameter aperture		195 - 240

DISTRIBUTION. — *Gonaxia pachyclados* was found at one locality (type locality) off the southeastern tip of New Caledonia [west of Île des Pins (= Kunie)] at a depth of 140-160 m.

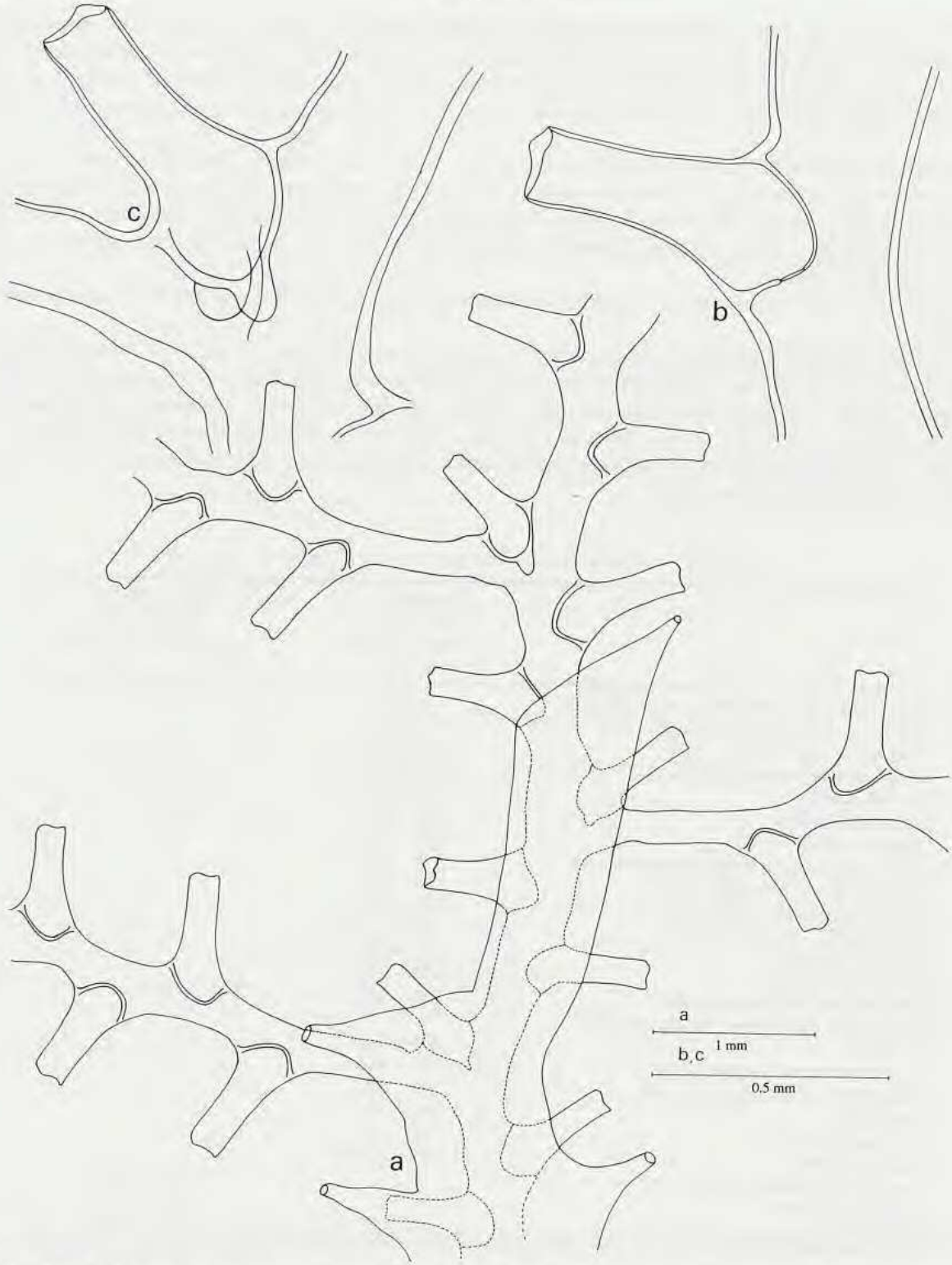

FIG. 28. — *Gonaxia perplexa* sp. nov., holotype, MUSORSTOM 5, Stn DC 375 : **a**, monosiphonic distal part of colony, backside, with male gonothecae; **b**, axial hydrotheca; **c**, axillary hydrotheca.
a-c, slide no. 530.

REMARKS. — This species shows affinities with *Gonaxia crassa* sp. nov. and *G. crassicaulis* sp. nov. In *G. crassa* the hydrothecae are completely immersed while in *G. crassicaulis* the shape of the hydrothecae is different; moreover, the latter is characterized by internal perisarcal structures absent from *G. pachyclados*.

ETYMOLOGY. — The specific name *pachyclados* refers to the thick, flattened hydrocladia. From the greek words *pachys* (thick) and *klados* (branch, twig).

Gonaxia perplexa sp. nov.

Figs 27c-d, 28a-c

MATERIAL EXAMINED. — **Chesterfield Islands**. MUSORSTOM 5 : stn DC 375, 19°52.20'S-158°29.70'E, 300 m, 20.10.1986 (type locality) : thirty-five mm high stem with pinnately arranged hydrocladia; gonothecae on stem (holotype). All in slide no. 530 (MNHN-Hy. 1038). Removed from coral fragment.

DESCRIPTION (based on holotype). — Axis erect, probably forked, polysiphonic by presence of fertile secondary tubules over greater part of length, only extreme distal portion monosiphonic. Division of axis into internodes not apparent; axis of holotype bearing 13 pinnately arranged hydrocladia, alternately pointing right and left; axis, hydrocladia and hydrothecae all in one plane. Axis bearing alternate hydrothecae; every third axial hydrotheca becomes axillary by presence of distinct though not particularly strong apophysis supporting hydrocladium; there are consequently three hydrothecae between two successive apophyses : one axillary, one right, one left (fig. 28a). Hydrocladia with alternately arranged hydrothecae (fig. 27c), scarcely geniculate, occasionally only so at base, set off from apophysis by indistinct node; basal portion of hydrocladium lengthened.

Three types of hydrothecae present : axial, axillary and hydrocladial. Axillary hydrothecae almost tubular, with slightly widened, globular proximal portion completely sunk into apophysis (fig. 28c). Abcauline and free part of adcauline wall parallel, free part hydrotheca consequently more or less tubular, slightly widening towards base. Adnate part adcauline wall and hydrothecal floor form rounded plate with conspicuous perisarcal peg at end adcauline wall, not fully closed at meeting point with abcauline hydrothecal wall. Large, oval fenestra present near peg at adcauline wall, bordered on one side by internal perisarcal ridge. Axial (fig. 28b) and hydrocladial (fig. 27d) hydrothecae similar, tubular in distal part, gradually widening towards globular basal portion almost completely sunk into hydrocladium. Abcauline hydrothecal wall slightly concave in lower third or with slight flexure; free portion adcauline wall straight. Adnate part adcauline wall strongly curved, moderately thickened; hydrothecal floor with distinct hole for passage of coenosarc; meeting point with internal surface abcauline wall set off by means of perisarcal peg. Hydrothecal rim in all three types of hydrothecae with three rounded cusps : one abcauline and two laterals near adcauline border. Many hydrothecae show remnants of closing apparatus which originally must have been composed of three triangular plates closing to form a low roof.

Perisarc of colony moderately developed, thickest along walls of axis and internodes of hydrocladia, gradually thinning out along hydrothecal walls, yellowish.

Gonothecae (presumed to be male) present in fair numbers along length of axis along both sides of colony and appear to be produced by fertile secondary tubules. Each gonotheca more or less sack-shaped, elongated, apically narrowing into small opening at end of distal portion of gonotheca and turned away from gonothecal body (fig. 28a). Gonothecae strongly adnate, borders between individual gonothecae indistinct. Periderm on walls of gonothecae fairly strong. All gonothecae empty.

No soft tissue observed.

DISTRIBUTION. — The holotype, the sole specimen obtained, originates from off Barrière de l'Est, Chesterfield Islands, near Îlots du Mouillage, depth 300 m.

REMARKS. — The species can easily be recognized by the shape of the hydrothecae and the development of the gonothecae.

FIG. 29 a-b. — *Gonaxia persimilis* sp. nov., BIOGEOCAL, Stn DW 291 : **a**, monosiphonic distal part of colony; **b**, female gonotheca.

FIG. 29 c. — *Gonaxia robusta* sp. nov., schizoholotype, MUSORSTOM 4, Stn DW 156, hydrocladial hydrothecae. a-b, slide no. 997; c, slide no. 537.

ETYMOLOGY. — From the latin word *perplexus* meaning intricate, puzzling, referring to the curiously shaped gonothecae.

TABLE 19. — Measurement of *Gonaxia perplexa* sp. nov., in µm.

	MUSORSTOM 5 Stn DC 375 (slide no. 530) holotype
Axis, diameter at base	605
Axial hydrotheca, length abcauline wall	510 - 540
length free part adcauline wall	415 - 430
length adnate part adcauline wall	265 - 305
total depth	620 - 680
maximal diameter	245 - 260
diameter at rim	155 - 160
Axillary hydrotheca, length abcauline wall	435 - 445
length free part adcauline wall	405 - 430
length adnate part adcauline wall	370 - 385
total depth	645 - 660
maximal diameter	245 - 265
diameter at rim	155 - 160
Hydrocladium, diameter at node	205 - 210
Hydrocladial hydrotheca, length abcauline wall	590 - 605
length free part adcauline wall	480 - 505
length adnate part adcauline wall	305 - 355
total depth	680 - 710
maximal diameter	250 - 275
diameter at rim	160 - 170
Male gonotheca, approximate length	1,300
approximate diameter	750
diameter of aperture	65 - 85

Gonaxia persimilis sp. nov.

Figs 29a-b, 30d, 31a, 33a-b

MATERIAL EXAMINED. — **New Caledonia**. CHALCAL 2 : stn DW 76, 23°40.50'S-167°45.20'E, 470 m, 30.10.1986 : single 30 mm high colony and a fragment; 3 gonothecae present (RMNH-Coel. 25818). Slide no. 532 of hydrocladium (MNHN-Hy. 1039).

BIOGEOCAL : stn DW 291, 20°34.47'S-166°54.33'E, 510-520 m, 27.04.1987 : three colonies 35-60 mm high with many gonothecae on stem. Stems straight, strongly polysiphonic; hydrocladia pinnately arranged. Smaller colony as 3 slides no. 997. (MNHN-Hy. 1040, 1 colony and loose hydrocladia; BMNH 1989.11.23.33, 1 colony; RMNH-Coel. 25819, 3 slides no. 997).

Loyalty Islands. MUSORSTOM 6 : stn DW 398, 20°47.19'S-167°05.65'E, 370 m, 13.02.1989 : single hydrocladium on slide no. 934 (RMNH-Coel. 25820). — Stn DW 399, 20°41.80'S-167°00.20'E, 282 m, 14.02.1989 (type locality) : single colony c. 30 mm high (holotype, MNHN-Hy. 1041); slide no. 1001 of hydrocladium (schizoholotype, RMNH-Coel. 25821). — Stn DW 461, 21°06.00'S-167°26.20'E, 240 m, 21.02.1989 : single 45 mm high colony (paratype, RMNH-Coel. 25822) with many (presumed female) gonothecae; slide no. 1002 of hydrocladium (schizoparatype, BMNH 1989.11.24.34).

DESCRIPTION. — Shape and structure of colony (fig. 29a) as in *Gonaxia similis*, from which it differs in the following details :

1. Hydrothecae generally larger, particularly at orifice, and less cylindrical, with strongly swollen basal portion, inserting on swollen portion of internode (figs 30d, 31a, 33a-b). Wall of hydrotheca rather more tapering towards rim than being contracted proximally and being cylindrical onwards.

2. Hydrocladia, and to lesser degree also axis, more regularly broken up into internodes, separated by oblique septa.

There are no differences in the shape of the gonothecae (fig. 29b).

In the material assigned to this species some of the hydrothecae, in contradistinction to *Gonaxia similis*, have well preserved, small hydranths with 14 tentacles and small, rounded proboscis. The strongly contracted hydranths have a distinct abcauline 'caecum', from the top of which runs a fine filament attached to the inside of the abcauline hydrothecal wall at about half its length.

TABLE 20. — Measurements of *Gonaxia persimilis* sp. nov., in µm.

	CHALCAL 2 Stn DW 76 (slide no. 532)	BIOGEOCAL Stn DW 291 (slide no. 997)	MUSORSTOM 6 Stn DW 399 (slide no. 1001)	MUSORSTOM 6 Stn DW 461 (slide no. 1002)
Hydrocladial internode, length	520 - 740	520 - 815	520 - 665	480 - 555
diameter	95 - 175	125 - 150	155 - 185	160 - 200
Hydrocladial hydrotheca, length abcauline wall	445 - 490	510 - 525	590 - 615	555 - 595
length free part adcauline wall	445 - 510	510 - 545	510 - 525	480 - 505
length adnate part adcauline wall	295 - 305	265 - 290	290 - 325	260 - 290
total depth	590 - 620	675 - 690	705 - 725	695 - 710
maximal diameter	265 - 310	275 - 325	280 - 290	305 - 320
diameter at rim	150 - 175	150 - 160	200 - 210	160 - 185
Female gonotheca, length		3,320 - 3,690		
maximal diameter		575 - 620		
diameter at aperture		220 - 260		

DISTRIBUTION. — One locality from the northern tip of the Norfolk Ridge, southeast of the southern extremity of New Caledonia and four localities in the Pacific around the Loyalty Islands; depth 240-520 m.

REMARKS. — After considerable hesitation I have put aside the above mentioned material from *Gonaxia similis* and described it as *Gonaxia persimilis*, the points of difference, that are not impressive, being mentioned above. Though the material of *Gonaxia similis* available to me is large I have so far found no intermediate forms between those described as *G. similis* and *G. persimilis*. The differences mentioned above are best developed in the colony from MUSORSTOM 6, Stn DW 399 (fig. 31a), which consequently has been indicated as the holotype.

ETYMOLOGY.— From the latin *per* (very) and *similis* (resembling), pointing to the great similarity of this species to *Gonaxia similis*.

Gonaxia robusta sp. nov.

Figs 29c, 30a-c

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4 : stn DW 156, 18°54.00'S-163°18.80'E, 530 m, 15.09.1985 (type locality) : twenty-five mm long stem with gonothecae attached to stem (holotype; MNHN-Hy. 1042); 3 slides no. 537 of detached top-part and detached hydrocladia (schizoholotypes; BMNH 1989.11.24.35, 1 slide; RMNH-Coel. 25823, 2 slides).

DESCRIPTION (of holotype). — Axis erect, basally attached to firm substratum by means of some fibres, c. 25 mm high, bearing alternately arranged hydrocladia pointing laterally and obliquely upwards, 10-15 mm long with 8-13 pairs of hydrothecae. Axis largely polysiphonic by presence of fertile secondary tubules, only extreme distal portion monosiphonic, not divided into internodes. Axis and hydrocladia with alternately arranged hydrothecae all in same plane with axis and hydrocladia. Hydrocladia inserting on small apophyses at base of axillary hydrothecae on stem, usually three hydrothecae between two succeeding apophyses : one axillary, one right, one left. Hydrocladia set off from apophysis by means of perisarcal constriction that may occasionally be oblique and slightly contorted (fig. 30a).

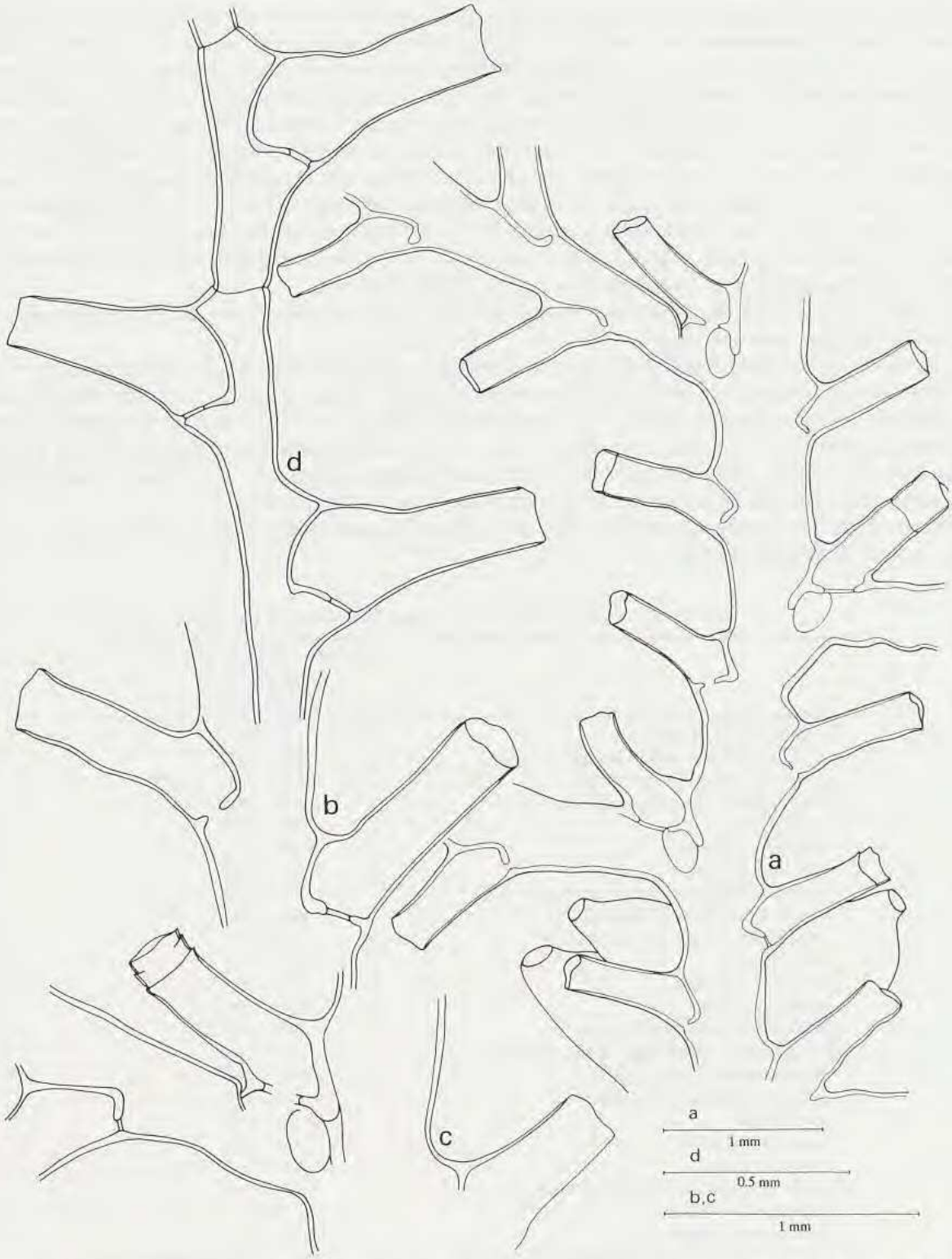

FIG. 30 a-c. — *Gonaxia robusta* sp. nov., schizoholotype, MUSORSTOM 4, Stn DW 156 : **a,** monosiphonic distal part of colony, frontal view; gonothecae on backside; **b**, hydrocladial hydrothecae; **c**, axillary hydrotheca.
FIG. 30 d. — *Gonaxia persimilis* sp. nov., CHALCAL 2, Stn DW 76, part of hydrocladium.
a-c, slide no. 537; d, slide no. 532.

Three types of hydrothecae present : axial, axillary and hydrocladial, of which axial and hydrocladial differ only in size. All hydrothecae tubular, with parallel ad- and abcauline walls and slightly enlarged, small proximal portion sunk into axis or internode (fig. 29c). Axillary hydrothecae with lengthened fused portion of adcauline wall and conspicuous perisarcal peg beside distinct fenestra (fig. 30c). Axial and hydrocladial hydrothecae leaving axis or internode at angle of c. 60 degrees; free part adcauline wall usually straight, abcauline wall basally with slight concavity. Adnate part of adcauline wall thickened, strongly curved at proximal end, with perisarcal peg. Hydrothecal floor with small hole to permit passage of coenosarc; meeting point at inside abcauline wall with distinct peg (fig. 29c). Hydrothecal rim, when in good condition, with three indistinct marginal cusps with rounded tips : 1 median abcauline and two laterals near adcauline wall. Many hydrothecae show signs of renovations or of repair after damage, many have irregular walls or are slightly curved. Renovated hydrothecae have very obscure or even absent marginal cusps; the hydrothecal rim may be slightly thickened.

Remnants only of tissue have been observed in some hydrocladia; no well preserved hydranths present, so that structure of polyp remains unknown.

Gonothecae on basal and middle part of axis on frontal as well as back of colony, presumably formed by fertile secondary tubules or directly by axis. They form a mass of adnate, elongated bodies, with only distal portion free and pointing away from axis or pointing upwards in oblique direction. In adnate portion of gonothecae walls of individual gonothecae become lost; foramina at bases of apophyses apparently communicate with gonothecal cavity, free distal portion narrowing apically and there with circular aperture at end of short, conical funnel. All gonothecae empty but judging from diameter of aperture they were female (fig. 30a).

Perisarc thick, particularly in axis and hydrocladia, yellowish-brown, thinning out gradually along hydrothecal walls; perisarc of gonothecae brown.

TABLE 21. — Measurements of *Gonaxia robusta* sp. nov., in µm.

	MUSORSTOM 4, Stn DW 156 (slide no. 537) schizoholotype
Axis, diameter at base	1,250
Axial hydrotheca, length abcauline wall	615 - 705
length free part adcauline wall	555 - 590
length adnate part adcauline wall	265 - 295
total depth	725 - 775
maximal diameter	260 - 275
diameter at rim	200 - 215
Axillary hydrotheca, length abcauline wall	650 - 680
length free part adcauline wall	630 - 650
length adnate part adcauline wall	355 - 370
total depth	815 - 850
maximal diameter	235 - 245
diameter at rim	230 - 245
Hydrocladium, diameter at node	265 - 355
Hydrocladial hydrotheca, length abcauline wall	725 - 760
length free part adcauline wall	560 - 590
length adnate part adcauline wall	345 - 370
total depth	800 - 815
maximal diameter	260 - 280
diameter at rim	235 - 260
Female gonotheca, approximate length	1,520
approximate diameter	540
diameter of aperture	195 - 215

DISTRIBUTION. — The type locality is off Grand Passage at the extreme north-western end of the New Caledonian reefs, depth 530 m.

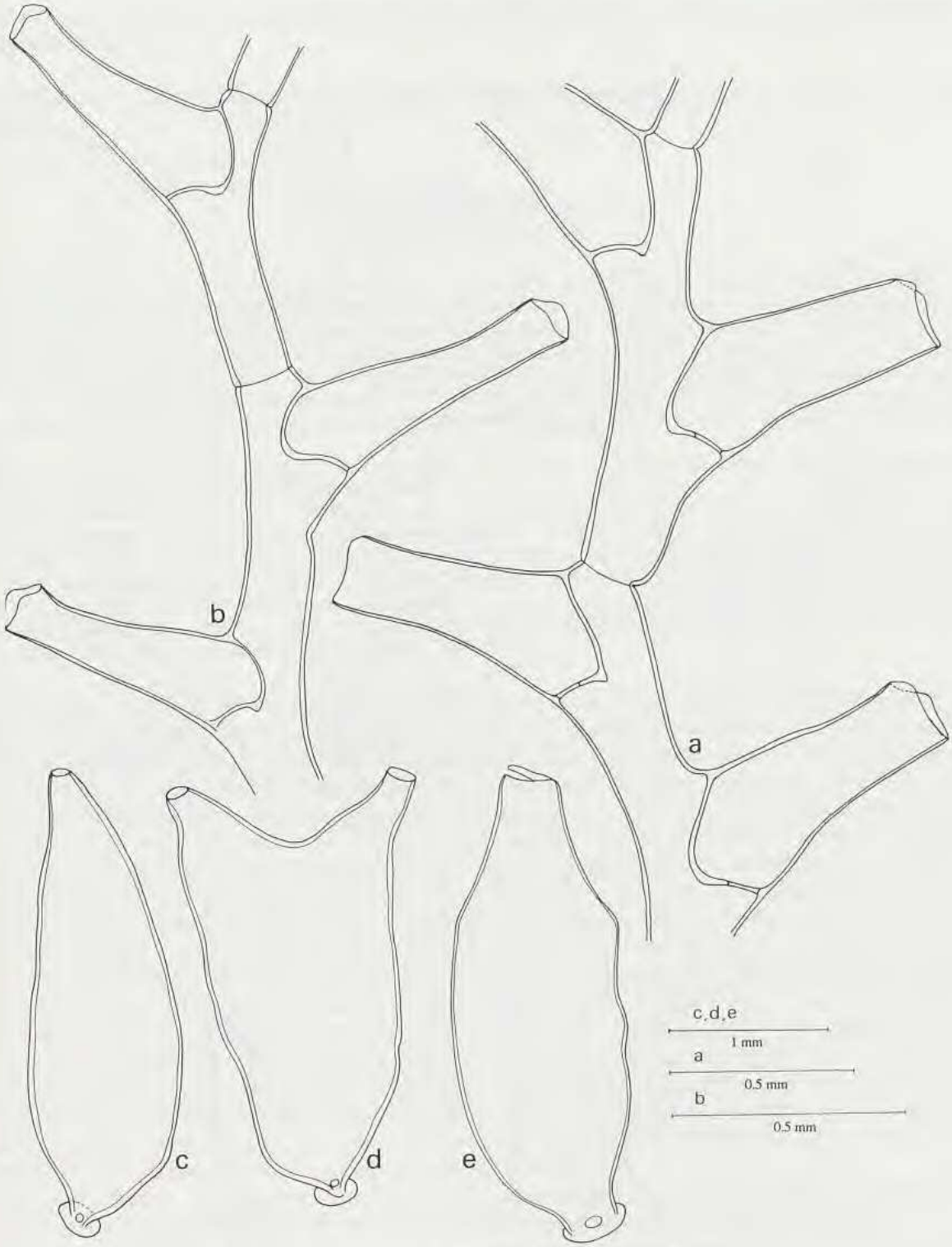

FIG. 31 a. — *Gonaxia persimilis* sp. nov., MUSORSTOM 6, Stn 399, part of hydrocladium.
FIG. 31 b. — *Gonaxia scalariformis* sp. nov., MUSORSTOM 6, Stn 421, part of hydrocladium.
FIG. 31 c-e. — *Gonaxia sinuosa* sp. nov. : **c-d**, SMIB 4, Stn DW 59, male gonothecae. — **e**, CHALCAL 2, Stn DW 80, female gonotheca.
a, slide no. 1001; b, slide no. 933; c-d, slide no. 1043; e, slide no. 882.

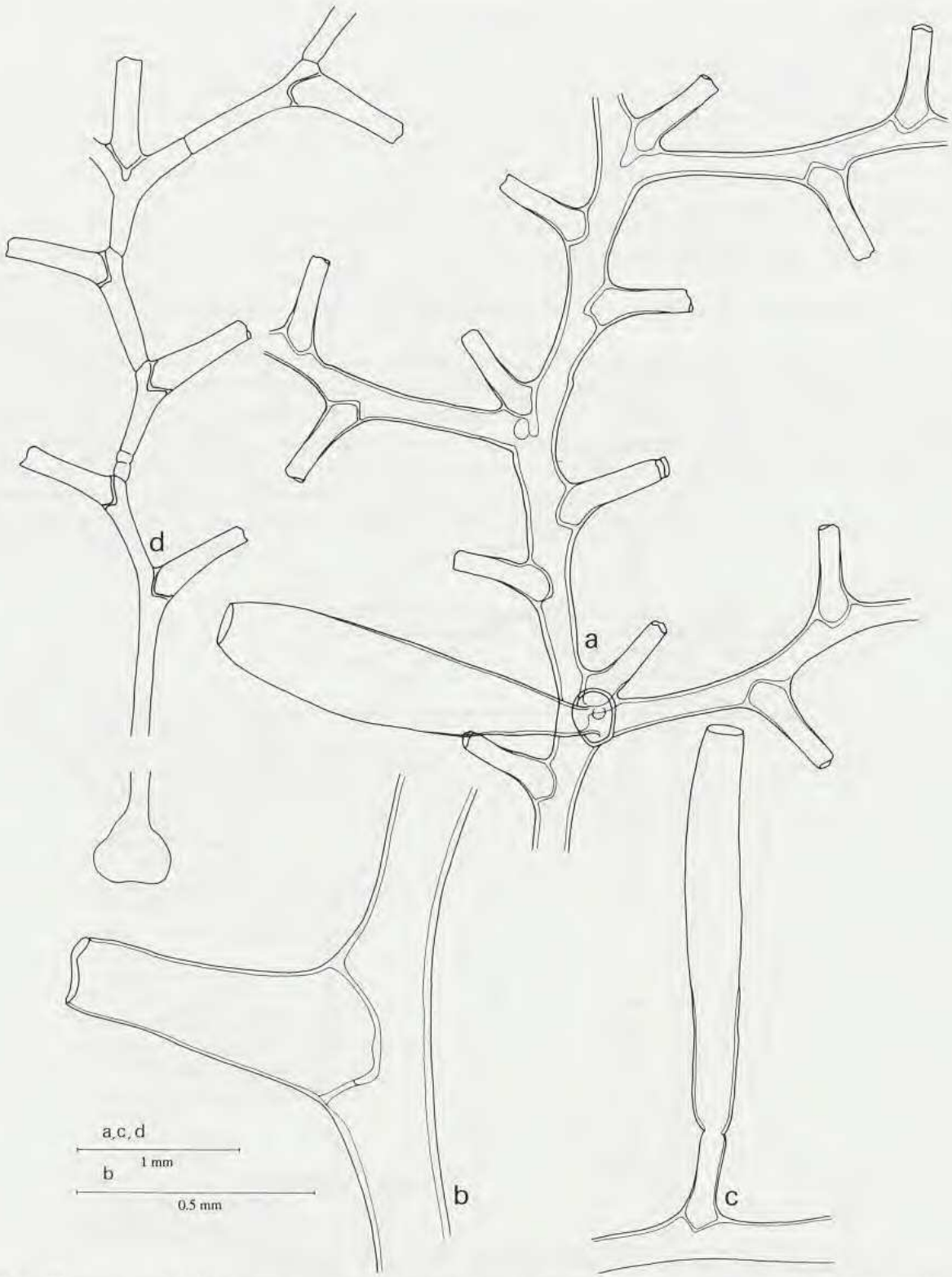

FIG. 32. — *Gonaxia scalariformis* sp. nov., paratypes, BIOCAL, Stn DW 08 : **a**, monosiphonic distal part of colony; **b**, hydrocladial hydrotheca; **c**, female gonotheca developing from hydrotheca; **d**, young colony.
a, slide no. 333; b-c, slide no. 377; d, slide no. 522.

REMARKS. — The species is recognized by the large, tubular hydrothecae, the largest amongst the species of *Gonaxia* so far observed.

ETYMOLOGY. — From the latin *robustus*, meaning hard and strong like oak, referring to the large and robust hydrothecae.

Gonaxia scalariformis sp. nov.

Figs 31b, 32a-d, 33c-d, 35a

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn DW 08, 20°34.35'S-166°53.90'E, 435 m, 12.08.1985 (type locality) : c. 7 mono- and polysiphonic colonies 30-60 mm high and many fragments. One c. 60 mm high colony is holotype (MNHN-Hy. 1043), remaining colonies and slides are paratypes; slides nos 296, 333A, 377A & B, 519, 521, 522, 523, slide no. 522 is a 9 mm long, young colony [MNHN-Hy. 1043, 2 paratypes, slide no. 296; BMNH 1989.11.24.36, 2 paratypes and slides nos 521 and 523; RMNH-Coel. 25824, rest paratypes and fragments, slides nos 333A, 377A & B, 519, 522 and 645 (gonotheca)]. — Stn DW 66, 24°55.43'S-168°21.67'E, 515-505 m, 03.09.1985 : three colonies up to 40 mm high with gonothecae; also some fragments (MNHN-Hy. 1044); slide no. 930 (RMNH-Coel. 25825).

CALSUB: Plongée 15, 20°37.1'S-166°58'E, 545-327 m, 06.03.1989 : fifty mm high colony with gonothecae on stem (RMNH-Coel. 25826); slide no. 998 (MNHN-Hy. 1045).

Loyalty Islands. MUSORSTOM 6 : stn DW 391, 20°47.35'S-167°05.70'E, 390 m, 13.02.1989 : single 25 mm high colony with some gonothecae and some loose hydrocladia (MNHN Hy 1046); slide no. 940 (partly, one of 3 hydrocladia; RMNH-Coel. 25827). — Stn DW 421, 20°26.27'S-166°40.17'E, 245 m, 16.02.1989 : 15 mm high basal part of colony. All in slide no. 933 (RMNH-Coel. 25828). — Stn DW 428, 20°23.54'S-166°12.57'E, 420 m, 17.02.1989 : two colonies 35 and 40 mm high, both with gonothecae (BMNH 1989.11.24.37, 1 colony; RMNH-Coel. 25829); slide no. 907 of hydrocladium (MNHN-Hy. 1047). — Stn DW 447, 20°54.90'S-167°19.87'E, 460 m, 19.02.1989 : single 30 mm high colony; no gonothecae. All as slide no. 1006 (RMNH-Coel. 25830).

DESCRIPTION (based on present material). — Adult colony composed of straight, polysiphonic stem (axis), basally attached to substratum and 1.5-2 mm thick, upper part of axis monosiphonic (fig. 35a). Hydrocladia pinnately and alternately arranged along axis, all strictly in one plane. Hydrocladia placed on short apophyses under axillary hydrotheca, usually three hydrothecae between two successive apophyses (one axillary, one right, one left; fig. 32a), but this arrangement is not strict or may become obscured by development of secondary tubules in basal part of stem. Internodes only visible in young colonies, in older colonies occasionally marked by perisarcal constrictions in monosiphonic parts of colony; in young colonies straight septa may occasionally be observed.

Hydrothecae arranged alternately along both sides of stem and hydrocladia, all in same plane with axis and hydrocladia, tubular, strongly diverging from stem or hydrocladium, angle between free part adcauline wall and axis slightly less than 90 degrees (fig. 32b). Basal portion of hydrotheca, including portion fused to axis, slightly swollen, rest of hydrotheca tubular, ab- and adcauline walls nearly parallel (fig. 33c). Adnate part of adcauline wall less than half length of free part in young hydrothecae, about half that length in older hydrothecae; straight to slightly convex, with sharp flexure near hydrothecal floor, which is completely closed by basal plate; large circular hydropore permits passage of coenosarc. Apical portion of hydrotheca slightly constricted around rim; aperture with three obtuse, indistinct cusps (one abcauline, two laterals), closing apparatus, if present, deciduous, not observed on any of hydrothecae. Number of renovations restricted to one or two; hydrothecal aperture may become almost circular and slightly thickened after renovation. Axillary hydrotheca slightly displaced by exit of apophysis, with big perisarcal notch at flexure of adnate portion of adcauline wall (fig. 33d).

Only some colonies with remnants of small hydranths, apparently all completely attached to the basal plate; no filament attaching it to the abcauline wall being observed. Number of tentacles could not be ascertained.

Gonothecae mainly on frontal aspect of colony, placed on main axis, originating from base of axillary hydrotheca (figs 32a, 35a). Fenestrae, indicating presence of gonothecae, exclusively occur at base of axillary hydrothecae of stem. Gonotheca large, elongated ovoid, more or less club-shaped, pointing perpendicularly away from axis, basally with perisarcal disc firmly attaching gonotheca to stem. Apically gonotheca with small, circular opening. There are two types; those presumed to be female with a wide circular opening (fig. 32a); those thought

to be male with a narrow apical hole (fig. 35a). All gonothecae empty. Perisarc firm, particularly on stem and hydrocladia, thinning out rapidly along hydrothecal walls, though reduced number of damaged hydrothecae suggests that these are quite firm.

TABLE 22. — Measurements of *Gonaxia scalariformis* sp. nov., in µm.

	BIOCAL Stn DW 08 young colony (slide no. 522)	BIOCAL Stn DW 08 old colony (slide no. 333)
Internode, length	665 - 890	
diameter	90 - 135	
Hydrotheca, length abcauline wall *	630 - 650	650 - 660
length free part adcauline wall *	590 - 600	605 - 610
length adnate part adcauline wall	175 - 215	245 - 250
total depth *	700 - 710	760 - 700
diameter at apex	120 - 220	220 - 225
Gonotheca, total length		2,550 - 2,570**
maximal diameter		580 - 600**
diameter of aperture		130 - 280**

(* = including renovations; ** = slide no. 519)

DISTRIBUTION. — Recorded from several localities in deeper waters of the Pacific Ocean around the Loyalty Islands and from one locality (BIOCAL, Stn DW 66) on the northwestern extremity of the Norfolk Ridge.

REMARKS. — The original division into internodes is best visible in young colonies, particularly the 9 mm high juvenile colony from BIOCAL, Stn DW 08, which consists of four or five such internodes each with a single hydrotheca and an apophysis for the next internode (fig. 32d). The basal part consists of a single long internode bearing basally a small disk attaching the colony to a rock fragment and apically two alternate hydrothecae.

There is a fair amount of variability in the shape of the hydrothecae; in young colonies they tend to be long with scarcely swollen basal portion (fig. 33c); in older colonies they are swollen basally and have lost their slender appearance (fig. 32b). All transitional stages are observed on the various colonies. One of the colonies from BIOCAL, Stn DW 08, is remarkable because of the development of a gonotheca apparently as a result of hydrothecal renovation (fig. 32c).

On slide no. 519 (BIOCAL, Stn DW08) is the top part of a colony differing from the type series by the fact that the hydrothecae leave the internodes under an angle of c. 60 degrees and not more or less perpendicular as in the remaining specimens. The top part bears a single gonotheca not different from the type found in this species (fig. 35a). The specimen from MUSORSTOM 6, Stn DW 421 (slide no. 933), is remarkable because of the slightly upturned hydrothecae (cf. fig. 31b).

ETYMOLOGY. — The specific name *scalariformis* has been chosen because of the transversely directed hydrothecae; the latin substantivum *scalaris* meaning ladder, flight of stairs and *formis* meaning resembling : shaped like a ladder, shaped like a flight of stairs, referring to the regular arrangement of the strongly diverging hydrothecae.

Gonaxia similis sp. nov.

Figs 33e-f, 34a-e, 36a, 39a

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4 : stn CP 216, 22°59.50'S-167°22.00'E, 515 m, 29.09.1985 : fifteen mm high colony with many gonothecae, and a fragment. All in slide no. 452 (RMNH-Coel. 25831).

SMIB 5 : stn DW 93, 22°20.0'S-168°42.3'E, 255 m, 13.09.1989 : twelve mm high colony with single gonotheca, all in slide no. 1046 (RMNH-Coel. 25832). — Stn DW 95, 22°59.7'S-168°19.8'E, 200 m, 14.09.1989 : basal part of c. 10 mm high colony with 1 gonotheca, all in slide no. 1013 (MNHN-Hy. 1048).

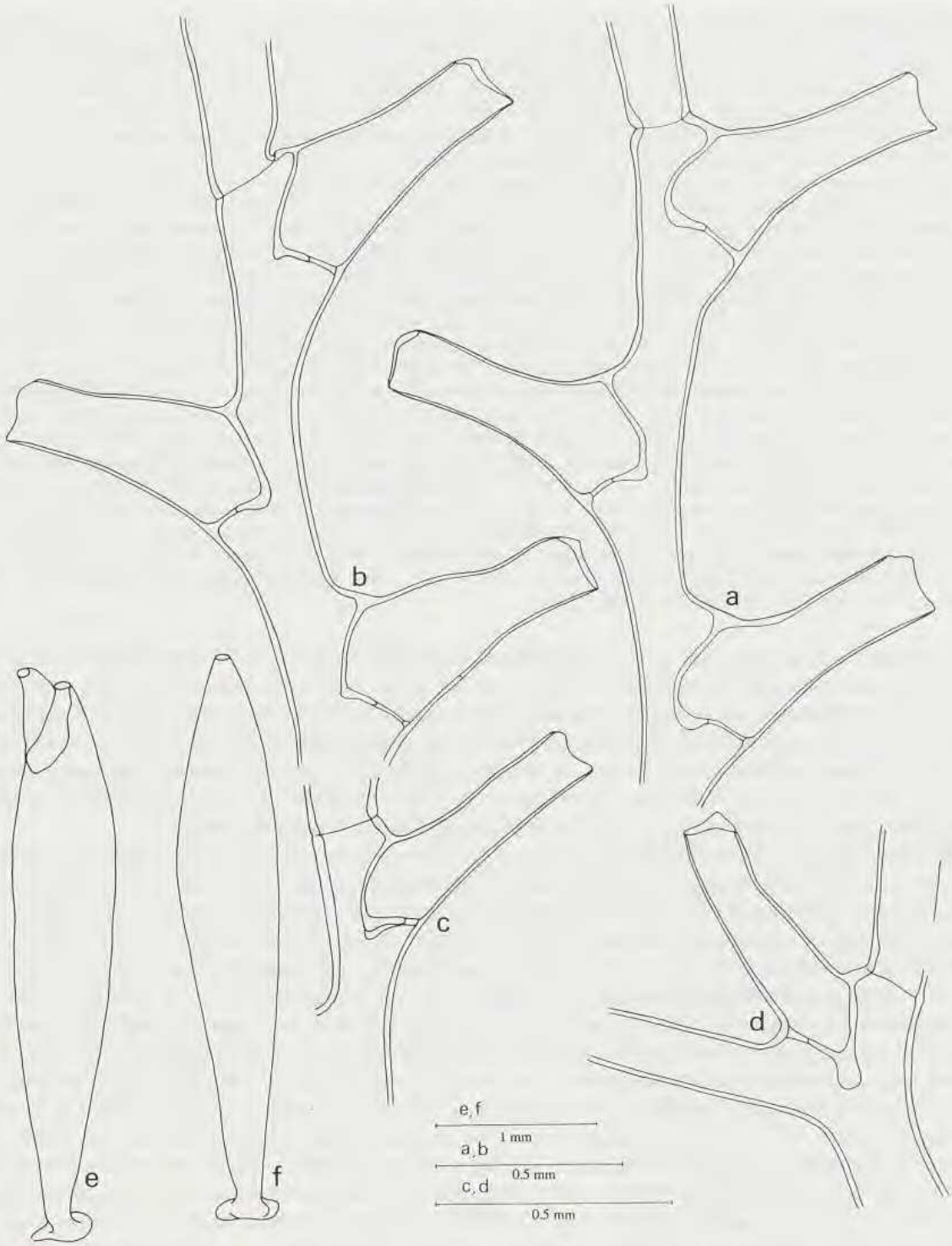

FIG. 33 a-b. — *Gonaxia persimilis* sp. nov. : **a**, BIOGEOCAL, Stn DW 291, part of hydrocladium. — **b**, MUSORSTOM 6, Stn DW 461, part of hydrocladium.

FIG. 33 c-d. — *Gonaxia scalariformis* sp. nov., paratype, BIOCAL, Stn DW 08 : **c**, hydrocladial hydrotheca; **d**, axillary hydrotheca.

FIG. 33 e-f. — *Gonaxia similis* sp. nov.. MUSORSTOM 4, Stn CP 216 : **e**, repaired male gonotheca; **f**, normal male gonotheca.

a, slide no. 997; b, slide no. 1002; c-d, slide no. 519; e-f, slide no. 452.

Loyalty Islands. MUSORSTOM 6 : stn DW 391, 20°47.35'S-167°05.70'E, 390 m, 13.02.1989 (type locality) : c. 10 colonies 20-80 mm high, many with gonothecae, also many loose hydrocladia. Slides nos 940 (partly, 2 of 3 hydrocladia) and 1008 (2). One 80 mm high specimen with gonothecae is holotype (MNHN-Hy. 1049), remaining colonies, including specimen on slides no. 1008, paratypes (MNHN-Hy. 1049, 2 paratypes; BMNH 1989.11.24.38, 2 paratypes; RMNH-Coel. 25833, rest paratypes and 2 slides no. 1008; slide no. 940 is RMNH-Coel. 25827). — Stn DW 392, 20°47.32'S-167°04.60'E, 340 m, 13.02.1989 : single 75 mm high colony with gonothecae on stem (MNHN-Hy. 1050). Slide no. 932 of hydrocladium (RMNH-Coel. 25834). — Stn DW 397, 20°47.35'S-167°05.17'E, 380 m, 13.02.1989 : two colonies 50 and 25 mm high, the larger with gonothecae; also some fragments (larger colony BMNH 1989.11.24.39; smaller colony as slide no. 939, RMNH-Coel. 25835). — Stn DW 398, 20°47.19'S-167°05.65'E, 370 m, 13.02.1989 : c. 10 colonies up to 60 mm high, with gonothecae, and several fragments; slides nos 934 (one of 2 hydrocladia) and 1004 (MNHN-Hy. 1051, 3 colonies; BMNH 1989.11.24.40, 3 colonies; RMNH-Coel. 25836, rest colonies, fragments and slide no. 1004; slide no. 934 is RMNH-Coel. 25820). — Stn DW 399, 20°41.80'S-167°00.20'E, 282 m, 14.02.1989 : eight colonies 25-60 mm high and many fragments. Many gonothecae; 2 slides no. 1000 and slide no. 1009, gonotheca (RMNH-Coel. 25837). — Stn DW 422, 20°26.20'S-166°40.31'E, 257 m, 16.02.1989 : four colonies 35-70 mm high with gonothecae and a number of fragments (MNHN-Hy. 1052). Slide no. 785 (RMNH-Coel. 25838). — Stn DW 423, 20°25.85'S-166°40.50'E, 280 m, 16.02.1989 : three fragmentary colonies up to c. 30 mm high, the largest with gonothecae; several detached hydrocladia. Two slides no. 905 with parts of colonies with gonothecae (all RMNH-Coel. 25839). — Stn DW 446, 20°54.33'S-167°18.59'E, 360 m, 19.02.1989 : five colonies 30-50 mm with gonothecae (BMNH 1989.11.24.41); slide no. 1005 (RMNH-Coel. 25840). — Stn DW 448, 20°55.66'S-167°22.34'E, 410 m, 19.02.1989 : single 90 mm high stem with many gonothecae, also developing from hydrothecae. Slide no. 936 of hydrocladium (all RMNH-Coel. 25841). — Stn DW 451, 20°59.00'S-167°24.50'E, 330 m, 20.02.1989 : two fragments, one a 5 mm long stem fragment with gonotheca and a 3 mm long fragment. All as slide no. 1007 (RMNH-Coel. 25842). — Stn CP 464, 21°02.30'S-167°31.60'E, 430 m, 21.02.1989 : six colonies up to 60 mm high, with many gonothecae; one as slide no. 899 (MNHN-Hy. 1053, 2 colonies; BMNH 1989.11.24.42, 2 colonies; RMNH-Coel. 25843, slide no. 899). — DW 485, 21°23.48'S-167°59.33'E, 350 m, 23.02.1989 : two mutilated colonies 20 and 15 mm high, no gonothecae, all in slide no. 938 (RMNH-Coel. 25844).

DESCRIPTION. — Species with great general resemblance to *Gonaxia scalariformis*. Colony with erect axis bearing alternately arranged hydrocladia, all strictly in one plane. Axis monosiphonic in distal part (fig. 34b); basally axis covered by secondary tubules obscuring axial hydrothecae; hydrocladia remaining monosiphonic; axis occasionally forked. Usually three hydrothecae between two successive hydrocladia : one axillary, one left, one right (fig. 34b). Division into internodes obscure on axis and hydrocladia, only occasionally internodes marked by perisarcal constrictions, no septa have been observed. First internode of each hydrocladium lengthened. Monosiphonic part of axis indistinctly geniculate; hydrocladia weakly to distinctly geniculate.

Hydrothecae, with exception of axillary hydrothecae, identical on axis and hydrocladia, tubiform with distinctly swollen proximal portion, leaving axis or hydrocladium almost perpendicularly, but usually slightly directed upwards (angle c. 80 degrees; fig. 36a). Abcauline hydrothecal wall with slight convexity proximally, running smoothly into wall of internode; distal part straight. Free part abcauline wall straight or with minor concavity proximally; at insertion of hydrotheca usually with flattened portion, continuing for some distance along wall of internode. Adnate part of adcauline wall straight to distinctly curved, with sudden flexure at hydrothecal floor; point of flexure marked by perisarcal notch (figs 36a, 39a). Hydrothecal floor may appear completely closed, but at inspection in oblique position that floor also appears to be horseshoe-shaped, with both arms of horseshoe forming thickened ledge on inside of internode and almost completely closed; a strand of coenosarcal tissue passing through opening formed by both arms. Distal portion of hydrotheca cylindrical, sometimes slightly widening towards rim. Hydrothecal margin with three low, obtuse cusps (one abcauline, two laterals), separated by quite shallow embayments. Remnants of opercular plates rare, closing apparatus apparently largely deciduous. Renovations of hydrothecae do occur, not resulting in telescopic arrangement of hydrothecal apertures as in *Symplectoscyphus* or *Sertularella*, but in malformed hydrotheca, e.g., lengthened hydrothecae with a circular, transverse constriction. Axillary hydrotheca smaller and narrower, making angle of c. 60 degrees with length axis of stem; notch at hydrothecal floor of greatly increased size (fig. 34a).

Preservation of hydranths such that no distinct countings of tentacles could be made; hydranths much smaller than in *Gonaxia constricta*, hypostome globular.

Gonothecae abundant, male as well as female gonothecae having been observed on different colonies. General shape of gonothecae elongated bomb-shaped (as a depository), inserted on front of colony at base of axillary

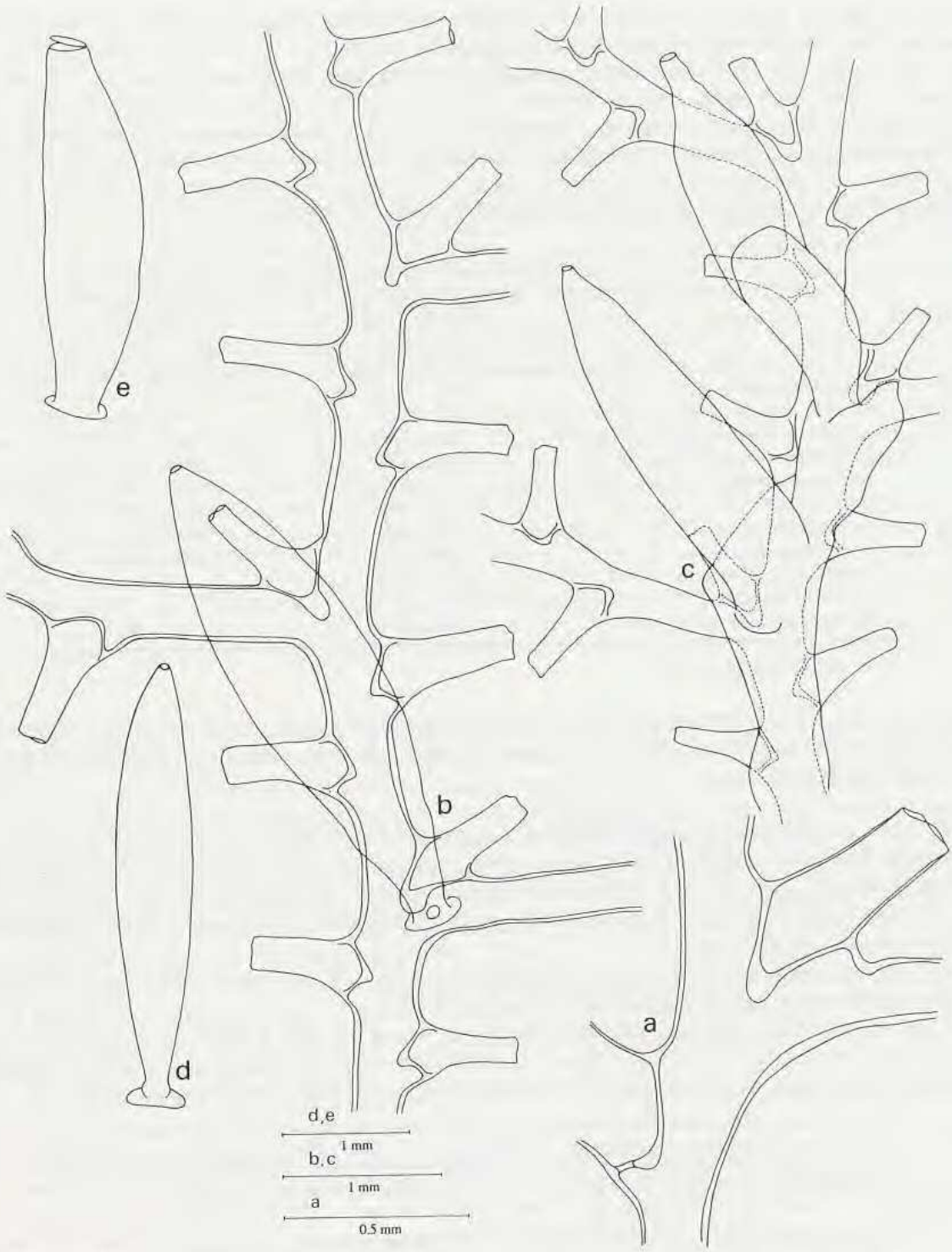

FIG. 34. — *Gonaxia similis* sp. nov. : **a**, MUSORSTOM 4, Stn CP 216, axillary hydrotheca. — **b**, paratype, MUSORSTOM 6, Stn DW 391, monosiphonic distal part of colony. — **c**, MUSORSTOM 6, Stn DW 423, distal part of colony, backside, with partly coalesced male gonothecae. — **d**, MUSORSTOM 4, Stn CP 216, male gonotheca. — **e**, MUSORSTOM 6, Stn DW 399, female gonotheca.

a, slide no. 452; b, slide no. 1008; c, slide no. 905; d, slide no. 452; e, slide no. 1000.

hydrotheca; base of gonotheca widened from a circular collar firmly attaching gonotheca to base of internode, communicating with internode through small, circular hole in centre of collar. Male gonothecae (figs 33f, 34d) longer than female (fig. 34c), apical portion gradually narrowing into a small, rounded aperture. Female gonotheca truncated at apex, with larger circular aperture, closed by circular lid. Some of female gonothecae contain developing embryos or planulae; male gonothecae all empty. Besides the above described gonothecae others have been observed to develop from secondary tubules; such gonothecae may also develop on backside of colony. Occasionally such gonothecae have a tendency to fuse with the tube from which they develop, as with two gonothecae from the colony at MUSORSTOM 6, Stn DW 423 (slide no. 905) (fig. 34c).

TABLE 23. — Measurements of *Gonaxia similis* sp. nov., in µm.

	MUSORSTOM 4 Stn CP 216 (slide no. 452)	MUSORSTOM 6 Stn DW 391 (slide no. 940)
Internode, length	520 - 725	
diameter	140 - 175	135 - 205
Hydrotheca, length abcauline wall *	480 - 520	560 - 615
length free part adcauline wall *	405 - 430	460 - 505
length adnate part adcauline wall	220 - 255	215 - 235
total depth *	590 - 600	615 - 665
maximal diameter	250 - 265	230 - 290
diameter at apex	130 - 140	140 - 160
Gonotheca, total length	3,255 - 3,470	
maximal diameter	540 - 650	
diameter of aperture	20 - 25	

(* = including renovations)

DISTRIBUTION. — This species has chiefly been found in Pacific waters around the Loyalty Islands at depths varying between 257 and 515 m. Three records are from the northwestern end of the Norfolk Ridge from depths between 200 and 515 m.

REMARKS. — A fully developed gonotheca on a colony from MUSORSTOM 4, Stn CP 216 (in slide no. 452), has regenerated a second, slightly laterally placed aperture apparently as the result of regeneration after damage to the apical portion (fig. 33e). Besides normally developed gonothecae, inserting on the basal part of the internode close to axillary hydrothecae, gonothecae may also be observed to develop from otherwise normal hydrothecae (as is usually observed in *Synthecium*).

One of the gonothecae of a colony from MUSORSTOM 6, Stn DW 399 (in slide no. 1000), has a circular lid; also many female gonothecae from that station have developing embryos.

This species generally resembles *Gonaxia scalariformis*, so much so that at first I was inclined to consider the two forms identical. Inspection of the large material available has convinced me that two distinct species are present that although closely alike in general appearance, are nevertheless separable by the following differences :

Gonaxia scalariformis	*Gonaxia similis*
Hydrocladia distinctly geniculate	Hydrocladia weakly geniculate
Hydrotheca small, tubular over almost entire length, proximal portion slightly widened inside internode, leaving internode perpendicularly	Hydrothecae large, distal part of hydrotheca tubular, with proximal portion distinctly swollen outside internode, pointing slightly upwards

ETYMOLOGY. — The specific name *similis* refers to the great general resemblance of this new species with *Gonaxia scalariformis*; the latin adverb *similis* meaning having a great resemblance to, or resembling.

Gonaxia sinuosa sp. nov.

Figs 31c-e, 35b, 37a-b, 38a

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn CP 110, 22°12.38'S-167°06.43'E, 275-320 m, 09.09.1985 : single 30 mm high stem and some fragments, no gonothecae; 2 slides no. 518, with *Hebella* sp. (RMNH-Coel. 25845).

MUSORSTOM 4 : stn DW 207, 22°39.00'S-167°07.40'E, 220-235 m, 28.09.1985 : five colonies 15-35 mm high, some forked, no gonothecae. Slides no. 543 (2) of colony fragments and no. 894 of top part [MNHN-Hy. 1054, 2 colonies; BMNH 1989.11.24.43, 2 colonies; RMNH-Coel. 25846, colony and fragments, slides nos 543 (2) and 894].

CHALCAL 2 : stn DW 80, 23°26.70'S-168°01.80'E, 80-160 m, 31.10.1986 : single 60 mm high pinnate colony with a few gonothecae on stem, slides nos 882 and 1033 of hydrocladia and gonotheca (RMNH-Coel. 25847).

