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Porifera Hexactinellida: Amphidiscophora off New Caledonia

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ABSTRACT

During the "MUSORSTOM" cruises in the southwestern Pacific, and particularly off New Caledonia, 19 species of Hexactinellida Amphidiscophora have been found. Twelve species are considered as new: *Hyalonema spatha, H. uncinata, H. microstauractina, Sericolophus calsubus, S. neocaledonicus, Semperella abyssalis, S. crosnieri, S. varioactina, Poliopogon micropentactinus, P. claviculus, P. zonecus,* and *Pheronema pseudogiganteum.*

Two other new species were collected near Hawaii: *Sericolophus hawaiicus* and off eastern Australia: *Sericolophus cidaricus*. The description of the holotype of *Pheronema giganteum* Schulze is completed.

RÉSUMÉ

Porifera Hexactinellida: Amphidiscophora du large de la Nouvelle-Calédonie.

Au cours de l'examen des collections de spongiaires des campagnes "MUSORSTOM" dans le sud-ouest de l'océan Pacifique, notamment autour de la Nouvelle-Calédonie, 19 espèces d'Hexactinellida Amphidiscophora vivant entre 200 et 3000 m de profondeur ont été identifiées. Douze espèces sont nouvelles : *Hyalonema spatha, H. uncinata, H. microstauractina, Sericolophus calsubus, S. neocaledonicus, Semperella abyssalis, S. crosnieri, S. varioactina, Poliopogon micropentactinus, P. claviculus, P. zonecus* et *Pheronema pseudogiganteum.*

Deux autres espèces nouvelles de *Sericolophus* provenant l'une des Hawaii, *S. hawaiicus*, et l'autre de la côte est de l'Australie, *S. cidaricus*, sont également décrites et la description de l'holotype de *Pheronema giganteum* Schulze est complétée.

TABACHNICK, K. R. & LÉVI, C., 2000. — Porifera Hexactinellida: Amphidiscophora off New Caledonia. *In*: A. CROSNIER (ed.), Résultats des Campagnes MUSORSTOM, Volume 21. *Mémoires du Muséum national d'Histoire naturelle*, **184**: 53-140. Paris ISBN 2-85653-526-7.

INTRODUCTION

The Hexactinellida of the southwestern Pacific were almost unknown until the cruise of N/O *"Vauban"* in 1977 off southern New Caledonia (LÉVI & LÉVI, 1982). However, we have two excellent documents on the Hexactinellida of the central Pacific (VON LENDENFELD, 1915) and of Indonesia (IJIMA, 1927). The species from the Japanese coasts are known thanks to IJIMA & OKADA (1938).

The large collections of deep-water fauna (*"Challenger"*,*"Investigator"*,*"Valdivia"*,*"Galathea"*) do not include sponges from this area, except two species collected by the *"Challenger"* near the Kermadec Islands.

The many French oceanographic expeditions around New Caledonia since 1985, obtained an interesting collection of Hexactinellida Amphidiscophora rich in new species, which are the objective of this study.

The systematic study of Hexactinellida is still very difficult because of the small number of collected specimens. Most of the described amphidiscophoran species are defined from a single specimen and sometimes from fragments. If most of the genera are well defined, taxonomy at the species level is rather approximative, and the degree of intraspecific variability is unknown. The works of VON LENDENFELD (1915), based on a very rich photographic documentation, show the variability of spicular characteristics. Expecting results of the comparative analysis of isoenzymes and nucleotide sequences, the taxonomist must underscore the observed morphological variants. The description of atypical, abnormal shapes and the indications of presence vs absence or differences in spicule densities lead to an artificial grouping of specimens into temporary "species".

Collection of Amphidiscophora from the "MUSORSTOM" expeditions mainly around New Caledonia and in other areas of the southwestern Pacific is similar to the better known collection from the Indian Ocean. It is, however, too early to extract pertinent biogeographical information and to determine its major and original characteristics. This will be easier to achieve when all Hexactinellida genera have been studied.

The collection of Amphidiscophora contains 18 species, including 12 new species. Two other new species: *Sericolophus hawaiicus* and *Sericolophus cidaricus* came respectively from Hawaii and the Eastern coast of Australia. The type specimen of *Pheronema giganteum* Schulze (stored in the BNMH) has been redescribed.

Information on the cruises where the samples studied here were collected can be found in:

— RICHER DE FORGES (1990) for BIOCAL, BIOGEOCAL, CHALCAL 2, MUSORSTOM 4, 5 and 6, SMIB 1 and 4;
— RICHER DE FORGES & MENOU (1993) for MUSORSTOM 7;
— ROUX (1994) for CALSUB;
— RICHER DE FORGES & CHEVILLON (1996) for BATHUS 4;
— GRANDPERRIN *et al.* (1997) for HALIPRO 2.

No published reports are known concerning CIDARIS 1 and HURL 88 and 92.

When no place of deposit is specified, the material is in the collection of the Muséum national d'Histoire naturelle (MNHN).

The abbreviations for the institutions whose collections were used in this study are as follows:

BPBM - Bernice P. Bishop Museum, Honolulu.
IORAN - Institute of Oceanology, Russian Academy of Sciences, Moscow.
MTQ - Museum of Tropical Queensland, Townsville, Australia.
NHM - The Natural History Museum, London [formerly the Bristish Museum (Natural History)].
USNM - National Museum of Natural History. Smithsonian Institution, Washington.
ZMA - Zoölogisk Museum, Amsterdam.

In the list of material examined, the capital letters preceding the station number refer to the gear used: DC: Charcot dredge; DW: Warén dredge; CP: beam trawl; CC: shrimp otter trawl; BT: benthic fish trawl.

The research vessels' names are in italics, quoted in commas.

LIST OF SPECIES

The new species are in bold.

AMPHIDISCOPHORA F.E. Schulze, 1886

I. Family HYALONEMATIDAE J.E. Gray, 1857

Genus ***HYALONEMA*** J.E. Gray, 1835

Hyalonema (Leptonema) spatha sp. nov.
Hyalonema (Onconema) uncinata sp. nov.
Hyalonema (Pteronema) topsenti Ijima, 1927
Hyalonema (Oonema?) microstauractina sp. nov.
Hyalonema (Cyliconema) pateriferum Wilson, 1904

II. Family MONORHAPHIDIDAE Ijima, 1927

Genus ***MONORHAPHIS*** F.E. Schulze, 1904

Monorhaphis chuni F.E. Schulze, 1904

III. Family PHERONEMATIDAE J.E. Gray, 1872

Genus ***SERICOLOPHUS*** Ijima, 1901

Sericolophus calsubus sp. nov.
Sericolophus neocaledonicus sp. nov.
Sericolophus hawaiicus sp. nov.
Sericolophus cidaricus sp. nov.

Genus ***SEMPERELLA*** J.E. Gray, 1868

Semperella schultzei (Semper, 1868)
Semperella varioactina sp. nov.
Semperella abyssalis sp. nov.
Semperella crosnieri sp. nov.

Genus ***POLIOPOGON*** Wyville Thomson, 1873

Poliopogon micropentactinus sp. nov.
Poliopogon claviculus sp. nov.
Poliopogon zonecus sp. nov.

Genus ***PHERONEMA*** Leidy, 1868

Pheronema pilosum Lévi, 1964
Pheronema semiglobosum Lévi & Lévi, 1982
Pheronema conicum Lévi & Lévi, 1982
Pheronema giganteum F.E. Schulze, 1887
Pheronema pseudogiganteum sp. nov.

DEPTH DISTRIBUTION

The depth ranges where the species were found are given below.

Species	Depth
Pheronema semiglobosum Lévi & Lévi	235-800 m (highest density 400 m)
Pheronema conicum Lévi & Lévi	310-610 m (highest density 410 m)
Semperella schultzei Semper	370-580 m
Hyalonema topsenti Ijima	550-602 m
Sericolophus calsubus sp. nov.	516-880 m
Pheronema pseudogiganteum sp. nov.	540-1000 m (1620 ?)
Hyalonema spatha sp. nov.	760-970 m
Sericolophus neocaledonicus sp. nov.	700-1480 m
Semperella varioactina sp. nov.	? -1070 m
Monorhaphis chuni Schulze	825-1070 m
Semperella crosnieri sp. nov.	800-1240 m
Poliopogon zonecus sp. nov.	697- 1380 m
Poliopogon claviculus sp. nov.	1100-1380 m
Pheronema pilosum Lévi	825-1620 m
Hyalonema microstauractina sp. nov.	1015-1620 m
Poliopogon micropentactinus sp. nov.	1395-2160 m
Hyalonema uncinata sp. nov.	2370-2375 m
Hyalonema pateriferum Wilson	2380-2697 m
Semperella abyssalis sp. nov.	2960-3036 m

The mean bottom temperatures and salinities observed were:

Depth	Bottom temperature	Bottom salinity
400 m	13°C	35.1 ‰
600-800 m	7°C	34.4 ‰
800-1000 m	5°C	34.5 ‰
2000 m	2°C	34.6 ‰

SYSTEMATIC ACCOUNT

Family HYALONEMATIDAE Gray, 1857

Genus ***HYALONEMA*** Gray, 1835

Subgenus ***LEPTONEMA*** von Lendenfeld, 1915

DIAGNOSIS (IJIMA, 1927). — Dermal pinular ray short-spiny and whip-like, up to 0.800 mm long or shorter (up to 0.300 mm long) and either short spiny or moderately long-spiny and narrowly plumose in appearance; rachis thickest at base. Choanodermal macrohexactin and intermedial microhexactin generally present. Without ambuncinate. Largest macramphidisc relatively narrow, with umbel longer than broad. Sponge with or without oscular sieve plate or a covering layer to sunken gastral surface.

TYPE SPECIES. — *H. campanula* von Lendenfeld, 1915.

Hyalonema (Leptonema) spatha sp. nov.

Fig. 1-6; Tab. 1

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn CP 31, 23°08.70'S, 166°51.55'E, 850-1005 m, 29.08.1985: HCL 495. — Stn CP 54, 23°10.08'S, 167°43.54'E, 950-1000 m, 1.09.1985: HCL 420-421. — Stn CP 75, 22°42'S, 167°23.41'E, 825-860 m, 4.09.1985: HCL 416-419.

HALIPRO 2: stn BT 066, 24°44.86'S, 168°29.39'E, 885 m, 19.11.1996: HCL 422.

Loyalty Islands. BIOGEOCAL: stn CP 290, 20°36.91'S, 167°03.34'E, 920-760 m, 27.04.1987: HCL 415.

CALSUB: stn 7, W of Lifou Island and N of Santal Bay, 20°48'S, 167°05'E, 970-489 m, 24.02.1989: HCL 413, 414.

TYPES. — *Holotype*: HCL 413 (CALSUB, stn 7, W of Lifou Island and N of Santal Bay, 20°48'S, 167°05'E, 970-489 m).

Paratypes: all the other specimens cited above.

DESCRIPTION. — The holotype (fig. 1-2) is cone-like, 100 mm long, with a slightly convex atrial surface and a short apical cone. The diameter of the lower part is 15 mm, the maximum diameter of 65 mm is between dermal and atrial surfaces. Basalia are twisted in a tuft over 60 mm long, about 7 mm in diameter. The body shape of the paratypes varies: they are all bell-like whereas the atrial surface is flat (HCL 417) (fig. 3) or slightly concave (HCL 414) (fig. 1-4). The canalar-like depressions on atrial surface are numerous and small in HCL 417, restricted to 5 and deeply penetrating the body in HCL 414. The length of the body of paratypes is 50-80 mm, the diameter 15-90 mm.

Spicules: The choanosomal skeleton consists of smooth diactins (fig. 6.10) 0.6-1.6/0.006-0.008 mm with a widening medially. Prostalia lateralia (fig. 6.11) are pinular diactins, with four rudimental tubercles in the middle. Pinular ray 0.21-0.43/0.014 mm similar to dermal or atrial pentactins but the finely pointed ends do not protrude far beyond the last spines. The ray directed inside the body 0.07-0.38/0.012-0.014 mm is smooth, sometimes with rare short spines. These pinular diactins are often found among the dermal and atrial spicules. All the anchorate basalia (if present) are broken and their ends are unknown. Dermalia and atrialia are pinular pentactins, rarely hexactins. The base of the pinular ray is thickest at the base. Pinular ray of dermalia (fig. 6.1) 0.085-0.380/ 0.004 mm, the tangential rays are 0.019-0.060/0.003 mm. The pinular ray of atrialia (fig. 6.2-3) is 0.074-0.270/0.004 mm, tangential rays 0.019-0.050/0.003 mm. The whip-like ends of the pinular rays freely project far beyond the last spine. The tangential rays are usually smooth, sometimes with spaced short spines. Hypodermal and hypoatrial pentactins (fig. 6.12) have smooth rays 0.09-0.33/0.015-0.038 mm, the ray directed inside the body is usually longer than tangential ones.

Microstauractins (fig. 6.4-9) are sword-like, with rays covered with dense spines, three rays are short 0.008-0.026/0.003 mm and one is long 0.044-0.145/0.003 mm. Two rays of these stauractins are sometimes long, rarely all four rays are short and a spicule is similar to stauractin acanthophore of some other representatives of *Hyalonema* or very rarely these spicules have form of paratetractin.

The amphidiscs (fig. 6.13-14) fall into two groups, despite of some overlap of maximal length of micramphidiscs and minimal length of macramphidiscs. They are sometimes hardly distinguished from each other in shape and size. Nevertheless, most of them are well distinguished by size classes and the macramphidiscs often have umbels more elongate than the micramphidisc (fig. 6.15) which umbels are nearly equal in length and diameter. The macramphidiscs are rare in the specimen HCl 415. Total length of macramphidiscs 0.025-0.148 mm, umbel length 0.008-0.063 mm, umbel diameter 0.008-0.059 mm. Total length of micramphidiscs 0.014-0.041 mm, umbel length 0.004-0.015 mm, umbel diameter 0.005-0.013 mm. Shafts of macramphidiscs and micramphidiscs covered with spines. Several macramphidiscs, probably of foreign origin, were found in one specimen. They have very long teeth which cross the equator and overlap with the opposite teeth. One huge macramphidisc, probably foreign too, 0.315/0.111/0.104 mm, was found in specimen HCl 415.

ETYMOLOGY. — The specific name alludes to the shape of microholactine spicules.

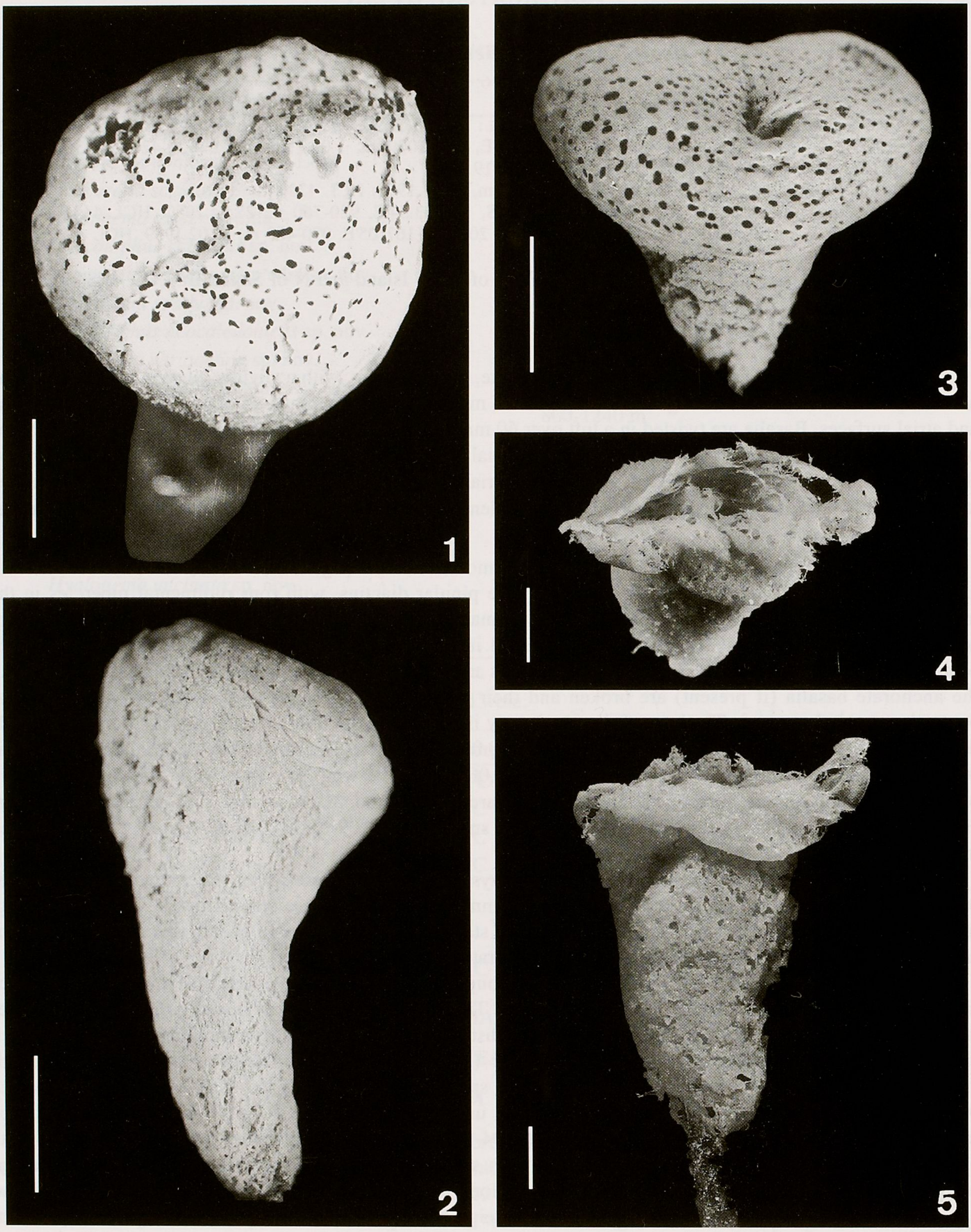


FIG. 1-5. — *Hyalonema (Leptonema) spatha* sp. nov.: **1-2** (HCL 413); **3** (HCL 417); **4-5** (HCL 414). Scales = 2 cm.

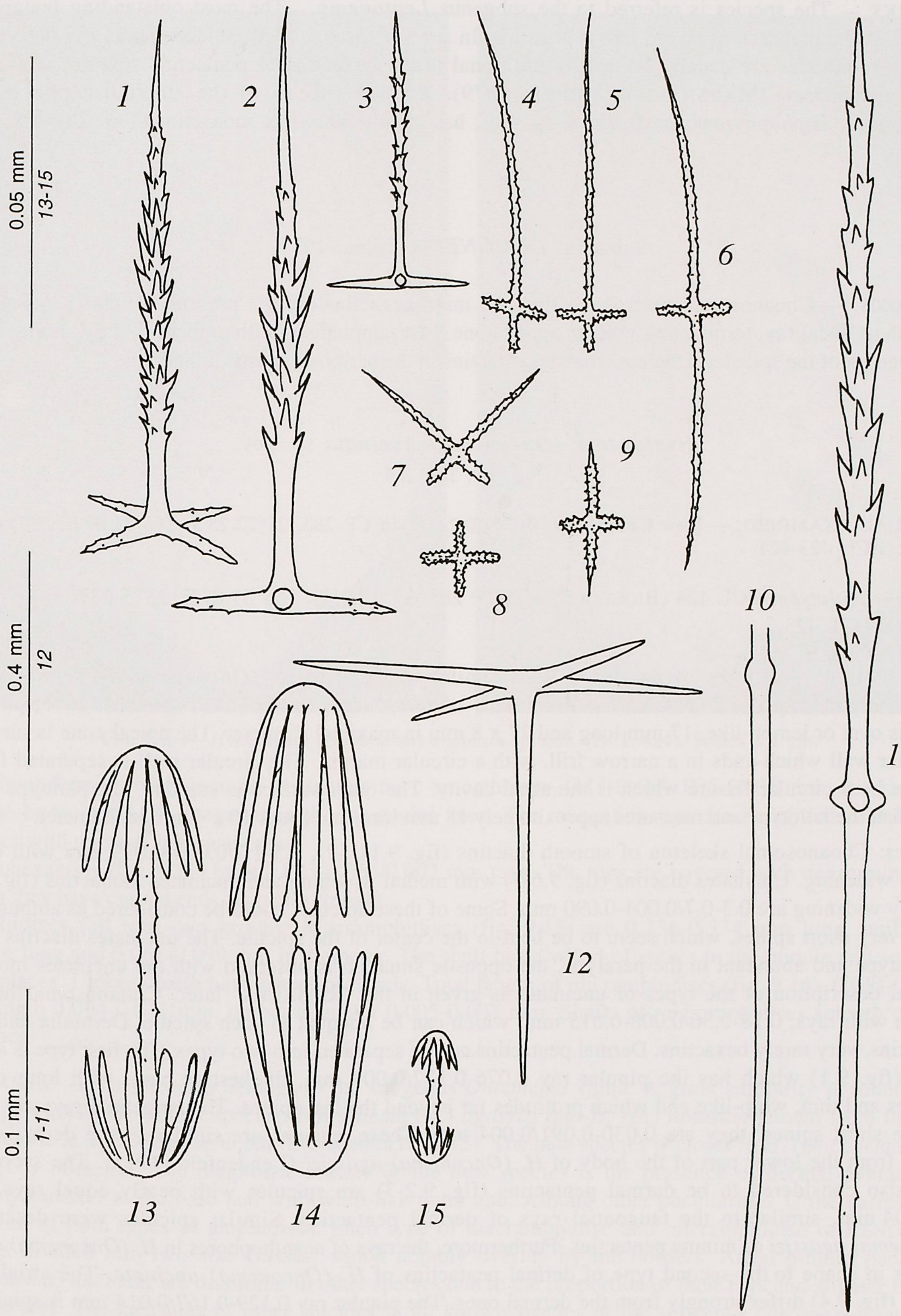


FIG. 6. — Spicules of *Hyalonema (Leptonema) spatha* sp. nov.: **1**, dermal pentactin (HCL 413); **2-3**, atrial pentactins (HCL 413); **4-6**, microstauractins (HCL 413); **7-9**, microstauractins (HCL 418); **10**, choanosomal diactin (HCL 413); **11**, prostalia lateralia - pinular diactin (HCL 413); **12**, hypodermal pentactin (HCL 413); **13**, macramphidisc (HCL 413); **14**, macramphidisc (HCL 417); **15**, micramphidisc (HCL 413).

REMARKS. — The species is referred to the subgenus *Leptonema*. The most outstanding feature of the new species is the presence of sword-like stauractins. In several species of Amphidiscophora the derivatives of hexactins to monactins are usually known as additional to the hexactins or pentactins spicules (for example *Semperella schultzei*) (MARSHALL & MEYER, 1879). Another species of the amphidiscophoran family Hyalonematidae, *Lophophysema australicum* sp. nov., has mainly whip-like monactins (TABACHNICK & LÉVI, 1999).

Subgenus *ONCONEMA* Ijima, 1927

DIAGNOSIS. — Choanosomal macrohexactins and microhexactins always present. Pinular pentactins with relatively short distal ray, terminating with an apical cone. Macramphidiscs with umbels slightly shorter than 1/3 the whole length of the spicules. Uncinate rhabdoxydiactins in the peripheral parts of the body.

Hyalonema (Onconema) uncinata sp. nov.

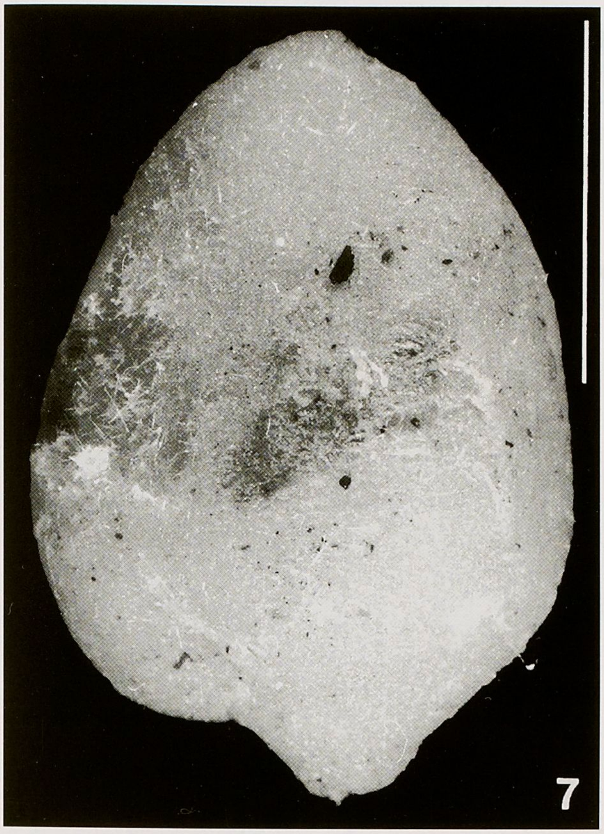
Fig. 7-9; Tab. 2-3

MATERIAL EXAMINED. — **New Caledonia**. BIOGEOCAL: stn CP 283, 21°22.25'S, 166°31.07'E, 2375-2370 m, 26.04.1987: HCL 423-424.

TYPES. — *Holotype*: HCL 424 (BIOGEOCAL, stn CP 283, 21°22.25'S, 166°31.07'E, 2375-2370 m). *Paratype*: HCL 423.

DESCRIPTION. — The holotype (fig. 7-8) is similar in shape to *H. (Onconema) agassizi* "form A" (LENDENFELD, 1915, pl. 41.2) and to *H. (Onconema) obtusum* var. *gracilis* (LENDENFELD, 1915, pl. 33.16). The body is oval or lemon-like, 17 mm long and 17 x 8 mm in maximal diameter. The apical cone is surrounded by a circular wall which ends in a narrow frill, with a circular margin. The circular wall is separated from the apical cone by a circular fissure which is the atrial cavity. The outer surface is smooth. The paratype is more damaged than the holotype and measures approximately 18 mm long and about 10 x 4 mm in diameter.

Spicules: Choanosomal skeleton of smooth diactins (fig. 9.11-12), 0.5-1.7/0.004-0.019 mm with or without medial widening. Uncinates diactins (fig. 9.6-7) with medial widening and uncinates monactins (fig. 9.8,10) without any widening are 0.3-0.7/0.004-0.090 mm. Some of these spicules could be considered as ambuncinates; they have very short spines, which seem to be bent to the center of the spicule. The uncinates diactins are rare in the holotype and abundant in the paratype, the opposite situation is observed with the uncinates monactins. The special description of the types of uncinates is given in the "REMARKS" later. Choanosomal hexactins are smooth with rays, 0.18-0.36/0.008-0.015 mm, which can be unequal in each spicule. Dermalia and atrialia are pentactins, very rarely hexactins. Dermal pentactins can be separated into two types. The first type is a pinular pentactin (fig. 9.1) which has the pinular ray 0.076-0.137/0.004 mm, thickest at base, with long or rarely short spines and thin, whip-like end which protrudes far beyond the last spines. The tangential rays are covered with dense short spines, they are 0.030-0.091/0.004 mm. These spicules are similar to the dermal, pinular pentactins from the lower part of the body of *H. (Onconema) agassizi* (Lendenfeld, 1915). The second type which is also considered to be dermal pentactins (fig. 9.2-3) are spicules with nearly equal rays, 0.084-0.122/0.004 mm, similar to the tangential rays of dermal pentactins. Similar spicules were described in *H. (Onconema) agassizi* as minute pentactins. Furthermore, the rays of acanthophores in *H. (Onconema) obtusum* are similar in shape to the second type of dermal pentactins of *H. (Onconema) uncinata.* The atrial pinular pentactins (fig. 9.4) differ strongly from the dermal ones. The pinular ray 0.129-0.167/0.014 mm is spindle-like, often thickest in the middle, with relatively short spines, the end has an apical cone. The tangential rays 0.019-0.034/0.006 mm are short, usually with sparse small spines or entirely smooth. Their ends are rounded or finely pointed.



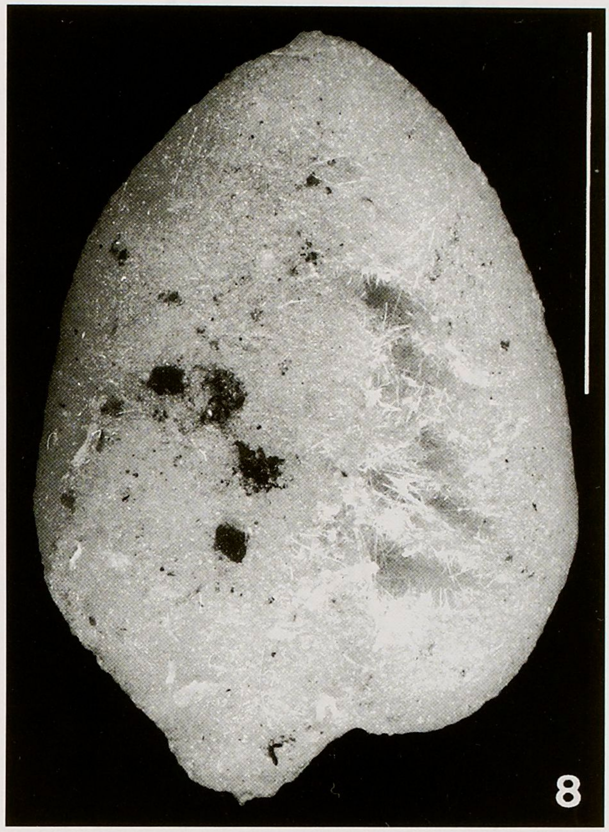


FIG. 7-8. — *Hyalonema (Onconema) uncinata* sp. nov. (HCL 424). Scales = 1 cm.

The hypodermal and hypoatrial pentactins have smooth rays, 0.14-0.68/0.006-0.038 mm, the ray directed inside the body is usually longer than the tangential ones. The tangential rays can be of different length and sometimes with unusual spherical ends.

Microhexactins (fig. 9.17) have 0.023-0.065/0.002 mm rays. The rays are covered with dense minute spines and often they have curved ends, or rarely straight.

Amphidiscs fall into two groups: Macramphidiscs (fig. 9.15) are 0.236-0.334 mm long, umbel 0.084-0.122 mm long and 0.061-0.099 mm in diameter. The shaft has a whorl of spines in the middle and some spines in other places. Umbel's teeth have lancet-like ends. Total length of micramphidiscs (fig. 9.16), 0.014-0.032 mm, umbel length 0.004-0.011 mm, umbel diameter 0.005-0.007 mm. Shafts of micramphidiscs smooth or covered with spines.

REMARKS. — This species belongs to the subgenus *Onconema* Ijima. A great similarity is found between this and previously described species: *Hyalonema (O.) agassizi and H. (O.) obtusum* known from the central-eastern Pacific at 4069-4504 m depth (LENDENFELD, 1915). The new species is closer to *H. (Onconema) agassizi* than *H. (O.) obtusum*. The diagnostic feature of the new species is the presence of dermal pentactins with pinular ray thickest at the base and with whip-like outer end. Among other peculiarities is the narrower range of variation of both types of amphidiscs. Each type of macramphidisc and micramphidisc of LENDENFELD's species is divided into two size classes, which notably overlap by the borders. Atrial pinular pentactins of *H. (Onconema) uncinata* are dissimilar to other species due to the proportion of their rays and slighter because of their measures. The measures of other spicules in all known species of the subgenus *Onconema* have similar parameters.

ETYMOLOGY. — The species name refers to the presence of the uncinate spicules.

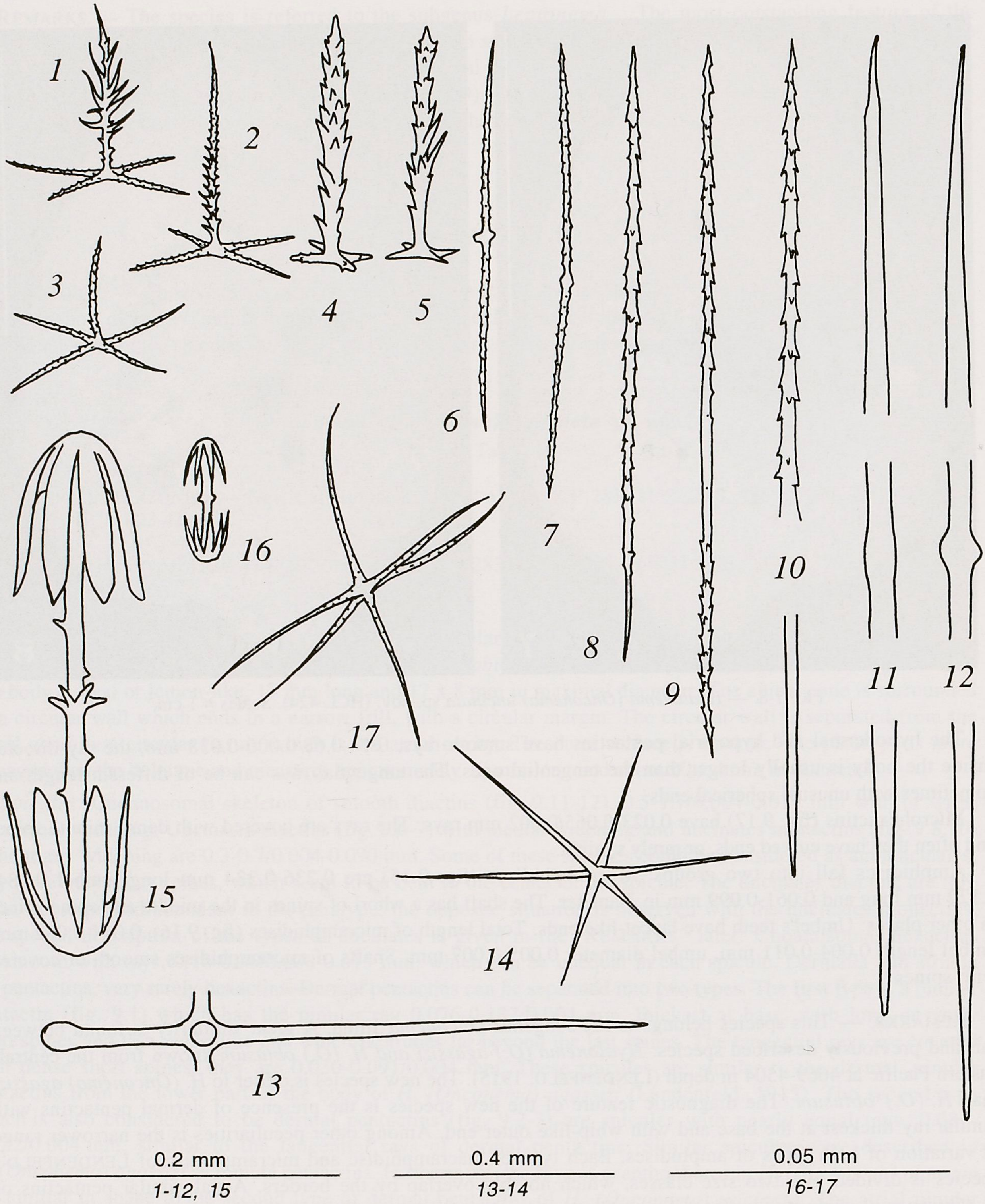


FIG. 9. — Spicules of *Hyalonema (Onconema) uncinata.* sp. nov.: **1**, dermal pinular pentactin (HCL 424); **2-3**, dermal pentactin (HCL 424); **4**, atrial pinular pentactins (HCL 424); **5**, atrial pinular pentactins (HCL 423); **6-7**, uncinates diactin (HCL 424); **8**, **10**, uncinates (HCL 424); **9**, ambuncinate (HCL 424); **11-12**, diactins (HCL 424); **13**, hypodermal pentactin with different rays (HCL 424); **14**, choanosomal hexactin (HCL 424); **15**, macramphidisc (HCL 424); **16**, micramphidisc (HCL 424); **17**, microhexactin (HCL 424).

Subgenus *PTERONEMA* Ijima, 1927

DIAGNOSIS. — Dermal pinular ray plumose or with moderately long lateral spines giving a conical or spindle-like shape to their entire ray under 0.170 mm length. Rachis thickest at base. Ambuncinate present. Microholactin hexactin sometimes pentactin and stauractin. Macramphidiscs with umbel broader than long.

Hyalonema (Pteronema) topsenti Ijima, 1927

Fig. 10-12; Tab. 4

Hyalonema (Pteronema) topsenti Ijima, 1927: 61, pl. 1 fig. 5-6, pl. 2 fig. 11, pl. 3 fig. 1-10.
Hyalonema topsenti - LÉVI & LÉVI, 1989: 36, fig. 5.

FIG. 10-12. — *Hyalonema (Pteronema) topsenti* Ijima, 1927 (HCL 425). Scales = 2 cm.

MATERIAL EXAMINED. — **New Caledonia**. Dragages *"Vauban"*: stn 39, dragage 9, 22°29'S, 166°23'E, 375-550 m, 7.06.1978: HCL 427.

CALSUB: stn 9, 20°53'S, 167°03'E, 602 m, 27.02.1989: HCL 425.

BATHUS 4: stn CP 892, 21°01'S, 164°27'E, 580-602 m, 2.08.1994: HCL 426.

Loyalty Islands. MUSORSTOM 6: stn CP 490, 20°48.88'S, 167°06.13'E, 750 m, 24.02.1989: HCL 428. — Stn DW 493, 20°48.35'S, 167°05.80'E, 700 m, 25.02.1989: HCL 429.

DESCRIPTION. — The complete specimens are HCL 425 and HCL 426. The first is oval, 55 mm long and 25 x 20 mm in maximal diameter. The section is nearly quadrangular and the surface seems divided in four longitudinal areas: 55 x 20-25 mm. The dermal lattice is similar to *Hyalonema globus* Schulze. The atrial cavity is not apparent. Under the convex apical surface, four subatrial canals penetrate vertically deep inside the body. Basalia are 100-120 mm long and covered with strong spines or denticular ridges like in *Cholaronema sibogae* Ijima. This sponge HCL 425 shares several characters with *Hyalonema topsenti* Ijima and *Hyalonema globus* Schulze. IJIMA (1927) already suggested a close affinity between these species.

REMARKS. — Most generally, these sponges are very similar to specimens of the same species described by IJIMA (1927) from the Indonesia and by LÉVI & LÉVI (1989) from the Philippine Islands.

The external shape of this species displays a high variability: presence of apical cone in one specimen and atrial depression in another. This variation is large enough and may be rather observed among related species than between intraspecific populations. All specimens are nearly identical in spicule content despite being collected far from each other. The specimens off New Caledonia have micropentactins and microstauractins instead of microhexactins, which the previously known specimens exhibited.

DISTRIBUTION. — Indonesia, Philippines, New Caledonia.

Hyalonema (Oonema?) microstauractina sp. nov.

Fig. 13-16; Tab. 5

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn CP 57, 23°44.51'S, 166°54.94'E, 1490-1620 m, 1.09.1985: HCL 430. — Stn CP 60, 23°58.87'S, 167°07.72'E, 1530-1480 m, 2.09.1985: HCL 432 et 433. — Stn CP 61, 24°10.67'S, 167°33.65'E, 1070 m, 2.09.1985: HCL 431.

BIOGEOCAL: stn CP 214, 22°43.09'S, 166°27.19'E, 1665-1590 m, 9.04.1987: HCL 435.