SMIB 4 : stn DW 40, 24°46.2'S-168°08.7'E, 260 m, 07.03.1989 : single stem with separate gonothecae, 40 mm high; slide no. 866 (MNHN-Hy. 1055, sample; RMNH-Coel. 25848, slide no. 866). — Stn DW 55, 23°21.4'S-168°04.5'E, 260 m, 09.03.1989 : two young colonies c. 20 mm high on sponge; no gonothecae, slide no. 864 of one of colonies (BMNH 1989.11.24.44, sample; RMNH-Coel. 25849, slide no. 864). — Stn DW 57, 23°21.5'S-168°04.6'E, 260 m, 09.03.1989 : two 50 mm high colonies with gonothecae; *Diphasia* sp. growing on top of colonies. Also some detached hydrocladia (MNHN-Hy. 1056). Slides nos 871 (2) and 872 (with *Diphasia* sp.; RMNH-Coel. 25850). — Stn DW 59, 22°58.0'S-167°22.5'E, 650 m, 10.03.1989 : single 60 mm high colony with gonothecae, slides nos 1034 and 1043 (2) of top parts (MNHN-Hy. 1057, slide no. 1034; RMNH-Coel. 25851, sample and 2 slides no. 1043).

SMIB 5 : stn DW 71, 23°41.3'S-168°00.7'E, 265 m, 07.09.1989 (type locality) : one forked colony 90 mm high (holotype, MNHN-Hy. 1058) and one 60 mm high stem (paratype, RMNH-Coel. 25852), both with gonothecae. Slide no. 1035 of top part is schizoholotype (RMNH-Coel. 25853); slide no. 1044 of top part is schizoparatype (BMNH 1989.11.24.45). — Stn DW 95, 22°59.7'S-168°19.8'E, 200 m, 14.09.1989 : three fragmentary colonies 15-25 mm high, of which 2 with gonothecae (MNHN-Hy. 1059); slide no. 1036 (RMNH-Coel. 25854). — Stn DW 101, 23°21.2'S-168°04.9'E, 270 m, 14.09.1989 : thirty mm high stem and some smaller fragments, gonothecae present on stem (RMNH-Coel. 25855). Slide no. 1037, basal part of stem (BMNH 1989.11.24.46) and slide no. 1045 of top part (MNHN-Hy. 1060).

DESCRIPTION (mainly based in material from type locality, SMIB 5, Stn DW 71). — Resembling *Gonaxia ampullacea* in many details, but differing in shape of hydrothecae and gonothecae. Axis strong, upright, basally c. 2 mm diameter, polysiphonic because of secondary tubules running parallel to primary axis and covering axial hydrothecae and apophyses, leaving only distal part of stem monosiphonic (fig. 37a). Axis basally with small expanded portion to attach colony to fixed objects (small stones, corals, etc.). Hydrocladia alternately and pinnately arranged, leaving axis at almost right angle, inserted on distinct apophyses; three hydrothecae between two successive apophyses, one axillary, one on opposite side and one on same side almost opposite next apophysis (fig. 37a). Hydrocladium separated from apophysis by perisarcal constriction, no septum visible; each apophysis, directly under axillary hydrotheca, with large circular hole or thin spot (fenestra; fig. 35b). Hydrocladia 10-20 mm long, with 14-22 pairs of hydrothecae; hydrothecae alternately arranged in same plane as axis and hydrocladia; packing of hydrothecae varied, in colonies from type locality with small but distinct portion of hydrocladium exposed between succeeding hydrothecae (fig. 38a), in many other colonies more closely packed and normally no hydrocladium exposed between hydrothecae (fig. 37b).

Axial and hydrocladial hydrothecae similar, those of axis slightly smaller; proximal portion slightly to distinctly swollen, distal portion tubular, turning away from axis or hydrocladium almost perpendicularly, scarcely or slightly narrowing towards aperture (fig. 35b). Free part of adcauline hydrothecal wall c. twice as long as adnate part, with rounded but very prominent curve and a distinct, basally rounded slit between proximal part free adcauline wall and wall of hydrocladium (fig. 38a). This slit almost closed in hydrocladial hydrothecae of colonies with closely packed hydrothecae, but proximal rounded part still distinctly visible (fig. 37b). Adnate adcauline wall with strong perisarcal peg basally; hydrothecal floor strongly convex, with scarcely visible hole for passage of perisarc. Abcauline hydrothecal wall with distinct flexure. Hydrothecal margin with three, usually acute and well developed marginal cusps, one median abcauline and two laterals on adcauline side. Closing apparatus preserved in some hydrothecae and observed to be composed of three more or less triangular flaps, when closed forming low roof. In many hydrothecae, nevertheless, opercular apparatus deciduous; some hydrothecae show signs of repair after damage sustained to aperture. Axillary hydrothecae more or less tubular, slightly curved proximally, ad- and abcauline walls with basal flexure (fig. 35b).

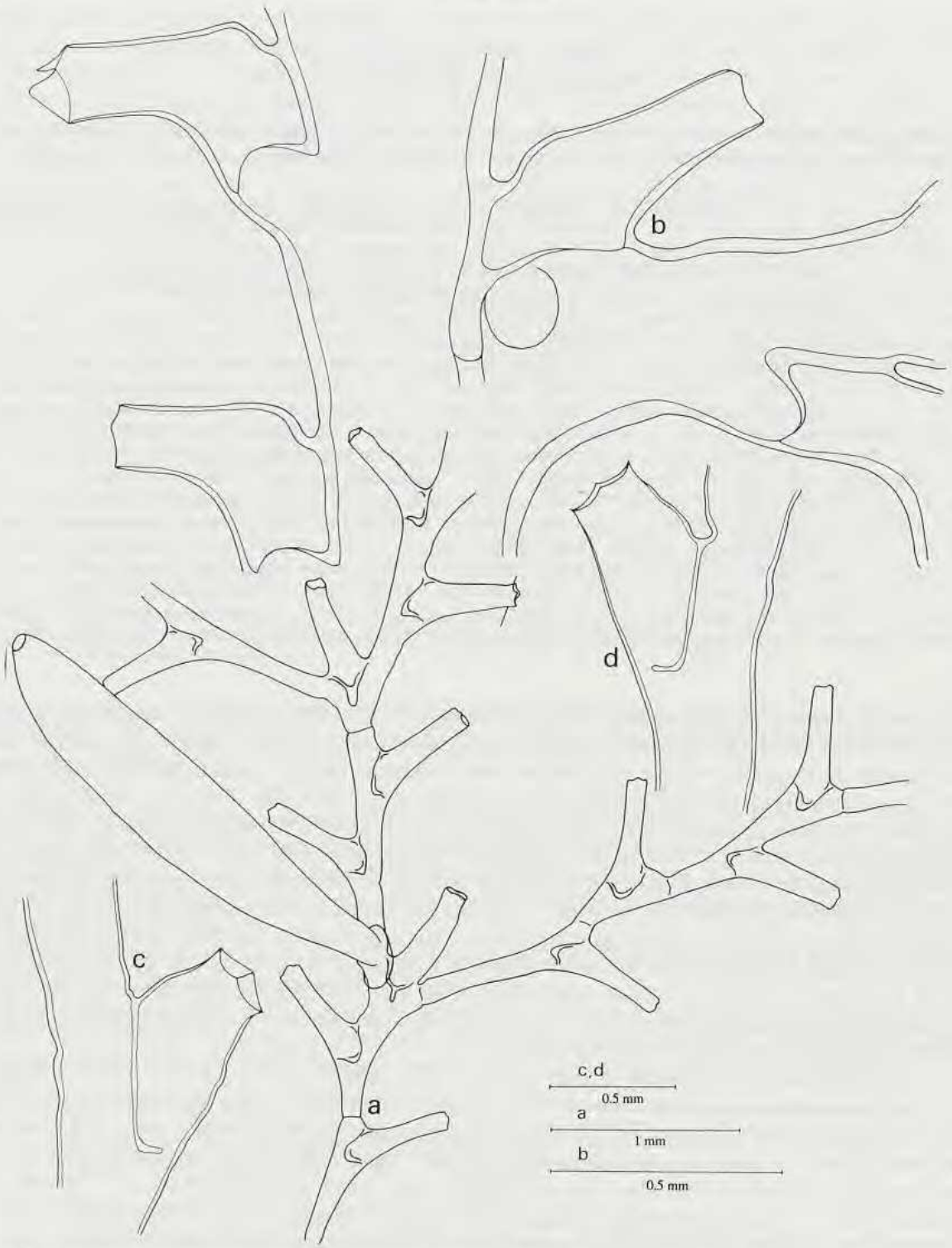

FIG. 35 a. — *Gonaxia scalariformis* sp. nov., paratype, BIOCAL, Stn DW 08, monosiphonic distal part of colony.
FIG. 35 b. — *Gonaxia sinuosa* sp. nov., schizoholotype, SMIB 5, Stn SW 71, part of axis with axillary hydrotheca.
FIG. 35 c-d. — *Sertularella geodiae* Totton, 1930, BIOGEOCAL, Stn CP 214, hydrocladial hydrothecae.
a, slide no. 519; b, slide no. 1035; c-d, slide no. 581.

Hydranths preserved in some colonies but invariably in mediocre condition, so that number of tentacles could not be counted; attached in concavity of inside of adnate part adcauline wall, appearing fairly large.

Gonothecae of two types observed on frontal part of stem inserting at fenestra of apophyses. They are separate, elongated ovoid bodies of c. 2 mm length with very short pedicel and widened basal disk with circular perforation. Those considered female having one fairly wide circular opening at apex, in some still closed by circular lid (fig. 31e). Those considered male gradually narrowing apically with a small circular opening, apparently without lid (fig. 31c); one male gonotheca with two apertures (fig. 31d). Contents of all gonothecae spent.

Perisarc strong, particularly along axis, hydrocladia and proximal, swollen part of hydrothecae, thinning out along distal, tube-shaped portion, yellowish, badly staining in haematoxyline. Colonies usually covered by many epizoites (smaller hydroids, Bryozoa, Foraminifera).

TABLE 24. — Measurements of *Gonaxia sinuosa* sp. nov., in µm.

	SMIB 5 Stn DW 71 (slide no. 1035) schizoholotype	CHALCAL 2 Stn DW 80 (slide no. 882)	SMIB 4 Stn DW 59 (slide no. 1034)	SMIB 4 Stn DW 59 (slide no. 1043)
Stem, diameter at base	1,875			
Axial hydrotheca, length abcauline wall	405 - 435		345 - 400	
length free part adcauline wall	415 - 435		390 - 445	
length adnate part adcauline wall	275 - 310		205 - 280	
total depth	435 - 475		445 - 465	
maximal diameter	205 - 235		200 - 205	
diameter at rim	125 - 150		140 - 165	
Axillary hydrotheca, length abcauline wall	325 - 335		355 - 365	
length free part adcauline wall	475 - 495		465 - 490	
length adnate part adcauline wall	355 - 400		355 - 370	
total depth	635 - 660		585 - 595	
maximal diameter	215 - 230		185 - 205	
diameter at rim	135 - 140		125 - 140	
Hydrocladium, diameter at base	275		370	
Hydrocladial hydrotheca, length abcauline wall	405 - 430		370 - 445	
length free part adcauline wall	465 - 475		355 - 480	
length adnate part adcauline wall	215 - 225		200 - 225	
total depth	530 - 540		510 - 530	
maximal diameter	205 - 235		185 - 220	
diameter at rim	155 - 165		160 - 175	
Male gonotheca, length				2,600
diameter				860
diameter of aperture				195
Female gonotheca, length		2,820		
diameter		1,040		
diameter at aperture		370		

DISTRIBUTION. — The material all originates from the Pacific off the south-eastern extremity of New Caledonia; the type locality is on the northwestern extremity of the Norfolk Ridge. The depth records are between c. 80 and 600 m depth.

REMARKS. — The great resemblance of this species to *Gonaxia ampullacea* has already been indicated above; it can readily be distinguished in fertile state by the ovoid, separate gonothecae and in sterile condition by the differing hydrothecae. The reluctance of the present species to stain with haematoxyline also affords an additional character.

ETYMOLOGY. — From the latin *sinuosus* (full of bendings), referring to the condition of the hydrothecae.

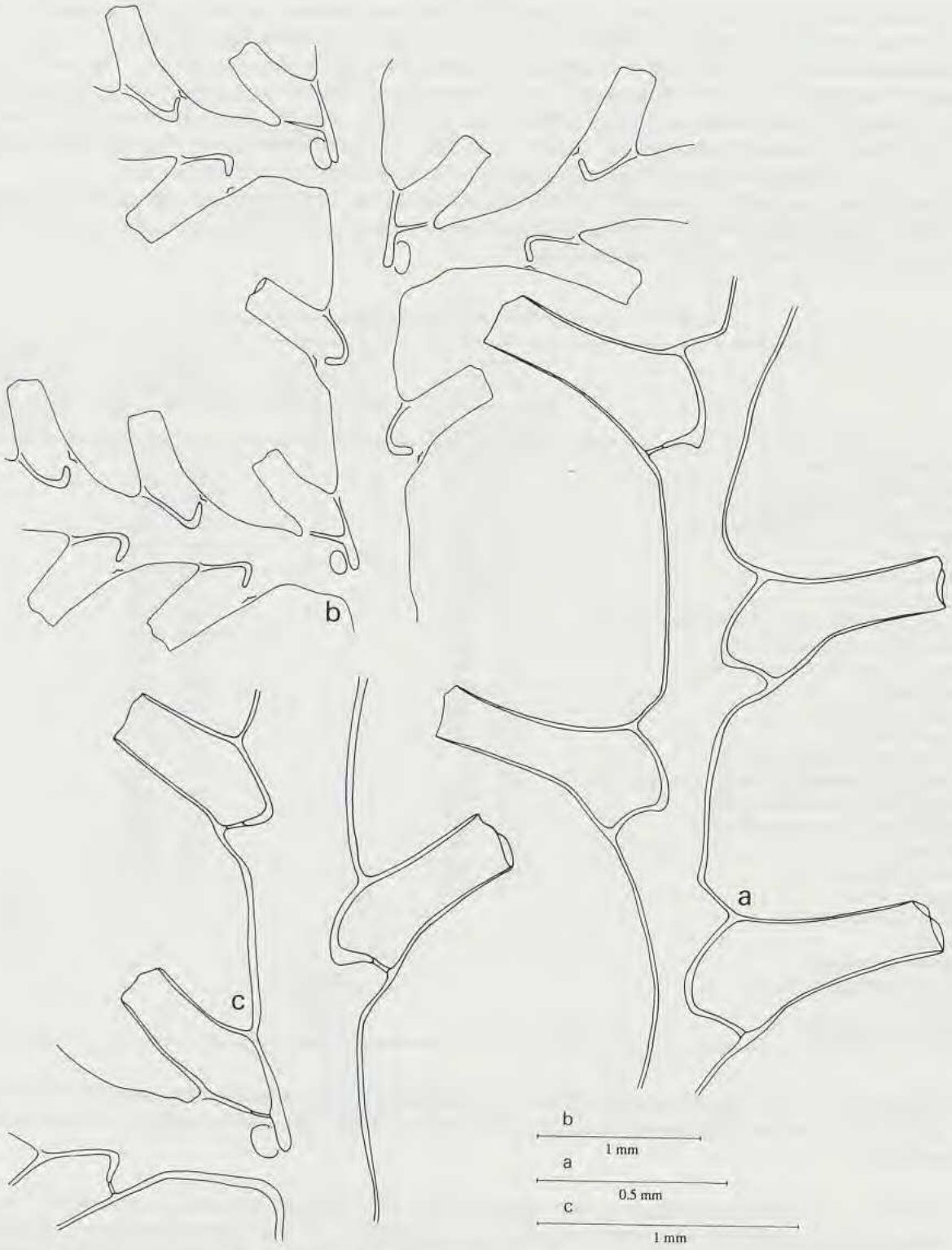

FIG. 36 a. — *Gonaxia similis* sp. nov., MUSORSTOM 4, Stn CP 216, part of hydrocladium.
FIG. 36 b-c. — *Gonaxia stricta* sp. nov., schizoholotype, CHALCAL 2, Stn DW 76 : **b**, monosiphonic distal part of colony; **c**, part of axis with axillary hydrotheca.
a, slide no. 452; b-c, slide no. 1054.

Gonaxia stricta sp. nov.

Figs 36b-c, 37c, 38b

MATERIAL EXAMINED. — **New Caledonia.** CHALCAL 2, Stn DW 76, 23°40.50'S-167°45.20'E, 470 m, 30.10.1986 (type locality) : thirty mm high stem fragment with 2 hydrocladia (holotype, MNHN-Hy. 1061), a top part and 10 detached hydrocladia; no gonothecae. Two slides no. 881 of hydrocladia and slide no. 1054 of top part (schizoholotypes; BMNH 1989.11.24.47, 1 slide no. 881; RMNH-Coel. 25856, 1 slide no. 881 and slide no. 1054).

DESCRIPTION (based on holotype). — Stem c. 30 mm high, basally and apically broken, top part separate. Axis basally polysiphonic by presence of parallel secondary tubes fused with primary axis; apical portion monosiphonic and there structure of colony visible (fig. 36b). No division of axis into internodes apparent, the few hydrocladia present insert alternately on apophyses at both sides of axis and in same plane with axial and hydrocladial hydrothecae. Apophyses not particularly large but well visible, with axillary hydrotheca (fig. 36b). Normally three hydrothecae between two successive apophyses : one axillary, one right, one left, but presence of two apophyses directly following each other (without intermediary axillary hydrothecae) has also been observed.

Hydrocladia set off from apophysis by perisarcal constriction; no torsion of hydrocladium has been observed. Hydrocladia, especially in stained slides, divided into internodes each bearing a single hydrotheca alternately turned left or right; hydrothecae fairly closely packed. Division between internodes marked by slight perisarcal constriction and in stained slides by less intensely staining zone indicating ring of thinner perisarc (fig. 38b); hydrocladia stiff and straight, pointing obliquely upwards.

TABLE 25. — Measurements of *Gonaxia stricta* sp. nov., in µm.

	CHALCAL 2, Stn DW 76 (slide no. 1054) schizoholotype
Stem, diameter at base	1,000
Axial hydrotheca, length abcauline wall	520 - 530
length free part adcauline wall	385 - 405
length adnate part adcauline wall	325 - 400
total depth	665 - 675
maximal diameter	220 - 245
diameter at rim	200 - 210
Axillary hydrotheca, length abcauline wall	460 - 480
length free part adcauline wall	405 - 445
length adnate part adcauline wall	420 - 445
total depth	705 - 715
maximal diameter	235 - 265
diameter at rim	175 - 190
Hydrocladium, diameter at base	260 - 275
Hydrocladial hydrotheca, length abcauline wall	510 - 575
length free part adcauline wall	390 - 465
length adnate part adcauline wall	320 - 360
total depth	635 - 715
maximal diameter	280 - 295
diameter at rim	245 - 250

Three types of hydrothecae present : axial, axillary and hydrocladial. Axial and hydrocladial hydrothecae differing only in size, more or less tubular, slightly widening basally; widening best visible in axial hydrothecae. Free part adcauline wall straight, slightly longer than adnate part; adnate portion thickened, basally with swollen portion, hole in hydrothecal floor to permit passage of coenosarc distinct. Abcauline wall distally straight, with slight but distinct flexure at about two-thirds length from rim (fig. 37c). Axillary hydrothecae tubular, slightly curved; free part adcauline wall usually concave, abcauline wall convex. Adnate part of adcauline wall running into a conspicuous peg at its end; fenestrae small but distinct, oval (fig. 36c). All hydrothecae at rim with three shallow

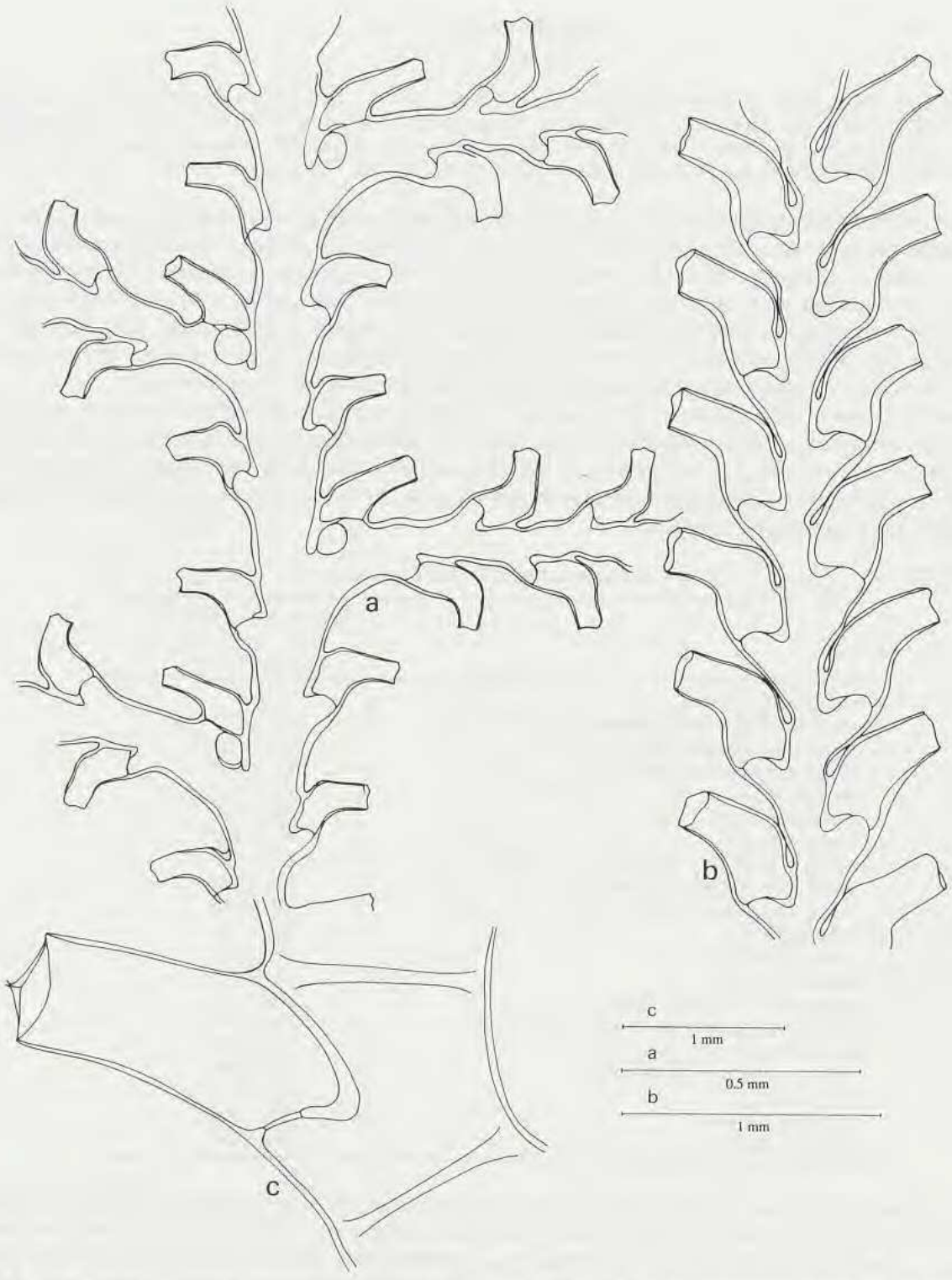

FIG. 37 a-b. — *Gonaxia sinuosa* sp. nov. : **a**, schizoholoype, SMIB 5, Stn DW 71, monosiphonic distal part of colony. — **b**, SMIB 4, Stn DW 59, part of hydrocladium.
FIG. 37 c. — *Gonaxia stricta* sp. nov., schizoholotype, CHALCAL 2, Stn DW 76, hydrocladial hydrotheca.
a, slide no. 1035; b, slide no. 1034; c, slide no. 881.

rounded cusps; arrangement in many hydrothecae irregular but in some with one abcauline cusp and two laterals near adcauline border. Remnants of closing apparatus frequently observed; some hydrothecae with apparatus complete, being composed of three more or less triangular flaps closing to form a low roof, edges of plates recurved (fig. 37c). No renovations observed, number of repaired hydrothecae small.

Perisarc not particularly thick, yellowish, thickest on axis, thinning out gradually along hydrothecal walls.

Soft tissue present in hydrocladia and remnants of hydranths visible in hydrothecae, but in too poor condition to permit counts of tentacles; hydranths of medium size.

No gonothecae present.

DISTRIBUTION. — The type locality is at the northwestern extremity of the Norfolk Ridge; depth 470 m.

REMARKS. — The species may be recognized by the shape and arrangement of the hydrothecae.

ETYMOLOGY. — From the latin *strictus* (drawn together, tight), referring to the placement of the hydrothecae.

Genus ***HYDRALLMANIA*** Hinks, 1868

In this genus five species have been described, one of which (*Hydrallmania graptolithiformis* Voigt, 1973, *Paläontol. Z.*, **47** (12) : 28, pl. 4 figs 1-4) is fossil and can remain out of consideration here. A sixth species, *Hydrallmania (?) bicalycula* Coughtrey, 1876 (*Ann. Mag. nat. Hist.*, (4) **17** : 29, pl. 3 figs 8-9) is presently referred to the genus *Salacia* Lamouroux, 1816. The four species to be considered here are : *Hydrallmania distans* Nutting, 1899; *H. falcata* (Linnaeus, 1758); *H. franciscana* (Trask, 1857), and *H. plumulifera* (Allman, 1877); references to descriptions, distribution records and synonymies are given below. *Hydrallmania plumulifera* stands out from the remaining three species by the fact that the hydrothecae, on the secondary hydrocladia, are arranged in two distinct though not quite opposite rows with alternate hydrothecae scarcely touching or completely free. It is known from a fairly large number of localities in the northwestern Atlantic and may well turn out to be a species of *Sertularia*. The remaining three species have in common that on the secondary hydrocladia (of well developed colonies) the flask-shaped to elongated flask-shaped hydrothecae are basally placed in a single row, though following hydrothecae alternately curve left and right; the shape of the colony is characteristic by the presence of a helicoidal axis (composed of basal parts of succeeding primary hydrocladia); each primary hydrocladium being pinnate and supporting alternate secondary hydrocladia (cf. description of *H. falcata*). Of those three species *H. falcata* is considered to be exclusively Atlantic, the remaining two (*H. distans* and *H. franciscana*) are exclusively Pacific. The three species are differentiated by characters of the hydrothecae : flask-shaped with swollen proximal portion versus elongated; circular rim versus weakly bicuspid rim, the cusps being lateral, characters that are known to be variable and dependent upon age and wear of the colony. *Hydrallmania franciscana*, since its original record from San Francisco Bay, has never been completely redescribed : it is said to have the hydrothecae "distinctly flask shaped, (the) distal ends much constricted, (and the) aperture round" (NUTTING, 1904 : 124, key). *H. distans* and *H. falcata* differ in the disposition of the hydrothecae, being spaced in the first, with the top of the hydrotheca not reaching the middle of the next one above, and closely approximated in the second, the top of the hydrotheca reaching beyond the middle of the next hydrotheca above. This is a notoriously variable character, very much dependent upon the age of the colony, as is shown by a large material of the commonly distributed Atlantic *Hydrallmania falcata*. The characters separating *H. falcata* and *H. distans* consequently need further study. NAUMOV (1960 : 402) refers to two species in the genus *Hydrallmania*, one of which is *H. falcata*; the second is not indicated.

There seems to be some controversy in literature concerning the exact nature of the operculum, this structure being variously described as being composed of a single adcauline, circular flap (NAUMOV, 1960; CORNELIUS, 1979) or of both a large adcauline flap and a much smaller adcauline plate (LEVINSEN, 1913; BOUILLON, 1985). Observations of the New Caledonia material and the Atlantic material used for comparison confirm the correctness of the second view.

The development of the lateral cusps at the hydrothecal rim is much varied, but usually two little to moderately elevated, rounded cusps are present, though occasionally hydrothecae with a more or less circular rim, possibly due to some wear and tear, can be observed.

Hydrallmania distans Nutting, 1899

Hydrallmania distans Nutting, 1899 : 744, 746, pl. 63 figs 3-3d; 1904 : 46, 124, 126, pl. 38 figs 5-9. — HARTLAUB, 1901a : 355. — SHIDLOVSKII, 1902 : 224. — TORREY, 1902 : 13, 22, 70. — FRASER, 1911 : 65; 1913 : 154; 1914 : 185, pl. 28 fig. 103; 1933 : 259; 1935 : 145; 1936 : 125; 1937b : 140-141, pl. 31 fig. 163; 1948 : 239. — McCORMICK, 1965 : 143.
Diphasia clarae Fraser, 1911 : 64, pl. 6 fig. 1; 1913 : 154.
Nigellastrum clarae - STECHOW, 1922 : 147; 1923d : 160.

DISTRIBUTION. — Puget Sound region (NUTTING, 1899, 1904); Vancouver Island and Queen Charlotte Islands region (FRASER, 1937b); middle and lower regions of San Francisco Bay (FRASER, 1937b); Monterey Bay, Gulf of Santa Catalina and San Diego area, California, U.S.A. (FRASER, 1948). Depth distribution : 10-150 fms (= 18-274 m).

Hydrallmania falcata (Linnaeus, 1758)

Fig. 2e

Sertularia falcata Linnaeus, 1758 : 810. — PALLAS, 1766 : 144-146.
Plumularia falcata - LAMARCK, 1816 : 174.
Hydrallmania falcata - HINCKS, 1868 : 273-275, pl. 58. — BEDOT, 1911 : 222. — STECHOW, 1912 : 357; 1927 : 312. — LEVINSEN, 1913 : 308, pl. 5 fig. 7. — BROCH, 1918 : 135-138, fig. 73. — FRASER, 1921 : 171, fig. 83; 1927 : 326; 1932 : 51; 1944 : 250-252, pl. 53 fig. 236. — LELOUP, 1940b : 18; 1952 : 171-172, fig. 99. — VERVOORT, 1942 : 295; 1946b : 255, figs 111-113; 1949 : 155. — NAUMOV, 1960 : 402-403, fig. 294. — REDIER, 1964b : 146. — RICHARDS & RILEY, 1967 : 130. — CORNELIUS, 1979 : 273, figs 15-16.
Sertularia stipulata Linnaeus, 1758 : 813.

MATERIAL EXAMINED. — **New Caledonia**. BIOGEOCAL : stn CP 214[2], 22°43.09'S-166°27.19'E, 1665-1590 m, 09.04.1987 : c. 8 mm high stem fragment with 4 spirally arranged primary hydrocladia, one of these with attached colony of *Diphasia attenuata* (Hincks, 1866). Slides nos 584 and 852 (all RMNH-Coel. 25873).

DESCRIPTION. — Stem helicoidal, composed of basal parts of primary hydrocladia, each primary hydrocladium inserting on apophysis with axillary hydrotheca. Distal part of primary hydrocladium, beyond apophysis supporting next primary hydrocladium, divided into short internodes, each with basal apophysis and three hydrothecae, of which the first is axillary to basal apophysis. Apophyses of consecutive internodes of primary hydrocladium alternately turned left and right and each supporting a short basal internode and a secondary hydrocladium; secondary hydrocladia consequently pinnately arranged and alternately directed to left or right side of primary hydrocladium; internodes of primary hydrocladium separated by strongly oblique nodes. Node separating basal internode from apophysis straight; remaining nodes oblique. Number of hydrothecae on internodes of secondary hydrocladia varied between 3 and 6. All hydrothecae on primary and secondary hydrocladia monoserially arranged but alternately turned left or right, more or less bottle-shaped with slightly swollen proximal portion and curved, narrowing distal part. Hydrothecal rim with two rounded lateral cusps, separated by shallow adcauline and slightly deeper abcauline sinus. Opercular apparatus two-flapped, with larger and medially folded adcauline flap, attached to adcauline sinus, and smaller, usually missing, abcauline flap attached to abcauline sinus (fig. 2e). Development of perisarc moderate, thickest on internodes, thinning out along hydrothecal walls.

The BIOGEOCAL specimen has no tissue rests and gonothecae are absent.

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[2] Species found at this station are : *Filellum serpens* (Hassall, 1848), *Diphasia attenuata* (Hincks, 1866), *Diphasia mutulata* (Busk, 1852), *Hydrallmania falcata* (Linnaeus, 1758) and *Sertularella geodiae* Totton, 1930.

DISTRIBUTION. — It is interesting to find this, mainly northern Atlantic shallow-water species, in deep water of the Pacific off southeastern New Caledonia (off Nouméa), as is the abundant occurrence of fertile specimens of a second Atlantic species, *Diphasia attenuata* (HINCKS, 1866), at the same station. The known distribution of *H. falcata* includes littoral and moderately deep waters of both the American and European sides of the northern Atlantic, penetrating into Arctic regions (NUTTING, 1904; NAUMOV, 1960; CORNELIUS, 1979), occasionally extending towards very deep waters [BONNEVIE, 1899 : 1100 fms (= 2011 m)].

TABLE 26. — Measurements of *Hydrallmania falcata* (Linnaeus, 1758), in µm.

	BIOGEOCAL Stn CP 214 (slide no. 584)	BALGIM Atlantic off Strait of Gibraltar
Length internode primary hydrocladium	815 - 850	
diameter	185 - 170	
Length internode secondary hydrocladium	1.110 - 1.330	
diameter	110 - 150	
Hydrotheca, maximal length	335 - 370	300 - 400
maximal diameter	135 - 150	130 - 190
diameter at rim	95 - 110	80 - 140

REMARKS. — Though no positive Pacific records of *H. falcata* are available, attention is here drawn towards the unsatisfactory delimitation of this Atlantic species from its Pacific congeners. The occurrence of this species in a deep water sample is not greatly surprising, with regard to its bathymetric distribution in the Atlantic.

Hydrallmania falcata var. *bidens* Mereshkovskii, 1878

Hydrallmania falcata var. *bidens* Mereshkovskii, 1878 : 324. — CHWOROSTANSKY, 1892 : 215. — KNIPOVITCH, 1893 : 63, 65, 66, 73. — SHIDLOVSKII, 1902 : 224.

REMARKS. — Badly known variety that needs further study.

Hydrallmania franciscana (Trask, 1857)

Plumularia franciscana Trask, 1857 : 113, pl. 4 fig. 3.
Hydrallmania franciscana - CLARK, 1876a : 249, 250, 260, 263. — THOMPSON, 1887 : 395. — NUTTING, 1899 : 747; 1904 : 46, 124, 126-127, pl. 38 fig. 10. — HARTLAUB, 1901a : 355. — SHIDLOVSKII, 1902 : 224. — TORREY, 1902 : 13, 23. — FRASER, 1911 : 65; 1937b : 141, pl. 31 fig. 164.
Plumularia gracilis Murray, 1860a : 251, pl. 12 fig. 1. — SHIDLOVSKII, 1902 : 224. — NUTTING, 1904 : 126.
Plumularia (Hydrallmania) gracilis - KIRCHENPAUER, 1876 : 43.
Sertularia gracilis - AGASSIZ, 1865 : 145, 223.

DISTRIBUTION. — Exclusively known from San Francisco Bay and not recorded since its original description from that area (TRASK, 1857; MURRAY, 1860, as *Plumularia gracilis*).

Hydrallmania plumulifera (Allman, 1877)

Thuiaria plumulifera Allman, 1877 : 27, pl. 17 figs 3-6. — JÄDERHOLM, 1896 : 12, pl. 2 fig. 4. — NUTTING, 1904 : 67-68, pl. 9 figs 9-13. — FRASER, 1944 : 305-306, pl. 65 fig. 291.
Hydrallmania plumulifera - LEVINSEN, 1913 : 305, pl. 5 figs 1-6.

DISTRIBUTION. — Originally recorded off Cape Fear, N. Carolina, U.S.A., 9 fms (= 16.5 m) (ALLMAN, 1877), and off the mouth of the Savannah River, Georgia, U.S.A., 4 fms (= 7 m) (JÄDERHOLM, 1896). Additional northwestern Atlantic localities are given by NUTTING (1904) and FRASER (1944).

Hydrallmania sp.

Hydrallmania sp. McCauley, 1972 : 412.

Genus *IDIELLANA* Cotton & Godfrey, 1942

Only one species has so far been described in the genus *Idiellana*, viz. *Idiellana pristis* (Lamouroux, 1816).

Idiellana pristis (Lamouroux, 1816)

Idya pristis Lamouroux, 1816 : 200, pl. 5 figs A, B, C, D, E. — Allman, 1888 : 85-87, pl. 39 figs 1-10. — Billard, 1907 : 351; 1925b : 219, fig. 58, pl. 8 fig. 33; 1931 : 249. — Levinsen, 1913 : pl. 5 figs 18-22. — Stechow, 1913b : 13, 141. — Jäderholm, 1916 : 7; 1919 : 16; 1920 : 4. — Jarvis, 1922 : 344. — Bale, 1924 : 249. — Hargitt, 1924 : 490, pl. 4 fig. 14. — Gravely, 1927 : 15, pl. 3 fig. 21; 1941 : 94. — Nutting, 1927 : 217. — Leloup, 1932 : 1. — Yamada, 1959 : 55.

Idiella pristis - Stechow, 1919 : 106; 1923b : 12; 1923d : 162; 1925a : 221. — Stechow & Müller, 1923 : 469. — Briggs & Gardner, 1931 : 191. — Leloup, 1935 : 37, figs 19-21; 1937a : 107, 116; 1937b : 5, 35; 1960 : 229. — Vervoort, 1941 : 205; 1946a : 306; 1959 : 252; 1968 : 36, 103. — Blackburn, 1942 : 116. — Fraser, 1944 : 311-312, pl. 66 fig. 298. — Buchanan, 1957 : 365. — Mammen, 1965 : 52, fig. 86. — Wedler, 1975 : 334 et seq.

Idiellana pristis - Cotton & Godfrey, 1942 : 234. — Pennycuik, 1959 : 193. — Ralph, 1961 : 766, fig. 5c-e. — Redier, 1965 : 371, figs 1-2. — Rees & Thursfield, 1965 : 124. — Van Gemerden-Hoogeveen, 1965 : 16. — Vervoort, 1968 : 36, 103. — Hirohito, 1969 : 21. — Millard, 1968 : 266; 1975 : 269, fig. 88A-E; 1978 : 194 et seq. — Millard & Bouillon, 1974 : 8. — Flórez González, 1983 : 120. — Bandel & Wedler, 1987 : 41.

Pasythea philippina Marktanner-Turneretscher, 1890 : 234, 239, pl. 4 figs 8, 8a.

Material examined. — **Makassar Strait**. Corindon 2 : stn 207, 00°14.9'S-117°51.7'E, 150 m, 31.10.1980 : twenty five mm long fragment without gonothecae, made up in slide no. 1621 (RMNH-Coel. 25960). — Stn 258, 01°56.8'S-119°17.3'E, 30 m, 06.11.1980 : many large, mutilated colonies 80-100 mm high on wormtubes. Stems with many gonothecae. Three slides no. 1622 (RMNH-Coel. 25956). — Stn 263, 01°56.8'S-119°16.7'E, 80 m, 06.11.1980 : several 60 mm high stems with some hydrocladia and many gonothecae; some additional fragments. Slide no. 1623 (all MNHN-Hy. 1125).

Philippines. Musorstom 3 : stn CP 121, 12°08.3'N-121°17.3'E, 84-73 m, 03.06.1985 : thirty mm high stem with hydrocladia all in one plane. No gonothecae. On stem and branches stolons of *?Clytia* sp. Slides nos 291A and 1624 (all RMNH-Coel. 25957). — Stn CP 134, 12°01.1'N-121°57.3'E, 92-95 m, 05.06.1985 : top part of 25 mm length, made up in slide no. 383. In addition 3 large colonies 60 mm high and a few smaller colonies. No gonothecae (all BMNH 1989.11.24.90).

New Caledonia. Lagon : stn 114, 22°23.6'S-166°49.6'E, 37 m, 22.08.1984 : three colonies with fused basal portion and many gonothecae, c. 150 mm high and several smaller colonies; slide no. 1625 (all RMNH-Coel. 25958). — Stn 120, 22°28.1'S-166°43.7'E, 46 m, 23.08.1984 : three colonies up to 50 mm high and some fragments. No gonothecae. Slide no. 672 of top-part (all MNHN-Hy. 1126). — Stn 129, 22°30.5'S-166°47.2'E, 45 m, 23.08.1984 : c. 5 colonies 80 mm high on wormtubes and many fragments. No gonothecae; slide no. 1626 (all RMNH-Coel. 25959).

Distribution. — Well distributed over and fairly common in the tropical and subtropical Pacific, Indian and Pacific Oceans, usually at moderate depths. The present records are from the central part of Makassar Strait, Indonesia (Corindon 2, Stns 207 and 263), from South Mindoro Strait (Musorstom 3, Stn CP 121) and entrance to Tablas Strait (Musorstom 3, Stn CP 134) in the Philippines, and from three localities in the lagoon at the southeastern extremity of New Caledonia (Lagon, Stns 114, 120 and 129), the depth distribution being between 30 and 95 m depth. Many Indonesian records are given by Billard (1925b), while Philippine records can be found in Hargitt (1924) and Nutting (1927). Though I have been unable to discover New Caledonian records in the literature the occurrence of this species at moderate depths around the island could only be expected. The limited occurrence of this species in the New Caledonia collection can be explained from the considerable depth at which the majority of the hydroid material was collected.

Remarks. — The present material agrees with existing descriptions and need not be redescribed here.

Genus *SERTULARELLA* Gray, 1847

Of the genus *Sertularella* Gray, 1848, type, by subsequent designation (HINCKS, 1868 : 235), *Sertularia polyzonias* Linnaeus, 1758, the following species, subspecies, varieties and forms have been considered :

Sertularella acutidentata Billard, 1919 : 20, figs IE, II [= *Sertularella philippinensis* Hargitt, 1924 : 496, pl. 6 fig. 22].

Sertularella africana Stechow, 1919 : 83 [= *Sertularella fusiformis* Warren, 1908 : 295-297, fig. 5C, D; not *Sertularella fusiformis* Hincks, 1861].

Sertularella albida Kirchenpauer, 1884 : 42 [= *Sertularella robusta* Clark, 1876a : 225-226, pl. 13 figs 32-33; not *Sertularella robusta* Coughtrey, 1876b : 300].

Sertularella ampullacea Fraser, 1938a : 9, 51, pl. 12 fig. 58.

Sertularella annulata (Allman, 1888) [= *Sertularia annulata* Allman, 1888 : 52, pl. 24 figs 2, 2a; *Sertularella gayi* var. *allmani* Billard, 1910 : 10-11, fig. 3].

Sertularella antarctica Hartlaub, 1901b : 82-83, pl. 6 figs 27-28 [= *Sertularella unilateralis* Allman, 1876b : 114; *Sertularia unilateralis* Allman, 1888 : 53-54; *Sertularia secunda* Allman, 1888 : 90, pl. 25 figs 2, 2a, 2b; *Sertularella Allmani* Hartlaub, 1901b : 81-82, pl. 5 figs 12-13, pl. 6 figs 1, 8].

Sertularella arbuscula (Lamouroux, 1816) [= *Sertularia arbuscula* Lamouroux, 1816 : 191, pl. 5 fig. 4; *Sertularella arborea* Kirchenpauer, 1884 : 41-42, pl. figs 1, 1a, 1b; *Sertularella crassipes* Allman, 1885 : 133-134, pl. 8 figs 4-5; *Sertularella cuneata* Allman, 1885 : 134, pl. 9 figs 1-2; *Sertularella tumida* Warren, 1908 : 297-300, fig. 6].

Sertularella arbuscula var. *pinnata* Kirchenpauer, 1884 [= *Sertularella arborea* var. *pinnata* Kirchenpauer, 1884 : 42].

Sertularella arbuscula var. *quinquelaminata* Leloup, 1934 : 1-4, figs 1-3.

Sertularella areyi Nutting, 1904 : 83, pl. 17 fig. 16 [= *Sertularella annulaventricosa* Mulder & Trebilcock, 1915 : 54, pl. 7 fig. 1, pl. 8 fig. 4; *Sertularella undulata* Bale, 1915 : 284, pl. 46 fig. 1; *Sertularella tricincta* Billard, 1939 : 248-250, fig. 1; *Sertularella capensis delicata* Millard, 1964 : 38, fig. 12B-D].

Sertularella argentinica El Beshbeeshy, 1991 : 151-156, fig. 37.

Sertularella atlantica Stechow, 1920 : 29 [= *Sertularella tenella* Jäderholm, 1903 : 281; not *Sertularella tenella* (Alder, 1856)].

Sertularella avrilia Watson, 1973 : 172-174, figs 24-25.

Sertularella blanconae El Beshbeeshy, 1991 : 156-160, fig. 38.

Sertularella brandti Linko, 1912 : 119-121, fig. 17.

Sertularella capensis Millard, 1957 : 210-211, fig. 10H.

Sertularella catena (Allman, 1888) [= *Sertularia catena* Allman, 1888 : 58, pl. 28 figs 2, 2a].

Sertularella clarki Mereschkowsky, 1878b : 447, pl. 17 figs 20-22.

Sertularella clarkii (Marktanner-Turneretscher, 1890) [= *Calyptothuiaria clarkii* Marktanner-Turneretscher, 1890 : 243-244, pl. 5 figs 6, 6a]. [Doubtful species deserving, besides another specific name, a critical re-evaluation].

Sertularella clausa (Allman, 1888) [= *Sertularia clausa* Allman, 1888 : 54, pl. 25 figs 3, 3a].

Sertularella complexa Nutting, 1904 : 94, pl. 21 figs 5-9.

Sertularella conella Stechow, 1920 : 37 [= *Sertularella conica* Fraser, 1911 : 68-69, pl. 6 figs 2-4; not *Sertularella conica* Allman, 1877].

Sertularella congregata Millard, 1964 : 39-41, fig. 13A-D.

Sertularella conica Allman, 1877 : 21, pl. 15 figs 6-7 [= *Sertularella turgida* Trask, 1857 : 113, pl. 4 fig. 1].

Sertularella costata Leloup, 1940a : 11-12, fig. 5.

Sertularella crassa Billard, 1919 : 18, fig. 1B.

Sertularella crassicaulis (Heller, 1868) [= *Sertularia crassicaulis* Heller, 1868 : 34, pl. 1 figs 3-4].

Sertularella crassiuscula Bale, 1924 : 240-242, fig. 8.

Sertularella craticula Naumov, 1960 : 345, fig. 236.

Sertularella crenulata Nutting, 1905 : 949, pl. 4 fig. 3, pl. 11 figs 4-7.

Sertularella cruzensis El Beshbeeshy, 1991 : 160-163, fig. 39.
Sertularella cubica García Corrales, Aguirre Inchaurbe & González Mora, 1980 : 24-26, fig. 7.
Sertularella cumberlandica Jäderholm, 1905 : 27-28, pl. 10 figs 8-11.
Sertularella cylindritheca (Allman, 1888) [= *Sertularia cylindritheca* Allman, 1888 : 59-60, pl. 29 figs 1, 1a].
Sertularella decipiens Billard, 1919 : 21, fig. 3B.
Sertularella diaphana (Allman, 1885) [= *Thuiaria distans* Allman, 1877 : 27, pl. 17 figs 1-2; *Thuiaria pinnata* Allman, 1877 : 28, pl. 15 figs 1-2; *Thuiaria diaphana* Allman, 1885 : 145, pl. 18 figs 1-3; *Thuiaria hyalina* Allman, 1888 : 69-70, pl. 33 figs 2, 2a; *Sertularella pinnigera* Hartlaub, 1901b : 113, footnote 1; *Sertularella torreyi* Nutting, 1905 : 934, 949, pl. 4 fig. 4, pl. 11 figs 2-3; *Sertularella speciosa* Congdon, 1907 : 463, 476, figs 24-28; *Sertularella sargassi* Stechow, 1920 : 37; *Thuiaria quadrilateralis* Hargitt, 1924 : 493-494, pl. 5 fig. 17].
Sertularella diaphana var. *delicata* Billard, 1919 [= *Sertularella delicata* Billard, 1919 : 21, fig. 3A].
Sertularella diaphana var. *orthogona* Billard, 1925b : 161, fig. 23.
Sertularella diaphana var. *gigantea* Billard, 1925b : 161, pl. 9 fig. 35.
Sertularella diaphana var. *madagascariensis* Billard, 1921 : 184-185, fig. 1.
Sertularella dubia Billard, 1907b : 344-346, fig. 3.
Sertularella dubia var. *magna* Millard, 1958 : 189-190, fig. 7A.
Sertularella edentula Bale, 1924 : 237-239, fig. 6.
Sertularella ellisi (Deshayes & Milne Edwards, 1836) [= *Sertularia ellisi* Deshayes & Milne Edwards, 1836 : 142-143].
Sertularella ellisi var. *lagenoides* Stechow, 1919 [= *Sertularella lagenoides* Stechow, 1919 : 86-87, fig. C^1].
Sertularella ellisi var. *spelea* Picard, 1956 : 264, fig. 3c.
Sertularella exigua Thompson, 1879 : 101, pl. 16 fig. 3.
Sertularella exilis Fraser, 1938a : 51, pl. 12 fig. 59.
Sertularella falsa Millard, 1957 : 211-212, figs 10F, 11D.
Sertularella flabellum (Allman, 1885) [= *Thecocladium flabellum* Allman, 1885 : 149-150, pl. 19 figs 4-5].
Sertularella fuegonensis El Beshbeeshy, 1991 : 163-167, fig. 41.
Sertularella fusiformis Hincks, 1861 : 253, pl. 6 figs 7-8 [= *Sertularella lineata* Stechow, 1923c : 109].
Sertularella fusiformis var. *glabra* Broch, 1933 : 69-73, fig. 29.
Sertularella fusiformis var. *ornata* Broch, 1933 : 74-76, fig. 30.
Sertularella fusoides Stechow, 1926 : 103-104 [= *Sertularella fusiformis* Torrey, 1902 : 61, pl. 6 figs 53-54; not *Sertularella fusiformis* Hincks, 1861].
Sertularella gaudichaudi (Lamouroux, 1824) [= *Sertularia Gaudichaudi* Lamouroux, 1824 : 615, pl. 10 figs 4-5].
Sertularella gayi (Lamouroux, 1821) [= *Sertularia Gayi* Lamouroux, 1821 : 12-13, pl. 66 figs 8-9].
Sertularella gayi var. *elongata* Billard, 1906 : 185-186, fig. 9c.
Sertularella gayi var. *gracilescens* Jäderholm, 1919 : 17-18, pl. 4 fig. 5.
Sertularella gayi var. *parva* Billard, 1925b : 140-141, fig. 10, pl. 7 fig. 4.
Sertularella gayi var. *robusta* Allman, 1877 : 22-23, pl. 15 figs 3-5.
Sertularella gayi unituba Calder, 1991 : 103-104, fig. 54.
Sertularella geodiae Totton, 1930 : 196-197, fig. 43, pl. 3 figs 7-8.
Sertularella gigantea Mereschkowsky, 1878a : 330, pl. 14 figs 6-7 [= *Sertularella polyzonias* var. *gigantea* Mereschkowsky, 1878a; *Sertularella quadricornuta* Hincks, 1880 : 277, pl. 15 figs 1, 1a].
Sertularella gilchristi Millard, 1964 : 44-45, fig. 12E, G, H.
Sertularella goliathus Stechow, 1923c : 112-113.
Sertularella hartlaubi Nutting, 1904 : 104-105, pl. 27 fig. 5.
Sertularella hermanosensis El Beshbeeshy, 1991 : 167-171, fig. 42.
Sertularella humilis Fraser, 1943 : 81, pl. 19 fig. 12.
Sertularella implexa (Allman, 1888) [= *Sertularia implexa* Allman, 1888 : 54-55, pl. 26 figs 1, 1a].
Sertularella inabai Stechow, 1913a : 141-142.
Sertularella inconstans Billard, 1919 : 19, fig. 1C.

Sertularella integra Allman, 1876a : 262, pl. 13 figs 3-4 [= *Sertularella robusta* var. *flucticulata* Trebilcock, 1928 : 18, pl. 6 figs 5, 5a].
Sertularella intricata Billard, 1919 : 20, fig. 1D.
Sertularella japonica Stechow, 1926 : 104-105.
Sertularella jorgensis El Beshbeeshy, 1991 : 171-174, fig. 43.
Sertularella keiensis Billard, 1925b : 147, fig. 16.
Sertularella laevis Bale, 1882 : 12, pl. 12 fig. 6 [= *Sertularella Novarae* Marktanner-Turneretscher, 1890 : 226, pl. 4 figs 3, 3a, 3b].
Sertularella lagena (Allman, 1876b : 114) [= *Sertularella contorta* Kirchenpauer, 1884 : 39, pl. 15 figs 2, 2a].
Sertularella lata Bale, 1882 : 26, 45, pl. 13 fig. 2.
Sertularella laxa Allman, 1888 [= *Sertularia exigua* Allman, 1888 : 55; *Sertularia laxa* Allman, 1888 : 90, pl. 26 figs 2, 2a].
Sertularella leiocarpa (Allman, 1888) [= *Sertularia leiocarpa* Allman, 1888 : 52-53, pl. 25 figs 1, 1a].
Sertularella levigata Stechow, 1931, *in* STECHOW & UCHIDA, 1931 : 559-561, fig. 9.
Sertularella magna Nutting, 1904 : 103-104, pl. 27 fig. 1 (may represent a new genus!).
Sertularella mediterranea Hartlaub, 1901b : 86-87, pl. 5 figs 10-11, 15-16.
Sertularella mediterranea var. *asymmetrica* Millard, 1958 : 191, fig. 7B.
Sertularella megastoma Nutting, 1904 : 90, pl. 20 figs 8-9.
Sertularella megista Stechow, 1923c : 111-112.
Sertularella microtheca Leloup, 1974 : 30-31, fig. 24.
Sertularella minuscula Billard, 1925a : 648, fig. 2F.
Sertularella mirabilis Jäderholm, 1896 : 9-10, pl. 2 fig. 1.
Sertularella miurensis Stechow, 1921 : 258 [= *Sertularella indivisa* Stechow, 1913b : 134-135, figs 106-107; not *Sertularella indivisa* Bale, 1882 = *Sertularella solidula* Bale, 1882].
Sertularella miurensis var. *obtusa* Stechow, 1931 [= *Sertularella obtusa* Stechow, 1931 : 182-183].
Sertularella miurensis var. *pungens* Stechow, 1931 : 182.
Sertularella mutsuensis Stechow, 1931 : 181-182.
Sertularella nana Hartlaub, 1901a : 350, 352, 354, 358, 361, pl. 21 figs 4, 10-11.
Sertularella natalensis Millard, 1968 : 271, fig. 4A-E.
Sertularella nuttingi Billard, 1914 : 26-28, fig. 16 [= *Sertularella amphorifera* Nutting, 1904; not *Sertularella amphorifera* (Allman, 1877)].
Sertularella ornata Fraser, 1937a : 2, pl. 1 fig. 2.
Sertularella paessleri Hartlaub, 1901b : 80, pl. 6 figs 3, 19.
Sertularella parvula Mammen, 1965 : 37-38, fig. 69 (preoccupied name!).
Sertularella patagonica (d'Orbigny, 1846) [= *Sertularia patagonica* d'Orbigny, 1846 : 25, pl. 11 figs 3-5; ?*Sertularella rugosa* (Linnaeus, 1758)].
Sertularella peculiaris Leloup, 1974 : 34, footnote 1 [= *Thyroscyphus intermedius* f. *peculiaris* Leloup, 1935 : 33-36, figs 15-17].
Sertularella pedrensis Torrey, 1904 : 27, figs 19-21.
Sertularella pellucida Jäderholm, 1907 : 374.
Sertularella peregrina Bale, 1926 : 19-21, fig. 4.
Sertularella picta (Meyen, 1834) [= *Sertularia picta* Meyen, 1834 : 201, pl. 34 figs 1-3].
Sertularella polyzonias (Linnaeus, 1758) [= *Sertularia polyzonias* Linnaeus, 1758 : 813; *Sertularella kerguelensis* Allman, 1876b : 113].
Sertularella polyzonias var. *robusta* Verrill, 1873 : 10.
Sertularella producta Allman, 1888 [= *Sertularia geniculata* Allman, 1888 : 59; *Sertularia producta* Allman, 1888 : 90, pl. 28 figs 3, 3a, 3b].
Sertularella protecta Hartlaub, 1901b : 79-80, 120, pl. 6 figs 21-26.
Sertularella pulchra Stechow, 1923c : 113-115.
Sertularella punctagonangia Hargitt, 1924 : 496-497, pl. 6 fig. 23 (probably a species of *Sertularia*).

Sertularella quadrata Nutting, 1895 : 88.
Sertularella quadridens (Bale, 1884) [= *Thuiaria quadridens* Bale, 1884 : 119, pl. 7 figs 5-6].
Sertularella quadridens cornuta Ritchie, 1909 [= *Sertularella polyzonias* var. *cornuta* Ritchie, 1909 : 525; = *Sertularella cornuta* Ritchie, 1909].
Sertularella quadridens var. *timorensis* Billard, 1919 [= *Sertularella timorensis* Billard, 1919 : 21, fig. 1F-G].
Sertularella quadrifida Hartlaub, 1901b : 120, footnote 1 [= *Thuiaria quadridens* Allman, 1888 : 66, pl. 31 figs 2, 2a; not *Thuiaria quadridens* Bale, 1884 : 119, pl. 7 figs 5-6].
Sertularella quinquelaminata Stechow, 1931 : 180-181.
Sertularella ramosa Thompson, 1879 : 102, pl. 6 figs 5, 5a.
Sertularella richardsoni Ralph, 1961a : 825-827, fig. 22e-h.
Sertularella robusta Coughtrey, 1876a : 27, pl. 3 fig. 6a-b [= *Sertularella microgona* Von Lendenfeld, 1884 : 416, pl. 7 figs 1-3; *Sertularella angulosa* Bale, 1894 : 102, pl. 4 fig. 6; *Sertularella robusta* var. *quasiplana* Trebilcock, 1928 : 18, pl. 6 figs 4, 4a].
Sertularella robustoides Mulder & Trebilcock, 1915 : 56, pl. 9 fig. 1.
Sertularella rugosa (Linnaeus, 1758) [= *Sertularia rugosa* Linnaeus, 1758 : 290; *Sertularella saccata* Nutting, 1901a : 183-184, pl. 24 figs 1-3].
Sertularella sagamina Stechow, 1921 : 257.
Sertularella sanmatiasensis El Beshbeeshy, 1991 : 188-192, fig. 47.
Sertularella similis Fraser, 1948 : 187, 244-245, pl. 28 fig. 19.
Sertularella simplex Hutton, 1873 : 257.
Sertularella sinensis Jäderholm, 1896 : 11, pl. 2 figs 2-3.
Sertularella solidula Bale, 1882 : 12, pl. 12 fig. 8 [= *Sertularella indivisa* Bale, 1882 : 12, pl. 12 fig. 7].
Sertularella spinosa Kirchenpauer, 1884 : 43-44, pl. 15 figs 5, 5a.
Sertularella spirifera Stechow, 1931 : 184-185.
Sertularella striata Stechow, 1923a : 10.
Sertularella tanneri Nutting, 1904 : 81, pl. 16 fig. 1.
Sertularella tasmanica Bale, 1915 : 283, pl. 46 fig. 2.
Sertularella tenella (Alder, 1856) [= *Sertularia tenella* Alder, 1856 : 357-358, pl. 13 figs 3-6; *Sertularella geniculata* Hincks, 1874 : 152-153, pl. 7 figs 13-14; *Sertularella rigosa* Armstrong, 1879 : 101-102, pl. 10].
Sertularella thecocarpa Jarvis, 1922 : 341-342, pl. 24 fig. 10.
Sertularella tilesii Kirchenpauer, 1884 : 39, pl. 15 figs 3, 3a, 3b.
Sertularella tongensis Stechow, 1919 : 89-91, fig. F^1-G^1.
Sertularella tridentata (Lamouroux, 1816) [= *Sertularia tridentata* Lamouroux, 1816 : 187].
Sertularella undulitheca Vervoort, 1959 : 269-271, fig. 32.
Sertularella unilateralis (Lamouroux, 1824) [= *Sertularia unilateralis* Lamouroux, 1824 : 615, pl. 90 figs 1-3].
Sertularella uruguayensis Mañé-Garzon & Milstein, 1973 : 21-22, figs 1-4.
Sertularella valdiviae Stechow, 1923a : 11.
Sertularella vervoorti El Beshbeeshy, 1991 : 192-196, fig. 48.
Sertularella wallacei Stechow, 1926 : 101-102 [= *Sertularella conica* Fraser, 1911 : 68-69, pl. 5 figs 2-4].
Sertularella whitei Rees & Vervoort, 1987 : 108-111, fig. 21d-e.
Sertularella xantha Stechow, 1923c : 109-110 [= *Sertularella longa* Stechow, 1923c : 110-111].
Sertularella zenkevitchi Naumov, 1960 : 343, fig. 233.