Wallis and Futuna Islands. MUSORSTOM 7, stn CP 564, 11°46.10'S, 178°27.40'W, 1015-1020 m, 20.05.1992: HCL 434.

TYPES. — *Holotype*: HCL 432 (BIOCAL, stn CP 60, 23°58.87'S, 167°08.43'E, 1530-1480 m).
Paratypes: all the other specimens mentioned above.

DESCRIPTION. — The holotype is conical, with very shallow (slightly depressed) atrial cavity, 60 mm long and 40 x 50 mm in maximal diameter. The paratypes are similar to the holotype in shape and size; they are 45-70 mm

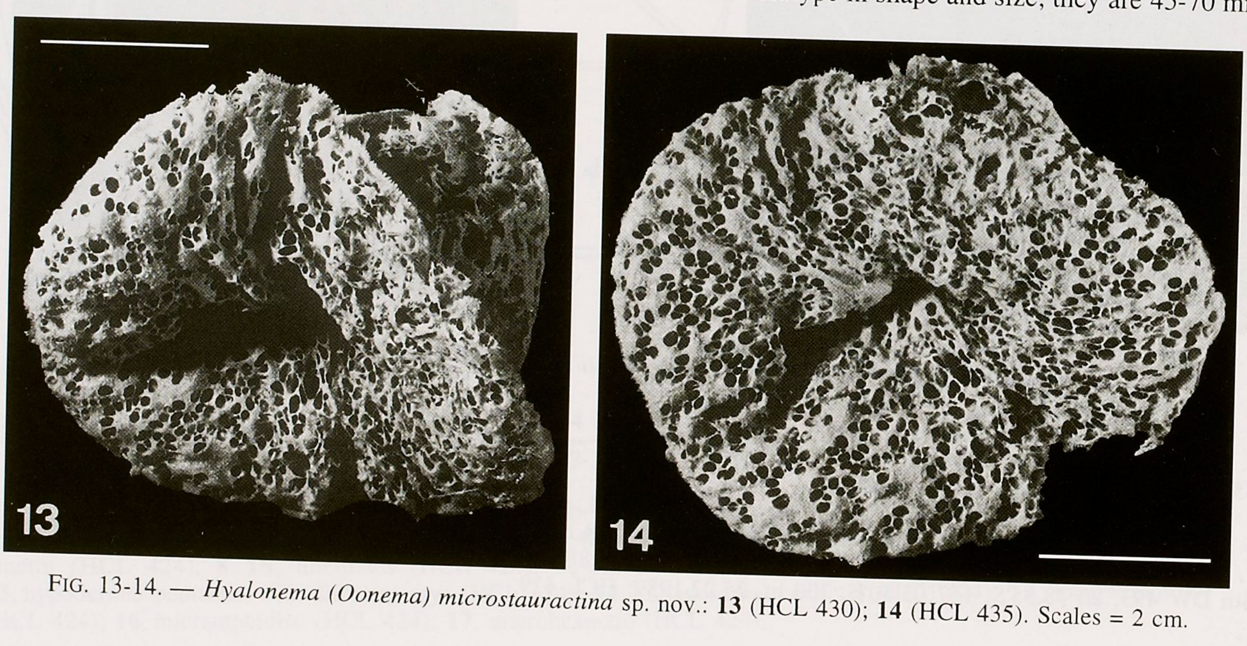


FIG. 13-14. — *Hyalonema (Oonema) microstauractina* sp. nov.: **13** (HCL 430); **14** (HCL 435). Scales = 2 cm.

long and 40-70 mm in diameter. The paratype HCL 433, which contains the greatest number and variation of macramphidiscs, is a thin lamellar fragment 45 x 75 mm. No notable canals were observed beneath the atrial surface.

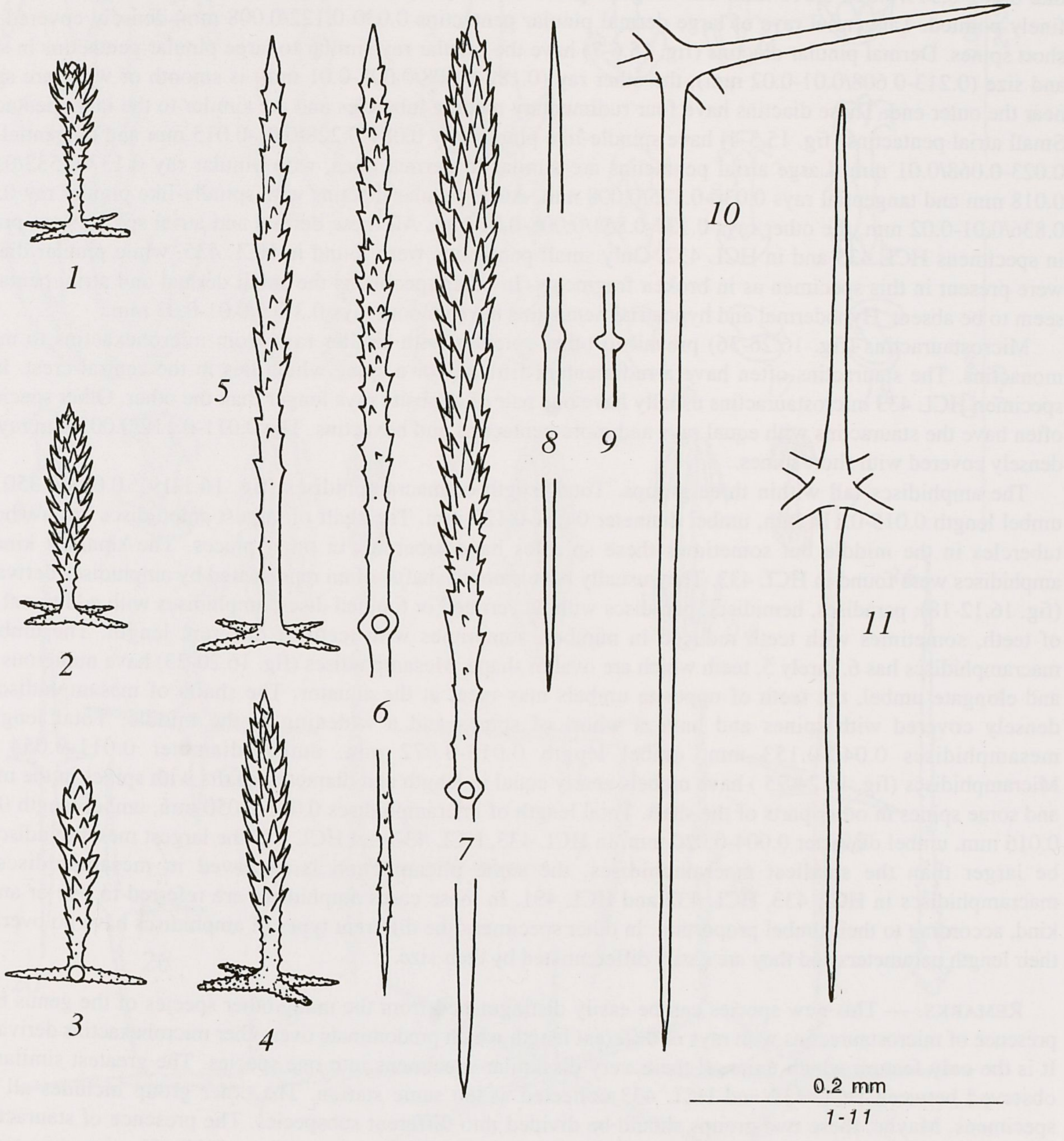


FIG. 15. — Spicules of *Hyalonema (Oonema) microstauractina* sp. nov.: **1-2**, small dermal pentactins (HCL 433); **3-4**, small atrial pentactins (HCL 433); **5**, large dermal pentactin (HCL 433); **6**, dermal pinular diactins (HCL 433); **7**, dermal pinular diactins (HCL 432); **8-9**, choanosomal diactins (HCL 432); **10**, hypodermal pentactin (HCL 432); **11**, choanosomal hexactin (HCL 432).

Spicules: Choanosomal skeleton of smooth diactins (fig. 15.8-9), 0.76-1.8/0.006-0.015 mm, with a widening in the central part. Choanosomal hexactins (fig. 15.10-11) smooth with rays 0.25-0.49/0.01 mm. Dermalia and atrialia pinular pentactins (fig. 15.1-2) of one or two kinds and pinular diactins. Small dermal pentactins have pinular ray with apical cone and spines longest near the outer end or in the upper part. Pinular ray of small dermal pentactin 0.076-0.258/0.008 mm at base, 0.010 mm near the outer end; tangential rays 0.023-0.046/0.006-0.008 mm, covered with dense small spines. Large dermal pinular pentactins (fig. 15.5), with pinular ray spindle-like 0.167-0.517/0.016-0.018 mm. The longest spines are medially situated and the ray has an apical cone or is finely pointed. Tangential rays of large dermal pinular pentactins 0.030-0.122/0.008 mm, densely covered with short spines. Dermal pinular diactins (fig. 15.6-7) have the pinular ray similar to large pinular pentactins in shape and size (0.213-0.608/0.01-0.02 mm); the other ray (0.182-0.608/0.008-0.01 mm) is smooth or with rare spines near the outer end. These diactins have four rudimentary median tubercles and are similar to the large pentactins. Small atrial pentactins (fig. 15.3-4) have spindle-like pinular ray 0.084-0.228/0.01-0.015 mm and tangential rays 0.023-0.068/0.01 mm. Large atrial pentactins are similar to dermal ones, with pinular ray 0.137-0.532/0.016-0.018 mm and tangential rays 0.030-0.175/0.008 mm. Atrial pinular diactins with spindle-like pinular ray 0.205-0.836/0.01-0.02 mm, the other rays 0.137-0.851/0.008-0.01 mm. All these dermal and atrial spicules are present in specimens HCL 433 and in HCL 432. Only small pentactins were found in HCL 435, while pinular diactins were present in this specimen as in broken fragments. In other specimens the small dermal and atrial pentactins seem to be absent. Hypodermal and hypoatrial pentactins have smooth rays 0.3-0.5/0.01-0.03 mm.

Microstauractins (fig. 16.26-36) prevail to other spicules with similar rays from microhexactins to micromonactins. The stauractins often have a rudimentary fifth ray or a spine which lies in the central crest. In the specimen HCL 433 microstauractins usually have one pair of opposite rays longer than the other. Other specimens often have the stauractins with equal rays and more pentactins and hexactins. The 0.011-0.112/0.005 mm rays are densely covered with short spines.

The amphidiscs fall within three groups. Total length of macramphidiscs (fig. 16.1-19): 0.038-0.350 mm, umbel length 0.015-0.114 mm, umbel diameter 0.021-0.129 mm. The shaft of largest amphidiscs has a whorl of tubercles in the middle but sometimes these spicules have tubercles in other places. The smallest kinds of amphidiscs were found in HCL 433. They usually have smooth shafts, often represented by amphidiscs derivatives (fig. 16.12-18): paradiscs, hemidiscs, paradiscs without serrated or toothed discs, amphidiscs with additional rows of teeth, sometimes with teeth reduced in number, sometimes with teeth of different length. The umbel of macramphidiscs has 6, rarely 5, teeth which are oval in shape. Mesamphidiscs (fig. 16.20-23) have numerous teeth and elongate umbel, the teeth of opposite umbels may meet at the equator. The shafts of mesamphidiscs are densely covered with spines and have a whorl of spines and a widening in the middle. Total length of mesamphidiscs 0.040-0.153 mm, umbel length 0.013-0.072 mm, umbel diameter 0.011-0.054 mm. Micramphidiscs (fig. 16.24-25) have umbels nearly equal in length and diameter, shafts with spines in the middle and some spines in other parts of the shaft. Total length of micramphidiscs 0.011-0.050 mm, umbel length 0.004-0.016 mm, umbel diameter 0.004-0.020 mm. In HCL 433, HCL 432 and HCL 435 the largest mesamphidiscs can be larger than the smallest macramphidiscs, the same phenomenon is observed in mesamphidiscs and macramphidiscs in HCL 433, HCL 432 and HCL 431. In these cases amphidiscs are referred to one or another kind, according to their umbel proportion. In other specimens the different types of amphidiscs have no overlap in their length parameters and they are easily differentiated by their size.

REMARKS. — This new species can be easily distinguished from the many other species of the genus by the presence of microstauractins with rays of different length which predominate over other microhexactins derivatives. It is the only feature which unite all these very dissimilar specimens into one species. The greatest similarity is observed between HCL 432 and HCL 433 collected at the same station. The other group includes all other specimens. Maybe, these two groups should be divided into different subspecies. The presence of stauractins is reported for an another genus (or subgenus) of Hyalonematidae: *Chalaronema* (Ijima, 1927). *H. microstauractina* is tentatively placed into the subgenus *Oonema*, but this new sponge possesses some features of the other subgenera, *Paradisconema* and even *Cyliconema.* The main diagnostic feature of the doubtful subgenus *Paradisconema* is the mandatory presence of rare paradiscs among micramphidiscs (IJIMA, 1927), whereas in *H. microstauractina* paradiscs belong to the kind of smallest macramphidiscs and were found only in two out of six specimens. The outer ends of pinular pentactins in *H. microstauractina* are similar to those of both *Paradisconema* with the rachis of the ray of dermal pinular pentactin "thickest at base, and tapering towards tip" [see *H. (Paradisconema) vosmaeri*

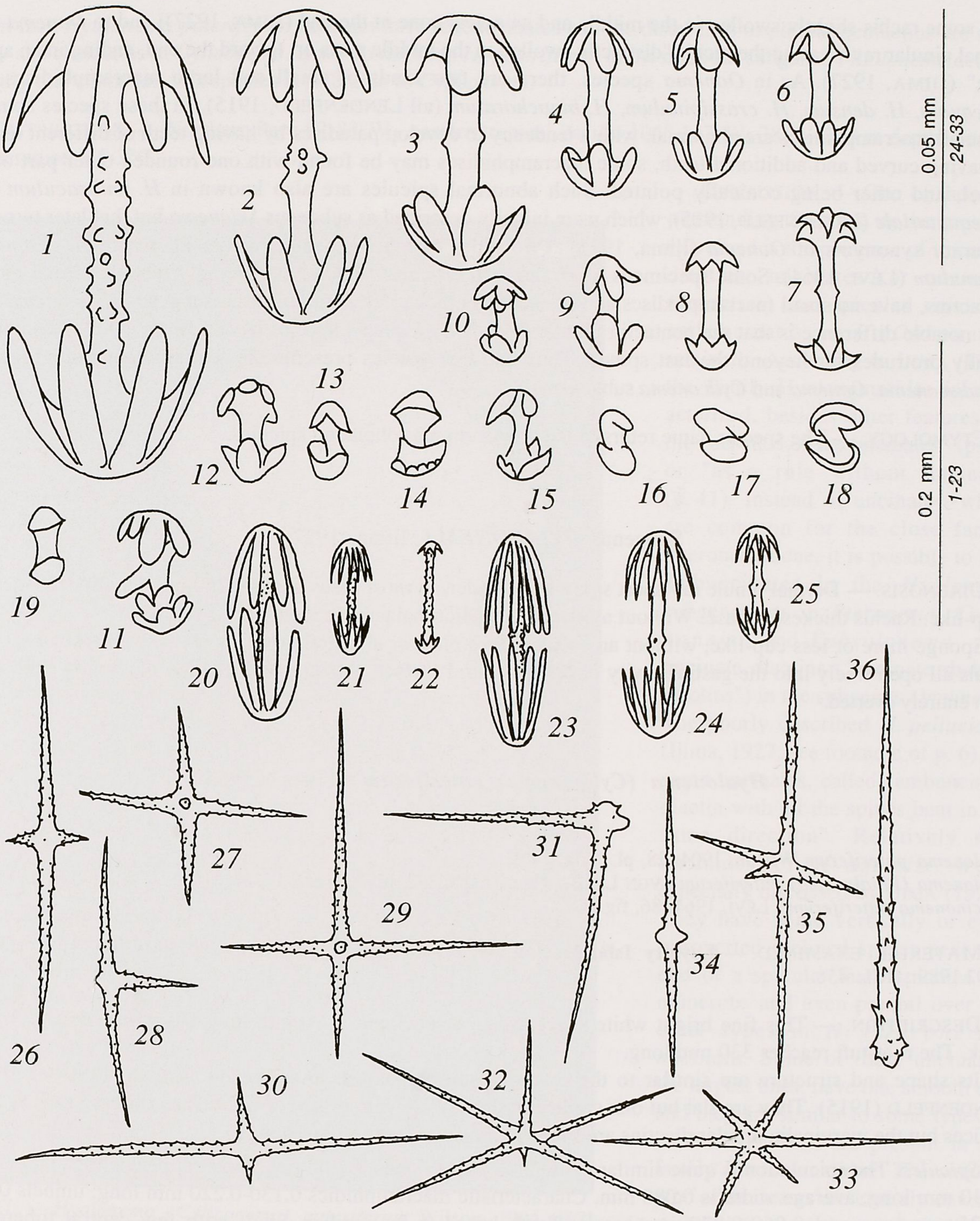


FIG. 16. — Spicules of *Hyalonema (Oonema) microstauractina* sp. nov.

1-19, macramphidiscs and derivatives: 1 (HCL 430); 2 (HCL 432); 3-19 (HCL 433).

12-18, paradiscs; **16**, **18**, paradiscs with unserrate and not-toothed umbels; **19**, macramphidisc with unserrate and not-toothed umbels.

20-23, mesamphidiscs: 20-21 (HCL 434); 22 (HCL 430); 23 (HCL 433).

24-25, micramphidiscs (HCL 433).

26-36, microstauractins and derivatives: 26, 30, 34, 36 (HCL 433) ; 32 (HCL 434); 33 (HCL 431).

with some rachis slightly swollen in the middle and an apical cone at the end (IJIMA, 1927)] and to *Oonema* with dermal pinular ray wearing the rachis "distinctly swollen in the middle parts or, toward the end, ending in an apical cone" (IJIMA, 1927). As in *Oonema* species, there are two kinds of small and large macramphidiscs, i.e. *H. sequoia, H. densum, H. crassipinulum, H. bianchoratum* (all LENDENFELD, 1915). In these species some of the small macramphidiscs are abnormal: with a tendency to develop paradiscs by having teeth of different length, by having curved and additional teeth, some macramphidiscs may be found with one rounded outer part of the umbel, and other being conically pointed. Such abnormal spicules are also known in *H. umbraculum* and *H. aequatoriale* (LENDENFELD, 1915), which were initially described as subgenus *Skianema* but that later turned to be junior synonyms of *Oonema* (Ijima, 1927). Two types of pinular pentactins are known in *H. (Oonema) bipinnulum* (LÉVI, 1964). Some specimens of *H. microstauractina*, which have the only type of dermal pinular pentactins, have no small macramphidiscs and hence the paradiscs are similar to the subgenus *Cyliconema*. The only notable difference is that the pentactin pinular rays of *Cyliconema* species have a finely pointed end which usually protrudes far beyond the last spines. Thus the new species presents the features that draw together, *Paradisconema, Oonema* and *Cyliconema* subgenera.

ETYMOLOGY. — The species name refers to the cruciform microholactin spicules.

Subgenus ***CYLICONEMA*** Ijima, 1927

DIAGNOSIS. — Dermal pinule ray short spiny and slender, in most cases under 0.250 mm length or longer and whip-like. Rachis thickest at base. Without ambuncinate. Microholactin hexactine.

Sponge more or less cup-like, without an oscular sieve plate or a gastral covering layer, so that the excurrent canals all open freely into the gastral cavity or on the gastral surface, which may be nearly externally exposed or even entirely everted.

Hyalonema (Cyliconema) pateriferum Wilson, 1904

Fig. 17

Hyalonema pateriferum Wilson, 1904: 28, pl. 1 fig. 1-13.
Hyalonema (Phialonema) pateriferum - VON LENDENFELD, 1915: 362, pl. 50 fig. 6-15, pl. 51 fig. 1-28, pl. 52 fig. 1-29.
Coscinonema pateriferum - LÉVI, 1964: 86, fig. 32.

MATERIAL EXAMINED. — **Loyalty Islands**. CALSUB, E. slope off Lifou Island, 20°35.4'S, 167°12'E, 2697 m, 23.02.1989: HCL 436.

DESCRIPTION. — This fine bright white saucer-shaped specimen is 90 mm long, 70 mm wide and 10 mm thick. The root-tuft reaches 330 mm long.

Its shape and structure are similar to the eastern Pacific sponges described by WILSON (1904) and VON LENDENFELD (1915). They are flat but one surface is slightly convex. It is very difficult to observe the excurrent orifices but the marginalia pinular diactins are found in the apical part of the sponge.

Spicules: The spiculation is quite similar to WILSON's specimens. Distal ray of gastral pentactins range 0.300-0.410 mm long; average width is 0.088 mm. Characteristic macramphidics 0.130-0.220 mm long; umbels 0.020-0.035 mm long and 0.060-0.070 mm broad. Teeth broad, 6 in number. Shaft with few central tubercules. Abundant mesamphidics 0.025 -0.066 mm long. Scarcely found microxyhexactins with rays, straight or sligthly bent. Acanthophora similar to the type present in the collar pad.

REMARKS. — VON LENDENFELD (1915) created the subgenus *Phialonema* for *Hyalonema pateriferum* Wilson and *Hyalonema brevancora* Lendenfeld. But IJIMA (1927) maintains only *H. brevancora* in *Phialonema* and assigned *H. pateriferum* to the subgenus *Coscinoderma*, used further by LÉVI (1964).

In fact, *Hyalonema pateriferum* does not have ambuncinates and the distal rays of pinular pentactins are short spiny and slender as in *Cyliconema*. If we do not keep *H. pateriferum* in the doubtful subgenus *Phialonema* defined by only one character, this species is referable to *Cyliconema*.

DISTRIBUTION. — Northern Peru 82-83°W - eastern tropical Pacific 104°-117°W; 3811-4063 m depth. Bottom temperature: 1.5-3°C.

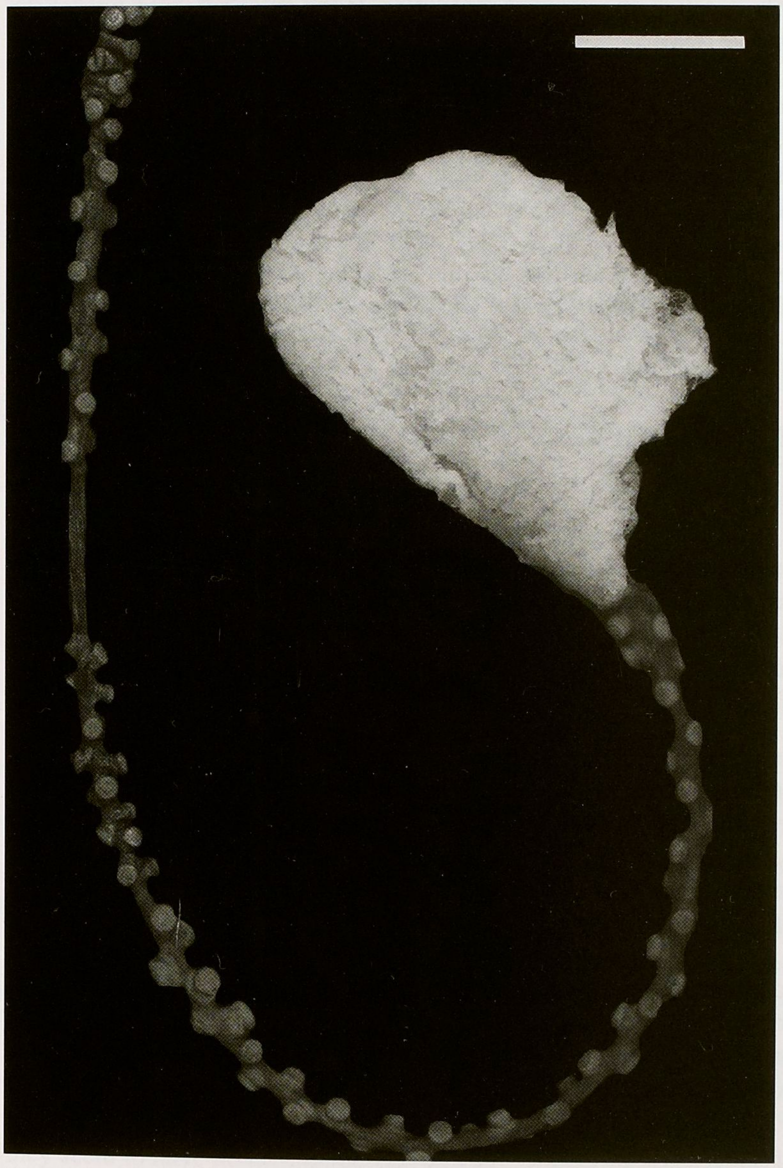


FIG. 17. — *Hyalonema (Cyliconema) pateriferum* Wilson, 1904 (HCL 436). Scale = 1 cm.

DISCUSSION. — One of the most outstanding features in the material examined is the presence of uncinates diactins, uncinates (or uncinates monactins) and spicules similar to ambuncinates in *H.(Onconema) uncinata*. According to IJIMA (1927) the family Hyalonematidae is characterized, besides other features, by the "absence of the uncinates" (p. 42) or "as a rule without uncinate" (p. 41). Instead of uncinates, which are common for the close family Pheronematidae, it is possible to find ambuncinates in the *Hyalonema* subgenera as in *Pteronema, Coscinonema* and *Euhyalonema* and uncinate diactins ("uncinate rhabdodiactins") in the subgenus *Onconema*. The poorly described *H. pellucidum* (Ijima, 1927, see footnote of p. 6) has some uncinates, called "ambuncinate diactin with all the spines bent in the same direction". Relatively rare uncinates of *H. agassizi* were especially discussed by IJIMA (1927). They have some vertically or even retroverted inclined spines near one end of a spicule. Such spicules are numerous and even prevail over the other types in *H. (Onconema) uncinata*. Some of these uncinates, the largest ones, have one smooth end and they are similar to some types of uncinates, which are present in the family Pheronematidae. The smaller type of uncinates are entirely covered with spines, and they are similar to those described for *H. (Onconema) agassizi* and especially discussed by IJIMA. The smaller type of uncinates have a widening in their central part and only the smallest ones have rudiments in shape of two tubercles. Does this morphological series of uncinates reflect their ontogenesis and phylogenesis? If it is a result of ontogenesis, the observed morphological differences represent development stages of the adult. If it is a result of recapitulation, the smallest type of uncinate is likely to be derived from the "archaic stauractin" (IJIMA, 1927), and the largest type of uncinates which are described as uncinates monactins are uncinates diactins. Are the uncinates of Pheronematidae homologous to these large uncinates diactins? If so, the existence of uncinates monactins is questionable. Formally, according to morphology (asymmetry of spines) they are monactins, being however real diactins according to their origin. The only argument to their monactin nature is the absence of axial crest traces inside these spicules. Hence, we can conclude that it is very likely that the morphological series of uncinates observed in the subgenus *Onconema* displays some features of its phylogenesis and all the uncinates observed in other groups of Hexactinellida are likely to be uncinates diactins and only using the formal morphological criteria, it is possible to call them uncinates monactins. In the ontogenesis of *Farrea* the youngest uncinates show a widening in the middle (OKADA, 1928) and hence the uncinates of Hexasterophora may be also considered to be uncinates diactins according to their origin. Moreover, uncinates diactins were found together with usual uncinates (uncinates monactins) in mature *Tretocalyx polae* (Schulze, 1900). It is very likely that uncinates diactins, uncinates monactins and ambuncinates are close types of spicules, homologous not only in Hyalonematidae and Pheronematidae but even among Amphidiscophora and Hexasterophora. It is very difficult to come to a conclusion in favour of separate origin of uncinate-like spicules and some other smooth choanosomal spicules.

These facts point out the similarities of evolutionary trends even in quite separate branches of Hexactinellida, when similar but independently evolved structures give parallel series of variability.

Family MONORHAPHIDIDAE Ijima, 1927

Genus ***MONORHAPHIS*** Schulze, 1904

DIAGNOSIS (after IJIMA, 1927). — Amphidiscophora with uncinate, choanosomal supporting spicules predominantly tauactins, elongate in the complete axis and sometimes passing over into rhabdodiactin form by suppression of the unpaired ray; basalia a single, excessively strongly developed needle. Sponge body somewhat like a laterally compressed cylinder, with excurrent canals orifices, irregularly distributed on the surface, and showing on one body edge a longitudinal series of niche-like depressions covered with a sieve-like lattice.

Monorhaphis is one of the most peculiar genera of Hexactinellida. Among the specimens collected by the *"Valdivia"* in the Indian Ocean, SCHULZE (1904) identified two species, *M. chuni* and *M. dives*, based on the presence or absence of mesamphidiscs and abnormal micramphidiscs.

Since then, other specimens collected in Indonesia (IJIMA, 1927) and the Indian Ocean (BURTON, 1959) have been linked to these two species. We agree with SCHULZE (1886, 1893) and IJIMA (1927) that the very small fragment of "*Hyalonema* sp." collected off Luzon (Philippine Islands) renamed by SCHULZE as "*Hyalonema fruticosum*" belongs to *Monorhaphis.*

More recently, LI JINHE (1987) described *M. intermedia,* a new species from the China Sea. It has all types of spicules which exist in the two species described by SCHULZE.

Finally, *Monorhaphis* was observed during dives of the submarine *"Cyana"* in the Loyalty Basin (ROUX *et al.*, 1991a, 1991b). It was also found on the Norfolk Rise (LÉVI *et al.*, 1989) and on the outer slope of the Great Barrier Reef (HOOPER & WIEDENMAYER, 1994).

The MUSORSTOM and CIDARIS I cruises provided complete specimens and numerous raw basalia. The study of these collections allowed us to determine that *M. dives* and *M. intermedia* are junior synonyms of *M. chuni* Schulze, the type species of the genus (designation by DE LAUBENFELS, 1936).

Monorhaphis chuni Schulze, 1904

Fig. 18; Tab. 6-9

Monorhaphis chuni Schulze, 1904: 112, fig. 3-4, pl. 40-42, 44-48. — IJIMA, 1927: 37, fig. 3, pl. 6 fig. 11-12.

Monorhaphis dives Schulze, 1904: 121, pl. 43 fig. 1-20. — BURTON, 1959: 176.
Monorhaphis intermedia Li Jinhe, 1987: 130, pl. 1-2.

MATERIAL EXAMINED. — **Red Sea**. *"Anton Bruun"*: stn 7-370 D, 28°00'N, 35°60'E, 880 m: kt476 (USNM).

Somalia. *"Valdivia"*: stn 257, 1°48.2'N, 45°42.5'E, 1644 m: fragment of the holotype of *Monorhaphis dives* (NHM 1908.09.24.065). — Stn 264: 6°18.8'N, 49°32.5'E, 1079 m: fragment of *Monorhaphis chuni* (NHM 1908.09. 24.064).

Madagascar (NW coast). *"Vitjaz II"*: stn 2601, 12°25.04'S, 48°08.00'E, 700 m: 5/2/1351, 5/2/1422, 5/2/1352 (IORAN). — Stn 2606, 12°26.70'S, 48°06.40'E, 700-720 m: 5/2/1408 (IORAN).

Australia (NE coast). CIDARIS I: stn 1-4, 18°08.69'S, 147°33.79'E, 962-966 m, 6.05.1986: p540 (MTQ). — Stn 4-1, 18°11.52'S, 147°52.12'E, 1012-998 m, 6.05.1986: fr767 (MTQ). — Stn 8-1, 18°07.82'S, 148°15.39'E, 1115-1119 m, 7.05.1986: fr867.1 (MTQ).

Chesterfield Islands. MUSORSTOM 5: stn CP 324, 21°15.01'S, 157°51.33'E, 970 m, 14.10.1986: HCL 408-409.

New Caledonia. BIOCAL: stn CP 61, 24°10.67'S, 167°33.65'E, 1070 m, 2.09.1985: HCL 445. — Stn CP 75, 22°20.42'S, 167°23.41'E, 825-860 m, 4.09.1985: HCL 405-407.

Loyalty Islands. CALSUB: stn 7, W of Lifou Island and N of Santal Bay, 20°48'S, 167°05'E, 970-489 m, 25.02.1989: HCL 411. — Stn 8, W of Lifou Island and N of Santal Bay, 20°48'S, 167°05'E, 880-516 m, 26.02.1989: HCL 412. — Stn 13, 21°26'S, 166°22.7'E, 1807-1567 m, 4.03.1989: HCL 410.

TYPES. — Those of *Monorhaphis chuni* are perhaps deposited at the Hamburg Museum.

A fragment of the holotype of *Monorhaphis dives* (*"Valdivia"*, stn 257: 1°48.2'N, 45°42.5'E, 1644 m) is deposited at The Natural History Museum, in London (NHM 1908.09.24.065).

DESCRIPTION. — Most of material examined consisted of fragments, but the typical shape of the genus may be often deduced. Only two sponges are complete specimens similar in shape to those described as *M. chuni* (Schulze, 1904) or observed and photographed from the submarine *"Cyana"* (ROUX *et al.*, 1991a, 1991b).

Spicules: Choanosomal spicules are chiefly tauactins (triactines, typical for the genus and family) with the opposite rays longer than the third one. These tauactins occur together with paratetractins and stauractins with two opposite rays notably longer than the other ones. Uncinates are also present in all specimens. Basalium, if present, is a single giant monaxonal diactine spicule.

Hypodermalia and hypoatrialia are represented by pentactins (fig. 18.1), with the ray directed inside the body longer than the tangential ones; the tangential rays are similar in length.

Dermalia and atrialia are pinular pentactins. They are very similar in shape and size to each other (see Tab. 6-9). The pinular ray of these pentactins is slightly widened toward the end, often with an apical cone which protrudes beyond the last spines. Canalaria are pinular pentactins observed in some, probably the biggest specimens. These pentactins are shorter than the dermal and atrial ones; the pinular ray is thicker at the base with an outer end finely pointed, the spines are notably shorter than the spines of dermal and atrial pentactins. All the spicules mentioned above are similar in all the examined specimens and in all the known descriptions (for references see synonymies). They can never be used for the species definition (see Tab. 9).

Microhexactins (fig. 18.3-5) (rarely micropentactins and microstauractins) are usually numerous in all the examined specimens. They are rare in kt476. The microhexactins have rays covered with more or less dense short spines.

The micramphidiscs (fig. 18.14-16) are more or less similar in all of these species. They are mostly similar in shape and size but in some specimens they may have more or less spinous shafts. Since curious micramphidiscs are rarely found among the normal ones it is possible to mention the following cases, but they seem to have no taxonomic significance. Micramphidiscs in the form of paradisc were observed in specimen kt417; the ratio of its umbels diameters is 0.7. Micramphidiscs with one tooth at each umbel (sigmoidal in shape) were found in NHM 5/2/1408, whereas in HCL 411 only two teeth were found at one side while at the other there was no umbel but a small spherical outer end instead. Micramphidisc in the form of tylodisc (fig. 18.18) with one umbel reduced to spherical end while the other is "normal" were found in NHM 1908.09.24.065. Micramphidisc (fig. 18.21) with one hemispherical umbel and the other conically pointed was found in HCL 410. And finally hexadiscs (fig. 18.13) corresponding to micramphidiscs in shape and size were found in fr767.

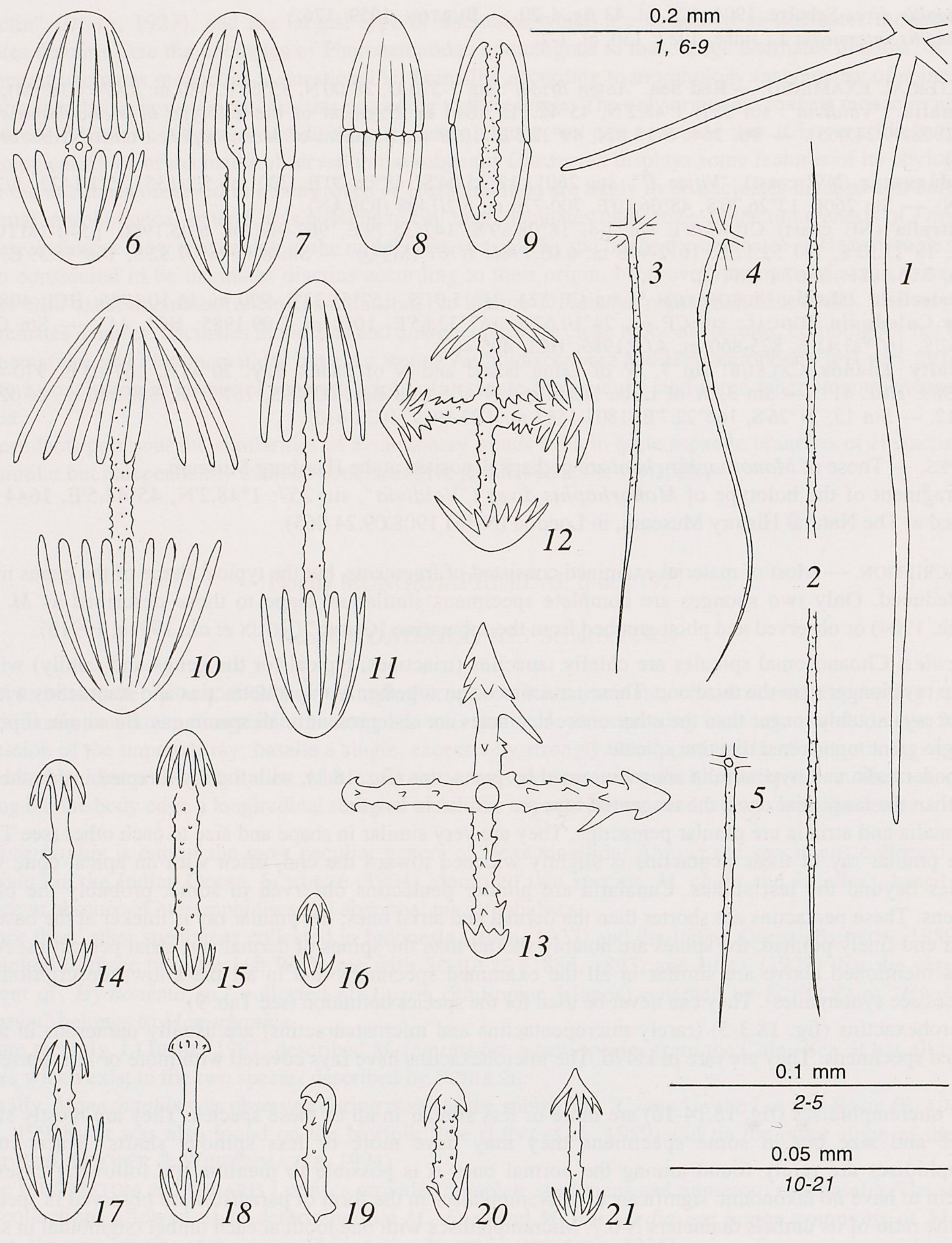


FIG. 18. — Spicules of *M. chuni* Schulze, 1904: **1**, hypodermal pentactin (5/2/1351); **2**, uncinate (5/2/1422); **3-4**, microhexactins (5/2/1351); **5**, microhexactins (fr867.1.); **6**, amphidisc intermediate between macramphidiscs and mesamphidiscs (fr867.1.); **7**, barrel-shaped mesamphidisc (HCL 409); **8-9**, mesamphidiscs with fused teeth (HCL 409) (9, optical section); **10-11**, amphidiscs intermediate between mesamphidiscs and micramphidiscs (10, HCL 411; 11, HCL 408); **12**, hexadiscs (HCL 411); **13**, hexadiscs (fr767); **14-15**, micramphidiscs (5/2/1351); **16**, abnormaly small micramphidisc (fr867.1); **17**, hemidisc (1908.09.24.064); **18**, tylodisc (1908.09.24.065); **19-20**, paradiscs (1908.09.24.064); **21**, micramphidisc with different umbels (HCL 410).

REMARKS. — Species of *Monorhaphis* were distinguished earlier by the presence or absence of macramphidiscs and mesamphidiscs. The macramphidiscs are usually notably larger (over 0.3 mm in length) than mesamphidiscs, and have fewer teeth (about 8) in each umbel; they often have smooth shafts or are provided with sparse short spines. Among macramphidiscs, forms with all or some of opposite teeth fused at equator (barrel-shaped, IJIMA, 1927) are present. All mentioned exceptions were found in all the observed materials. Mesamphidiscs are distinguished by their length, shafts densely covered with spines and often more elongate umbels than in micramphidiscs. Sometimes they can be found in the form of hexadiscs. Rarely mesamphidiscs (fig. 18.8-9) are found with fused opposite teeth as macramphidiscs: HCl 409, 406, 405. In one specimen, HCL 409, all the teeth of some mesamphidiscs were fused into a continuous silica layer. All the exceptions of mesamphidisc shapes are very similar to those of macramphidiscs. Moreover, forms of amphidiscs which are transitional between macramphidiscs and mesamphidiscs, and which could be hardly referred to as these kinds of spicules were widely observed in HCL 409, 406, 407. Kinds of amphidiscs transitional between micramphidiscs and macramphidiscs were observed in NHM 1908.09.24.065, HCL 408 and 410 as well.

The only known difference between three well described species of *Monorhaphis* — *M. chuni, M. dives* and *M. intermedia* — is the presence or absence of macramphidiscs and mesamphidiscs. Using this criterion, the existing material was arranged into six groups (Tab. 4). The first group consisted of *M. chuni* according to its original description (SCHULZE, 1904). The second group is *M. chuni* according to the description of IJIMA (1927). Unfortunately these sponges were not found in the investigated collections and the sponge NHM 1908.09.24.064 labeled as *M. chuni* turned out to be a suspected *M. dives.* The third group consisted of four specimens of *Monorhaphis* which were closer to *M. chuni* from its typical location, in shape and in spiculation except mesamphidiscs that are similar to *M. dives* (rare in 5/2/1408, and numerous in 5/2/1352). The fourth group included the investigated fragment of the holotype of *M. dives* (NHM 1908.09.24.065) and two sponges that could be doubtfully referred to this species by shape and by the fact that they were collected in nearby stations (NHM 1908.09.24.064 and kt476); and in NHM 1908.09.24.064 some macramphidiscs were found. The fifth group was *M. intermedia* according to the description of LI JINHE (1987). These include sponges that contain both macramphidiscs and mesamphidiscs together with their abnormal forms. The last and sixth group consisted of numerous specimens which are similar to *M. intermedia* collected off New Caledonia and Australia. It is possible to distinguish specimens without macramphidiscs (HCL 405, 410, 411, p540), specimens that contained neither macramphidiscs nor mesamphidiscs (HCL 412) and specimens that contained them both (all other specimens). It is obvious from this list that the diagnostic features distinguishing the species does not work and that the material showed all the possible variations. Concerning the length of microhexactin rays, the third group of *M. chuni* had rays about two times longer, but this type of spicule was poorly described in the holotype and such spicules of *M. chuni* described by IJIMA (1927) (second group) have the shortest rays of microhexactins comparable with those of most other specimens. Hence, the investigated and described species must be considered as synonyms of one polymorphic species, *M. chuni.*

Family PHERONEMATIDAE Gray, 1872

Genus ***SERICOLOPHUS*** Ijima, 1901

DIAGNOSIS (slightly emended after REISWIG & ZGRAGGEN, 1991). — Body shape like a thick tongue or spoon borne upon a compact root tuft of approximately equal length. Frontal and abfrontal surfaces respectively as gastral and dermal, with gastral surface strongly reflexed over the dermal surface around body margins. Gastral surface with open excurrent canals. Hexactins and pentactins as spicules principalia. With genuine uncinates. Pleuralia lateralia as monactine sceptres. Basalia include anchors and distinctive monactine "crook" spicules. Internally basalia radiate to body margins in several strands, without a columella or associated acanthophore.

TYPE SPECIES. — *Hyalonema reflexum* Ijima, 1894.

Sericolophus calsubus sp. nov.

Fig. 19-21; Tab. 10, 14

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn CP 75, 22°18.65'S, 167°23.30'E, 825-860 m, 4.09. 1985: HCL 446.

CALSUB: stn 8, 20°48.3'S, 167°05'E, 880-516 m, 26.02.1989: HCL 155.

TYPES. — *Holotype*: HCL 155 (CALSUB, stn 8, 20°48.3'S, 167°05'E, 880-516 m).
Paratype: HCL 446 (BIOCAL, stn CP 75, 22°18.65'S, 167°23.30'E, 825-860 m).

DESCRIPTION. — The shape and structure of the body are typically those of the genus *Sericolophus*. The holotype is a well preserved sponge 100 mm in long, 70 mm wide and 12 mm thick; a long single tuft of basalia is about 100 mm long. The paratype is a poor fragment.

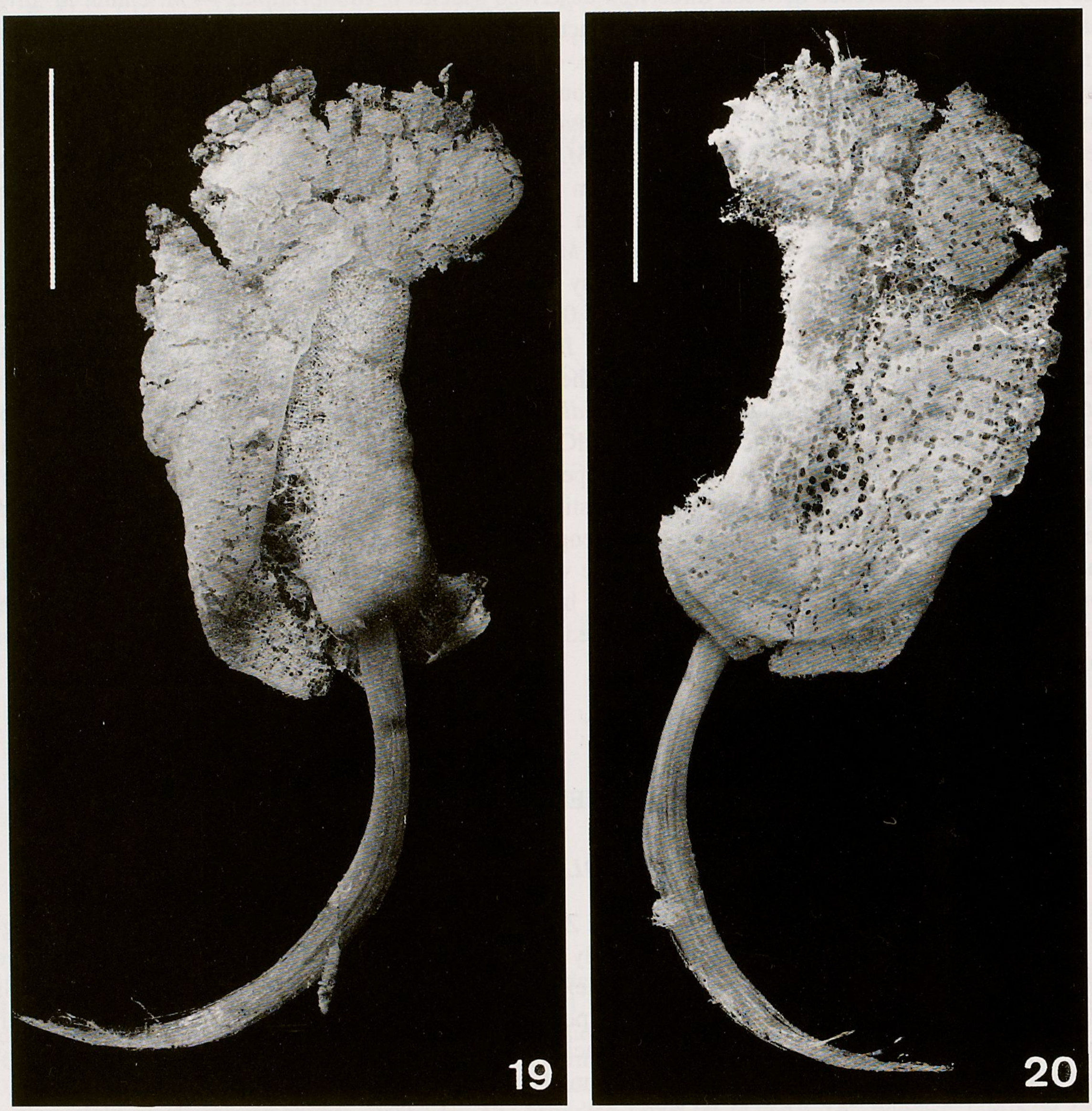


FIG. 19-20. — *Sericolophus calsubus* sp. nov. (HCL 155). Scales = 4 cm.

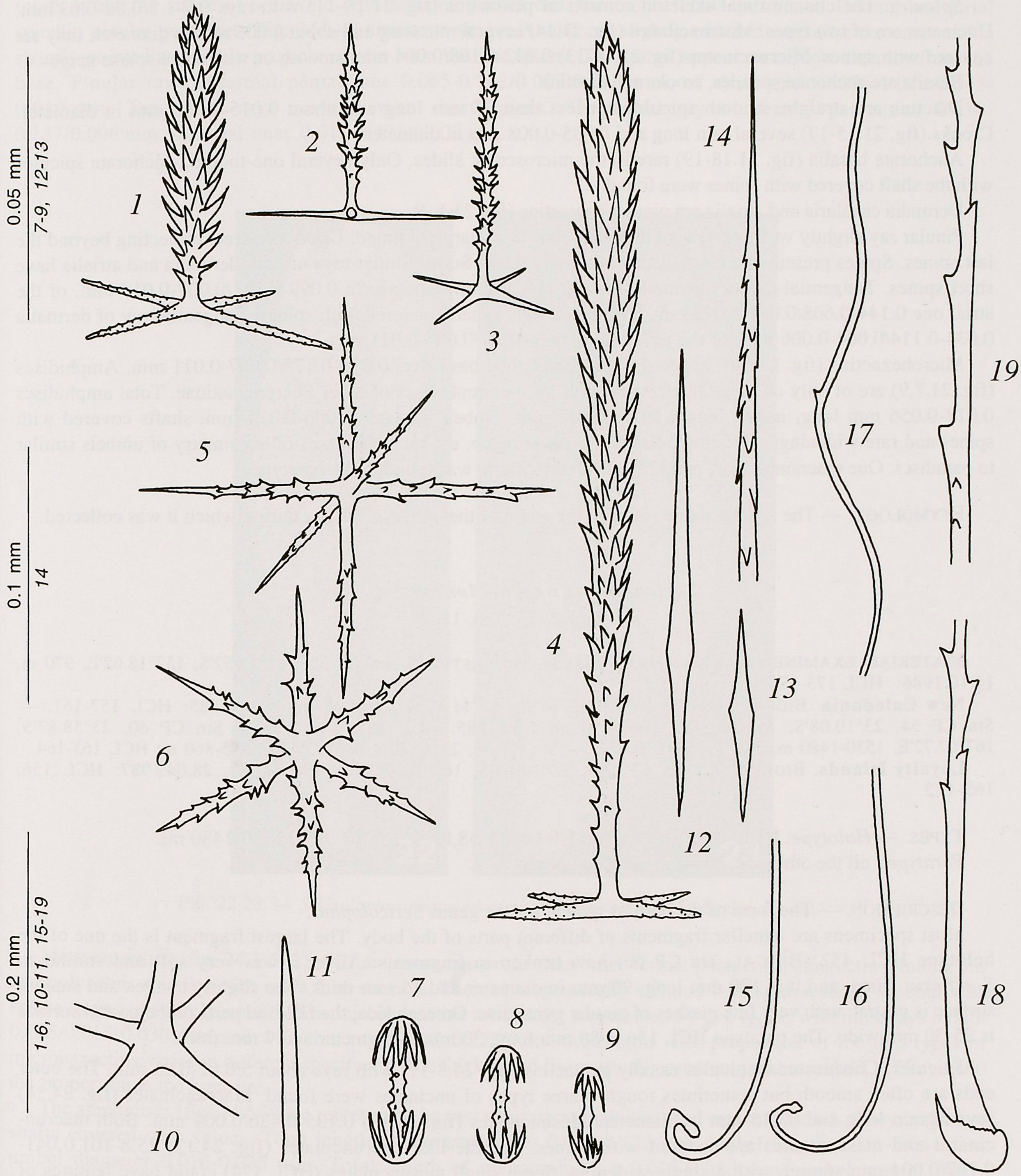


FIG. 21. — Spicules of *Sericolophus calsubus* sp. nov. (HCL 155): **1-2**, dermal pinular pentactins; **3-4**, atrial pinular pentactins; **5-6**, microhexactins; **7-9**, micramphidiscs; **10**, choanosomal pentactin; **11**, outer end of choanosomal pentactin; **12-13**, micruncinates; **14**, macruncinate; **15-16**, crooks; **17**, shaft of crook; **18**, anchorate basalia; **19**, shaft anchorate basalia.

Spicules: The choanosomal skeleton consists of pentactins (fig. 21.10-11) with rays 0.7-1.3/0.02-0.03 mm. Uncinates are of two types. Macruncinates (fig. 21.14) several mm long and about 0.005 mm in diameter, they are covered with spines. Micruncinates (fig. 21.12-13) 0.032-0.108/0.004 mm, smooth or with some sparse spines.

Basalia are anchorate spicules, crooks and diactins.

Diactins are straight, smooth spicules not less than 27 mm long and about 0.015-0.038 mm in diameter. Crooks (fig. 21.15-17) several mm long and 0.005-0.008 mm in diameter.

Anchorate basalia (fig. 21.18-19) rare in the microscopic slides. Only several one-toothed anchorate spicules with the shaft covered with spines were found.

Dermalia canalaria and atrialia are pinular pentactins (fig. 21.1-4).

Pinular ray slightly widened toward the outer end. It is sharply pointed. Upper end free, projecting beyond the last spines. Spines present at a short distance from the base. Some pinular rays of both dermalia and atrialia have short spines. Tangential rays are smooth. Pinular ray of dermal pentactin 0.099-0.361/0.007-0.019 mm, of the atrial one 0.144-0.608/0.007-0.022 mm. Tangential rays usually covered with spines. Tangential ray of dermalia 0.034-0.114/0.004-0.006 mm, of the atrial one 0.046-0.087/0.004-0.011 mm.

Microhexactins (fig. 21.5-6) covered with spines, they have rays 0.068-0.175/0.007-0.011 mm. Amphidiscs (fig. 21.7,9) are of only one type that corresponds to micramphidiscs of other Pheronematidae. Total amphidiscs 0.018-0.056 mm long, umbel length 0.007-0.018 mm, umbel diameter 0.006-0.014 mm, shafts covered with spines and rare widenings. The amphidiscs have usual shape, except some cases of asymmetry of umbels similar to paradiscs. One macramphidisc, probably of foreign origin, was found in the paratype.

ETYMOLOGY. — The species name refers to the name of the cruise, CALSUB, during which it was collected.

Sericolophus neocaledonicus sp. nov.

Fig. 22-25; Tab. 11, 14

MATERIAL EXAMINED. — **Chesterfield Islands**. MUSORSTOM 5: stn CP 323, 21°18.52'S, 157°18.62'E, 970 m, 14.10.1986: HCL 173-175.

New Caledonia. BIOCAL: stn CP 34, 23°12.44'S, 167°11.87'E, 710-700 m, 29.08.1985: HCL 157-161. — Stn CP 54, 23°10.08'S, 167°43.54'E, 1000-950 m, 1.09.1985: HCL 162, 447-451. — Stn CP 60, 23°58.87'S, 167°07.72'E, 1530-1480 m, 2.09.1985: HCL 452. — Stn CP 75, 22°40.42'S, 167°23.41'E, 825-860 m: HCL 163-164.

Loyalty Islands. BIOGEOCAL: stn CP 297, 20°38.64'S, 167°10.77'E, 1230-1240 m, 28.04.1987: HCL 156, 165-172.

TYPES. — *Holotype*: HCL 425 (BIOCAL, stn CP 60, 23°58,87'S, 167°07,72'E, 1530-1480 m).
Paratypes: all the other specimens mentioned above.

DESCRIPTION. — The form of the body is typical for the genus *Sericolophus*.

Most specimens are lamellar fragments of different parts of the body. The largest fragment is the one of the holotype HCL 452 (BIOCAL, stn CP 60) now broken in fragments. Alive, it was very soft and similar to *S. reflexus* Ijima, and it is 190 mm long, 90 mm in diameter and 15 mm thick. The slightly convex and smooth surface is gastral, with very fine meshes of pinular pentactins. On each side, the reflexed parts of the gastral surface is 25-30 mm wide. The paratype HCL 156 is 80 mm long, 30 mm in diameter and 7 mm thick.

Spicules: Choanosomal spicules usually pentactins (fig. 24.8-11) with rays about 5/0.02-0.05 mm. The outer ends are often smooth but sometimes rough. Three types of uncinates were found. Macruncinates (fig. 24.14) several mm long and 0.015 mm in diameter. Mesuncinates (fig. 24.13) 0.135-0.426/0.004 mm. Both macruncinates and mesuncinates are covered with spines. Spindle-like micruncinates (fig. 24.12, 25.8-10) 0.041-0.137/0.004 mm smooth with a single widening. Some small mesuncinates (HCL 174) could have features of both types, they have spines and widenings. Sceptres (fig. 24.15) rare, they are several mm long and 0.009 mm in diameter. Prostalia basalia crooks (fig. 24.16-18) about 0.006 mm in diameter, long diactins 0.03-0.06 mm in diameter and anchorate spicules (fig. 24.19-20). The anchorate spicules are rare. The only complete anchor has no tooth, it has the shape of a clavule with serrated pileate end, the rachis 0.010-0.015 mm. Dermal and atrial spicules pinular pentactins (fig. 24.1-2) similar in shape. Pinular ray slightly widened medially; the outer end is sharply pointed and freely projects not far from the last spines. The spines appear on a short distance from the base. Pinular ray of dermal pentactines 0.065-0.342/0.007-0.015 mm, of atrial ones 0.076-1.079/0.015-0.019 mm. Tangential rays covered with short spines. Tangential ray of dermal pentactins 0.030-0.137/0.006 mm, of atrial ones 0.011-0.175/0.007 mm.

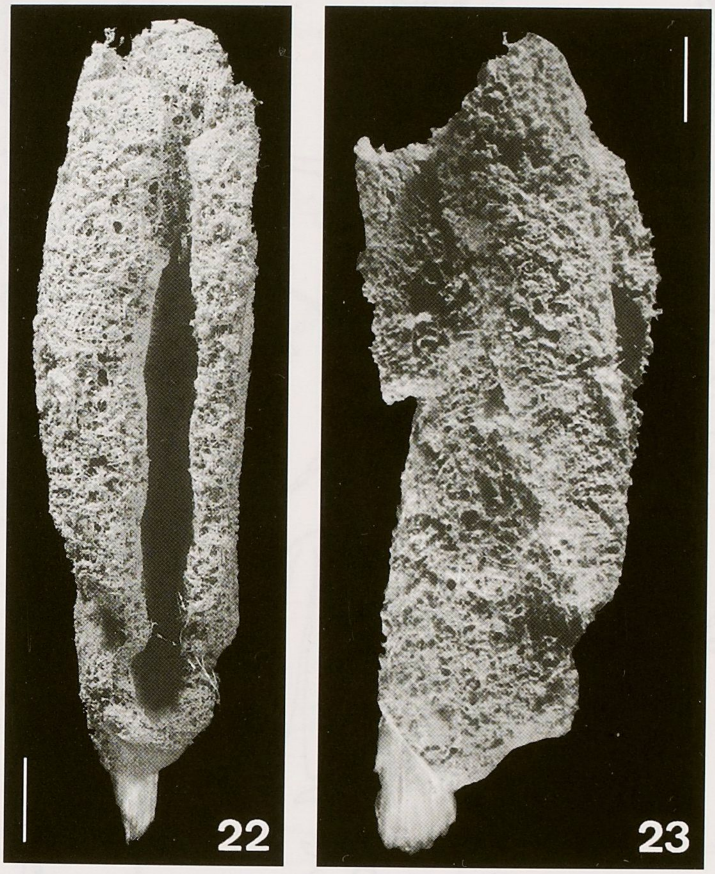


FIG. 22-23. — *Sericolophus neocaledonicus* sp. nov. (HCL 425). Scales = 1 cm.

Microhexactins (fig. 24.3-5, 25.1-7) are more numerous than other forms: pentactins, stauractins, monactins and polyactins spicules with more than six rays. Their rays are usually covered with spines, rarely smooth with sparse spines or entirely smooth. The microhexactins are usually represented by two types: with thick rays 0.046-0.205/0.015-0.030 mm and with thin rays 0.046-0.213/0.004-0.007 mm. The proportion of the two types of microhexactins varies in different specimens. The thick-rayed forms usually predominate but in HCL 175 and 160 the proportion is the opposite.

The amphidiscs (fig. 24.6-7) are represented by two types: mesamphidiscs and micramphidiscs. They both have shafts covered with spines. Total length of mesamphidiscs 0.032-0.122 mm, umbel length 0.011-0.044 mm, umbel diameter 0.010-0.035 mm. Total length of micramphidiscs 0.015-0.050 mm, umbel length 0.005-0.020 mm, umbel diameter 0.004-0.018 mm.

ETYMOLOGY. — This specific name refers to the recorded locality.

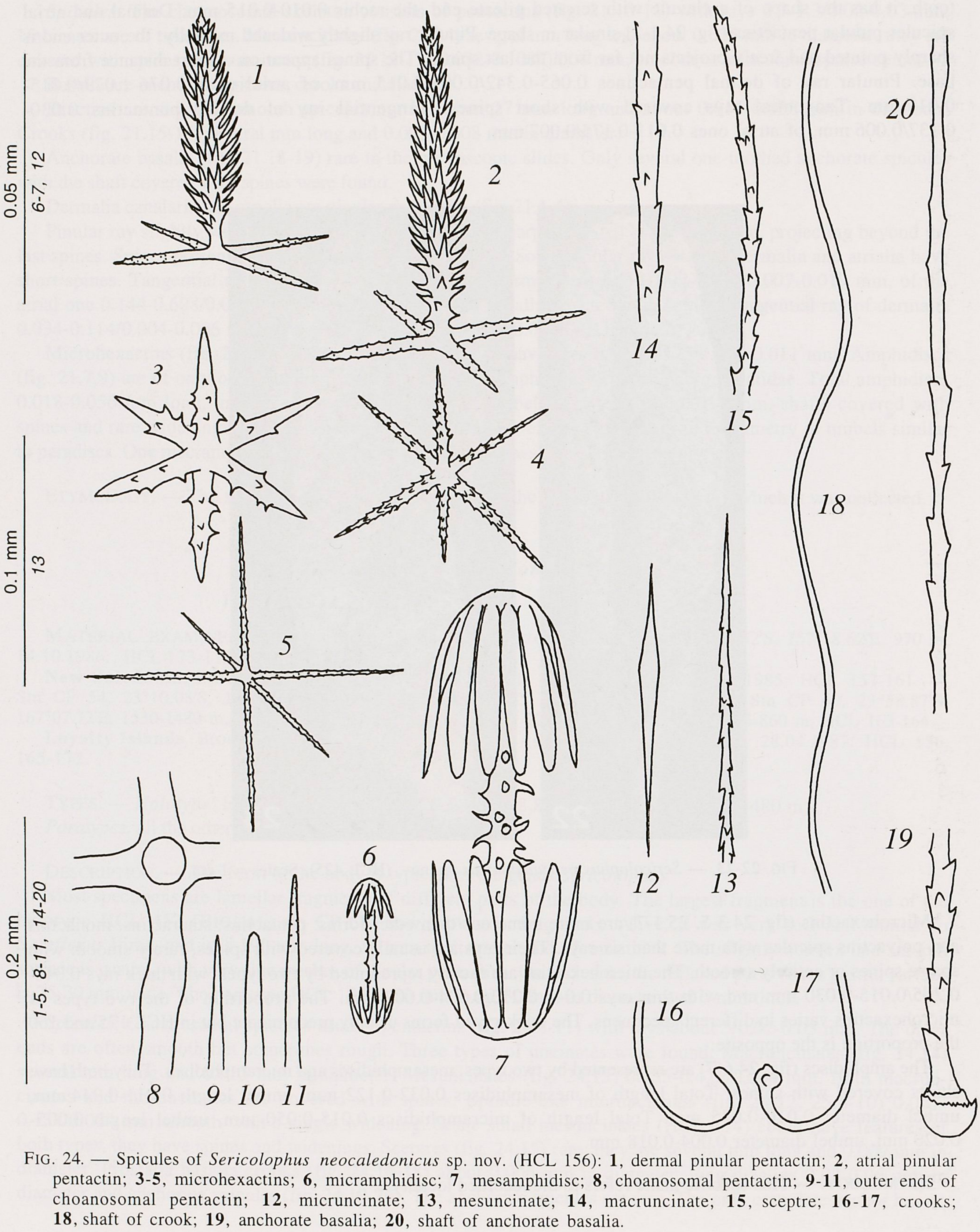


FIG. 24. — Spicules of *Sericolophus neocaledonicus* sp. nov. (HCL 156): **1**, dermal pinular pentactin; **2**, atrial pinular pentactin; **3-5**, microhexactins; **6**, micramphidisc; **7**, mesamphidisc; **8**, choanosomal pentactin; **9-11**, outer ends of choanosomal pentactin; **12**, micruncinate; **13**, mesuncinate; **14**, macruncinate; **15**, sceptre; **16-17**, crooks; **18**, shaft of crook; **19**, anchorate basalia; **20**, shaft of anchorate basalia.

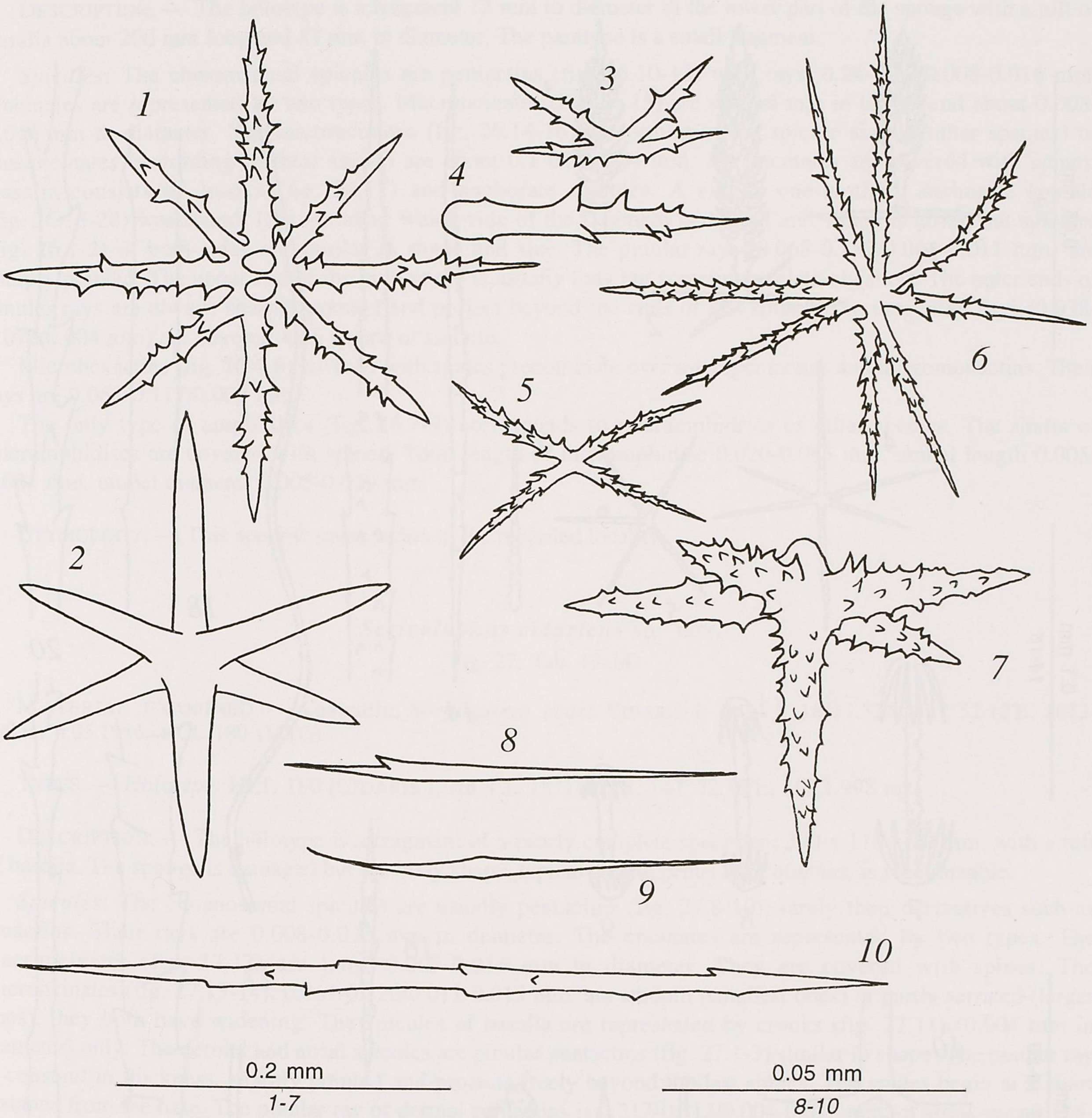


FIG. 25. — Spicules of *Sericolophus neocaledonicus* sp. nov.: **1-7**, deformed microhexactins; **8-10**, micruncinates [1 (HCL 175), 2 (HCL 167), 3-4 (HCL 162), 5 (HCL 162), 6 (HCL 173), 7-9 (HCL 167), 10 (HCL 174)].

Sericolophus hawaiicus sp. nov.

Fig. 26; Tab. 12, 14

MATERIAL EXAMINED. — **Hawaii**. HURL-88: stn P5-057, 19°37'N, 156°02'W, 580 m: co471 (BPBM). HURL-92, stn 5201, 20°53'N, 157°38'W, 380 m: co475 (BPBM).

TYPES. — *Holotype*: co475 (HURL-92, sta. 5201, 20°53'N, 157°38'W, 380 m). *Paratype:* co471 (HURL-88: stn P5-057, 19°37'N, 156°02'W, 580 m).

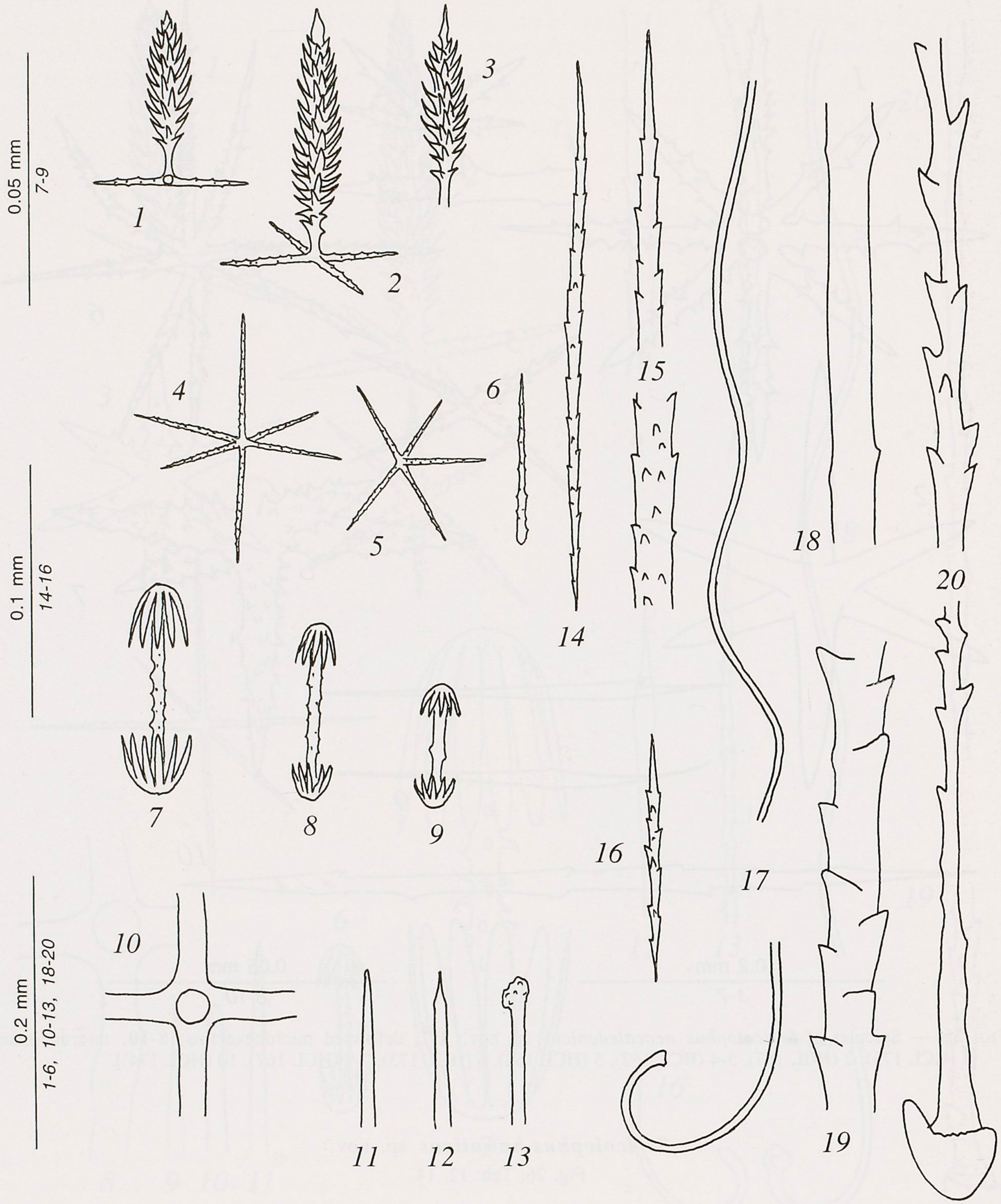


FIG. 26. — Spicules of *Sericolophus hawaiicus* sp. nov.: **1**, dermal pinular pentactin (co475); **2**, atrial pinular pentactin (co475); **3**, pinular ray of atrial pinular pentactin (co475); **4**, microhexactin (co475); **5**, micropentactin (co475); **6**, micromonactin (co475); **7-9**, amphidiscs (co475); **10**, choanosomal pentactin (co475); **11-13**, outer ends of choanosomal pentactin (co475); **14**, **16**, micruncinates (co475); **15**, macruncinate (co475); **17**, crook (co471); **18-20**, shafts of basal anchorate spicule (co471).

DESCRIPTION. — The holotype is a fragment 12 mm in diameter of the lower part of the sponge with a tuft of basalia about 200 mm long and 17 mm in diameter. The paratype is a small fragment.

Spicules: The choanosomal spicules are pentactins (fig. 26.10-13) with rays, 0.24-1.37/0.008-0.016 mm. Uncinates are represented by two types. Macruncinates (fig. 26.15) are several mm in length and about 0.008-0.016 mm in diameter. The micruncinates (fig. 26.14-16) (according to the spicule size in other species) or mesuncinates (according to their shape) are about 0.1-0.5/0.004 mm. All uncinates are covered with spines. Basalia consists of crooks (fig. 26.17) and anchorate spicules. A single, one-toothed, anchorate spicule (fig. 26.18-20) was found. It is not clear which side of the fragment is dermal and which is atrial, but spicules (fig. 26.1-2) of both sides are similar in shape and size. The pinular rays (0.068-0.182/0.004-0.011 mm) are sharply pointed. The upper end of the pinular ray is usually long but sometimes relatively short. The outer ends of pinular rays are always sharply pointed and project beyond the ends of last spines. The tangential rays (0.038-0.072/0.004 mm) are covered with spines or smooth.

Microhexactins (fig. 26.4-6) covered with spines predominate over micropentactins and micromonactins. Their rays are 0.063-0.117/0.007 mm.

The only type of amphidiscs (fig. 26.7-9) corresponds to micramphidiscs of other species. The shafts of micramphidiscs are covered with spines. Total length of micramphidisc 0.020-0.065 mm, umbel length 0.005-0.021 mm, umbel diameter 0.005-0.019 mm.

ETYMOLOGY. — This specific name refers to the recorded locality.

Sericolophus cidaricus sp. nov.

Fig. 27; Tab. 13-14

MATERIAL EXAMINED. — **Australia**. *Northeastern coast*. CIDARIS I: stn 4.1, 18°11.52'S, 147°52.12'E, 1012-998 m, 6.05.1986: HCL 180 (MTQ).

TYPES. — *Holotype*: HCL 180 (CIDARIS I, stn 4.1, 18°11.52'S, 147°52.12'E, 1012-998 m).

DESCRIPTION. — The holotype is a fragment of a nearly complete specimen, 200 x 110 x 20 mm, with a tuft of basalia. The sponge is damaged but the body shape, typical for the genus *Sericolophus*, is recognizable.

Spicules: The choanosomal spicules are usually pentactins (fig. 27.8-10), rarely their derivatives such as tauactins. Their rays are 0.008-0.023 mm in diameter. The uncinates are represented by two types. The macruncinates (fig. 27.12) are long, 0.003-0.016 mm in diameter. They are covered with spines. The micruncinates (fig. 27.13-14), 0.061-0.120/0.011-0.015 mm, are smooth (smallest ones) or partly serrated (larger ones), they both have widening. The spicules of basalia are represented by crooks (fig. 27.11) (0.004 mm in diameter) only. The dermal and atrial spicules are pinular pentactins (fig. 27.1-3) similar in shape. The pinular ray is constant in thickness, sharply pointed and projects freely beyond the last spines. The spines begin at a short distance from the base. The pinular ray of dermal pentactins is 0.217-0.813/0.004-0.022 mm, of atrial ones 0.186-1.904/0.015-0.019 mm. The tangential rays of dermal pentactins are pointed and covered with short spines. The tangential rays of atrialia are covered with spines longer and denser than those of the dermalia; they are pointed or rounded. The tangential ray of dermal pentactins is 0.038-0.129/0.004-0.013 mm, of atrial ones 0.057-0.148/0.013 mm.