This list does not pretend to be complete, nor does it give full synonymy; it indicates such species as have been compared with the new species described below. The principal differences to differentiate between *Sertularella* and *Symplectoscyphus* Marktanner-Turneretscher, 1890, have been the (generally) four-cusped condition of the hydrothecal rim and the presence of a four-flapped opercular apparatus in *Sertularella*.

The following species have been described in *Sertularella* but have been removed to other genera besides *Symplectoscyphus* (the list does not claim completeness; * = present name) :

Sertularella campanulata Warren, 1908 : 271, 300-302, 347, 349, pl. 47 figs 21, 22 [= **Calamphora campanulata* (Warren, 1908)].
Sertularella ceramensis Billard, 1925a : 649 [= **Geminella ceramensis* Billard, 1925].
Sertularella cylindrica Bale, 1888 : 765, pl. 16 fig. 7 [= **Synthecium cylindricum* (Bale, 1888)].
Sertularella diffusa Allman, 1885 : 136, pl. 11 figs 1-2 [= **Sertularia diffusa* (Allman, 1885)].
Sertularella distans (Lamouroux, 1816) [= **Sertularia distans* Lamouroux, 1816 : 191].
Sertularella echinocarpa (Allman, 1888) [*Sertularia echinocarpa* Allman, 1888 : 57-58, pl. 28 figs 1, 1a = **Hincksella echinocarpa* (Allman, 1888)].
Sertularella episcopus Allman, 1876a : 263, pl. 13 figs. 5-7 [= **Amphisbetia episcopus* (Allman, 1876a)].
Sertularella evansi (Ellis & Solander, 1786) [*Sertularia evansi* Ellis & Solander, 1786 : 58 = **Synthecium evansi* (Ellis & Solander, 1786)].
Sertularella fallax Hartlaub, 1904 : 5, 14, pl. 2 fig. 5 [= **Hincksella fallax* (Hartlaub, 1904)].
Sertularella formosa Fewkes, 1881 : 129, 130 [= **Synthecium formosum* (Fewkes, 1881)].
Sertularella halecina Torrey, 1902 : 4, 13, 23, 48, 61, pl. 6 fig. 55, pl. 7 fig. 56 [= **Hincksella cylindrica* Bale, 1888].
Sertularella intermedia (Congdon, 1907) [*Thyroscyphus intermedius* Congdon, 1907 : 482-483, figs 33-36 = **Symmetroscyphus intermedius* (Congdon, 1907)].
Sertularella maccallumi Bartlett, 1907 : 62, fig. [= **Amphisbetia maccallumi* (Bartlett, 1907)].
Sertularella molukkana Von Campenhausen, 1896a : 104, 106 [= *Caminothuiaria molukkana* (Von Campenhausen, 1896)].
Sertularella parvula (Allman, 1888) [= **Calamphora parvula* Allman, 1888 : 29, pl. 10 figs 3, 3a].
Sertularella rectitheca Ritchie, 1907a : 536-537, pl. 1 fig. 5 [= **Amphisbetia rectitheca* (Ritchie, 1907a)].
Sertularella reticulata Kirchenpauer, 1884 : 40, pl. 15 figs 4, 4a, 4b [= **Dictyocladium reticulatum* (Kirchenpauer, 1884)].
Sertularella serrata Billard, 1919 : 22, fig. 3C [= **Dynamena crisioides* Lamouroux, 1824].
Sertularella sigmagonangia (Hartgitt, 1924) [*Sertularia sigmagonangia* Hargitt, 1924 : 495, pl. 5 fig. 20 = **Caminothuiaria molukkana* (Von Campenhausem, 1896)].
Sertularella singularis Billard, 1920a : 14-16, fig. 1 [= **Caminothuiaria molukkana* (Von Campenhausen, 1896)].
Sertularella solitaria Nutting, 1904 : 89-90, pl. 20 figs 10, 11 [= **Calamphora solitaria* (Nutting, 1904)].
Sertularella spasskii (Fenyuk, 1947) [*Diphasia spasskii* Fenyuk, 1947 : 9, fig. 9 = **Abietinaria spasskii* (Fenyuk, 1947)].
Sertularella squamata Kirchenpauer, 1884 : 44, pl. 15 figs 6, 6a, 6b (an Isid!).
Sertularella trochocarpa Allman, 1886 : 135-136, pl. 10 figs 3, 4 [= **Amphisbetia trochocarpa* (Allman, 1886)].

Sertularella acutidentata acutidentata Billard, 1919

Figs 38c-e, 39b

Sertularella acutidentata Billard, 1919 : 20, figs IE, II; 1925b : 148-149, fig. 18, pl. 7 fig. 8.
Sertularella philippensis Hargitt, 1924 : 496, pl. 6 fig. 22. — NUTTING, 1927 : 217.

MATERIAL EXAMINED. — **Indonesia (Makassar Strait)**. CORINDON 2 : stn 266, 01°56.6'S-119°15.8'E, 95 m, 07.11.1980 : ten mm high fragment with 3 hydrocladia; no gonothecae. All in slide no. 509 (MNHN-Hy. 1062).
New Caledonia. MUSORSTOM 4 : stn CP 171, 18°57.80'S-163°14.00'E, 435 m, 17.09.1985 : single c. 70 mm high colony without gonothecae (RMNH-Coel. 25857). Hydrocladium as slide no. 517 (BMNH 1989.11.24.48).

DESCRIPTION (mainly based on specimen from CORINDON 2, Stn 266). — Fragment composed of 8 mm long axis bearing 3 apophyses supporting hydrocladia. Perisarc of axis with some indistinct constrictions, no distinct nodes. Apophyses, as axial hydrothecae, alternating, placed with remaining (hydrocladial) hydrothecae in one plane; oblique, contorted node present between hydrocladium and apophysis. Three hydrothecae between successive

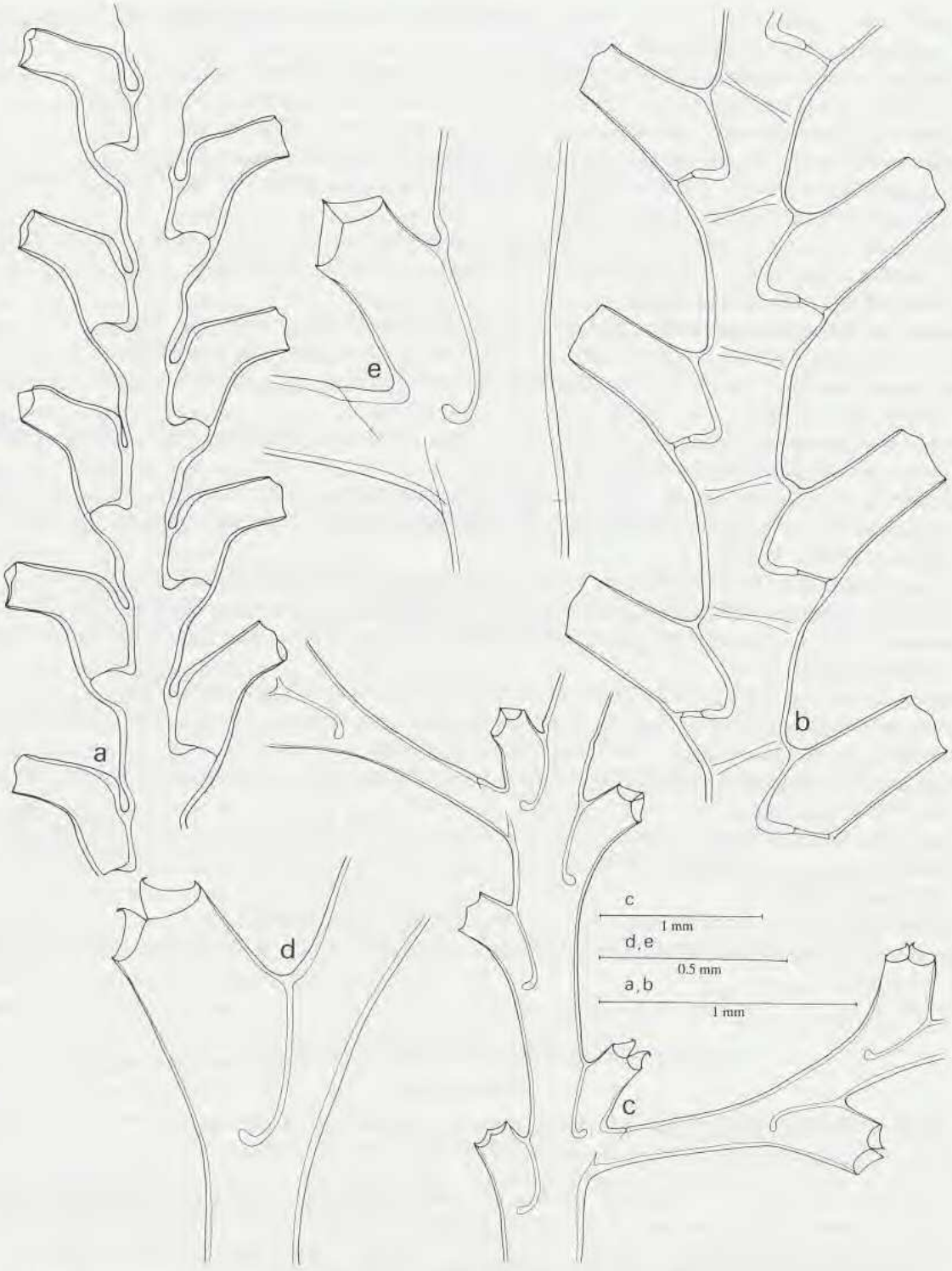

FIG. 38 a. — *Gonaxia sinuosa* sp. nov., schizoholotype, SMIB 5, Stn DW 71, part of hydrocladium.
FIG. 38 b. — *Gonaxia stricta* sp. nov., schizoholotype, CHALCAL 2, Stn DW 76, part of hydrocladium.
FIG. 38 c-e. — *Sertularella acutidentata acutidentata* Billard, 1919, CORINDON 2, Stn 266 : **c**, part of colony; **d**, hydrocladial hydrotheca; **e**, axillary hydrotheca.
a, slide no. 1035; b, slide no. 881; c-e, slide no. 539.

apophyses (one axial, one left, one right); upper hydrotheca almost opposite next apophysis. No division into internodes of hydrocladia (fig. 38c).

Hydrothecae large and wide, slightly curving outward, free part of adcauline wall slightly exceeding half length of adnate part, straight, angle with length axis of hydrocladium between 60 and 45 degrees (fig. 38d-e). Adnate part of hydrothecal wall thick, slightly curved, basally with curved, thickened notch, leaving large hole for passage of coenosarc (fig. 38d). Abcauline wall slightly concave, running smoothly into wall of hydrocladium; plane of aperture of hydrotheca pointing obliquely upwards. Hydrothecal margin with four distinct and acute marginal cusps, separated by deep, semicircular embayments, into which fit fairly large triangular, hyaline plates of opercular apparatus, when closed forming high, triangular roof. Renovations of hydrothecal margin not observed, but hydrothecal margin slightly thickened as appears from stained micro-preparations.

Remnants only of hydranths present; no gonothecae.

The specimen from MUSORSTOM 4, Stn CP 171, is composed of a monosiphonic, stiff axis c. 70 mm high, bearing 13 alternate hydrocladia of 10-15 mm length in its upper portion. The hydrothecae (fig. 39b) are larger than those of CORINDON 2, Stn 266, but are still within the size range given by BILLARD (1925).

TABLE 27. — Measurements of *Sertularella acutidentata acutidentata* Billard, 1919, in µm.

	SIBOGA EXPEDITION (BILLARD, 1925)	CORINDON 2 Stn 266 (slide no. 266)	MUSORSTOM 4 Stn CP 171 (slide no. 517)
Stem, diameter at base	165 - 345	445	
Hydrocladia, diameter at apophysis	150 - 165	190 - 205	
Axillary hydrotheca, length		375 - 445	
abcauline wall		85 - 220	
length free part adcauline wall		390 - 445	
length adnate part adcauline wall		540 - 555	
total depth		230 - 260	
diameter at apex		245 - 265	
maximal diameter			
Hydrocladial hydrotheca, length		505 - 520	585 - 615
abcauline wall	165 - 410	260 - 335	185 - 250
length free part adcauline wall	350 - 410	440 - 445	575 - 605
length adnate part adcauline wall		590 - 630	630 - 675
total depth	235 - 395	295 - 300	345 - 375
diameter at apex		310 - 325	385 - 400
maximal diameter			
Gonotheca, length	2,000 - 2,400		
diameter	690 - 875		

DISTRIBUTION. — Two localities in the eastern part of the Malay Archipelago are given by BILLARD (1925); several localities in the seas of the Philippines are mentioned (but not specified) by HARGITT (1924). NUTTING (1927) records this species from the South China Sea in the vicinity of Hong Kong. The CORINDON 2 locality (Makassar Strait) fits in the general picture of the distribution of this species. The second locality, MUSORSTOM 4, Stn CP 171, records the species for the first time from the waters northwest of New Caledonia (Grand Passage area). The depth distribution extends from 69 m down to at least 435 m.

REMARKS. — Though represented by a single colony and a fragment the identification is not in doubt as the species is well characterized by the sharply pointed hydrothecal cusps that warrant its identification even in absence of the gonothecae. Moreover, the present material has been compared with BILLARD's type slide no. 566 in MNHN, originating from "*Siboga*", Stn 49a, Sapeh Strait, Indonesia, 08°23.5'S-119°04.6'E, 69 m, 14.04.1889; there is complete conformity.

FIG. 39 a. — *Gonaxia similis* sp. nov., MUSORSTOM 6, Stn DW 391, part of hydrocladium.
FIG. 39 b. — *Sertularella acutidentata acutidentata* Billard, 1919, MUSORSTOM 4, Stn CP 171, part of hydrocladium.
FIG. 39 c-d. — *Sertularella acutidentata profunda* ssp. nov., schizoholotype, MUSORSTOM 4, Stn DW 220 : **c**, part of hydrocladium; **d**, axillary hydrotheca.
a, slide no. 940; b, slide no. 517; c-d, slide no. 371.

Sertularella acutidentata profunda ssp. nov.

Figs 39c-d, 40a

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4 : Stn DW 220, 22°58.50'S-167°38.30'E, 550 m, 29.09.1985 (type locality) : single, 55 mm high, slightly polysiphonic stem with c. 20 hydrocladia; no gonothecae. In 2 parts in 2 slides no. 371 (1 holotype, MNHN-Hy. 1063; 1 schizoholotype, RMNH-Coel. 25858).

DESCRIPTION. — Stem stiff, erect, unforked, weakly polysiphonic over greater part of its length; secondary tubules not forming apophyses and hydrocladia. Axis with two rows of alternate apophyses supporting c. 20 hydrocladia with 10-20 hydrothecae each; all in one plane. Arrangement of apophyses and hydrocladia such that two alternate apophyses occur together without intermediate axial hydrotheca, but each with axillary hydrotheca, while each group of two apophyses is separated by three hydrothecae (one axillary, one left, one right, see fig. 40a). There is no division into internodes, though nodes occasionally occur in hydrocladia, probably as result of regeneration or repair; hydrocladia separated from apophyses by oblique, contorted node.

Hydrothecae alternately arranged along axis and hydrocladia, with exception of axial hydrothecae of identical shape and size, greatly resembling those of *S. acutidentata*, but with slightly longer free portion and margin without sharp cusps (fig. 39c, this may result from damage as colony has no well preserved hydranths). Abcauline hydrothecal wall smoothly concave and running into hydrocladial wall; slight bulge at hydrothecal base present in majority of hydrothecae. At this point inside of abcauline wall with perisarcal peg, resulting from strongly oblique position of hydrothecal foramen (fig. 39c). Free portion of adcauline wall about half length of adnate portion; this part fairly thick, curved, with flexure at floor and there of increased thickness. Margin damaged in majority of hydrothecae, but apparently with four marginal cusps with rounded (or pointed and later on abraded) tip; opercular apparatus incomplete in all hydrothecae, probably composed of four flaps (only abcauline flaps observed). Axillary hydrothecae differing from other hydrothecae by strongly thickened adnate part of adcauline wall, near floor of hydrotheca with large, rounded swelling; hydropore of reduced size (fig. 39d).

Perisarc fairly thick along axis and hydrocladia, thinning out along hydrothecal wall. Some of axial hydrothecae with hole (or circular foramen) near base, showing place of attachment of (lost) gonothecae; these holes surrounded by halo of thickened perisarc.

TABLE 28. — Measurements of *Sertularella acutidentata profunda* ssp. nov., in µm.

	MUSORSTOM Stn DW 220 (slide no. 371)
Stem, diameter	615
Hydrocladium, diameter near apophysis	205 - 235
Axial hydrotheca, length abcauline wall	220 - 235
length free part adcauline wall	160 - 205
length adnate part adcauline wall	420 - 505
total depth	545 - 615
diameter at apex	125 - 150
maximum diameter	185 - 205
Hydrocladial hydrotheca, length adcauline wall	370 - 420
length free part adcauline wall	200 - 260
length adnate part adcauline wall	430 - 475
total depth	185 - 205
maximum diameter	265 - 275

DISTRIBUTION. — This new subspecies was taken from the Pacific southeast of New Caledonia at a depth of c. 500 m.

REMARKS. — In the general shape of the hydrothecae this subspecies is almost like the nominotypical subspecies, particularly in the development of the adnate part of the adcauline wall and the oblique node at the hydrocladial base. It differs by the development of a (slightly) polysiphonic hydrocaulus, the absence of pointed

cusps at the hydrothecal margin, which may largely be the result of abrasion, and the presence of a perisarcal peg at the floor of the inside of the adcauline hydrothecal wall.

ETYMOLOGY. — The subspecific name, *profunda* (latin adjective *profundus* meaning deep), refers to the depth at which the specimen was taken.

Sertularella anguina sp. nov.

Figs 40b-d, 41a-b

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn DW 08, 20°34.35'S-166°53.90'E, 435 m, 12.08.1985 : ten mm high fragment, no gonothecae. All in slide no. 493 (RMNH-Coel. 25859).

BIOGEOCAL : stn KG 219, 22°38.81'S-166°33.63'E, 570 m, 10.04.1987 : c. 10 mm long fragment, made up in slide no. 822 (paratype, BMNH 1989.11.24.49).

Loyalty Islands. MUSORSTOM 6 : stn DW 458, 21°00.93'S-167°29.96'E, 400 m, 20.02.1989 (type locality) : twenty-five mm high colony or branch with 2 gonothecae; all in slide no. 911 (holotype, MNHN-Hy. 1064). — Stn CP 464, 21°02.30'S-167°31.60'E, 430 m, 21.02.1989 : twenty-five mm high stem with 3 sidebranches (paratype, RMNH-Coel. 25860), one as slide no. 724 (schizoparatype, MNHN-Hy. 1065) and single 25 mm long hydrocladium or part of colony in slide no. 900 (paratype, BMNH 1989.11.24.50).

DESCRIPTION (based mainly on holotype). — Fine, unbranched or scarcely branched species with strongly geniculate axis and widely diverging, slender hydrothecae (fig. 40b). Axis in holotype rising from fragment of stolon, with basally two secondary tubules running along axis for some distance, axis fairly stiff, upright. Internodes long and slender, indicated by shallow constrictions of perisarc, no distinct septa present.

Hydrothecae one per internode, strictly alternating, strongly diverging from axis, slender, three to four times as long as maximal diameter, occasionally slightly inflated basally. Abcauline hydrothecal wall smooth, adcauline wall smooth or occasionally with two or three indistinct undulations basally, indicating weakly ribbed structure of some hydrothecae. Adnate part adcauline wall c. one-third length of free portion; basal plate thickened, with large circular hole for passage of coenosarc. Apical portion of hydrotheca slightly widening, with four low marginal cusps and a closing apparatus composed of four triangular, hyaline flaps. Inside of hydrothecal aperture with a number of lamellar internal cusps. The original number of internal cusps is believed to be four, placed between marginal cusps, but the number may be increased by renovation of hydrothecal aperture (fig. 41a-b). Renovations occur frequently, both as the result of hydrothecal damage or as repair of otherwise normal hydrothecae. As a result strongly damaged hydrothecae with completely renovated apical portion and undamaged hydrothecae bearing a number (up to c. 8) of renovated apertures occur together; both types of renovation leading towards increase of the number of internal cusps (fig. 40c). Some hydrothecae have the (renovated) apical portion slightly turned upwards.

Perisarc fairly thick on internodes, thinning out along hydrothecal walls.

Remnants only of hydranths are present in some of the hydrothecae so that the number of tentacles could not be counted.

Two gonothecae occur on the holotype, inserting on internode some distance under hydrotheca. Each gonotheca elongated oval, with slightly constricted apical portion bearing three weak elevations surrounding a slightly deepened circular opening (fig. 40d). Both gonothecae are empty.

DISTRIBUTION. — All specimens originate from the Pacific east of New Caledonia, depth 400-570 m.

REMARKS. — This species is remarkable because of the strongly geniculate axis and the long, slender hydrothecae. The length of the internodes and the degree in geniculation is different in the various specimens. The colonies from MUSORSTOM 6, Stn CP 464, have one and three sidebranches (hydrocladia) respectively, the branches originating from the internodes closely under a hydrotheca. The development of the adcauline hydrothecal border is different in the various specimens, being almost smooth in the specimens from BIOGEOCAL, Stn KG 219, and MUSORSTOM 6, Stn DW 458 (fig. 41b); in the hydrothecae from MUSORSTOM 6, Stn CP 464, the adcauline hydrothecal border is distinctly furrowed, the furrows being present only on the adcauline surface of the hydrotheca (fig. 41a).

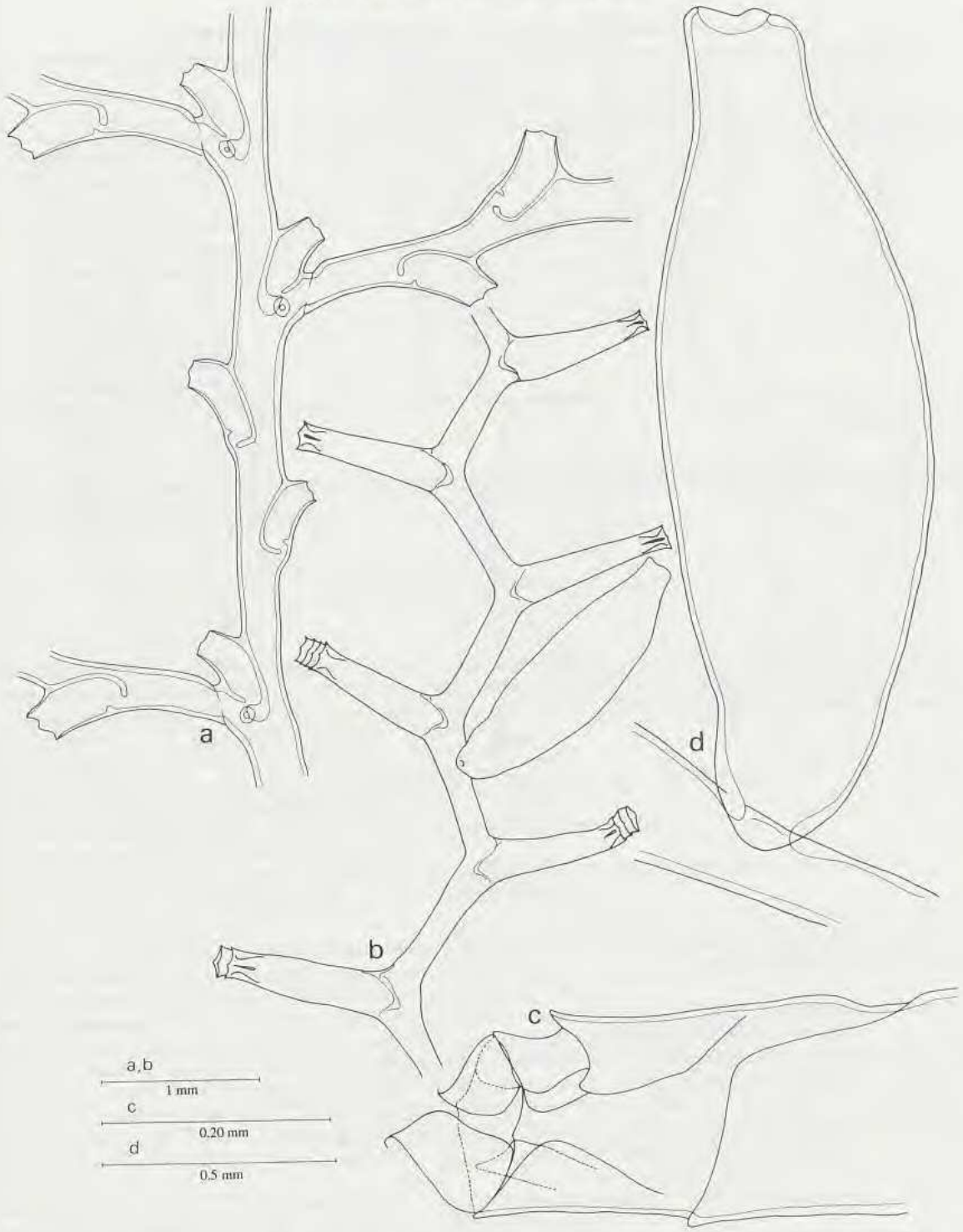

FIG. 40 a. — *Sertularella acutidentata profunda* ssp. nov., schizoholotype, MUSORSTOM 4, Stn DW 220, monosiphonic distal part of colony.

FIG. 40 b-d. — *Sertularella anguina* sp. nov. : **b**, paratype, MUSORSTOM 6, Stn CP 464, part of axis with gonothecae. — **c**, holotype, MUSORSTOM 6, Stn DW 458, strongly renovated apical portion of hydrotheca. — **d**, paratype, MUSORSTOM 6, Stn DW 464, gonotheca.

a, slide no. 371; b, d, slide no. 900; c, slide no. 911.

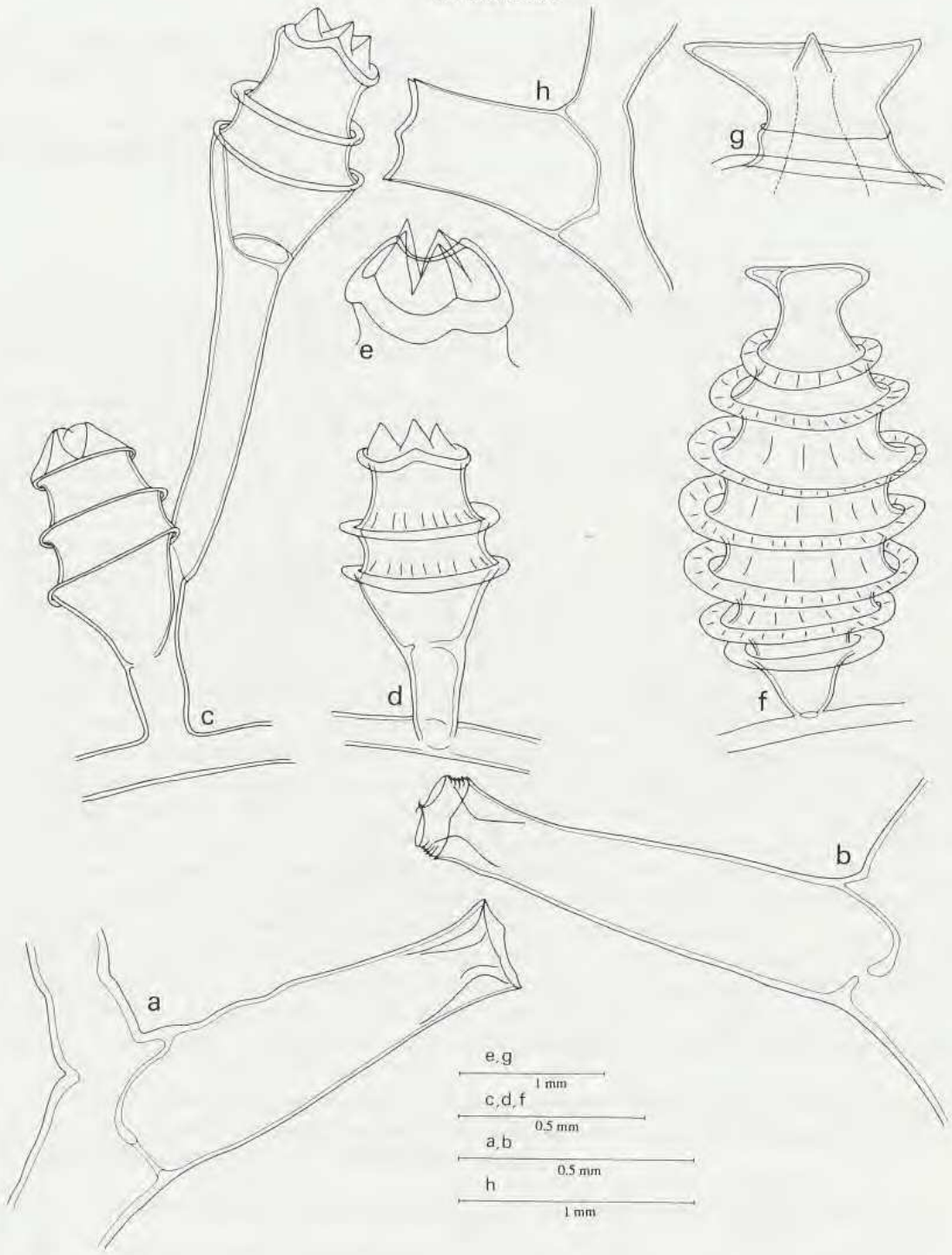

FIG. 41 a-b. — *Sertularella anguina* sp. nov. : **a**, paratype, MUSORSTOM 6, Stn CP 464, hydrocladial hydrotheca. — **b**, holotype, MUSORSTOM 6, Stn DW 458, hydrocladial hydrotheca.

FIG. 41 c-g. — *Sertularella areyi* Nutting, 1904, BIOCAL, Stn DW 37 : **c**, small colony; **d**, solitary hydrotheca; **e**, apical portion of hydrotheca with opercular apparatus, oblique view; **f**, gonotheca; **g**, apical portion of gonotheca, lateral view.

FIG. 41 h. — *Sertularella billardi* sp. nov., schizoholotype, MUSORSTOM 4, Stn DW 63, hydrocladial hydrotheca.

a, slide no. 900; b, slide no. 911; c-g, slide no. 647; h, slide no. 397.

TABLE 29. — Measurements of *Sertularella anguina* sp. nov., in µm.

	MUSORSTOM 6 Stn DW 458 (slide no. 911)	MUSORSTOM 6 Stn CP 464 (slide no. 900)	BIOGEOCAL Stn KG 219 (slide no. 822)
Stem, diameter at base	320		
Stem 'internode', length	755 - 850	1,365 - 1,585	1,195 - 1,300
diameter at 'node'	175 - 205	160 - 170	150 - 160
Hydrotheca, length abcauline wall *	890 - 935	780 - 870	650 - 700
length free part adcauline wall *	760 - 845	650 - 780	730 - 740
length adnate part adcauline wall	235 - 245	270 - 280	270 - 280
total depth *	955 - 1,000	890 - 935	780 - 825
diameter at apex	150 - 170	170 - 185	190 - 195
maximal diameter	235 - 245	280 - 290	270 - 275
Gonotheca, total length	1,750 - 1,845		
maximal diameter	520 - 540		

(*including renovations)

ETYMOLOGY. — The specific name *anguina* has been chosen because of the slender shape of the hydrothecae and is derived from the latin *anguinus* (snaky).

Sertularella areyi Nutting, 1904

Fig. 41c-g

Sertularella areyi Nutting, 1904 : 83, pl. 17 fig. 16. — STECHOW, 1913a : 144; 1913b : 12, 128, fig. 98; 1923b : 13. — JÄDERHOLM, 1919 : 18, pl. 4 fig. 6. — BILLARD, 1939 : 349. — DEEVEY, 1954 : 270. — YAMADA, 1959 : 65. — REES & THURSFIELD, 1965 : 133. — VERVOORT, 1968 : 104. — HIROHITO, 1969 : 21; 1983 : 44. — RHO & CHANG, 1974 : 142, pl. 4 figs 4-5. — RHO, 1977 : 266, 420, pl. 83 fig. 79.
Sertularella tenella p.p. - HARTLAUB, 1901b : 64, pl. 5 fig. 24.
Sertularella annulaventricosa Mulder & Trebilcock, 1915 : 54, pl. 7 fig. 1, pl. 8 fig. 4. — WATSON, 1973 : 172, fig. 23. — MILLARD, 1975 : 279-281, fig. 91F-H; 1978 : 197.
Sertularella undulata Bale, 1915 : 284, pl. 46 fig. 1. — HODGSON, 1950 : 34, fig. 59.
Sertularella tricincta Billard, 1939 : 248-250, fig. 1.
?Sertularella areyi - VANNUCCI-MENDES, 1949 : 244, pl. 12 fig. 37. — VANNUCCI, 1951 : 109, 113, 114.
Sertularella capensis delicata Millard, 1964 : 38, fig. 12B-D; 1979 : 143.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn DR 117, 12°31,2'N-120°39.3'E, 92-97 m, 03.06.1985 : colonies composed of stolon with single hydrothecae and gonotheca (on stolon) creeping on Bryozoa and *Antennella* sp. (RMNH-Coel. 25861), 2 slides no. 502 (RMNH-Coel. 25763).

New Caledonia. LAGON : stn 444, 18°15.3'S-162°58.8'E, 300-350 m, 28.02.1985 : many colonies on dead coral fragments, *Diphasia* sp. and *Synthecium* sp.; no gonothecae observed (RMNH-Coel. 25862). No slide.

BIOCAL : stn DW 37, 22°59.99'S-167°15.650'E, 350 m, 30.08.1985 : several colonies 2-4 mm high on *Sertularella helenae* sp. nov., with *Filellum serratum* (Clarke, 1879) and *Modeeria rotunda* (Quoy & Gaimard, 1827). Gonothecae present. All in 2 slides no. 647 (MNHN-Hy. 1066 and RMNH-Coel. 25863).

MUSORSTOM 4 : stn CP 172, 19°01.20'S-163°16.00'E, 275-330 m, 17.09.1985 : up to 5 mm high colonies on sponge fragment and on *Synthecium* sp., also growing on sponge fragment. No gonothecae. (RMNH-Coel. 25864, sample and slide no. 503).

BIOGEOCAL : stn DW 307, 20°35.38'S-166°55.25'E, 470-480 m, 01.05.1987 : several small colonies on *Acryptolaria* sp., no gonothecae observed, no slide. (Retained with *Acryptolaria* sp.).

SMIB 4 : stn DW 53, 23°40.1'S-167°59.9'E, 270 m, 09.03.1989 : several 2-3 mm high stems on stylasterid; no gonothecae (RMNH-Coel. 25865), slide no. 897 (MNHN-Hy. 1067). — Stn DW 55, 23°21.4'S-168°04.5'E, 260 m, 09.03.1989 : some 10-15 mm high colonies without gonothecae on sponge and other hydroids (i.a., *Sertularella helenae* sp. nov.); slide no. 915 (with *Antennella* sp.). Also 2 stems with gonothecae from same batch; 2 slides no. 808 (MNHN-Hy. 1068, sample and 1 slide no. 808; BMNH 1989.11.24.51, sample and 1 slide no. 808; RMNH-Coel. 25866, sample and slide no. 915). — Stn DW 57, 23°21.5'S-168°04.6'E, 260 m, 09.03.1989 : several 4-8 mm high colonies on old axis of gorgonid (?), with *Diphasia* sp. All in 2 slides no. 922 (MNHN-Hy. 1069 and RMNH-Coel. 25867)

SMIB 5 : stn DW 93, 22°20.0'S-168°42.3'E, 255 m, 13.09.1989 : two separate hydrothecae rising from stolon creeping on hydroid, no gonothecae; slide no. 970 (BMNH 1989.11.24.52). — Stn DW 95, 22°59.7'S-168°19.8'E, 200 m, 14.09.1989 : separate hydrothecae and small colonies composed of several internodes with hydrothecae on *Monostaechas quadridens* (McCrady, 1859) and *Geminella ceramensis* Billard, 1925; no gonothecae; slides nos 965 (2), 966 and 967 (all RMNH-Coel. 25868). — Stn DW 101, 23°21.2'S-168°04.9'E, 270 m, 14.09.1989 : separate hydrothecae rising from stolon on various hydroids and some small colonies composed of 3 internodes; no gonothecae, no slides (MNHN-Hy. 1070, sample; BMNH 1989.11.24.53, sample). — Stn DW 102, 23°19.6'S-168°04.7'E, 305 m, 14.09. 1989 : two separate hydrothecae rising from stolon on hydroid, no gonothecae; slide no. 962 (RMNH-Coel. 25869).

LAGON : stn DW 1149, 19°04.5'S-163°29.5'E, 230-235 m, 28.10.1989 : six separate hydrothecae rising from stolon on gorgonid; no gonothecae (MNHN-Hy. 1071).

Loyalty Islands. MUSORSTOM 6 : stn CP 400, 20°42.18'S-167°00.40'E, 270 m, 14.02.1989 : a few c. 8 mm high stems on wormtubes; no gonothecae (BMNH 1989.11.24.54). Slide no. 917 (RMNH-Coel. 25870). — Stn DW 473, 21°08.80'S-167°55.30'E, 236 m, 22.02.1989 : up to 10 mm high colonies on other hydroids; no gonothecae, no slide (MNHN-Hy. 1072). — Stn DW 474, 21°08.80'S-167°55.50'E, 260 m, 22.02.1989 : some separate hydrothecae rising from stolon and part of larger colony composed of three internodes with hydrothecae; no gonothecae. Associated with small species of *Zygophylax*. Slide no. 969 (RMNH-Coel. 25871). — Stn DW 478, 21°08.96'S-167°54.28'E, 400 m, 22.02.1989 : bunch of c. 10 mm high colonies on Bryozoa and coral fragments; no gonothecae (BMNH 1989.11.24.55). Slide no. 928 (RMNH no. 25872).

DESCRIPTION. — Small, few mm high species with stems composed of c. 5 internodes rising from stolon on sponges, other hydroids, etc., stolon also supporting single hydrothecae on short pedicels (fig. 41c, d). Pedicels of isolated hydrothecae of varied lengths, usually short in colonies. Internodes, where present, separated by oblique nodes, geniculate. In isolated hydrothecae pedicel is seen to continue for some distance behind hydrotheca; in colonies following internode springing from this part of pedicel. Internodes slender, about twice as long as hydrothecae. Adnate part adcauline wall of hydrotheca about as long as free part. Hydrotheca barrel-shaped, greatest diameter at lower third, with two circular, frilled ribs; body of hydrotheca lightly longitudinally striated between ribs. Adnate part of hydrotheca not thickened near hydropore (fig. 41c). Isolated hydrotheca with asymmetrically placed hydropore (fig. 41d). Hydrothecal rim distinctly reinforced, with four low cusps, separated by shallow embayments; no intrathecal teeth. Opercular apparatus composed of four large, squarish flaps, each with thickened triangular part, the base of which fits into rounded embayments of hydrothecal rim. When closing reinforced triangles fold over the thecal aperture, non-reinforced parts of neighbouring plates are pressed together and remain in standing position, thus forming four more or less triangular, raised ribs on the thecal apex (fig. 41c-e). Hydrothecal rim usually perpendicular to hydrothecal length axis, occasionally slightly tilted in adcauline direction.

TABLE 30. — Measurements of *Sertularella areyi* Nutting, 1904, in µm.

	BIOCAL Stn DW 37 (slide no. 647)	MUSORSTOM 4 Stn CP 172 (slide no.503)
Primary internode, length	295 - 1,110	
diameter	110 - 115	
Secondary and following internodes,		
length	775 - 815	775 - 850
diameter	125 - 135	125 - 160
Hydrotheca, length abcauline wall	570 - 575	520 - 570
length free part adcauline wall	295 - 370	320 - 335
length adnate part adcauline wall	295 - 355	290 - 310
total depth	555 - 575	600 - 630
diameter at rim	280 - 290	275 - 290
maximal diameter	390 - 415	355 - 360
Male gonotheca, total length	1,260 - 1,410	
maximal diameter	650 - 695	
distance between apices of prongs	300 - 410	

Hydranths present in nearly all hydrothecae inspected, attached basally to curved part of adnate portion of adcauline wall; a ligament runs from 'caecum' formed by body of hydranth to adcauline wall at level of superior

transverse rib. Number of tentacles 10-12. Ligaments also connect opercular plates with body of hydranth : contraction and closing goes with such force that occasionally tentacles are found clasped between opercular plates, torn off from ring of tentacles around proboscis.

Gonothecae occur in material from BIOCAL, Stn DW 37, only male sex represented. Gonotheca elongated ovoid, with short pedicel attached to stolon, body with 7 or 8 transverse, frilled ribs, longitudinally striated between ribs (fig. 41f). Apex narrowed, with four strong, laterally directed prongs, forming four-pointed star when seen from above (fig. 41g). No opening could be observed, but gonotheca probably opens by means of slit or hole to permit exit of spermatozoa. Gonothecae completely filled with mass of developing spermatocytes.

DISTRIBUTION. — Originally described from the Caribbean [off Havana, Cuba, 100-200 fms (= 182-364 m), NUTTING, 1904], later on also doubtfully recorded from the Brazilian coast (VANNUCCI, 1949, 1951). The species appears to be well distributed in Japanese and Korean waters (HIROHITO, 1969, 1983; RHO & CHANG, 1974; RHO, 1977). The present specimens are from Pacific waters N.E. and N.W. of New Caledonia.

REMARKS. — I would not be surprised if this species turned out to be identical with *Sertularella annulaventricosa* Mulder & Trebilcock, 1915, of which the synonymy has been given above. From the descriptions by MULDER & TREBILCOCK and that by WATSON (1973), who inspected the holotype slide, I gather that *S. annulaventricosa* is occasionally branched and the hydrothecae have an oblique aperture. The hydrothecae of the holotype are described by WATSON as having "a ledge passing around the hydrotheca a little below the margin". The Pearson Island specimens inspected by WATSON have "1-2 annular ridges, giving the hydrotheca a crumpled appearance". This seems to be different from the condition observed here, where two distinctly frilled ridges encircle a nearly completely symmetrical hydrotheca. Some of the material described as *S. annulaventricosa*, as e.g. South African material described by MILLARD (1975) is almost as the New Caledonian colonies, with the exception of the hydrothecal rim, which appears to be thin in the South African material. The area of distribution of *S. annulaventricosa*, viz. Tasmania, Victoria, Australia and Pearson Island (probably also South Africa, see above) does not exclude the suggestion of identity of the two species.

Sertularella billardi sp. nov.

Figs 41h, 42a-d, 43a-b

Sertularella catena - BILLARD, 1925b : 147-148, fig. 17. (Not *Sertularia catena* Allman, 1888, vide infra).

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4 : stn CP 153, 19°04.20'S-163°21.20'E, 235 m, 14.09.1985 : c. 30 mm long fragment with quadrangular hydrothecae. All in slide no. 429 (RMNH-Coel. 25874). — Stn DW 162, 18°35.00'S-163°10.30'E, 535 m, 16.09.1985 : nine mm high fragment with 7 hydrothecae, slide no. 891 (RMNH-Coel. 26650). — Stn DW 163, 18°33.80'S-163°11.50'E, 350 m, 16.09.1985 (type locality) : c. 50 colonies up to 80 mm high and many fragments; gonothecae present. Slides nos 397 and 1022 (2). Holotype an 80 mm high colony with gonothecae (MNHN-Hy. 1073), rest, including slides, are paratypes (MNHN-Hy. 1073, 2 paratypes and fragments; BMNH 1989.11.24.56, 2 paratypes and fragments; RMNH-Coel. 25875, rest paratypes, fragments and slides nos 397 and 1022). Found growing on coral fragments and wormtubes, together with *Synthecium* sp.; on stems *Halecium* sp. — Stn CP 193, 18°56.30'S-163°23.20'E, 415 m, 19.09.1985 : c. 10 up to 45 mm high colonies and fragments. Hydrothecae almost quadrangular. No gonothecae. Slides nos 344 (2) and 492 (2). [MNHN-Hy. 1074, slides nos 344 (1) and 492 (1); BMNH 1989.11.24.57, slides nos 344 (1) and 492 (1); RMNH-Coel. 25876, sample]. — Stn CP 195, 18°54.80'S-163°22.20'E, 465 m, 19.09.1985 : single c. 15 mm high colony with quadrangular hydrothecae; no gonothecae. All in slide no. 511 (RMNH-Coel. 25877). — Stn CP 237, 22°12.00'S-167°16.50'E, 630 m, 02.10.1985 : single, 12 mm long hydrocladium with quadrangular hydrothecae. All in slide no. 456 (RMNH-Coel. 25873).

DESCRIPTION (based mainly on material from MUSORSTOM 4, Stn DW 163). — Colonies with stiff, erect stems up to 80 mm high, attached to substratum by means of a few thick hydrorhiza fibres. Axis monosiphonic, stiff because of strong development of perisarc, broken up into internodes by means of oblique constrictions of perisarc, complete nodes occasionally present. Internodes each with three hydrothecae and one apophysis, one hydrotheca almost axillary, one left, one right (fig. 42a). All apophyses, hydrocladia and hydrothecae in one plane; apophyses,

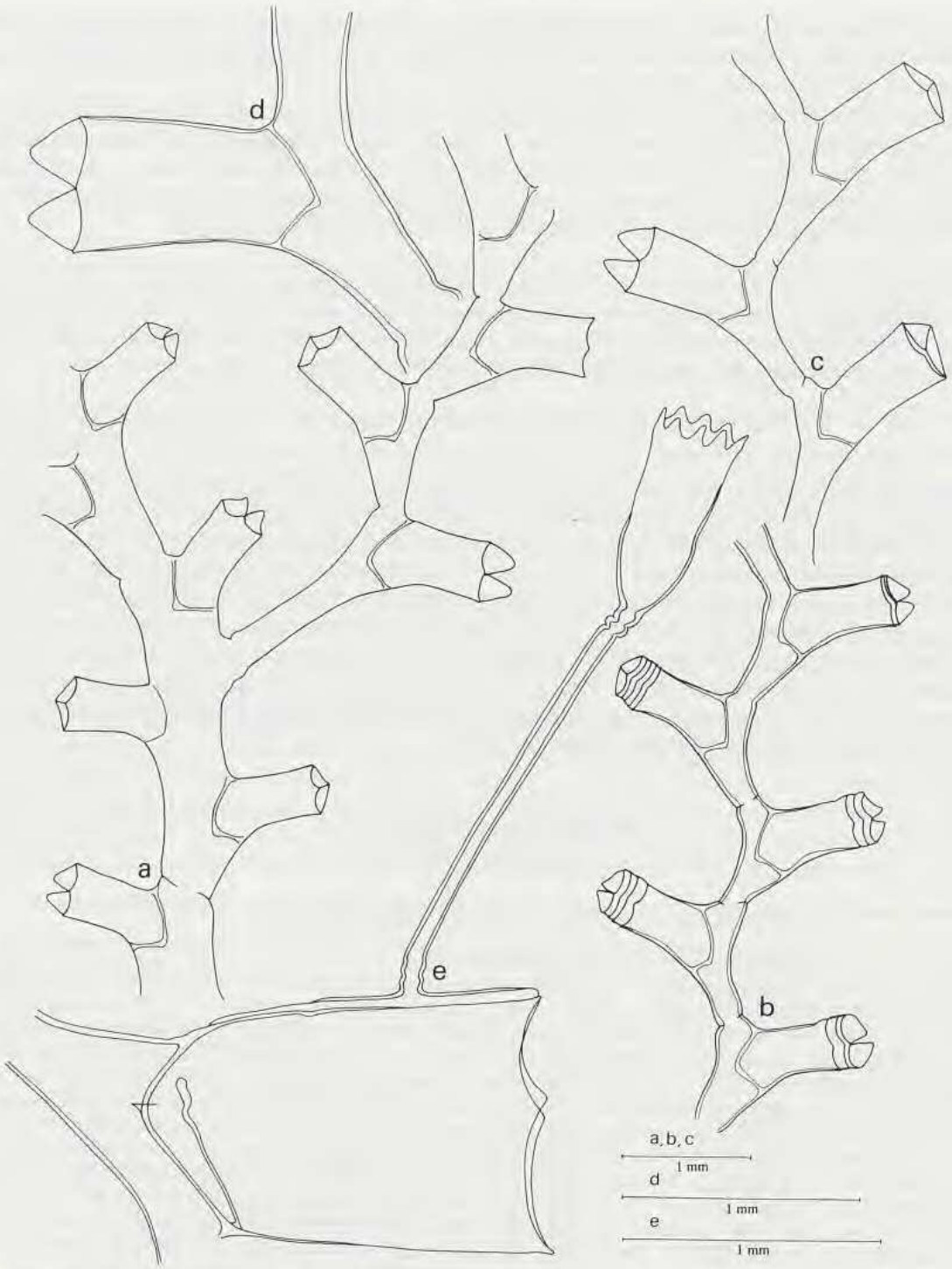

FIG. 42. — *Sertularella billardi* sp. nov. : **a**, schizoholotype, MUSORSTOM 4, Stn DW 163, monosiphonic top part of colony. — **b**, MUSORSTOM 4, Stn CP 237, part of hydrocladium. — **c-d**, MUSORSTOM 4, Stn CP 153 : **c**, part of hydrocladium; **d**, hydrocladial hydrotheca. — **e**, SIBOGA EXPED., Stn 302, BILLARD's slide no. 248 in MNHN of "*Sertularella catena*" with *Campanularia longitheca* Stechow, 1924.

a, slide no. 397; b, slide no. 456; c-d, slide no. 492; e, slide no. 248 in BILLARD's slide collection in MNHN.

and consequently also hydrocladia, alternately arranged. Hydrocladia up to 25 mm long, composed of maximally 20 internodes, separated by perisarcal constrictions, usually strongly geniculate, each supporting one large hydrotheca (fig. 42b-c).

Stem and hydrocladial hydrothecae slightly different, those of stem being slightly narrower, leaving axis under almost perpendicular angle (fig. 41h). Overall shape of hydrothecae cylindrical basally, gradually becoming quadrangular in cross section apically. Adnate portion of adcauline wall about half length of free part, with thickened portion or knob at hydrothecal floor; bottom plate straight, hydropore difficult to observe (fig. 42d). Abcauline hydrothecal wall in axial hydrothecae with sharp curve continuing into wall of internode; in hydrocladial hydrothecae this wall continues smoothly into internodal wall. Distinct flexure in abcauline wall usually present at c. one-third its length from bottom; internally flexure has thickened wall serving attachment of filament running from body of hydranth. All hydrothecae with four marginal cusps (two lateral, one ad-, one abcauline) separated by shallow embayments, supporting four hyaline, triangular flaps, when closed forming fairly high, triangular roof (fig. 42d). Renovations normally reduced to one or two; hyaline hydrothecal rim not notably reinforced. No intrathecal teeth observed.

Nearly all hydrothecae with hydranths, preservation inadequate. Number of tentacles c. 18, hypostome rounded. Hydranth attached to bottom plate and by means of ligament also to inside abcauline hydrothecal wall.

Female gonothecae occurring on a number of colonies, protruding from axial hydrothecae and directed towards front of colony. Each gonotheca balloon-shaped, narrowing at base and carrying a number of longitudinal furrows or ribs; cross section in middle with undulated walls (fig. 43a). Opening at end of short, pyramidal funnel, placed asymmetrically and provided with 6-8 internal, longitudinal, corrugated ribs. Each gonotheca containing 2 or 3 eggs or developing larvae.

Material from MUSORSTOM 4, Stn CP 237, differs from above description in strong zig-zag of hydrocladium and by the fact that hydrothecal border carries many (in some cases at least 15) renovations, leading towards increase in thickness of hydrothecal rim (fig. 42b). Occasionally opercular apparatus also renovated, number of plates also increased in such hydrothecae.

TABLE 31. — Measurements of *Sertularella billardi* sp. nov., in µm.

	MUSORSTOM 4 Stn CP 153 (slide no. 429)	MUSORSTOM 4 Stn DW 163 (slide no. 397)	MUSORSTOM 4 Stn CP 193 (slide no. 344)	MUSORSTOM 4 Stn CP 195 (slide no. 511)	MUSORSTOM 4 Stn CP 237 (slide no. 456)
Stem internode, length		2,275 - 2,385	2,400 - 3,035		
diameter		500 - 825	435 - 540		
Stem hydrotheca, length abcauline wall		670 - 675	760 - 825		
length free part adcauline wall		650 - 715	760 - 780		
length adnate part adcauline wall		435 - 455	435 - 475		
total depth		825 - 870	930 - 975		
diameter at margin		370 - 390	475 - 500		
diameter in middle		300 - 325	435 - 455		
Hydrocladial internode, length	1,000 - 1,260	975 - 1,195	1,200 - 1,300	1,085 - 1,845	865 - 975
diameter at node	175 - 325	175 - 215	210 - 200	210 - 240	175 - 210
Hydrocladial hydrotheca					
length adcauline wall	780 - 870	760 - 765	845 - 870	845 - 870	755 - 760
length free part adcauline wall	735 - 760	605 - 650	695 - 735	755 - 760	670 - 675
length adnate part adcauline wall	370 - 410	390 - 435	345 - 390	390 - 410	365 - 435
total depth	935 - 1,000	910 - 935	955 - 975	1,000 - 1,020	930 - 945
diameter at margin	520 - 585	390 - 410	475 - 490	475 - 520	410 - 415
diameter in middle	435 - 500	365 - 390	435 - 455	435 - 455	365 - 390
Female gonotheca, total length		2,280 - 2,290			
maximal diameter		1,195 - 1,260			
length of funnel		260 - 265			
diameter of funnel at apex		190 - 195			

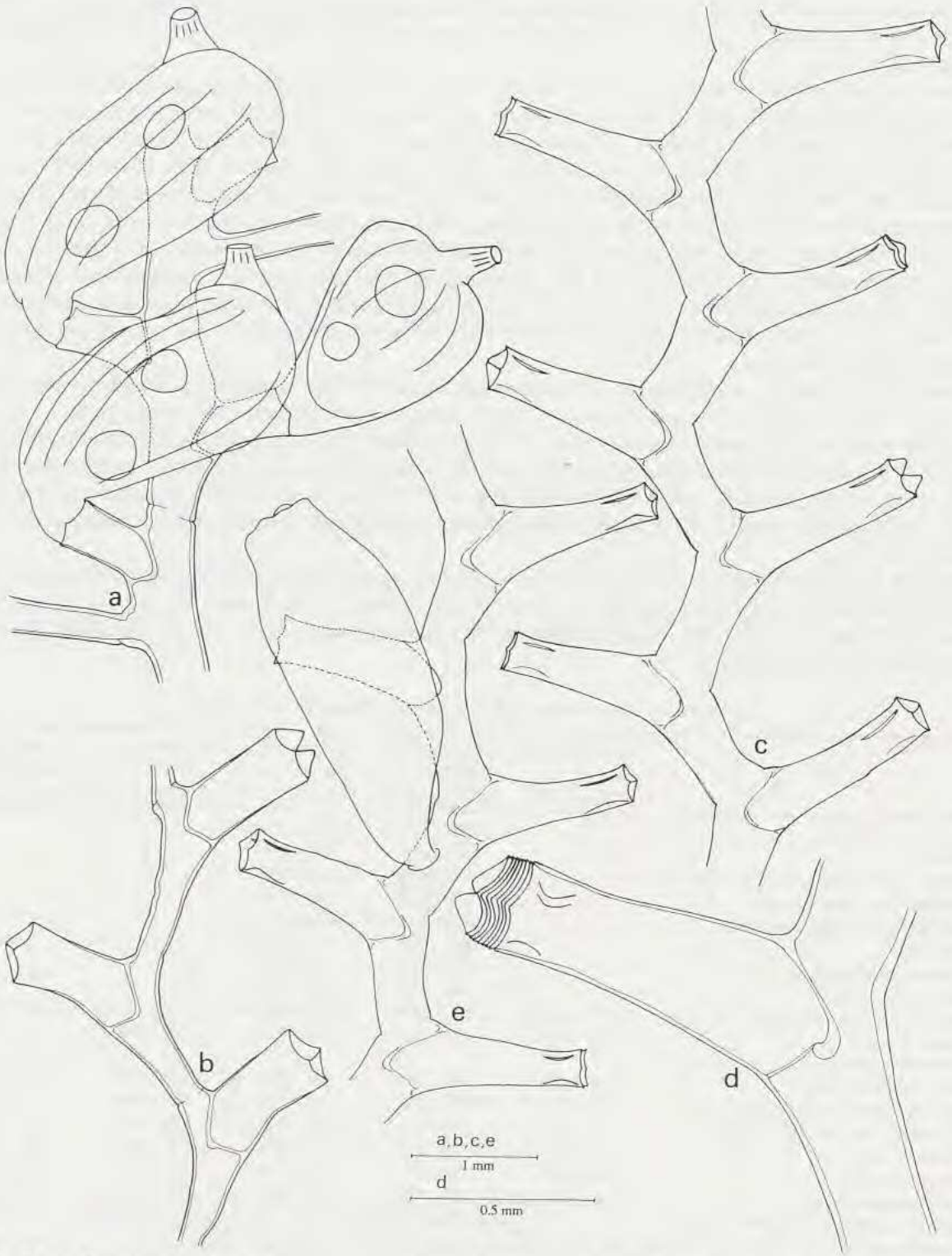

FIG. 43 a-b. — *Sertularella billardi* sp. nov. : **a**, schizoholotype, MUSORSTOM 4, Stn DW 163, part of axis with gonothecae (pressed aside by cover glass). — **b**, MUSORSTOM 4, Stn CP 193, part of hydrocladium.