Microhexactins (fig. 27.4) predominate over other types of analogues spicules (fig. 27.5-7): micropentactins, microstauractins, micromonactins and polyactins. All these spicules are covered with spines. Their rays are 0.076-0.107/0.007-0.009 mm. Two types of amphidiscs can be observed. Mesamphidiscs (fig. 27.16) have shafts with spines or tubercles. Total length of mesamphidisc 0.058-0.104 mm, umbel length 0.013-0.032 mm, umbel diameter 0.018-0.030 mm. Micramphidiscs have shafts with spines or widenings. Total length of micramphidiscs 0.016-0.040 mm, umbel length 0.005-0.013 mm, umbel diameter 0.005-0.014 mm. Some macramphidiscs (fig. 27.15) 0.312/0.099/0.122 mm with tuberculated shafts are not certain to belong to this species.

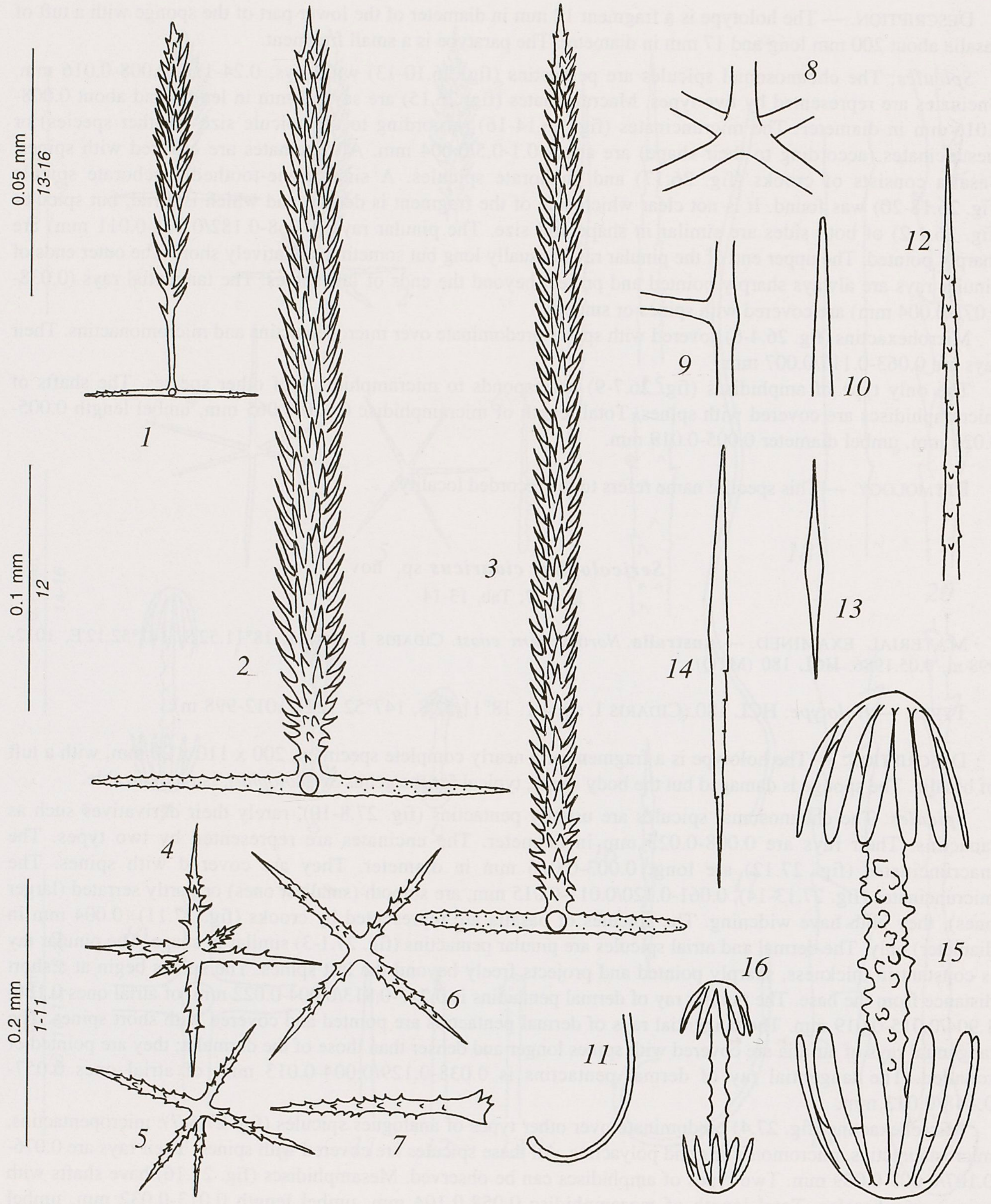


FIG. 27. — Spicules of *Sericolophus cidaricus* sp. nov. (HCL 180): **1-2**, dermal pinular pentactin; **3**, atrial pinular pentactin; **4**, microhexactin; **5**, micropentactin; **6**, microstauractin; **7**, micromonactin; **8**, choanosomal pentactin; **9**, choanosomal tauactin; **10**, outer end of choanosomal spicule; **11**, crook; **12**, macruncinate; **13-14**, micruncinates; **15**, macramphidisc; **16**, mesamphidisc.

REMARKS. — All specimens of *Sericolophus* described earlier (for references see REISWIG & ZGRAGGEN, 1991) were collected off Japan. All belong to *S. reflexus*. The best descriptions of the Japanese materials were made by IJIMA and OKADA (1938). REISWIG & ZGRAGGEN (1991) completed the previous descriptions and clarified the problem of synonymies. The specimens from Hawaii, New Caledonia and Australia obviously belong to the same genus. Their shape is similar to that of *S. reflexus* and they have crooks that are never found in representatives of other genera. Species of *Sericolophus* are distinguished by a combination of size classes of amphidiscs, shapes and size variations of microhexactins, dermal and atrial pinular pentactins and uncinates (Tab. 14). These features are distributed mosaically among these species. *S. neocaledonicus* and *S. cidaricus* are similar in size of amphidiscs and variations of microhexactins (up to monactins). They differ in the proportions of dermal and atrial pinular pentactins and the presence of thick-rayed microhexactins in *S. neocaledonicus*. *S. calsubus* has microamphidiscs smaller than those of *S. neocaledonicus* and *S. cidaricus*. Dermal and atrial pinular pentactins of *S. calsubus* differ in size. The maximal diameter of the microhexactins of *S. calsubus* is intermediate between those of the two other species. *S. hawaiicus* differs from the others by more significant features: small-sized dermal and atrial pentactins, and short and thin-rayed microhexactins and micruncinates bearing spines similar to macruncinates. The anchorate spicules of basalia of *S. reflexus* are best known. The anchors in *S. reflexus* have one, sometimes two, teeth with serrations on the anchorate margin. Numerous accessory spines, even similar to teeth, seem to be secondary elements as a result of "developed serration" (REISWIG & ZGRAGGEN, 1991). A unique but predictable form was found in *S. neocaledonicus* with pileate head and serrated margin, devoid of teeth. It may be considered as a derivate of the "normal" toothed anchors. This spicule is analogous in shape to some clavules of *Farrea* (IJIMA, 1927). These features of basalia have low taxonomic value and after careful investigation of other materials, the difference among basalia may disappear.

ETYMOLOGY. — The species is named after the CIDARIS cruise along the N.E. Australian slope.

Genus *SEMPERELLA* Gray, 1868

DIAGNOSIS (after IJIMA, 1927). — Pheronematidae of a columnar or a club-like body shape, without gastral concavity, consisting internally of alternating incurrent and excurrent systems of anastomosing canals, which stand in relation respectively with several dermal and oscular areas distinguishable in all parts of the external surface. Dermal areas covered with uniformly fine-meshed lattice; oscular areas either covered with a larger-meshed lattice or opening through relatively large orifices, found isolated or in close groups. Basalia arising in separate tufts, join in a matted mass.

TYPE SPECIES. — *Hyalonema schultzei* Semper, 1868.

Semperella schultzei (Semper, 1868)

Fig. 28

Hyalonema schultzei, Semper, 1868: 272.
Semperella schultzei - J.E. GRAY, 1868: 373. — W. MARSHALL, 1875: 212, fig. 67-83, pl. 12 fig. E, pl. 16-17. — W. MARSHALL & MEYER, 1877: 276, fig. 18-19, pl. 14, pl. 15. — SCHULZE, 1886: 67; 1887: 261, pl. 51-52. — BLACKBURN, 1896: 57, pl. 1. — OKADA, 1932: 16. — IJIMA & OKADA, 1938: 441, pl. 15 fig. 1-3, pl. 16 fig. 22-32. — LÉVI & LÉVI, 1982: 289, fig. 3-4, pl. 4 fig. 2, pl. 5; 1989: 29, fig. 1.

MATERIAL EXAMINED. — **Chesterfield Islands**. MUSORSTOM 5: stn DC 378, 19°53.74'S, 158°38.30'E, 355 m, 20.10.1986: HCL 186.

New Caledonia. Dragages *"Vauban"*: stn 39, 22°29'S, 166°23'E, 375-550 m, 5-7.06.1979: HCL 201.

MUSORSTOM 4: stn CC 175, 18°59.30'S, 163°17.50'E, 370 m, 17.09.1985: HCL 183-185. — Stn CC 202, 18°58.00'S, 163°10.50'E, 580 m, 20.09.1985: HCL 182. — Stn CC 241, 22°09.00'S, 167°12.20'E, 470-480 m, 3.10.1985: HCL 453.

BIOCAL: stn CP 42, 22°46.09'S, 167°13.80'E, 380 m, 30.08.1985: HCL 181. — Stn DW 44, 22°47.35'S, 167°14.50'E, 440-450 m, 30.08.1985: HCL 188.

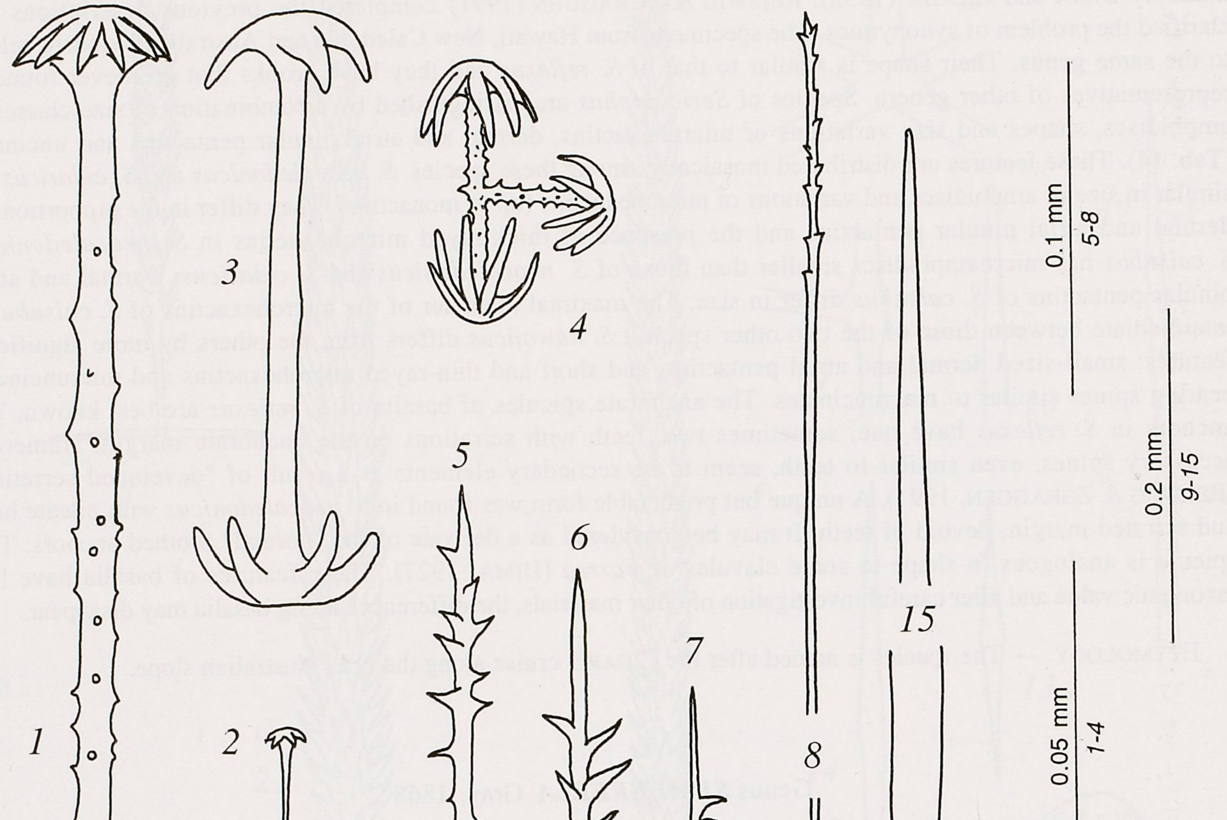


FIG. 28. — Spicules of *Semperella schultzei* (Semper, 1868): **1-4**, curious amphidiscs (1-3, HCL 198; 4, HCL 182); **5-7**, micromonactins (5-6, HCL 200; 7, HCL 182); **8**, sceptre (HCL 186); **9**, choanosomal stauractin; **10-12**, choanosomal pentactins; **13-14**, outer ends of choanosomal spicules; **15**, choanosomal hypodermal or hypoatrial pentactin.

Loyalty Islands. MUSORSTOM 6: stn DW 391, 20°47.35'S, 167°05.70'E, 390 m, 13.02.1989: HCL 197. — Stn DW 393, 20°48.29'S, 167°09.54'E, 420 m, 13.02.1989: HCL 198. — Stn DW 410, 20°38.05'S, 167°06.65'E, 490 m, 15.02.1989: HCL 190. — Stn DW 412, 20°40.60'S, 167°03.75'E, 15.02.1989: HCL 195. — Stn CP 415, 20°40.20'S, 167°03.95'E, 461 m, 15.02.1989: HCL 196. — Stn DW 428, 20°23.54'S, 166°12.57'E, 420 m, 17.02. 1989: HCL 189. — Stn DW 448, 20°55.66'S, 167°22.34'E, 410 m, 19.02.1989: HCL 191-194.
Wallis and Futuna Islands. MUSORSTOM 7: stn DW 510, 14°14.50'S, 178°11.50'W, 280-370 m, 12.05.1992: HCL 199. — Stn DW 605, 13°21.3'S, 176°08.3'W, 335-340 m, 26.05.1992: HCL 200.

DISTRIBUTION. — *S. schultzei* is widely distributed from New Caledonia and the southwestern Pacific to Japan. Nearly all the specimens show similar morphological features except some from the Australian region which may be considered as a new subspecies (unpublished data).

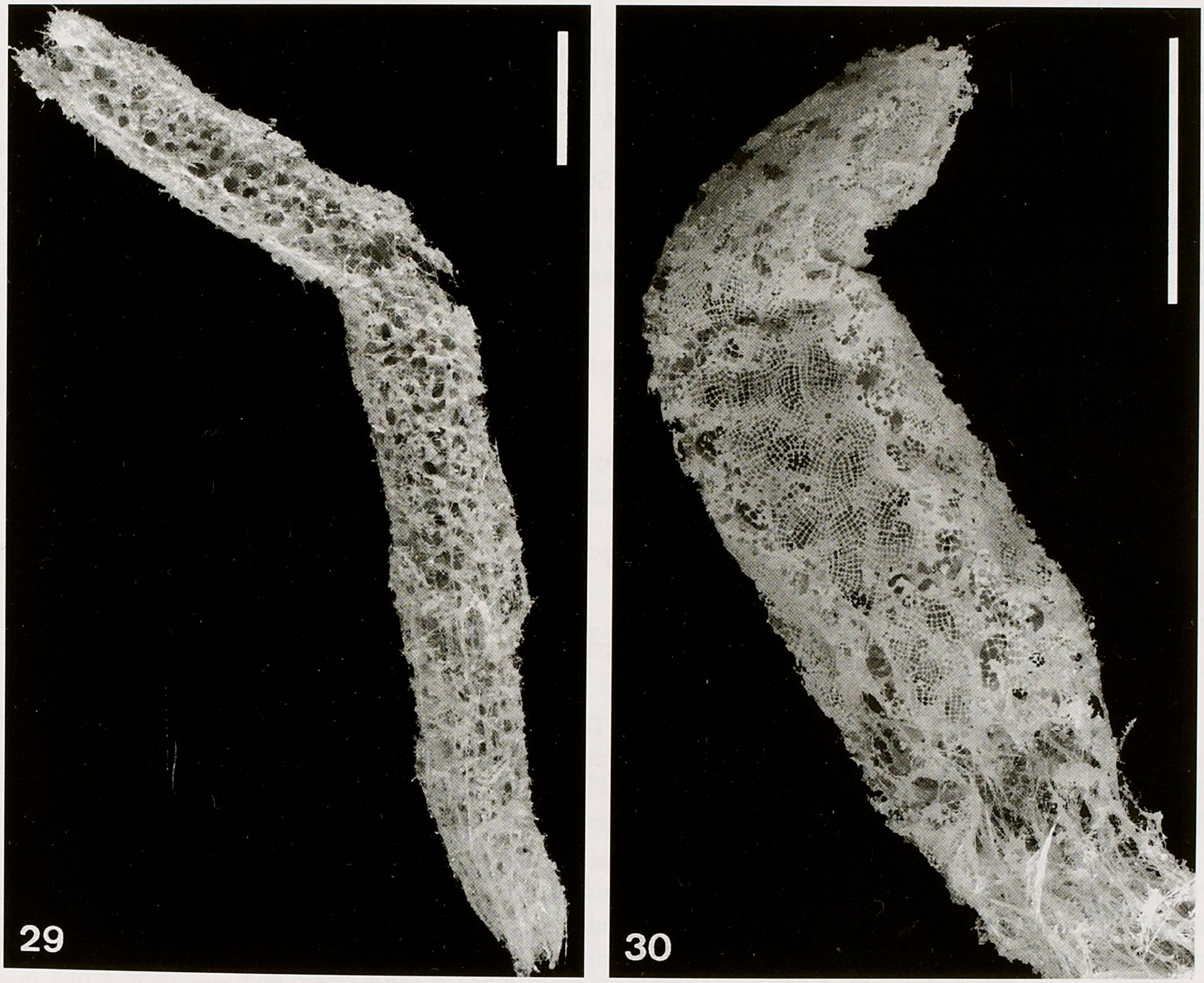


FIG. 29. — *Semperella varioactina* sp. nov. (HCL 202). Scale = 1 cm.
FIG. 30. — *Semperella abyssalis* sp. nov. (HCL 203). Scale = 3 cm.

Semperella varioactina sp. nov.

Fig. 29, 31; Tab. 15

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn CP 61, 24°10.67'S, 167°33.65'E, 1070 m, 2.09.1985: HCL 202.

TYPES. — *Holotype*: HCL 202 (BIOCAL: stn CP 61, 24°10.67'S, 167°33.65'E, 1070 m).

DESCRIPTION. — The general shape is elongated, columnar, sligthly broader in the middle. The holotype is 140 mm long, 8-12 mm in diameter.

The body presents a rectangular cross-section and the general surface of the sponge is divided into four longitudinal areas without sieve plates. In all specimens or fragments, oscular and dermal areas cannot be recognized. Openings of transverse canals (l-1,5 mm in diameter), are scattered.

Spicules: The choanosomal skeleton consists of pentactins (fig. 31.4-9) and rare stauractins with rays 0.3-4.6/0.008-0.180 mm. The rays are smooth, rarely with rough outer ends. Uncinates (fig. 31.10) are rare, and only fragments about 0.004 mm in diameter were found. Basalia and other prostalia were not found. Dermalia and atrialia are pinular pentactins (fig. 31.1-3). The atrial pinular pentactins were not found with certainty. The pinular ray 0.099-0.198/0.007 mm is sharply pointed, the upper end projects freely beyond the ends of last spines. The spines are relatively short, being bent upward; they begin at a short distance from the base. The tangential rays (0.061-0.137/0.007 mm) are curved and acutely intersect in pairs, as in other *Semperella* species. Tangential rays mainly smooth. Outer ends or even more than half of a ray covered with short spines directed upward.

Microhexactins (fig. 31.11-22) and their derivatives, including monactins and spheres (pearls), are rough or spinous. Some spicules have enclosing unequal angles. Stauractins, monactins and pentactins are numerous. Ray length of these spicules is 0.061-0.137/0.007 mm. The monactins have one spherical, the other finely pointed outer ends. Only one type of amphidisc (fig. 31.23-25) is present, but their length varies greatly. The shafts of these amphidiscs are covered with short spines. Total length of amphidiscs 0.032-0.108 mm, umbel length 0.009-0.038 mm, umbel diameter 0.007-0.032 mm.

ETYMOLOGY. — The species is named after the diversity of microholactine spicules.

Semperella abyssalis sp. nov.

Fig. 30, 32; Tab. 16

MATERIAL EXAMINED. — **Loyalty Islands**. BIOGEOCAL: stn CP 306, 20°35.18'S, 167°13.99'E, 2960-3036 m, 1.05.1987: HCL 203-208.

TYPES. — *Holotype*: HCL 203 (BIOGEOCAL, stn CP 306, 20°35.18'S, 167°13.99'E, 2960-3036 m).
Paratypes: HCL 205-208.

DESCRIPTION. — The sponge is subcylindrical. The holotype is over 210 mm long and 35 x 25 mm in maximal section. The paratypes are over 100-170 mm long, and are flatter than the holotype (15 x 10 - 25 x 5 mm). They were probably squeezed. No basalia were found in these specimens. The atrial surface is band-like, and situated along the dermal surface. In the holotype two such bands merge in the upper part of the sponge.

Spicules: The choanosomal skeleton consists of pentactins (fig. 32.7-11) and rare stauractins with smooth rays 0.2-13/0.02-0.09 mm, equal or unequal in length. Uncinates (fig. 32.12) 0.002-0.004 mm in diameter are rarely found. Basalia and prostalia marginalia are absent. Dermal and atrial spicules are very similar; most are pinular pentactins (fig. 32.1-6) or hexactins. The dermal pentactins of the holotype have pinular ray 0.129-0.296/0.007-0.030 mm (avg. 0.183 mm, std. 0.047 long), tangential ray 0.061-0.167/0.005-0.007 mm (avg. 0.092 mm, std. 0.026 long). The atrial pentactins of the holotype have similar parameters; the pinular ray is 0.122-0.303/0.007-0.030 mm (avg. 0.177 mm, std. 0.036 long), the tangential ray 0.053-0.211/0.005-0.007 mm (avg. 0.103 mm, std. 0.035 long). Two types of spicules with different pinular outer ends are present among dermal and atrial pentactins. The first has the pinular ray widening toward the outer end with conical tip which do not project freely beyond the ends of the last spines. The long spines bent upward and the longest ones are often situated at the upper part of the ray. The second has pinular ray widening slightly toward the end and covered with short spines. The conical upper end freely projects beyond the ends of last spines. The spines appear close to the base of the shaft. The tangential rays are curved and smooth, with outer ends covered with short spines directed upward.

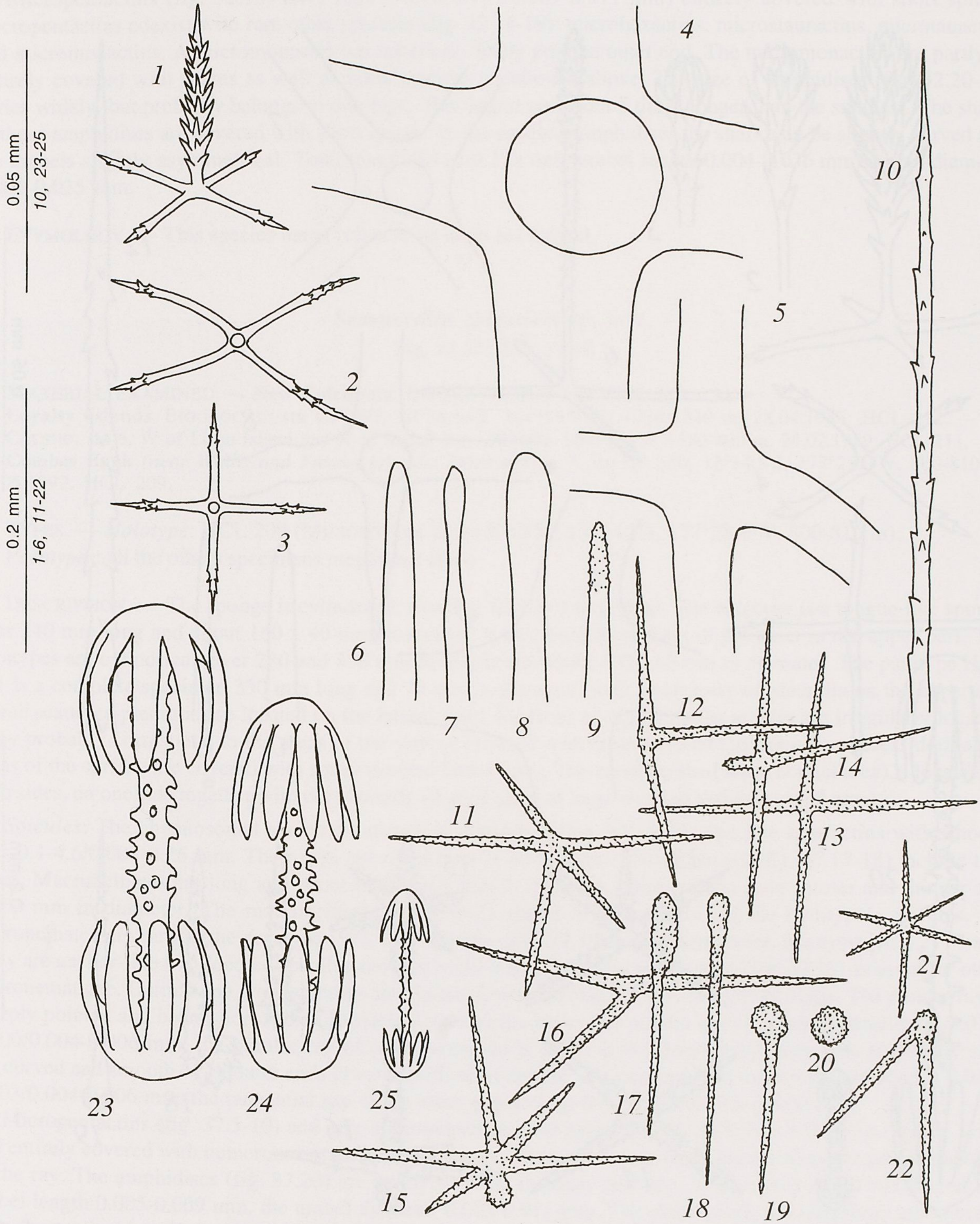


FIG. 31. — *Semperella varioactina* sp. nov. (HCL 202): **1**, dermal pinular pentactin; **2-3**, tangential rays of dermal pinular pentactin; **4**, choanosomal pentactin; **5**, choanosomal stauractin; **6-9**, outer ends of choanosomal spicules; **10**, uncinate; **11**, micropentactin; **12**, **16** microtauactins; **13**, microstauractin; **14**, microtauactin with rudimental ray; **15**, micropentactin with rudimental ray; **17-19**, micromonactin; **20**, microsphere; **21**, microhexactin; **22**, microdiactin; **23-24**, macramphidiscs; **25**, micramphidisc.

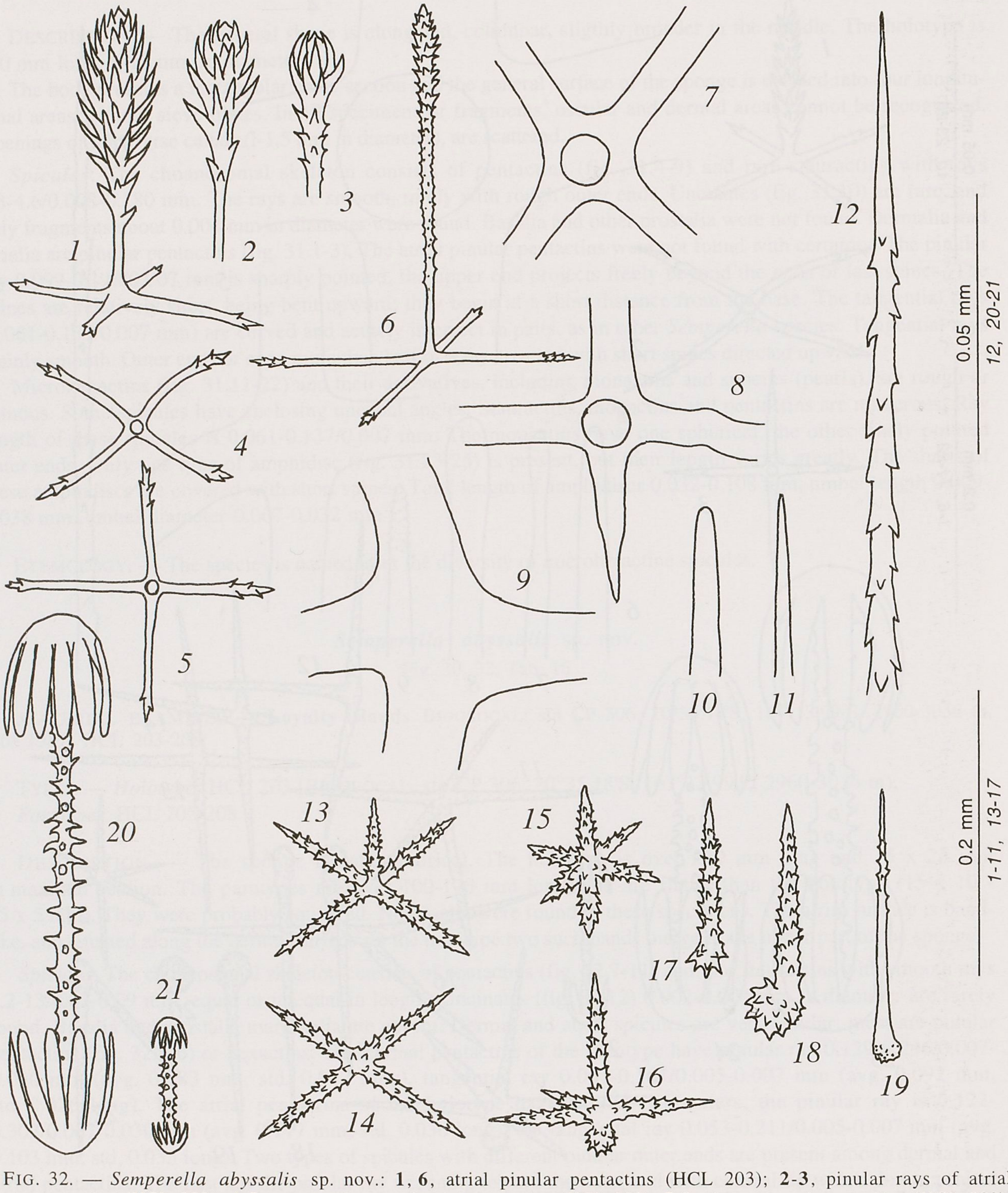


FIG. 32. — *Semperella abyssalis* sp. nov.: **1**, **6**, atrial pinular pentactins (HCL 203); **2**-**3**, pinular rays of atrial pentactins (HCL 203); **4**-**5**, tangential rays of atrial pentactins (HCL 203); **7**-**8**, choanosomal pentactins (HCL 203); **9**, choanosomal stauractin (HCL 203); **10**-**11**, outer ends of choanosomal spicules (HCL 203); **12**, uncinate (HCL 203); **13**, micropentactin (HCL 203); **14**, microstauractin (HCL 203); **15**, microhexactin (HCL 206); **16**, microtauactin with rudimental ray (HCL 205); **17**, micromonactin (HCL 203); **18**, micromonactin (HCL 205); **19**, micromonactin (HCL 204); **20**, macramphidisc (HCL 203); **21**, micramphidisc (HCL 203).

Micropentactins (fig. 32.13) have rays (0.046-0.167/0.009-0.011 mm) entirely covered with short spines. Micropentactins coexist with rare other spicules (fig. 32.14-19): microhexactins, microstauractins, microtauactins and micromonactins. A micromonactin has spherical, finely pointed outer end. The micromonactins are partly or entirely covered with spines as well as other spicules mentioned above. The size of amphidiscs (fig. 32.20-21) varies widely, but probably belongs to one type. The largest are about 5 times longer than the smallest. The shafts of these amphidiscs are covered with short spines. In the smallest amphidiscs the shaft may be slightly curved and the umbels slightly asymmetrical. Total length 0.016-0.119 mm, umbel length 0.004-0.036 mm, umbel diameter 0.005-0.025 mm.

ETYMOLOGY. — This species name refers to its deep-sea habitat.

Semperella crosnieri sp. nov.

Fig. 33-37; Tab. 17-18

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: no other data: HCL 210.
Loyalty Islands. BIOGEOCAL: stn CP 297, 20°38.64'S, 167°10.77'E, 1230-1240 m, 28.04.1987: HCL 212.
CALSUB: stn 6, W of Lifou Island and N of Santal Bay, 20°48'S, 167°02.4'E, 1150-400 m, 24.02.1989: HCL 211.
Combes Bank *(near Wallis and Futuna Islands)*. MUSORSTOM 7: stn CP 550, 12°14.8'S, 177°28.0'W, 800-810 m, 18.05.1992: HCL 209.

TYPES. — *Holotype*: HCL 209 (MUSORSTOM 7, stn CP 550, 12°14.8'S, 177°28.0'W, 800-810 m).
Paratypes: all the others specimens mentioned above.

DESCRIPTION. — The sponge is cylindrical, ovoid or flattened in section. The holotype is a tongue-like sponge over 240 mm long and about 160 x 40 mm in section. It has three short rows of prostalia in the upper part. The paratypes are cylindrical, over 280 and 330 mm in length and about 100-180 mm in diameter. The paratype HCL 211 is a complete specimen 330 mm long and 70 mm in diameter, with small rows of pleuralia on the upper end (some scattered pleuralia are located on the lateral side). Surfaces occupied by the atrialia are irregularly located. They probably correspond to the areas of the surface covered with large-meshed latticework, whereas dermalia - areas of the surface are covered with small-meshed latticework. The small meshed area (dermal area) is located on both sides, on one side together with occasionally situated areas of large-meshed surfaces (atrial area).

Spicules: The choanosomal skeleton consists of pentactins (fig. 37.11-15) and rare stauractins with smooth rays 0.1-4.6/0.008-0.26 mm. Their rays are often bent in an X-form. The uncinates (fig. 37.17-18) include two types. Macruncinates are long and about 0.002-0.01 mm in diameter. Micruncinates are shorter and thinner and 0.002 mm in diameter. The macruncinates were rarely found in preparations of the holotype's spicules, the micruncinates are rare in the paratype HCL 211. Basalia (fig. 37.19) are present in the paratype HCL 211 only. They are anchor-like two-toothed spicules covered with spines. Prostalia are sceptres (fig. 37.16) as usual for other Pheronematidae. Dermal and atrial spicules are pinular pentactins (fig. 37.1-4), similar in shape. The pinular ray is sharply pointed and bears short spines appearing close to the base. The pinular ray of dermal pentactins is 0.072-0.300/0.004-0.006 mm, the pinular ray of atrial pentactin is 0.076-0.342/0.004-0.006 mm. The tangential rays are curved and smooth, with outer ends covered with short spines. The tangential ray of dermal pentactin is 0.038-0.103/0.004-0.006 mm, the tangential ray of the atrial pentactin is 0.038-0.133/0.004-0.006 mm.

Micropentactins (fig. 37.5-10) and rare microhexactins have rays 0.031-0.171/0.011-0.022 mm usually thick and entirely covered with numerous or rarely sparse spines. These spines are long, and are directed toward the base of the ray. The amphidiscs (fig. 37.20) are nearly uniform in shape and size. Total length 0.014-0.029 mm, the umbel length 0.005-0.009 mm, the umbel diameter 0.005-0.011 mm. The shafts of these amphidiscs are covered with short spines.

REMARKS. — It is often difficult to decide if a specimen belongs to *Semperella* or to *Poliopogon*. Typical specimens of *Semperella* have columnar body shape whereas *Poliopogon* are plate-like, with dermal and atrial surfaces on the opposite sides. The atrial surface of *Semperella* is not continuous, and it shows numerous areas

FIG. 33-36. — *Semperella crosnieri* sp. nov.: **33-34**, (HCL 211). Scales = 5 cm; **35-36**, (HCL 210). Scales = 10 cm.

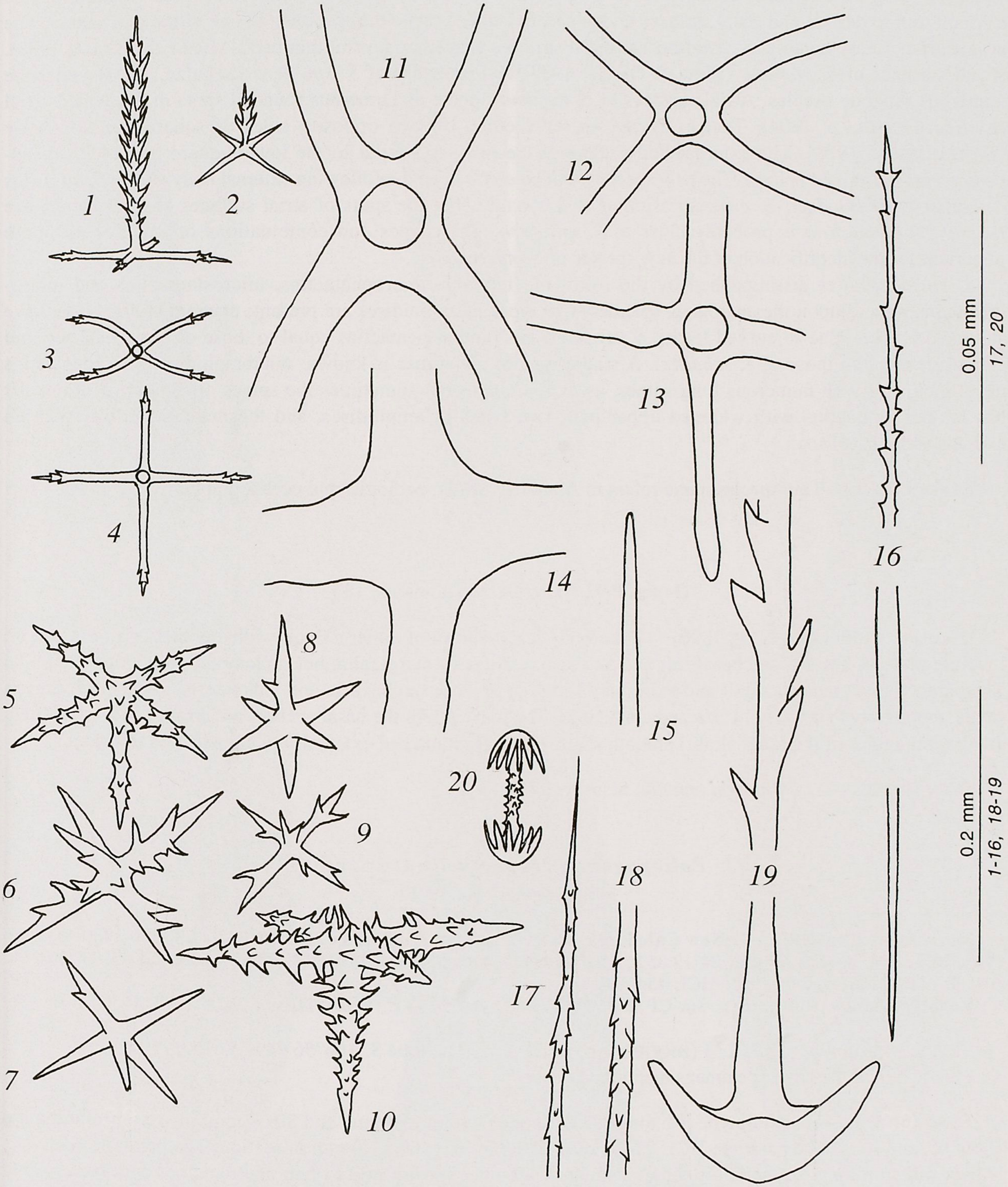


FIG. 37. — *Semperella crosnieri* sp. nov.: **1-2**, dermal pinular pentactins (HCL 209); **3-4**, tangential rays of dermal pentactins (HCL 209); **5-7**, **9-10**, micropentactins (5-6, 9-10, HCL 209; 7, HCL 212); **8**, microhexactin (HCL 212); **11-13**, choanosomal pentactins (HCL 209); **14**, choanosomal stauractin (HCL 209); **15**, outer end of choanosomal spicule (HCL 209); **16**, sceptre (HCL 211); **17**, micruncinate (HCL 210); **18**, macruncinate (HCL 210); **19**, anchorate basalia (HCL 211); **20**, amphidisc (HCL 209).

isolated as single or in groups on all sides of the conical body (IJIMA, 1927). If the specimen is damaged it may be difficult to find dermal and atrial surfaces and hence difficult to relate the specimen to one of the two genera. The atrial surfaces vary notably. *S. schultzei* has atrial surfaces shaped as several thin bands (IJIMA & OKADA, 1938). Atrial surfaces of *S. stomata* (Ijima & Okada, 1938) and probably of *S. spicifera* (Schulze, 1904) underline numerous separate oscules. Atrial surfaces of *S. cucumis* appear as numerous rounded spots of excavated atrial cavities (SCHULZE, 1904). That of *S. alba* is represented by two opposite sides of squared section body (TABACHNICK, 1988). The external body shape of the latter is similar to the lower square part of *P. micropentactinus* (described below). The new species of *Semperella* have the following external body shape: *S. abyssalis* is similar to *S. schulzei; S. crosnieri* similar to *S. cucumis* but the spots of atrial surfaces of *S. crosnieri* are larger; *S. varioactina* is probably close to *S. spicifera*. The shapes and combinations of spicules are more important for the identification of the new species of *Semperella*.

S. varioactina is distinguished by the following features: micropentactins, microstauractins and micromonactins prevail upon the analogous spicules; two types of amphidiscs are present; macramphidiscs may have spherical umbels (due to curved teeth). *S. crosnieri* has pinular pentactins equal to those of *S. varioactina* and similar in shape to those of *S. schultzei*. A single type of amphidisc is known: micramphidisc. Micropentactins have thick rays with numerous long spines, as in *S. stomata* but sometimes the spines are sparse. *S. abyssalis* has pinular pentactins with widened upper part, two types of amphidiscs, and the macramphidiscs with an extremely elongated shaft.

ETYMOLOGY. — This species name refers to Alain CROSNIER, zoologist and oceanographer.

Genus ***POLIOPOGON*** Thomson, 1873

DIAGNOSIS (after SCHULZE, 1886). — The body has the form of either a thick-walled goblet or an ear-shaped involute plate. It has a broad basal tuft and an oscular fringe of marginalia, but no laterally projecting pleuralia. The parenchyma contains small and extremely rough or spinose oxyhexacts and uncinates. In one species, even small smooth oxydiacts vary in size and abundance. The two teeth of the basal anchors are arranged approximately at the right angles of the long, almost smooth shaft. The marginalia end externally in club-shaped thickenings.

TYPE SPECIES. — *Poliopogon amadou* Schulze, 1887.

Poliopogon micropentactinus sp. nov.

Fig. 38-44; Tab. 19-20

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn CP 60, 23°58.87'S, 167°07.72'E, 1530-1480 m, 2.09. 1985: HCL 214. — Stn CP 62, 24°19.35'S, 167°49.43'E, 1410 m, 2.09.1985: HCL 215. — Stn CP 63, 24°26.97'S, 168°08.17'E, 2160 m, 2.09.1985: HCL 454-457.

Loyalty Islands. BIOGEOCAL: stn CP 272, 21°00.04'S, 166°56.94'E, 1615-1710 m, 20.04.1987: HCL 213.

TYPES. — *Holotype*: HCL 213 (BIOGEOCAL, stn CP 272, 21°00.04'S, 166°56.94'E, 1615-1710 m).
Paratypes: all the other specimens mentioned above.

DESCRIPTION. — The holotype is a tongue-like sponge 480 mm in long and 80x30 mm in section. Basalia are about 60 mm long. The paratype HCL 214 is over 270 mm long, 60 x 20 mm in section. The paratype HCL 215 is over 600 mm long. In section it shows a square with one opposite convex pair and the other concave as some *Semperella*. Other paratypes are represented as fragments that are rather shaped like *Poliopogon*.

Spicules: The choanosomal skeleton consists of pentactins (fig. 44.4-8), with rays from 0.2 to over several mm in length and 0.02-0.76 mm in diameter. The length of these rays differs notably. Uncinates (fig. 44.9) are

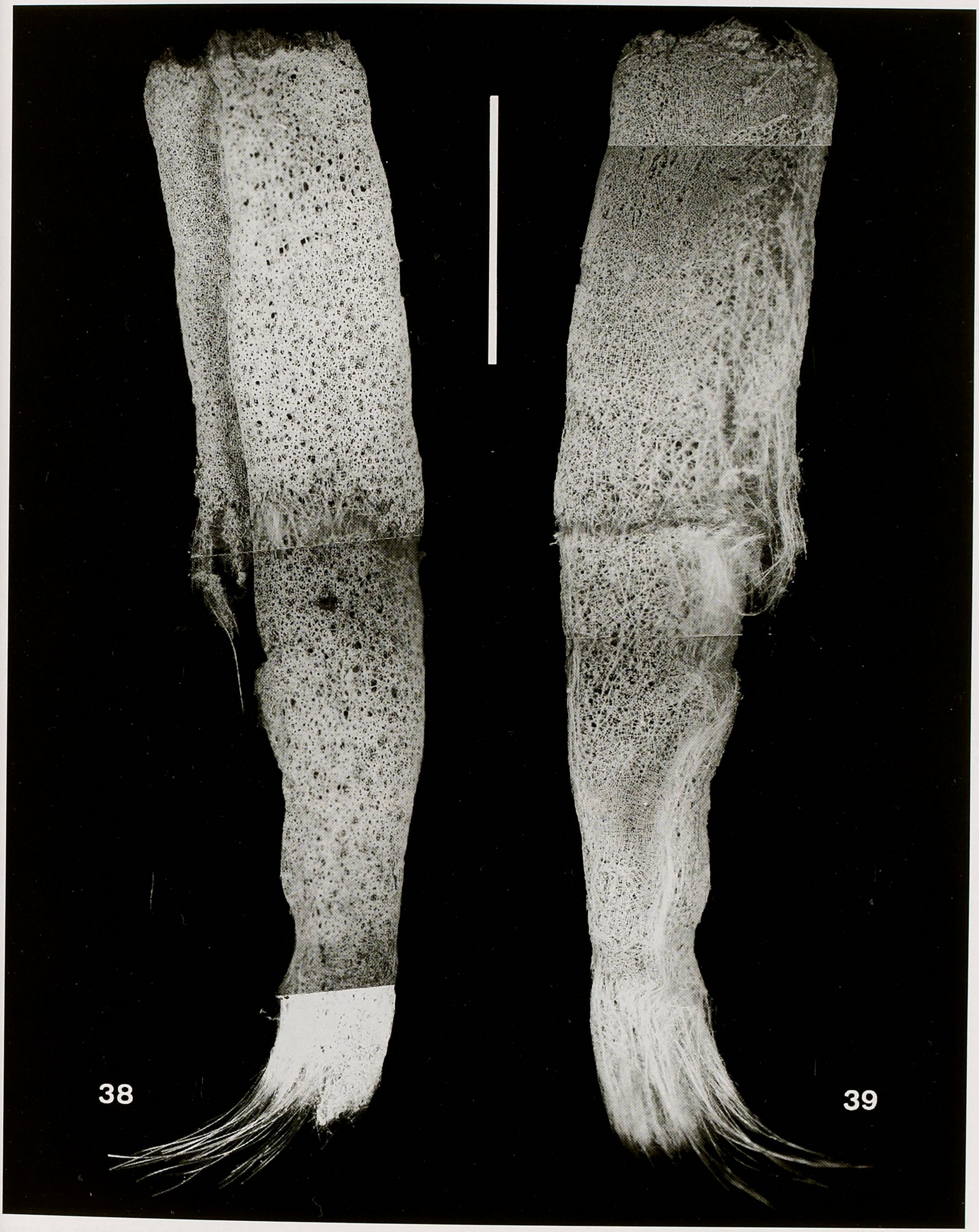


FIG. 38-39. — *Poliopogon micropentactinus* sp. nov. (HCL 213). Scale = 10 cm.

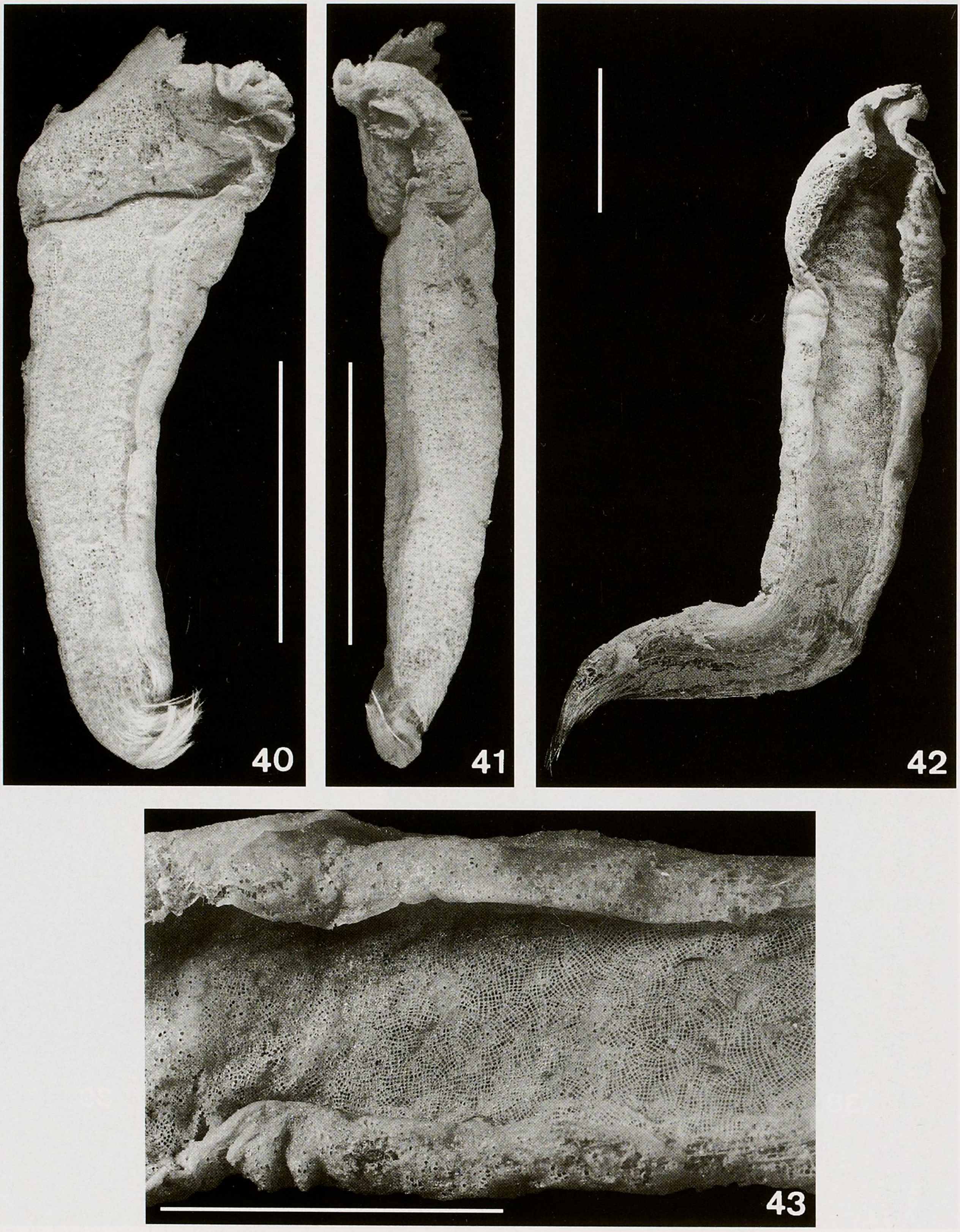


FIG. 40-43. — *Poliopogon micropentactinus* sp. nov.: **40-41**, (HCL 215); **42-43**, (HCL 214). Scales = 10 cm.

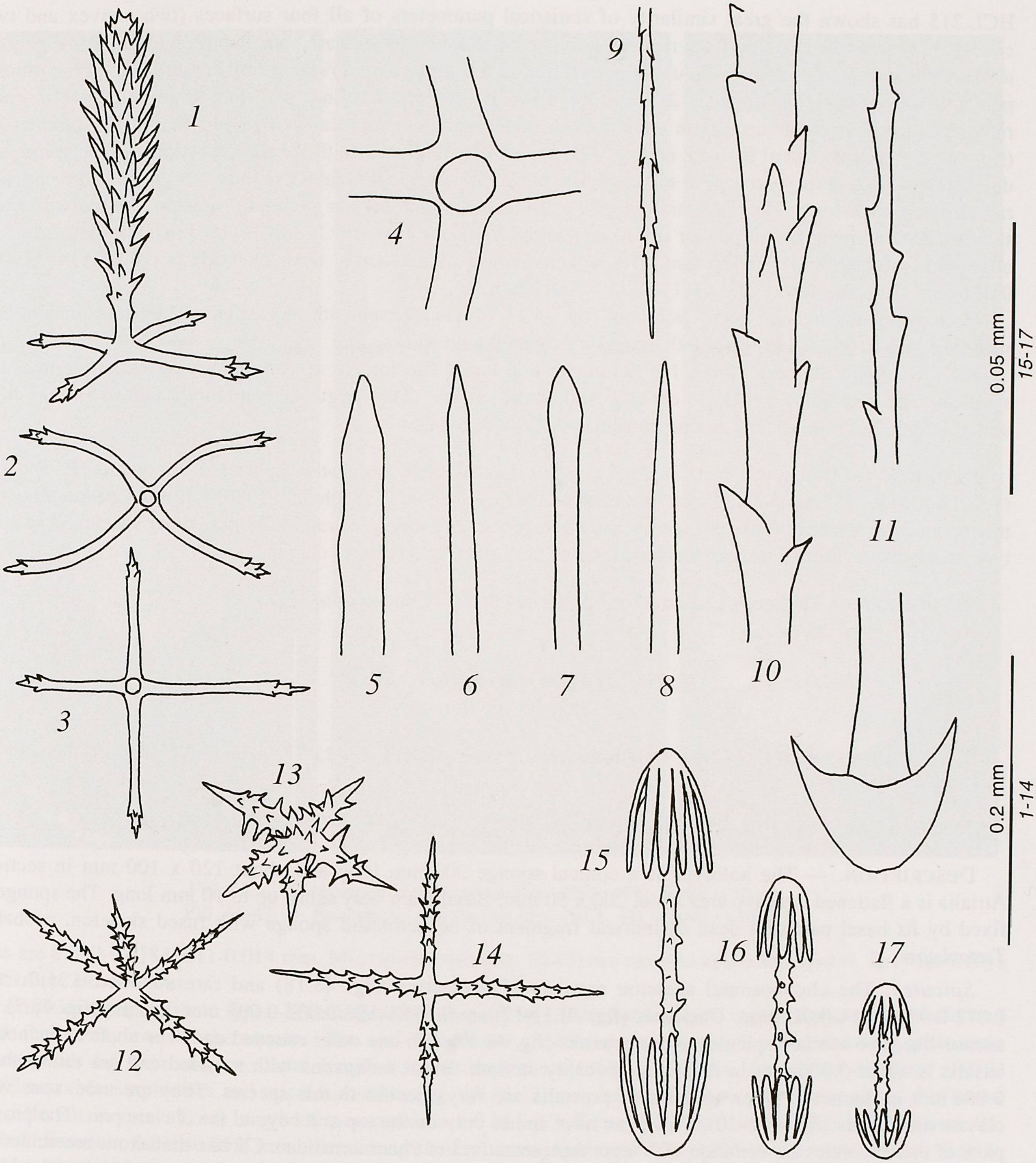


FIG. 44. — *Poliopogon micropentactinus* sp. nov. (HCL 213): **1**, dermal pinular pentactin; **2-3**, tangential rays of dermal pinular pentactin; **4**, choanosomal pentactin; **5-8**, outer ends of choanosomal pentactins; **9**, uncinate; **10**, shaft of anchorate basalia; **11**, anchorate basalia; **12-13**, micropentactins; **14**, microstauractin; **15-17**, amphidiscs.

0.002-0.009 mm in diameter. Basalia (fig. 44.10-11) were found in the holotype only; they are anchor-like, two toothed spicules, the shaft 0.01-0.04 mm in diameter covered with spines. Which surface between two opposite parts is atrial and which is dermal, as it must be in *Poliopogon*, has not be determined so that spicules are discussed as spicules from different sides. The careful examination of the pinular pentactins in the specimen

HCL 215 has shown the great similarity of statistical parameters of all four surfaces (two convex and two concave), whereas the spicules of the ribs between two neighbours surfaces are notably larger. If they corresponded to the atrial surface, this sponge should be transferred to the genus *Semperella*. The increased size of the pinular pentactins from the ribs in HCL 215 can be a result of their marginal position. Pinular pentactins and rare hexactins from both surfaces in other species of the genus are similar in size and shape. The pinular ray (fig. 44.1-3) widens toward the end, ending with a relatively thick end with several short spines. The spines are directed upward and they occur near the base. The tangential rays could make a regular crest or two, the opposite rays are bent in X-form. The tangential rays are smooth with outer ends or even half of a ray covered with short spines directed upward. The pinular ray of pentactins from one side is 0.122-0.334/0.011-0.026 mm, from the other, 0.114-0.262/0.0011-0.026 mm. The tangential rays of pentactins from one side is 0.034-0.148/0.007-0.011 mm, from the other, 0.034-0.122/0.007-0.011 mm.

Micropentactins and rare microstauractins (fig. 44.12-14) are covered with short spines. They have thick or thin rays. The rays (0.052-0.198/0.006-0.017 mm) are covered with spines.

All the amphidiscs (fig. 44.15-17) belong to one type. The largest are about two times larger than the smallest. The amphidisc shafts are covered with short spines. Total length of amphidiscs is 0.015-0.115 mm, umbel length 0.005-0.041 mm, umbel diameter 0.005-0.026 mm.

REMARKS. — This new species of *Poliopogon* differs notably from other species of the genus [*P. amadou* (Schulze, 1887), *P. amadou pacifica* (Tabachnick, 1988), *P. maitai* (Tabachnick, 1988)]. *P. micropentactinus* has micropentactins instead of microhexactins and micropentactins, which are rarely found in other species. It has one type of amphidisc, dermal and atrial pentactins may have the tangential rays curved.

ETYMOLOGY. — The species name refers to the prevalence of micropentactins.

Poliopogon claviculus sp. nov.

Fig. 45, 48; Tab. 21

MATERIAL EXAMINED. — **New Caledonia**. HALIPRO 2: stn BT 25, 25°17.45'S, 170°23.93'E, 1100-1348 m, 11.11.1996: HCL 458.

TYPES. — *Holotype*: HCL 458 (HALIPRO 2, stn BT 25, 25°17.45'S, 170°23.93'E, 1100-1348 m).

DESCRIPTION. — The holotype is a conical sponge 300 mm long and about 120 x 100 mm in section. Atrialia is a flattened concave area about 200 x 50 mm. Basalia are very short, up to 10 mm long. The sponge is fixed by its basal part to a dead cylindrical fragment of hexactinellid sponge with fused skeleton, probably *Tretopleura*.

Spicules: The choanosomal skeleton consists of pentactins (fig. 48.18) and rare stauractins with rays 0.072-0.972/0.014-0.022 mm. Uncinates (fig. 48.11-12) are 0.191-0.828/0.002-0.007 mm. Basalia (fig. 48.7) are anchor-like, two-toothed spicules and monaxons (fig. 48.6), with one outer rounded end. The shaft of anchorate basalia is about 0.006 mm in diameter, probably smooth. Basal monaxons with rounded end are thick, about 0.050 mm in diameter. Other spicules of prostalia are very specific to this species. They are monaxons with clavate distal ends (fig. 48.8-10), which can have spines only on the top and beyond the clavate part. The prostal parts of these spicules are common with other representatives of Pheronematidae. Clavate monaxons are numerous in dermal area and particularly numerous among basalia, they are 0.220-0.396 mm long, 0.004-0.005 mm in diameter of main shaft and 0.014-0.022 mm in diameter of their clavate parts. Dermal and atrial pentactins are pinular pentactins (fig. 48.1-5) similar to each other in shape. Dermal pentactins can be about two times larger than the atrial ones. The pinular ray of these spicules often has a thin spine or its outer end which protrudes far beyond the last spines. The pinular ray of dermal pentactins is 0.078-0.392/0.011-0.025 mm, tangential ones are 0.044-0.096/0.007-0.016 mm. The pinular ray of atrial pentactins is 0.078-0.174/0.022-0.029 mm, tangential

FIG. 45. — *Poliopogon claviculus* sp. nov. (HCL 458). Scale = 10 cm.
FIG. 46-47. — *Poliopogon zonecus* sp. nov. (HCL 459). Scale = 10 cm.

ones are 0.030-0.078/0.011-0.014 mm. Micropentactins (fig. 48.13) are covered with short spines. They have rays 0.061-0.122/0.004 mm.

Amphidiscs are of three types. Macramphidiscs (fig. 48.14-15) are oval, almost round, with smooth shafts and teeth that nearly meet at the equator. The umbel teeth are often broad but sometimes thin and long with some short spines on their surface. Total length of macramphidiscs 0.131-0.287 mm, the umbel diameter 0.070-0.183 mm. Mesamphidiscs and micramphidiscs (fig. 48.16-17) are similar in shape. They have spiny shafts and are different in sizes. Total length of mesamphidiscs 0.061-0.200 mm, the umbel length 0.017-0.078 mm, the umbel diameter 0.010-0.052 mm. Total length of micramphidiscs 0.032-0.058 mm, umbel length 0.012-0.018 mm, umbel diameter 0.008-0.016 mm.

REMARKS. — *Poliopogon claviculus* can be easily distinguished from the other species. It has oval macramphidiscs and prostalia lateralia, and monactins with clavate outer ends. A similar sponge with similar characteristic spicules was found off Hawaii Islands. It is very likely that it belongs to *Poliopogon claviculus* (REISWIG, personal communication).

ETYMOLOGY. — The specific name *claviculus* refers to the shape of the prostalia spicules.

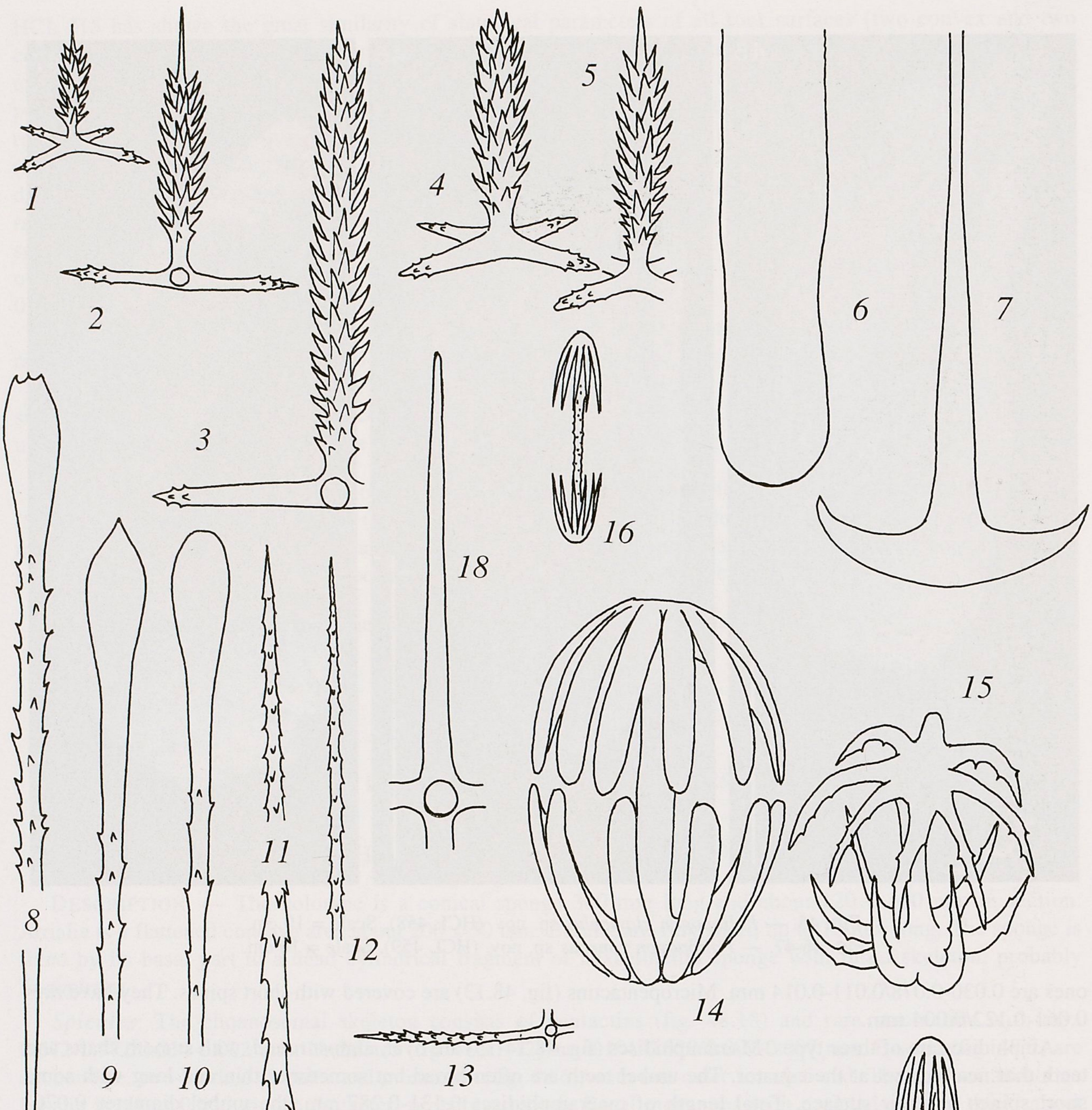


FIG. 48. — *Poliopogon claviculus* sp. nov. (HCL 458): **1-3**, dermal pinular pentactins; **4-5**, atrial pinular pentactins; **6**, basal monaxon; **7**, anchorate basalia; **8-10**, prostalia lateralia (clavate); **11-12**, uncinates; **13**, micropentactin; **14**, common macramphidisc; **15**, thin-toothed macramphidisc; **16**, mesamphidisc; **17**, micramphidisc; **18**, choanosomal pentactin.

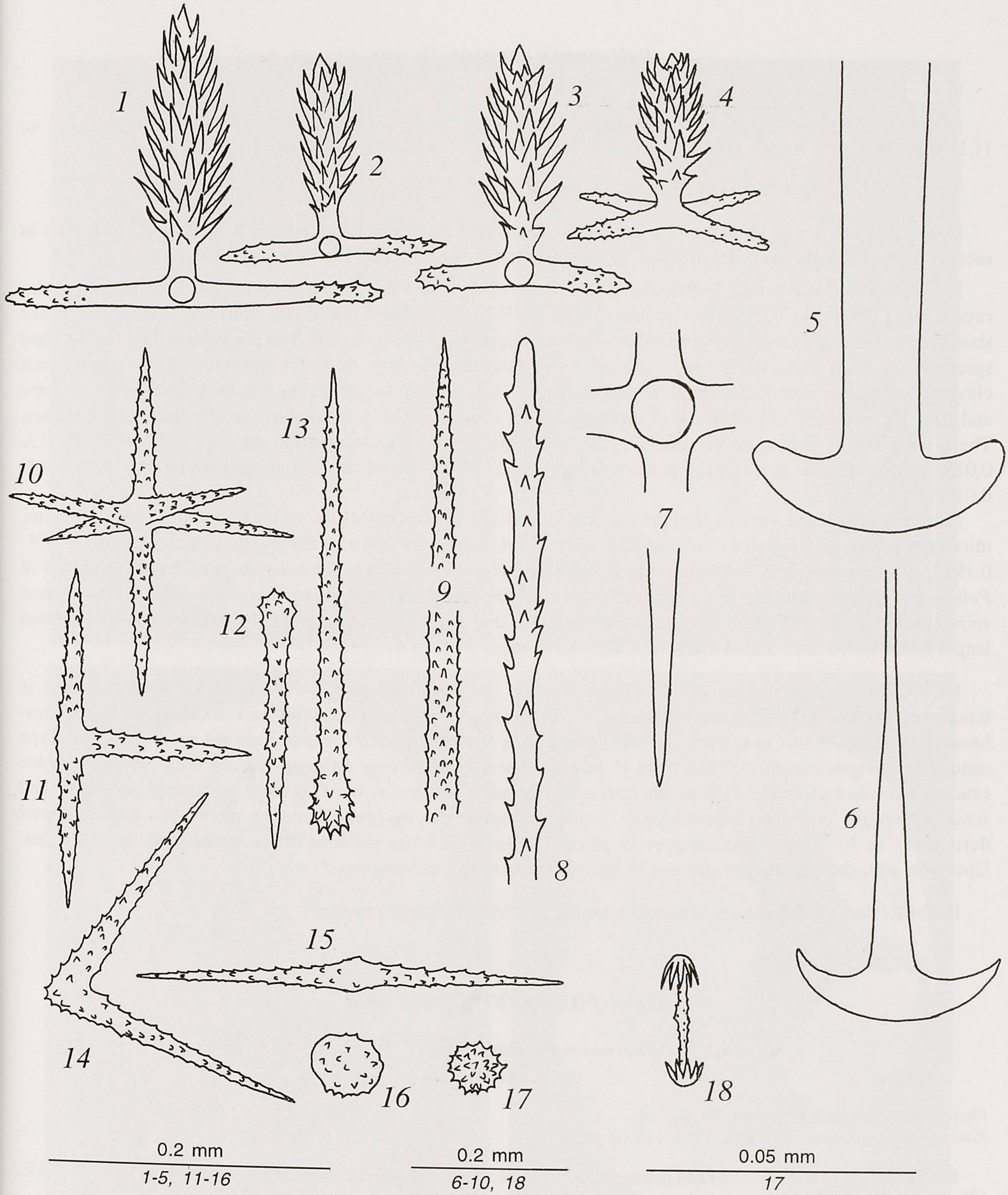


FIG. 49. — *Poliopogon zonecus* sp. nov. (HCL 479): **1-2**, dermal pinular pentactins; **3-4**, atrial pinular pentactins; **5-6**, anchorate basalia; **7**, choanosomal pentactin; **8**, prostalia lateralia (cuspidate); **9**, uncinate; **10**, microhexactin; **11**, microtriactin; **12-13**, micromonactins; **14**, microorthodiactin; **15**, microdiactin; **16-17**, microspheres; **18**, micramphidisc.

Poliopogon zonecus sp. nov.

Fig. 46-47, 49; Tab. 22

MATERIAL EXAMINED. — **New Caledonia**. HALIPRO 2: stn BT 25, 25°17.45'S, 170°23.93'E, 1100-1348 m, 11.11.1996: HCL 459. — Stn BT 32, 25°19.95'S, 168°54.75'E, 697-1340 m, 12.11.1996: HCL 460.

TYPES. — *Holotype*: HCL 459 (HALIPRO 2, stn BT 25, 25°17.45'S, 170°23.93'E, 1100-1348 m).

DESCRIPTION. — The holotype is a tongue-like, elongated, 170 mm long sponge. It is about 75 x 40 mm in section. Tuft of basalia protrudes at about 20 mm. The specimen HCL 460 is a poor fragment.

Spicules: The choanosomal skeleton consists of pentactins (fig. 49.7) rarely of stauractins and tauactins, with rays 0.216-1.080/0.011-0.025 mm. Uncinates (fig. 49.9) (0.367-0.576/0.004-0.005 mm) are covered with very short spines, their surface seems to be rather rough than spinous. Basalia (fig. 49.5-6) are anchor-like, two-toothed spicules with shaft about 0.007 mm in diameter. Prostalia lateralia (fig. 49.8) are monaxons with rounded (not clavate) outer ends. Dermal and atrial pentactins (fig. 49.1-4) are pinular pentactins similar to each other in shape and size. The outer end of pinular ray of these spicules is conical, equal to or not much longer than the last spines. The pinular ray of dermal pentactins is 0.113-0.200/0.022-0.032 mm, tangential rays are 0.070-0.131/0.013-0.018 mm. The pinular ray of atrial pentactins is 0.104-0.191/0.018 mm, tangential ones are 0.061-0.122/0.014-0.018 mm.

Microhexactins and various derivatives (fig. 49.10-17) (micropentactins, microstauractins, microdiactins, micromonactins and spheres) are covered with short numerous spines. These spicules have rays 0.078-0.191/0.014 mm in length. A single type of amphidisc (fig. 49.18) of a more constant total length than that of *Poliopogon micropentactinus* was found in *P. zonecus.* These amphidiscs have shafts covered with numerous short spines and often have a widened part in the middle. Total length of micramphidiscs 0.025-0.047 mm, umbel length 0.006-0.010 mm, umbel diameter 0.007-0.012 mm.

REMARKS. — The specimen HCL 460 is a poor fragment. Its spicule content is incomplete and it is tentatively identified as *P. zonecus* because of similarities of pinular pentactins and micramphidiscs. Microhexactins prevail in this specimen. As this specimen is tentatively identified, it does not receive the paratype status. *Poliopogon zonecus* differs from *P. micropentactinus* in having different microscleres: amphidiscs are smaller; microhexactins and various derivatives are found in *P. zonecus* whereas there are mainly pentactins and some stauractins in *P. micropentactinus.* Some analogues can be found between microhexactins and their derivatives in *P. zonecus* and *Semperella abyssalis* but most other spicules differ strongly in these species. Uncinates with short spines are also one of the characters of this new species.

ETYMOLOGY. — The species is named after the HALIPRO 2-ZONECO cruise.

Genus *PHERONEMA* Leidy, 1868

Pheronema pilosum Lévi, 1964

Fig. 50-54; Tab. 23

Pheronema pilosum Lévi, 1964: 99, fig. 54.
Pheronema giganteum - BURTON, 1959: 159 (in part).

MATERIAL EXAMINED. — **Madagascar**. *Northwestern Coast. "Akademic Kurchatov"*, stn 3754, 12°29'S, 48°05'E, 670 m: 5/2/390.9 (IORAN).

Zanzibar area. JOHN MURRAY EXPEDITION: stn 122, 5°21.24'S, 39°23.00'E, 745 m, 22.01.1934: NHM 1936.03.04.080.

Australia. *Eastern Coast.* CIDARIS I: stn 24-2, 17°19.58'S, 147°47.61'E, 1187-1200 m, 11.05.1986: fr870 (provisional number) (MTQ).

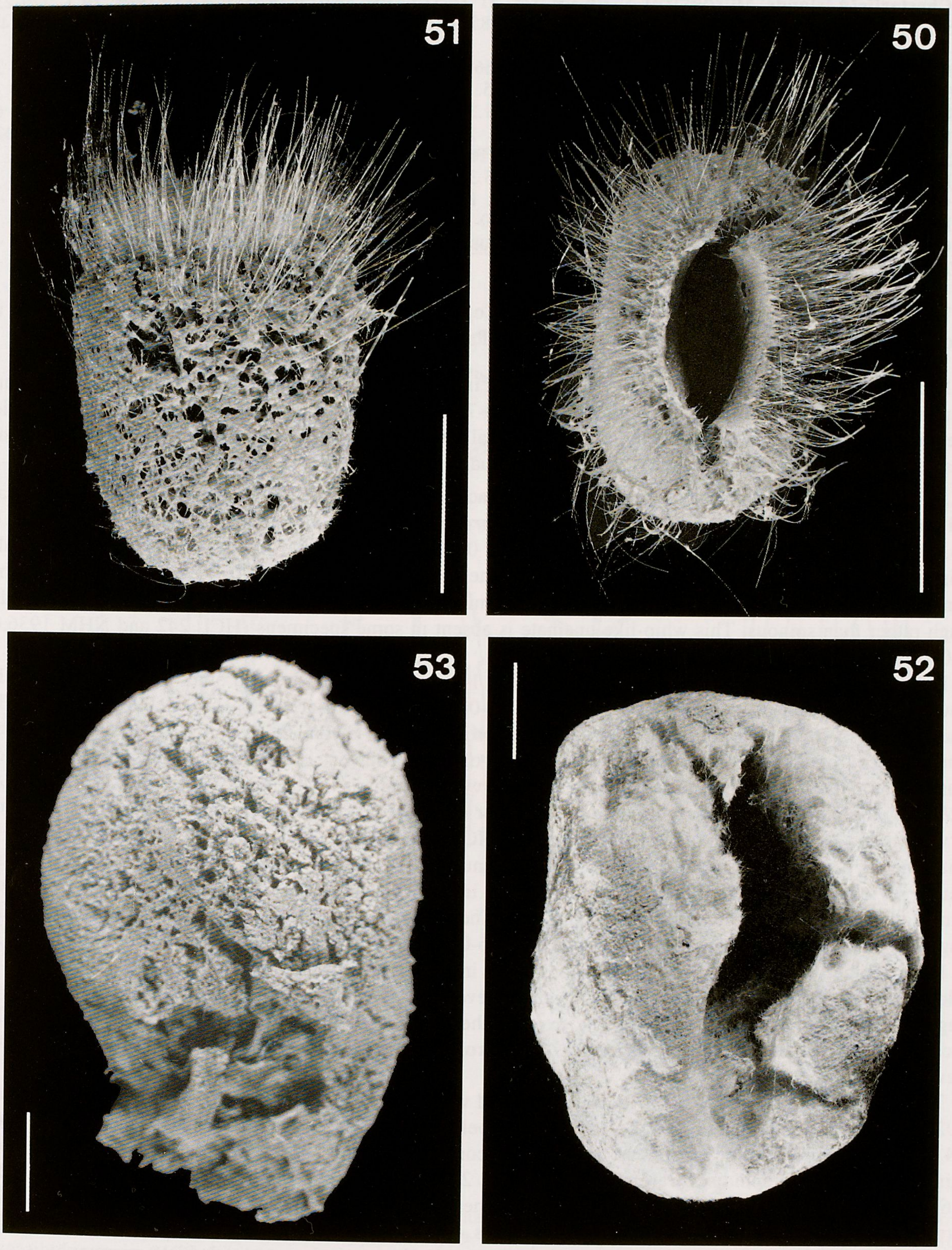


FIG. 50-53. — *Pheronema pilosum* Lévi, 1964: **50-51** (HCL 216); **52** (HCL 256); **53** (HCL 252). Scales = 2 cm.