FIG. 43 c-e. — *Sertularella bipectinata* sp. nov. : **c-d**, BIOCAL, Stn DW 36 : **c**, schizoholotype, part of axis; **d**, axial hydrotheca. — **e**, MUSORSTOM 4, Stn DW 220, part of axis with gonotheca.

a, slide no. 397; b, slide no. 492; c, slide no. 485; d, slide no. 497; e, slide no. 515.

DISTRIBUTION. — Pacific waters northwest and south of New Caledonia, depth 235-630 m. BILLARD's "*Siboga*" specimen, a fragmentary colony 15 mm high, originated from Stn 302, 10°27.9'S-123°28.7'E, between Roti and the southwest point of Timor, 216 m depth, 02.02.1900.

REMARKS. — I have identified this material with BILLARD's *Sertularella catena* (BILLARD, 1925b : 147-148), having convinced myself after studying the type of this species in the British Museum (Natural History) (vide infra) that BILLARD's "*Siboga*" specimen, which I have been unable to trace, is quite different from ALLMAN's type of *Sertularia catena*. The overall shape of the hydrothecae and particularly their quadrangular cross-section near the apex are very characteristic and are not observed in ALLMAN's "*Challenger*" material.

Sertularella billardi is well represented in the New Caledonia material, the variability of this material is quite evident and concerns principally the size of the hydrothecae and the geniculation of the hydrocladia. Variation in size can easily be lifted from the measurements given above; variability in other characters may also appear from the drawings.

I have been unable to trace the "*Siboga*" specimens referred to by BILLARD (1925b : 147-148, fig. 17); they neither occur in the collections of the Institute for Taxonomic Zoology (Zoologisch Museum) of the University of Amsterdam, nor in MNHN. However, BILLARD's slide no. 248 of *Campanularia longitheca* Stechow, 1924, in MNHN (fig. 42e) contains a single hydrotheca of a species of *Sertularella* identified by BILLARD as *Sertularella catena* (Allman, 1888). This is undoubtedly the species described here as *Sertularella billardi* sp. nov. This single hydrotheca originates from "*Siboga*", Stn 302, Roti Strait, 10°27.9'S-123°28.7'E, 216 m, 02.02.1900.

Sertularella bipectinata sp. nov.

Figs 43c-e, 44a-e

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn DW 33, 23°09.71'S-167°10.27'E, 675-680 m, 29.08.1985 : one stem 38 mm long on *Sertularella novaecaledoniae* sp. nov. Slide no. 512 (RMNH-Coel. 25879). Specimen as well as host completely covered by stolon of *Zygophylax* sp. — Stn DW 36, 23°08.64'S-167°10.99'E, 650-680 m, 29.08.1985 (type locality) : c. 10 branched colonies, up to c. 60 mm high, some with gonothecae. A 60 mm high colony with gonothecae is the holotype (MNHN-Hy. 1075), rest are paratypes. Slides no. 485 (schizoholotype, RMNH-Coel. 25880). Also fragments as slides nos 496 (young colony) and 497; no gonothecae. With *Zygophylax* sp., *Sertularella paucicostata* sp. nov. and *Symplectoscyphus commensalis* sp. nov. (MNHN-Hy. 1075, holotype, 3 paratypes and slide no. 497; BMNH 1989.11.24.58, 3 paratypes; RMNH-Coel. 25880, schizoholotype, rest paratypes and slide no. 496). — Stn CP 52, 23°05.79'S-167°46.54'E, 600-540 m, 31.08.1985 : fragment of c. 25 mm length, unbranched; no gonothecae. As slide no. 516 (RMNH-Coel. 25881). Hydrothecal wall weakly ribbed.

MUSORSTOM 4 : stn CP 215, 22°55.70'S-167°17.00'E, 520 m, 28.09.1985 : single colony 40x40 mm and 2 fragments. No gonothecae. Slide no. 477 (MNHN-Hy. 1076). — Stn DW 220, 22°58.50'S-167°38.30'E, 550 m, 29.09.1985 : five forked colonies c. 50x50 mm and a few fragments, one with 2 gonothecae. Two slides no. 515 of fragment with 2 gonothecae and of separate branch; also slide no. 472. With *Scandia* sp., *Symplectoscyphus commensalis* sp. nov., *Sertularella novaecaledoniae* sp. nov. and *Synthecium* sp. (MNHN-Hy. 1077, 2 colonies, fragments and slide no. 472; BMNH 1989.11.24.59, 1 slide no. 515; RMNH-Coel. 25882, rest colonies and fragments, 1 slide no. 515).

DESCRIPTION (mainly based on material from type locality). — Upright, irregularly branched colonies with slightly polysiphonic main axis, branches usually directed upwards, long, polysiphonic only occasionally and then only in proximal parts. Colonies attached to substratum by means of flattened part of axis; secondary tubes springing from basal disk or from stem internodes and running upwards. Initially axis and branches divided into internodes by means of oblique perisarcal constrictions; septa have occasionally been observed in younger parts of colonies. Each internode with single distal hydrotheca, hydrothecae alternately arranged in one plane; hydrocladia, where present, springing from internode directly under hydrotheca; first hydrocladial internode lengthened. Internodes moderately to strongly geniculate (figs 43c-e, 44c); hydrothecae strongly diverging from main axial length axis, in extreme cases diverging perpendicularly and such colonies distinctly pectinate.

Hydrothecae elongated, twice or thrice as long as maximum diameter, basally slightly swollen, leaving internode abruptly; angle with wall of following internode 80 to 90 degrees (figs 43d, 44a-b, d-e). Both ab- and adcauline walls may be almost straight, slightly diverging near hydrothecal aperture. Exact nature of both walls varied : adcauline wall in certain hydrothecae slightly undulated to weakly ribbed (fig. 44a-b), slightly concave to

basally slightly convex; abcauline wall straight to basally slightly convex. Adnate part of abcauline wall one-third to one-half the length of free part, basally curved and forming thickened lip near hydropore (fig. 43d). Hydropore large, visible as thickened perisarcal ring on inside of thecal floor. Hydrothecal aperture perpendicular to hydrothecal length axis, with four low marginal cusps (one ad-, one abcauline, two laterals), separated by shallow embayments. Inside of distal part hydrotheca with three lamellar cusps (one abcauline, one on each side of adcauline marginal cusp), running downwards for c. one-third of hydrothecal depth (fig. 44a-b). Hydrothecal margin frequently renovated; repaired hydrothecae, resulting from repair of strongly damaged hydrothecae, of common occurrence.

Some hydrothecae have (badly preserved) hydranths that are fairly large and have a large adcauline caecum; ligamentum running from apex of caecum towards upper part of internal abcauline hydrothecal wall.

Gonothecae large, elongated sack-shaped, narrowing basally and there attached to middle of internode by means of short pedicel (fig. 43e). Apical portion of gonotheca shaped as short cylinder with more or less flattened top bearing four shallow, rounded tubercles. Contents of gonothecae too badly preserved to discern their sex.

Periderm thick, yellowish-brown, gradually thinning out along length of colony and along hydrothecae.

TABLE 32. — Measurements of *Sertularella bipectinata* sp. nov., in µm.

	BIOCAL Stn DW 33 (slide no. 512)	BIOCAL Stn DW 36 (slide no. 485) schizoholotype	BIOCAL Stn DW 36 (slide no. 496) young colony
Internode, length	975 - 1,150	1,150 - 1,260	750 - 760
diameter at node	345 - 390	435 - 455	280 - 305
Hydrotheca, length abcauline wall*	1,260 - 1,300	1,195 - 1,300	975 - 1,065
length free part adcauline wall*	1,130 - 1,150	1,000 - 1,065	890 - 910
length adnate part adcauline wall	410 - 455	450 - 520	370 - 390
total depth*	1,300 - 1,475	1,390 - 1,430	1,150 - 1,170
diameter at apex	240 - 260	260 - 265	240 - 260
maximal diameter	410 - 455	410 - 435	390 - 435
Gonotheca, length			3,255
maximal diameter			955

	BIOCAL Stn CP 52 (slide no. 516)	MUSORSTOM 4 Stn CP 215 (slide no. 477)	MUSORSTOM 4 Stn DW 220 (slide no. 515)
Internode, length	1,000 - 1,040	825 - 890	1,080 - 1,195
diameter at node	370 - 390	370 - 410	370 - 410
Hydrotheca, length abcauline wall*	1,130 - 1,150	890 - 935	1,150 - 1,170
length free part adcauline wall*	935 - 975	540 - 650	890 - 955
length adnate part adcauline wall	390 - 410	500 - 585	475 - 500
total depth*	1,215 - 1,280	1,020 - 1,040	1,325 - 1,345
diameter at apex	255 - 265	260 - 305	280 - 305
maximal diameter	370 - 410	370 - 390	435 - 455
Gonotheca, length			2,800 - 3,040
maximal diameter			1,020 - 1,065

(*including renovations)

DISTRIBUTION. — Recorded from a restricted area of the Norfolk Ridge south of New Caledonia, depth 520-680 m.

REMARKS. — Though the fully grown colony is quite characteristic because of its pectinate appearance, younger colonies, as occur amongst the abundant material from BIOCAL, Stn DW 36, can easily be confused with *Sertularella leiocarpa* (Allman, 1888) or *S. leiocarpoides* sp. nov. In the shape of the hydrothecae *Sertularella bipectinata* approaches *S. anguina*, but in the latter the hydrothecae are even more slender and the geniculate condition of the axis is less extreme.

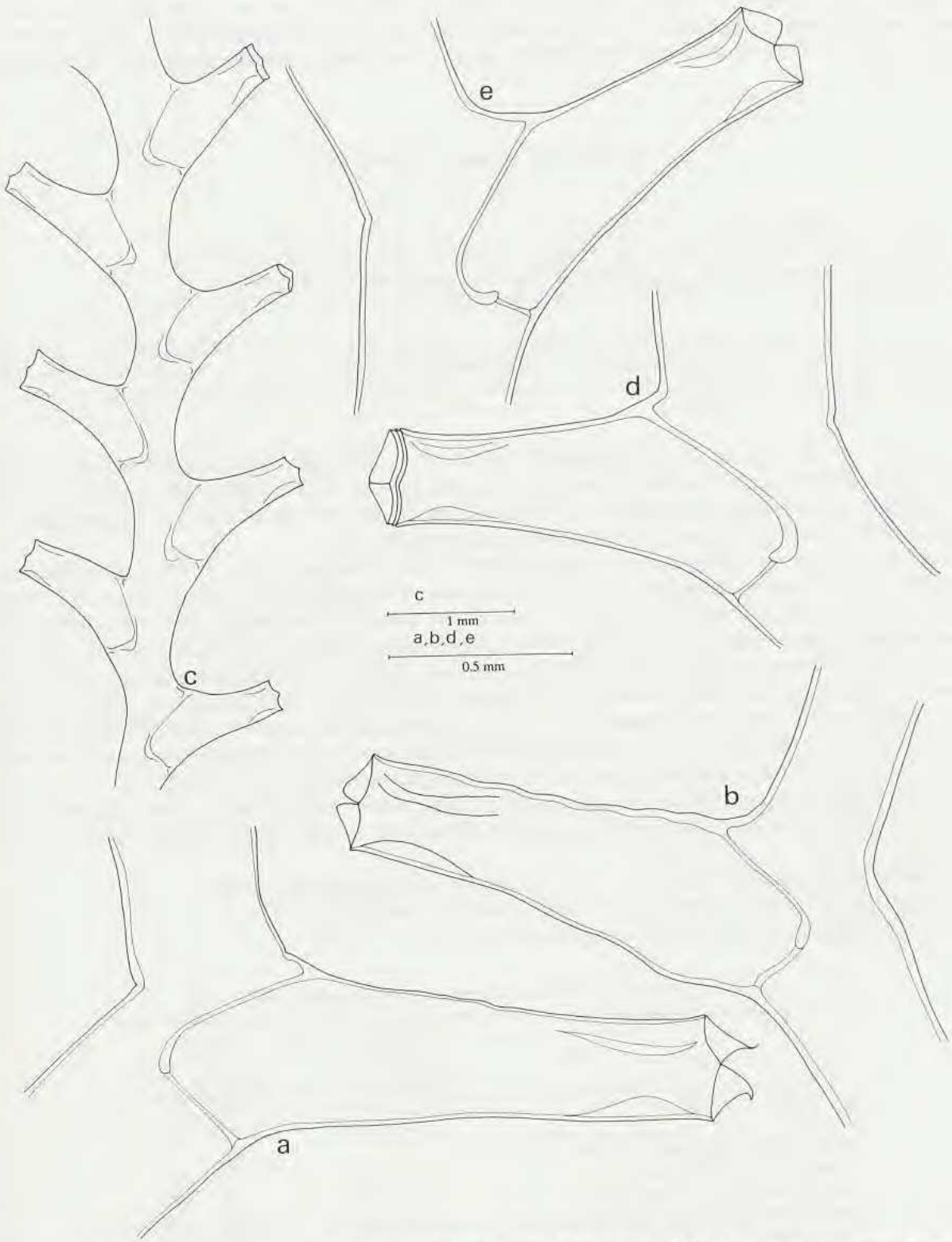

FIG. 44. — *Sertularella bipectinata* sp. nov. : **a**, schizoholotype, BIOCAL, Stn DW 36, axial hydrotheca; **b**, BIOCAL, Stn DW 36,axial hydrotheca. — **c-e**, MUSORSTOM 4, Stn CP 215 : **c**, part of axis; **d, e**, axial hydrothecae. a, slide no. 485; b, slide no. 496; c-e, slide no. 477.

There is a good deal of variability amongst the colonies of this species from the various localities as well as in a larger material from a single locality. This variability covers the degree of geniculation of axis and branches, the mode of divergence of hydrotheca from internode, the length of the hydrotheca and the shape of the proximal part of the hydrotheca.

Sertularella catena (Allman, 1888)

Fig. 45a-c

Sertularia catena Allman, 1888 : 58, pl. 28 figs 2, 2a.
Sertularella catena - NUTTING, 1904 : 80, pl. 15 fig. 3. — FRASER, 1944 : 257-258, pl. 54 fig. 242.
Not *Sertularella catena* - BILLARD, 1925b : 147-148, fig. 17 (= *Sertularella billardi* sp. nov.).
Not *Sertularella catena* - MAYAL, 1973 : 39, figs 24-25 [= *Sertularella cylindritheca* (Allman, 1888)].

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn DW 33, 23°09.71'S-167°10.27'E, 675-680 m, 29.08.1985 : eighteen mm long stem with one sidebranch. All in slide no. 514 (MNHN-Hy. 1078). No gonothecae. — Stn DW 36, 23°08.64'S-167°10.99'E, 650-680 m, 29.08.1985 : fragment 8x10 mm with 3 sidebranches, hydranths present; all in slide no. 814 (RMNH-Coel. 28883).

DESCRIPTION (based on the BIOCAL, Stn DW 33, specimen). — Stem fairly stiff, erect, divided into internodes by oblique peridermal constrictions and occasionally by an oblique node, distinctly geniculate in higher part, largely monosiphonic, with a few secondary tubules in lowest part. One sidebranch (hydrocladium) present, springing from internode directly under hydrotheca; there is no distinct apophysis (fig. 45a).

Axial hydrotheca not different from remaining hydrothecae. Internode slender at base, widening distally, supporting large, diverging hydrotheca, of which c. one-third of adcauline wall is adnate. Shape of hydrotheca slightly varied, usually cylindrical, with parallel ad- and abcauline walls, but occasionally with slightly convex adcauline wall and as a result slightly bulging in lower half. Abcauline wall nearly straight, smoothly running into wall of internode, towards rim with a few undulations. Free part adcauline wall straight or slightly convex, in basal half with 5 or 6 oblique corrugations, replaced on distal half by undulations of hydrothecal wall, transition between both parts gradual (fig. 45b-c). Hydrothecal rim with four shallow cusps, separated by weak embayments, slightly thickened (as appears from stained microslide preparations). Renovations of hydrothecal border present, but reduced to one or two. Opercular apparatus composed of four triangular flaps, forming low roof (fig. 45c). Plane of hydrothecal aperture perpendicular to longitudinal axis of hydrotheca or slightly tilted in adcauline direction. Only one axial hydrotheca observed, this particular hydrotheca slightly more slender than remaining hydrothecae, strictly cylindrical.

Hydranths present but fully retracted, with 12-14 tentacles, small; hypostome rounded.

Perisarc firm, particularly on lower stem internodes; colony consequently erect.

No gonothecae present and no places of attachment observed.

TABLE 32. — Measurements of *Sertularella catena* (Allman, 1888), in µm.

	BIOCAL Stn DW 33 (slide no. 514)	BIOCAL Stn DW 36 (slide no. 814)
Stem internode, length	705 - 775	740 - 815
diameter	175 - 195	160 - 190
Hydrocladium (sidebranch), diameter at base	170	150 - 155
Hydrotheca, length abcauline wall	705 - 740	705 - 740
length free part adcauline wall	645 - 665	575 - 590
length adnate part adcauline wall	230 - 250	260 - 285
total depth	775 - 815	740 - 765
diameter at apex	295 - 310	250 - 275
maximal diameter	310 - 320	275 - 290

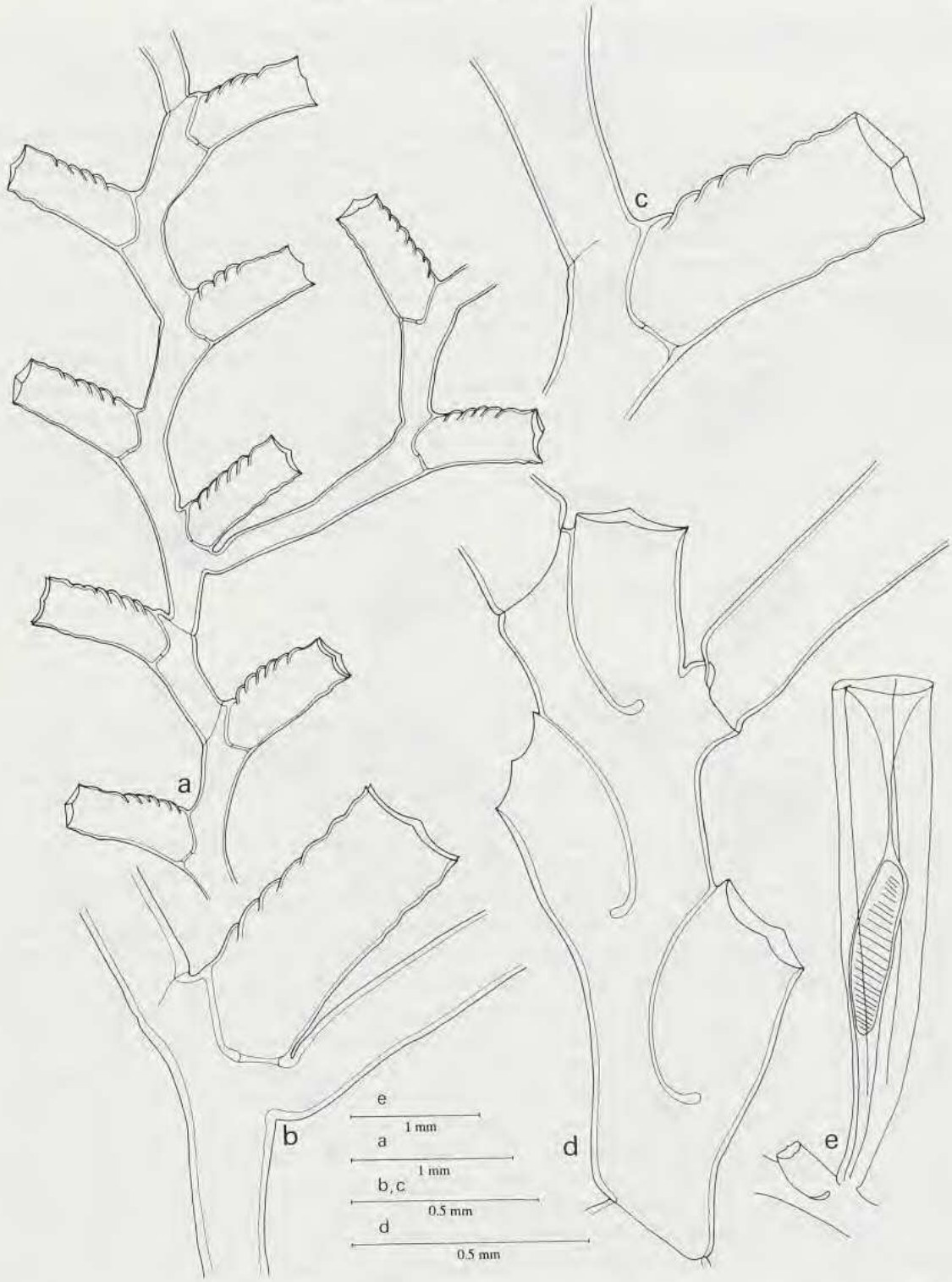

FIG. 45 a-c. — *Sertularella catena* (Allman, 1888), MUSORSTOM 4, Stn CP 193 : **a**, stem and sidebranch; **b**, axillary hydrotheca; **c**, hydrocladial hydrotheca.

FIG. 45 d-e. — *Sertularella diaphana* (Allman, 1885) : **d**, BIOCAL, Stn DW 36, monosiphonic part of axis; **e**, MUSORSTOM 4, Stn CP 153, male gonotheca.

a-c, slide no. 514; d, slide no. 488; e, slide no. 483.

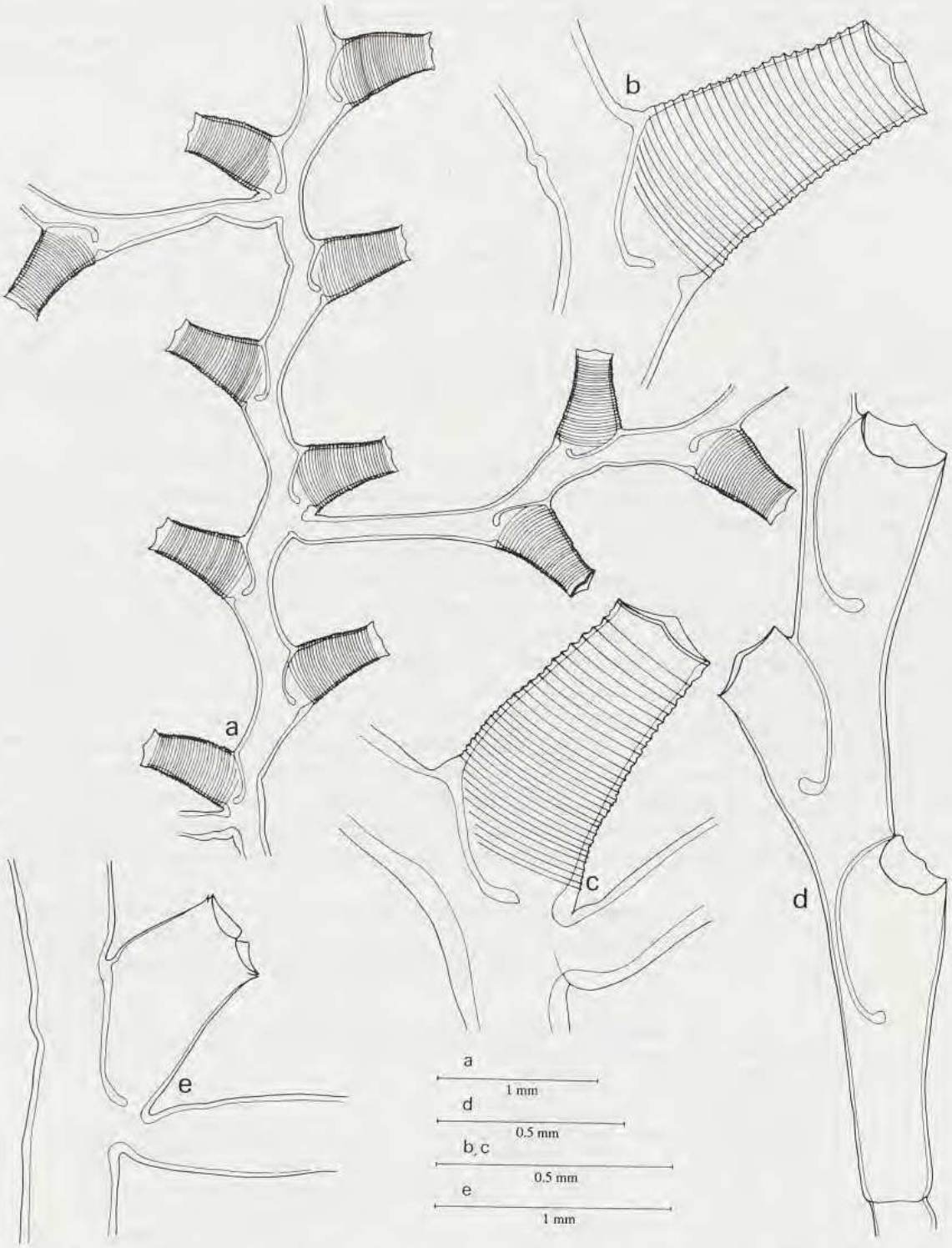

FIG. 46 a-c. — *Sertularella crenulata* Nutting, 1905, MUSORSTOM 4, Stn CP 193 : **a,** monosiphonic distal part of colony; **b**, hydrocladial hydrotheca; **c**, axillary hydrotheca.
FIG. 46 d. — *Sertularella diaphana* (Allman, 1885), BIOCAL, Stn DW 36, part of hydrocladium.
FIG. 46 e. — *Sertularella geodiae* Totton, 1930, BIOGEOCAL, Stn CP 214, axillary hydrotheca.
a-c, slide no. 345; d, slide no. 488; e, slide no. 581.

DISTRIBUTION. — Originally described from "*Challenger*", Stn 24, Culebra Island, off Puerto Rico, Caribbean, 18°38'30"N-65°05'30"W, 390 fms (= 713 m), 25.03.1873. The present material is from the Pacific, east of New Caledonia, depth 650-680 m.

REMARKS. — I have tentatively identified these fragmentary colonies with ALLMAN's Caribbean species, basing myself mainly on NUTTING's (1904) account and on his drawing of the holotype. The agreement in structure and shape of the hydrothecae is very striking. NUTTING's drawing, also reproduced by FRASER (1944, pl. 54 fig. 242) is apparently based on a fragment of the holotype in NUTTING's collection, showing a distinctly undulated adcauline hydrothecal wall. I have inspected ALLMAN's type of *Sertularia catena* (BMNH 88.11.13.46, alcohol specimen and ALLMAN's slide). All that is left of the holotype colony is a 18 mm long colony composed of a slightly polysiphonic hydrocaulus with 4 sidebranches. There is no gonotheca. The slide is a (restored) 11 mm long branch with 10 hydrothecae, top part detached bearing one gonotheca and 2 hydrothecae. Obviously the drawing in ALLMAN's Challenger Report (pl. 28 fig. 2a) has been made from the slide. The hydrothecae in the slide have a weakly undulated adcauline wall; the gonotheca is broader than that figured by ALLMAN, at the apical third with two indistinct furrows; there is no funnel and no distinct opening could be observed. This is primarily a Caribbean species; the type locality being Culebra Island, off Puerto Rico, Caribbean, 18°38'30"N-65°05'30"W, depth 390 fms (= 713 m).

For the "*Siboga*" specimen referred by BILLARD (1925 : 147-148) to this species and here considered a new species, *Sertularella billardi* sp. nov., see above.

Sertularella crenulata Nutting, 1905

Fig. 46a-c

Sertularella crenulata Nutting, 1905 : 949, pl. 4 fig. 3, pl. 11 figs 4-7.

MATERIAL EXAMINED. — **New Caledonia**. LAGON : stn 491, 18°56.0'S-163°20.0'E, 450-460 m, 03.02.1985 : top part of colony c. 30 mm high; no gonothecae (RMNH-Coel. 25884). Part as slide no. 927 (BMNH 1989.11.24.60).

MUSORSTOM 4 : stn CP 193, 18°56.30'S-163°23.20'E, 415 m, 19.09.1985 : one colony c. 30x50 mm with forked axis; no gonothecae (MNHN-Hy. 1079). Part as slide no. 345 (RMNH-Coel. 25885). With *Filellum serratum* (Clarke, 1879).

DESCRIPTION. — Strongly built colony c. 50 mm high with thick, forked, polysiphonic axis, monosiphonic at the top. Sidebranches and hydrocladia all in one plane with hydrothecae; colony flabellate. Hydrocladia, that by development of secondary hydrocladia and accessory tubules coming from axis may become sidebranches, have alternately arranged hydrothecae, as have also axis and its ramifications. Hydrocladia alternate (fig. 46a), number of hydrothecae between successive hydrocladia varied (1 to c. 10). Internodes on axis and hydrocladia only indicated by perisarcal constrictions; no septa developed. First 'internode' of hydrocladium longer than following (fig. 46a); axillary hydrotheca not greatly different from remaining hydrothecae (fig. 46c).

Hydrotheca vase-shaped, diverging from 'internodes', axis between hydrothecae geniculate. Free portion adcauline wall less than twice length of adnate part, usually slightly convex, though hydrothecae with straight or slightly concave adcauline wall also occur. Adnate part of adcauline wall thickened basally where it forms hydrothecal floor; large hole (hydropore) present between apex of bottom plate and raised part of opposite wall. Abcauline wall smoothly curved and continuous into wall of 'internode'. Rim of hydrotheca perpendicular to length axis, slightly but distinctly thickened, with four marginal cusps (two lateral, one ad-, one abcauline) with rounded apices. Four triangular plates fit into shallow embayments between marginal cusps, forming low almost flat opercular apparatus when closed. Body of hydrotheca with c. 30 transverse, circular ribs with sharp edges. Between ribs body of hydrotheca furrowed, ribs almost equidistant, distance between ribs slightly widening from base towards rim. There are no intrathecal cusps (fig. 46b).

Perisarc thick along walls of 'internode', gradually thinning along hydrothecal wall, but thickening again near hydrothecal rim.

Hydranths present though badly preserved, with c. 14 tentacles. Body attached to hydrothecal floor. Distinct 'caecum' present, connected to inside of abcauline wall by means of filament.

No gonothecae observed.

TABLE 33. — Measurements of *Sertularella crenulata* Nutting, 1905, in µm.

	MUSORSTOM 4 Stn CP 193 (slide no. 345)	LAGON Stn 491 (slide no. 927)
Stem, diameter at base	1,300	1,200
Sidebranch, diameter at base	160 - 175	150 - 185
Axial hydrotheca, length abcauline wall	585 - 630	535 - 550
length fused part adcauline wall	315 - 370	250 - 280
length free part adcauline wall	520 - 530	475 - 500
total depth	630 - 670	600 - 650
diameter at rim	225 - 240	160 - 180
maximal diameter	300 - 325	265 - 290
Distance between successive hydrothecae, measured from axil to base of next hydrotheca	390 - 415	290 - 405

DISTRIBUTION. — Previously only recorded from two localities off the south coast of the island of Molokai in the Hawaiian Islands, depth 44-134 fms (= 80-245 m). The present records are from a restricted area of the Pacific (c. 18°56'S-163°20'E) southeast of New Caledonia.

REMARKS. — This is a very characteristic species with finely ribbed hydrothecae; though NUTTING's description (1905 : 949) is not very detailed, the closely ribbed structure of the hydrothecae leaves no doubt about the identity of the present material.

Sertularella diaphana (Allman, 1885)

Figs 45d-e, 46d

Thuiaria distans Allman, 1877 : 27, pl. 17 figs 1-2. [= *Sertularella distans* (Allman, 1877), non *Sertularella distans* (Lamouroux, 1816)].
Thuiaria pinnata Allman, 1877 : 28, pl. 15 figs 1-2. [= *Sertularella pinnata* (Allman, 1877), non *Sertularella pinnata* Clark, 1876a : 211, 226, pl. 12 figs 28, 29].
Thuiaria diaphana Allman, 1885 : 145, pl. 18 figs 1-3.
Thuiaria hyalina Allman, 1888 : 69-70, pl. 33 figs 2, 2a.
Sertularella distans - HARTLAUB, 1901b : 100. — NUTTING, 1904 : 88, pl. 19 figs 5-6. — VERVOORT, 1968 : 104.
Sertularella pinnigera Hartlaub, 1901b : 113, footnote 1. — NUTTING, 1904 : 86-87, pl. 19 fig. 3. — DEEVEY, 1954 : 270. — VERVOORT, 1968 : 105.
Sertularella lata - NUTTING, 1904 : 85-86, pl. 18 fig. 10. [Non *Sertularella lata* (Bale, 1882)].
Sertularella torreyi Nutting, 1905 : 934, 949, pl. 4 fig. 4, pl. 11 figs 2-3.
Sertularella speciosa Congdon, 1907 : 463, 476, figs 24-28. — BENNITT, 1922 : 250. — FRASER, 1943 : 92. — DEEVEY, 1954 : 270. — VERVOORT, 1968 : 44, 105, fig. 21. — WEDLER, 1975 : 333 et seq. — COOKE, 1977 : 96, fig. 22. — COLIN, 1978 : 139. — FLÓREZ GONZÁLEZ, 1983 : 120, photo 30. — BANDEL & WEDLER, 1987 : 38.
Sertularella diaphana - BALE, 1919 : 337, pl. 16 fig. 5. — JÄDERHOLM, 1920 : 6, pl. 2 fig. 2. — BILLARD, 1925b : 157-160, fig. 22, pl. 7 figs 12-13; 1931 : 248; 1933 : 12, pl. 1 fig. 2. — STECHOW, 1925a : 226, fig. H. — DOLLFUS, 1933 : 127. — MILLARD, 1958 : 188, fig. 7C-D; 1970 : 268; 1975 : 285, fig. 93A-D; 1978 : 197. — YAMADA, 1958 : 51, 58, fig. 3; 1959 : 63. — PENNYCUIK, 1959 : 195. — HIROHITO, 1969 : 21. — SCHMIDT, 1972 : 42. — MILLARD & BOUILLON, 1975 : 2, 14.
Sertularella diaphana var. *delicata* Billard, 1919 : 21, fig. IIIA; 1925b : 161, fig. 24, pl. 7 fig. 14.
Sertularella sargassi Stechow, 1920 : 37; 1923d : 179.
Thuiaria quadrilateralis Hargitt, 1924 : 493-494, pl. 5 fig. 17.
Sertularella diaphana var. *orthogona* Billard, 1925a : 161, fig. 23. — VAN SOEST, 1976 : 83.

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn DW 36, 23°08.64'S-167°10.99'E, 650-680 m, 29.08.1985 : four colonies 20-45 mm high, base strongly polysiphonic, and some detached hydrocladia. Some young gonothecae present. Two slides no. 488 of fragments (MNHN-Hy. 1080, 2 colonies; BMNH 1989.11.24.61, 1 colony and 1 slide no. 488; RMNH-Coel. 25886, 1 colony and 1 slide no. 488).

MUSORSTOM 4 : stn CP 153, 19°04.20'S-163°21.20'E, 235 m, 14.09.1985 : two 80 mm high stems and some fragments; all with gonothecae. Two slides no. 483 (all RMNH-Coel. 25887). — Stn DW 220, 22°58.50'S-167°38.30'E,

550 m, 29.09.1985 : one colony of characteristic structure, 80 mm high, and a fragment. Two slides no. 487 of fragment and one of branches (MNHN-Hy. 1081, colony; BMNH 1989.11.24.62, 1 slide no. 487; RMNH-Coel. 25888, 1 slide no. 487).

DESCRIPTION (mainly based on specimen from MUSORSTOM 4, Stn DW 220). — Fully developed colony c. 80 mm high, with strongly polysiphonic, basally c. 1.5 mm thick, branched and rigid axis. Ultimate branches monosiphonic, bearing alternately arranged, 15-20 mm long hydrocladia. Polysiphony of axis and older branches brought about by development of secondary, non-hydrothecate tubules, the majority of which originate from stolon. Some secondary tubules, however, end on axis at base of axial hydrothecae. Both axis, branches and hydrocladia hydrothecate, though in polysiphonic parts hydrothecae covered by secondary tubules. Hydrothecae, with exception of axillary hydrothecae, all of same shape and size. Axis, branches and hydrocladia divided into internodes, usually indicated by slightly oblique septa and distinct perisarcal constrictions, usually with three hydrothecae, though that number may be reduced to two or increased to five. Hydrocladium inserting on small apophysis directly under axillary hydrotheca of reduced length (fig. 45d), usually one apophysis for each internode, though occasionally two subalternate apophyses may be present. First internode of hydrocladium of increased length.

Hydrothecae almost completely sunken into axis or hydrocladium, with only a fraction of adcauline wall free; adcauline wall smoothly curved, basal portion thickened, forming circular wall around hydropore; opposite wall of adcauline side not thickened, abcauline hydrothecal wall slightly swollen basally, slightly everted apically. Hydrothecal aperture wide, circular, sloping downwards, plane of opening making angle of c. 30 degrees with longitudinal axis of internode, with four low, rounded cusps separated by shallow embayments (figs 45d, 46d). Opercular apparatus only preserved on protected hydrothecae, composed of four thin, triangular plates, when closed forming shallow roof. Majority of hydrothecae without or with imperfect number of opercular plates. Axillary hydrothecae with shorter, straight abcauline wall and less deep. Hydrothecae alternately arranged, though not always strictly in one plane. Large portion of stem and branches and basal parts of internodes with hydrothecae arranged in two planes that meet at an oblique angle, but along hydrocladia this arrangement is gradually replaced by arrangement in a single plane, as is the case with hydrothecae along ultimate parts of hydrocladia.

Perisarc fairly thick along walls of internodes and hydrothecae, thickest at basal plate of hydrotheca, thinning out some distance under hydrothecal aperture; hydrothecal margin not thickened.

Hydranths present in material from BIOCAL, Stn DW 36, indicating that this material at least was captured alive, large, filling whole of hydrothecal cavity, with distinct 'caecum', 10-12 tentacles and large, globular hypostome.

Gonothecae in mature condition (MUSORSTOM 4, Stn CP 153) large and cylindrical, narrowed basally and attached to internode directly under hydrocladial hydrothecae (only occasionally also attached to axis). Only male gonothecae observed, these have four longitudinal ribs, starting at flattened apex and running downwards for almost whole length of gonotheca (fig. 45e). Interior of gonotheca only partly filled by oblong, yellow mass of developing spermatocytes. Gonotheca apparently opening by means of apical lid, though this condition could not be observed unambiguously.

REMARKS. — There can be no reasonable doubt that the New Caledonia material is identical with Indo-Malayan material described by BILLARD (1925b) from the SIBOGA EXPEDITION as *Sertularella diaphana*, though I have not accepted *Sertularella diaphana* var. *orthogona* and *S. diaphana* var. *delicata*, having included those in the synonymy of the species. For the time being I have accepted BILLARD's *Sertularella diaphana* var. *gigantea*, though the finer branches of this large variety seem to have the same dichotomous branching observed in the present material (cf. BILLARD, 1925b, pl. 9 fig. 35). On comparing BILLARD's accurate descriptions of the species and the first named two varieties I find the New Caledonia material to have characters of all three. It has the hydrothecal arrangement described for *S. diapahana* var. *orthogona*, but misses the perisarcal peg at the base of the abcauline hydrothecal wall attributed to that variety.

Sertularella diaphana var. *delicata* finally is based on a small material of epizootic colonies with small hydrothecae with a longer free adcauline portion of the hydrothecal wall. Though BILLARD's material of this variety is inferior in its dimensions to any of the New Caledonia colonies it is in my opinion based on characters that by the present material are proved to be highly variable and I have therefore included it in the synonymy of the species.

None of my material shows a sign of a thickened hydrothecal aperture or the presence of an adcauline perisarcal peg just under the hydrothecal margin, characters apparently present in all of BILLARD's "*Siboga*" specimens of this species and its varieties.

TABLE 34. — Measurements of *Sertularella diaphana* (Allman, 1885), in µm.

	SIBOGA EXPED. (BILLARD, 1925)	BIOCAL Stn DW 36 (slide no. 488)	MUSORSTOM 4 Stn CP 153 (slide no. 483)
Stem internode, length		1,325 - 1,475	1,430 - 1,625
diameter		370 - 410	350 - 430
Axillary hydrotheca, length abcauline wall		260 - 275	190 - 200
length free part adcauline wall		30 - 40	65 - 75
length adnate part adcauline wall		385 - 400	440 - 445
total depth		400 - 415	440 - 445
diameter at apex		220 - 230	215 - 225
maximal diameter		235 - 260	240 - 250
Hydrocladial hydrotheca, length abcauline wall		295 - 320	290 - 300
length free part adcauline wall		30 - 35	45 - 65
length adnate part adcauline wall		385 - 435	360 - 370
total depth	350 - 570	430 - 445	370 - 385
diameter at apex	230 - 270	205 - 250	250 - 260
maximal diameter		265 - 280	265 - 270
(Male) gonotheca, length	1,730 - 2,400		3,535 - 3,755
diameter at apex	530 - 880		715 - 880

DISTRIBUTION. — *Sertularella diaphana* is a species well distributed in tropical and subtropical waters, being almost circumglobal in its distribution. It has been recorded from several Indo-Malayan localities (BILLARD, 1925b) as well as from Australia : the type locality of ALLMAN's *Thuiaria diaphana* being Moreton Bay, Australia. Its has now also been recorded from the Pacific around the southeastern part of New Caledonia.

Sertularella geodiae Totton, 1930

Figs 35c-d, 46e, 47a

Sertularella geodiae Totton, 1930 : 196-197, fig. 43, pl. 3 figs 7-8. — BRIGGS, 1939 : 37. — RALPH, 1961a : 831-833, fig. 24c, g. — NAUMOV & STEPAN'YANTS, 1962 : 86-87, fig. 10. — VERVOORT, 1972 : 120-123, fig. 37. — BLANCO, 1976 : 39-42, pl. 3 figs 7-8. — MILLARD, 1977a : 23-25, figs 6E-F. — STEPAN'YANTS, 1979 : 89-90, pl. 14 figs 4A-B.

MATERIAL EXAMINED. — **New Caledonia**. BIOGEOCAL : stn CP 214[3], 22°43.09'S-166°27.19'E, 1665-1590 m, 09.04.1987 : branched and unbranched fragments 15-20 mm high. No sign of polysiphony; no gonothecae. Slide no. 581 (MNHN-Hy. 1082, fragments; BMNH 1989.11.24.63, fragments; RMNH-Coel. 25889, slide no. 581).

DESCRIPTION. — Colony fragments with stiff, largely monosiphonic axis with pinnately arranged hydrocladia all in one plane. Axis divided into internodes by oblique perisarcal constrictions; no distinct septa being present. Axial and hydrocladial hydrothecae all in one plane, alternately arranged. Hydrocladia springing from axis closely under axillary hydrotheca, normally one hydrocladium to each internode (fig. 47a), though two alternate hydrocladia for one internode also observed. Division of hydrocladia into internodes also by means of oblique perisarcal constrictions; no septa present. First internode of each hydrocladium lengthened, 1.5 times as long as remaining hydrocladial internodes.

[3] Species found at this station are : *Filellum serpens* (Hassall, 1848), *Diphasia attenuata* (Hincks, 1866), *Diphasia mutulata* (Busk, 1852), *Hydrallmania falcata* (Linnaeus, 1758) and *Sertularella geodiae* Totton, 1930.

Hydrothecae large; abcauline wall smooth or slightly undulated, continuing smoothly into wall of internode (fig. 35c-d). Free part of adcauline wall usually distinctly but irregularly undulated, slightly shorter than fused portion which is almost straight and fairly sharply curved near hydrothecal floor. Hydropore large, scarcely indicated on inside abcauline wall. Hydrothecal margin large, perpendicular to hydrothecal length axis, with four sharp but low cusps, separated by shallow embayments, slightly but distinctly everted, not thickened. Number of renovations much reduced : only a few hydrothecae with a single renovation observed. Closing apparatus complete in some of more protected axillary hydrothecae and there composed of four hyaline flaps forming a low rooflike structure. Usually a distinct pocket formed by free part of adcauline hydrothecal wall and constriction at bottom of next internode. Axial hydrothecae only slightly deformed, of almost same shape generally as remaining hydrothecae (fig. 46e).

Perisarc firm, particularly along walls of axial internodes, thinning out along distal parts of ab- and adcauline hydrothecal walls.

Small hydranths present but as hydrothecae are filled with mud their structure could not be observed. Material evidently collected alive.

No gonothecae found.

TABLE 35. — Measurements of *Sertularella geodiae* Totton, 1930, in µm.

	New Zealand area (TOTTON, 1930)	Patagonian area (VERVOORT, 1972)	New Caledonia BIOGEOCAL Stn CP 214
Stem internode, length	1,280 - 1,390	1,010 - 1,350	1,300 - 1,520
diameter	330 - 390	280 - 285	280 - 390
Axillary hydrotheca, length ab-			
cauline wall			630 - 705
free part adcauline wall			385 - 505
adnate part adcauline wall			555 - 590
total depth			775 - 850
maximal diameter			430 - 480
diameter at apex			340 - 385
Hydrocladial internode, length	1,220		975 - 1,085
diameter	310		280 - 325
Hydrocladial hydrotheca, length			
abcauline wall	600 - 740	650 - 715	665 - 705
length free part adcauline wall	470 - 550	405 - 480	405 - 445
length adnate part adcauline wall	680 - 760	515 - 540	555 - 605
total depth		810 - 850	775 - 800
maximal diameter		445 - 470	
diameter at apex	380 - 400	350 - 400	325 - 325
Gonotheca, total length	2,000 - 2,040		
diameter	840 - 1,030		

DISTRIBUTION. — Originally described from two localities in the New Zealand area, viz. off Three Kings Islands, 100 fms (= 183 m), and off North Cape, 70 fms (= 128 m) (TOTTON, 1930); no distinct type locality indicated. The species was subsequently recorded from off Maria Island, Tasmania, 1300 fms (= 2377 m) (BRIGGS, 1939); from Pacific and Atlantic waters around the southern extremity of South America (i.e. south of 50°S) (NAUMOV & STEPAN'YANTS, 1962; STEPAN'YANTS, 1979; VERVOORT, 1972; BLANCO, 1976), and from the southern Indian Ocean between Possession and Cochons Islands, 45°57.2'S-50°32.8'E, 100 m (MILLARD, 1977a). The species is now recorded from deep water (1590-1665 m) of the Pacific east of New Caledonia. The species is apparently restricted to a belt of water in the southern oceans between approximately 40° and 55°S, penetrating north in deeper Pacific waters.

REMARKS. — There can be no reasonable doubt that the New Caledonia material is conspecific with that recorded previously from Pacific and Atlantic off southern America (VERVOORT, 1972), with which I have compared

the present specimens. The large, bulging hydrothecae with slightly everted margin, irregularly undulated free adcauline hydrothecal wall and distinct 'pocket' in axil of that wall and the next internode afford good characters to distinguish this species from *Sertularella polyzonias* (Linnaeus, 1758), *S. gayi gayi* (Lamouroux, 1821) and *S. conica* Allman, 1877.

Sertularella helenae sp. nov.

Fig. 47b-e

MATERIAL EXAMINED. — **New Caledonia**. LAGON : stn 394, 22°44.1'S-167°05.8'E, 309 m, 23.01.1985 : two slightly polysiphonic colonies 40-20 mm high and many fragments, no gonotheca; covered with *Filellum* sp. (RMNH-Coel. 25890). Two slides no. 924 [MNHN-Hy. 1083 (1) and BMNH 1989.11.24.64 (l)].

BIOCAL : stn DW 37, 22°59.99'S-167°15.65'E, 350 m, 30.08.1985 (type locality) : four colonies, 15x18 - 20x15 mm and a number of fragments. No gonothecae. With *Filellum serratum* (Clarke, 1879), *Modeeria rotunda* (Quoy & Gaimard, 1827), and *Sertularella areyi* Nutting, 1904. Three slides no. 500 and 2 slides no. 647. Colony 18x16 mm on one of slides no. 500 is holotype (MNHN-Hy. 1084), rest of material are paratypes (BMNH 1989.11.24.65, 1 slide no. 500; RMNH-Coel. 25891, sample and 1 slide no. 500, also one of slides no. 647 = RMNH-Coel. 25863, with *Sertularella areyi* Nutting, 1904).

SMIB 4 : stn DW 53, 23°40.1'S-167°59.9'E, 270 m, 09.03.1989 : slightly polysiphonic fragment 10x15 mm on slide no. 802; no gonothecae (RMNH-Coel. 25892). — Stn DW 55, 23°21.4'S-168°04.5'E, 260 m, 09.03.1989 : small 15 mm high fragment; no gonothecae. Also large, flabellate, strongly polysiphonic colony 45x60 mm with *Halecium fragile* (Hodgson, 1950); no gonothecae. Slide no. 896 of part of large colony (MNHN Hy 1085, part of sample; RMNH-Coel. 25893, rest of sample and slide no. 896).

SMIB 5 : stn DW 101, 23°21.2'S-168°04.9'E, 270 m, 14.09.1989 : one colony 30x25 mm and some smaller fragments, no gonothecae (BMNH 1989.11.24.66); slide no. 973 (RMNH-Coel. 25894).

Loyalty Islands. MUSORSTOM 6 : stn DW 406, 20°40.65'S-167°06.80'E, 373 m, 15.02.1989 : three fragments of c. 5 mm length, all on slide no. 972 (RMNH-Coel. 25895). — Stn DW 457, 21°00.42'S-167°28.71'E, 353 m, 20.02.1989 : thirty mm high, monosiphonic plume without gonothecae on slide no. 920 (MNHN-Hy. 1086). — Stn DW 458, 21°00.93'S-167°29.96'E, 400 m, 20.02.1989 : thirty-five mm long, branched, largely monosiphonic colony with polysiphonic base (RMNH-Coel. 25896), part as slide no. 913 (BMNH 1989.11.24.67). — Stn CP 464, 21°02.30'S-167°31.60'E, 430 m, 21.02.1989 : several small mono- and polysiphonic colonies and fragments, maximally 40 mm high; no gonothecae, no slide. Also smaller, slightly polysiphonic colonies, 15 mm high attached to sea urchin and to coral fragments; no gonothecae (all RMNH-Coel. 25897). — Stn DW 471, 21°08.00'S-167°54.10'E, 460 m, 22.02.1989 : small colony 10x10 mm, with *Stephanoscyphus* sp. on coral fragment, no gonothecae; no slide (MNHN-Hy. 1087). — Stn DW 478, 21°08.96'S-167°54.28'E, 400 m, 22.02.1989 : single fragment 15x15 mm; no gonothecae. Also 20 mm high, slightly polysiphonic, forked colony on sponge or wormtube. With well preserved hydranths; no gonothecae. Two slides no. 919 (BMNH 1989.11.24.68, one of slides 919; RMNH Coel. 25898, sample and one of slides 919).

DESCRIPTION (based on specimens from BIOCAL, Stn DW 37). — Flabellate colonies with forked stem, 15-20 mm high, irregularly branched in one plane, with polysiphonic axis, basally c. 1 mm wide, top parts monosiphonic. Secondary tubes partly covering hydrothecae of primary axis, also bearing hydrothecae and producing ramifications. Stem and sidebranches divided into internodes by means of oblique perisarcal constrictions, nodes usually present, thin. Sidebranches springing from small apophyses under axillary hydrothecae (fig. 47b-c), re-branching several times. Internodes short, widening distally and supporting large, strongly ribbed hydrotheca, curving away from internode at angle of c. 45 degrees, basal part of internode usually with some indistinct undulations of perisarc forming incomplete, oblique rings.

Hydrothecae more or less cylindrical, usually slightly curved outwards, abcauline wall slightly concave, adcauline wall slightly convex, with 8 complete, sharp carinae and one incomplete carina on basal portion (fig. 47c-d). Carinae completely encircle hydrotheca, visible in optical section by scalloped structure of ab- and adcauline walls. Length of adnate portion adcauline hydrothecal wall slightly less than half length of free part of that wall. Adnate part slightly thickened at hydrothecal floor, hydropore fairly large. Hydrothecal rim distinctly reinforced, with four low cusps (fig. 47e); opercular apparatus composed of four fairly thick plates, when closed forming an almost flat roof. Renovation of hydrothecal rim observed, but reduced to a single renovation : in those hydrothecae opercular plates also doubled.

Perisarc of colony strong and thick, yellowish-brown, also fairly thick along hydrothecal walls.

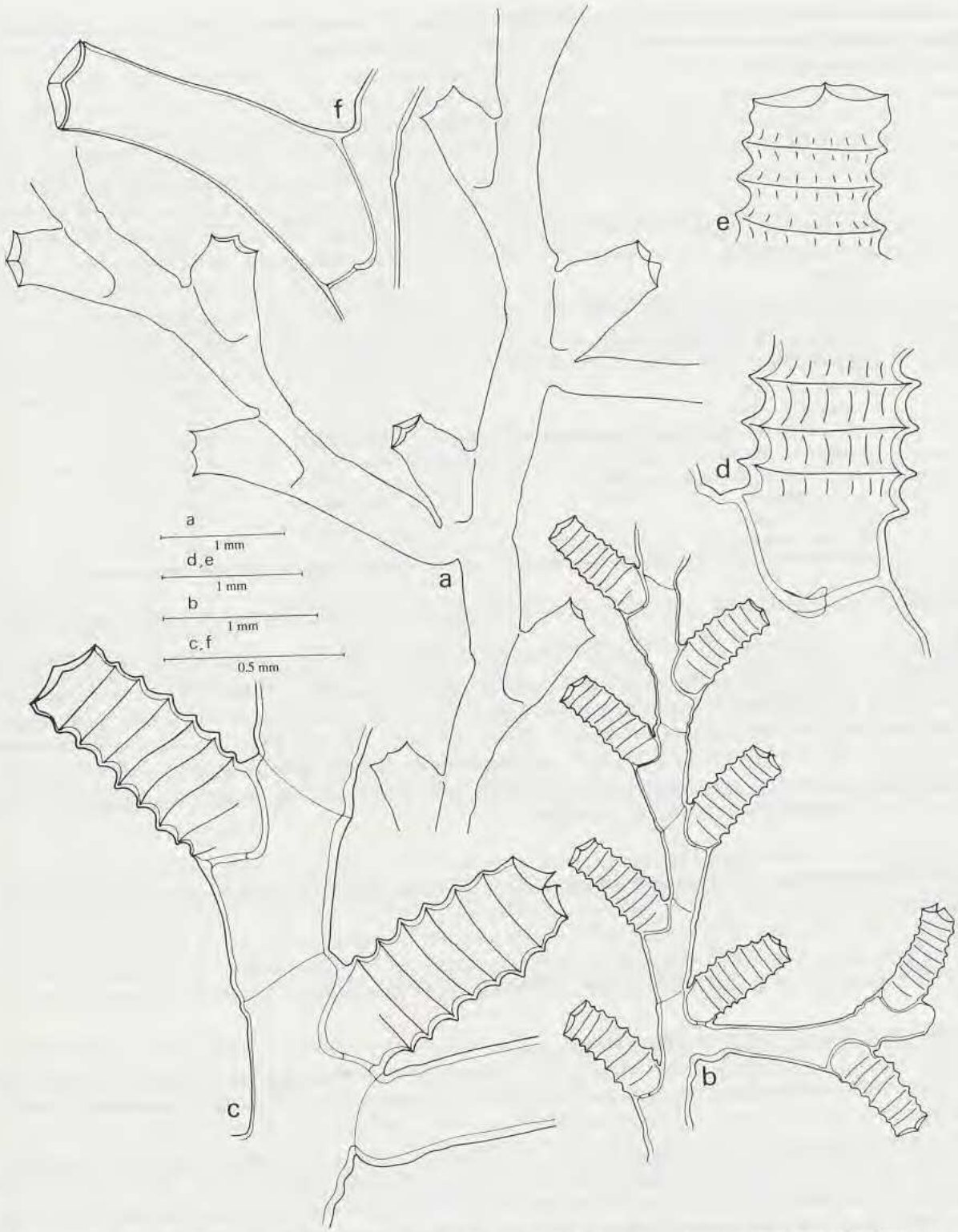

FIG. 47 a. — *Sertularella geodiae* Totton, 1930, BIOGEOCAL, Stn CP 214, monosiphonic upper part of colony.
FIG. 47 b-e. — *Sertularella helenae* sp. nov., holotype, BIOCAL, Stn DW 37 : **b**, monosiphonic distal part of colony; **c**, part of axis with axillary and axial hydrothecae; **d**, basal part of hydrocladial hydrotheca; **e**, distal part of (hydrocladial) hydrotheca.
a, slide no. 581; b-e, slide no. 500.

Hydranths slender, with 8-10 tentacles and distinct adcauline caecum. From top of caecum a ligament runs upwards and attaches to inside abcauline wall at level of third ring from above.

No gonothecae observed.

TABLE 36. — Measurements of *Sertularella helenae* sp. nov., in µm.

	BIOCAL Stn DW 37 (slide no. 500)	SMIB 4 Stn DW 55 (slide no. 896)
Stem, diameter at base	1,000	1,900
Internode, length	445 - 520	590 - 630
diameter	260 - 280	280 - 335
Axial hydrotheca, length abcauline wall	650 - 690	785 - 815
length free part adcauline wall	520 - 540	590 - 635
length adnate part adcauline wall	280 - 320	305 - 320
total depth	770 - 780	845 - 860
diameter at apex	220 - 245	250 - 265
maximal diameter	290 - 295	370 - 385
Stem or branch hydrotheca, length abcauline wall	590 - 660	755 - 775
length free part adcauline wall	480 - 525	620 - 630
length adnate part adcauline wall	260 - 275	295 - 310
total depth	705 - 740	850 - 875
diameter at apex	230 - 245	265 - 310
maximal diameter	295 - 305	340 - 355

DISTRIBUTION. — Moderately deep water of the Pacific east of New Caledonia and around the Loyalty Islands.

REMARKS. — *Sertularella helenae* is a very characteristic species with strongly ribbed hydrothecae that I have been unable to identity with any of the described species of this large genus. Unfortunately no gonothecae have been found; the gonothecae of *Sertularella areyi*, occurring in profusion on this species, may easily be mistaken for those of *Sertularella helenae*, as they occur on the stolon of *S. areyi*. There is some variability in the size of the hydrothecae, as can also be seen from the table of measurements, as well as in the shape : some colonies have slightly bulkier hydrothecae with slightly convex abcauline hydrothecal wall. The number of rings has been found to be constant : 8 complete and one (basal) incomplete.

ETYMOLOGY. — I have named this species after my wife, Mrs Len (short for Leny or Helena) MOL, and our daughters Mariëtte Heleen and Hélène Catharina, who in many ways have enabled me to carry on my hydroid studies.

Sertularella leiocarpa (Allman, 1888)

Fig. 48a-f

Sertularia leiocarpa Allman, 1888 : 52-53, pl. 25 figs 1-1a.

Sertularella leiocarpa - STECHOW, 1925b : 477, fig. 35. — VERVOORT, 1966 : 128, figs 31-32. — MILLARD, 1968 : 269, fig. 4A-C; 1975 : 292-294, fig. 95D-F; 1977b : 107; 1978 : 197 et seq.; 1980 : 132. — GRAVIER-BONNET, 1979 : 44, fig. 8A.

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn DW 46, 22°53.05'S-167°17.08'E, 570-610 m, 30.08.1985 : c. 10 mm long branch with 2 gonothecae. All as slide no. 817 (RMNH-Coel. 25899).

BIOGEOCAL : stn KG 201, 22°40.42'S-166°32.72'E, 595 m, 07.04.1987 : small, 12 mm high colony with only 3 complete hydrothecae; no gonothecae. Made up in slide no. 792 (MNHN-Hy. 1088).

DESCRIPTION (based on BIOCAL, Stn DW 46, specimen). — Axis of fragment broken up into slender internodes by means of oblique perisarcal constrictions, axis slightly geniculate. Hydrothecae alternately arranged, one for each internode, all in one plane (fig. 48c).

Hydrothecae leaving end of internode at an angle of c. 60 degrees, slightly but distinctly curved in abcauline direction, free part adcauline wall about twice length of adnate part, slightly convex to almost straight, smooth (fig. 48d). Adnate part with rounded curve near hydrothecal floor, produced into upturned lip; hydropore fairly large, visible as peridermal ring. Abcauline hydrothecal wall smoothly concave, running imperceptibly into internodal wall. Hydrothecal margin with four low, more or less rounded cusps (one ad-, one abcauline and two laterals), separated by shallow embayments. Hydrothecal margin in majority of hydrothecae repeatedly renovated and as a result thickened; renovations close together. Closing apparatus composed of four triangular flaps, when closed forming low roof. No intrathecal cusps or ridges have been observed.

Contracted hydranths present, showing that specimen was taken from a living colony; hydranths large, with prominent 'caecum', filament running from top of caecum towards inside abcauline hydrothecal wall, attaching hydranth some distance below hydrothecal margin.

Two gonothecae present on same (frontal) side of fragment, attached to internode at hydrothecal floor; proximal portion of gonothecae narrowing, but no distinct pedicel present (fig. 48d). General shape of gonotheca elongated club-shaped, apex flattened and with single, rounded elevation. Both gonothecae with a mass of developing spermatocytes.

TABLE 37. — Measurements of *Sertularella leiocarpa* (Allman, 1888), in µm.

	BIOCAL Stn DW 46 (slide no. 817)	CHALLENGER EXPED. Stn 135C schizoholotype	VALDIVIA EXPED. Stn 165 (STECHOW, 1925)	GALATHEA EXPED. Stn 196 (VERVOORT, 1966)	BIOGEOCAL Stn KG 201 (slide no. 792)
Internode, length	910 - 1,040	1,280 - 1,410		1,215 - 1,350	1,020 - 1,365
diameter	120 - 135	240 - 280	300	150 - 300	90 - 95
Hydrotheca, length abcauline wall*	775 - 815	890 - 910		745 - 850	725 - 835
length free part adcauline wall*	630 - 680	695 - 735	880 - 1,040	675 - 900	605 - 730
length adnate part adcauline wall	320 - 370	520 - 585	560 - 620	410 - 450	280 - 290
total depth*	870 - 890	1,085 - 1,105	960 - 1,200	810 - 1,050	775 - 850
diameter at apex	220 - 235	280 - 325	260 - 270	220 - 250	205 - 230
maximal diameter	295 - 325	475 - 500	480 - 500	310 - 500	250 - 310
Gonotheca, length	1,670 - 1,715	2,280 - 2,345			
maximal diameter	540 - 565	910 - 935			

(* = including renovations)

DISTRIBUTION. — So far *Sertularella leiocarpa* has been recorded from the southern Atlantic off Nightingale Island, Tristan da Cunha, 37°25'30"S-12°28'30"W, 100-150 fms (= 183-275 m) (type locality; ALLMAN, 1888), from various localities in the Indian Ocean off southern Africa (VERVOORT, 1966; MILLARD, 1975; GRAVIER-BONNET, 1979; depths between 200 and 595 m). These are the first records from deep waters of the Pacific Ocean, the localities being southeast of New Caledonia on the northern extremity of the Norfolk Ridge, depth 570-610 m.

REMARKS. — One of the hydrothecae of the BIOGEOCAL specimen has a distinctly undulated adcauline hydrothecal wall, the undulations being faintly reflected on the adcauline side (fig. 48e-f).

This is a rare but well characterized deep water species that has been discussed previously by VERVOORT (1966), MILLARD (1975) and GRAVIER-BONNET (1979). The New Caledonian specimens are smaller than the holotype and the material described previously (VERVOORT, 1966), but MILLARD (1975) gives measurements from a much larger material and records the abcauline hydrothecal wall lengths as being between 700 and 1,200 microns, which comprises all measurements of that part of the hydrotheca given here. The variability in hydrothecal length (as well as the nature of the abcauline hydrothecal wall : smooth to slightly undulated) thus seems to be considerable.

I have compared the New Caledonia specimens with a schizoholotype of ALLMAN's *Sertularia leiocarpa* [CHALLENGER EXPED., Stn 135c, Nightingale Island, Tristan da Cunha, 37°25'30"S-12°28'30"W, 111 fms (= 201 m), 17.10.1873, cf. fig. 48a (monosiphonic part of stem with gonotheca) and 48b (hydrotheca with its hydranth)]. There is fair general agreement.

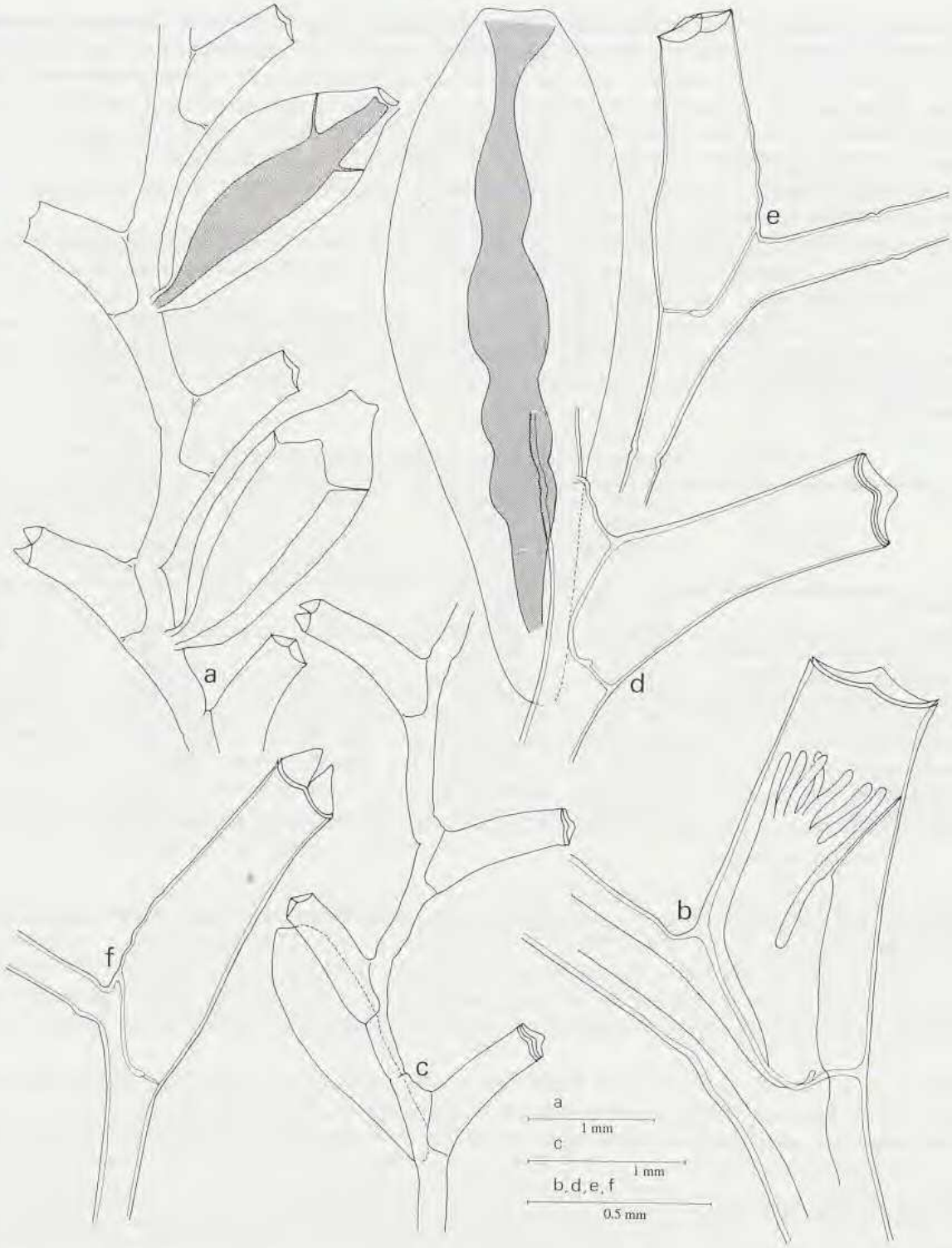

FIG. 48. — *Sertularella leiocarpa* (Allman, 1888) : **a-b**, schizoholotype, CHALLENGER EXPED., Stn 135^{c}, Nightingale Island, Tristan da Cunha, 37°25'30"S-12°28'30"W ; **a**, monosiphonic part of stem with gonothecae; **b**, hydrocladial hydrotheca with its hydranth. — **c-d**, BIOCAL, Stn DW 46 : **c**, monosiphonic part of stem and gonotheca; **d**, axial hydrotheca and male gonotheca. — **e-f**, BIOGEOCAL, Stn KG 201, axial hydrothecae.
a-b, slide no. 947; c-d, slide no. 817; e-f, slide no. 792.

Sertularella leiocarpoides sp. nov.

Fig. 49a-d

MATERIAL EXAMINED. — **New Caledonia.** MUSORSTOM 4 : stn DW 212, 22°47.40'S-167°10.50'E, 380 m, 28.09.1985 (type locality) : six large colonies with polysiphonic stems, up to 60x45 mm and a large number of fragments, some gonothecae present. One 65 mm high colony has been chosen as holotype (MNHN-Hy. 1089); 2 slides no. 347 (schizoholotypes, RMNH-Coel. 25900) are from that specimen. All remaining specimens are paratypes (MNHN-Hy. 1089, sample; BMNH 1989.11.24.69, sample; RMNH-Coel. 25902, sample). On stems *Lafoea dumosa* (Fleming, 1820), *Zygophylax* sp. and *Symplectoscyphus* cf. *commensalis* sp. nov. — Stn DW 234, 22°15.40'S-167°08.30'E, 365 m, 02.10.1985 : five up to 50 mm high colonies with gonothecae. On stem *Synthecium* sp. and *Zygophylax* sp. (RMNH-Coel. 25901). Slide no. 480 (MNHN-Hy. 1090).

DESCRIPTION. — Irregularly branched colonies with thick, polysiphonic main axis; ramifications and branches roughly in one plane, bearing hydrocladia more or less pinnately arranged; finer ramifications and branches monosiphonic, fairly stiff, just able to support themselves out of fluid. Axis, branches and hydrocladia initially broken up into internodes, separated by indistinct, oblique constrictions of perisarc; hydrothecae alternately arranged in one plane, one to each internode, arrangement of internodes and hydrothecae obscured on polysiphonic branches by presence of many secondary tubes. Monosiphonic branches geniculate, particularly in proximal region, geniculation less distinct in ultimate parts of branches and hydrocladia. Hydrocladia springing from internodes just under hydrotheca (fig. 49a).

Hydrothecae cylindrical, leaving internode under an angle of c. 60 degrees, widening towards insertion on internode and slightly so towards margin. Free part adcauline wall c. 1.5 times as long as fused part, straight or slightly concave. Adnate part adcauline hydrothecal wall with sharp, thickened flexure, hydropore large, visible in slightly oblique view as circular peridermal ridge; no upturned lip of bottom plate visible. Some hydrothecae with slightly undulated free abcauline hydrothecal wall (fig. 49c-d). Abcauline wall slightly concave, running smoothly into wall of internode. Hydrothecal aperture slightly everted and slightly thickened, with four low marginal cusps (one ad-, one abcauline and two laterals), separated by shallow embayments. Only few hydrothecae with complete opercular apparatus, when present and closed forming low roof. Inside of hydrotheca usually with one or two low, longitudinal cusps flanking the abcauline marginal cusp, but this condition much varied (fig. 49c-d). Renovations of hydrotheca do occur but rare and restricted to a single renovation.

Hydranths present in many hydrothecae, indicating that species was collected alive, small (much smaller than those of *Sertularella leiocarpa*), with 10-12 thin tentacles and small caecum. Ligamentum, running from top of caecum towards inside abcauline wall, thin.

Gonothecae large, elongated sack-shaped, with slightly undulated walls, narrowing basally and attached to internode on frontal part of colony. Apex flattened, with three or four rounded elevations; contents missing, no hole at top visible (fig. 49b).

Perisarc firm though not particularly thick, thickest along internodal walls in basal parts of colony, gradually thinning out apically and along hydrothecal walls.

DISTRIBUTION. — The type locality is in the Pacific southeast of New Caledonia (22°47.40'S-167°10.50'E, 380 m depth), the second locality is in the same area.

REMARKS. — This species has a great resemblance to *Sertularella leiocarpa* (Allman, 1888), represented in the present collection by fragments only (see above). I have thought it advisable to keep the present specimens separate from ALLMAN's species for the following reasons :

1. Consistent and distinct difference in shape of hydrothecae, those in present species being straight and widening slightly towards aperture; *S. leiocarpa* has hydrothecae slightly but distinctly curved downwards and no sign of apical widening. Hydrothecal floor in *S. leiocarpa* with upturned lip at end of adnate part abcauline wall; no such lip occurs in *S. leiocarpoides*, where large, well marked hydropore is visible.

2. Hydranths in *S. leiocarpoides* small and thus in sharp contrast to those of *S. leiocarpa* where they are notably large.

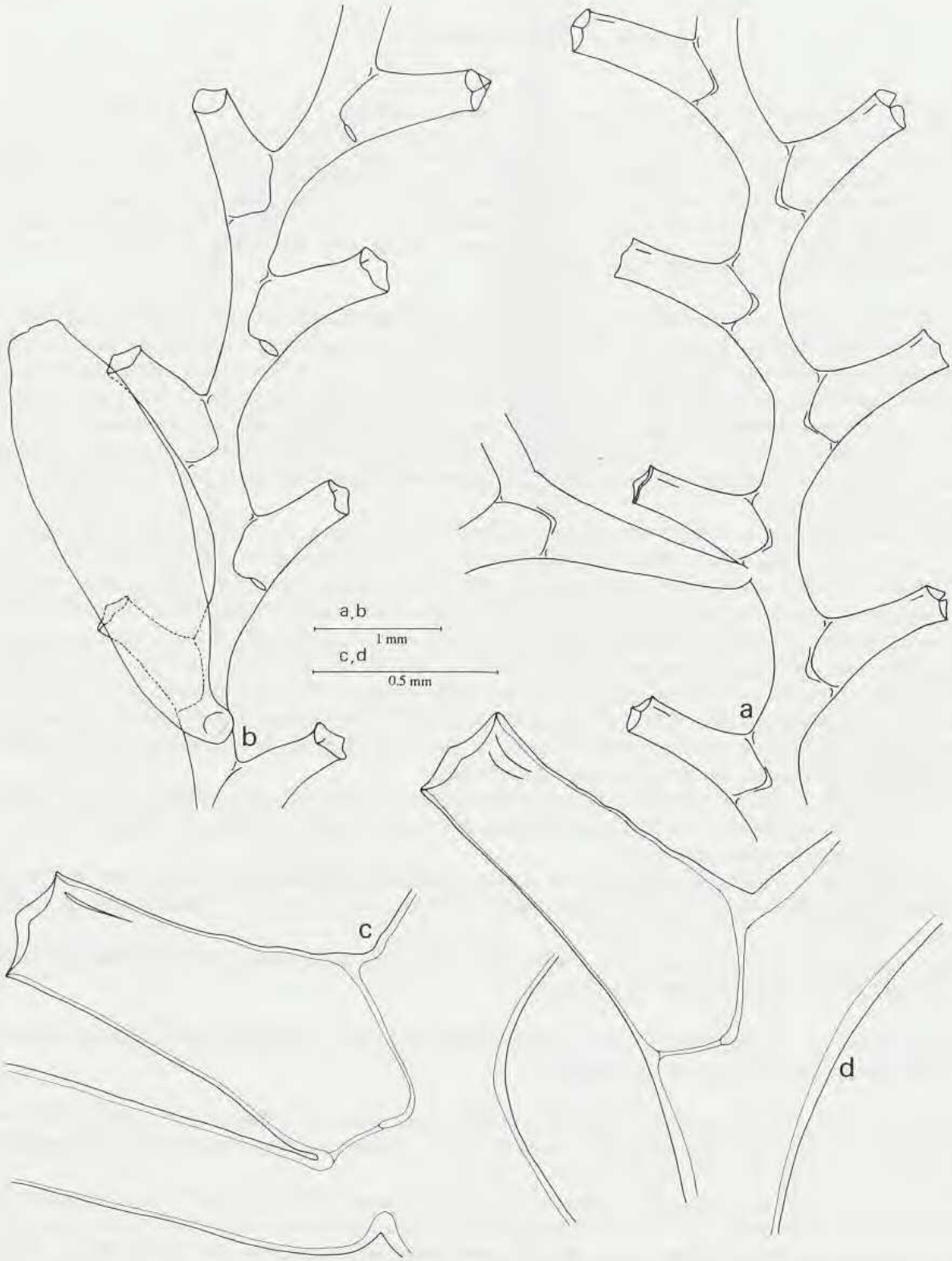

FIG. 49. — *Sertularella leiocarpoides* sp. nov., schizoholotype, MUSORSTOM 4, Stn DW 212 : **a**, monosiphonic distal part of axis; **b**, monosiphonic part of axis with gonotheca; **c**, axillary hydrotheca; **d**, hydrocladial hydrotheca. a-d, slide no. 347.

3. Internodes in *S. leiocarpoides* are short and geniculate; in *S. leiocarpa* they are longer and almost straight.
4. Gonothecae of *S. leiocarpoides* are larger than those of *S. leiocarpa*.

To show the conformity in measurements those of the schizoholotype of *S. leiocarpa* have also been listed (table 38).

TABLE 38. — Measurements of *Sertularella leiocarpoides* sp. nov. and *S. leiocarpa* (Allman, 1888), in µm.

	S. leiocarpoides		*S. leiocarpa*
	MUSORSTOM 4 Stn DW 212 (slide no. 347) schizoholotype	MUSORSTOM 4 Stn DW 234 (slide no. 480)	CHALLENGER EXPED. Stn 135[c] schizoholotype
Internode, length	870 - 1,040	875 - 1,040	1,280 - 1,410
diameter	280 - 305	300 - 390	240 - 280
Hydrotheca, length abcauline wall	870 - 910	870 - 935	890 - 910
length free part adcauline wall	695 - 735	695 - 740	695 - 735
length adnate part adcauline wall	410 - 435	390 - 435	520 - 585
total depth	1,000 - 1,040	955 - 1,040	1,085 - 1,105
diameter at apex	280 - 305	260 - 280	280 - 325
maximal diameter	390 - 410	390 - 410	475 - 500
Gonotheca, length	3,100 - 3,255	3,900	2,280 - 2,345
maximal diameter	1,000 - 1,020	1,600*	910 - 935

(* = flattened by pressure of cover glass)

ETYMOLOGY. — The specific name *leiocarpoides* refers to the great resemblance with *S. leiocarpa* (*leiocarpoides*: resembling *leiocarpa*).

Sertularella novaecaledoniae sp. nov.

Figs 50a-e, 51a, 52a

MATERIAL EXAMINED. — **New Caledonia**. LAGON : stn 397, 22°38.5'S-167°10.6'E, 125 m, 23.01.1985 : fragmentary colony or parts of several colonies; maximal height c. 20 mm. No gonothecae; slide no. 916 (all RMNH-Coel. 25905).

BIOCAL : stn DW 33, 23°09.71'S-167°10.27'E, 675-680 m, 29.08.1985 : c. 10 large, flabellate colonies, largest 80x70 mm and many fragments. Single male gonotheca. Slides nos 489, 512, 513 and 912. With *Filellum serratum* (Clarke, 1879), *Zygophylax* sp., *Sertularella bipectinata* sp. nov., *Symplectoscyphus commensalis* sp. nov. and *Synthecium* sp. (MNHN-Hy. 1091, sample and slide no. 513; BMNH 1989.11.24.70, sample and slide no. 912; RMNH-Coel. 25906, sample and slide no. 489; RMNH-Coel. 25879, slide no. 512). — Stn DW 36, 23°08.64'S-167°10.99'E, 650-680 m, 29.08.1985 : c. 25 colonies up to c. 50x50 mm and many fragments, forming bulk of sample. No gonothecae. Slides nos 360, 387, 478, 479, 499 and 918. With *Filellum serratum* (Clarke, 1879), *Zygophylax* sp., *Sertularella paucicostata* sp. nov. and *Symplectoscyphus commensalis* sp. nov. (MNHN-Hy. 1092, sample and slide no. 387; BMNH 1989.11.24.71, sample and slide no. 918; RMNH-Coel. 25907, sample and slides nos 360 [with *Symplectoscyphus commensalis*), 479 and 499 (2)]. — Stn DW 51, 23°05.27'S-167°44.95'E, 700-680 m, 31.08.1985 : two colonies c. 50 and 60 mm high and some fragments, 2 slides no. 336 (all RMNH-Coel. 25908). — Stn CP 52, 23°05.79'S-167°46.54'E, 600-540 m, 31.08.1985 : single small colony, 20x30 mm; no gonothecae, slide no. 507 of fragment (all MNHN-Hy. 1093).

MUSORSTOM 4 : stn CP 215, 22°55.70'S-167°17.00'E, 520 m, 28.09.1985 : single colony c. 40 x 40 mm; part as slide no. 902 (all RMNH-Coel. 25909). — Stn DW 220, 22°58.50'S-167°38.30'E, 550 m, 29.09.1985 (type locality) : c. 25 flabellate colonies and many fragments. Gonothecae present. Slides nos 468, 471 and 490. One large colony, 90x100 mm selected as holotype (MNHN-Hy. 1094); rest of colonies and slides from this station are paratypes (MNHN Hy 1094, paratype sample; BMNH 1989.11.24.72, paratype sample; RMNH-Coel. 25910, rest paratypes and slides nos 468, 471 and 490). With *Symplectoscyphus commensalis* sp. nov. and *Scandia* (?) sp. — Stn DW 223, 22°57.00'S-167°30.00'E, 560 m, 30.09.1985 : large colony 60x60 mm and many fragments, some with gonothecae. Some hydrothecae fairly strongly ribbed. Slide no. 439 and 3 slides no. 486 [MNHN-Hy. 1095, 1 slide no. 486; BMNH 1989.11.24.73, 1 slide no. 486; RMNH-Coel. 25911, sample and slides nos 439 and 486 (1)]

SMIB 2 : stn DW 15, 22°53'S-167°11'E, 375-402 m, 18.09.1986 : c. 30 mm high fragment; no gonothecae (RMNH-Coel. 25912).

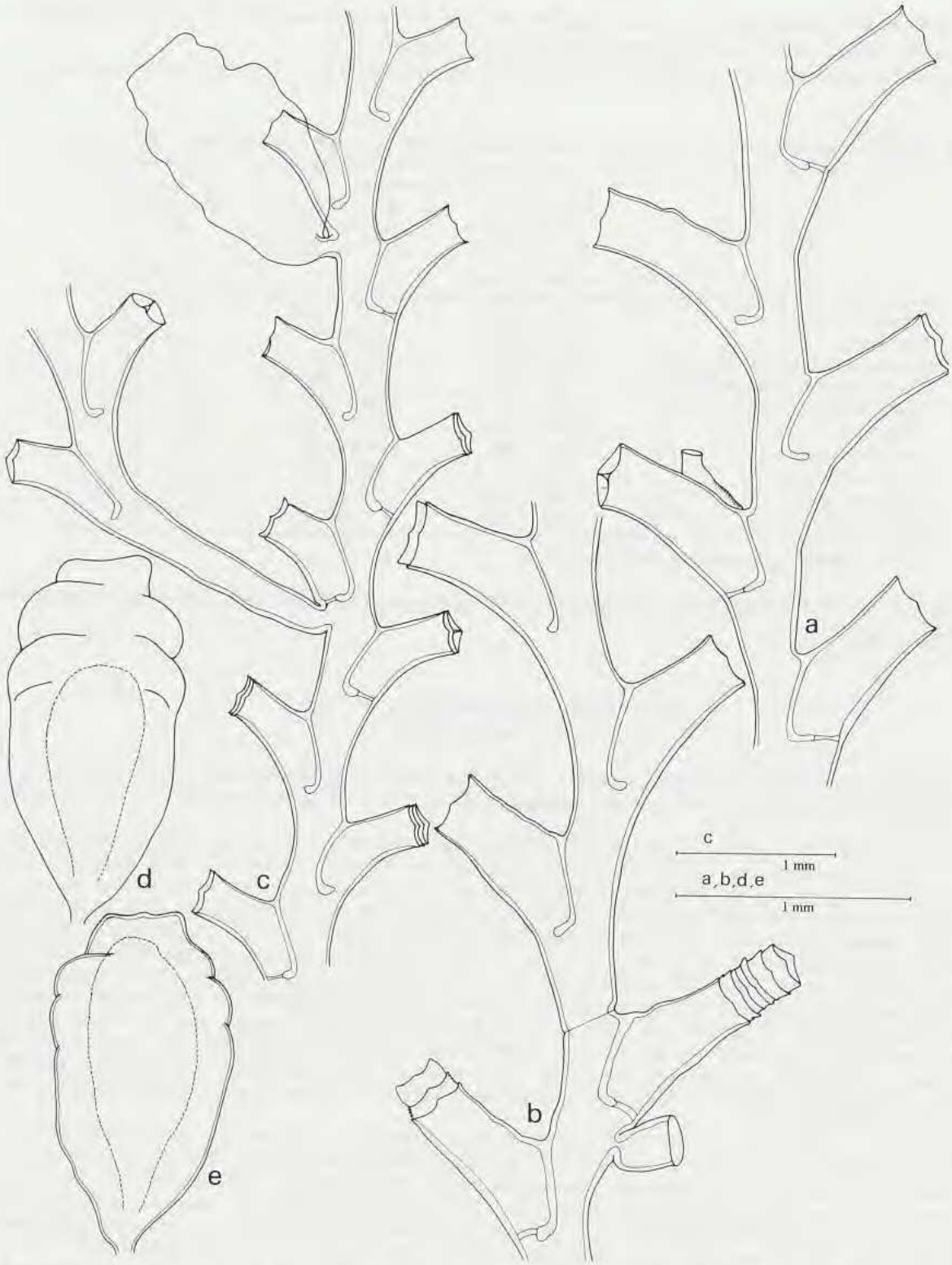

FIG. 50. — *Sertularella novaecaledoniae* sp. nov. : **a-b**, BIOCAL, Stn DW 33, parts of hydrocladia. — **c**, MUSORSTOM 4, Stn DW 220, monosiphonic part of stem with hydrocladia. — **d-e**, MUSORSTOM 4, Stn DW 223, presumed male gonothecae.

a-b, slide no. 489; c, slide no. 490; d-e, slide no. 439.

DESCRIPTION. — Large, strongly built flabellate colonies with thick, repeatedly forked main axis, basally several mm in diameter (5 mm in some colonies) and strongly polysiphonic except highest parts. Ramification takes place by development of sidebranches directly under hydrotheca, as can be seen in youngest parts of colonies (fig. 50c). Hydrothecae alternately arranged along axis and branches, all in one plane, being also plane of ramification of colony. No division into internodes visible, though nodes occasionally present, separating younger from older parts of colony. Basal portion of each branch without hydrothecae. Hydrothecae of stem and older branches soon becoming covered by secondary tubes, obscuring structure of colony.

Hydrothecae tubular, sunken into stem or branch for about half their length, slightly outwardly curved, free and adnate portions of adcauline wall of about same length or free portion slightly longer, smooth or slightly undulated (fig. 50a-c); adnate part fairly straight and thick, floor curved, thickened, with large hydropore for passage of coenosarc. Abcauline hydrothecal wall distinctly concave, smoothly curved, notably thicker than adcauline wall. Hydrothecal margin with four blunt cusps, no intrathecal teeth visible. Cusps separated by shallow, rounded embayments; plates of opercular apparatus visible in many (young) hydrothecae, forming low roof (fig. 51a). Renovation of hydrotheca frequent, in older parts of colony considerably narrowing hydrothecal aperture. Plane of hydrothecal aperture tilted upwards, not parallel to axis.

Gonothecae ovoid, twice as long as wide, inserting on axis some distance under hydrotheca (fig. 50c), leaving circular foramen when shed. Surface with 4-5 circular constrictions, deepening towards apex. Apex flattened, with 2-3 shallow, rounded elevations, no opening observed. As far as could be made out without sectioning, all observed gonothecae male containing a large ball of developing spermatocytes (fig. 50d-e).

DISTRIBUTION. — All records of this new species are from a restricted area of the Norfolk Ridge southeast of New Caledonia, depth 125-700 m.

REMARKS. — Very characteristic species with large, flabellate colonies. There is a fair amount of variability in the shape of the free part of the hydrothecae, the length of which is distinctly varied and is also influenced by the repeated renovations. In some colonies the majority of hydrothecae may have a fairly regularly undulated free adcauline wall (figs 50b, 52a), in such colonies hydrothecae with smooth free adcauline walls are also present.

ETYMOLOGY. — The specific name, *novaecaledoniae*, is a latinization of the locality, New Caledonia.

Sertularella paucicostata sp. nov.

Fig. 51b-f, j

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn DW 08, 20°34.35'S-166°53.90'E, 435 m, 12.08.1985 : eight mm high fragment; no gonothecae. Slide no. 495 (all RMNH-Coel. 25913). — Stn DW 36, 23°08.64'S-167°10.99'E, 650-680 m, 29.08.1985 (type locality) : small colonies 10x15 mm, on *Sertularella bipectinata* sp. nov., *Sertularella novaecaledoniae* sp. nov. and Bryozoa. No gonothecae. Colony c. 15 mm high made up in slide no. 494 is holotype (MNHN-Hy. 1096), rest of materials from this station are paratypes (BMNH 1989.11.24.74, paratype sample; RMNH-Coel. 25914, paratype sample). Also small colony without gonothecae on *Sertularella bipectinata* sp. nov., together with *Symplectoscyphus commensalis* sp. nov. (RMNH-Coel. 25915) — Stn DW 44, 22°47.30'S-167°14.30'E, 440-450 m, 30.08.1985 : fragment of c. 12 mm length, no gonothecae. Made up in slide no. 305 (RMNH-Coel. 25916). — Stn CP 52, 23°05.79'S-167°46.54'E, 600-540 m, 31.08.1985 : c. 10 mm high, branched stem, partly invested by sponge, no gonothecae. Made up in slide no. 320 (MNHN-Hy. 1097).

MUSORSTOM 4 : stn DW 220, 22°58.50'S-167°38.30'E, 550 m, 29.09.1985 : small, 5-8 mm high colonies partly on calcified wormtubes, with empty gonothecae. Part as slide no. 510 (all RMNH-Coel. 25917). — Stn CP 238, 22°13.00'S-167°14.00'E, 510 m, 02.10.1985 : small colony on stem of *Hemicarpus* sp., length c. 20 mm. No gonothecae. All in 2 slides no. 501 [MNHN Hy. no. 1098 (1) and BMNH 1989.11.24.75 (1)].

DESCRIPTION. — Colonies straggling, monosiphonic, a few mm high, rising from a stolon creeping on other hydroids and corals, usually composed of geniculate internodes, each bearing a single, almost completely free hydrotheca (fig. 51b). Stolon may bear single hydrothecae, supported by a single, frequently elongated internode, a small colony composed of a number of internodes, or branched colonies resulting from development of additional hydrocladia (sidebranches) from part of internode supporting hydrotheca. Occasionally two of such hydrocladia arise,

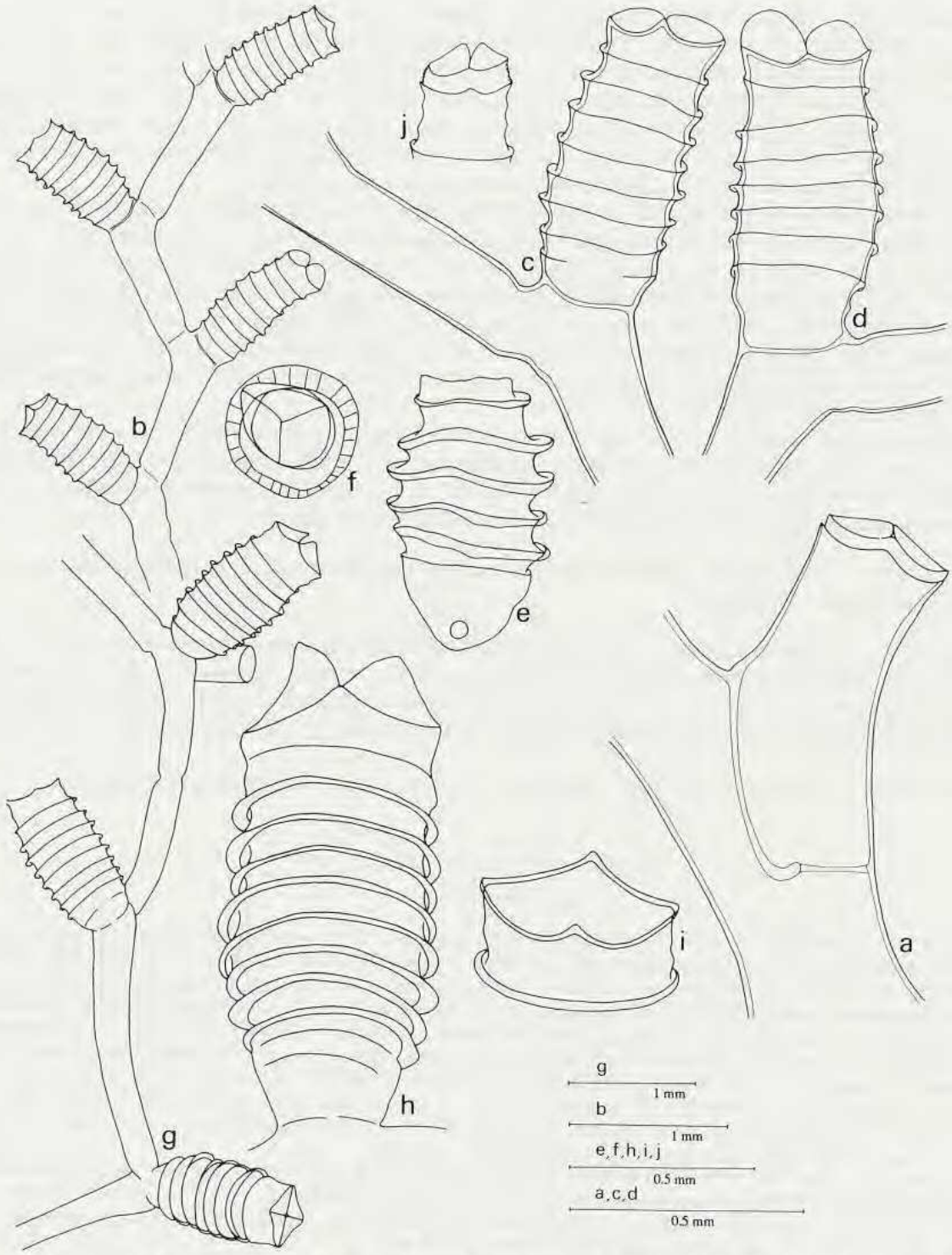

FIG. 51 a. — *Sertularella novaecaledoniae* sp. nov., paratype, MUSORSTOM 4, Stn DW 220, hydrocladial hydrotheca.
FIG. 51 b-f, j. — *Sertularella paucicostata* sp. nov. : **b-d**, holotype, BIOCAL, Stn DW 36 : **b**, part of axis; **c-d**, axial hydrothecae. — **e-f**, MUSORSTOM 4, Stn DW 220 : **e**, gonotheca, lateral view; **f**, gonothecae, view from above. — **j**, MUSORSTOM 4, Stn CP 238, renovated top part of hydrotheca.
FIG. 51 g-i. — *Sertularella pseudocostata* sp. nov., schizoholotype, BIOCAL, Stn CP 75 : **g**, part of axis; **h**, axial hydrotheca; **i**, distal part part of hydrotheca, oblique lateral view.
a, slide no. 490; b-d, slide no. 494; e-f, slide no. 510; g-i, slide no. 498; j, slide no. 501.

one on each side of hydrotheca, resulting in pseudodichotomous branching. Unbranched colonies with strongly geniculate axis (fig. 51b); branches, if present, not necessarily in same plane with axis from which they originate.

Internodes slender, slightly swollen apically, supporting hydrotheca that is completely free from internode and an apophysis bearing next internode (fig. 51c). Internodes occasionally with some rings and with wrinkled perisarc.

Hydrothecae elongated barrel-shaped, occasionally slightly curved when adcauline wall is more convex than abcauline wall (fig. 51c-d). Surface of hydrotheca with 8 or 9 frilled, transverse ribs, between which body of gonotheca is slightly furrowed. Rim of hydrotheca quadrangular, with four marginal cusps (two lateral, one ad-, one abcauline), separated by shallow embayments. Plates of opercular apparatus fairly thick, fitting together to form low, triangular roof. Renovations of hydrothecal margin reduced, usually one or two (with exception of material from MUSORSTOM 4, Stn CP 238). No intrathecal teeth observed.

Hydranths present in majority of colonies, number of tentacles 14-16. Hydranths basally attached to bottom plate of hydrotheca and by means of filament to inside of adcauline hydrothecal wall at level of second rib from rim.

Empty gonothecae occur in colonies from MUSORSTOM 4, Stn DW 220, being attached to internode just under hydrotheca. Shape of gonotheca almost as hydrotheca, but basal portion narrowed and rounded, laterally attached to internode (fig. 51e). Body of gonotheca with 6 ribs with broad, upturned frill, reduced on first and last ribs. Apical portion forming a short, broad, indistinctly three-pointed funnel, closed by means of tripartite membrane (fig. 51f).

Material from MUSORSTOM 4, Stn CP 238, has hydrothecae of which apical part forms short, broad tube, resulting from frequent renovations of hydrothecal rim. Closing plates, which may be also renovated, found attached to rim of this tubiform structure (fig. 51j).

TABLE 40. — Measurements of *Sertularella paucicostata* sp. nov., in µm.

	BIOCAL Stn DW 08 (slide no. 495)	BIOCAL Stn DW 36 (slide no. 494)	BIOCAL Stn DW 44 (slide no. 305)
Internode, length	1,085 - 1,195	865 - 870	930 - 935
diameter at node	150 - 195	170 - 175	150 - 165
Hydrotheca, total depth	735 - 800	800 - 825	715 - 735
diameter at apex	305 - 325	280 - 305	260 - 280
maximal diameter	365 - 370	365 - 390	325 - 330
number of ribs	9	8	8

	BIOCAL Stn CP 52 (slide no. 320)	MUSORSTOM 4 Stn DW 220 (slide no. 510)	MUSORSTOM 4 Stn CP 238 (slide no. 501)
Internode, length	865 - 975	860 - 870	1,085 - 1,195
diameter at node	150 - 170	150 - 155	150 - 155
Hydrotheca, total depth	730 - 735	715 - 760	715 - 735
diameter at apex	275 - 280	280 - 305	260 - 265
maximal diameter	325 - 330	345 - 350	305 - 320
number of ribs	8	8 - 9	8
Gonotheca, total length		760 - 845	
maximal diameter		410 - 455	
diameter of apical funnel		195 - 235	
length of funnel		110 - 130	
number of ribs		6	

DISTRIBUTION. — Recorded from the Pacific northeast of New Caledonia (BIOCAL, Stn DW 08), from the Pacific east of New Caledonia (MUSORSTOM 4, Stn CP 238) and from the Norfolk Ridge southeast of New Caledonia (remaining stations). The type locality (BIOCAL, Stn DW 36) is from on the northern tip of the Norfolk Ridge.

REMARKS. — This species resembles *Sertularella costata* Leloup, 1940, in colony structure and general shape of the hydrothecae. Points of difference are :

1. Hydrothecae in *Sertularella paucicostata* more cylindrical, scarcely swollen medially, with a reduced number (8-9) of costae and without intrathecal teeth.

2. Axis distinctly geniculate in *S. paucicostata*, scarcely so in *S. costata*.

Sertularella paucicostata sp. nov., as described above, also resembles *Sertularella exilis* Fraser (1938a : 51, pl. 12 fig. 59), a Pacific species briefly characterized and insufficiently figured. The hydrothecae in *S. exilis* appear to be slenderer but there is agreement in colony structure. As FRASER's species has never been redescribed a re-inspection of the holotype is desirable.

ETYMOLOGY. — The specific name *paucicostata* has been chosen because the number of ribs (latin *costae*) is reduced (latin adjective *paucus* meaning few).

Sertularella pseudocostata sp. nov.

Fig. 51g-i

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn CP 75, 22°18.65'S-167°23.30'E, 825-860 m, 04/05.09.1985 (type locality) : straggling and tangled, monosiphonic colonies 20-30 mm high, stems strongly zig-zag, hydrothecae at each internode, strongly ribbed, c. 10 ribs. No gonothecae. One of colonies is holotype (MNHN-Hy. 1099), rest of colonies are paratypes and slides nos 295 and 498 (2) are schizoholotypes [MNHN-Hy. 1099, slide no. 498 (1); BMNH 1989.11.24.76, slide no. 498 (1); RMNH-Coel. 25918, paratype sample and slide no. 295]. — Stn CP 78, 22°16.25'S-167°15.53'E, 445-450 m, 05.09.1985 : irregularly branched, prostrate colony c. 20x30 mm, no gonothecae (BMNH no. 1989.11.24.77). Detached fragment in slide no. 318 (RMNH-Coel. 25919).

DESCRIPTION (based mainly on material from type locality). — Colonies straggling, rising from creeping stolon, up to 30 mm high, unable to support themselves outside fluid, composed of several long internodes, each bearing a single hydrotheca and formed by sympodial branching (next internode springing from previous internode directly behind hydrotheca), by pseudodichotomy (two internodes springing from previous one directly behind hydrotheca), or by combination of both ways of branching. Sympodially branched parts geniculate. Internodes long and slender, of nearly same diameter along overall length, slightly swollen apically where region of attachment of hydrothecae is found (fig. 51g).

Hydrotheca almost completely free, large, barrel-shaped, scarcely widened in middle, basally narrowing, fully symmetrical, bearing 9 to 11 circular, transverse, frilled ribs (fig. 51h). On first from apex and on basal two ribs frill almost completely reduced. Because of reduction of apical circular rib hydrotheca with distinct apical portion, gradually becoming quadrangular in cross section (fig. 51i). Rim of hydrotheca slightly thickened, with four marginal, rounded cusps separated by shallow embayments, into which fit triangular opercular plates, when closed forming low roof. Renovations of hydrothecal border occasionally observed, number of renovations 1 or (rarely) 2. No intrathecal cusps.

Hydranths present but condition mediocre; a filament attaching body of hydranth to inside of hydrothecal wall at level of second rib from apex.

Perisarc thin on internodes and along hydrothecal walls; hydrothecae consequently fragile and easily collapsible.

No complete gonothecae observed. Remnants in material from BIOCAL, Stn CP 75, attached to internode at about halfway its length, forming shallow cups with transverse, circular, frilled ribs.

TABLE 41. — Measurements of *Sertularella pseudocostata* sp. nov., in µm.

	BIOCAL Stn CP 75 (slide no. 498)	BIOCAL Stn CP 78 (slide no. 318)
Internode, length	1,965 - 2,170	1,955 - 3,390
diameter	280 - 325	240 - 280
Hydrotheca, total depth	1,215 - 1,300	1,105 - 1,260
diameter at apex	455 - 520	20 - 540
diameter in middle	565 - 585	540 - 585
number of ribs	9 - 11	10

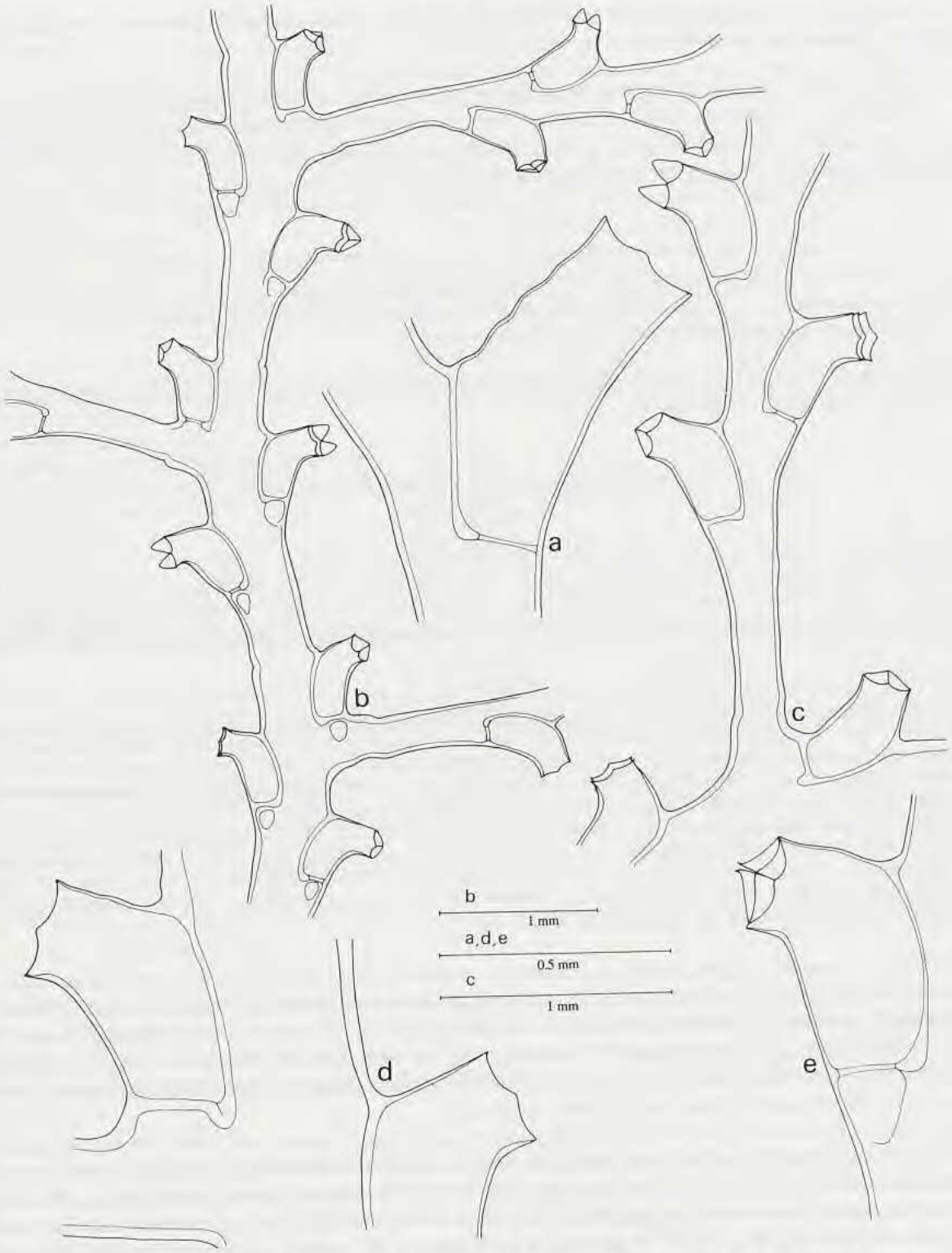

FIG. 52 a. — *Sertularella novaecaledoniae* sp. nov., MUSORSTOM 4, Stn DW 223, hydrocladial hydrotheca.
FIG. 52 b-e. — *Sertularella quadridens cornuta* Ritchie, 1909, MUSORSTOM 3, Stn DR 117 : **b**, monosiphonic stem with hydrocladia; **c**, insertion of hydrocladium on axis; **d**, axillary hydrotheca; **e**, hydrocladial hydrotheca.
a, slide no. 439; b-e, slide no. 473.

DISTRIBUTION. — The two stations are from a restricted area east of New Caledonia (between New Caledonia and the Loyalty Islands); depth 445-860 m.

REMARKS. — This species differs from *Sertularella costata* Leloup, 1940, in the following details :

1. Hydrotheca in *S. pseudocostata* c. twice as large. LELOUP (1940) and HIROHITO (1983) give no concrete measurements of their material but judging from their drawings and the scale with which these are presented the length of the hydrotheca in *S. costata* must be between 0.4 and 0.5 mm.

2. Number of hydrothecal costae reduced in *S. pseudocostata*, where it varies between 9 and 11. Both LELOUP and HIROHITO give that number in *S. costata* as being c. 20.

3. In *S. pseudocostata* there are no intrathecal teeth, while the hydrotheca is almost cylindrical with quadrangular aperture. LELOUP and HIROHITO describe and figure three intrathecal teeth in *S. costata*, where the hydrotheca is decidedly swollen medially. Quadrangular condition of the aperture is neither mentioned by LELOUP nor HIROHITO and does not appear unambiguously from their drawings.

ETYMOLOGY. — From the greek *pseudes* (false), the specific name *pseudocostata* pointing towards the great resemblance of this species to *Sertularella costata*.

Sertularella quadridens cornuta Ritchie, 1909

Figs 52b-e, 53a-b

Sertularella polyzonias var. *cornuta* Ritchie, 1909 : 525; 1910a : 10-11, pl. 4 fig. 2; 1910b : 818.
Sertularella cornuta Stechow, 1923a : 12; 1923d : 195. — NUTTING, 1927 : 215-216, pl. 42 figs 1-2.
Sertularella quadridens var. *cornuta* Billard, 1925b : 151-152, fig. 19C-E, pl. 7 fig. 9. — VERVOORT, 1941 : 216-217. — MAMMEN, 1965 : 36. — REES & THURSFIELD, 1965 : 136, 200. — REDIER, 1971a : 142. — SMALDON, HEPPELL & WATT, 1976 : 19.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 3 : stn DR 117, 12°31.2'N-120°39.3'E, 92-97 m, 03.06.1985 : four colonies 30 mm high, monosiphonic, without gonothecae (RMNH Coel. n. 25920). Slide no. 473 of one of colonies (MNHN-Hy. 1100). — Stn CP 131, 11°36.6'N-121°43.0'E, 120-122 m, 05.06.1985 : two colonies c. 20x40 mm of which 1 attached to antipatharian axis and 1 fragment. Slide no. 1680 (all RMNH-Coel. 26653).

New Caledonia. SMIB 4 : stn DW 50, 23°42.2'S-168°00'E, 295 m, 09.03.1989 : small, 5-10 mm high colonies on wormtubes, no gonothecae (MNHN-Hy. 1101). Slide no. 895 (RMNH-Coel. 25921).

Loyalty Islands. MUSORSTOM 6 : stn DW 473, 21°08.80'S-167°55.30'E, 236 m, 22.02.1989 : five fragments, all in slide no. 751 (BMNH 1989.121.24.78). — Stn DW 475, 21°08.95'S-167°55.40'E, 236 m, 22.02.1989 : c. 10 mm high colonies on wormtube with *Diphasia* sp. No gonothecae; slide no. 925 (all RMNH-Coel. 25922). — Stn DW 477, 21°07.98'S-167°54.69'E, 550 m, 22.02.1989 : c. 10-15 mm high, branched colonies from a stolon creeping on wormtube. No gonothecae. Slide no. 711 (all MNHN-Hy. 1102).

DESCRIPTION (based on MUSORSTOM 3 specimens). — Colonies 30-35 mm high with erect stem bearing up to 15 mm long hydrocladia perpendicular to axis and carrying up to 24 hydrothecae. Division of axis and hydrocladia into internodes indistinct; constrictions of perisarc occur on axis just above axillary hydrothecae; hydrocladia basally separated from apophyses by weak constrictions of perisarc (fig. 52b-c). Hydrocladia placed on short apophyses under axillary stem hydrothecae; three hydrothecae between two successive apophyses, one axillary, one left, and one right; the upper almost opposite next apophysis.

Hydrothecae of axis and hydrocladia of identical shape, fairly deeply sunken into internode, so that about half adcauline wall is free, apical portion of hydrotheca strongly curving away from internode, angle between axis and free adcauline wall being 90 degrees or slightly less (fig. 52d-e). Abcauline hydrothecal wall usually with fairly sharp flexure; perisarc thickened in region of flexure. Free part adcauline wall straight or slightly convex, in some hydrothecae weakly undulated (fig. 52e), perisarc of that portion thin. Fused adcauline wall smoothly curved, at floor with distinct notch, particularly in axial hydrothecae. Bottom plate with large hydropore, serving passage of coenosarc. Hydrothecal aperture slightly tilted in upward direction, rim with four blunt cusps (adcauline, abcauline and two lateral), slightly thickened. Opercular apparatus present in many hydrothecae, composed of four fairly firm triangular flaps, when closed forming fairly high roof-shaped structure (fig. 52e). Renovations of hydrotheca

common, as many as five having been observed; hydrothecal rim increasing in thickness with each renovation. Renovations also concern opercular apparatus; some hydrothecae with a bundle of triangular plates attached in semicircular embayments between cusps. First hydrothecae of hydrocladium fairly close together : axil between free part adcauline wall and hydrocladium and notch at base of following hydrotheca at about same level (fig. 52c), but this distance increasing along hydrocladium.

Perisarc thick on axis and internodes, thinning out along hydrothecal walls (with exception of thickened portion of abcauline wall). Fenestrae visible under some hydrothecae of axis and hydrocladia, but by no means of common occurrence.

No gonothecae found.

TABLE 42. — Measurements of *Sertularella quadridens cornuta* Ritchie, 1909, in µm.

	MUSORSTOM 3 Stn DR 117 (slide no. 473)	SIBOGA EXPED. (BILLARD, 1925)	SNELLIUS EXPED. (VERVOORT, 1941)	SMIB 4 Stn DW 50 (slide no. 895)
Axis, diameter at base	295			280
Hydrocladium, diameter at base	205 - 220			120 - 140
Hydrocladial hydrotheca, length abcauline wall*	335 - 390			380 - 385
length free part adcauline wall *	185 - 200	165 - 315	165 - 300	90 - 95
length fused part adcauline wall	435 - 460	330 - 365	315 - 380	310 - 375
total depth *	520 - 530			400 - 435
diameter at rim	190 - 205	165 - 200		160 - 175
maximal diameter	265 - 275			205 - 215
Gonotheca, length		1,230 - 1,540		
greatest diameter		510 - 575		

	MUSORSTOM 6 Stn DW 473 (slide no. 751)	MUSORSTOM 6 Stn DW 475 (slide no. 925)	MUSORSTOM 6 Stn DW 477 (slide no. 711)
Axis, diameter at base	260	260	245
Hydrocladium, diameter at base	95 - 120	140 - 170	100 - 105
Hydrocladial hydrotheca, length abcauline wall*	360 - 390	370 - 455	355 - 405
length free part adcauline wall *	155 - 295	150 - 220	150 - 220
length fused part adcauline wall	220 - 370	295 - 405	310 - 370
total depth *	420 - 475	445 - 505	405 - 480
diameter at rim	170 - 185	175 - 205	185 - 215
maximal diameter	200 - 215	205 - 250	190 - 215

(*= including renovations)

DISTRIBUTION. — Recorded from the Andaman Islands (RITCHIE, 1910a); various localities in the waters of the eastern part of the Malay Archipelago (BILLARD, 1925b; VERVOORT, 1941) and the Philippines (NUTTING, 1927). The depth distribution extends to at least 122 m. The subspecies is now also recorded from New Caledonian waters: northern part of the Norfolk Ridge southeast of New Caledonia and from the Pacific off the Loyalty Islands, depths 235-550 m.

REMARKS. — The material from the Philippines agrees with descriptions by BILLARD (1925b) and VERVOORT (1941) and can easily be recognized in spite of absence of gonothecae. The New Caledonia specimens are generally smaller and are characterized by repeated renovations of the hydrothecal aperture and opercular apparatus (fig. 53a-b). Hydrothecae with a considerable portion of the adcauline hydrothecal wall free from the internode occur in the higher parts of stems and hydrocladia; proximally the length of the free adcauline hydrothecal wall decreases, that of the adnate portion slightly increasing. The hydrothecae, as a result, appear to be more deeply embedded into hydrocladia or axis in the proximal parts of the colony, where the thickness of the perisarc also increases considerably.