Indonesia (Flores Sea). *"Snellius"*: stn 164, 7°27.0'S, 124°27.5'E, 200 m: por9402.

Chesterfield Islands. MUSORSTOM 5: stn CP 323, 21°18.52'S, 157°57.62'E, 970 m, 14.10.1986: HCL 229-239. — Stn CP 324, 21°15.01'S, 157°51.33'E, 970 m, 14.10.1985: HCL 242-244. — Stn CP 387, 20°53.41'S, 160°52.14'E, 650-660 m, 22.10.1985: HCL 240-241.

New Caledonia. BIOCAL: stn CP 29, 23°08.70'S, 166°39.70'E, 1100 m, 29.08.1985: HCL 222. — Stn CP 30, 23°09.76'S, 166°40.85'E, 1140 m; 29.08.1985: HCL 225. — Stn CP 57, 23°44.51'S, 166°54.94'E, 1490-1620 m, 1.09.1985: HCL 462. — Stn CP 61, 24°11.67'S, 167°31.37'E, 1070 m, 2.09.1985: HCL 226-227. — Stn CP 62, 24°19.35'S, 167°49.43'E, 1395-1410 m, 2.09.1985: HCL 223-224. — Stn CP 69, 23°52.21'S, 167°57.82'E, 1220-1225 m, 3.09.1985: HCL 228. — Stn CP 75, 22°20.42'S, 167°23.41'E, 825-860 m, 4.09.1985: HCL 216-221, 461.

Loyalty Islands. MUSORSTOM 6: stn CP 427, 20°23.35'S, 166°20.00'E, 800 m, 17.02.1989: HCL 245-247. — Stn CP 438, 20°23.00'S, 166°20.10'E, 780 m, 18.02.1987: HCL 248-249.

BIOGEOCAL: stn CP 297, 20°38.64'S, 167°10.77'E, 1230-1240 m, 28.04.1987: HCL 256.

Combe Bank *(near Wallis and Futuna Islands)*. MUSORSTOM 7: stn CP 551, 12°15.3'S, 177°28.1'W, 791 m, 18.05.1992: HCL 250-252.

TYPES. — Holotype at the Zoologisk Museum in Copenhagen. A spicular slide (MNHN-HCL 28) from the holotype at the Muséum national d'Histoire naturelle in Paris.

DESCRIPTION. — Ovoid sponge from 23 to 120 mm in length, 12 to 65 mm in diameter, with relatively large osculum (8-50 mm in diameter), deep atrial cavity (20-70 mm) and relatively thin walls about 6-25 mm thick. The sponge usually has well developed prostalia lateralia which protrudes at 20-50 mm from the surface and prostalia oscularia. Basalia are different in length but usually not very long.

Spicules: The choanosomal skeleton consists of pentactins and rare hexactins, stauractins and triactins. Basalia and sceptres are similar to those of other species of *Pheronema*. The uncinates belong to three types (fig. 54.13-15). The macruncinates are several mm long and about 0.009 mm in diameter, with spines developed normally. This kind of uncinate is absent in some specimens. The mesuncinates are about 0.7-1.2/0.008 mm, with short spines, and are present everywhere. Small, whip-like micruncinates 0.091-0.912/0.003 mm are tuberculated or rough rather than spinous. This whip-like uncinate is absent in some specimens (HCL 242 and NHM 1936.03.04.080) including the holotype.

Dermalia and atrialia are pinular pentactins (fig. 54.1-8) usually similar to each other in shape and size. The pinular ray of dermal pentactins is 0.046-0.304/0.006-0.026 mm, of atrial, 0.053-0.356/0.006-0.013 mm. The pinular ray is sharply pointed. The whip-like outer end projects freely beyond the last spines. The spines begin at a short distance from the base of the shaft. The pinular ray of atrial pentactins is often curved whereas the dermal one is usually straight. In both specimens collected from the western Indian Ocean (NHM 1936.03.04.080 and IORAN 5/2/390.3) the pinular ray is straight and only the outer end, which projects freely beyond the last spines, may curve slightly. The pinular ray of dermal pentactins of HCL 256 is straight and not very thick, whereas that of the atrial ones is curved or straight. Thickness of atrial pinular ray is similar to that of the dermal one. The atrial pinular ray may be whip-like with rare spines or oval in shape with conical or rounded outer end. Some long spines of pinular ray are dichotomously branched. The tangential rays are rough and sharply pointed. The tangential ray of dermal pentactins is 0.038-0.236/0.006-0.008 mm, of atrial, 0.038-0.205/0.006-0.007 mm.

Micropentactins (fig. 54.9) with rough rays are rare in most specimens and they were not described from the holotype. These micropentactins are canalaria or non developed pinular pentactins as their rays are similar to the tangential rays of pinular pentactins. The rays of these micropentactins are 0.026-0.152/0.006 mm. The microhexactins and microstauractins in addition to micropentactins are present in HCL 256. The microhexactins prevail in HCL 462.

The amphidiscs (fig. 54.15-18), with shafts covered with numerous spines, belong to one type. Total length 0.022-0.189 mm, umbel length 0.007-0.052 mm, umbel diameter 0.008-0.045 mm. Their length varies about 3-4 times between different specimens. However, according to figures of the holotype they also vary about 3 times. The largest amphidiscs were observed in HCL 220, 232, 248, the smallest ones in HCL 217, 221, 222, 226, 243. According to the length of amphidiscs of other species of *Pheronema*, the amphidiscs of *P. pilosum* correspond both to micramphidiscs and mesamphidiscs. They were described as mesamphidiscs in the original description. In the close species, *P. amphorae* (Reiswig, 1992), these spicules are divided into micramphidiscs and mesamphidiscs. Some specimens have fragments of these micramphidiscs, probably of allochtonous origin.

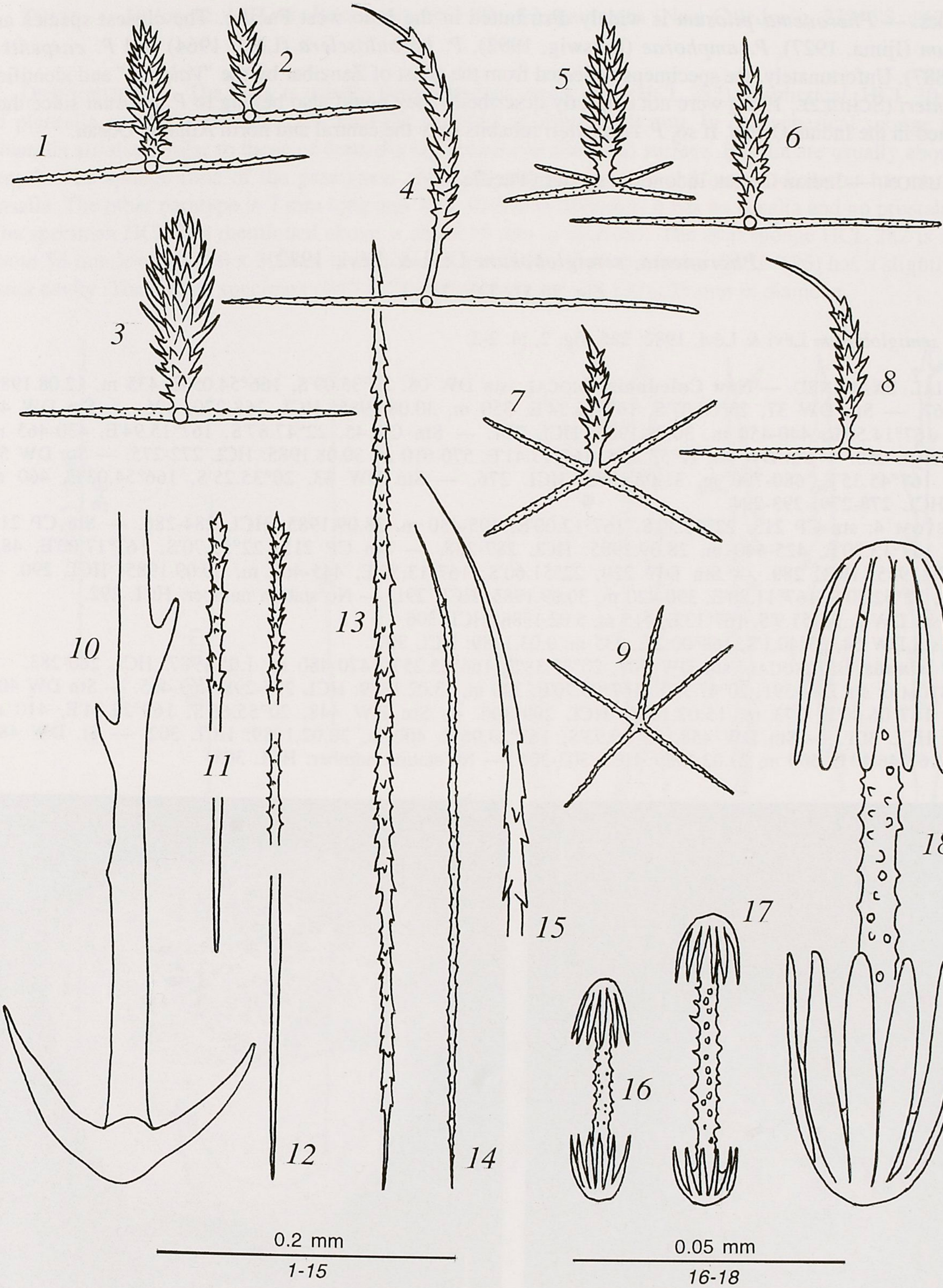


FIG. 54. — *Pheronema pilosum* Lévi, 1964: **1-4**, dermal pentactins (1-2, HCL 461; 3, HCL 242; 4, HCL 220); **5-8**, atrial pentactins (5-6, HCL 461; 7, 5/2/390.9; 8, HCL 461); **9**, micropentactin (HCL 461); **10**, anchor-like basalia (HCL 461); **11**, sceptre (HCL 461); **12**, sceptre (5/2/390.9); **13**, mesuncinate (HCL 461); **14**, micruncinate (HCL 461); **15**, macruncinate (HCL 461); **16**, amphidisc (HCL 461); **17**, amphidisc (HCL 243); **18**, amphidisc (HCL 220).

REMARKS. — *Pheronema pilosum* is widely distributed in the Indo-west Pacific. The closest species are *P. echinatum* (Ijima, 1927), *P. amphorae* (Reiswig, 1992), *P. barbulosclera* (Lévi, 1964) and *P. carpenteri* (Schulze, 1887). Unfortunately, the specimens collected from the coast of Zanzibar by the *"Valdivia"* and identified as *P. carpenteri* (SCHULZE, 1904) were not correctly described. They could also belong to *P. pilosum* since they were collected in the Indian Ocean. If so, *P. carpenteri* inhabits only the central and north Atlantic Ocean.

DISTRIBUTION. — Indian Ocean, Indonesia, western Pacific.

Pheronema semiglobosum Lévi & Lévi, 1982

Fig. 55-57; Tab. 24

Pheronema semiglobosum Lévi & Lévi, 1982: 286, fig. 2, pl. 2-3.

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 08, 20°35.09'S, 166°54.05'E, 435 m, 12.08.1985: HCL 261-267. — Stn DW 37, 23°00.07'S, 167°16.34'E, 350 m, 30.08.1985: HCL 268-270, 496. — Stn DW 44, 22°47.35'S, 167°14.50'E, 440-450 m, 30.08.1985: HCL 271. — Stn CP 45, 22°47.87'S, 167°15.94'E, 430-465 m, 30.08.1985: HCL 260. — Stn DW 46, 22°53.27'S, 167°17.41'E, 570-610 m, 30.08.1985: HCL 272-275. — Stn DW 51, 23°05.43'S, 167°45.35'E, 680-700 m, 31.08.1985: HCL 276. — Stn DW 83, 20°35.25'S, 166°54.03'E, 460 m, 6.09.1985: HCL 278-279, 293-294.

MUSORSTOM 4: stn CP 213, 22°51.30'S, 167°12.00'E, 405-430 m, 28.09.1985: HCL 284-286. — Stn CP 214, 22°53.80'S, 167°13.90'E, 425-440 m, 28.09.1985: HCL 287-288. — Stn CP 215, 22°55.70'S, 167°17.00'E, 485-520 m, 28.09.1985: HCL 289. — Stn DW 229, 22°51.60'S, 167°13.50'E, 445-460 m, 30.09.1985: HCL 290. — Stn DW 230, 22°52.50'S, 167°11.80'E, 390-420 m, 30.09.1985: HCL 291. — No station number: HCL 292.

SMIB 1: stn DW 2, 22°51.9'S, 167°13'E, 415 m, 5.02.1986: HCL 306.

SMIB 4: stn DW 54, 23°40.1'S, 168°00.2'E, 235 m, 9.03.1989: HCL 307.

Loyalty Islands. BIOGEOCAL: stn DW 307, 20°35.38'S, 166°55.25'E, 470-480 m, 1.05.1987: HCL 280-283.

MUSORSTOM 6: stn DW 391, 20°47.35'S, 167°05.70'E, 390 m, 13.02.1989: HCL 295-298, 463-465. — Stn DW 406, 20°40.65'S, 167°06.80'E, 373 m, 15.02.1989: HCL 299-300. — Stn DW 448, 20°55.66'S, 167°22.34'E, 410 m, 19.02.1989: HCL 301. — Stn DW 458, 21°00.93'S, 167°29.96'E, 400 m, 20.02.1989: HCL 302. — St. DW 487, 21°23.30'S, 167°46.40'E, 500 m, 23.02.1989: HCL 303-304. — No station number: HCL 305.

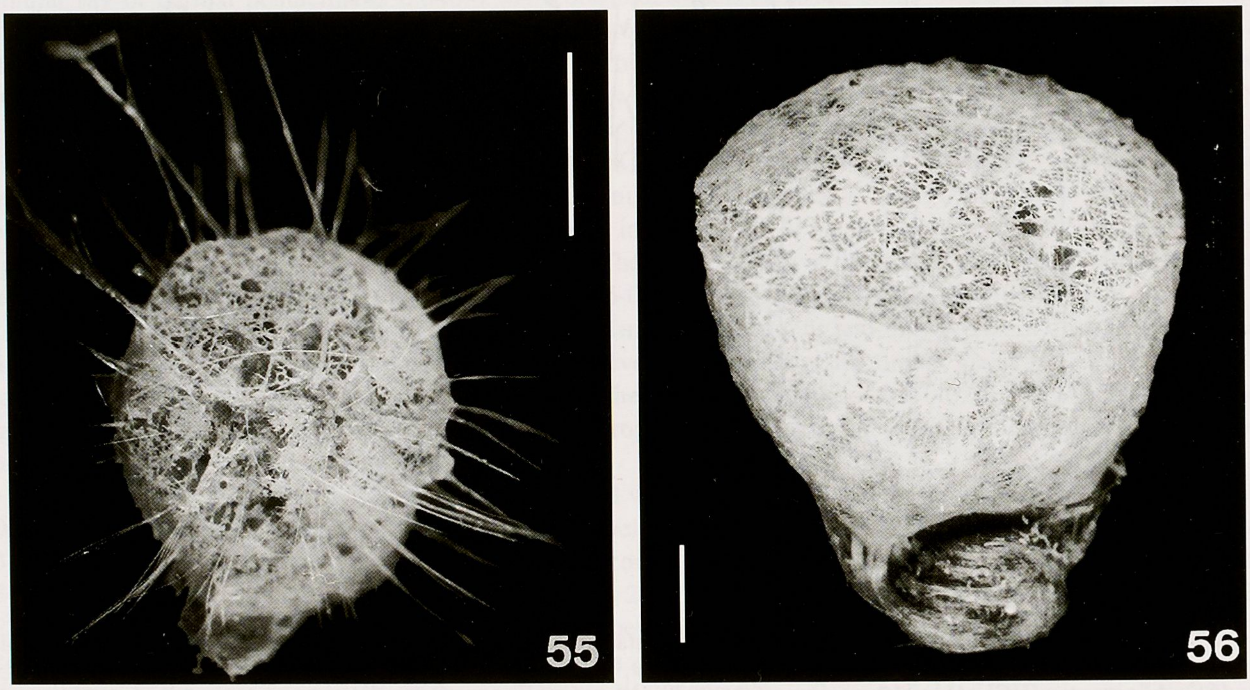


FIG. 55-56. — *Pheronema semiglobosum* Lévi & Lévi, 1982: **55** (HCL 298); **56** (HCL 294). Scales 2 cm.

TYPES. — *Holotype*: HCl 48. *Paratypes*: HCl 49 - 17 specimens (New Caledonia, 22°46'S, 167°14'E, 400-410 m).

DESCRIPTION. — The body is usually hemispherical, rarely oval (HCL 282) or spherical (HCL 304). The tufts of pleuralia oscularia and pleuralia lateralia protrude at about 5-40 mm. In one spherical sponge (HCL 304), pleuralia atrialia similar to those of dermalia are found over the atrial surface. Basalia are usually about 30 mm in length. The sponge (one of the paratypes) about 13 mm long and 13 x 8 mm in diameter has no prostalia or basalia. The other paratype is 7 mm long and 12 x 10 mm in diameter, it has no basalia and no prostalia oscularia. The specimen HCL 304 mentioned above is about 15 mm in diameter. The oval sponge HCL 282 is rather large, about 55 mm long and 50 x 30 mm in diameter. One of the small specimens (HCL 496) has a slightly depressed atrial cavity. The largest specimen (HCL 278) is120 mm long and 130x155 mm in diameter.

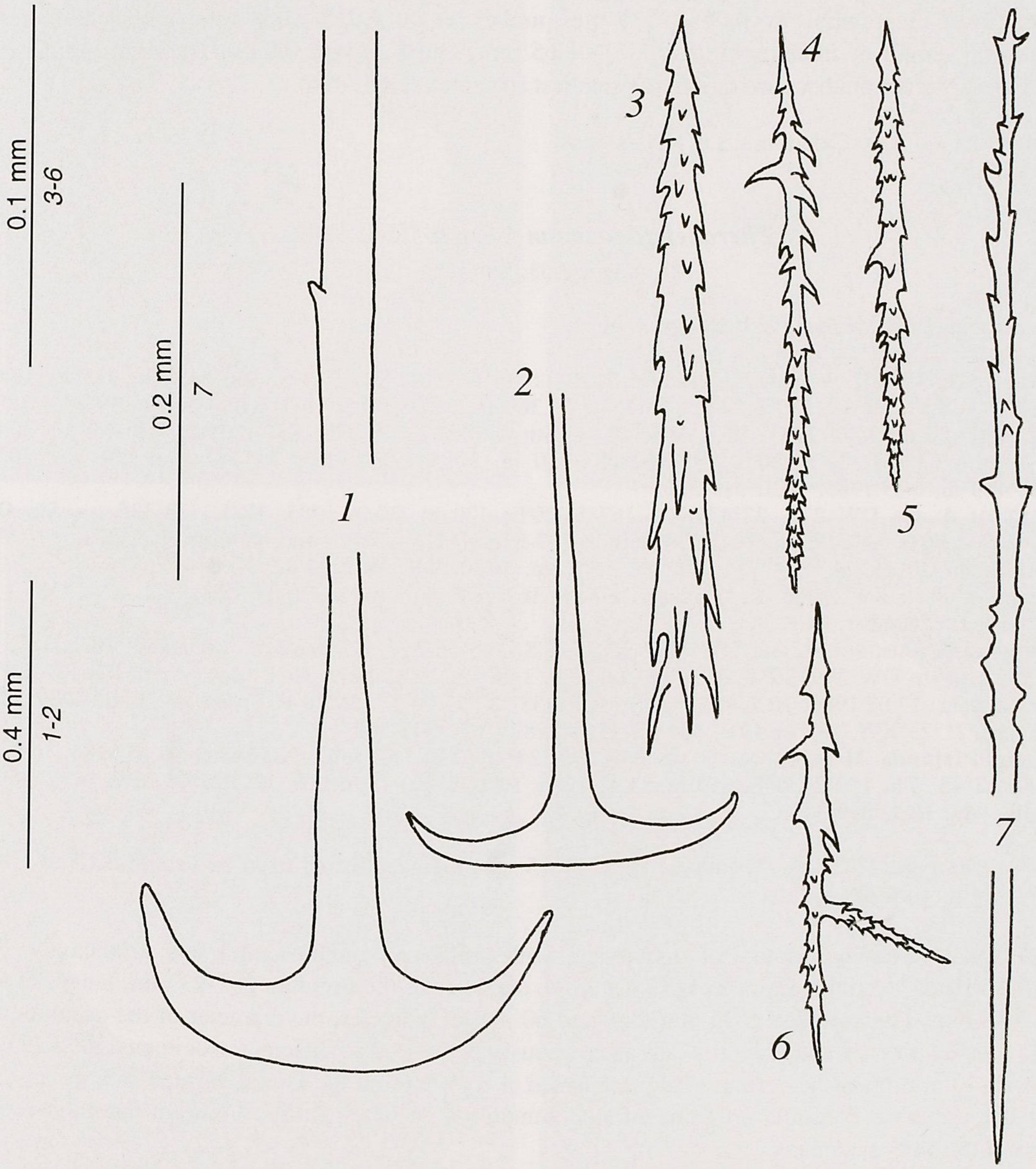


FIG. 57. — Spicules of *Pheronema semiglobosum* Lévi & Lévi, 1982 (types, except 4-5, HCL 278): **1-2**, anchorate basalia; **3**, macruncinate; **4-6**, micruncinates; **7**, sceptre.

Additional remarks on the skeleton spicules:

Hexactins prevail over pentactins in the choanosomal skeleton in some specimens (e.g. HCL 304). The basalia sometimes have some teeth located at a short part of the rachis.

Prostalia oscularia and lateralia are sceptres (fig. 57.7) as in other *Pheronema.* The micruncinates (fig. 57.4-6) are rare in the smallest specimens (HCL 304, 287, 282) and in two smallest paratypes; they seem to be absent in HCL 278. Only two mesuncinates have been found in the smallest paratype specimen but they belong to macruncinates (fig. 57.3) rather than to micruncinates. The micruncinates are 0.084-0.646 mm long.

Dermalia and atrialia are pinular pentactins and, rarely, hexactins similar in shape. The pinular ray of dermal pentactins is 0.053-0.236 mm, of atrial, 0.076-0.372 mm. The pinular ray is straight or curved. The tangential rays are entirely or partly (the upper end) covered with numerous spines. The tangential rays are straight or two opposite pairs bent in an X-form. From side view the tangential rays are always slightly deviated away from the pinular ray. The tangential ray of dermal pentactins is 0.023-0.099 mm, of atrial 0.027-0.133 mm.

Total length of macramphidisc 0.068-0.239 mm, umbel length 0.015-0.068 mm, umbel diameter 0.027-0.076 mm. Total length of micramphidisc 0.017-0.065 mm, umbel length 0.005-0.013 mm, umbel diameter 0.005-0.013 mm. Micramphidiscs are rare in the smallest specimen (HCL 496).

DISTRIBUTION. — New Caledonia, Loyalty Islands.

Pheronema conicum Lévi & Lévi, 1982

Fig. 58-63; Tab. 25

Pheronema conicum Lévi & Lévi, 1982: 284, pl. 1 fig. 1.

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 08, 20°35.09'S, 166°54.05'E, 435 m, 12.08.1985: HCL 312-315. — Stn DW 38, 22°59.94'S, 167°15.42'E, 360 m, 30.08.1985: HCL 316. — Stn DW 44, 22°47.35'S, 167°14.50'E, 440-450 m, 30.08.1985: HCL 317-318. — Stn CP 45, 22°47.87'S, 167°15.94'E, 430-465 m, 30.08.1995: HCL 310. — Stn CP 47, 22°53.10'S, 167°16.82'E, 550 m, 30.08.1985: HCL 311. — Stn DW 83, 20°35.25'S, 166°54.03'E, 460 m, 6.09.1985: HCL 319-326.

MUSORSTOM 4: stn DW 228, 22°47.00'S, 167°18.20'E, 420 m, 30.09.1985: HCL 333-335. — Stn DW 230, 22°52.50'S, 167°11.80'E, 390-420 m, 30.09.1985: HCL 337-338, 467. — No station number: HCL 472.

CHALCAL 2: stn CP 25, 23°38.60'S, 167°43.12'E, 418 m, 30.10.1986: HCL 329-332.

CALSUB: stn 19, S to SW of the Isle of Pines, 22°46'S, 167°20'E, 416-404 m, 10.03.1989: HCL 328, 336.

SMIB 1: no station number: HCL 343.

Loyalty Islands. BIOGEOCAL: stn DW 307, 20°35.38'S, 166°55.25'E, 470-480 m, 1.05.1987: HCL 327.

MUSORSTOM 6: stn DW 396, 20°48.05'S, 167°00.59'E, 1400 m, 13.02.1989: HCL 469. — Stn CP 427, 20°23.35'S, 166°20.00'E, 800 m, 17.02.1989: HCL 471. — Stn CP 438, 20°23.00'S, 166°20.10'E, 780 m, 18.02.1989: HCL 470. — Stn DW 487, 21°23.30'S, 167°46.40'E, 500 m, 23.02.1989: HCL 341-342.

Chesterfield Islands. MUSORSTOM 5: stn DW 272, 24°40.91'S, 159°43'E, 500-540 m, 9.10.1986: HCL 466. — Stn DW 300, 22°48.27'S, 159°23.94'E, 450 m, 11.10.1986: HCL 468. — Stn DW 301, 22°06.90'S, 159°24.60'E, 487-610 m, 12.10.1986: HCL 339-340.

TYPES. — *Holotype*: HCL 46. *Paratypes*: HCL 47 - 5 specimens collected from two stations (New Caledonia, 22°49'S, 167°12'E, 390-395 m).

DESCRIPTION. — The body is conical or spherical, with a relatively small osculum and atrial cavity. The body length is 15-150 mm, maximal diameter is 19-130 mm, diameter of the osculum is 1-23 mm, length of the atrial cavity is 12-80 mm. The holotype is 45 mm long and 60 mm in diameter, the diameter of the osculum is 8 mm. The sponge has few basalia and pleuralia lateralia variously developed in different specimens. Pleuralia lateralia protrude at 10-40 mm from the surface. They are found everywhere on the lateral surface and are absent in the vicinity of the osculum. Pleuralia are concentrated sometimes in several tufts. Pleuralia lateralia seem to be entirely absent in some specimens.

Spicules: The choanosomal spicules are pentactins (fig. 62.20) or rarely hexactins and stauractins (fig. 62.18-19), with smooth, rarely rough rays several mm long and 0.02-0.09 mm in diameter. Prostalia lateralia are diactins, partly smooth and partly rough or entirely smooth, several mm long and about 0.15 mm in diameter. Basalia (fig. 62.22-24) are usual for other Pheronematidae anchorate spicules, with rare spines on the rachis. The macruncinate (fig. 62.11) is thick, 0.010-0.012 mm in diameter, and long, with normally developed spines. The whip-like micruncinates (fig. 62.12) are relatively short, with short spines or rough surface. They are approximately 0.17/0.0015 mm. Dermal spicules differ from the atrial. They both are pinular pentactins (fig. 62.1-10) or rare hexactins. In some specimens (as in one paratype) the dermal hexactins are notably numerous and atrial ones even predominate over the pinular pentactins. The dermal pinular ray is sharply pointed, the upper end

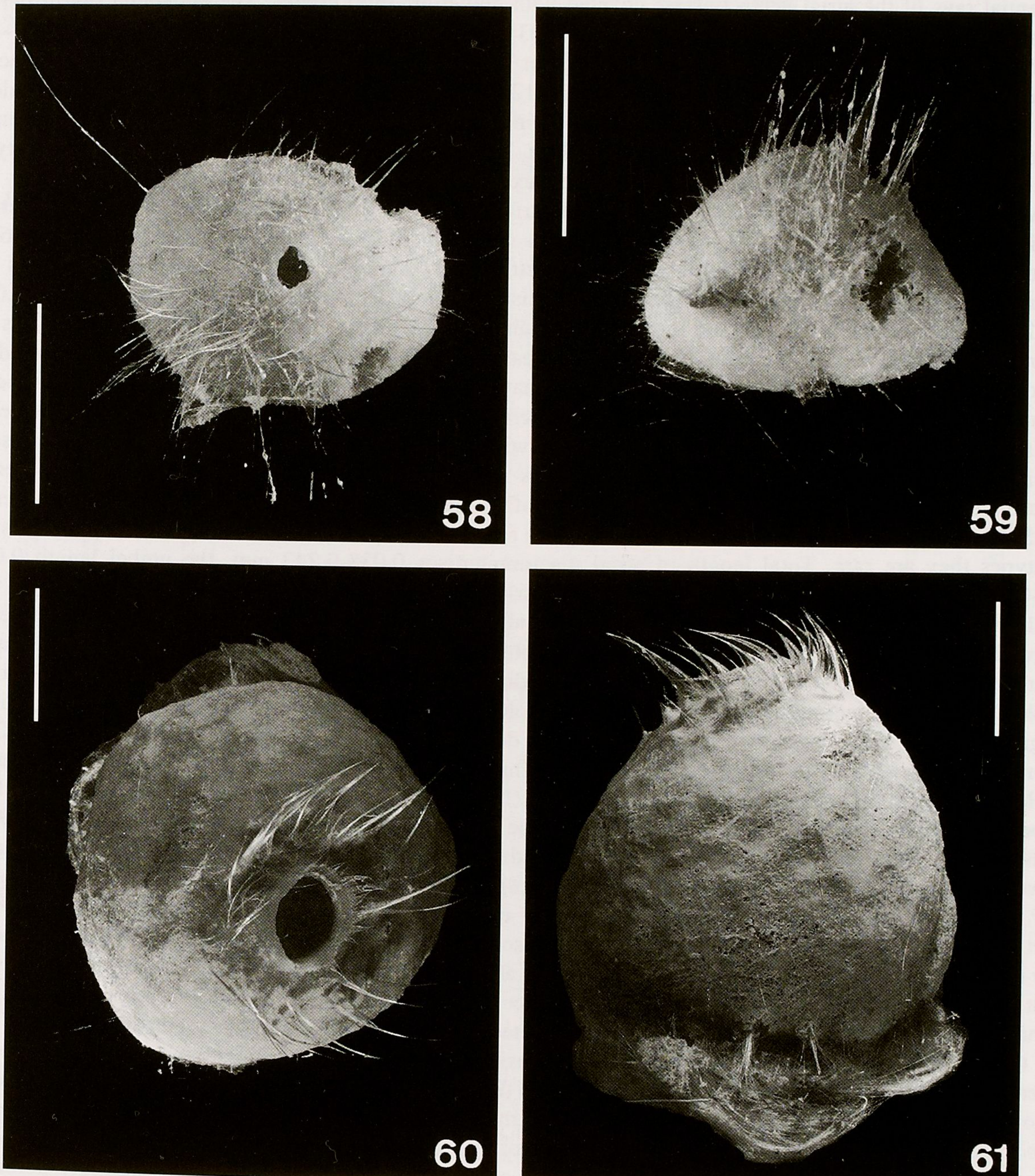


FIG. 58-61. — *Pheronema conicum* Lévi & Lévi, 1982: **58-59** (HCL 328); **60-61** (HCL 336). Scales = 2 cm.

terminates at the same level with the upper spines or sometimes projects beyond the ends of the last spines. Most of the spines are long, hook-like, and are directed upward except the closest one to the base, which may be directed downward. The spines begin at the upper 2/3 of the ray or at a short distance from the base. The tangential rays are not sharply pointed, and are smooth with outer ends rough or short-spiny. Some rarely found dermal and atrial pentactins have few thick and long spines. The pinular ray of the atrial pentactins is long, conically pointed, and the upper end freely projects beyond the ends of last spines. The spines are directed upward, and they cover all the shaft, being relatively short. Some spines near the base may be directed downward; they may split into two spines. The pinular ray of dermal pentactins is 0.049-0.251/0.004-0.007 mm, of atrial 0.053-0.468/0.004-0.011 mm. The tangential rays of the atrial pentactins are covered with numerous short spines. The tangential ray of dermal pentactins is 0.038-0.190/0.004-0.006 mm, of atrial 0.038-0.462/0.004-0.006 mm.

Microhexactins (fig. 62.13-17) covered with short or long spines prevail over the analogous micropentactins and microstauractins. The ray of microhexactins is 0.12-0.22/0.007-0.013 mm. The microtriactins and microdiactins with thick ray covered with spines described in the primary description (LÉVI & LÉVI, 1982) seem to belong to another sponge, probably *Semperella schulzei.* They were observed only in the holotype and paratypes of *P. conicum*. Nearly all the other specimens that were examined had no such spicules.

Amphidiscs located in the vicinity of dermal and atrial surface are different. Two types are found. Macramphidiscs with great variation in size and micramphidiscs more uniform in length. The macramphidiscs (fig. 63.1-20) of the dermal surface are usually larger then the atrial ones, their size variation within a specimen is less distinct but the size variation among specimens is distinct. Total length of dermal macramphidiscs 0.046-0.312 mm, umbel length 0.019-0.106 mm, umbel diameter 0.023-0.106 mm. Most of these amphidiscs are "normal" with the umbels spherical or elongated, whereas some rare forms have the shaft projecting beyond the end of the umbel. Some other dermal macramphidiscs have different sizes of umbels but this difference is not as distinct as in atrial macramphidiscs. Such proportions were previously known for some other species of the genus. The shafts of dermal macramphidiscs are often covered with tubercles or rarely with a few curved spines. In some specimens (e.g. HCL 321) the dermal macramphidiscs were not found. The micramphidiscs from the dermal surface are entirely similar to atrial ones. Total length of dermal micramphidiscs 0.014-0.063 mm, umbel length 0.005-0.020 mm, umbel diameter 0.005-0.014 mm. The atrial macramphidiscs are usually numerous but in some paratypes they are rare. Total length of atrial macramphidiscs 0.038-0.243 mm, the umbel length 0.018-0.084 mm, the umbel diameter 0.014-0.084 mm. In nearly all specimens the atrial macramphidiscs show a very similar variation. If the atrial macramphidiscs are normally developed, the teeth of the umbels may be flattened, tongue-like or rarely spinous, hook-like. Some macramphidiscs have one normally developed umbel, whereas the other has a deformed upper surface, with the shaft protruding over the surface and the lack of some teeth. The other amphidiscs have one reduced umbel, they end with a prolongation of the shaft and have some teeth situated in an irregular manner, often finger-like. Such spicules were described in *Hyalonema thomsoni* (Schulze, 1905). The other deformed macramphidiscs are paradisc-shaped. This type of spicules was previously known in the family Hyalonematidae, only in *Hyalonema* (*Paradisconema)* (IJIMA, 1927). The next deformed form, hemidiscs, have umbels of different sizes (length and diameter). This type of amphidisc, or birotulates, according to REID (1958a; 1958b; 1961), were previously known in the fossil order Hemidiscosa (SCHRAMMEN, 1924). The proportion between the diameters of the umbels of *Hemidiscella schrammeni* is 3.3 (REID, 1958b), whereas in the paradiscs of *P. conicum* it is not more than 1.2. Another type of deformed macramphidisc has umbels with teeth which meet or even overlap in the equator. These macramphidiscs are usually smaller in size than others but nevertheless they cannot be considered mesamphidiscs because of the absence of overlap in size with such other amphidiscs. As most other deformed amphidiscs, they are usually smaller than normal ones and they may be considered as a type of macramphidiscs rather than mesamphidiscs. The long teeth of macramphidiscs show several deformations. They can turn to be paradiscs. Others demonstrate some fusions. Teeth at each end may merge to form an entire spherical surface. The ends of these teeth are accreted to the middle of a shaft. The whole spicule looks like a pair of joined balls with latitudinal depressions. Fusion of the umbels of the amphidiscs was previously known in *Monorhaphis chuni* (Schulze, 1905) but it is the fusion of the opposite teeth. The shafts of atrial macramphidiscs are usually tuberculated, rarely smooth with a whorl of tubercles in the middle. All the strongly deformed macramphidiscs are smaller than the complete ones. It nevertheless seems to be impossible to distinguish separate

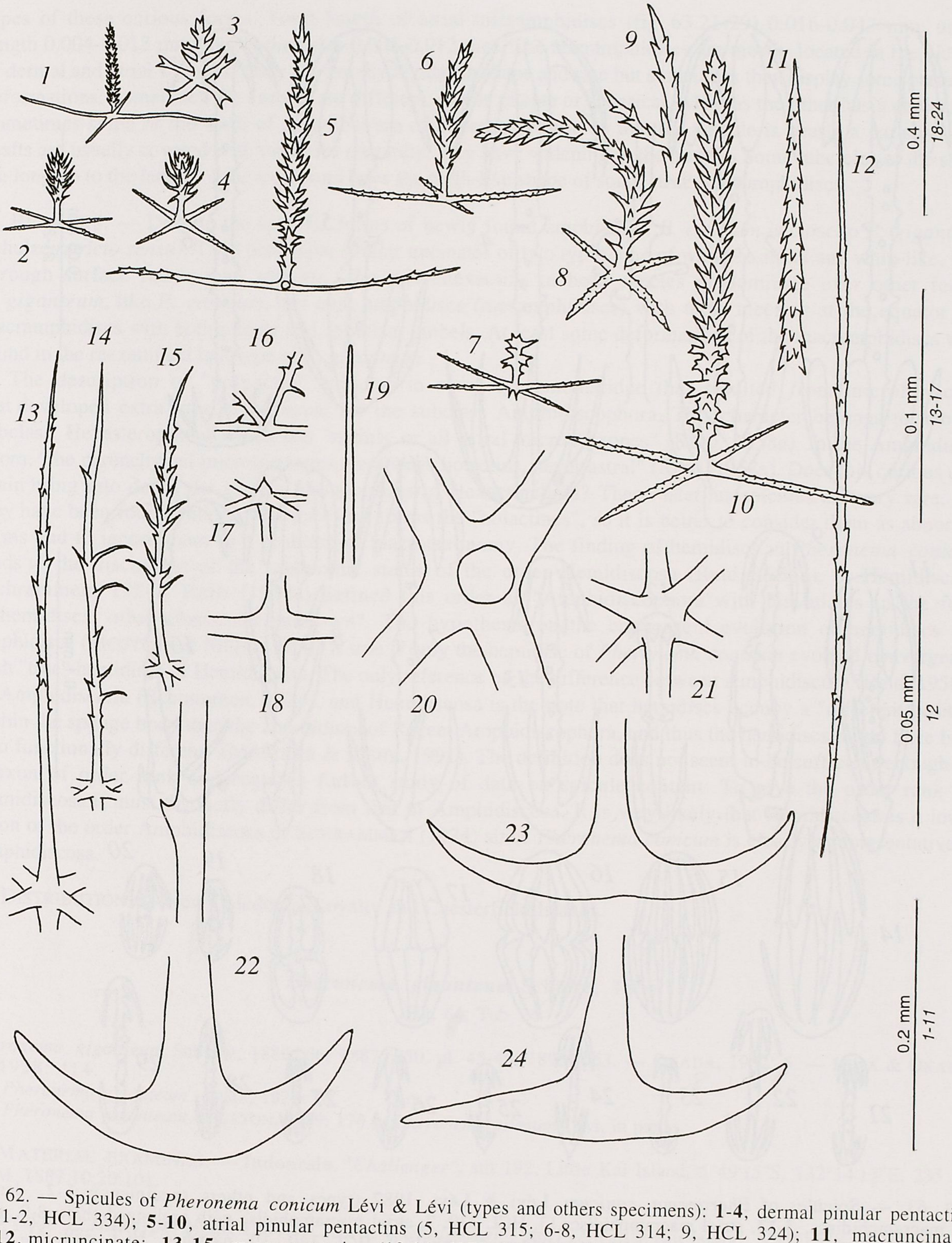


FIG. 62. — Spicules of *Pheronema conicum* Lévi & Lévi (types and others specimens): **1-4**, dermal pinular pentactins (1-2, HCL 334); **5-10**, atrial pinular pentactins (5, HCL 315; 6-8, HCL 314; 9, HCL 324); **11**, macruncinate; **12**, micruncinate; **13-15**, micropentactins (13-14, HCL 340; 15, HCL 439); **16**, microtauactin (HCL 439); **17**, micropentactin (HCL 439); **18**, choanosomal stauractin (HCL 331); **19**, outer end of choanosomal stauractin (HCL 331); **20**, choanosomal pentactin; **21**, choanosomal hexactin (HCL 332); **22-24**, anchorate basalia (24, HCL 322).