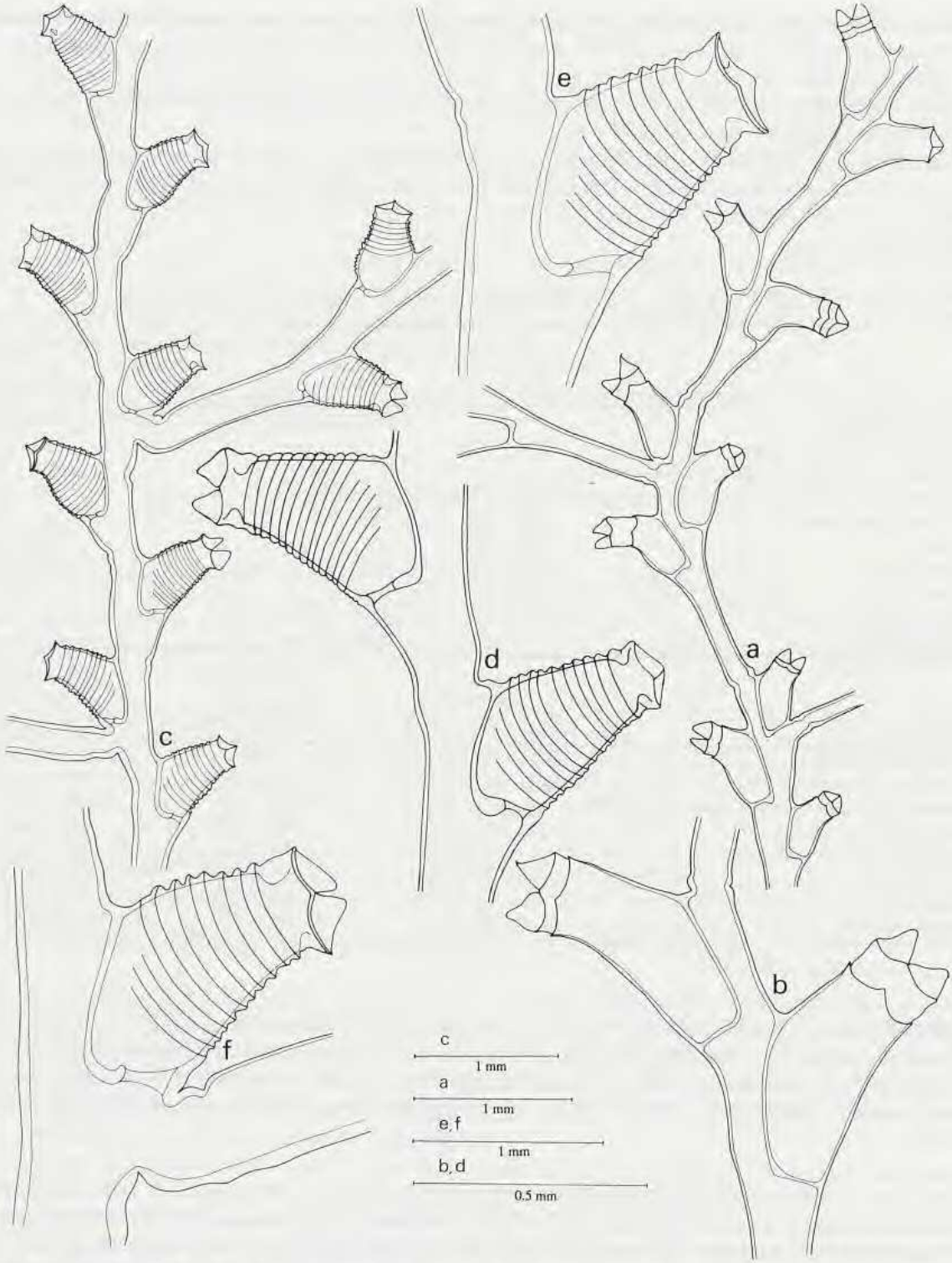

FIG. 53 a-b. — *Sertularella quadridens cornuta* Ritchie, 1909, MUSORSTOM 6, Stn DW 477 : **a**, monosiphonic colony; **b**, pair of hydrocladial hydrothecae.

FIG. 53 c-f. — *Sertularella sinensis* Jäderholm, 1896 : **c**, **e-f**, CHALCAL 2, Stn DW 80 : **c**, monosiphonic part of colony; **e**, hydrocladial hydrotheca; **f**, axillary hydrotheca. — **d**, LAGON, Stn DW 1146, pair of hydrocladial hydrothecae.
a-b, slide no. 711; c, e-f, slide no. 421; d, slide no. 971.

Sertularella sinensis Jäderholm, 1896

Figs 53c-f, 54a

Sertularella sp. Inaba, 1892 : 432, figs 11-12.
Sertularella sinensis Jäderholm, 1896 : 11, pl. 2 figs 2-3; 1903 : 280; 1919 : 17. — Hartlaub, 1901b : 20, 47, 51, 53, 56, 69, 70, 72, 125, pl. 4 fig. 12. — Stechow, 1913b : 13, 129, figs 99-100; 1923b : 13. — Hiro, 1939 : 175, fig. 8. — Rees & Thursfield, 1965 : 138. — Yamada, 1959 : 65. — Naumov, 1960 : 342-343, fig. 232. — Hirohito, 1969 : 23; 1983 : 47. — Rho & Chang, 1974 : 144, pl. 5 figs 1-2. — Belousov, 1975a : 206; 1975b : 655, fig. 1 no. 46. — Rho, 1977 : 266, pl. 82 fig. 78. — Yamada & Kubota, 1987 : 40.

Material examined. — **New Caledonia**. Chalcal 2 : stn DW 80, 23°26.70'S-168°01.80'E, 160 m, 31.10.1986 : large tuft, 60x60 mm composed of several partly anastomosing smaller colonies. No gonothecae; slide no. 421 (MNHN-Hy. 1103, sample; BMNH 1989.11.24.79, sample; RMNH-Coel. 25923, sample and slide no. 421).

Lagon : stn DW 1146, 19°08.3'S-163°30.9'E, 176-185 m, 28.10.1989 : fifteen mm high colony and some fragments, no gonothecae (MNHN-Hy. 1104). Slide no. 971 (RMNH-Coel. 25924).

Smib 6 : stn DW 135, 19°02.8'S-163°18.7'E, 250-260 m, 04.03.1990 : two fragments, one c. 10 mm high with branch and a 3 mm long fragment; no gonothecae. All in slide no. 1387 (RMNH-Coel. 25925).

Description. — Flabellate colonies forming bushy complex of several c. 50 mm high colonies with forked axis, anastomoses between various parts present. Axis polysiphonic, only basally with some strength, consequently colonies unable to support themselves outside fluid. Apical parts of colonies monosiphonic; in these parts axis with alternate hydrothecae and hydrocladia, all placed in one plane; axis or hydrocladium scarcely geniculate. Hydrocladia springing from axis under axillary hydrothecae; number of hydrothecae between two successive hydrocladia varied but usually three (one axial, one ad-, one abcauline, fig. 53c). No proper apophysis present, basal portion of first hydrocladium, which is longer than those following, with constrictions at beginning of abcauline wall of axial hydrotheca. No distinct division in internodes visible, though perisarcal constrictions do occur. In older parts of colony monosiphonic structure overlaid by secondary tubules and obscured by presence of anastomoses.

Hydrothecae vase-shaped, usually slightly curved so that adcauline wall is slightly convex; abcauline wall basally bulged but just under hydrothecal rim with distinct concavity. Axis of hydrotheca making angle of c. 60 degrees with length axis of internode or stem. Axial and remaining hydrothecae almost similar; length of adnate part adcauline wall slightly exceeding that of free part. Adnate part adcauline wall curved basally to form hydrothecal floor; this portion slightly swollen. Hydropore scarcely visible because of development of strong ligament at hydrothecal floor. Body of hydrotheca with 10-12 sharp ridges corresponding with undulations of hydrothecal wall; 7-8 of those ribs are complete, encircling whole hydrotheca (fig. 53d-f). Hydrothecal rim distinctly flaring and reinforced, with 4 low marginal cusps (2 laterals, 1 ad-, 1 abcauline), separated by shallow embayments, accommodating 4 triangular, hyaline flaps of closing apparatus. Moreover, 3 intrathecal cusps present in many hydrothecae (one abcauline, one on each side of adcauline marginal cusp).

Well preserved hydranths present, number of tentacles 10-12. Hydranth attached to curved part of hydrothecal floor. Distinct 'caecum' present; top of 'caecum' connected by strong ligament to inside abcauline wall under second costa from rim.

Perisarc fairly thin on stem and hydrocladia, though rather thick and strong along hydrothecal walls; few collapsed hydrothecae have been observed.

No gonothecae present.

Distribution. — Originally described from the South China Sea, c. 90 km S of Hsia-Men (Amoy), c. 65 m depth. The species occurs rather plentifully in the waters south and southeast of Japan (Jäderholm, 1904, 1919; Yamada, 1959), including Sagami Bay (Stechow, 1913; Jäderholm, 1919; Hirohito, 1969, 1983) and the Bonin Islands (Hirohito, 1969). Also reported from Korean waters (Rho & Chang, 1974; Rho, 1977), from Taiwan Strait (Naumov, 1960) and from the Sea of Okhotsk, near Cape Soya, La Pérouse Strait (Naumov, 1960). The depth distribution extends from c. 35 m down to at least 730 m. The present specimens are from the Pacific north and east of New Caledonia, depth 160-185 m.

TABLE 43. — Measurements of *Sertularella sinensis* Jäderholm, 1896, in µm.

	CHALCAL 2 Stn DW 80 (slide no. 421)	LAGON Stn DW 1146 (slide no. 971)
Stem, diameter at base	1,110 - 1,200	
Hydrocladium, diameter at base	175 - 190	160 - 165
Axial hydrotheca, length abcauline wall	340 - 360	
length free part adcauline wall	280 - 295	
length adnate part adcauline wall	290 - 295	
total depth	450 - 465	
diameter at rim	170 - 175	
maximal diameter	260 - 270	
Normal hydrotheca, length abcauline wall	295 - 355	*345 - 390
length free part adcauline wall	250 - 310	*200 - 340
length adnate part adcauline wall	265 - 310	245 - 275
total depth	400 - 465	*445 - 480
diameter at rim	170 - 185	150 - 205
maximal diameter	250 - 275	245 - 260
Distance between two successive hydrothecae, measured from axil to base next hydrotheca	260 - 295	280 - 295

(*= including renovations)

REMARKS. — Slide no. 421 has been compared in BMNH with slide no. 19.7.26.2, off Cape Padaran, Cochin China, 70 fms, C.S. "*Recorder*", which it generally resembles, but the number of ribs on the hydrothecae in the MUSORSTOM specimen is slightly higher. The number of these ribs in this species is rather varied, though 12 is apparently the maximum. HIROHITO (1983) gives the number of these ribs for Sagami Bay specimens as 'about 6-8'.

The ribbed structure of the hydrothecae corresponds with that observed in *Sertularella crenulata* Nutting, 1905, though in that species the ribs are finer and their number on each hydrotheca c. 30. Moreover, there is a considerable difference in the shape of the hydrothecae. The colony in *S. crenulata* is strong and self-supporting.

The fragments from LAGON, Stn DW 1146, are remarkable because of the repeated renovations of hydrotheca and opercular apparatus (fig. 54a). In these specimens the perisarc is thick and the internal hydrothecal cusps are strong.

Sertularella tenella (Alder, 1856)

Fig. 54b-e

Sertularia rugosa Johnston, 1847 : 63.

Sertularia tenella Alder, 1856 : 357-358, pl. 13 figs 3-6.

Sertularella tenella - HINCKS, 1868 : 242-243, pl. 47 figs 3, 3a-c.

Sertularella geniculata Hincks, 1874 : 152-153, pl. 7 figs 13-14.

Sertularella tenella - HARTLAUB, 1901b : 63-64, pl. 5 figs 21-23, pl. 6 figs 2, 4, 7, 9, 10. — FRASER, 1911 : 71; 1914 : 193, pl. 31 fig. 116; 1938a : 9, 53; 1938c : 134; 1943 : 92; 1948 : 246 . — JÄDERHOLM, 1916-1917 : 7, pl. 4 fig. 5; 1919 : 17, pl. 4 fig. 4; 1923 : 6. — BENNITT, 1922 : 250. — STECHOW, 1923a : 13; 1923d : 185-186, fig. A^1b; 1926 : 102. — KRAMP, 1935 : 178, fig. 73C. — LELOUP, 1935 : 45, figs 26-27; 1940b : 18. — VERVOORT, 1942 : 293; 1946b : 228, fig. 97b; 1968 : 105. — YAMADA, 1950 : 12, pl. 1 fig. 11. — VANNUCCI, 1951 : 116. — DEEVEY, 1954 : 270. — HAMOND, 1957 : 320. — NAUMOV, 1960 : 341-342, fig. 231. — BLANCO, 1963 : 173, 178, figs 7-8. — REDIER, 1964b : 138. — MAMMEN, 1965 : 36, fig. 68. — REES & THURSFIELD, 1965 : 138. — VAN GEMERDEN-HOOGEVEEN, 1965 : 31. — CALDER, 1970 : 1529, pl. 6 fig. 6. — HIROHITO, 1974 : 20, fig. 8. — CORNELIUS, 1979 : 292, fig. 24. — STEPAN'YANTS, 1979 : 88. — GARCÍA CORRALES, AGUIRRE INCHAURBE & GONZÁLEZ MORA, 1980 : 46, fig. 16. — LJUBENKOV, 1980 : 49. — ANTSULEVICH, 1987 : 70.

Sertularella atlantica Stechow, 1920 : 29, fig. 2A; 1923d : 183-184, fig. A^1a.

Sertularella tenella f. *peculiaris* Leloup, 1935 : 45, figs 26-27; 1938a : 6.

MATERIAL EXAMINED. — **Loyalty Islands**. MUSORSTOM 6 : stn DW 420, 20°29.27'S-166°43.35'E, 600 m, 16.02.1989 : four colonies 3-5 mm high on coral fragment. No gonothecae; slide no. 964 of one of stems (all RMNH-Coel. 25926).

Chesterfield Islands. CHALCAL 1 : stn DC 34, 19°52.10'S-158°20.10'E, 37 m, 21.07.1984 : several small 3-5 mm high stems rising from stolon creeping on *Lytocarpia* sp., single empty gonotheca present; 2 slides no. 1672 (RMNH-Coel. 26652).

DESCRIPTION (based on MUSORSTOM 6, Stn DW 420, material). — Material composed of four 3-5 mm high stems rising individually from stolon attached to coral fragment. Stolon tubiform, of same diameter as basal part of stems; these divided into slender internodes separated by oblique constrictions running in opposite directions or occasionally a complete septum, slightly geniculate (fig. 54b).

Hydrothecae inserted at distal end of internode, forming an angle of c. 60 degrees with following internode, cylindrical to slightly bulging; adcauline as well as abcauline walls may be either nearly straight or slightly convex, adnate part of adcauline wall c. half length of free part. Surface of hydrotheca with 5-6 transverse, spirally running undulations, visible on external surface of hydrotheca as transverse lines (fig. 54c-e), in lateral aspect undulations visible on optical section of hydrothecal wall as rounded elevations. Hydrothecal aperture with four marginal cusps (one ad-, one abcauline, two laterals), separated by fairly deep, rounded embayments. Hydrothecal opercular apparatus composed of four triangular flaps attached in embayments of hydrothecal margin and when closed forming low roof. Plane of hydrothecal aperture usually perpendicular to hydrothecal length axis, but occasionally slightly shifted in ad- or abcauline direction.

Hydranths present in majority of hydrothecae, with small adcauline caecum of which top attached to inside adcauline wall by means of fine filament (fig. 54e); point of attachment at level of distal hydrothecal undulation. Number of tentacles 10.

Periderm firm and not particularly thin; hydrothecal margin distinctly thickened but no internal cusps present. No renovations of hydrothecae observed.

Gonothecae absent; one colonies with circular hole just under hydrothecal base where gonotheca possibly attached.

TABLE 44. — Measurements of *Sertularella tenella* (Alder, 1856), in µm.

	MUSORSTOM 6 Stn DW 420 (slide no. 964)
Stem internode, length	1,020 - 1,780
diameter	175
Hydrotheca, length abcauline wall	500 - 540
length free part adcauline wall	435 - 455
length adnate part adcauline wall	220 - 240
total depth	540 - 565
diameter at rim	260 - 280
maximal diameter	280 - 315
number of undulations	5 - 6

DISTRIBUTION. — Cosmopolitan species found in all oceans of the world under widely varying conditions and consequently with a considerable range of variability. The present records are from deep water of the Pacific off the Loyalty Islands and from off Île Longue, Chesterfield Islands. The species has been recorded from Japan (YAMADA, 1950) and the Bonin Islands (HIROHITO, 1974) but so far has not been obtained from the Malay Archipelago, Australia or New Zealand. HARTLAUB (1901b : 127 and footnote no.1) records the species from the Loyalty Islands.

REMARKS. — In the synonymy of this variable species I have largely followed CORNELIUS's view but I have, at least for the time being, not included *Sertularella rugosa* (Linnaeus, 1758) into its synonymy. The material from CHALCAL 1, Stn DC 34, is doubtfully referred to the present species being in fairly poor condition. The hydrotheca is contracted distally, the four marginal cusps pointing obliquely outwards and the opercular flaps are missing. The gonotheca is ovoid, compressed on the back and ribbed over its whole length, ten ribs being present. The gonothecal aperture has four marginal cusps.

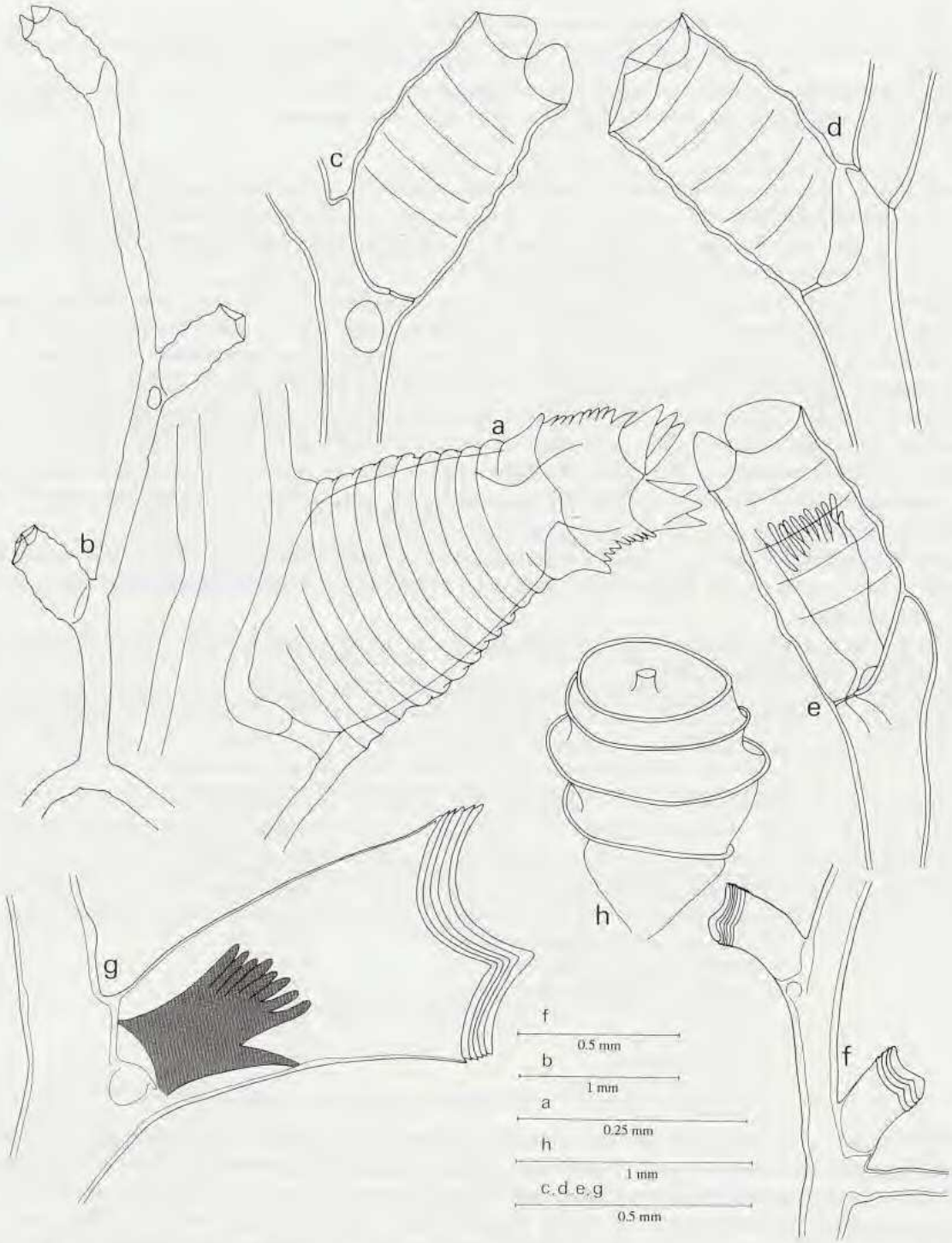

FIG. 54 a. — *Sertularella sinensis* Jäderholm, 1896, LAGON. Stn DW 1146, hydrocladial hydrotheca with much renovated distal portion.

FIG. 54 b-e. — *Sertularella tenella* (Alder, 1856), MUSORSTOM 6, Stn DW 420 : **b**, colony; **c**, **d**, axial hydrothecae; **e**, terminal hydrotheca.

FIG. 54 f-h. — *Symplectoscyphus bathyalis* Vervoort, 1972 : **f**, Bay of Biscay, *"Monarch"*, 48°04'N-09°23'W, monosiphonic distal part of colony. — **g-h**, BIOCAL, Stn DW 36 : **g**, hydrocladial hydrotheca with its hydranth; **h**, gonotheca.

a, slide no. 971; b-e, slide no. 964; f, slide no. 1392; g, slide no. 525; h, slide no. 361.

Genus **SYMPLECTOSCYPHUS** Marktanner-Turneretscher, 1890

Of the genus *Symplectoscyphus* Marktanner-Turneretscher, 1890 : 235, type, by monotypy, *Symplectoscyphus australis* Marktanner-Turneretscher, 1890 = *Symplectoscyphus johnstoni* (Gray, 1843), the following species, subspecies, varieties and forms have been considered :

Symplectoscyphus adpressus (Ritchie, 1911) [= *Sertularella adpressa* Ritchie, 1911 : 837-839, pl. 85 fig. 5, pl. 88 figs 1, 2, 9].
Symplectoscyphus affinis (Hartlaub, 1901b) [= *Sertularella affinis* Hartlaub, 1901b : 43-44, pl. 1 fig. 5, pl. 2 figs 23-24].
Symplectoscyphus aggregatus (Jäderholm, 1916-1917) [= *Sertularella aggregata* Jäderholm, 1916-1917 : 13, pl. 2 fig. 1].
Symplectoscyphus amphorifera (Allman, 1877) [= *Sertularella amphorifera* Allman, 1877 : 22, pl. 15 figs 8-10].
Symplectoscyphus arboriformis (Marktanner-Turneretscher, 1890) [= *Sertularella arboriformis* Marktanner-Turneretscher, 1890 : 228, pl. 4 fig. 5].
Symplectoscyphus articulatus (Allman, 1888) [*Sertularia articulata* Allman, 1888 : 61, pl. 29 figs 3, 3a; ?*Symplectoscyphus elongatus* (Jäderholm, 1904)].
Symplectoscyphus bathyalis Vervoort, 1972 : 174-180, figs 58-60.
Symplectoscyphus biformis (Jäderholm, 1905) [= *Sertularella biformis* Jäderholm, 1905 : 28-29, pl. 11 figs 1-3].
Symplectoscyphus chubuticus El Beshbeeshy, 1991 : 202-206, fig. 51.
Symplectoscyphus columnarius (Briggs, 1914) [= *Sertularella columnaria* Briggs, 1914 : 286, 293-294, fig. 1].
Symplectoscyphus confusus Totton, 1930 : 184-185, fig. 35, pl. 1 figs 4, 6].
Symplectoscyphus cumberlandicus (Jäderholm, 1905) [= *Sertularella cumberlandica* Jäderholm, 1905 : 27-28, pl. 10 figs 8-11].
Symplectoscyphus curvatus (Jäderholm, 1916-1917) [= *Sertularella curvata* Jäderholm, 1916-1917 : 11-12, pl. 1 figs 10-11]
Symplectoscyphus delicatulus (Hutton, 1873) [= *Sertularella delicatula* Hutton, 1873 : 256; *Sertularella capillaris* Allman, 1885 : 133, pl. 8 figs 1-3].
Symplectoscyphus dentiferus (Torrey, 1902) [= *Sertularella dentifera* Torrey, 1902 : 61, pl. 6 figs 51-52].
Symplectoscyphus divaricatus (Busk, 1852) [= *Sertularia divaricata* Busk, 1852 : 388].
Symplectoscyphus divaricatus var. *dubius* (Bale, 1888) [= *Sertularella divaricata* var. *dubia* Bale, 1888 : 761-762, pl. 16 figs 1-2].
Symplectoscyphus divaricatus var. *subdichotomus* (Bale, 1888) [= *Sertularella divaricata* var. *subdichotoma* Bale, 1888 : 761, pl. 16 figs 3-4].
Symplectoscyphus elegans (Nutting, 1904) [= *Sertularella elegans* Nutting, 1904 : 98, pl. 24 fig. 1]
Symplectoscyphus elongatus (Jäderholm, 1904) [= *Sertularella elongata* Jäderholm, 1904 : x; ?*Symplectoscyphus articulatus* (Allman, 1888)].
Symplectoscyphus epizoicus Watson, 1973 : 177, figs 31-33.
Symplectoscyphus epizooticus Totton, 1930 : 185-186, fig. 36a-b, pl. 1 figs 5-6.
Symplectoscyphus erectus (Fraser, 1938c) [= *Sertularella erecta* Fraser, 1938c : 134, 141-142, pl. 21 fig. 11].
Symplectoscyphus erectus (Naumov & Stepan'yants, 1962) [= *Sertularella erecta* Naumov & Stepan'yants, 1962 : 84-85, fig. 7]. (preoccupied name!).
Symplectoscyphus exochus Blanco, 1984 : 39-41, figs 1-7.
Symplectoscyphus exsertus (Allman, 1888) [= *Sertularia exserta* Allman, 1888 : 56-57, pl. 27 figs 1, 1a-c].
Symplectoscyphus filiformis (Allman, 1888) [= *Sertularia gracilis* Allman, 1888 : 51-52; *Sertularia filiformis* Allman, 1888 : 90, pl. 24 figs 1, 1a].
Symplectoscyphus filiformis var. *reticulatus* Ritchie, 1907a [= *Sertularella filiformis* var. *reticulata* Ritchie, 1907a : 535].
Symplectoscyphus flexilis (Hartlaub, 1901b) [= *Sertularella flexilis* Hartlaub, 1901b : 44-45, pl. 3 fig. 2, pl. 4 fig. 28].
Symplectoscyphus fuscus (Trebilcock, 1928) [= *Sertularella fusca* Trebilcock, 1928; 13-14, pl. 5 figs 2, 2a-b].
Symplectoscyphus glacialis (Jäderholm, 1904) [= *Sertularella glacialis* Jäderholm, 1904 : ix].

Symplectoscyphus gotoi (Stechow, 1913a) [= *Sertularella Gotoi* Stechow, 1913a : 142].
Symplectoscyphus grandis Blanco, 1977 : 6-7, figs 14-18.
Symplectoscyphus gruzovi Stepan'yants, 1979 [= *Sertularella gruzovi* Stepan'yants, 1979 : 67-68, pl. 12 fig. 1, pl. 25 fig. 5].
Symplectoscyphus hero Blanco, 1977 : 4-6, figs 1-13, 19-30.
Symplectoscyphus hozawai Stechow, 1931 : 179.
Symplectoscyphus huanghaiensis Tang & Huang, 1986 : 317-318, fig. 1.
Symplectoscyphus hydrallmaniaeformis (Kudelin, 1914) [= *Sertularella hydrallmaniaeformis* Kudelin, 1914 : 503-505, fig. 172].
Symplectoscyphus incisus (Fraser, 1938a) [= *Sertularella incisa* Fraser, 1938a : 9, 52, pl. 12 fig. 60].
Symplectoscyphus indivisus (Bale, 1882) [= *Sertularella indivisa* Bale, 1882 : 24, pl. 12 fig. 7; *Sertularella solidula* Bale, 1882 : 24-25, pl. 12 fig. 8; *Sertularella sieboldi* Kirchenpauer, 1884 : 49, pl. 16 figs 5, 5a; *Sertularella muelleri* Kirchenpauer, 1884 : 49-50, pl. 16 figs 7, 7a-b; *Sertularella variabilis* Bale, 1888 : 764-765, pl. 15 figs 5-9].
Symplectoscyphus indivisus var. *bidentatus* (Ling, 1938) [= *Sertularella indivisa* var. *bidentata* Ling, 1938 : 357, figs 15-16].
Symplectoscyphus infractus (Kirchenpauer, 1884) [= *Sertularella infracta* Kirchenpauer, 1884 : 46].
Symplectoscyphus interruptus (Pfeffer, 1889) [= *Sertularia interrupta* Pfeffer, 1889 : 55].
Symplectoscyphus irregularis (Trebilcock, 1928) [= *Sertularella irregularis* Trebilcock, 1928 : 13, pl. 5 figs 1, 1a-b].
Symplectoscyphus johnstoni johnstoni (Gray, 1843) [= *Sertularella johnstoni* (Gray, 1843 : 294); *Sertularella purpurea* Kirchenpauer, 1884 : 49, pl. 16 figs 3, 3a-b; *Sertularella pygmaea* Bale, 1882 : 25, pl. 12 fig. 9; *Symplectoscyphus australis* Marktanner-Turneretscher, 1890 : 235, pl. 4 figs 9, 9a].
Symplectoscyphus johnstoni subtropicus Ralph, 1961a [= *Symplectoscyphus johnstoni* f. *subtropicus* Ralph, 1961a : 811, fig. 18l-n].
Symplectoscyphus laevis (Bale, 1882) [= *Sertularella laevis* Bale, 1882 : 24, pl. 12 fig. 6; *Sertularella novarae* Marktanner-Turneretscher, 1890 : 226-227, pl. 4 figs 3, 3a-b].
Symplectoscyphus leloupi El Beshbeeshi, 1991 : 206-211, fig. 52.
Symplectoscyphus levinseni Nutting, 1904 [= *Sertularella levinseni* Nutting, 1904 : 100, pl. 26 figs 1-2].
Symplectoscyphus liouvillei (Billard, 1914) [= *Sertularella Liouvillei* Billard, 1914 : 24-26, figs 14-15].
Symplectoscyphus longitheca (Bale, 1888) [= *Sertularella longitheca* Bale, 1888 : 762-763, pl. 16 figs 5-6].
Symplectoscyphus macrocarpa (Billard, 1918) [= *Sertularella macrocarpa* Billard, 1918 : 23-24, fig. 3A-B].
Symplectoscyphus macrogona (Trebilcock, 1928) [= *Sertularella macrogona* Trebilcock, 1928 : 11, pl. 1 figs 4, 4a-d].
Symplectoscyphus macrotheca (Bale, 1882) [= *Sertularella macrotheca* Bale, 1882 : 13, pl. 13 fig. 1].
Symplectoscyphus magellanicus (Marktanner-Turneretscher, 1890) [= *Calyptothuiaria magellanica* Marktanner-Turneretscher, 1890 : 244, pl. 5 fig. 7].
Symplectoscyphus margaritaceus (Allman, 1885) [= *Sertularella margaritacea* Allman, 1885 : 133, pl. 7 figs 3-4].
Symplectoscyphus marionensis Millard, 1971 : 405-406, fig. 7.
Symplectoscyphus mawsoni Briggs, 1939 : 35-37, fig. 2, pl. 16 figs 1-2.
Symplectoscyphus millardi (Stepan'yants, 1979) [= *Sertularella millardi* Stepan'yants, 1979 : 81-82, pl. 15 fig 1A-D, pl. 25 fig. 6].
Symplectoscyphus milneanus (d'Orbigny, 1846) [= *Sertularia Milneana* d'Orbigny, 1846 : 26, pl. 11 figs 6-8; *Sertularella plana* Jäderholm, 1903 : 279, pl. 12 fig. 9, pl. 13 figs 1-2; *Sertularella meridionalis* Nutting, 1904 : 98, pl. 23 figs 8-9].
Symplectoscyphus minutus (Nutting, 1904) [= *Sertularella minuta* Nutting, 1904 : 99-100, pl. 24 figs 9-10].
Symplectoscyphus modestus (Hartlaub, 1901b) [= *Sertularella modesta* Hartlaub, 1901b : 42-43, 111, pl. 1 fig. 1, pl. 2 fig. 28].
Symplectoscyphus monopleura (Hartlaub, 1901b) [= *Sertularella monopleura* Hartlaub, 1901b : 73, 111, figs 44-46; *Sertularella annulata* Marktanner-Turneretscher, 1890 : 227, pl. 4 figs 4, 4a-b, not *Sertularella annulata* (Allman, 1888)].
Symplectoscyphus multinoda Fraser, 1948 (= *Sertularella multinoda* Fraser, 1948 : 187, 242, pl. 28 fig. 18].
Symplectoscyphus naumovi Blanco, 1969 : 14-16, figs 1-9.

Symplectoscyphus neglectus (Thompson, 1879) [= *Sertularia neglecta* Thompson, 1879 : 100, pl. 16 fig. 1; *Sertularella Sonderi* Kirchenpauer, 1884 : 50, 54, pl. 16 figs 4, 4a-b].
Symplectoscyphus pallidus (Kirchenpauer, 1884] [= *Sertularella pallida* Kirchenpauer, 1884 : 48, pl. 16 figs 6, 6a; ?*Symplectoscyphus tricuspidatus* (Alder, 1856)].
Symplectoscyphus paraglacialis El Beshbeeshy, 1991 : 220-224, fig. 55.
Symplectoscyphus paulensis Stechow, 1923a : 8-10.
Symplectoscyphus pedrensis (Torrey, 1904) [= *Sertularella pedrensis* Torrey, 1904 : 1, 2, 4, 27, figs 19-21].
Symplectoscyphus pedunculatus (Billard, 1919) [= *Sertularella pedunculata* Billard, 1919 : 18 fig. IA].
Symplectoscyphus pinnatus (Clark, 1876a) [= *Sertularella pinnata* Clark, 1876a : 211, 226, pl. 12 figs 28-29; *Sertularella fruticulosa* Kirchenpauer, 1884 : 50, pl. 16 figs 8, 8a, 8b].
Symplectoscyphus plectilis (Hickson & Gravely, 1907) [= *Sertularella plectilis* Hickson & Gravely, 1907 : 20-21, pl. 3 fig. 21]
Symplectoscyphus pluma (Hartlaub, 1901b) [= *Sertularella pluma* Hartlaub, 1901b : 26-27, 113, pl. 4 figs 1, 2, 2a
Symplectoscyphus procera (Trebilcock, 1928) [= *Sertularella procera* Trebilcock, 1928 : 11-12, pl. 1 figs 5, 5a-d]
Symplectoscyphus pseudodivaricatus Ralph, 1961a : 807-808, fig. 16i-n.
Symplectoscyphus pulchellus (Jäderholm, 1904) [= *Sertularella pulchella* Jäderholm, 1904 : 8].
Symplectoscyphus pushi (Stepan'yants, 1979) [= *Sertularella pushi* Stepan'yants, 1979 : 69-70, pl. 11 fig. 4].
Symplectoscyphus rentoni (Bartlett, 1907) [= *Sertularella rentoni* Bartlett, 1907 : 43, pl. 1].
Symplectoscyphus ritchiei (Briggs, 1915) [= *Sertularella ritchiei* Briggs, 1915 : 196, fig. 1; *Sertularella longitheca* var. *robusta* Ritchie, 1911 : 841-842, pl. 88 fig. 8].
Symplectoscyphus rostratus Watson, 1973 : 176-177, figs 28-30.
Symplectoscyphus rubellus (Kirchenpauer, 1884) [= *Sertularella rubella* Kirchenpauer, 1884 : 48, pl. 16 figs 2, 2a-b].
Symplectoscyphus salvadorensis El Beshbeeshy, 1991 : 227-229, fig. 57.
Symplectoscyphus secundus (Kirchenpauer, 1884) [= *Sertularella secunda* Kirchenpauer, 1884 : 50, pl. 15 figs 7, 7a; *Sertularella limbata* Allman, 1886 : 134-135, pl. 9 figs 3-4].
Symplectoscyphus sibogae (Billard, 1924) [= *Sertularella sibogae* Billard, 1924 : 69-70, fig. 3].
Symplectoscyphus singularis El Beshbeeshy, 1991 : 229-232, fig. 58.
Symplectoscyphus sinuosus (Fraser, 1948) [= *Sertularella sinuosa* Fraser, 1948 : 187, 245, pl. 28 fig. 20].
Symplectoscyphus spiralis (Hickson & Gravely, 1907) [= *Sertularella spiralis* Hickson & Gravely, 1907 : 19-20, pl. 3 figs 19-20; *Sertularella bifurca* Billard, 1914 : 22-23, fig. 13].
Symplectoscyphus spiritualis Totton, 1930 : 184, fig. 34.
Symplectoscyphus subarticulatus Coughtrey, 1875 [= *Thuiaria subarticulata* Coughtrey, 1875 : 287, pl. 20 figs 32-34].
Symplectoscyphus subdichotomus (Kirchenpauer, 1884) [= *Sertularella subdichotoma* Kirchenpauer, 1884 : 46, pl. 16 figs 1, 1a-b].
Symplectoscyphus tricuspidatus (Alder, 1856) [= *Sertularia tricuspidata* Alder, 1856 : 356-357, pl. 13 figs 1-2; *Sertularella hesperia* Torrey, 1902 : 63-64, pl. 7 figs 57-58].
Symplectoscyphus tricuspidatus acuminatus Kirchenpauer, 1884 [= *Sertularella tricuspidata* var. *acuminata* Kirchenpauer, 1884 : 45].
Symplectoscyphus trimucronatus (Allman, 1885) [= *Sertularella trimucronata* Allman, 1885 : 135, pl. 10 figs 1-2].
Symplectoscyphus tropicus (Hartlaub, 1901b) [= *Sertularella tropica* Hartlaub, 1901b : 41, 130, fig. 19 = *Sertularella variabilis* Clarke, 1894 : 75-76, pl. 4 figs 17-20, pl. 5 figs 21-22; not *Sertularella variabilis* Bale, 1888].
Symplectoscyphus tuba Totton, 1930 : 186, fig. 37a-b.
Symplectoscyphus turgidus (Trask, 1857) [= *Sertularella turgida* Trask, 1857 : 113, pl. 1 fig. 1; *Sertularella nodulosa* Calkins, 1899 : 360, pl. 5 figs 29, 29a-b].
Symplectoscyphus unilateralis (Lamouroux, 1824) [= *Sertularia unilateralis* Lamouroux, 1824 : 615, figs 1-3].
Symplectoscyphus valdesicus El Beshbeeshy, 1991 : 237-239, fig. 60.
Symplectoscyphus vanhoeffeni Totton, 1930 : 187-188, fig. 38a-d [= *Sertularella subdichotoma* Vanhöffen, 1910 : 326-327, fig. 41a-e, not *Symplectoscyphus subdichotomus* (Kirchenpauer, 1884)].

Symplectoscyphus variabilis (Bale, 1888) [= *Sertularella variabilis* Bale, 1888 : 764-765, pl. 15 figs 5-9].
Symplectoscyphus vervoorti El Beshbeeshy, 1991 : 239-245, fig. 6.
Symplectoscyphus sp. 1 [= *Sertularella* sp. no. 1 Naumov & Stepan'yants, 1962 : 85, fig. 8].
Symplectoscyphus sp. 2 [= *Sertularella* sp. no. 2 Naumov & Stepan'yants, 1962 : 85-86, fig. 9].

This list does not pretend to be complete; it lists such species as have been used to check descriptions and figures against the species of *Symplectoscyphus* in the present collection. As indicated above the principal difference with *Sertularella* is the three-cusped condition of the hydrothecal rim and the presence of a three-flapped opercular apparatus. The hydrothecal cusps are 2 laterals and one adcauline cusp, distinguishing this genus from *Gonaxia* gen. nov.

Symplectoscyphus bathyalis Vervoort, 1972

Figs 54f-h, 55a-b, d

Symplectoscyphus bathyalis Vervoort, 1972 : 174-180, figs 58, 59, 60a.
Sertularella bathyalis - STEPAN'YANTS, 1979 : 70, pl. 12 fig. 4.

MATERIAL EXAMINED. — **Bay of Biscay**. *"Monarch"* : 48°04'N-09°23'W, 1000 fms (= 1828 m), 1950 : many up to 45 mm high colonies, originally attached to submarine cable. Alcohol preserved material and 2 slides in BMNH (1950.2.10.1), 3 slides in RMNH (Coel. no. 25.280).

New Caledonia. BIOCAL : stn DW 36, 23°08.64'S-167°10.99'E, 650-680 m, 29.08.1985 : several up to 25 mm high colonies, some with gonothecae (MNHN-Hy. 1105). Slides nos 361 and 525 (RMNH-Coel. 25.281).

DESCRIPTION (based on BIOCAL, Stn DW 36, material). — Stem fairly stiff, up to 25 mm high, basally with weakly polysiphonic, indistinctly geniculate; division into internodes indistinct, these being marked by constrictions of perisarc, no distinct septa. Stem internodes each with single hydrotheca, alternately pointing left and right, placed in one plane. Hydrocladia few, springing from small apophyses directly under stem hydrothecae, divided into internodes separated by constrictions of perisarc, no distinct septa; first hydrocladial internode longer than following. Arrangement of hydrothecae as on stem.

Hydrothecae of stem and hydrocladia similar, more or less tubiform, with weakly curved, concave abcauline and slightly more strongly curved, convex adcauline wall (fig. 55a-b, d). Fused part of hydrotheca of varied length, one-third to one-fourth the length of free portion. Hydrothecae slightly but distinctly curved; some hydrothecae slightly increasing in diameter from base towards rim, but in others with greatest diameter at about half total length. Hydrothecal rim usually slightly thickened, renovated up to seven times, with three marginal cusps (one adcauline and two laterals) separated by deep embayments. Closing apparatus composed of three triangular flaps, perfect in none of hydrothecae inspected. Fused part of adcauline wall steep and straight, with sudden flexure at hydrothecal base, floor with distinct hydropore to permit passage of coenosarc.

Perisarc fairly strong and thick, particularly along walls of internodes, giving colonies a certain degree of rigidity, thinning along hydrothecal walls, that appear to be rather strong. Distinct circular spot (probably thin patch of perisarc) present under majority of hydrothecae, marking places of attachment of gonothecae.

Hydranths poorly preserved, present in some hydrothecae, indicating material having been collected alive. Hydranths attached by means of slight muscular strand to fused part of adcauline wall and by means of strong muscle strand to inside of abcauline wall (fig. 54g).

Empty gonothecae present along terminal parts of some hydrocladia, in outline more or less pear-shaped, with narrowing basal portion and there inserting at circular spot under each hydrotheca. Surface with four or five elevated, apparently circular ribs with thickened margin; apex truncate, with short funnel and slightly everted aperture (fig. 54h).

DISTRIBUTION. — *Symplectoscyphus bathyalis* is now known to occur in deep water of the southeastern Pacific, 46°59.5'S-75°54'W, 2657-2470 m (VERVOORT, 1972), in deep water of the Bay of Biscay, 48°04'N-09°23'W, 1000 fms (= 1828 m) (VERVOORT, 1972 and present record) and at the northwestern tip of the Norfolk ridge (BIOCAL, Stn DW 36, 650-680 m).

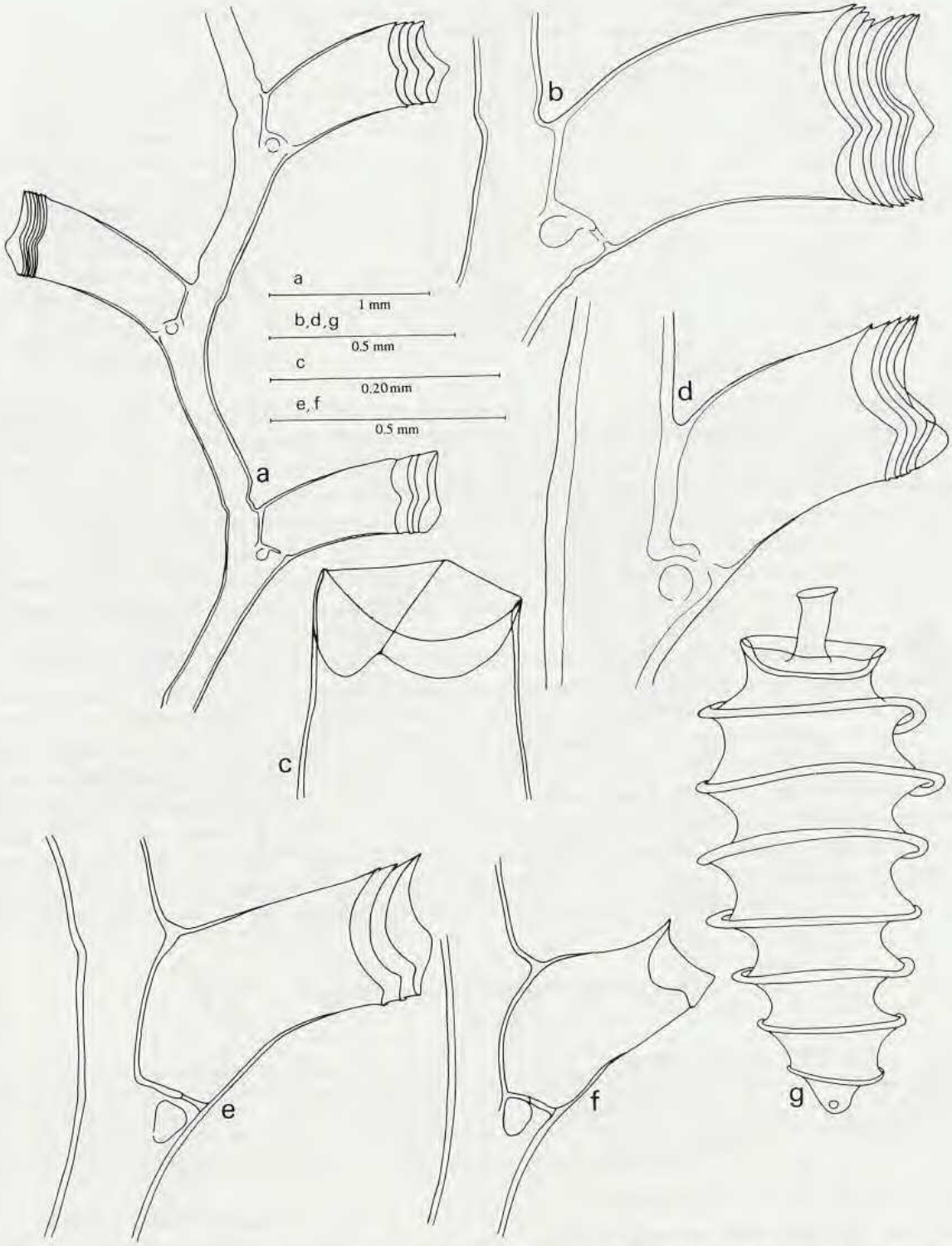

FIG. 55 a-b, d. — *Symplectoscyphus bathyalis* Vervoort, 1972 : **a-b**, BIOCAL, Stn DW 36 : **a**, hydrocladium; **b**, hydrocladial hydrotheca. — **d**, Bay of Biscay, "*Monarch*", 48°04'N-09°23'W, axial hydrotheca.
FIG. 55 c, e-g. — *Symplectoscyphus bathypacificus* sp. nov., holotype, BIOCAL, Stn DW 36 : **c**, top part of hydrotheca in oblique view; **e, f**, hydrocladial hydrothecae; **g**, female gonotheca.
a-b, slide no. 361; c, e-g, slide no. 540; d, slide no. 1392.

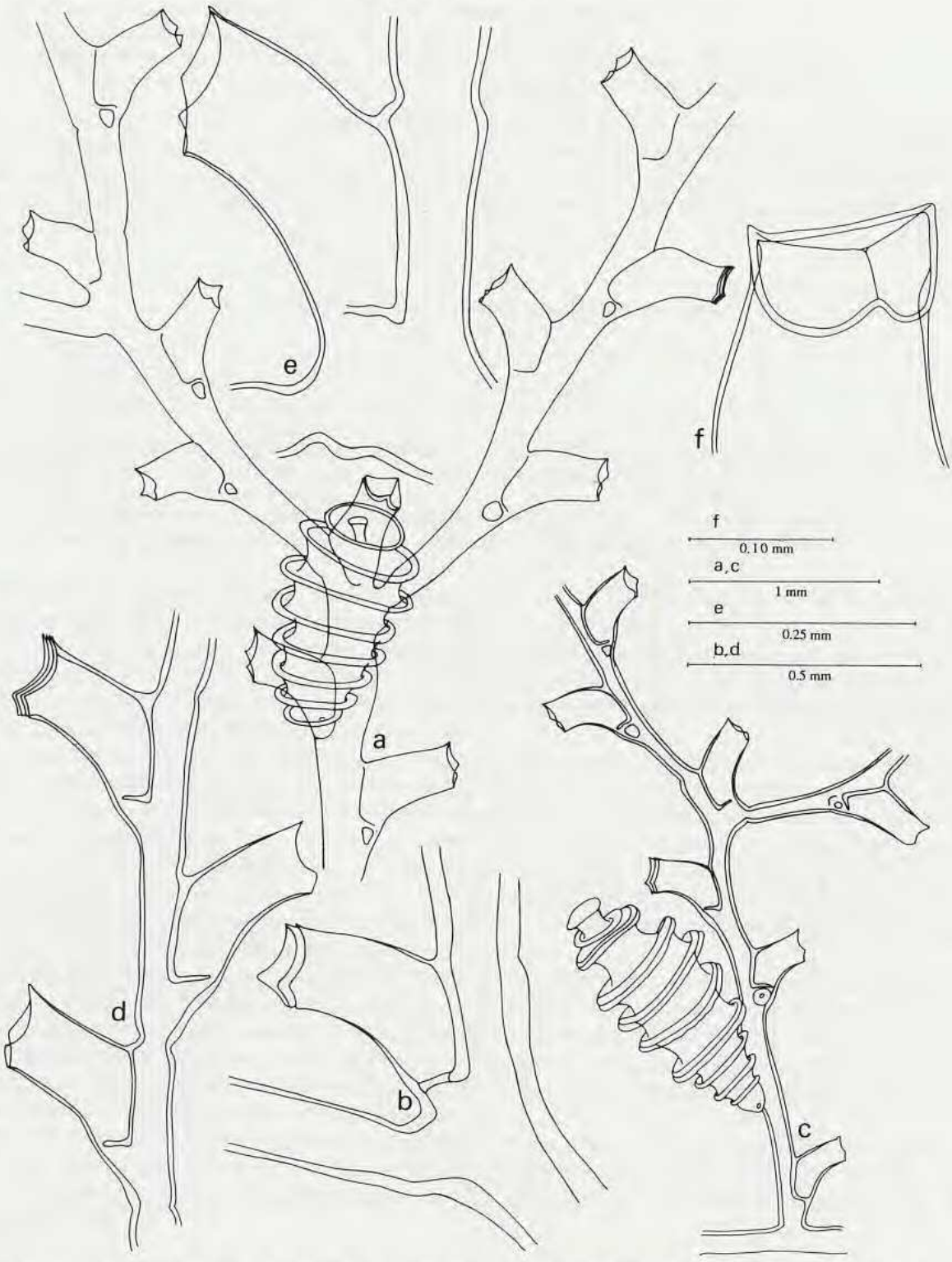

FIG. 56 a-b. — *Symplectoscyphus bathypacificus* sp. nov., holotype, BIOCAL, Stn DW 36 : **a**, part of colony with female gonotheca; **b**, axillary hydrotheca.

FIG. 56 c-f. — *Symplectoscyphus commensalis* sp. nov., holotype, BIOCAL, Stn DW 36 : **c**, basal part of colony with female gonotheca; **d**, part of hydrocladium; **e**, axillary hydrotheca; **f**, top part of hydrotheca, oblique view from above. a-b, slide no. 540; c-e, slide no. 389; f, slide no. 360.

TABLE 45. — Measurements of *Symplectoscyphus bathyalis* Vervoort, 1972, in µm.

	Bay of Biscay (VERVOORT, 1972)	S.E. Pacific (VERVOORT, 1972)	BIOCAL, Stn DW 36 (slide no.361)
Internode, length	1,215 - 2,025	1,150 - 1,285	1,195 - 1,520
diameter at node	205 - 270	135 - 175	195 - 260
Hydrotheca, length abcauline wall *	610 - 675	725 - 745	900 - 930
length free part adcauline wall *	595 - 675	850 - 865	975 - 1,080
length adnate part adcauline wall	285 - 310	330 - 340	255 - 260
total depth *	745 - 760	875 - 945	1,040 - 1,080
maximal diameter	390 - 430	430 - 475	455 - 500
diameter at rim	350 - 375	440 - 450	500 - 540
Gonotheca, maximal diameter	1,010 - 1,150		870 - 935
total length (incl. funnel)	1,350 - 1,480		1,195 - 1,305

(* including renovations)

REMARKS. — This material comes nearest to *Symplectoscyphus bathyalis* Vervoort, 1972, a species closely resembling *Symplectoscyphus paulensis* Stechow, 1923, and mainly differing from that species in the shape of the gonothecae. The description of *S. bathyalis* was based partly on material from the S.E. Pacific, partly on some microslide preparations of Bay of Biscay material discovered in the slide collection of the British Museum (Natural History). Since then alcohol preserved material from which the slides were made has been found in the BMNH collections (bearing the same number, 1950.2.10.1), which has been studied by the author and from which some additional slides for the RMNH collections have been made. This additional material demonstrates the degree of variability in the shape of the hydrothecae, finding expression in total length, degree of curvature, renovation and widening of the hydrothecae (figs 54f, 55b, d).

The BIOCAL, Stn DW 36, material differs from the Bay of Biscay and S.E. Pacific material in having generally larger hydrothecae. They nevertheless agree in shape. The gonothecae in the BIOCAL specimens are slightly smaller and have fewer ribs (4-5 in the BIOCAL material; 7 in the Bay of Biscay specimens). These few differences in variable characters are hardly sufficient to consider the BIOCALmaterial specifically different.

The available material of *Symplectoscyphus bathyalis* has been compared with the only available description of *Symplectoscyphus tropicus* (Hartlaub, 1901) (= *Sertularia variabilis* Clarke, 1894), viz. that by CLARKE, 1894 : 75-76, figs 17-22 on pls 4 and 5. Though an exact comparison is much hampered by the fact that measurements of *S. tropicus* are lacking, there are great differences in the shape of the gonothecae, those of *S. tropicus* being 2.5-3 times as long as wide, with 5-6 'rings' restricted to the distal half. Since CLARKE's description of the species after material from deep Pacific waters off Panama it has never been recorded nor redescribed.

Symplectoscyphus bathypacificus sp. nov.

Figs 55c, e-g, 56a-b

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn DW 33, 23°09.71'S-167°10.27'E, 675-680 m, 29.08.1985 : several colonies 15-30 mm high, no gonothecae (paratypes, MNHN-Hy. 1106). Slides nos 327 (3) and 538 [paratypes, MNHN-Hy. 1106, slide no. 538; BMNH 1989.11.24.80, slide no. 327 (1); RMNH-Coel. 25927, slides no. 327 (2)]. — Stn DW 36, 23°08.64'S-167°10.99'E, 650-680 m, 29.08.1985 (type locality) : several small, ramified colonies on coral fragments, with a few gonothecae. Slide no. 540 (holotype, MNHN-Hy. 1107). Paratype sample RMNH-Coel. 25928.

DESCRIPTION (based mainly on holotype). — Twenty to forty mm high colonies with indistinct main stem, unable to support themselves outside fluid, in mode of colony structure and branching very much like *Symplectoscyphus johnstoni tropicus* ssp. nov. Stems indistinctly divided into internodes, these marked mainly by slight constrictions of perisarc just above axillary hydrothecae. Basal part of stem without internodes or apophyses; after a few mm apophyses appear on left and right side of stem, supporting hydrocladia of 5-8 mm length. Apophyses of stem separated by three hydrothecae, one axillary, one right and one left. All hydrothecae, of stem

and hydrocladia, alternately arranged and in one plane, internodes of stem between apophyses weakly geniculate; hydrocladia straight (fig. 56a).

Hydrothecae varied in form, generally tubular, greatest diameter where adcauline wall becomes free; free portion of adcauline wall usually slightly longer than fused portion, smoothly curved or with slight concavity near rim, causing adcauline cusp to be slightly upturned (fig. 55f, 56b). Abcauline wall smoothly concave (fig. 55e) or with slight flexure at about half its length (fig. 55f). Adnate part of adcauline wall fairly straight, with sharp curve near hydrothecal floor; bottom with large, circular hydropore to permit passage of coenosarc. Hydrothecal aperture not strictly parallel to hydrocladial axis, but slightly turned upwards, rim with three fairly acute cusps, one adcauline, two laterals, separated by semicircular embayments, fitting three triangular, hyaline plates forming closing apparatus (fig. 55c). Number of renovated hydrothecae restricted, though as many as eight renovations may occur. Hydrothecal rim may be slightly thickened, particularly on adcauline side and in renovated hydrothecae.

Remnants of large hydranths present in some of hydrothecae, number of tentacles could not be ascertained.

Perisarc thick on internodes of stem and hydrocladia, thinning out rapidly along adcauline hydrothecal wall but less quickly so along abcauline wall, where proximal half still with thick perisarc. Fenestrae on internodes of stem and hydrocladia directly under hydrothecae.

Gonothecae on stems and hydrocladia, of characteristic appearance, being elongated oval with eight circular, frilled ribs. Distal rib forming a frilled basin from middle of which a fairly long, slender funnel projects upwards; gonothecal aperture at end of this funnel with slightly flaring rim (figs 55g, 56a). Circular ribs with thickened ring, bearing distinct, hyaline frill. Gonothecae stand off from internode, backside not compressed but with circular ribs continuing on that side. All observed gonothecae female, with two large developing eggs or planulae.

TABLE 46. — Measurements of *Symplectoscyphus bathypacificus* sp. nov., in µm.

	S. vanhoeffeni New Zealand (RALPH, 1961a)	*S. bathypacificus* BIOCAL Stn DW 36 (slide no. 540)
Distance between axial hydrothecae on stem	1,750	1,845 - 2,100
Stem internode, diameter	200	175 - 215
Hydrocladial internode, length	400	
diameter	100 - 150	160 - 170
Hydrotheca, length abcauline wall		325 - 370
length free part adcauline wall	170 - 300	260 - 320
length adnate part adcauline wall	200	260 - 280
total depth		435 - 476
diameter at rim	110 - 130	160 - 165
maximal diameter	200	235
Male and female gonotheca, length	1,600	1,300
diameter	700	435
Female gonotheca, length terminal tube	300 - 370	215
diameter at rim terminal tube	250 - 280	110
width of frill	180 - 230	85
Male gonotheca, length terminal tube	150 - 200	
diameter at rim terminal tube	130 - 160	
width of frill	130	

DISTRIBUTION. — Recorded from a restricted area of the northern part of the Norfolk Ridge south of the southeastern extremity of New Caledonia, depth 650-680 m.

REMARKS. — This new species resembles both *Symplectoscyphus vanhoeffeni* Totton, 1930, and *S. tricuspidatus* (Norman, 1853). The hydrothecae in *S. bathypacificus* generally are slightly larger than those of *S. vanhoeffeni*, with a longer free part of the adcauline wall. There are also differences in the shape of the gonothecae: those of *S. vanhoeffeni* being larger and thicker, with a longer and wider terminal tube and a spirally curving, ribbed structure with broader frill. In *S. tricuspidatus* there are distinct internodes, marked by conspicuous

constrictions, while the gonotheca is larger and thicker, with a larger number of rings without frill. The structure of the colonies agrees with that of *Symplectoscyphus johnstoni tropicus* ssp. nov. Secondary and tertiary hydrocladia may develop, so that some colonies appear to be pseudodichotomously branched (fig. 56a). Moreover, there is a tendency to develop tendrils at the end of certain hydrocladia that may act as stolons and give rise to new colonies. Anastomoses also occur fairly frequently. The material described here as *Symplectoscyphus bathypacificus* is almost identical with that recorded as *Symplectoscyphus tuba* Totton, 1930, but for the different shape of the female gonothecae.

ETYMOLOGY. — From the greek *bathys* (deep) and the latin *pacificus* (peacemaking, peaceful, but here used to refer to the Pacific Ocean), indicating the occurrence of this species in deep water of the Pacific.

Symplectoscyphus columnarius (Briggs, 1914)

Sertularella columnaria Briggs, 1914 : 286, 294, fig. 1. — BALE, 1924 : 239. — STEPAN'YANTS, 1979 : 72, pl. 13 fig. 2.
Symplectoscyphus columnarius - STECHOW, 1922 : 148; 1923a : 10; 1923d : 171. — TOTTON, 1930 : 180-181, figs 30, pl. 1 fig. 10. — BRIGGS, 1939 : 29. — RALPH, 1961a : 802, fig. 15d-h; 1961b : 108. — LELOUP, 1974 : 35, fig. 29.

TABLE 47. — Measurements of *Symplectoscyphus columnarius* (Briggs, 1914), in µm (according to RALPH, 1961)

	New Zealand area
Stem internode, length	1,040 - 1,160
diameter at node	400 - 430
Hydrocladial internode, length	730 - 900
diameter at node	350 - 430
Hydrotheca, length abcauline wall	800 - 1,000
length free part adcauline wall	600 - 1,000
length adnate part adcauline wall	400 - 700
width at margin	400 - 600
Distance between hydrothecae measured from base to base	700 - 1,000
Gonotheca, total length	3,200
maximal diameter	1,300 - 1,680
length of funnel	550
diameter of opening	450

This species does not occur in the New Caledonia collection but is listed here because of its close agreement with *Symplectoscyphus pseudocolumnarius* sp. nov., to be described later on.

Symplectoscyphus commensalis sp. nov.

Figs 56c-f, 57a-g, 58a-e

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn DW 36, 23°08.64'S-167°10.99'E, 650-680 m, 29.08.1985 (type locality) : small, erect or slightly ramified, up to 10 mm high colonies on *Sertularella novaecaledoniae* sp. nov. Some gonothecae present. Slides nos 360, 389, 478, 524 and 641. Slide no. 389 of 8 mm high colony with 1 female gonotheca holotype (MNHN-Hy. 1108); slide no. 524 with 2 female gonothecae paratype (RMNH-Coel. 25929); all remaining colonies from this station also paratypes (BMNH 1989.11.24.81, slide no. 478; RMNH-Coel. 25907, slide no. 360, with *Sertularella novaecaledoniae* sp. nov.; RMNH-Coel. 26648, slide no. 641). Also from this station slightly branched 5-8 mm high colony with gonotheca on *Sertularella bipectinata* sp. nov., slide no. 974 (BMNH no. 1989.11.24.81). — Stn DW 37, 22°59.99'S-167°15.65'E, 350 m, 30.08.1985 : several 8-15 mm high colonies on other hydroids; gonothecae present. All in slide no. 520 (RMNH-Coel. 25930). — Stn CP 52, 23°05.79'S-167°46.54'E, 600-540 m, 31.08.1985 : c. 5 mm high colonies on base of *Synthecium hians*. No gonothecae. All in slide no. 534 (MNHN-Hy. 1109).

MUSORSTOM 4 : stn DW 220, 22°58.50'S-167°38.30'E, 505-550 m, 29.09.1985. c. 10 mm high colonies with hydrocladia on *Sertularella novaecaledoniae* sp. nov., no gonothecae (MNHN-Hy. 1110). Two slides no. 471 (RMNH-Coel. 25910, with *Sertularella novaecaledoniae* sp. nov.).

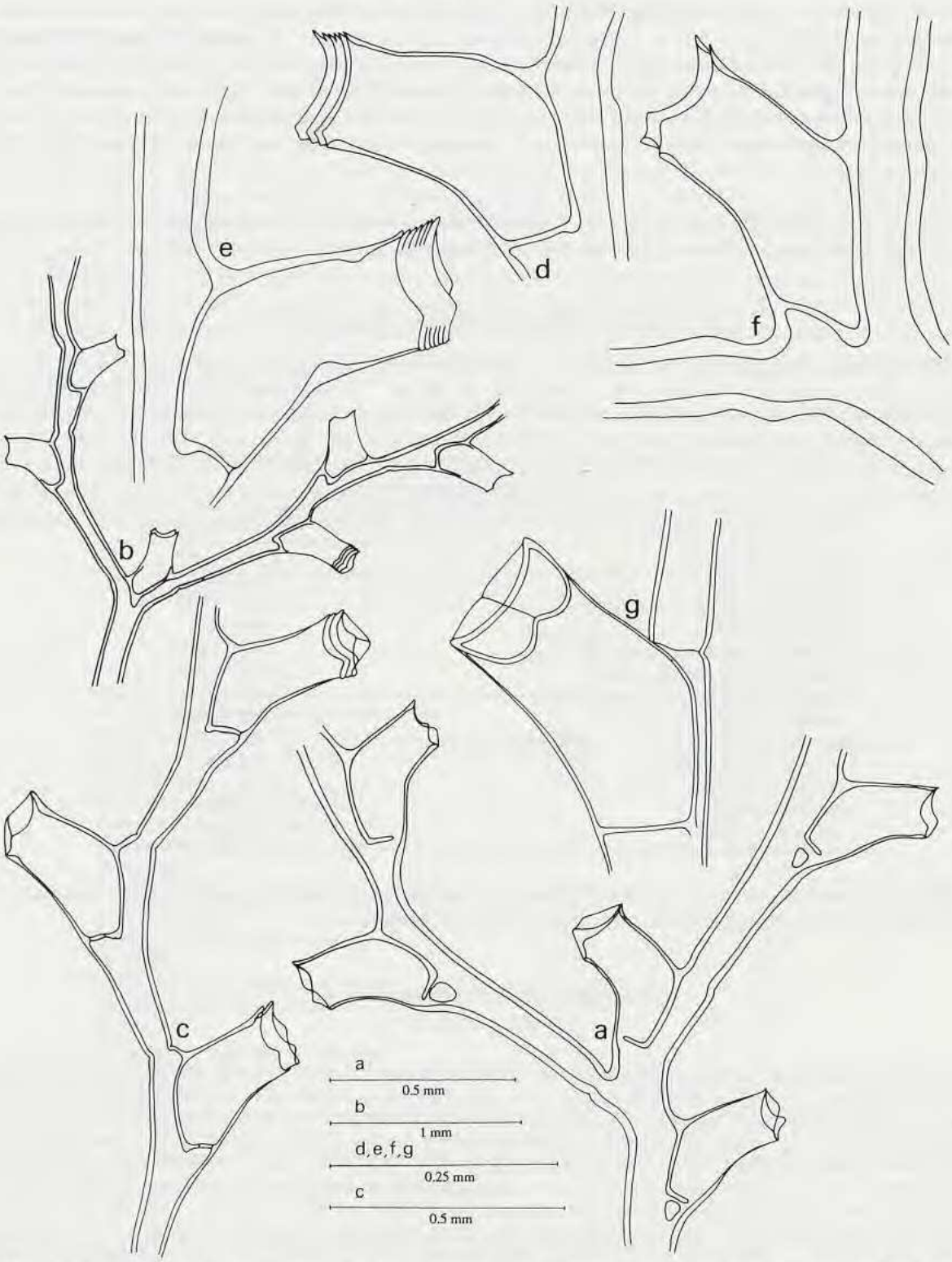

FIG. 57. — *Symplectoscyphus commensalis* sp. nov. : **a,** holotype, BIOCAL, Stn DW 36, part of stem. — **b-g**, BIOCAL, Stn DW 37 : **b**, part of stem; **c**, part of hydrocladium; **d**, hydrocladial hydrotheca, lateral view; **f**, axillary hydrotheca; **g**, hydrocladial hydrotheca, oblique view.
a, slide no. 360; b-g, slide no. 520.

DESCRIPTION (mainly based on material from BIOCAL, Stn DW 36). — Erect stems or stems bearing several hydrocladia rising from stolon creeping on *Sertularella novaecaledoniae* and occasionally on other hydroids, maximal height c. 15 mm. Stems monosiphonic, unforked, straight or slightly geniculate when bearing hydrocladia (fig. 56c). Division of stem and hydrocladia into internodes indistinct, only marked by constrictions of perisarc, best visible above axial hydrothecae. Hydrocladia originate from apophyses under axial (stem) hydrothecae, occasionally hydrocladia with secondary and tertiary hydrocladia (fig. 57a). Usually three hydrothecae between two successive hydrocladia (one axial, one left, one right); basal portion of hydrocladium fairly long.

Hydrothecae tubular, distinctly curved away from internode; free part adcauline wall usually slightly longer than adnate part, in renovated hydrothecae up to 1.5 times length of adnate part (fig. 56d). Abcauline hydrothecal wall distinctly concave, rounded, basally running into distinct swelling at base of hydrotheca; usually, but not consistently, with more or less triangular fenestra. Free part of adcauline hydrothecal wall usually convex and smoothly rounded (fig. 56e), in some hydrothecae almost straight (fig. 56d). Adnate part adcauline wall straight, at base of hydrotheca with sharp flexure; hydrothecal floor not fully closed but with large opening (hydropore) between end of bottom plate and inside abcauline wall (fig. 56e). Hydrothecal aperture with three fairly acute cusps, one adcauline and two laterals, separated by rounded, shallow embayments, into which fit three hyaline flaps of opercular apparatus, when closed forming shallow, acutely pointed roof over hydrothecal aperture. Hydrothecal rim slightly thickened (fig. 56f); thickening may increase by process of renovation, which is of common occurrence in this species. Repeatedly renovated hydrothecae may even give impression of carrying intrathecal teeth under each marginal cusp (fig. 57e). Plane of aperture slightly tilted in upward direction.

Perisarc of colony strong, particularly on internodes, thinning out along hydrothecal walls; only few collapsed hydrothecae observed.

Hydranths small, fully contracted in specimens available, attached to hydrothecal floor and with filament running to a point halfway internal surface abcauline wall; number of tentacles could not be ascertained.

Gonothecae of both sexes present, occurring on separate colonies. Female gonotheca elongated ovoid, with short pedicel attached to fenestra under hydrotheca of stem or hydrocladium (fig. 56c). Surface with 7-8 elevated circular ribs, margin of each rib with broad, hyaline flap (fig. 58a). Terminal rib forming elevated platform surrounded by hyaline border in middle of which rises a considerably widening funnel with everted margin. Width of funnel margin varied in specimens observed, in some almost sucker-shaped (fig. 58a-b). Body of gonotheca between ribs contracted, longitudinally striated. Gonothecal contents consist of two eggs or developing planulae. Male gonotheca slightly more swollen; funnel at apex slender, cylindrical, with slightly everted margin (fig. 58d-e). Shed gonothecae leave circular hole under hydrotheca, hole surrounded by halo of thickened perisarc, overlaying fenestra.

TABLE 48. — Measurements of *Symplectoscyphus commensalis* sp. nov., in µm.

	BIOCAL, Stn DW 36	
	female colony (slides nos 389 & 524)	male colony (slide no. 360)
Internode, length	615 - 815	690 - 705
diameter at node	75 - 95	65 - 90
Hydrotheca, length abcauline wall *	250 - 265	225 - 260
length adnate part adcauline wall	190 - 205	210 - 215
length free part adcauline wall *	215 - 235	185 - 225
total depth *	295 - 340	320 - 335
diameter at rim	135 - 140	135 - 140
maximal diameter	155 - 170	155 - 160
Gonotheca, length, incl. funnel	1,185	740 - 1,000
diameter, incl. frill	520	480 - 505
length funnel	110	180 - 185
diameter at rim	150	75 - 110
internal diameter	75	60 - 90

(* = including renovations)

FIG. 58 a-e. — *Symplectoscyphus commensalis* sp. nov., BIOCAL, Stn DW 36 : **a**, female gonotheca; **b**, top part of female gonotheca; **c**, male gonotheca; **d, e**, top part of male gonothecae.

FIG. 58 f-i. — *Symplectoscyphus* cf. *commensalis* sp. nov., MUSORSTOM 4, Stn DW 222 : **f**, part of colony; **g**, part of hydrocladium; **h**, hydrocladial hydrotheca; **i**, axillary hydrotheca.

a-b, slide no. 524; c, slide no. 520; d-e, slide no. 360; f-i, slide no. 536.

DISTRIBUTION. — *Symplectoscyphus commensalis* has been observed on *Sertularella bipectinata* sp. nov. and *S. novaecaledoniae* sp. nov.; one specimen was found on *Synthecium hians* Millard, 1957. All records are from a restricted area of the northern part of the Norfolk Ridge south of the southeastern tip of New Caledonia.

REMARKS. — This is a small species resembling *Symplectoscyphus bathypacificus*, but smaller in all dimensions, with different height and structure of the colony and with different gonothecae; so far it has only been observed epizootically. The specimens from BIOCAL, Stn DW 37, differ from previously described colonies in the following details :

1. Epizoic on stem of unrecognizable hydroid; small, 8-15 mm high colonies rising from creeping stolon, unbranched or with a few hydrocladia that give impression of pseudodichotomy (fig. 57b).

2. Hydrothecae with repeated renovations. Hydrothecal rim in such specimens thickened; intrathecal cusps also observed to occur some distance under rim of primary (original) hydrotheca, at times being of considerable size (fig. 57d-e).

3. Perisarc thicker, particularly on internodes, but also along hydrothecal walls, especially of adcauline wall, forming a distinct knob at end of that wall (fig. 57a, c, f).

4. Male gonothecae occur on both stem and hydrocladia, inserting under a hydrotheca, tightly pressed against stem, flattening backside of gonotheca. There are 7-8 circular, elevated ribs with thickened rim; apical ribs in addition with a fine frill, diminishing in width on the more proximal ribs and gradually disappearing. Topmost ring forming small platform in middle of which inserts a tube with flaring mouth. Gonothecae all contain single oval mass of developing spermatocytes (fig. 58c).

For the purpose of comparison the measurements (in µm) of *Symplectoscyphus commensalis* sp. nov. and those of *Symplectoscyphus epizooticus* Totton, 1930, from the New Zealand area have been listed below. Both species differ considerably in the shape of the gonothecae, but the gonotheca described by TOTTON (1930 : 185, fig. 36a) may not have been fully mature.

	S. epizooticus New Zealand (RALPH, 1961a)	*S. commensalis* BIOCAL Stn DW 37
Internodes, length	700	740 - 665
diameter	120	65 - 105
Hydrotheca, length abcauline wall *	200	200 - 245
length free part adcauline wall *	230	190 - 205
length adnate part adcauline wall	200	175 - 190
total depth *		280 - 295
diameter at rim	130	120 - 135
maximal diameter	150	140 - 150
(Male) gonotheca, length, incl. funnel	660	815
maximal diameter, incl. frill	340	400
length funnel	90	
diameter at aperture	70	95

(* = including renovations)

ETYMOLOGY. — From the latin *commensalis*, sharing the same table, referring to the occurrence of this species on larger sertulariids.

Symplectoscyphus cf. *commensalis* sp. nov.

Fig. 58f-i

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4 : stn DW 212, 22°47.40'S-167°10.50'E, 380 m, 28.09.1985 : branched, 10-15 mm high colonies from stolon creeping on *Sertularella leiocarpoides* sp. nov. No gonothecae; slide no. 975 (all RMNH-Coel. 25931). — Stn DW 222, 22°57.6'S-167°33.0'E, 410-440 m, 30.09.1985 : ten mm long fragment with 3 branches; no gonothecae. All in slide no. 536 (MNHN-Hy. 1111).

SMIB 5 : stn DW 72, 23°42.0'S-168°00.8'E, 400 m, 07.09.1989 : branched 5 mm high fragment of a larger colony, no gonothecae; all in slide no. 978C (BMNH 1989.11.24.82).

DESCRIPTION (based on MUSORSTOM 4, Stn DW 222, specimen). — Stem c. 10 mm long, bearing three hydrocladia, basally with a few secondary tubules. Both stem and hydrocladia divided into internodes, but nodes quite variously developed, being at times no more than perisarcal constrictions, while at other points of stem or hydrocladia being distinct, slightly twisted and usually oblique (fig. 58f). Hydrocladia springing from apophyses on stems; three hydrothecae between two successive apophyses, one of which is axillary, axis between apophyses geniculate. Length of internodes varied, longest at base of hydrocladium, weakly geniculate, shortening along length of hydrocladium.

Hydrothecae tubular, abcauline wall forming an almost straight line with continuation of hydrocladial wall (fig. 58g), occasionally weakly concave. Adnate part of adcauline wall slightly convex or straight, floor of hydrotheca formed by flexed part of adcauline wall, with large hydropore for passage of coenosarc (fig. 58h, hole so large that hydrothecal floor might be considered open). Free part of adcauline wall leaving internode at angle of c. 45 degrees, distinctly upturned at the adcauline hydrothecal cusp. Hydrothecal rim firm but not thickened, with three acute cusps (one adcauline, two laterals), of which adcauline is upturned (fig. 58h-i). No intrathecal cusps. Closing apparatus composed of three hyaline plates fitting the deep semicircular embayments between the cusps and when closed forming low roof (fig. 58h).

Hydranths fairly large, completely retracted in my specimens, so that number of tentacles could not be counted, but in contracted condition filling nearly whole of interior of hydrotheca. A distinct (muscular?) strand running from internal flexure in hydrothecal floor to a point slightly under middle of internal abcauline wall in an almost straight line.

Perisarc of colony firm, especially on internodes, thinning out along hydrothecal walls, of which only a few damaged.

No gonothecae observed, no fenestrae occurring under hydrothecae.

DISTRIBUTION. — The colonies discussed above were all found on *Sertularella leiocarpoides* sp. nov. at three localities in a restricted area northwest of the northern tip of the Norfolk Ridge, depth 380-440 m.

REMARKS. — This material has been kept separate from *Symplectoscyphus commensalis* sp. nov. because of the following reasons :

1. It is sterile.
2. Though agreeing in general shape of the hydrothecae it is slightly larger in all dimensions.
3. The internodes are well marked by oblique peridermal constrictions and are markedly long and slender.

TABLE 49. — Measurements of *Symplectoscyphus* cf. *commensalis* sp. nov., in µm.

	MUSORSTOM 4 Stn DW 212 (slide no.975)	MUSORSTOM 4 Stn DW 222 (slide no. 536)	SMIB 5 Stn DW 72 (slide no.978)
Hydrocladial internode, length	520 - 740	435 - 740	465 - 480
diameter at node	75 - 90	60 - 75	60 - 65
Hydrotheca, length abcauline wall *	255 - 260	235 - 250	235 - 260
length free part adcauline wall *	185 - 205	160 - 170	200 - 215
length adnate part adcauline wall	185 - 200	170 - 185	175 - 185
total depth *	305 - 310	310 - 325	320 - 340
diameter at rim	125 - 140	125 - 130	125 - 135
maximal diameter	145 - 155	140 - 150	145 - 155

(* = including renovation)

Symplectoscyphus effusus sp. nov.

Figs 59a-h, 60a-e

MATERIAL EXAMINED. — **New Caledonia**. CHALCAL 2 : stn DW 83, 23°20.30'S-168°05.50'E, 200 m, 31.10.1986 (type locality) : c. 15 mm high colony with tendril producing additional small colonies. No gonothecae. With *Halecium tenellum* Hincks, 1861 and *Filellum serratum* (Clarke, 1879). All in one slide no. 294 (holotype, MNHN-Hy. 1112).

SMIB 4 : stn DW 57, 23°21.5'S-168°04.6'E, 260 m, 09.03.1989 : two sterile colonies 8-10 mm high; no slide (RMNH-Coel. 25932).

SMIB 5 : stn DW 72, 23°42.0'S-168°00.8'E, 400 m, 07.09.1989 : three fragments, 8-10 mm high, branched, one with single gonotheca. All in slide no. 977A (paratype, RMNH-Coel. 25933); fragment in slide no. 978B (with *Symplectoscyphus ralphae* sp. nov. and *Acryptolaria* sp., RMNH-Coel. 25934). — Stn DW 85, 22°20.0'S-169°42.9'E, 260 m, 13.09.1989 : three small, 15 mm high colonies without gonothecae, attached by forming anastomoses, made up in slide no. 942 (RMNH-Coel. 25935). — Stn DW 101, 23°21.2'S-168°04.9'E, 270 m, 14.09.1989 : two colonies c. 10 mm high attached by stolon; 1 gonotheca, slide no. 979 (paratype, BMNH 1989.11.24.83). In addition 2 fragments 12 mm high without gonothecae; all in slide no. 996 (MNHN-Hy. 1113).

DESCRIPTION (based on CHALCAL 2, Stn DW 83, material). — Small, straggling species with fine, pseudo-dichotomously branched stem unable to support itself outside fluid. Axis with indistinct internodes, occasionally indicated by perisarcal constrictions, no transverse or oblique septa have been observed. Axis and hydrocladia with alternately arranged hydrothecae, all in same plane (fig. 60a). Hydrocladia with 5-10 hydrothecae rising from short apophyses on stem under an axillary hydrotheca; three hydrothecae between two successive apophyses, one axillary, one right and one left. Internodes of hydrocladia as indistinctly visible as along stem, first internode longer than those along rest of hydrocladium.

Hydrothecae fairly variable in shape, more or less tubular, apical portion standing away from internode at angle of c. 50 degrees. Adnate part of adcauline wall c. 3/4 length of free part or shorter. Free part adcauline wall straight or slightly convex, with slight concavity near end, adcauline marginal cusp slightly upturned. Abcauline hydrothecal wall smoothly running into internodal wall or with slight concavity or angle. Adnate part of adcauline wall straight, sharply flexed at hydrothecal floor; a minor notch may be present (fig. 60b-c). Hydrothecal margin with three fairly sharply pointed cusps (one adcauline, two laterals), separated by deep, semicircular embayments, fitting triangular plates of closing apparatus, this when closed forming shallow roof (fig. 60d-e). Number of renovations reduced, 1-3 being occasionally present (fig. 60c). Renovated hydrothecae usually with slightly thickened rim. Hydranths occasionally present, attached to basal plate of hydrotheca, no oblique attachment to inside abcauline wall has been observed. Number of tentacles could not be ascertained.

Perisarc of internodes fairly thick, rapidly thinning out along hydrothecal walls but still quite strong as no collapsed hydrothecae seen.

No gonothecae on holotype and no foraminae under hydrothecae found; colony probably quite young. A single gonotheca on each paratype, being found attached to stem. Gonotheca ovoid, broadest region in middle, narrowing basally and there running into short pedicel by means of which it is attached. A spirally curving strong rib forming 5-6 transverse coils runs length of gonotheca, forming circular basin at apex in middle of which is a short funnel with everted rim (fig. 59h). Spirally coiled rib provided with distinct hyaline border, broadest at apex and gradually disappearing downwards; hyaline flap curved downwards. Body of gonotheca strongly constricted between transverse ribs and furrowed. Both gonothecae empty.

DISTRIBUTION. — Recorded from a restricted area of the extreme northern part of the Norfolk Ridge south of the southeastern tip of New Caledonia, depth 200-400 m.

REMARKS. — One of the hydrocladia of the holotype forms an elongated tendril, from which several small colonies arise. The number of hydrothecal renovations in the holotype is reduced, but it is much larger in some of the hydrothecae of the paratypes (fig. 59b-c). In the colonies from SMIB 5, Stn DW 85, there are several anastomoses, while the hydrothecae are comparatively slender and have many renovations (fig. 59a-g). This new species has affinities with the *Symplectoscyphus johnstoni* group of species, but the colony structure is much finer,

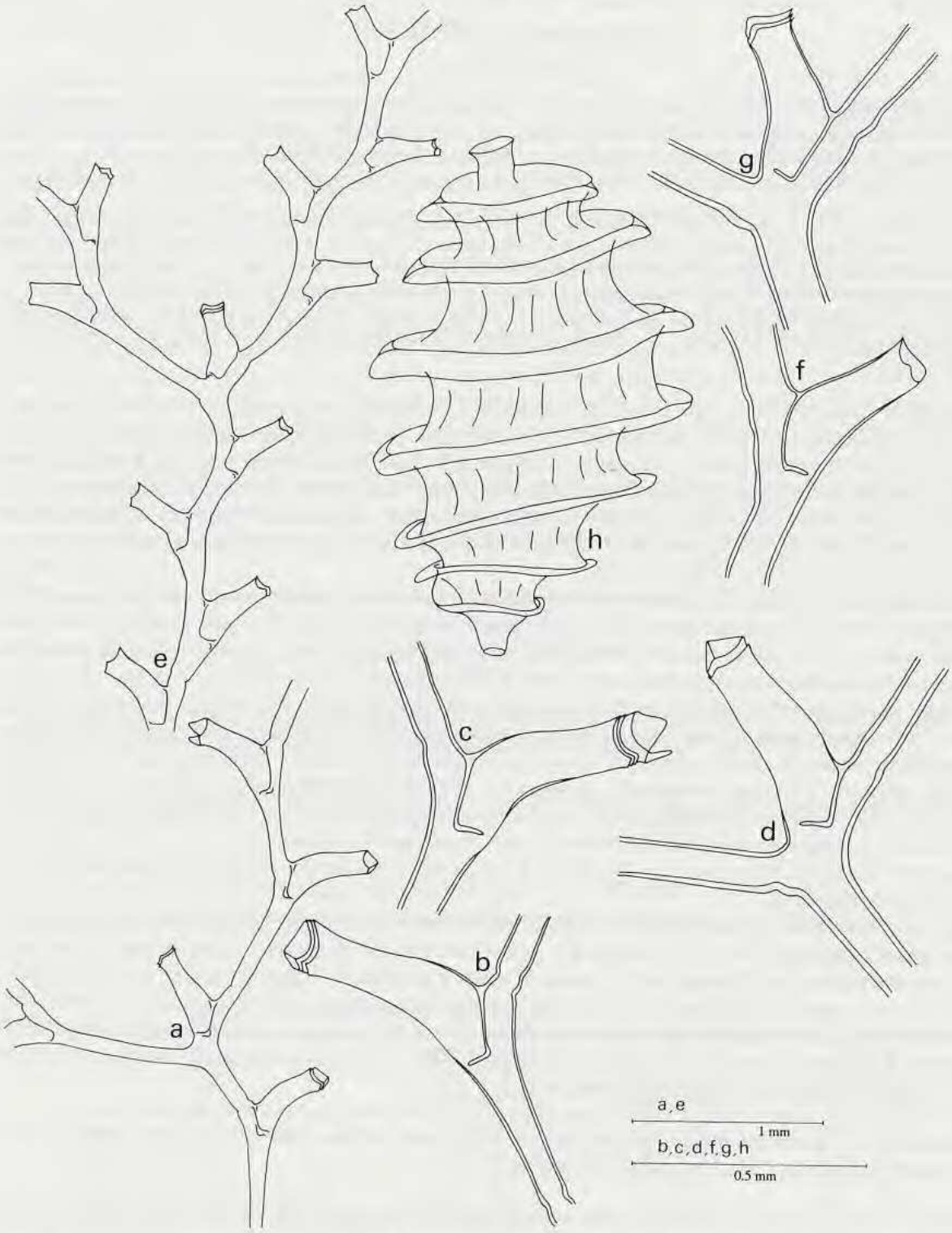

FIG. 59. — *Symplectoscyphus effusus* sp. nov. : **a-d,** SMIB 5, Stn DW 85 : **a**, part of colony; **b, c,** hydrocladial hydrothecae; **d**, axillary hydrotheca. — **e-g**, SMIB 5, Stn DW 101 : **e**, part of colony; **f**, hydrocladial hydrotheca; **g**, axillary hydrotheca. — **h**, paratype, SMIB 5, Stn DW 72, gonotheca.
a-d, slide no. 942; e-g, slide no. 979; h, slide no. 977.

the internodes more slender, the hydrothecae are smaller and the free portion of these hydrothecae is proportionally longer.

TABLE 51. — Measurements of *Symplectoscyphus effusus* sp. nov., in µm.

	CHALCAL 2 DW 08 (slide no.294)	SMIB 5 DW 72 (slide no.977)	SMIB 5 DW 101 (slide no.979)	SMIB 5 DW 85 (slide no. 942)
Internode, length	405 - 690	585 - 705	480 - 605	520 - 705
diameter at node	65 - 90	140 - 150	120 - 160	75 - 80
Hydrotheca, length abcauline wall *	295 - 320	335 - 405	295 - 360	320 - 370
length free part adcauline wall *	215 - 235	330 - 420	260 - 265	325 - 575
length adnate part adcauline wall	155 - 170	155 - 185	155 - 170	135 - 150
total depth *	300 - 345	430 - 490	370 - 395	385 - 430
diameter at rim	105 - 120	110 - 125	95 - 110	90 - 95
maximal diameter	135 - 140	150 - 160	110 - 135	110 - 125
Gonotheca, total length	1,110	1,128		
maximal diameter	645	665		
length of funnel	120	125		
diameter of funnel at apex	110	160		

(* = including renovations)

ETYMOLOGY. — The specific name *effusus* is a reference to the fine, open structure of the colonies, the latin word 'effusus' meaning extended, dispersed.

Symplectoscyphus johnstoni subtropicus Ralph, 1961

Fig. 60f-i

Symplectoscyphus johnstoni - TOTTON, 1930 : 181, fig. 32a-c.
Symplectoscyphus johnstoni forma *subtropicus* Ralph, 1961a : 811, fig. 18l-n.

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4 : Stn CP 155, 18°52.80'S-163°19.50'E, 570 m, 15.09.1985 : several small up to c. 10 mm high colonies and many fragments. Many appressed gonothecae (RMNH-Coel. 25937). Two slides no. 533; one of slides composite, also bearing *Symplectoscyphus johnstoni tropicus* ssp. nov. (MNHN-Hy. 1114, one of slides 533; RMNH-Coel. 25936, composite slide no. 533).

DESCRIPTION (based on specimens from MUSORSTOM 4, Stn CP 155). — Colonies composed of erect, monosiphonic stems, usually interwoven and with many anastomoses. Stems usually with pinnately arranged sidebranches that rebranch again several times, occasionally more or less dichotomously, creating a fairly regular pattern. Stems may aggregate together forming a bushy complex. Stems and branches composed of internodes separated by perisarcal constrictions; nodes only occasionally developed, straight, one or two hydrothecae per internode. Arrangement of internodes such that zig-zag arrangement of stem and branches is obvious, much more so than in *Symplectoscyphus johnstoni tropicus*, ramifications and hydrothecae not always strictly in one plane.

Hydrothecae found nearly at end of internode, tubular, with straight adcauline wall, leaving internode at an angle of c. 45 degrees and slightly concave abcauline wall, apical portion not everted (as in *S. johnstoni tropicus* ssp. nov.); fused part of adcauline wall as long as or slightly shorter than free portion, sharply bent at base of hydrotheca and with circular hydropore for passage of coenosarc (fig. 60g-h). Hydrothecal rim distinctly thickened, with three cusps separated by rounded embayments, only slightly recurved (best seen in adcauline tooth), with 2-3 renovations. Internal hydrothecal cusps occasionally present, placed some distance from rim on internal hydrothecal wall (fig. 60i). Usually one or two teeth present, rarely three teeth having been observed. Place of internal teeth not strictly intermediate between marginal cusps; a single internal tooth, when present, usually coinciding with abcauline cusp, occasionally internal cusp renovated (fig. 60h). Closing apparatus composed of three hyaline, triangular flaps, when closed forming a low roof.

FIG. 60 a-e. — *Symplectoscyphus effusus* sp. nov., holotype, CHALCAL 2, Stn DW 83 : **a,** part of colony; **b, c,** hydrocladial hydrothecae; **d, e,** axillary hydrothecae.

FIG. 60 f-i. — *Symplectoscyphus johnstoni subtropicus* Ralph, 1961, MUSORSTOM 4, Stn CP 155 : **f,** part of colony with gonotheca; **g,** part of axis with axial hydrothecae and gonotheca; **h,** hydrocladial hydrotheca, slightly oblique view; **i,** top part of hydrocladial hydrotheca, oblique side view.

a-e, slide no. 274; f-i, slide no. 533.

Sidebranches (or occasionally hydrocladia) springing from apophysis under axillary hydrotheca; this hydrotheca slightly turned toward front of colony (fig. 60f). Circular hyaline spot visible under majority of hydrothecae, absent under axillary hydrothecae; gonothecae springing from such foramina.

Hydranths present in nearly all hydrothecae, indicating material having been captured alive, fairly large for such small hydrothecae; base of hydranth attached to inside of abcauline hydrothecal wall by means of oblique muscular strand that may create the impression of an oblique septum.

Gonothecae plentiful, springing from circular foramina under hydrothecae (fig. 60f), elongated sack-shaped, three times as long as wide, pressed against internode, resulting in flattened backside of gonotheca; all occur on frontal aspect of colony. Apical portion flattened, with eccentrically placed short funnel with everted margin (fig. 60g). A spirally coiled ribbon starts on the apical platform, curving down gonotheca in 9-10 spiral twists (that may easily give the impression of circular ribs), each twist with thickened outer edge without frill. Only female gonothecae observed, these carrying two large eggs.

TABLE 50. — Measurements of *Symplectoscyphus johnstoni* (Gray, 1843) and *S. j. subtropicus* Ralph, 1961

	S. j. johnstoni New Zealand (RALPH, 1961a)	*S. j. subtropicus* MUSORSTOM 4 CP 155
Internode, length	400 - 800	665 - 890
diameter at node	100 - 130	110 - 160
Hydrotheca, length abcauline wall *	250 - 350	260 - 280
length free part adcauline wall *	100 - 160	220 - 295
length adnate part adcauline wall	150 - 220	200 - 215
total depth *	335 - 370	
diameter at rim	100	150 - 175
maximal diameter	150 - 220	185 - 210
Female gonotheca, length (incl. funnel)	850 - 1,500	850 - 890
maximal diameter	400 - 700	425 - 450

(* = including renovations)

DISTRIBUTION. — Originally described from Cape Maria van Diemen, New Zealand, depth 35-40 fms (= 64-73 m) (TOTTON, 1930); later recorded from the same locality by RALPH (1961). The present material originates from the Pacific north of New Caledonia.

REMARKS. — I have identified the present specimens with those described by RALPH (1961 : 811) as *Symplectoscyphus johnstoni* forma *subtropicus*, raising it to subspecific rank; the nominotypical subspecies, *S. johnstoni johnstoni* (Gray, 1843) does not occur in the New Caledonia collection. The MUSORSTOM specimens agree closely with RALPH's description of the nominotypical subspecies, particularly in colony structure, but the hydrothecae have thickened rims and usually internal marginal cusps. Points of difference from RALPH's *S. johnstoni* forma *subtropicus* concern the development of the intrathecal cusps : in RALPH's specimens there are three while one or two cusps is the usual condition in the New Caledonia specimens, and their position is not always strictly intermediate between the marginal cusps. Furthermore some of the gonothecae approach those described by RALPH for *S. johnstoni johnstoni* in the proportion of length and width but I find this character to be dependent upon the side from which the gonotheca is observed, as it is oval in cross section. I do not think differences in such variable characters as the development in intrathecal cusps or length-width proportions of gonothecae warrant the erection of another new subspecies, the more so since the agreement in other details is striking. The present locality, waters north of New Caledonia, forms a considerable extension of the geographical range of this subspecies.

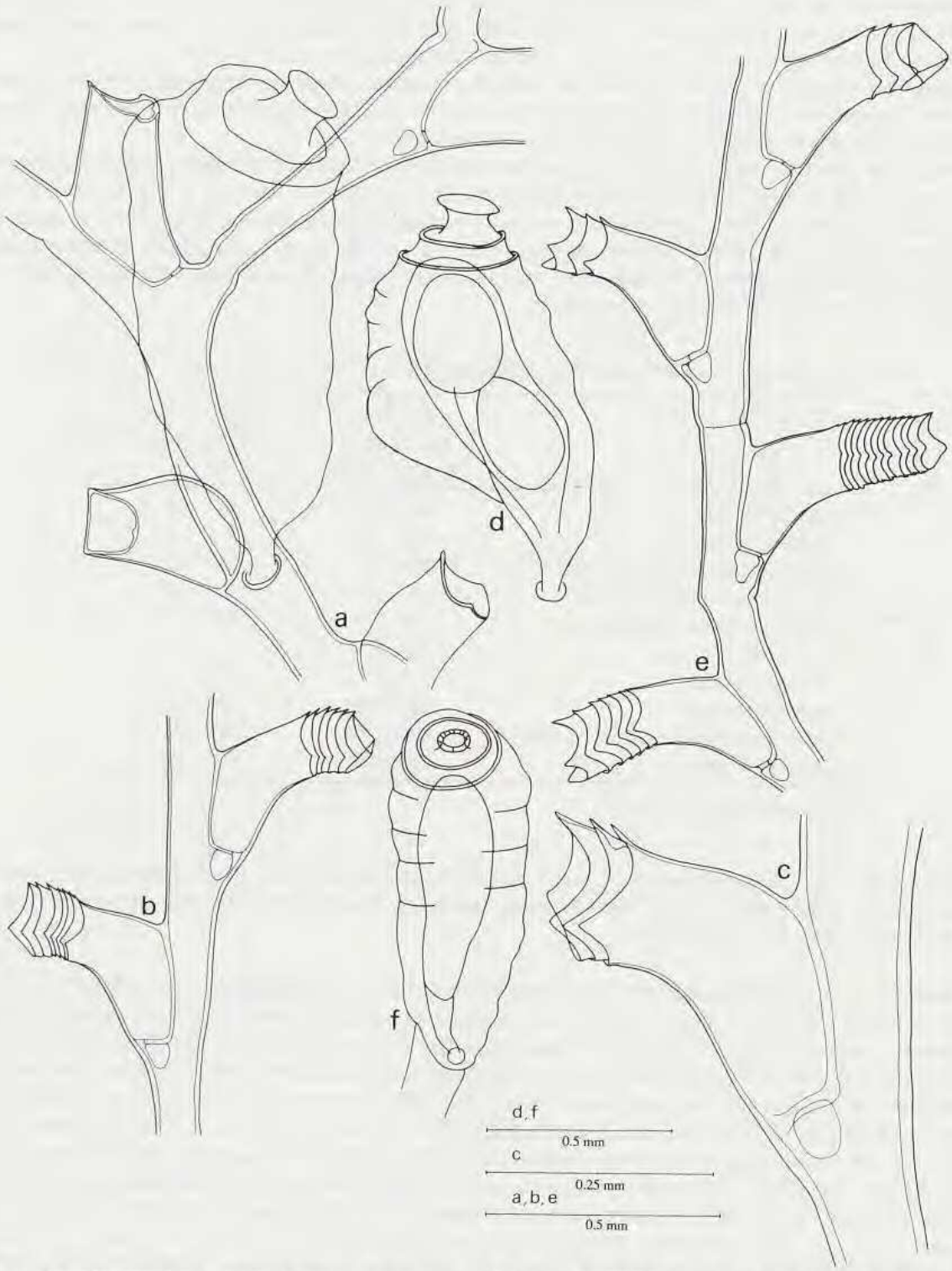

FIG. 61. — *Symplectoscyphus johnstoni tropicus* ssp. nov. : **a,** BIOCAL, Stn DW 36, part of axis with female gonotheca. — **b-d,** paratype, MUSORSTOM 4, Stn CP 153 : **b**, part of hydrocladium with pair of (renovated) hydrothecae; **c**, hydrocladial hydrotheca; **d**, female gonotheca. — **e**, MUSORSTOM 4, Stn CP 174, part of hydrocladium with strongly renovated hydrothecae. — **f**, MUSORSTOM 4, Stn CP 190, male gonotheca.

a, slide no. 362; b-d, slide no. 541; e, slide no. 529; f, slide no. 554.

Symplectoscyphus johnstoni tropicus ssp. nov.

Figs 61a-f, 62a-d

MATERIAL EXAMINED. — **New Caledonia**. LAGON : stn 500, 19°04.3'S-163°30.5'E, 225 m, 04.03.1985 : tangled colonies with geniculate axis and some anastomoses, 10-15 mm high, many gonothecae. Slides nos 906 and 921A (MNHN-Hy. 1115, slide no. 906; RMNH-Coel. 25938, slide no. 921A, with *Hicksella* sp.).

BIOCAL : stn DW 36, 23°08.64'S-167°10.99'E, 650-680 m, 29.08.1985 : small, 20 mm high monosiphonic colony with a few gonothecae. Branches pinnately arranged, dividing dichotomously. All in slide no. 362 (BMNH 1989.11.24.84). — Stn CP 84, 20°43.49'S-167°00.27'E, 210-150 m, 06.09.1985 : several colonies up to 20 mm high composed of monosiphonic stems, bearing pinnately arranged branches all in one plane. Nodes indistinct. Colonies with occasional anastomoses. One gonotheca (MNHN-Hy. 1116). Two slides no. 287 (one BMNH 1989.11.24.85; one RMNH-Coel. 25939).

MUSORSTOM 4 : stn CP 153, 19°04.20'S-163°21.20'E, 235 m, 14.09.1985 (type locality) : several well developed, flabellate colonies 30x50 mm, stems basally polysiphonic; many appressed gonothecae. Attached to coral fragments and occasionally larger hydroids. Many fragments. Slides nos 484, 541 and 1019. One large colony 30x40 mm is holotype (MNHN-Hy. 1117), rest of material paratypes; slides partly schizoholotypes (MNHN-Hy. 1117, schizoholotype slide no. 484; BMNH 1989.11.24.86, paratype sample and schizoholotype slide no. 484; RMNH-Coel. 25940, paratype sample and 2 slides no. 1019; RMNH-Coel. 25941, schizoholotype slide no. 541). — Stn CP 155, 18°52.80'S-163°19.50'E, 570 m, 15.09.1985 : two small up to 10 mm high colonies and some fragments. Base of stem polysiphonic; no gonothecae (RMNH-Coel. 25942). One of slides no. 533 (composite, also *Symplectoscyphus johnstoni subtropicus* Ralph, 1961; RMNH-Coel. 25936). — Stn CC 174, 19°00.30'S-163°18.50'E, 385 m, 17.09.1985 : large tangled tuft of c. 30 mm high colonies on wormtubes with many appressed gonothecae. Also many fragments with gonothecae, slides nos 529 (MNHN-Hy. 1118) and 644 (RMNH-Coel. 26649). — Stn CP 190, 19°06.30'S-163°29.50'E, 215 m, 19.09.1985 : large number of c. 30 mm high colonies basally polysiphonic, as well as many fragments. A few appressed gonothecae present; slide no. 554 (all RMNH-Coel. 25943).

CHALCAL 2 : stn DW 83, 23°20.30'S-168°05.50'E, 200 m, 31.10.1986 : three colonies up to 15 mm high and some fragments; several gonothecae present. With *Hebella* sp. All in 2 slides no. 1678 (RMNH-Coel. 26654).

SMIB 4 : stn DW 52, 23°40.6'S-168°00.5'E, 250 m, 09.03.1989 : c. 40 mm high, tangled colony; no gonothecae, slide no. 779 (all BMNH 1989.11.24.87). — Stn DW 55, 23°21.4'S-168°04.5'E, 260 m, 09.03.1989 : ramified and anastomosing colonies from stolon on sponge, largest c. 25 mm high, with gonothecae; slides nos 898, 931 and 937 (all RMNH-Coel. 25944).

SMIB 5 : stn DW 95, 22°59.7'S-168°19.8'E, 200 m, 14.09.1989 : small fragments, partly on coral fragments; no gonothecae. Slide no. 945. In addition several tangled colonies 15x15 mm with gonothecae and many fragments, all in slide no. 1012 (MNHN-Hy. 1119, sample and slide no. 945; RMNH-Coel. 25945, slide no. 1012). — Stn DW 101, 23°21.2'S-168°04.9'E, 270 m, 14.09.1989 : a fairly large number of tangled colonies, 15x15 mm, some with gonothecae; no slide (RMNH-Coel. 25946).

SMIB 6 : stn DW 114, 19°01.2'S-163°28.8'E, 255-265 m, 02.03.1990 : several colonies 10-15 mm high with gonothecae; slide no. 1389 (all RMNH-Coel. 25947).

DESCRIPTION (based mainly on material from MUSORSTOM 4, Stn CP 153). — Flabellate colonies formed of a complex of basally polysiphonic, flexuous stems, diameter c. 800 µm, usually fairly regularly and pinnately branched (fig. 62a), with a tendency of branches to rebranch dichotomously and by numerous anastomoses of ultimate branches forming occasional bushy complexes. Both monosiphonic stems and hydrocladia have indistinct internodes, marked occasionally by shallow constrictions of perisarc, but more often without indication of internodes whatsoever. Real nodes rare; hydrocladia almost in straight line, no distinct zig-zag structure, leaving branches from apophyses under hydrothecae; axillary hydrotheca normal (figs 61a, 62b, d). Hydrocladia pinnately arranged, branch between various hydrocladia bent in zig-zag fashion; several internodes between two successive curves (fig. 62a). Colonies of regular structure in spite of bushy character of whole complex, usually attached to fixed objects (coral fragments, Bryozoa, hydroid stems, etc.).

Hydrotheca as in *Symplectoscyphus johnstoni johnstoni* and *S. johnstoni subtropicus*, i.e. more or less tubular, curving away from internode, aperture nearly parallel to longitudinal axis of internode, free part of adcauline wall making almost square angle with internode (fig. 61c). Free part adcauline wall as long as (fig. 61c), slightly longer (fig. 62c), or, by repeated hydrothecal renovation, much longer (fig. 61b, e) than adnate part adcauline wall; adnate portion perfectly straight, with sharp flexure at hydrothecal floor; bottom plate with circular hydropore permitting passage of coenosarc. Free part adcauline wall almost straight or slightly convex; abcauline wall distinctly concave, concavity may have a distinct flexure (fig. 61b). Hydrothecal rim with three sharply pointed cusps separated by deep, semi-circular embayments, cusps slightly but distinctly everted so that apical part of hydrotheca shows shallow constriction prior to rim (fig. 61c). Renovations frequent, but number varied in the various colonies

(five is maximum in specimens from MUSORSTOM 4, Stn CP 153, fig. 61b, up to 15 in those from MUSORSTOM 4, Stn CC 174, fig. 61e). Intrathecal teeth and marginal thickening occasionally present; teeth restricted to single abcauline cusp (fig. 61c). Closing apparatus composed of three triangular flaps, when closed forming shallow roof over hydrothecal aperture, complete in many hydrothecae. Distinct foramina (or thin spots) present under each hydrotheca (with exception of many axillary hydrothecae), serving attachment of gonothecae (fig. 62a).

Hydranths present in majority of hydrothecae, showing material to be alive when captured, large for so small a hydrotheca, attached to base of hydrotheca and to abcauline hydrothecal wall by means of muscular strand that may easily give impression of hydrothecal septum. Nematocysts small, no large nematocysts observed.

Perisarc of internodes and hydrothecae firm, thickest at constriction of internodes.

Male and female gonothecae observed on separate colonies, not greatly different in shape and size. Both female and male gonothecae sack-shaped and fairly elongated, backside tightly pressed against internode and as a result flattened or with furrow. Top part of gonotheca flattened, aperture at top of short funnel with slightly everted margin, usually placed slightly eccentrically. Top part of gonotheca with two or three elevated ribs (apparently no spiral twists) with thickened edges, no frill being present. Rest of gonotheca furrowed, gradually petering out near basal portion of structure; base narrowed. Gonotheca attached by means of short, eccentrically placed stalk. Female gonotheca (fig. 61d) with two large eggs each; male gonotheca (fig. 61f) with large, elongated mass of spermatocytes.

TABLE 51. — Measurements of *Symplectoscyphus johnstoni tropicus* ssp. nov., in µm.

	MUSORSTOM 4 Stn CP 153 (slide no. 484)	MUSORSTOM 4 Stn CC 174 (slide no. 529)
Stem internode, length	665 - 700	
diameter	110 - 115	
Hydrocladial internode, length	405 - 450	500 - 505
diameter	80 - 90	90 - 95
Hydrotheca, length abcauline wall *	260 - 290	260 - 355
length free part adcauline wall *	215 - 280	215 - 390
length adnate part adcauline wall	205 - 220	185 - 220
total depth *	315 - 390	315 - 390
diameter at rim	135 - 140	110 - 140
maximal diameter	150 - 160	150 - 160
Female gonotheca, length	1,035 - 1,110	
maximal diameter	400 - 545	
length of funnel	70 - 75	
diameter at rim	160 - 170	
Male gonotheca, length		1,160
diameter		380
length of funnel		70
diameter at rim		150

(* = including renovations)

DISTRIBUTION. — Recorded from fairly deep water of the seas around New Caledonia.

REMARKS. — The present subspecies is so near *Symplectoscyphus johnstoni johnstoni* as described by RALPH (1961a : 810-811, figs 17a-n, 18a-c), particularly in the structure of the colony, that I have refrained from describing it as a new species but have, at least for the time being, given it the status of a subspecies. It does differ from the nominotypical subspecies by the fact that the colonies are slightly polysiphonic (in the basal part of the stems) and by slight differences in the general appearance of the hydrothecae, that in *S. johnstoni tropicus* usually have a fair number of renovations and have slightly everted hydrothecal cusps. The internodes, in both subspecies, are just as short and imperfectly indicated and they do not demonstrate zig-zag arrangements (as do portions of the stem between stem internodes in both forms). There is an occasional intrathecal cusp in *S. johnstoni tropicus*. The gonothecae of the present subspecies are different from those observed in the nominotypical subspecies though they have the same general outline.

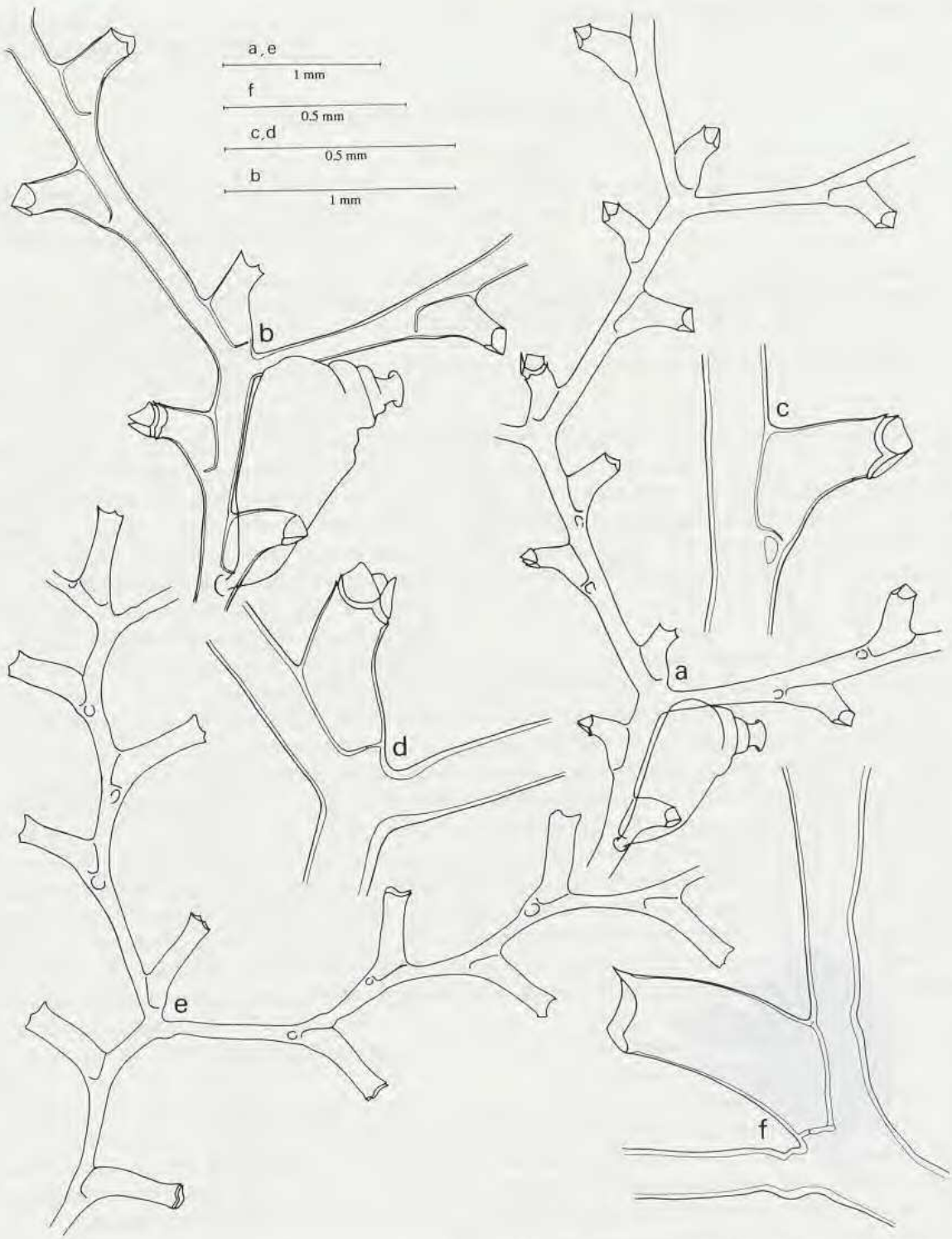

FIG. 62 a-d. — *Symplectoscyphus johnstoni tropicus* ssp. nov., BIOCAL, Stn CP 84 : **a-b**, parts of colony with gonotheca; **c**, hydrocladial hydrotheca; **d**, axillary hydrotheca.
FIG. 62 e. — *Symplectoscyphus pedunculatus* (Billard, 1919), BIOCAL, Stn DW 51, part of colony.
FIG. 62 f. — *Symplectoscyphus pseudocolumnarius* sp. nov., holotype, BIOCAL, Stn DW 51, axillary hydrotheca.
a-d, slide no. 287; e, slide no. 527; f, slide no. 337.

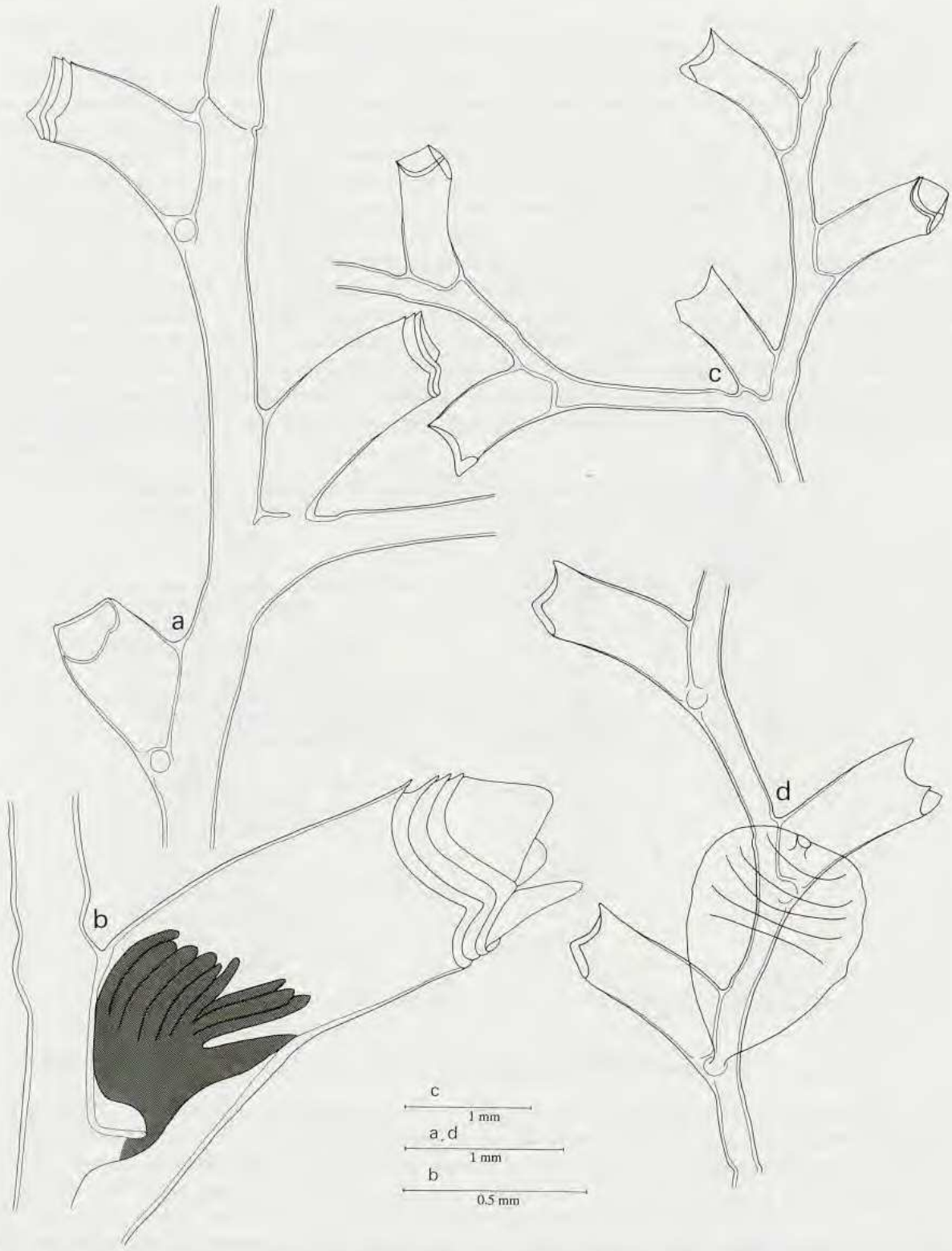

FIG. 63. — *Symplectoscyphus paulensis* Stechow, 1923 : **a-b,** lectotype, VALDIVIA, Stn 165, 38°40'S-77°39'E : **a**, monosiphonic upper part of axis; **b**, hydrocladial hydrotheca with its hydranth. — **c-d**, SAM, ABD 8C, 24°40'S-35°28'E : **c**, top part of colony; **d**, part of axis with (flattened) gonotheca.