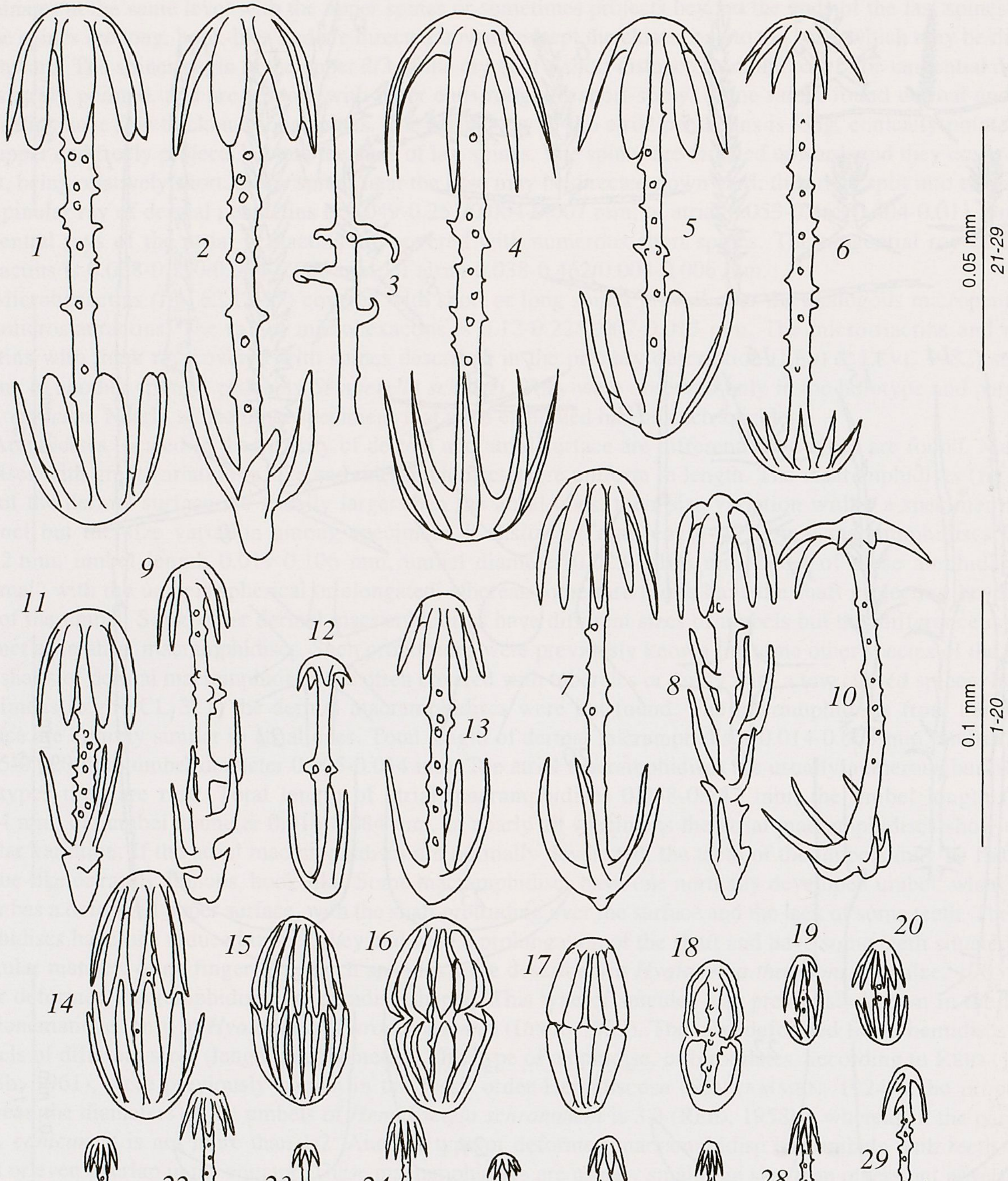


FIG. 63. — Spicules of *Pheronema conicum* Lévi & Lévi, 1982 (types and others specimens): **1-2**, dermal macramphidiscs; **3-13**, atrial macramphidiscs (3, HCL 330; 7, atrial macramphidisc with prolonged shaft; 8-9, atrial macramphidiscs with prolonged shaft and deformed umbel; 9, HCL 340; 10, paradisc, HCL 339; 11, atrial macramphidisc with prolonged shaft and deformed umbel; 12-13, hemidiscs, HCL 339)); **14-20**, atrial oval macramphidiscs (14, HCL 322; 15, HCL 323; 17, atrial oval macramphidisc with fused teeth, HCL 322; 18, optical section of atrial oval macramphidisc with fused teeth, HCL 322; 19, atrial oval paradisc, HCL 313; 20, HCL 314); **21-29**, micramphidiscs (21, HCL 322; 24, micramphidisc with prolonged shaft; 25, paradisc with prolonged shaft; 26, HCL 322; 27, hemidisc, HCL 337; 28, HCL 337; 29, HCL 314).

types of these curious forms. Total length of atrial micramphidiscs (fig. 63.21-29) 0.016-0.043 mm, umbel length 0.004-0.013 mm, umbel diameter 0.005-0.012 mm. The micramphidiscs are mostly located in the vicinity of dermal and atrial surfaces. They are usually regular in shape and size but sometimes they display some particular deformations. Sometimes the umbels are different: one is pileate or spherical, whereas the other has a conical tip. Sometimes some of the teeth of an umbel are of different length, so that the spicule is nearly a paradisc. The shafts are usually covered with tubercles or, rarely, they have widening in the middle. Some tubercles of the shafts are long up to the length of the teeth, and have the teeth-like shape of some atrial macramphidiscs.

REMARKS. — Despite the specific forms of newly found amphidiscs, *P. conicum* is close to *P. giganteum* Schulze *(stricto sensu)*. They both have similar uncinates of two types, one of which is small and whip-like, with a rough surface rather than spinous. The microhexactins in both species predominate over other forms. *P. giganteum*, like *P. conicum*, has oval amphidiscs (mesamphidiscs) with teeth meeting at the equator and macramphidiscs with both pileate and spherical umbels. At least some deformations of the macramphidiscs were found in the reexamined holotype of *P. giganteum*.

The description of "polyactin" spicules in some Pheronematidae that resulted from microhexactins that developed extra rays is not usual for the subclass Amphidiscophora. This character belongs to another subclass, Hexasterophora, which has "mainly or all astral microtriaxones" (REID, 1958a). In the Amphidiscophora, "the parenchymal microtriaxones are always holactins, never astral" (REID, 1958a). Does this curious case again bring into doubt the system of subclasses of Hexactinellida? These asterous spicules are very rare, and they have been found among their ancestral forms the "holactines", so it is better to consider them as abnormal forms and to ignore them as a problem of macrotaxonomy. The finding of hemidiscs in *Pheronema conicum* leads to the discussion of the taxonomic status of the order Hemidiscosa (Reid, 1958a), or Hemidiscaria (Schrammen, 1924). REID (1958a) defined this order as "Amphidiscophora with birotulates in the form of hemidiscs; other characters unknown". The hypothesis on the convergent evolution of hemidiscs and amphidiscs (MOSTLER & MEHL, 1990) is true if only the hemidisc of *Pheronema conicum* evolved convergently with "true" hemidiscs of Hemidiscosa. The only reference on the difference between Amphidiscosa (Reid, 1958a), or Amphidiscaria (Schrammen, 1924), and Hemidiscosa is the note that hemidiscs occupy a "different position within the sponge body than the amphidiscs of Recent Amphidiscophora, and thus the hemidiscs might have been also functionally different" (MOSTLER & MEHL, 1991). The definition does not seem to be sufficient enough for a taxon of order rank and requires further study of data on spicule content. To give the order rank for Hemidiscosa it must distinctly differ from that of Amphidiscosa. It is very likely that Hemidiscosa is a lower taxon of the order Amphidiscosa of SCHRAMMEN (1924) since *Pheronema conicum* is clearly a representative of Amphidiscosa.

DISTRIBUTION. — New Caledonia, Loyalty and Chesterfield Islands.

Pheronema giganteum Schulze, 1886

Fig. 64; Tab. 26

Pheronema giganteum Schulze, 1886: 66; 1887: 250, pl. 45-46; 1893: 563. — OKADA, 1932: 6. — IJIMA & OKADA, 1938: 414.
Not *Pheronema giganteum* - IJIMA, 1927: 10.
Not *Pheronema giganteum* - BURTON, 1959: 176 (= *Pheronema pilosum* Lévi, in part).

MATERIAL EXAMINED. — **Indonesia**. *"Challenger"*, stn 192, Little Kai Island, 5°49'15"S, 132°14'15"E, 235 m: NHM 1887.10.20.101.

TYPES. — *Holotype*: NHM 1887.10.20.101 (*"Challenger"*, stn 192, Little Kai Island, 5°49'15"S-132°14'15"E, 235 m).

DESCRIPTION. — The description only supplements that of SCHULZE (1887) since nothing besides the holotype already described was examined.

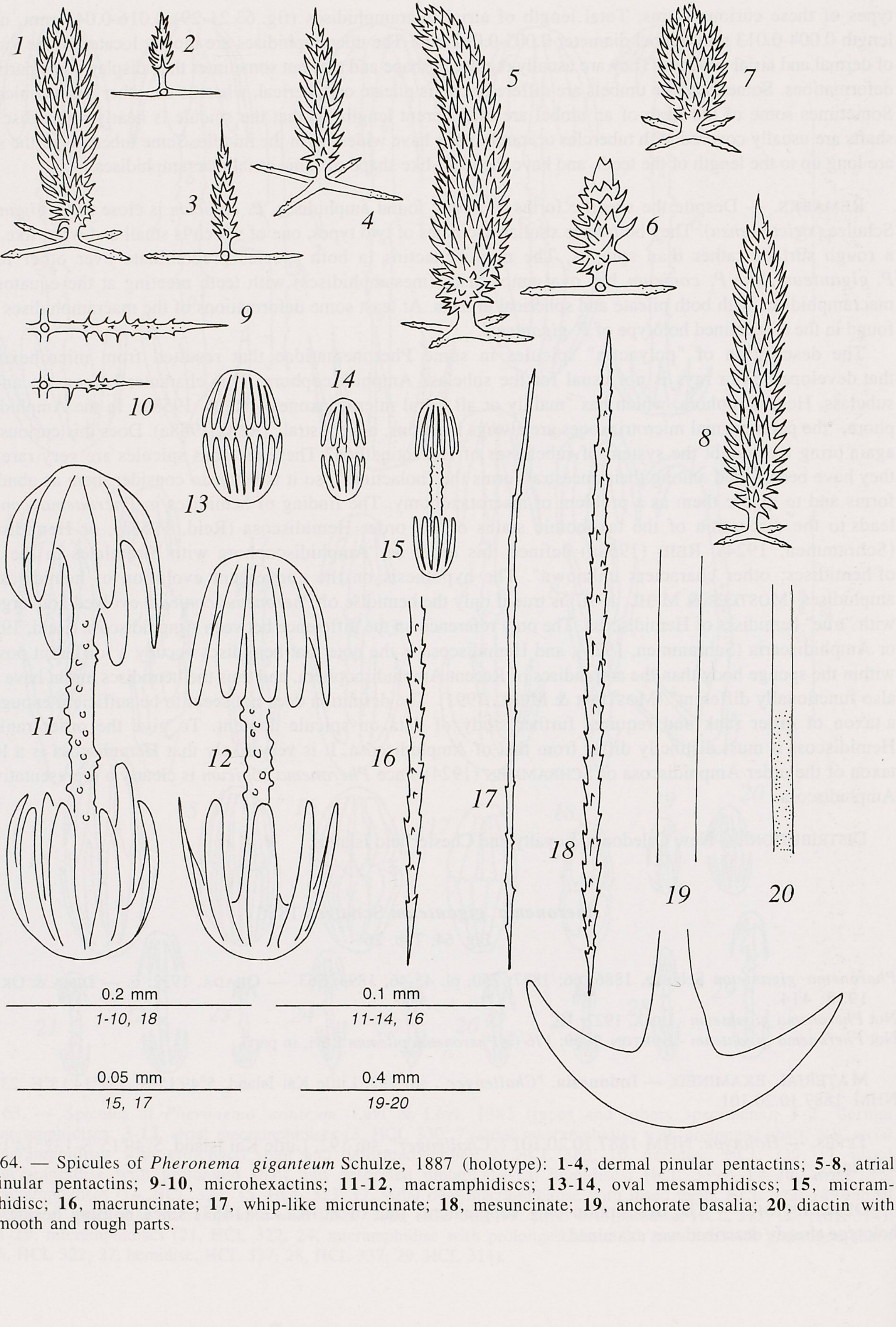


FIG. 64. — Spicules of *Pheronema giganteum* Schulze, 1887 (holotype): **1-4**, dermal pinular pentactins; **5-8**, atrial pinular pentactins; **9-10**, microhexactins; **11-12**, macramphidiscs; **13-14**, oval mesamphidiscs; **15**, micramphidisc; **16**, macruncinate; **17**, whip-like micruncinate; **18**, mesuncinate; **19**, anchorate basalia; **20**, diactin with smooth and rough parts.

Spicules: The uncinates belong to three types. Macruncinates (fig. 64.16) are several mm long and about 0.005-0.010 mm in diameter. Mesuncinates (fig. 64.18) are relatively short, about 0.35-0.72/0.005 mm. Both macruncinate and micruncinate are covered with spines typical for these types of spicules as in other Pheronematidae. Micruncinates (fig. 64.17) (0.13-0.30/0.001 mm) are whip-like. They are covered with very shallow and obtuse spines. Dermal and atrial pinular pentactins (fig. 64.1-8) are similar. The pinular ray is oval or whip-like in shape, rarely slightly curved. The outer end is usually sharply pointed or conical. It can project far beyond the last spines or more often be equal in length to the last spines. The lower spines sometimes branch into two spines. The pinular ray of dermal pentactin is 0.068-0.334/0.004-0.040 mm, of atrial one 0.076-0.266/0.004-0.040 mm. The tangential rays are often smooth near the base and on the first half of the ray, whereas the second half is rough or covered with spines. The tangential ray of dermal pentactin is 0.030-0.084/0.004, of atrial one 0.038-0.068/0.004 mm.

Microhexactins (fig. 64.9-10) and micropentactins have rays (0.061-0.152/0.005-0.012 mm) covered with spines. Amphidiscs are divided into three classes. The macramphidiscs (fig. 64.11-12) often have teeth of different length, spherical umbels and tuberculated shafts. Total length of macramphidisc is 0.167-0.289 mm, the umbel length 0.068-0.084 mm, the umbel diameter 0.053-0.084 mm. The mesamphidiscs (fig. 64.13-14) are oval with teeth that nearly meet at the equator. All were found among the atrial spicules. Total length of mesamphidisc is 0.032-0.054 mm, the umbel length 0.016-0.027 mm, the umbel diameter 0.016-0.032 mm. Micramphidiscs (fig. 64.15) have spiny or tuberculated shafts. Total length of mesamphidisc is 0.023-0.041 mm, the umbel length 0.007-0.018 mm, the umbel diameter 0.005-0.012 mm.

REMARKS. — In most of the features mentioned above *P. giganteum* is closer to *P. conicum* than to *P. giganteum* described by IJIMA (1927). Both *P. giganteum* and *P. conicum* have deformations of amphidiscs, the former has some deformations not so "deep" as the latter. These abnormal amphidiscs were not described by SCHULZE (1887) despite that they prevail over "normal" ones. The uncinate composition, sizes of microhexactins and micro-pentactins of *P. giganteum* of SCHULZE are similar to *P. conicum* rather than to *P. giganteum* of IJIMA. These facts distinguish the latter as a separate species. The status of the other specimens of *P. giganteum* described in the literature is not clear. The specimen described by IJIMA and OKADA (1938) is likely to be *P. giganteum*. The specimen described by OKADA (1932) is less clear because of its poor description. The reexamination of the specimen described by BURTON (1959) leads to transfer it to *P. pilosum*. As for the specimen described by IJIMA (1927), it seems better to refer it to a new species. Some specimens from the eastern and western Indian Ocean likely belong to *P. giganteum*, but probably to a new subspecies. They have no mesamphidiscs and sometimes no macramphidiscs (unpublished material).

DISTRIBUTION. — Indonesia, Japan.

Pheronema pseudogiganteum sp. nov.

Fig. 65; Tab. 27

Pheronema giganteum Ijima, 1927: 10, pl. 5 fig. 1-7. (Non Schulze, 1886).

MATERIAL EXAMINED. — *"Siboga"*: stn 251, 5°28.4'S, 132°00.2'E, 204 m: PQR 5099 (ZMA). Identified as *P. giganteum* by IJIMA, 1927.

TYPES. — *Holotype*: PQR 5099 (*"Siboga"*, stn 251, 5°28.4'S, 132°00.2'E, 204 m) (ZMA).

REMARKS. — The following notes on spicules complete the excellent description of IJIMA (1927). The micruncinates (fig. 65.8-9) are short, usually with a widening in the middle. They are covered with minute spines. Microhexactins (fig. 65.1-4) prevail over analogous micropentactins and other derivatives. Microhexactins have rays of different length which carry spines of different length. Some rays in the microhexactins are reduced up to the spherical outer ends, covered with numerous spines (nearly pinular). Such outer ends are characteristic of one end of the micromonactins, whereas the other is sharply pointed. These micromonactins are rare. Two kinds of amphidiscs are present. The macramphidiscs (fig. 65.10) have umbels that are regular in shape, with teeth equal in length. The shafts are tuberculated. The micramphidiscs (fig. 65.11) are similar in shape to the macramphidiscs.

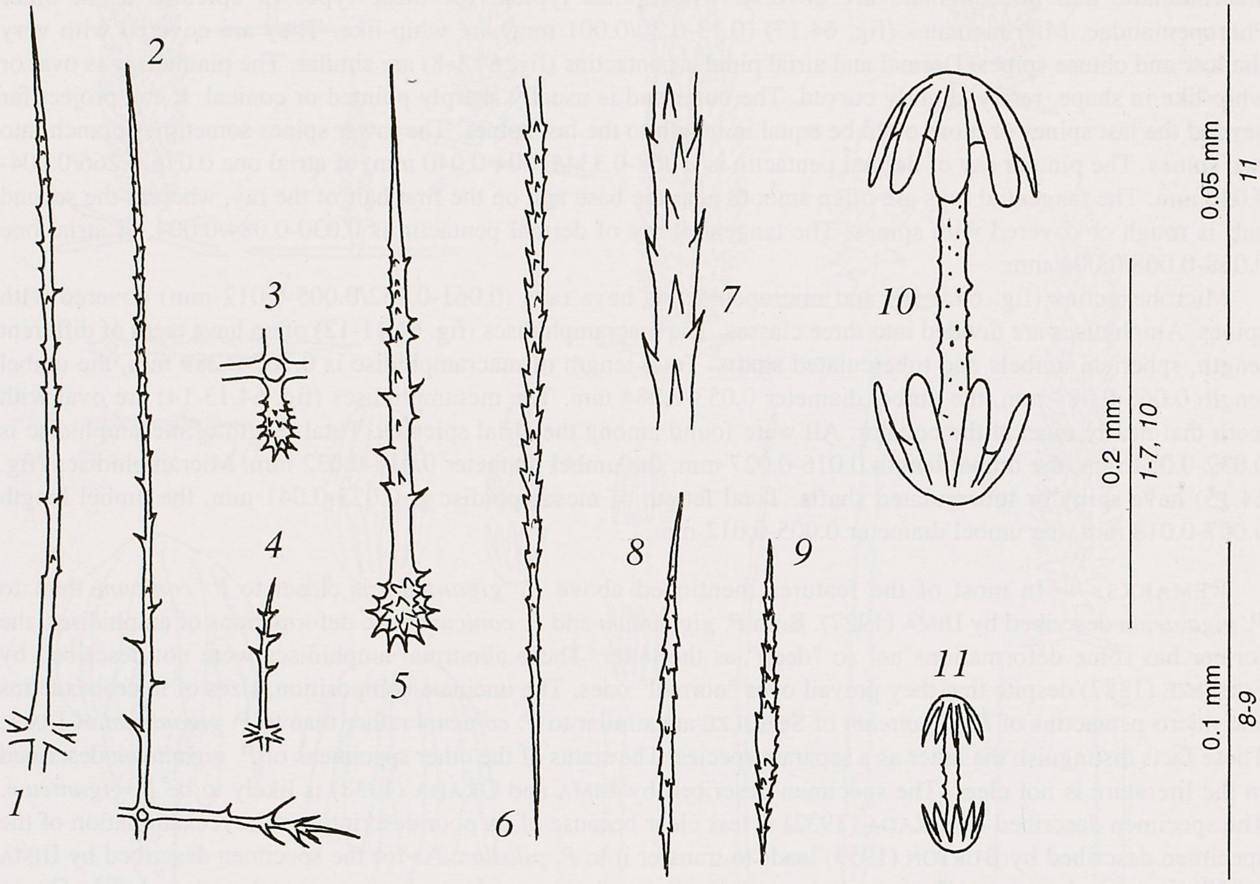


FIG. 65. — Spicules of *Pheronema pseudogiganteum* nov. sp. (holotype): **1-4**, microhexactins; **5**, micromonactin; **6**, mesuncinate; **7**, macruncinate; **8-9**, micruncinates; **10**, macramphidisc; **11**, micramphidisc.

The reasons for distinguishing a new species *P. pseudogiganteum* were given by the revision of the holotype. IJIMA did not revise the holotype, which was described insufficiently (SCHULZE, 1887). The features specific for *P. pseudogiganteum* are regular macramphidiscs, absence of mesamphidiscs, size and shape of micruncinates and microhexactins. Stronger similarities were found between *P. giganteum* and *P. conicum* on one hand and *P. pseudogiganteum* of IJIMA and its forma from the New Caledonian area described below on the other hand.

ETYMOLOGY. — This specific name alludes to the differences with *Pheronema giganteum.*

Pheronema pseudogiganteum forma *nuda* nov.

Fig. 66-67, 70; Tab. 28

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn DW 51, 23°05.43'S, 167°45.35'E, 700-680 m, 31.08.1985: HCL 360. — Stn CP 52, 23°06.18'S, 167°47.07'E, 600-540 m, 31.08.1985: HCL 358-359.

DESCRIPTION. — The sponge is ovoid, with a deep atrial cavity. The specimen HCL 358 is 70 mm in length, 45 mm in diameter. The osculum is 20 mm in maximal diameter. The walls are about 10 mm thick. Prostalia are represented by basalia only. Basalia are about 30 mm long. The specimen HCL 359 is 100 mm in length, 30 mm in diameter. The specimen HCL 360 is a fragment.

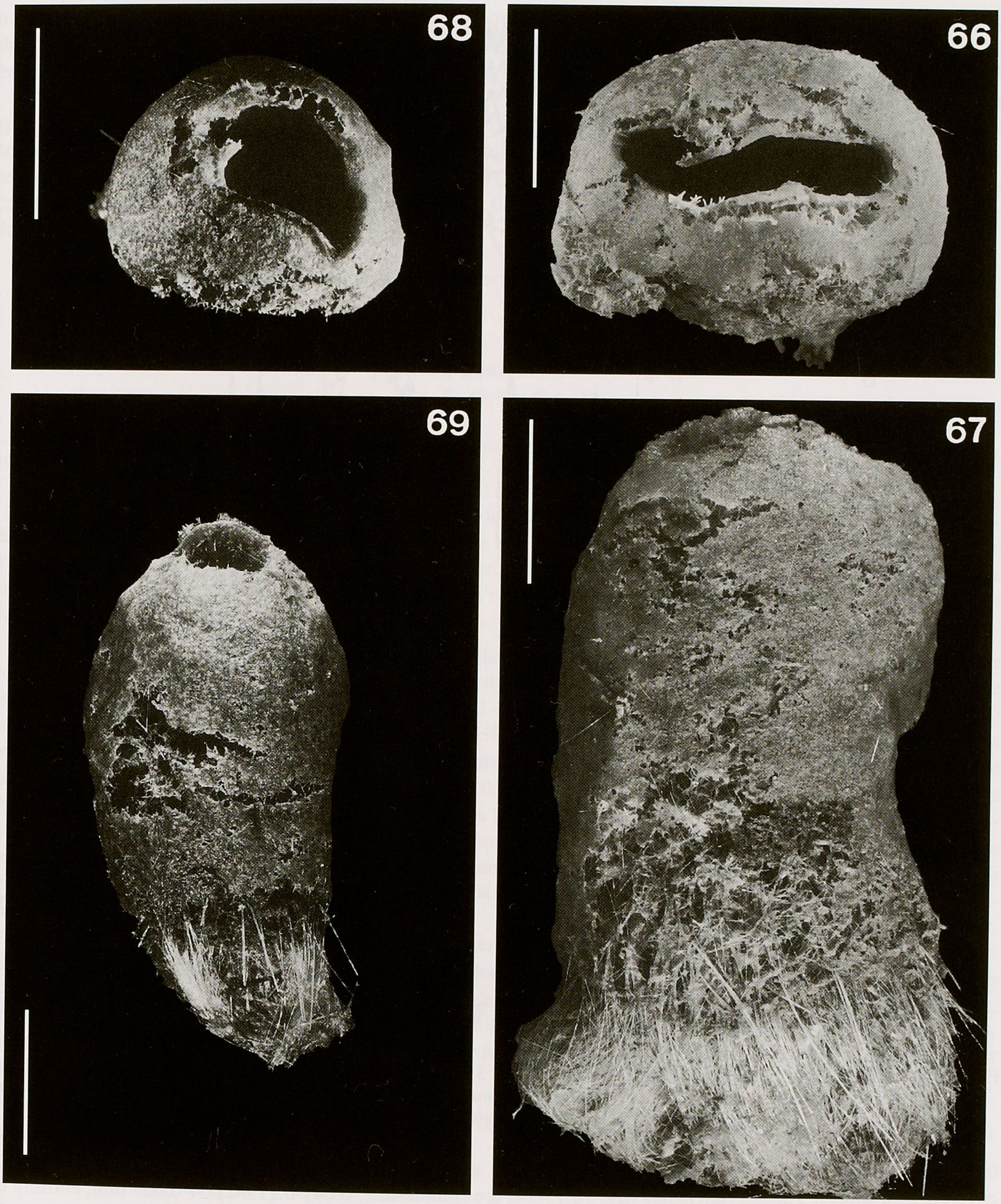


FIG. 66-67. — *Pheronema pseudogiganteum* f. *nuda* (HCL 358). Scales = 2 cm.
FIG. 68-69. — *Pheronema pseudogiganteum* f. *vaubana*. (HCL 353). Scales = 2 cm.

Spicules: The choanosomal skeleton consists of pentactins and sparse stauractins, with rays 0.014-0.100 mm in diameter. Three types of uncinates are known. Macruncinates (fig. 70.16) are several mm in length and

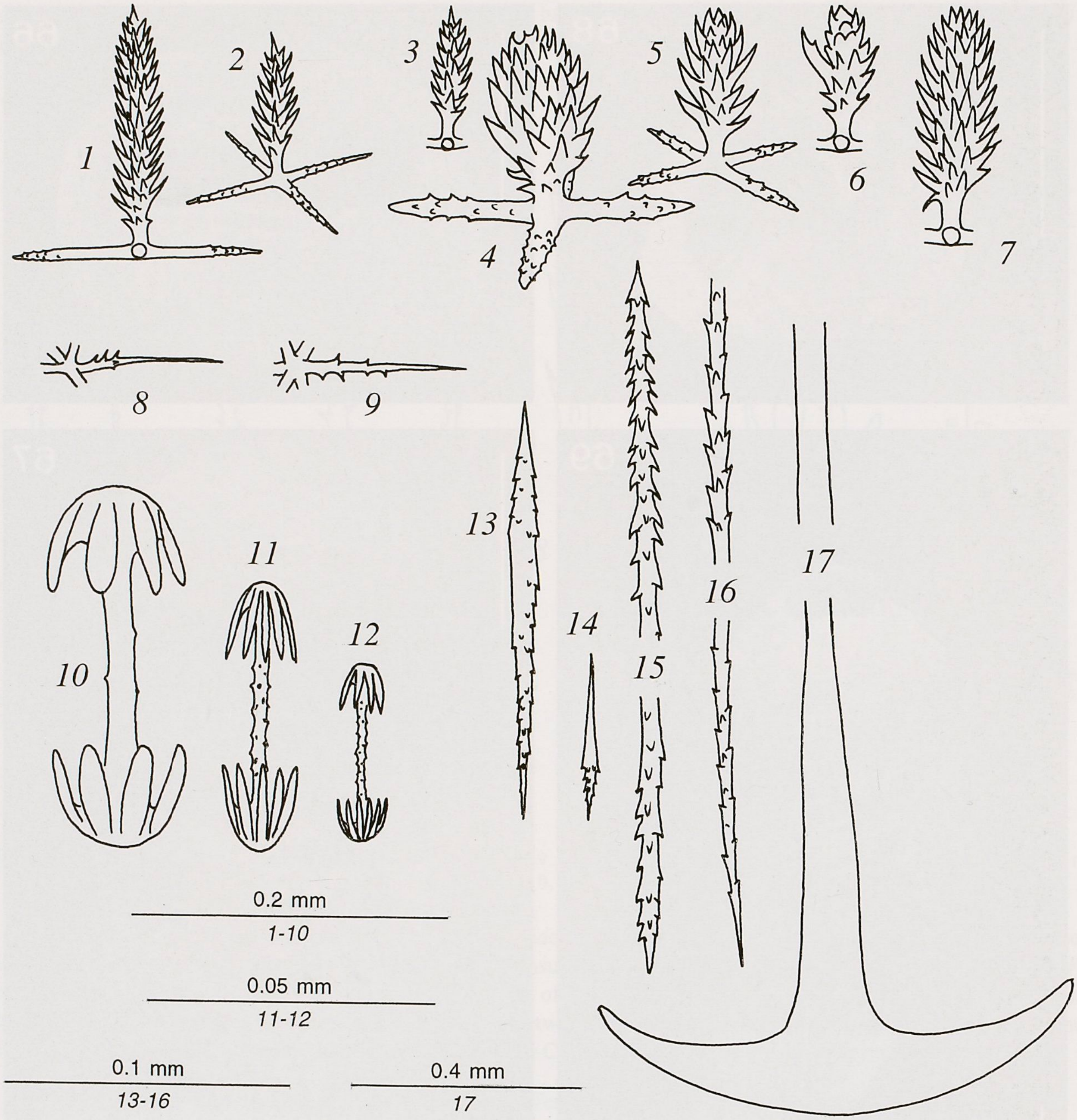


FIG. 70. — *Pheronema pseudogiganteum* f. *nuda* (HCL 358): **1-2**, dermal pinular pentactins; **3-7**, atrial pinular pentactins; **8**, micropentactin; **9**, microhexactin; **10**, macramphidiscs; **11-12**, micramphidiscs; **13-14**, micruncinates; **15**, mesuncinate; **16**, macruncinate; **17**, anchorate basalia.

0.008 mm in diameter. The mesuncinates (fig. 70.15) are about 0.45-0.52/0.004-0.009 mm. They are both covered with spines. The micruncinates (fig. 70.13-14) are spindle-like, 0.041-0.117/0.004-0.007 mm, entirely or partly serrated. The basalia are anchorate spicules with smooth rachis. Dermalia are pinular pentactins (fig. 70.1-7) with the pinular ray rather thin, 0.061-0.220/0.009-0.015 mm. The outer ends are finely pointed and project not far beyond the last spines. The tangential rays of dermal pentactins 0.046-0.152/0.005-0.007 mm are usually smooth at the base and covered with spines near the ends of the rays. Atrialia are pinular pentactins. The pinular ray (0.084-0.144/0.007-0.037 mm) varies in shape; sometimes it is similar to that of dermal pentactins but usually it is rather thick and has more or less distinct oval shape. The outer ends are longer or equal or smaller than the last spines. The tangential rays (0.030-0.091/0.004-0.011 mm) are usually covered with spines. Pinular hexactins are sparse dermal and atrial spicules.

The microhexactins and micropentactins (fig. 70.8-9) have rays (0.046-0.213/0.004-0.011 mm) covered with spines. Amphidiscs are divided into two types. Umbels of macramphidiscs (fig. 70.10) are regular in shape, shafts smooth, usually straight or rarely with widenings. Total length of macramphidiscs 0.152-0.236 mm, the umbel length 0.053-0.084 mm, the umbel diameter 0.061-0.099 mm. Shafts of micramphidiscs (fig. 70.11-12) are covered with spines. Total length of micramphidiscs 0.027-0.049 mm, umbel length 0.008-0.016 mm, umbel diameter 0.007-0.013 mm.

ETYMOLOGY. — The forma name refers to the absence of prostalia except basalia.

Pheronema pseudogiganteum forma *vaubana* nov.

Fig. 68-69, 71; Tab. 29

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4: stn CP 217, 22°03.60'S, 167°27.00'E, 850 m, 29.09.1985: HCL 363.

DESCRIPTION. — The sponge is ovoid, 55 mm long, 25 x 35 mm in diameter. The atrial cavity is deep, the walls are about 5 mm in thickness. The sponge has two longitudinal rows on the dermal surface that extend from the base to the osculum. They are the result of growth rather than a character of the subspecies. Prostalia oscularia are about 3 mm long, they edge the osculum regularly. Basalia are a broad tuft with same diameter as the lower part of the sponge. They are about 15-20 mm long.

Spicules: The choanosomal spicules are pentactins with rays 0.05-0.11 mm in diameter. The uncinates demonstrate three varieties. Macruncinates (fig. 71.10) are several mm long and 0.005-0.010 mm in diameter. The mesuncinates (fig. 71.11) are about 0.70-1.00/0.001-0.002 mm. They are both covered with spines. The micruncinates (fig. 71.12-18) are 0.038-0.182/0.004-0.010 mm, spindle-like and partly serrated. Prostalia oscularia are sceptres (fig. 71.8) 3-5/0.02 mm. Basalia are anchorate spicules (fig. 71.9) with smooth rachis. Dermalia are pinular pentactins (fig. 71.1-5) with pinular ray 0.068-0.114/0.007-0.010 mm slightly widening. Its outer end is sharply pointed and projects not far from the ends of the last spines. The pinular ray of the atrial pentactins 0.084-0.122/0.005-0.020 mm is similar to that of dermal ones, sometimes it is curved or oval in shape. If oval, the outer end is equal in length with the last spines. Tangential rays both of dermalia and atrialia are covered with spines. Tangential rays of the dermal pentactins are 0.046-0.084/0.005 mm, of the atrial ones 0.038-0.114/0.005-0.007 mm.

Microhexactins (fig. 71.6-7) and micropentactins have rays (0.076-0.167/0.004 mm) covered with spines. Two types of amphidiscs can be distinguished. Macramphidiscs (fig. 71.19-20) have umbels that are regular in shape and have smooth shafts, sometimes they have some widenings. Total length of macramphidiscs 0.167-0.251 mm, length of umbel 0.053-0.076 mm, umbel diameter 0.068-0.106 mm. The micramphidiscs (fig. 71.21-22) are elongated, the shafts covered with spines. Total length of micramphidiscs 0.029-0.058 mm, length of umbel 0.007-0.018 mm, umbel diameter 0.007-0.013 mm.

ETYMOLOGY. — Named after the *"Vauban"*, which has been used in many research cruises in New Caledonia and the Coral Sea.

Pheronema pseudogiganteum forma *stellata* nov.

Fig. 72; Tab. 30

MATERIAL EXAMINED. — **Loyalty Islands**. BIOGEOCAL: stn CP 290, 20°36.91'S, 167°03.34'E, 920-760 m, 27.04.1987: HCL 355-357, 473-479.

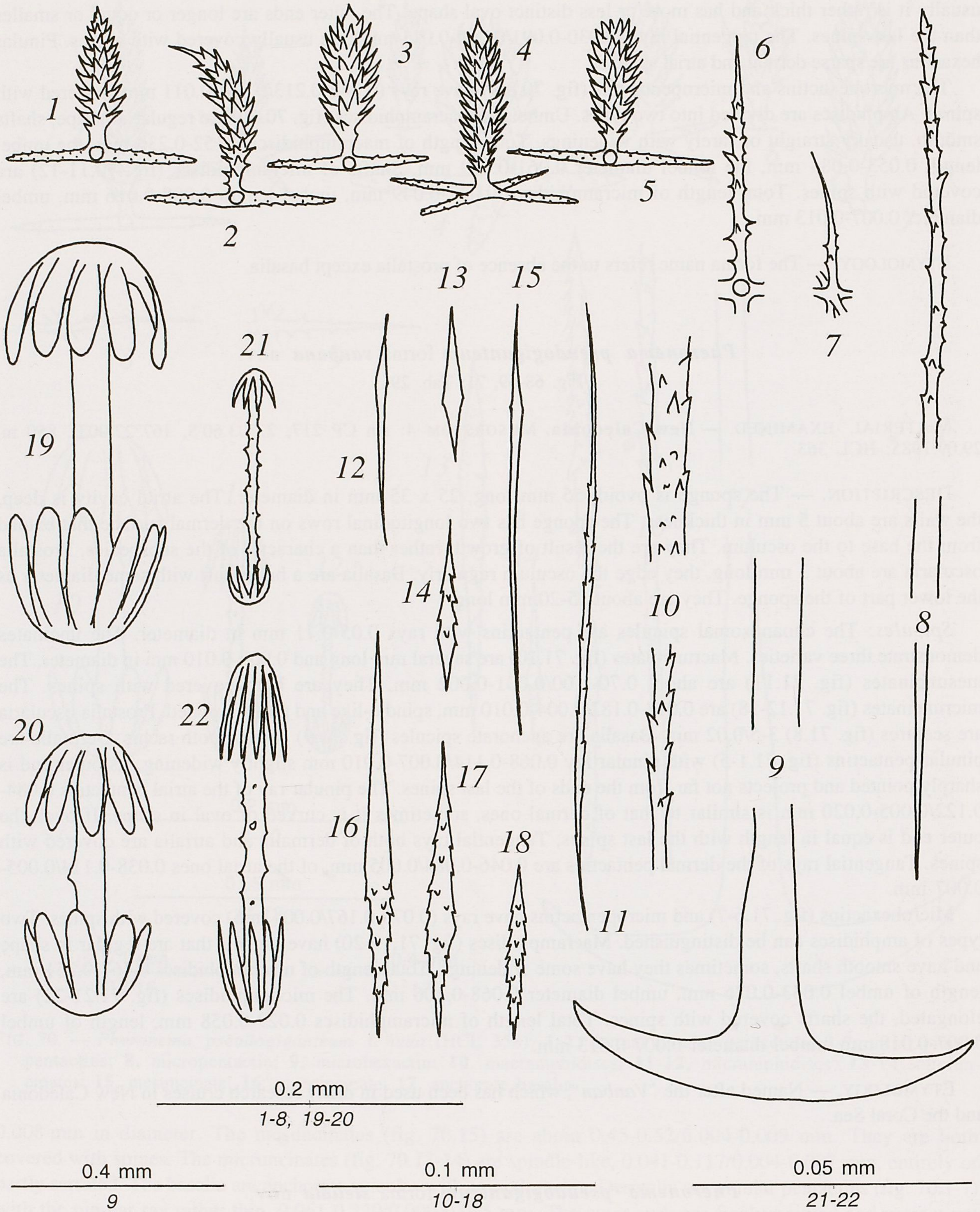


FIG. 71. — Spicules of *Pheronema pseudogiganteum* f. *vaubana* (HCL 353): **1**, dermal pinular pentactin; **2-5**, atrial pinular pentactins; **6-7**, microhexactins; **8**, sceptre; **9**, anchorate basalia; **10**, macruncinate; **11**, mesuncinate; **12-18**, micruncinates; **19-20**, macramphidiscs; **21-22**, micramphidiscs.