ETYMOLOGY. — The subspecific name *tropicus* refers to the occurrence of this subspecies in the tropics; *tropicus* being a latinization of that word.

Symplectoscyphus paulensis Stechow, 1923

Figs 63a-d, 65a

Symplectoscyphus paulensis Stechow, 1923a : 8-10; 1923d : 172; 1925b : 467-468, fig. 28. — MILLARD, 1967 : 183-184, fig. 4G-H; 1975 : 317-319, fig. 102A-C; 1977b : 107; 1978 : 199 et seq. — VERVOORT, 1972 : 180-183, figs 60b, 61.
Sertularella paulensis - STEPAN'YANTS, 1979 : 71, pl. 17 fig. 2.

MATERIAL EXAMINED. — **Southern Indian Ocean** (Saint Paul Island). VALDIVIA EXPED. : stn. 165, south of St Paul, 38°40'S-77°39'E, 680 m, 03.01.1899 : alcohol preserved material and 3 stained Canadabalsam slides to be described later on.
South-west Indian Ocean. "*Africana II*" : stn AFR 1248 IIN, 36°48'S-52°08'E, 400 m, 09.07.1961 : stained slide containing 3 fragments; no gonothecae.
Moçambique. "*Africana II*" : stn ABD 8C, 24°40'S-35°28'E, 347 m, 18.08.1964 : stained slide of 2 fragments; one gonotheca.

DESCRIPTION. — Through the kindness of Dr H. FECHTER, Zoologische Staatssammlung, München, B.R.D., I have been able to inspect some of the *"Valdivia"* material described by STECHOW (1923a, 1925b). This syntype material consists of five alcohol preserved fragments and a portion of a strongly polysiphonic stem with one hydrocladium, and three slides. The alcohol preserved fragments are hydrocladia bearing a number of hydrothecae but two are short stem fragments with a single hydrocladium, one of the stem fragments being slightly polysiphonic. The strongly polysiphonic stem fragment is referred to by STECHOW (1923a, 1925b) in descriptions of the species ("Ausserdem fand sich an demselben Fundort ein 25 mm langes unteres Stammstück mit anhängendem Wurzelplexus, sowie mit einem Cladium", etc.).

The slides consist of borax-carmine stained, embedded fragments, the largest fragment is a stem c. 30 mm long with three hydrocladia; it has evidently been used for the figure in STECHOW's 1925b paper (fig. 28) as it bears the single hydrotheca of an epizootic specimen of *Halecium tenellum* Hincks, 1861, in the position figured by STECHOW. This specimen of *Symplectoscyphus paulensis* is here indicated as the lectotype. The remaining two slides have hydrocladia or fragments of cladia; these also contain fragments of *Antennella secundaria* (Gmelin, 1791) and *Sertularella valdiviae* Stechow, 1923. The Valdivia material is in perfect agreement with specimens described by VERVOORT (1972 : 180-183, figs 60b, 61), including the variability in length of the hydrothecae, the occasional slight basal undulation of the abcauline hydrothecal wall and the repeated hydrothecal renovations, some of the renovated hydrothecae being fairly short (fig. 63a-b; cf. VERVOORT, 1972, fig. 60b). In the *"Valdivia"* material the internodes are indicated by constrictions of the perisarc, septa are quite rare, though occasionally present in the youngest part of the hydrocladia. Well preserved hydranths (fig. 63b) indicate that the material was collected alive; the completely retracted hydranths have 9-10 tentacles. They are attached to the inside of the abcauline hydrothecal wall by means of a strong strand of muscles. The measurements of this material appear from the table of measurements given below.

All of STECHOW's material is sterile; the gonotheca was subsequently described by MILLARD (1975 : 317-319, fig. 102C).

The authorities of the South African Museum, Cape Town, kindly permitted me to study two slides of *Symplectoscyphus paulensis* described by MILLARD (1967, 1975) from southwest Indian Ocean waters (localities specified above). I had at my disposal two Canadabalsam slides of stained colony fragments that are in general agreement with STECHOW's material, though much finer, as may also appear from the drawings. This character, however, is principally expressed in the size and shape of the internodes; the hydrothecae being of almost the same size. This results in a much more geniculate appearance of stem and hydrocladia (fig. 63c). Many of the hydrothecae are repeatedly renovated, the renovations causing parallel striation of the hydrothecal terminal portion (fig. 65a). Though three opercular flaps are present in many hydrothecae the opercular apparatus has not been observed in well-closed position and consequently has not been figured. The material labelled Stn ABD 8C evidently has been used to make the drawing of the gonotheca (MILLARD, 1967, fig. 4G; 1975, fig. 102C), the only figure of a gonotheca of this species so far published. One of the hydrocladia in the ABD 8C specimen carries the

empty gonotheca, inserting in the hole just under the hydrothecal floor. The gonotheca in the slide is considerably flattened (fig. 63d) by the cover glass; it is probably elongated ovoid, with five slight, circular depressions in the apical half, and a short funnel with slightly everted margin at its end. The depressions are not marked by raised walls or frills with thickened margins as occurs in *Symplectoscyphus bathyalis*.

TABLE 52. — Measurements of *Symplectoscyphus paulensis* Stechow, 1923, in µm.

	St Paul (lectotype)	South Atlantic (VERVOORT, 1972)	South African waters
Stem internode, length	1,625 - 1,845	1,285 - 1,430	865 - 1,085
diameter at node	280 - 370	340 - 405	175 - 215
Hydrocladial internode, length	1,410 - 1,840		1,200 - 1,300
diameter at node	195 - 240		130 - 195
Hydrotheca, length abcauline wall *	670 - 870	675 - 755	760 - 825
length free part adcauline wall *	865 - 935	595 - 835	910 - 935
length adnate part adcauline wall	540 - 585	500 - 580	370 - 390
total depth	1,105 - 1,260	920 - 1,055	1,100 - 1,130
maximal diameter	455 - 500	460 - 485	410 - 435
diameter at rim	410 - 435	365 - 475	390 - 415
Gonotheca, maximal diameter			1,065
total length (incl. funnel)			1,520

(* = including renovations)

Symplectoscyphus pedunculatus (Billard, 1919)

Figs 62e, 65b

Sertularella pedunculata Billard, 1919 : 18, fig. IA; 1925b : 165, fig. 27, pl. 7 fig. 18. — VAN SOEST, 1976 : 83.
Symplectoscyphus pedunculatus - STECHOW, 1922 : 148; 1923d : 172.

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn DW 51, 23°05.27'S-167°44.95'E, 700-680 m, 31.08.1985 : eleven mm long fragment, no gonothecae. All in slide no. 527 (RMNH-Coel. 25948). With small colony of *Opercularella* sp.

DESCRIPTION. — Fragment consists of monosiphonic, 11 mm long stem with three hydrocladia (one left, two right); number of hydrothecae between two successive hydrocladia seven and four. Division of stem and hydrocladia into internodes indistinct, only occasionally indicated by constrictions of perisarc. Hydrocladia placed on short apophyses directly under hydrotheca, which becomes axillary but which has the same shape as remaining hydrothecae (fig. 62e). Structure of colony, before being made up into slide, flexuous, unable to support itself.

Hydrothecae of characteristic appearance, slightly varied, but usually strictly tubular and gracefully curved, with basal portion standing away from internode almost perpendicularly and apical portion slightly curved upwards (fig. 65b). Abcauline wall with distinct concavity basally; free part of adcauline wall smoothly convex over greater part of its length but with distinct concavity just before margin so that adcauline marginal cusp is slightly upturned. A minority of hydrothecae more or less strictly tubular. Adnate portion adcauline wall slightly less than half length free part adcauline wall, straight, curved sharply at hydrothecal floor; bottom plate not touching opposite (abcauline) hydrothecal wall. Hydrothecal rim with three cusps (one adcauline, two laterals), of which adcauline appears rather sharply pointed because of upturned condition; laterals obtuse. Cusps separated by shallow, rounded embayments. Number of renovations 2-4; margin, especially in renovated hydrothecae, slightly everted. There are only remnants of hydranths and not a single hydrotheca has the closing apparatus perfect but apparently it is composed of three triangular flaps attached in embayments of hydrothecal margin.

Perisarc firm along internodes, thinning out rapidly along hydrothecal walls. Hydrocladia and axis slightly geniculate between hydrothecal insertions.

No gonothecae present, though circular foramina are present under several of axial and hydrocladial hydrothecae.

TABLE 53. — Measurements of *Symplectoscyphus pedunculatus* (Billard, 1919), in µm.

	SIBOGA EXPED. Stn 295	BIOCAL Stn DW 51
Internodes, total length		850 - 960
diameter at node	120 - 130	75 - 95
Hydrotheca, length abcauline wall *		480 - 520
length free part adcauline wall *		445 - 480
length adnate part adcauline wall		185 - 205
total depth *	665 - 730	590 - 605
diameter at rim	175 - 210	150 - 160
maximal diameter		150 - 160

(* = including renovations)

DISTRIBUTION. — Described by BILLARD (1919, 1925) after a single 30 mm high colony from the Timor Sea off the southern point of Timor, 10°36.6'S-124°11.7'E, 2050 m depth. The present specimen originates from Pacific waters north of New Caledonia, depth 680-700 m.

REMARKS. — I have identified the BIOCAL, Stn DW 51, specimen with BILLARD's species in spite of small differences in size, the *"Siboga"* colony having generally larger dimensions. There is, nevertheless, full agreement in shape and placement of the very characteristic hydrothecae, that also differentiate this species from *Symplectoscyphus macrocarpa* (Billard, 1918), with which the present species has been compared by BILLARD (1925b : 166).

Symplectoscyphus pseudocolumnarius sp. nov.

Figs 62f, 64a-c

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn DW 51, 23°05.27'S-167°44.95'E, 700-680 m, 31.08.1985 (type locality) : c. 20 mm high fragment with 2 gonothecae. All in slide no. 337 (holotype, MNHN-Hy. 1120).

DESCRIPTION. — Specimen, apparently a top part, composed of monosiphonic stem fragment and three hydrocladia, basal portion covered by wormtube. Stem monosiphonic, division into internodes indistinct, these being marked by slightly oblique constrictions of perisarc, very weakly geniculate. Three hydrocladia present, springing from small apophyses of stem under an axillary hydrotheca; hydrocladia separated by four hydrothecae, axillary hydrotheca (fig. 62f) included; all hydrothecae of stem and hydrocladia, as well as those hydrocladia, in one plane.

Hydrothecae alternately arranged along stem and hydrocladia (fig. 64a-b), tubular, slightly curved, abcauline wall slightly but distinctly concave, free adcauline wall convex with slight bulge in lower portion. Fused part of adcauline hydrothecal wall about half length of free part, forming smooth continuation of free adcauline wall. Hydrothecal floor straight, with circular hydropore for passage of coenosarc. Hydrothecal aperture parallel to length axis of internode, with three strong cusps separated by deep, semicircular embayments. Adcauline cusp distinctly upturned (fig. 64b); closing apparatus composed of three triangular flaps folding over aperture forming fairly high and acute dome.

Perisarc on stem and hydrocladia firm, gradually thinning out along hydrothecal walls, forming slightly raised internal wall around hydrothecal aperture, visible as slightly raised 'tooth' just under hydrothecal rim. Renovations of hydrothecal aperture common, though generally no more than four are present.

No well preserved hydranths observed, only remnants being present.

Two gonothecae occurring at end of stem, inserting on circular spot at internode just under hydrothecal floor (fig. 64a, c). General outline of gonotheca elongated oval, slightly compressed on side adjacent to stem, attached to internode by means of short stalk. Surface of gonotheca ornamented by strongly raised rib with thickened margin bearing distinct, hyaline frill and encircling gonotheca, starting just under funnel, in 10-11 spiral twists. Apex of

gonotheca with short funnel with slightly everted aperture. Contents of both gonothecae composed of two developing eggs or planulae (fig. 64c). Presence of circular spots under many hydrothecae indicates that more gonothecae have originally been present.

TABLE 54. — Measurements of *Symplectoscyphus pseudocolumnarius* sp. nov., in µm.

	BIOCAL Stn DW 51 (slide no. 337)
Hydrocladial internode, length	656 - 695
diameter at node	110 - 175
Hydrotheca, length abcauline wall *	520 - 564
length free part adcauline wall *	475 - 540
length adnate part adcauline wall	215 - 280
total depth *	585 - 605
diameter at aperture	215 - 240
maximal diameter	240 - 250
Gonotheca, total length	1,715 - 1,735
maximal diameter	800 - 825
length funnel	215 - 240
diameter at aperture	240 - 250

(* including renovations)

DISTRIBUTION. — Recorded from a single locality at the northwestern extremity of the Norfolk Ridge, south of the southeastern tip of New Caledonia, depth 700-680 m.

REMARKS. — This material resembles *Symplectoscyphus columnarius* (Briggs, 1914) in many respects; it is, however, smaller in all dimensions and differs considerably in the structure of the gonotheca. RALPH (1961a : 802) described *S. columnarius* as one of the taller species of *Symplectoscyphus* around the New Zealand coast with an erect stem up to 65 mm in length, regularly branched in one plane and with conspicuous tubular hydrothecae held well out from the stem and branches. Though LELOUP (1974) drew attention to the variability in hydrothecal shape in *S. columnarius* as exemplified by the figures of hydrothecae in papers by BRIGGS (1914), TOTTON (1930) and RALPH (1961a), the general outline of the curved hydrothecae and the upturned adcauline hydrothecal cusp agrees with that found in the present new species, though a comparison of the measurements given here with those listed under *S. columnarius* shows that the discrepancy in size is considerable. The gonotheca in *S. columnarius* is described by RALPH (1961a) as having three widely spaced, deep distal corrugations (and not the spirally coiled frill present here); its size is considerable ('very large, approximately 3.20 mm in length'). As I have been unable to identify the material with any other described symplectoscyphid it is here described as a new species.

ETYMOLOGY. — The specific name *pseudocolumnarius* points to the general resemblance of this species to *Symplectoscyphus columnarius* (Briggs, 1914), the greek word *pseudes* meaning false.

Symplectoscyphus cf. *pseudodivaricatus* Ralph, 1961

Fig. 65c-d

Sertularella johnstoni - BALE, 1884 : 109, pl. 3 fig. 7, pl. 19 fig. 21.
Sertularella divaricata p.p. - BALE, 1914a : 20, pl. 2 fig. 7.
Symplectoscyphus pseudodivaricatus Ralph, 1961a : 807-808, fig. 16i-n.

MATERIAL EXAMINED. — **New Caledonia**. LAGON : stn 491, 18°56.0'S-163°20.0'E, 450-460 m, 03.02.1985 : forty mm high colony with single hydrocladium. All in slide no. 910 (RMNH-Coel. 25949).

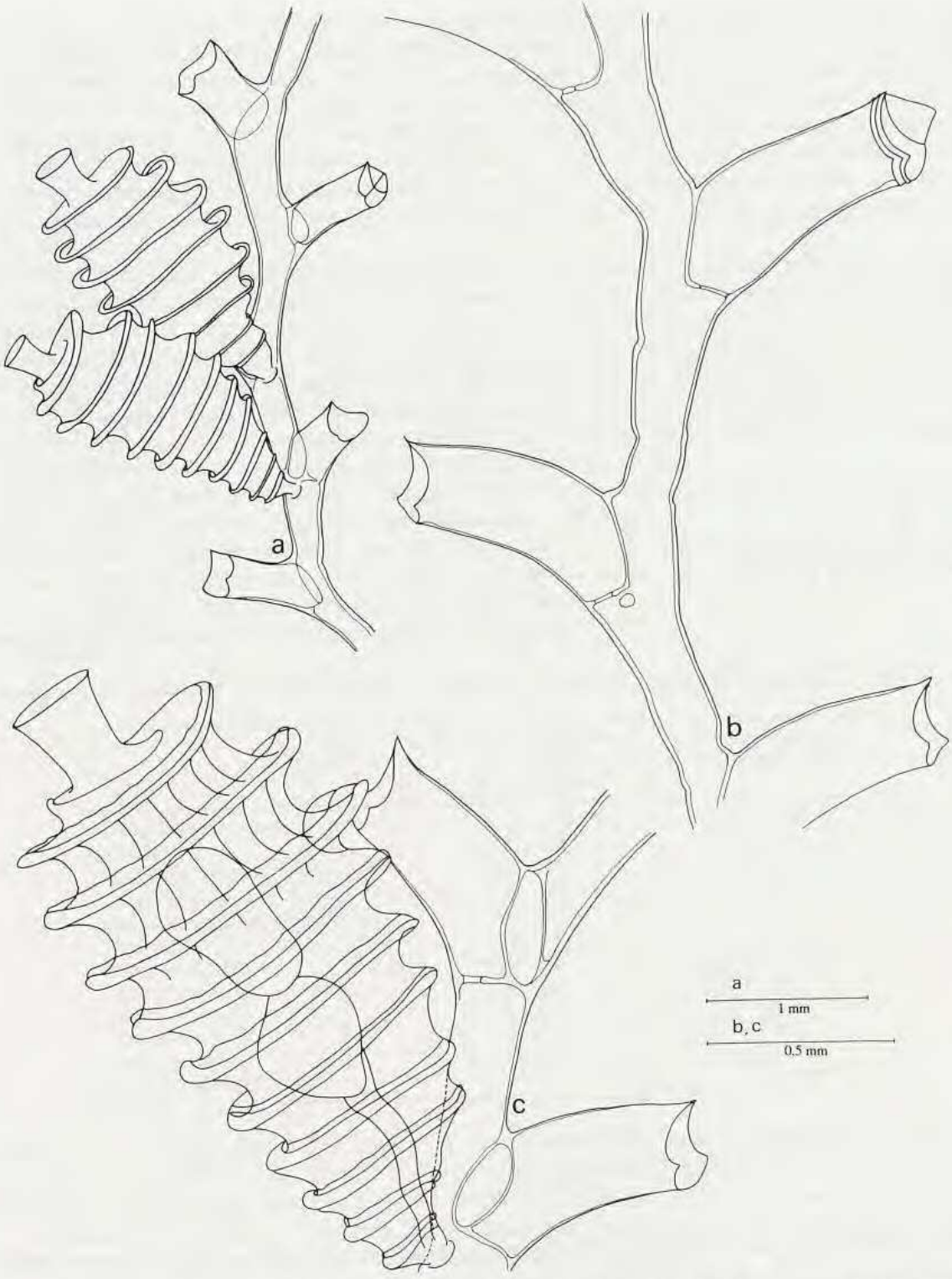

FIG. 64. — *Symplectoscyphus pseudocolumnarius* sp. nov., holotype, BIOCAL, Stn DW 51 : **a, c**, part of axis with gonothecae; **b**, part of hydrocladium with hydrothecae.
a-c, slide no. 337.

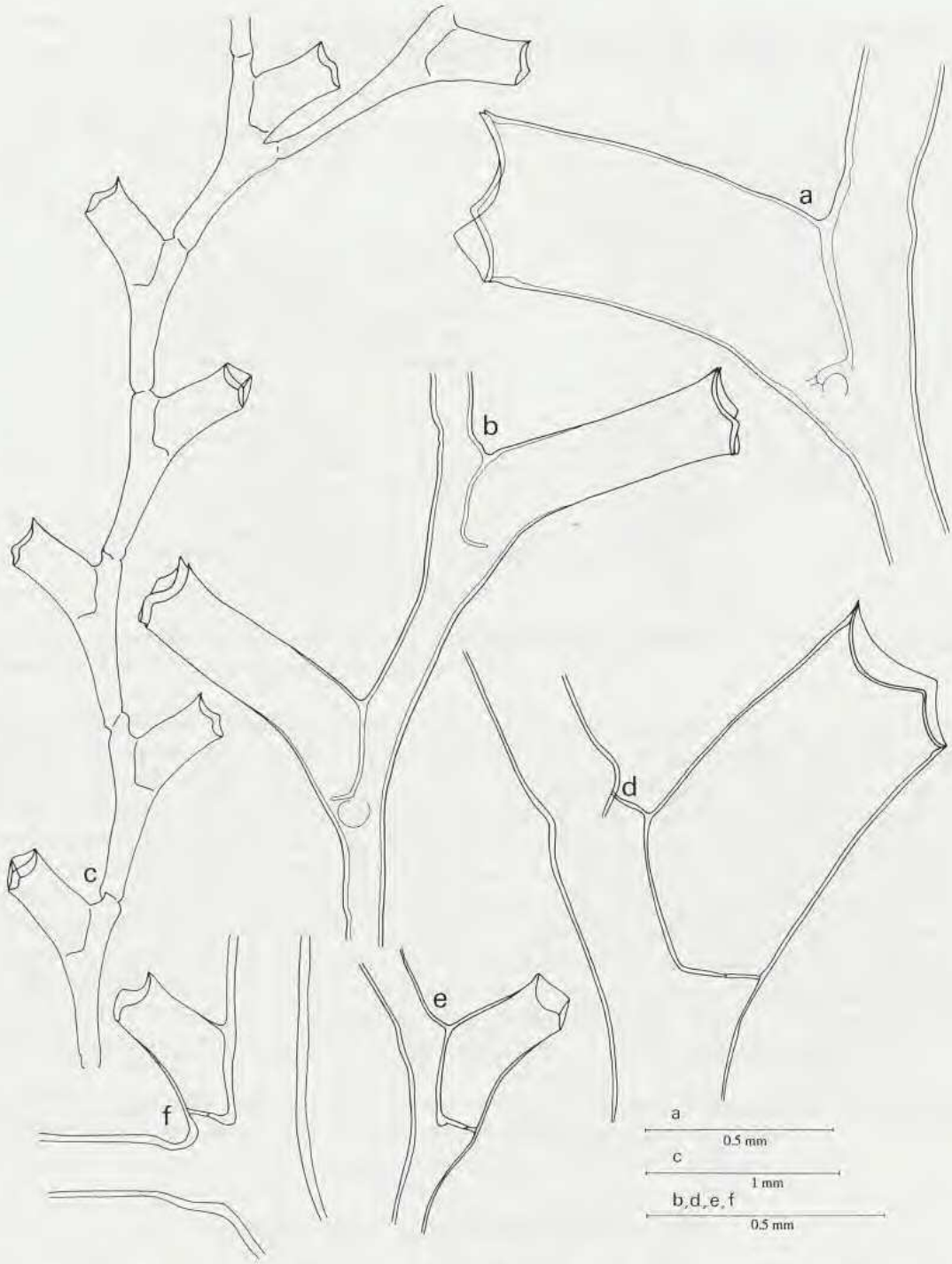

FIG. 65 a. — *Symplectoscyphus paulensis* Stechow, 1923, SAM, ABD 8C, 24°40'S-35°28'E, hydrocladial hydrotheca.
FIG. 65 b. — *Symplectoscyphus pedunculatus* (Billard, 1919), BIOCAL, Stn DW 51, part of hydrocladium with pair of hydrothecae.
FIG. 65 c-d. — *Symplectoscyphus* cf. *pseudodivaricatus* Ralph, 1961, LAGON, Stn 451 : **c**, part of hydrocladium; **d**, hydrocladial hydrotheca.
FIG. 65 e-f. — *Symplectoscyphus ralphae* sp. nov., holotype, SMIB 4, Stn DW 55 : **e**, hydrocladial hydrotheca; **f**, axillary hydrotheca.
b, slide no. 527; c-d, slide no. 910; e-f, slide no. 805.

DESCRIPTION. — Colony c. 45 mm high, with erect, monosiphonic stem, not divided into internodes, set with alternate hydrothecae that are slightly turned towards front of colony (fig. 65c). Ramification brought about by irregular pseudodichotomous branching, first visible 34 mm above base of stem. Anastomoses absent. Nodes apparent on ramifications and visible as rather steeply oblique constrictions in alternate directions, usually with fairly distinct septum; parts under and above septum distinctly twisted (fig. 65c). Each internode with hydrotheca at its end, hydrothecae alternately arranged and slightly turned towards front of colony. Ramifications springing from apophysis under internodal hydrotheca; this axial hydrotheca of normal appearance. Number of hydrothecae between two successive ramifications variable. Some internodes with fenestra directly under hydrothecal floor, small, circular.

Hydrothecae cylindrical, leaving internode at an angle of c. 60 degrees, free part adcauline wall c. 1.5 times longer than adnate part, almost straight, but turned upwards at margin; adcauline marginal cusp consequently turned upwards (fig. 65d). Adnate part adcauline hydrothecal wall straight, with perpendicular curve at hydrothecal floor, usually with slight notch or thickening; hydropore wide, leaving abcauline part of floor nearly open. Abcauline hydrothecal wall smoothly curved and imperceptibly running into wall of internode. Hydrothecal rim with usual three cusps (one adcauline, two laterals) with rounded tips; hydrothecal margin slightly but distinctly thickened; embayments between marginal cusps moderately deep, rounded, fitting three triangular closing plates, present in many of hydrothecae and forming, when closed, a low, triangular roof.

Perisarc thin, particularly on hydrothecae, many of them collapsed. Perisarc well developed on internodes of ramifications, thickened at nodes. On stem perisarc conspicuous, yellowish.

Three completely collapsed gonothecae present; shape more or less pyriform, narrowed basally, apically rounded and with a small platform at the top bearing a short, narrow funnel with everted rim. Platform formed by last of c. 5 circular ribs without frill, visible on distal part gonotheca.

Specimen without hydranths, coenosarc or gonothecal contents.

TABLE 55. — Measurements, of *Symplectoscyphus* cf. *pseudodivaricatus* and *S. pseudodivaricatus* Ralph, 1961, in µm.

	S. cf. *pseudodivaricatus* LAGON, Stn 491 (slide no. 910)	*S. pseudodivaricatus* (from RALPH, 1961a)
Hydrocladial internode, length	615 - 1,185	260 - 350
diameter	120 - 135	200 - 300
Hydrotheca, length abcauline wall	370 - 385	350 - 390
length free part adcauline wall	360 - 385	200 - 250
length adnate part adcauline wall	205 - 220	200 - 270
total depth	470 - 480	
maximal diameter	230 - 250	200 - 220
diameter at rim	200 - 210	200 - 250
Gonotheca, length	c. 1,410	1,000 - 1,500
maximal diameter	c. 650	500 - 800
length funnel	185	50
diameter at funnel apex	90	80

DISTRIBUTION. — *Symplectoscyphus pseudodivaricatus* is known from Australia (Queenscliff, Victoria; BALE, 1888) and from New Zealand (Little Papanui, Otaga Peninsula, New Zealand; RALPH, 1961). The present specimen provisionally referred to this species originates from the Pacific, northwest of New Caledonia, depth 450-460 m.

REMARKS. — The specimen has been provisionally brought to *S. pseudodivaricatus* Ralph, 1961, after close comparison with RALPH's description of this species. There are a number of differences. The hydrothecae in the present specimen are generally longer, with a larger free portion, noticeable in the lengths of abcauline wall and adnate part adcauline wall. The internodes in the New Caledonian colony are long and slender but quite short in RALPH's material; however, a considerable amount of variability may be expected in this respect. The exact shape of the completely collapsed gonothecae is hard to reconstruct, but apparently they have fewer rings than were

present in RALPH's specimens and the terminal funnel is distinctly longer. The generally poor condition of the present specimen makes it impossible to make a certain decision and the differences that I have noted are too few to justify the description of a new species based on such imperfect material.

Symplectoscyphus ralphae sp. nov.

Figs 65e-f, 66a-c

MATERIAL EXAMINED. — **New Caledonia**. SMIB 4 : stn DW 55, 23°21.4'S-168°04.5'E, 215-260 m, 09.03.1989 (type locality) : up to 10 mm high colonies on sponge (overgrown by *Diphasia* sp.; RMNH-Coel. 25950); a 20 mm high colony (holotype) and a 8 mm high top part, both with gonothecae, made up in slide no. 805 (MNHN-Hy. 1121). — Stn DW 57, 23°21.5'S-168°04.6'E, 260 m, 09.03.1989 : three colonies, the largest c. 15 mm high; with gonothecae, all in 2 slides no. 929 (paratypes; BMNH 1989.11.23.88 and RMNH-Coel. 25951).

SMIB 5 : stn DW 72, 23°42.0'S-168°00.8'E, 400 m, 07.09.1989 : three fragments of a larger colony, basally slightly polysiphonic, 5-15 mm high and 2 detached, completely ringed gonothecae; all in 2 slides no. 978A (MNHN-Hy. 1122), fragment in slide no. 978B (with *Symplectoscyphus effusus* sp. nov. and *Acryptolaria* sp.; RMNH-Coel. 25934). — Stn DW 101, 23°21.2'S-168°04.9'E, 270 m, 14.09.1989 : two branched colonies c. 12x12 mm with many gonothecae. All in 1 slide no. 977A and 2 slides no. 995 (RMNH-Coel. 25952).

DESCRIPTION (mainly based on holotype). — Small symplectoscyphid with c. 20 mm high colonies composed of axis with alternately arranged hydrocladia that may rebranch again in pseudodichotomous fashion. On axis division into internodes indistinct, though constrictions of perisarc do occur, particularly above insertion of hydrocladia (fig. 66a).

Hydrocladia alternately arranged along main axis, inserting on distinct apophyses; three hydrothecae between two successive apophyses, one axillary, one left, one right; axillary hydrotheca (fig. 65f) not much different from rest of hydrothecae (figs 65e, 66b). Axis between apophyses slightly geniculate. Internodes of hydrocladia slightly better defined than on axis, first internode invariably longer than those following; hydrocladia occasionally with apophyses bearing secondary hydrocladia, etc., thus forming pseudodichotomous structure.

Hydrothecae of axis and hydrocladia identical, tubiform, slightly curved; free portion of adcauline wall slightly to distinctly longer than adnate part, almost straight or slightly convex, distinctly upturned at end, leaving internode or axis at angle of c. 60 degrees or slightly less (figs 65e, 66b). Adnate part adcauline wall straight, suddenly flexed at base and there with small notch; hydropore scarcely visible. Abcauline hydrothecal wall smoothly curved, concave, running evenly into wall of internode or axis, in many axial hydrothecae with slight budge at hydrothecal floor. Many hydrothecae of axis and hydrocladia with distinct, triangular fenestra (fig. 66b). Rim of hydrotheca with three obtuse cusps, margin slightly everted and as a result adcauline tooth appearing acute. Marginal cusps separated by rounded embayments; many hydrothecae with closing apparatus composed of three triangular flaps when closed forming low roof (fig. 65e). Renovations occur though apparently not of regular occurrence, 1-3 being usually present. Hydrothecae with remnants of hydranths; number of tentacles could not be ascertained.

Perisarc firm and thick on axis, yellowish, thinner on hydrocladia and rapidly thinning out along hydrothecal walls, though apparently quite firm as no collapsed hydrothecae have been observed.

Female gonothecae (present on holotype) elongated, about three times as long as wide, inserting with short thick pedicel directly below hydrothecae of axis and internodes (fig. 66a). Surface of gonothecae with tightly coiled spiral ridge, running from top of hydrotheca, where it forms basin around short funnel, to base of gonothecae in 16-17 coils; each coil provided with downward directed hyaline frill, gradually diminishing in width and disappearing in middle of gonotheca. Gonothecal aperture at end of short, fairly wide funnel with flaring edge. Contents composed of two large eggs or developing planulae. Some of remaining colonies with gonothecae of slightly different appearance, being distinctly swollen and slightly shorter, with reduced number (12-13) of spirally arranged coils and with narrow funnel placed in center of fairly wide basin. These gonothecae, apparently male, tightly pressed against stem or internode, having a dorsal depression (fig. 66c); containing a single mass of developing cells (spermatocytes?).

DISTRIBUTION. — This species has been obtained from a restricted area at the northwestern extremity of the Norfolk Ridge, depths varying between 215 and 400 m.

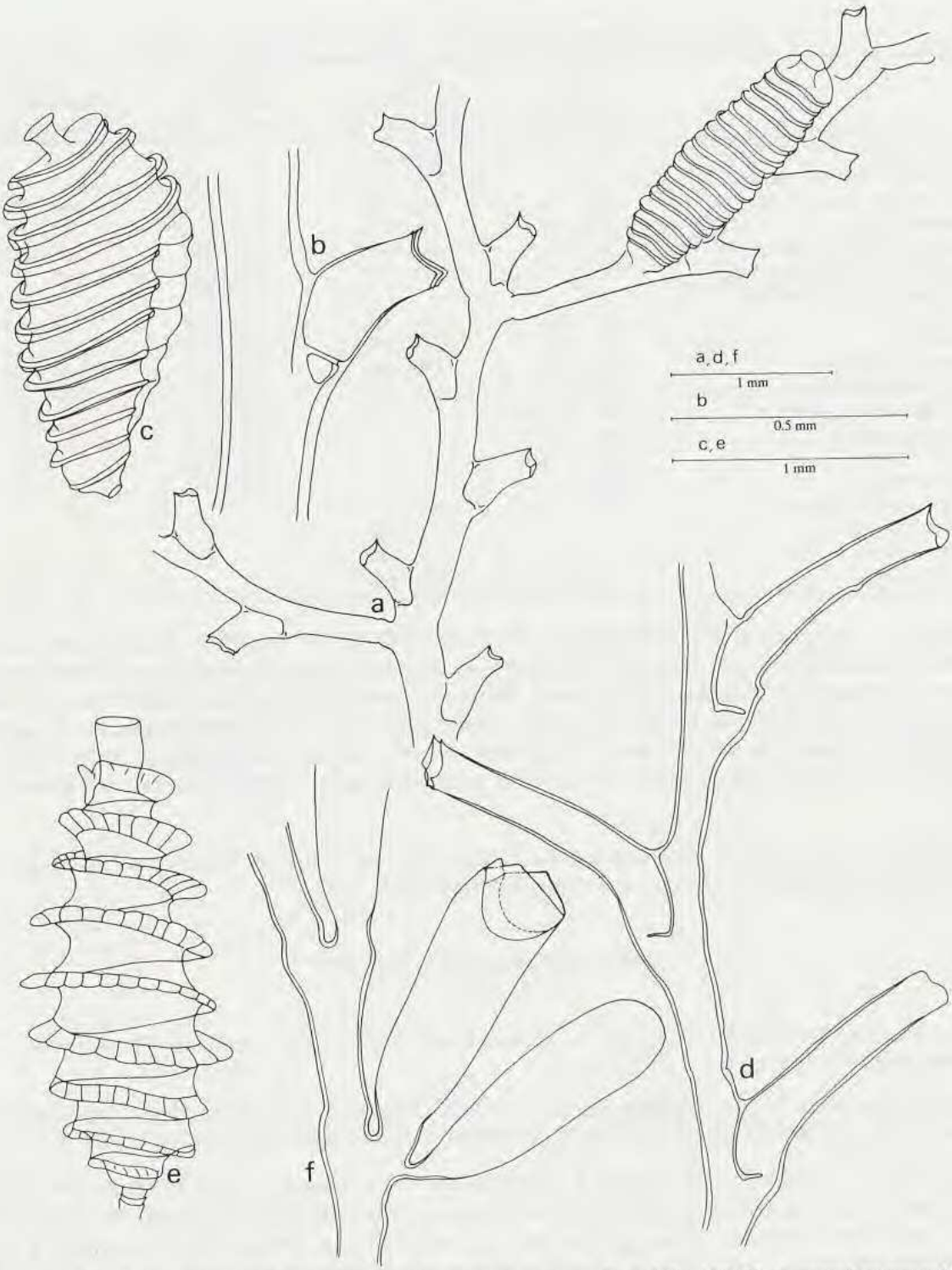

FIG. 66 a-c. — *Symplectoscyphus ralphae* sp. nov., **a-b,** holotype, **c**, paratype, SMIB 4, Stn DW 55 : **a**, part of colony with female gonotheca; **b**, axial hydrotheca; **c**, male gonotheca.

FIG. 66 d-e. — *Symplectoscyphus watsonae* sp. nov., holotype, BIOCAL, Stn DW 36 : **d,** part of axis; **e**, gonotheca.

FIG. 66 f. — *Thyroscyphus scorpioides* sp. nov., schizoholotype, BIOCAL, Stn CP 45, part of hydrocladium with hydro- and gonotheca.

a-b, slide no. 805; c, slide no. 929; d-e, slide no. 363; f, slide no. 841.

TABLE 55. — Measurements of *Symplectoscyphus ralphae* sp. nov., in µm.

	SMIB 4 Stn DW 55 (Slide no. 805)	SMIB 4 Stn DW 57 (Slide no. 929)	SMIB 5 Stn DW 72 (Slide no. 978A)	SMIB 5 Stn DW 101 (Slide no. 977A)
Diameter of stem	165 - 185	180 - 195		
Hydrocladial internode, length (constriction to constriction)	405 - 740	445 - 705	555 - 850	400 - 740
diameter at node	110 - 135	95 - 135	65 - 80	75 - 95
Hydrotheca, length abcauline wall	235 - 290	245 - 260	265 - 280	265 - 280
length free part adcauline wall	215 - 245	215 - 230	250 - 265	235 - 245
length adnate part adcauline wall	175 - 200	200 - 215	200 - 210	205 - 215
total depth	295 - 355	360 - 370	360 - 370	355 - 370
diameter at rim	120 - 125	120 - 135	110 - 120	120 - 125
maximal diameter	150 - 155	150 - 155	140 - 150	155 - 160
Female gonotheca, length	1,345 - 1,365		1,330 - 1,400	
maximal diameter	385 - 475		465 - 520	
length of funnel	135 - 150		160 - 175	
diameter at end	190 - 215		200 - 210	
Male gonotheca, length		1,000 - 1,035		
maximal diameter		430 - 445		
length of funnel		110 - 135		
diameter at end		110 - 120		

REMARKS. — The material from SMIB 5, Stns DW 72 and DW 101, is characterized by a larger number of hydrothecal renovations than have been observed in the type material. Part of the colonies from SMIB 5, Stn DW 101 (those on slides no. 995) are heavily overgrown. This species resembles *Symplectoscyphus effusus* in structure of the colony, but the hydrothecae are distinctly wider and less gracefully curved, the internodes are comparatively shorter and the gonotheca is quite different. Though there is some variation in the shape of the hydrothecae the variability in this respect is not so great as in *S. effusus*, mainly because renovations are restricted in the present species.

ETYMOLOGY. — The specific name *ralphae* is a tribute to Dr Patricia RALPH, Wellington, New Zealand, in recognition of her outstanding researches in the New Zealand hydroid fauna.

Symplectoscyphus tuba Totton, 1930

Fig 67a-d

Symplectoscyphus tuba Totton, 1930 : 186, fig. 37a-b. — RALPH, 1961a : 816, fig. 18f-g. — LELOUP, 1974 : 42 fig. 41.
Sertularella tuba - STEPAN'YANTS, 1979 : 76, pl. 17 fig. 4.

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn DW 36, 23°08.64'S-167°10.99'E, 650-680 m, 29.08.1985 : single 15 mm high, irregularly branched colony with 3 (female) gonothecae; all in slide no. 646 (RMNH-Coel. 25953).

DESCRIPTION. — Colony with unforked stem bearing three branches (hydrocladia) that rebranch pseudodichotomously, branching resulting from the development of hydrocladia on apophyses at the base of axillary hydrothecae. Internodes occasionally indicated by constrictions of perisarc (fig. 67a), usually at base of each hydrocladium and sometimes along length of hydrocladia; no complete septa or nodes observed. Hydrocladia straight, no geniculation visible.

Hydrothecae as in *Symplectoscyphus bathypacificus*, more or less tubular, with slightly swollen basal portion, rather varied in exact shape (cf. fig. 67a-c), free part adcauline wall slightly convex, adcauline marginal cusp slightly upturned. Adnate part adcauline wall about as long as or slightly shorter than free portion, at base of

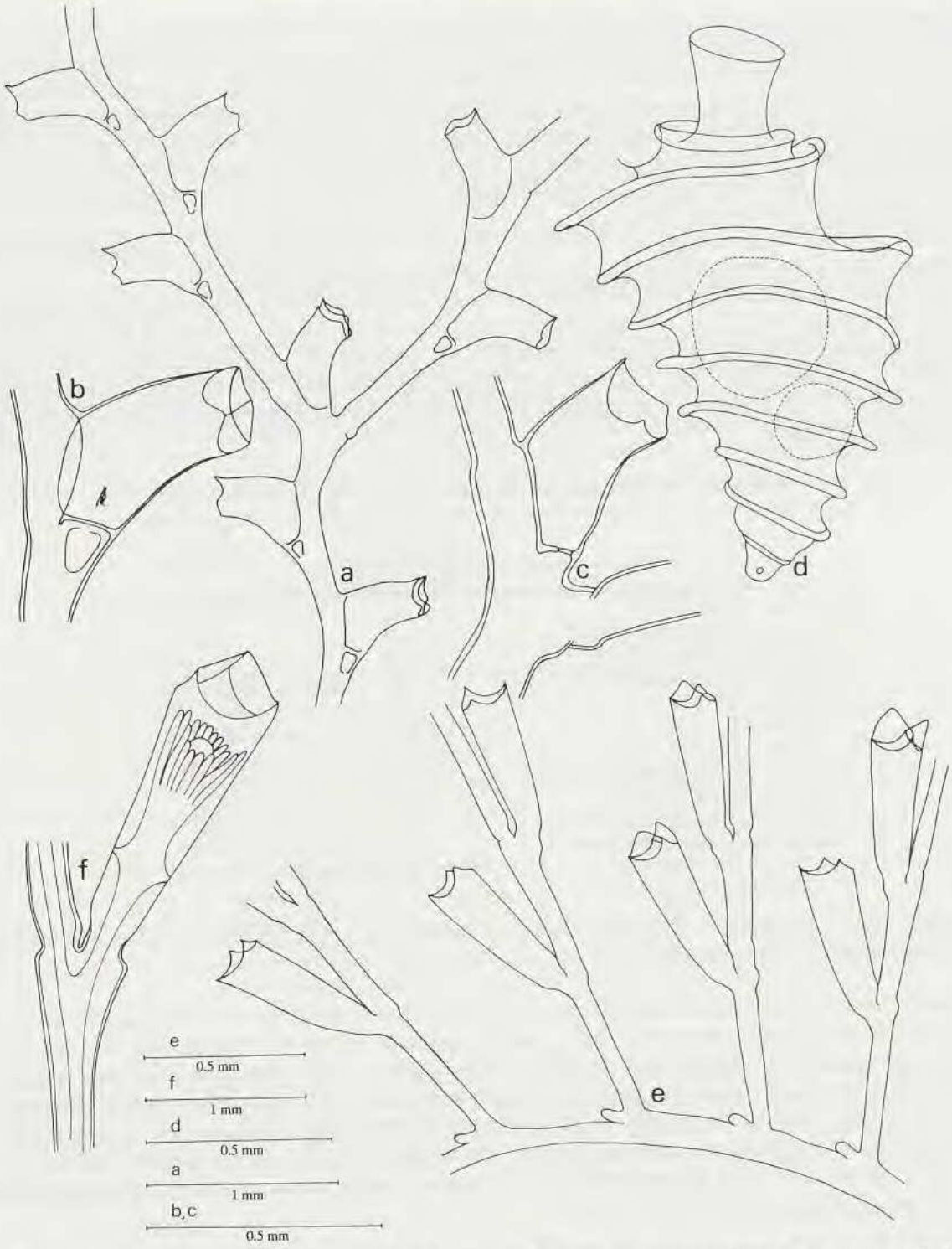

FIG. 67 a-d. — *Symplectoscyphus tuba* Totton, 1930, BIOCAL, Stn DW 36 : **a**, part of colony; **b**, hydrocladial hydrotheca; **c**, axillary hydrotheca; **d**, female gonotheca (slightly deformed).

FIG. 67 e-f. — *Thyroscyphus scorpioides* sp. nov., schizoholotype, BIOCAL, Stn CP 45 : **e**, part of pseudoaxis; **f**, part of hydrocladium with hydrotheca and its hydranth.

a-d, slide no. 646; e-f, slide no. 375.

hydrotheca with sharp flexure; hydrothecal floor fully closed, with circular hydropore to permit passage of coenosarc. Abcauline hydrothecal wall concave or with distinct bent at half its length. Opening of hydrotheca almost parallel with hydrocladial length axis; rim with three fairly acute cusps, one adcauline (slightly upturned), two laterals, separated by semi-circular embayments, fitting triangular plates of closing apparatus. Renovations of hydrotheca common, usually 3-4, though occasionally more; margin slightly thickened in renovated hydrothecae.

Many hydrothecae with retracted hydranths, attached to hydrothecal basal plate (adcauline corner) and with attachment filament running obliquely upwards, fastening hydranth halfway along internal abcauline wall. There are c. 12 tentacles; hypostome rounded.

Perisarc generally not as thick as in *S. bathypacificus*, best developed along walls of hydrocladia, thinning out along hydrothecal walls. Foramina occur under majority of hydrocladial hydrothecae.

Three female gonothecae present, attached at foramen under hydrotheca, elongated ovoid, though not as elongated as in *S. bathypelagicus*, with spirally descending rib making 8-9 turns, starting at an apical platform in the middle of which is placed a characteristic mouth tube, widening strongly at the apex (like the mouthpiece of an old-fashioned telephone, fig. 67d). Spiral rib with distinct, upward turned frill, gradually disappearing along downward curves. Each gonotheca with two large eggs or larvae. Figured gonotheca (fig. 67d) slightly deformed by pressure of cover glass.

TABLE 56. — Measurements of *Symplectoscyphus tuba* Totton, 1930, in µm.

	New Zealand (RALPH, 1961a) (slide no. 646)	BIOCAL Stn DW 36
Internodes, diameter	250	130 - 195
Hydrotheca, length abcauline wall *	220	410
length free part adcauline wall *	200	345 - 435
length adnate part adcauline wall	200	260 - 280
total depth *	340	415 - 520
diameter at rim	140	150 - 170
maximal diameter	170	215 - 235
Female gonotheca, length (incl. funnel)	1,100	1,430
diameter (incl. rib and frill)	590	900
diameter external opening funnel	250	260
diameter internal opening funnel	110	108

(* = including renovations)

DISTRIBUTION. — Recorded from a single locality on the northern part of the Norfolk Ridge, due south of the southeastern extremity of New Caledonia.

REMARKS. — I have reluctantly identified the BIOCAL specimens with TOTTON's *Symplectoscyphus tuba*, basing it mainly on the shape of the very characteristic gonothecae and on the consideration that the species is probably more variable than appears from TOTTON's fairly cryptic account of this species, a description based exclusively on a bunch of colonies collected off Three Kings Islands, New Zealand; this material was more fully described by RALPH (1961a). The present material has larger hydrothecae, partly because of frequent renovations in the BIOCAL material. I have compared this material with the type slide of *S. tuba* in BMNH (1929.10.28.108); I found the hydrothecae to be in good agreement, exhibiting a larger degree of variability than appears from the accounts given by TOTTON and RALPH.

Symplectoscyphus watsonae sp. nov.

Fig. 66d-e

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn DW 36, 23°08.64'S-167°10.99'E, 650-680 m, 29.08.1985 : single 13 mm long fragment with 23 hydrothecae, 1 complete and 1 damaged gonotheca (holotype). All in slide no. 363 (MNHN-Hy. 1123).

DESCRIPTION (based on material from BIOCAL, Stn DW 36). — Axis indistinctly divided into internodes by means of shallow constrictions of perisarc; usually each internode with single hydrotheca. Hydrothecae arranged in two opposite rows along axis, alternately pointing left and right.

Hydrothecae long, only small portion fused to internode, rest of hydrotheca free from internode and pointing away from axis at an angle of c. 45 degrees (fig. 66d). Lengthened part of hydrotheca usually composed of repeatedly renovated apical part of hydrotheca, but in some instances complete hydrotheca consists of primary, non-renovated hydrotheca of which apical portion is thin but has been observed to have three cusps (one adcauline, two laterals) and three hyaline flaps attached in embayments between the marginal cusps. Walls of hydrotheca occasionally with perisarcal notches or ribs.

Perisarc fairly thick along walls of internodes, thinning out considerably along hydrothecal walls, apical portion of hydrotheca collapsible.

One complete but spent gonotheca present, developed from otherwise normal hydrotheca; one damaged gonotheca also present. Gonotheca elongated, general outline oval, greatest diameter about halfway its length, narrowing towards both ends. No pedicel visible between base of gonotheca and orifice of hydrotheca. Apex of gonotheca with fairly wide, cylindrical funnel. Spirally downward curving, hyaline lamella begins at base of funnel and continues downwards spirally in 9 curves. Hyaline lamella fairly broad, margin scalloped, standing perpendicularly away from body of gonotheca bearing furrows between twists of lamella (fig. 66e).

TABLE 57. — Measurements of *Symplectoscyphus watsonae* sp. nov., in µm.

	BIOCAL Stn DW 36 (slide no. 363)
Internode, length	460 - 500
diameter at node	80 - 90
Hydrotheca, length abcauline wall *	665 - 815
length free part adcauline wall *	630 - 750
length adnate part adcauline wall	190 - 200
total depth *	815 - 850
diameter at rim	80 - 95
maximal diameter	95 - 125
Gonotheca, total length	2,060
maximal diameter	275
length funnel	120
diameter funnel at rim	55

(* = including renovations)

REMARKS. — This is a very distinctive species with a most characteristic gonotheca. In spite of the scarcity of material I have described it here as a new species for a variety of reasons. The hydrothecae in the fragment are quite characteristic; the (complete) gonotheca is highly diagnostic. Furthermore, on showing this specimen to Dr J.E. WATSON in my laboratory, in the summer of 1991, she mentioned having seen identical specimens in her material of the Russian Dmitry Mendeleev 1976 cruise to the Great Australian Bight.

In the British Museum (Natural History) I have found a similar condition of the hydrothecae in a slide of *Dictyocladium monilifer* (Hutton, 1873) (slide no. 90.5.27.47). Here too the hydrothecae are considerably lengthened, partly by repeated renovations, resembling the condition found here.

ETYMOLOGY. — The specific name, *watsonae*, has been chosen as a dedication to Dr Jeanette E. WATSON, Essendon, Victoria, Australia, in recognition of her outstanding studies of the Australian marine fauna, the Hydrozoa in particular.

Genus *THYROSCYPHUS* Allman, 1877

The genus *Thyroscyphus* Allman (1877 : 10; type, by monotypy, *Thyroscyphus ramosus* Allman, 1877) [= *Lytoscyphus* Pictet, 1893 : 35-36; type, by monotypy, *Lytoscyphus junceus* Pictet, 1893 = *Thyroscyphus bedoti* Splettstösser, 1929], is here considered to be composed of the following taxa :

Thyroscyphus fruticosus (Esper, 1793) (= *Laomedea fruticosa* Esper, 1793 : 188).
Thyroscyphus junceus (Allman, 1876) (= *Campanularia juncea* Allman, 1876 : 260-261, pl. 11 figs 3-4).
Thyroscyphus ramosus Allman, 1877 : 11, pl. 6 figs 5-6.
Thyroscyphus marginatus (Bale, 1884) (= *Campanularia marginata* Bale, 1884 : 54, pl. 1 fig. 2).
Thyroscyphus vitiensis Marktanner-Turneretscher, 1890 : 210, pl. 3 fig. 10 (= *Thyroscyphus gracilis* Kühn, 1911 : 25-38, pl. 2).
Thyroscyphus bedoti Splettstösser, 1929 : 39, 122, figs 36-38.
Thyroscyphus longicaulis Splettstösser, 1929 : 49-54, 123, figs 43-45.
Thyroscyphus sibogae Billard, 1930 : 230, fig. 1.
Thyroscyphus ramosus f. *ricardi* Redier, 1971b : 507-508, fig. 1B.

A new species is described below.

Thyroscyphus scorpioides sp. nov.[4]

Figs 66f, 67e-f

MATERIAL EXAMINED. — **New Caledonia**. *"Vauban"* : stn 3, drague 3 : 22°17'S-167°12'E, 390 m, 23.05.1978 : thirty mm high scorpioid colony with partly collapsed hydrothecae. (Paratype, made up in slide no. 416; RMNH-Coel. 25954).

BIOCAL : stn CP 45, 22°47.34'S-167°14.80'E, 430-465 m, 30.08.1985 (type locality) : c. 40 mm long part of scorpioid colony with a few gonothecae (holotype, MNHN-Hy. 1124). Parts as slides no. 375 (2) and 841 (schizoholotypes; BMNH 1989.11.24.89, 1 slide no. 375; RMNH-Coel. 25955, 1 slide no. 375 and slide no. 841).

DESCRIPTION (based on available material). — Basal part of stem erect, without hydrocladia. Rest of stem forming scorpioid sympodium, pseudoaxis formed by basal parts of respective hydrocladia that turn away from colony in more or less same direction, being nearly parallel and only slightly diverging, arranged, in larger fragment (holotype) as branches radiating from a circularly curved basal portion (pseudoaxis, fig. 67e). Basal portion without distinct segmentation, distance between basal parts of hydrocladia c. 1.5-2 mm; at insertion of hydrocladium with rounded perisarcal protuberance. Hydrocladia in holotype c. 10-15 mm long, with 8-12 hydrothecae, in paratype shorter but probably broken. Hydrocladia divided into distinct internodes separated by perisarcal constrictions; each internode with apical apophysis supporting large hydrotheca. Apophyses, and consequently hydrothecae, arranged in two rows but rows closely approximated, hydrothecae of the two rows consequently pointing towards one side of colony. Hydrothecae large, slightly rounded basally and narrowing towards short, almost imperceptible pedicel; distally slightly widening, slightly asymmetrical as adcauline wall bulges in basal third. Hydrothecal margin with three acute cusps, one abcauline and two laterals near adcauline side; hydrothecal rim, as appears from stained slides, reinforced by perisarcal thickening. Closing apparatus composed of three hyaline, triangular flaps, closing to form a fairly high roof; flaps adhering to hydrothecal margin in damaged hydrothecae (figs 66f, 67f).

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[4] Dr Dale CALDER, when reviewing the manuscript of this paper, has kindly drawn my attention to the fact that the genera *Cnidoscyphus* Splettstösser, 1929, and *Thyroscyphus* Allman, 1877, along with the genera *Parascyphus* Ritchie, 1911, *Thyroscyphoides* Naumov, 1955, *Uniscyphus* Millard, 1977b, and *Symmetroscyphus* Calder, 1986, should be brought to the family Thyroscyphidae Stechow, 1920 (cf. CALDER, 1991 : 76). The genus *Sertularelloides* Leloup, 1937a, is here considered to be synonymous with *Sertularella* Gray, 1848, the type species, *Sertularelloides mercatoris* Leloup, 1937a, being synonymous with *Sertularella cylindritheca* (Allman, 1888). *Thyroscyphus scorpioides* sp. nov. probably deserves generic distinction from the remaining species of *Thyroscyphus* Allman, 1877, because of its three-cusped hydrothecal rim, the other species in that genus being four-cusped.

Many large hydranths present in holotype, undoubtedly collected alive. Hydranths attached at inside of lower third of hydrotheca by means of circular widening of body; above ring of attachment of hydranth inside of hydrotheca covered by sheath of coenosarc. Hypostome globular, surrounded by c. 20 large tentacles (fig. 67f). Soft tissue (coenosarc) filled with large, in preserved specimen, violet-brown cells with lighter nucleus; these cells particularly visible in holotype, but also occurring in paratype, which is less well preserved.

Only a few gonothecae have been found. Each gonotheca springs from base of apophysis just under insertion of hydrotheca, club-shaped, without visible aperture, usually empty, but occasionally basal part filled with tissue in which stained cells dominate (fig. 66f).

Perisarc fairly thin, best developed on axis and hydrocladial internodes, slightly thickening at each node, thin along walls of hydrothecae and gonothecae, that as a result are easily collapsible.

TABLE 58. — Measurements of *Thyroscyphus scorpioides* sp. nov., in µm.

	BIOCAL Stn CP 45 (slide no. 841)
Axis, diameter between hydrocladia	325 - 390
Hydrocladia, length internodes	1,410 - 1,955
diameter at node	280 - 305
Hydrotheca, length (including pedicel)	1,690 - 1,950
maximal diameter	520 - 585
Gonotheca, approximate length	1,520
approximate diameter	540

DISTRIBUTION. — The holotype was obtained from deep water off the southeastern point of New Caledonia, S.W. of Kunie (= Îles des Pins), depth 430-465 m. The locality of the paratype is slightly north of the type locality.

REMARKS. — In spite of the fact that the hydrothecal rim has three cusps and not four as occurs in the other species of *Thyroscyphus* Allman, 1877, the present species has been placed in this genus because of the characters of the hydranth, that is attached inside the hydrotheca by means of a circular fold, the presence of a sheath of tissue inside the hydrotheca and the absence of an accumulation of nematocysts in the perisarc above the hydranth as occurs in *Cnidoscyphus* Splettstösser, 1929. It does not belong in *Parascyphus* Splettstösser, 1929, neither because of the shape of the colony nor by the attachment of the hydranths.

ETYMOLOGY. — The specific name *scorpioides* is an allusion to the scorpioid structure of the colony : scorpioid comes from the latin noun *scorpio* and means curled like the tail of a scorpion.

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Dr Jeanette WATSON, Essendon, Australia; I have gratefully used many of their very useful suggestions. I have been forced to put aside some quite appropriate remarks as their execution would have involved considerable changes and inherent technical problems. Some of those remarks have been acknowledged in footnotes.

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