DESCRIPTION. — This sponge is represented by different fragments. Since they were collected from the same station, these fragments must belong either to a single or numerous specimens. In the first case, the observed variability of spicules results from the different location of fragments in the sponge, in the other, from fragments from separate specimens. Most fragments are parts of the 5-10 mm thick walls. The fragment assigned as holotype is 7-8 mm thick. The other fragments are parts of dermalia and subdermalia with tufts of basalia.

Spicules: The choanosomal skeleton consists of pentactins with rays 0.002-0.004 mm in diameter. Macruncinates (fig. 72.5) are several mm long and 0.01 mm in diameter. The mesuncinates (fig. 72.6) are about 0.3/0.002 mm. Both macruncinates and mesuncinates are covered with spines. The micruncinates (fig. 72.7-8) 0.041-0.118/0.004-0.008 mm appear smooth or slightly serrated. The basalia are anchorate spicules (fig. 72.4) with smooth rachis. Dermalia and atrialia are pinular pentactins (fig. 72.1-3) similar in shape. The pinular ray is rather thin, finely pointed with the outer end that does not project far beyond the last spines. The pinular ray of dermal pentactin is 0.042-0.198/0.007-0.020 mm, of the atrial one 0.087-0.555/0.010-0.026 mm. The tangential rays are smooth, with outer ends covered with spines. The tangential rays of dermal pentactin are 0.034-0.106/0.006 mm, of the atrial ones 0.038-0.144/0.006 mm.

Microhexactins (fig. 72.16-21) with thick rays 0.046-0.198/0.011-0.015 mm, prevail on the other types of analogous spicules: micropentactins, microstauractins, and spicules with more than six rays. These microscleres have rays usually covered with spines, seldom smooth. They are conically pointed or rarely have a rounded end. The other spicules presented by microhexactins only have thin rays about 0.004 mm in diameter and covered with spines. Ray length is equal to that of thick-rayed forms. The thin-rayed forms are sparse. Amphidiscs can be divided into three types. Macramphidiscs (fig. 72.9-10) have umbels regular in shape, shafts are smooth. Total length of macramphidiscs 0.152-0.228 mm, umbel length 0.042-0.068 mm, umbel diameter 0.068-0.118 mm. Mesamphidiscs (fig. 72.11-13) and micramphidiscs (fig. 72.14-15) are similar in shape and size. Their shafts are covered with numerous spines. Total length of mesamphidiscs 0.034-0.092 mm, umbel length 0.013-0.034 mm, umbel diameter 0.012-0.030 mm. Total length of micramphidiscs 0.020-0.043 mm, umbel length 0.005-0.018 mm, umbel diameter 0.005-0.014 mm.

ETYMOLOGY. — The forma name refers to the shape of microhexactin spicules.

Pheronema pseudogiganteum forma ***variodisca*** nov.

Fig. 73; Tab. 31

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL: stn CP 54, 23°10.30'S, 167°42'E, 1000-950 m, 1.09.1985: HCL 364.

DESCRIPTION. — The sponge is ovoid, 55 mm long, 40 mm in diameter. The osculum is 20 mm in diameter, the atrial cavity is about 20 mm long.

Spicules: The choanosomal spicules are pentactins with rays 0.04-0.08 mm in diameter. The uncinates are of three types. Macruncinates (fig. 73.10) are several mm long and 0.005 mm in diameter. The mesuncinates (fig. 73.11-13) are about 0.70-1.00/0.004-0.010 mm. They are both covered with spines. The micruncinates (fig. 73.14) 0.030-0.084/0.004 mm are spindle-like, and appear smooth under light microscope. Dermalia are pinular pentactins (fig. 73.1-6) and sparse hexactins with pinular ray (0.068-0.137/0.004-0.012 mm) sharply pointed with the outer end that projects freely beyond the last spines. Pinular ray in the atrial pentactins 0.091-0.160/0.004-0.030 mm. Pinular ray of atrial pentactin is similar to that of the dermal ones or is rather ovoid in shape, with the end terminating at the ends of last spines. The tangential rays are covered with spines in both dermal and atrial pinular spicules. The tangential ray of the dermal pentactin is 0.042-0.080/0.002-0.007 mm, of the atrial pentactin 0.049-0.114/0.006-0.010 mm.

The microhexactins and micropentactins (fig. 73.7-8), with rays 0.057-0.129/0.004 mm, are covered with spines. Macramphidiscs (fig. 73.15-20) have umbels and teeth of various shapes. The "normal" macramphidiscs have identical umbels and oval or sometimes thin hook-like teeth. Umbels of some macramphidiscs have a different number of teeth (4-8) in each umbel. Umbels of other amphidiscs differ in diameter because the teeth of

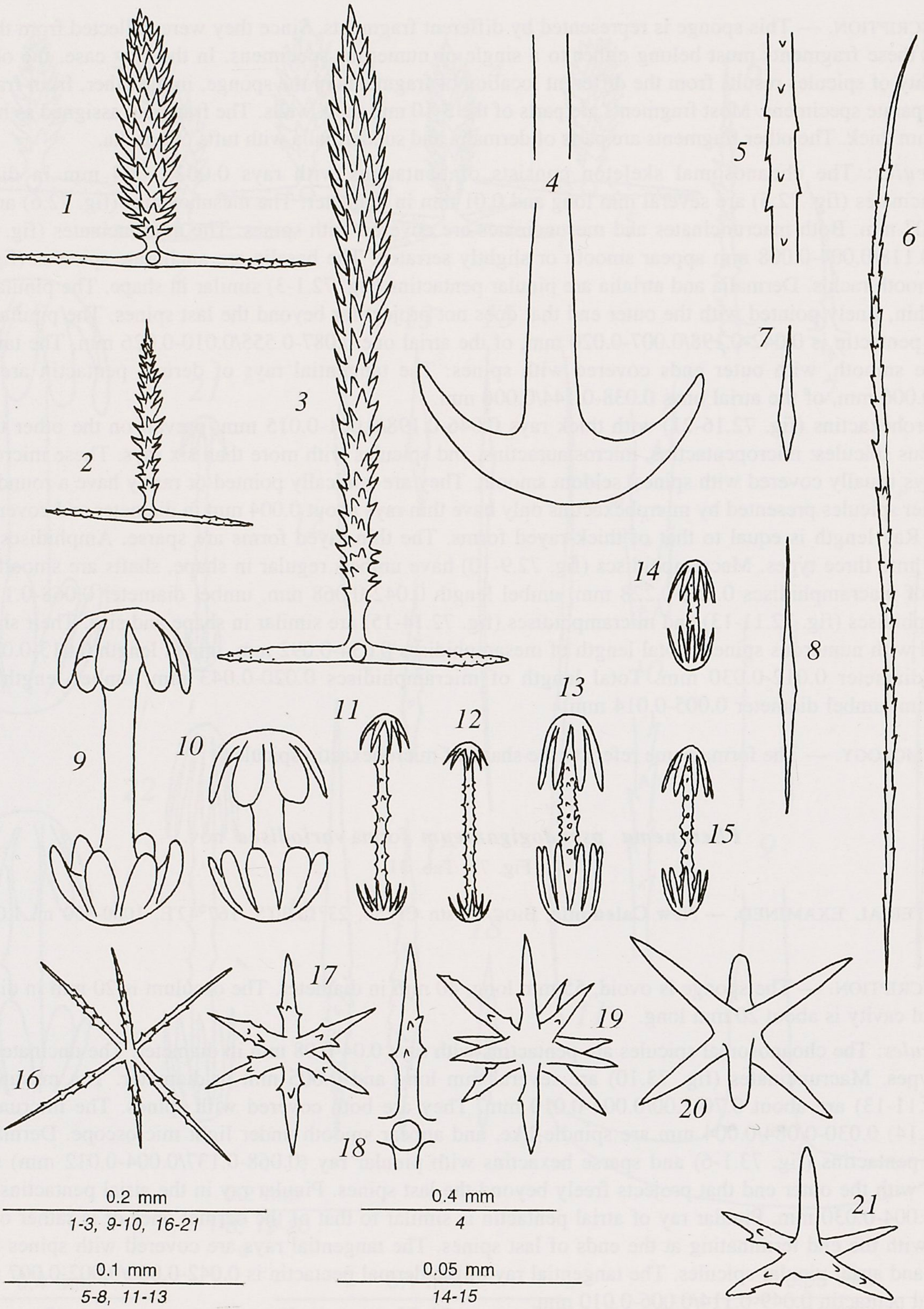


FIG. 72. — Spicules of *Pheronema pseudogiganteum* f. *stellata*: **1-2**, dermal pinular pentactins (1, HCL 355; 2, HCL 476); **3**, atrial pinular pentactin (HCL 355); **4**, anchorate basalia (HCL 357); **5**, macruncinate (HCL 355); **6**, mesuncinate (HCL 355); **7-8**, micruncinate (HCL 355); **9-10**, macramphidiscs (9, HCL 478; 10, HCL 357); **11-13** mesamphidisc (11-12, HCL 475; 13, HCL 478); **14-15**, micramphidiscs (HCL 478); **16-21**, microhexactins (16-19, HCL 478; 20, HCL 356; 21, HCL 478).

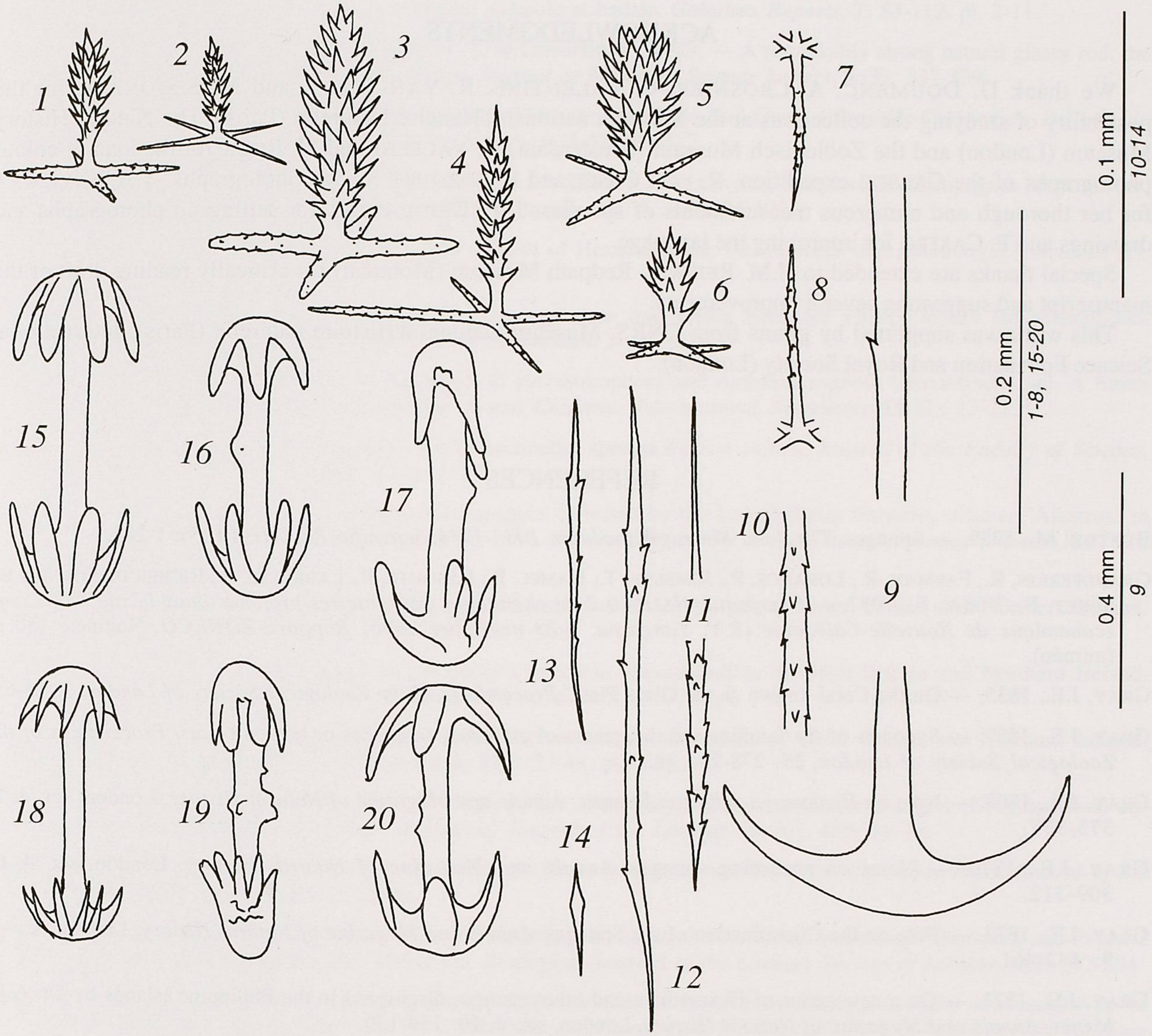


FIG. 73. — Spicules of *Pheronema pseudogiganteum* f. *variodisca* (HCL 364): **1-2**, dermal pinular pentactins; **3-6**, atrial pinular pentactins; **7**, microhexactin; **8**, micropentactin; **9**, anchorate basalia; **10**, macruncinate; **11-13**, mesuncinates; **14**, micruncinate; **15-20**, amphidiscs.

the umbel are closer to the shaft, which makes the umbel smaller. The shafts are smooth but sometimes with widenings or tubercles. Total length of macramphidiscs 0.137-0.228 mm, umbels length 0.046-0.076 mm, umbels diameter 0.053-0.091 mm. Only two micramphidiscs were found in a microscopic preparation. They probably belonged to another specimen.

ETYMOLOGY. — The forma name refers to the abnormal umbels of some amphidiscs.

REMARKS. — All these specimens belong to *Pheronema pseudogiganteum* sp. nov. It is possible that the variation of shape and size of dermal and atrial pinular pentactins, of microhexactins and its derivatives, together with the combination and shape of amphidiscs will be good features for a future taxonomic subspecific definition. But these features are mosaically expressed in the different specimens.

ACKNOWLEDGMENTS

We thank D. DOUMENC, A. CROSNIER, C. VALENTINE, R. VAN SOEST, and M. SEGONZAC for the possibility of studying the collections at the Muséum national d'Histoire Naturelle (Paris), The Natural History Museum (London) and the Zoölogisch Museum (Amsterdam), J. VACELET and M. ROUX for the loan of colour photographs of the CALSUB expedition, R. VON COSEL and P. LOZOUET for the photographs, T.A. SAVILOVA for her thorough and numerous measurements of spicules, J.-F. DEJOUANNET for setting up photographs and drawings and P. CASTRO for improving the language.

Special thanks are extended to H.M. REISWIG, Redpath Museum (Montréal) for critically reading draft of the manuscript and suggesting several improvements.

This work was supported by grants from CNRS, Muséum national d'Histoire naturelle (Paris), International Science Foundation and Royal Society (London).

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ANNEXE

MENSURATIONS OF SPICULES

In all the tables : L = length; D = diameter. All measurements in mm.

TABLE 1. — Some measurements of the spicules of *Hyalonema (Leptonema) spatha*.

	HCL 413					HCL 414					HCL 415				
	n	avg	min	max	std	n	avg	min	max	std	n	avg	min	max	std
L dermal pentactin pinular ray	25	.190	.120	.280	.039	25	.272	.180	.380	.047	15	.113	.089	.126	.011
L dermal pentactin tangential ray	24	.038	.030	.050	.006	25	.046	.032	.060	.006	13	.029	.022	.037	.005
L atrial pentactin pinular ray	25	.147	.080	.210	.036	18	.182	.100	.270	.052	15	.124	.074	.178	.025
L atrial pentactin tangential ray	25	.034	.025	.045	.006	18	.039	.030	.050	.005	15	.028	.022	.037	.004
L macramphidisc	19	.046	.025	.098	.019	25	.063	.029	.090	.017	8	.068	.041	.093	.017
L macramphidisc umbel	19	.017	.008	.033	.007	25	.023	.010	.038	.007	8	.025	.019	.030	.005
D macramphidisc umbel	19	.015	.008	.028	.005	25	.018	.010	.028	.005	.8	.018	.013	.022	.003
L micramphidisc	25	.021	.018	.025	.002	25	.022	.018	.028	.002	15	.018	.016	.023	.002
L micramphidisc umbel	25	.007	.005	.008	.001	25	.007	.005	.008	.001	25	.007	.005	.008	.001
D micramphidisc umbel	25	.007	.005	.009	.001	25	.007	.006	.009	.001	15	.006	.005	.007	.001
L stauractin long ray	25	.090	.068	.115	.012	25	.110	.085	.145	.014	10	.090	.074	.115	.017
L stauractin short ray	25	.014	.010	.018	.002	25	.015	.008	.025	.004	10	.016	.011	.022	.003

	HCL 495					HCL 416					HCL 417				
L dermal pentactin pinular ray	15	.182	.085	.255	.044	15	.286	.152	.363	.060	15	.140	.085	.170	.025
L dermal pentactin tangential ray	15	.032	.022	.041	.005	15	.037	.030	.044	.004	15	.028	.019	.037	.005
L atrial pentactin pinular ray	15	.179	.100	.211	.028	15	.189	.144	.244	.033	15	.130	.107	.207	.025
L atrial pentactin tangential ray	15	.032	.026	.041	.005	15	.031	.022	.041	.005	15	.029	.019	.037	.006
L macramphidisc	22	.086	.043	.149	.033	20	.085	.041	.107	.017	15	.073	.037	107	.022
L macramphidisc umbel	22	.032	.015	.063	.014	20	.017	.011	.022	.003	15	.030	.015	.048	.010
D macramphidisc umbel	22	.025	.013	.044	.009	20	.025	.010	.059	.011	15	.022	.013	.031	.006
L micramphidisc	15	.025	.017	.041	.005	15	.021	.020	.023	.001	15	.019	.014	.029	.004
L micramphidisc umbel	15	.007	.004	.015	.002	15	.005	.004	.006	.001	15	.006	.004	.013	.002
D micramphidisc umbel	15	.008	.006	.013	.002	15	.006	.005	.007	.001	15	.006	.005	.010	.001
L stauractin long ray	15	.114	.096	.133	.012	15	.092	.070	.107	.011	15	.095	.081	.111	.010
L stauractin short ray	15	.016	.011	.022	.003	15	.017	.015	.022	.002	15	.015	.011	.022	.004

	HCL 418					HCL 419				
L dermal pentactin pinular ray	15	.197	.130	.285	.039	15	.196	.144	.241	.029
L dermal pentactin tangential ray	15	.032	.019	.041	.007	15	.030	.026	.044	.005
L atrial pentactin pinular ray	15	.180	.133	.226	.028	15	.179	.137	.248	.028
L atrial pentactin tangential ray	15	.029	.022	.048	.007	15	.031	.026	.037	.004
L macramphidisc	15	.081	.041	.100	.017	15	.101	.052	.137	.027
L macramphidisc umbel	15	.030	.015	.041	.007	15	.038	.019	.056	.011
D macramphidisc umbel	15	.023	.012	.033	.006	15	.029	.015	.044	.008
L micramphidisc	15	.022	.014	.032	.005	15	.020	.016	.032	.004
L micramphidisc umbel	15	.007	.005	.011	.002	15	.006	.004	.011	.002
D micramphidisc umbel	15	.007	.005	.010	.001	15	.006	.005	.011	.001
L stauractin long ray	15	.070	.044	.089	.013	15	.104	.089	.118	.009
L stauractin short ray	15	.017	.011	.026	.003	15	.015	.011	.024	.004

TABLE 2. — Some measurements of the spicules of *Hyalonema (Onconema) uncinata*.

	HCL 424					HCL 423				
	n	avg	min	max	std	n	avg	min	max	std
L dermal pentactin pinular ray	15	.105	.076	.137	.021					
L dermal penctatin tangential ray	15	.051	.030	.091	.017					
L atrial pentactin pinular ray	15	.154	.129	.167	.011	15	.152	.137	.167	.009
L atrial pentactin tangential ray	15	.028	.023	.034	.004	15	.026	.019	.034	.005
L acanthophore pentactin ray	15	.100	.084	.122	.010					
L microhexactin ray	15	.037	.029	.041	.004	15	.037	.023	.065	.010
L macramphidisc	16	.296	.251	.327	.028	15	.290	.236	.334	.029
L macramphidisc umbel	16	.101	.084	.114	.009	15	.105	.084	.122	.012
D macramphidisc umbel	16	.085	.068	.099	.008	15	.078	.061	.091	.007
L micramphidisc	15	.020	.016	.032	.004	15	.018	.014	.023	.003
L micramphidisc umbel	15	.006	.004	.011	.002	15	.006	.005	.008	.001
D micramphidisc umbel	15	.006	.005	.007	.001	15	.005	.005	.006	.000

TABLE 3. — Some measurements of the spicules of the subgenus *Onconema*. From VON LENDENFELD, 1915.

	H. uncinata		*H. obtusum*		*H. agassizi*	
	min.	max.	min.	max.	min.	max.
L dermal pentactin pinular ray	.0176	.137	.137	.165	.070	.114
L dermal pentactin tangential ray	.030	.091	.010	.050	.018	.043
L atrial pentactin pinular ray	.129	.167	.073	.145	.069	.153
L atrial pentactin tangential ray	.019	.034	.035	.090	.020	.085
L dermal pentactin with equal rays	.084	.122			.025	.080
L microhexactin ray	.023	.065	.021	.040	.025	.080
L macramphidisc	.236	.334	.086	.335	.048	.290
L macramphidisc umbel	.084	.122	.032	.100	.010	.080
D macramphidisc umbel	.061	.099	.016	.112	.010	.086
L micramphidisc	.014	.032	.012	.068	.013	.069
L micramphidisc umbel	.004	.011	.005	.025	.004	.023
D micramphidisc umbel	.005	.007	.004	.026	.005	.014

TABLE 4. — Some measurements of the spicules of *Hyalonema (Pteronema) topsenti*.

	HCL 425					HCL 426					HCL 428				
	n	avg	min	max	std	n	avg	min	max	std	n	avg	min	max	std
L dermal pentactin pinular ray	25	.129	.106	.167	.013	25	.119	.068	.144	.017	12	.161	.091	.198	.030
L dermal pentactin tangential ray	25	.046	.030	.057	.007	25	.045	.023	.061	.008	12	.055	.038	.068	.010
L atrial pentactin pinular ray	25	.257	.053	.403	.110										
L atrial pentactin tangential ray	25	.041	.023	.061	.009										
L microstauractin-pentactin ray	25	.097	.049	.122	.020	25	.109	.068	.160	.021	14	.108	.079	.148	.021
L macramphidisc	25	.336	.266	.403	.031	25	.406	.334	.517	.043	3	.466	.441	.517	.044
L macramphidisc umbel	25	.090	.076	.106	.009	25	.112	.091	.129	.012	3	.129	.122	.144	.013
D macramphidisc umbel	25	.122	.099	.144	.009	25	.141	.106	.167	.015	3	.155	.152	.160	.004
L micramphidisc	25	.016	.014	.023	.002	25	.016	.013	.021	.002	15	.017	.014	.020	.002
L micramphidisc umbel	25	.005	.004	.007	.001	25	.005	.004	.006	.001	15	.005	.004	.005	.001
D micramphidisc umbel	25	.005	.004	.006	.001	25	.005	.004	.007	.001	15	.005	.004	.006	.000
	HCL 427					HCL 429									
L dermal pentactin pinular ray	15	.117	.099	.129	.009	15	.137	.114	.160	.014					
L dermal pentactin tangential ray	15	.044	.034	.053	.007	15	.050	.038	.084	.012					
L atrial pentactin pinular ray															
L atrial pentactin tangential ray															
L microstauractin-pentactin ray	15	.100	.058	.140	.024	15	.094	.068	.129	.019					
L macramphidisc	8	.337	.304	.380	.027	15	.401	.350	.471	.030					
L macramphidisc umbel	8	.068	.053	.084	.011	15	.108	.091	.144	.017					
D macramphidisc umbel	8	.096	.046	.137	.026	15	.144	.122	.160	.014					
L micramphidisc	15	.017	.013	.029	.004	15	.016	.014	.018	.001					
L micramphidisc umbel	15	.005	.004	.007	.001	15	.005	.004	.005	.000					
D micramphidisc umbel	15	.005	.004	.006	.001	15	.006	.005	.007	.001					

TABLE 5. — Some measurements of the spicules of *Hyalonema (Oonema?) microstauractina*.

	HCL 433					HCL 432					HCL 431				
	n	avg	min	max	std	n	avg	min	max	std	n	avg	min	max	std
L small dermal pentactin pinular ray	20	.103	.091	.137	.012	20	.102	.076	.137	.015	25	.152	.106	.258	.044
L small dermal pentactin tangential ray	20	.039	.030	.046	.005	20	.036	.023	.046	.007	25	.034	.023	.046	.006
L large dermal pentactin pinular ray	10	.296	.167	.494	.114	20	.350	.167	.517	.121					
L large dermal pentactin tangential ray	10	.044	.030	.061	.012	20	.050	.030	.076	.011					
L dermal diactin pinular ray	10	.337	.213	.486	.089	4	.447	.251	.608	.155					
L dermal diactin proximal ray	10	.407	.198	.608	.128	4	.456	.182	.608	.202					
L small atrial pentactin pinular ray	25	.169	.084	.228	.042	4	.122	.084	.152	.032	20	.131	.091	.182	.027
L small atrial pentactin tangential ray	25	.039	.030	.053	.006	4	.042	.027	.068	.019	20	.033	.023	.046	.007
L large atrial pentactin pinular ray	5	.404	.251	.532	.126	12	.262	.198	.357	.046					
L large atrial pentactin tangential ray	5	.046	.034	.061	.011	11	.053	.038	.068	.011					
L atrial diactin pinular ray	9	.421	.274	.547	.094	20	.528	.365	.722	.104	2	.638	.441	.836	.279
L atrial diactin proximal ray	9	.550	.274	.836	.161	9	.575	.137	.851	.266					
L microstauractine ray	20	.034	.011	.052	.012	20	.053	.032	.081	.012	20	.037	.016	.061	.012
L macramphidisc	24	.128	.038	.213	.056	20	.223	.106	.304	.044	20	.155	.084	.274	.049
L macramphidisc umbel	24	.037	.015	.061	.013	20	.067	.030	.091	.012	20	.056	.038	.091	.013
D macramphidisc umbel	24	.061	.021	.099	.024	20	.092	.053	.129	.016	20	.067	.046	.106	.016
L mesamphidisc	20	.074	.040	.152	.029	22	.084	.045	.153	.032	19	.081	.041	.131	.026
L mesamphidisc umbel	20	.029	.014	.072	.015	22	.031	.014	.068	.017	19	.037	.014	.065	.014
D mesamphidisc umbel	20	.021	.011	.046	.009	22	.025	.011	.054	.013	19	.026	.011	.040	.008
L micramphidisc	21	.023	.013	.050	.011	20	.020	.014	.040	.005	20	.015	.013	.018	.002
L micramphidisc umbel	21	.008	.004	.016	.004	20	.006	.004	.014	.002	20	.005	.004	.006	.001
D micramphidisc umbel	21	.008	.004	.020	.004	20	.007	.005	.012	.001	20	.006	.004	.007	.001

	HCL 430					HCL 434					HCL 435				
L small dermal pentactin pinular ray															
L small dermal pentactin tangential ray															
L large dermal pentactin pinular ray	16	.376	.312	.517	.055	15	.274	.213	.342	.037	8	.317	.167	.418	.084
L large dermal pentactin tangential ray	16	.57	.046	.076	.009	15	.038	.023	.053	.008	8	.057	.038	.122	.029
L dermal diactin pinular ray															
L dermal diactin proximal ray															
L small atrial pentactin pinular ray															
L small atrial pentactin tangential ray															
L large atrial pentactin pinular ray	20	.257	.160	.380	.067	15	.225	.137	.266	.034	5	.296	.228	.365	.050
L large atrial pentactin tangential ray	20	.059	.038	.175	.029	15	.042	.030	.053	.007	5	.046	.038	.053	.005
L atrial diactin pinular ray	15	.392	.205	.494	.072										
L atrial diactin proximal ray	15	.434	.114	.745	.165										
L microstauractin ray	15	.069	.045	.112	.016	15	.039	.029	.047	.006	2	.050	.050	.050	0
L macramphidisc	15	.318	.296	.350	.020	17	.238	.167	.334	.041	14	.270	.182	.327	.057
L macramphidisc umbel	15	.106	.099	.114	.006	17	.050	.038	.068	.009	14	.087	.061	.114	.014
D macramphidisc umbel	15	.139	.122	.152	.008	17	.076	.057	.114	.014	14	.112	.084	.129	.016
L mesamphidisc	15	.091	.050	.144	.029	15	.096	.054	.133	.023	5	.063	.050	.077	.010
L mesamphidisc umbel	15	.034	.013	.058	.013	15	.046	.027	.072	.013	5	.024	.018	.034	.007
D mesamphidisc umbel	15	.028	.014	.050	.012	15	.038	.020	.050	.009	5	.020	.014	.027	.006
L micramphidisc	15	.018	.014	.025	.003	15	.015	.011	.020	.002	5	.019	.014	.023	.005
L micramphidisc umbel	15	.006	.004	.009	.001	15	.005	.004	.008	.001	5	.006	.005	.007	.001
D micramphidisc umbel	15	.007	.006	.009	.001	15	.006	.005	.008	.001	5	.007	.006	.009	.001

TABLE 6. — Some measurements of the spicules of *Monorhaphis* which could be referred to *M. chuni* sensu stricto.

	5/2/1408					5/2/1351				
	n	avg	min	max	std	n	avg	min	max	std
L dermalia pinular	25	.149	.126	.184	.018	25	.161	.108	.202	.024
L dermalia tangential	25	.039	.025	.050	.006	25	.040	.032	.054	.005
L atrialia pinular	25	.146	.101	.209	.026	25	.143	.122	.173	.014
L atrialia tangential	25	.037	.018	.050	.008	25	.036	.029	.043	.005
L canalaria pinular	25	.073	.040	.104	.017	25	.072	.043	.097	.012
L canalaria tangential	25	.030	.022	.036	.004	25	.032	.025	.040	.004
L microhexactin ray	25	.141	.108	.176	.019	25	.147	.097	.180	.022
L macroamphidisc	5	.199	.122	.281	.076	6	.269	.229	.333	.040
L macramphidisc umbel	5	.111	.059	.178	.058	6	.165	.148	.185	.016
D macramphidisc umbel										
L mesamphidisc	1	.038	.038	.038						
L mesamphidisc umbel	1	.018	.018	.018						
D mesamphidisc umbel	1	.016	.016	.016						
L micramphidisc	25	.034	.028	.042	.004	25	.037	.028	.054	.006
L micramphidisc umbel	25	.009	.006	.012	.002	25	.008	.005	.012	.002
D micramphidisc umbel	25	.009	.006	.012	.001	25	.009	.006	.012	.001
	5/2/1422					5/2/1352				
L dermalia pinular	16	.171	.114	.236	.030	15	.165	.114	.213	.021
L dermalia tangential	16	.042	.030	.061	.008	15	.049	.030	.106	.017
L atrialia pinular	15	.161	.114	.198	.028	15	.148	.122	.175	.019
L atrialia tangential	15	.039	.030	.053	.005	15	.034	.023	.042	.006
L canalaria pinular	15	.082	.053	.122	.021	15	.080	.053	.099	.012
L canalaria tangential	15	.033	.023	.053	.009	15	.029	.023	.038	.005
L microhexactin ray	15	.147	.099	.205	.032	16	.152	.106	.213	.030
L macroamphidisc	2	.270	.236	.304	.048	3	.324	.312	.334	.012
L macramphidisc umbel						2	.038	.038	.038	0
D macramphidisc umbel	2	.190	.175	.205	.021	3	.101	.061	.152	.046
L mesamphidisc						8	.117	.065	.151	.026
L mesamphidisc umbel						8	.035	.014	.054	.014
D mesamphidisc umbel						8	.032	.014	.045	.011
L micramphidisc	16	.033	.023	.056	.008	15	.030	.025	.040	.004
L micramphidisc umbel	16	.008	.005	.013	.002	15	.007	.005	.011	.002
D micramphidisc umbel	16	.008	.006	.013	.002	15	.008	.006	.012	.002

TABLE 7. — Some measurements of the spicules of *Monorhaphis* which could be referred to previous *M. dives*.

	1908.09.24.064					1908.09.24.065					kt476				
	n	avg	min	max	std	n	avg	min	max	std	n	avg	min	max	std
L dermalia pinular	16	.162	.129	.236	.028	15	.217	.175	.266	.032	15	.210	.167	.251	.026
L dermalia tangential	16	.034	.015	.046	.008	15	.049	.038	.068	.008	15	.046	.034	.061	.008
L atrialia pinular	15	.241	.167	.281	.034										
L atrialia tangential	15	.040	.030	.053	.006										
L canalaria pinular	15	.080	.061	.099	.014						4	.082	.068	.114	.022
L canalaria tangential	15	.031	.023	.038	.005						4	.033	.023	.046	.011
L microhexactin ray	16	.139	.091	.167	.021	15	.099	.076	.118	.014	6	.106	.065	.137	.023
L macramphidisc	1	.334	.334	.334											
L macramphidisc umbel															
D macramphidisc umbel	1	.175	.175	.175											
L mesamphidisc	16	.104	.086	.146	.015	16	.101	.085	.131	.015	15	.084	.041	.104	.016
L mesamphidisc umbel	14	.030	.022	.043	.006	11	.035	.020	.058	.012	13	.028	.016	.045	.009
D mesamphidisc umbel	16	.032	.022	.065	.011	16	.039	.020	.061	.013	15	.030	.020	.052	.011
L micramphidisc	16	.029	.020	.038	.005	15	.030	.023	.047	.006	15	.025	.018	.032	.004
L micramphidisc umbel	16	.008	.006	.013	.001	15	.009	.006	.016	.003	15	.008	.007	.011	.001
D micramphidisc umbel	16	.009	.007	.013	.002	15	.010	.008	.016	.002	15	.008	.006	.011	.001

TABLE 8. — Some measurements of the spicules of *Monorhaphis* which could be referred to previous *M. intermedia*.

	HCL 410					fr767					HCL 411				
	n	avg	min	max	std	n	avg	min	max	std	n	avg	min	max	std
L dermalia pinular	15	.233	.175	.266	.029	15	.231	.182	.304	.047	15	.157	.091	.243	.050
L dermalia tangential	15	.052	.038	.068	.008	15	.050	.038	.068	.008	15	.035	.027	.046	.006
L atrialia pinular											15	.176	.137	.198	.019
L atrialia tangential											15	.035	.030	.042	.003
L canalaria pinular															
L canalaria tangential															
L microhexactin ray	15	.083	.045	.140	.026	15	.069	.036	.110	.019	15	.034	.022	.041	.006
L macramphidisc						4	.183	.171	.194	.013					
L macramphidisc umbel															
D macramphidisc umbel						4	.100	.085	.126	.018					
L mesamphidisc	17	.078	.061	.097	.011	10	.077	.050	.117	.022	1	.063	.063	.063	
L mesamphidisc umbel	17	.024	.018	.032	.005	10	.026	.020	.036	.005	1	.031	.031	.031	
D mesamphidisc umbel	17	.019	.016	.023	.002	10	.026	.018	.031	.005	1	.023	.023	.023	
L micramphidisc	15	.031	.025	.036	.003	15	.037	.031	.047	.005	15	.028	.020	.050	.007
L micramphidisc umbel	15	.008	.005	.011	.002	15	.009	.007	.013	.001	15	.008	.006	.013	.001
D micramphidisc umbel	15	.009	.008	.010	.001	15	.011	.009	.013	.001	15	.008	.007	.014	.002

	HCL 412					fr867.1					HCL 408				
	n	avg	min	max	std	n	avg	min	max	std	n	avg	min	max	std
L dermalia pinular	15	.153	.114	.198	.027	15	.292	.251	.380	.030	15	.251	.220	.289	.019
L dermalia tangential	15	.035	.023	.038	.005	15	.055	.046	.091	.011	15	.052	.030	.061	.010
L atrialia pinular	15	.158	.076	.205	.034										
L atrialia tangential	15	.035	.023	.046	.006										
L canalaria pinular															
L canalaria tangential															
L microhexactin ray	15	.030	.020	.041	.006	15	.066	.045	.117	.022	15	.076	.050	.135	.020
L macroamphidisc						8	.194	.151	.241	.033	16	.075	.061	.088	.006
L macramphidisc umbel											16	.023	.018	.036	.004
D macramphidisc umbel						8	.123	.068	.149	.028	16	.018	.016	.025	.002
L mesamphidisc						15	.081	.063	.108	.013	1	.176	.176	.176	
L mesamphidisc umbel						15	.030	.020	.049	.007					
D mesamphidisc umbel						15	.026	.021	.038	.005	1	.068	.068	.068	
L micramphidisc	16	.024	.012	.032	.004	15	.033	.029	.040	.004	16	.035	.031	.040	.003
L micramphidisc umbel	16	.006	.004	.009	.001	15	.009	.007	.011	.001	16	.008	.005	.011	.001
D micramphidisc umbel	16	.007	.004	.008	.001	15	.010	.008	.011	.001	16	.009	.006	.011	.001

	p540					HCL 406					HCL 407				
	n	avg	min	max	std	n	avg	min	max	std	n	avg	min	max	std
L dermalia pinular	15	.234	.182	.281	.028	16	.216	.144	.312	.053	15	.244	.114	.327	.067
L dermalia tangential	15	.049	.038	.076	.010	16	.039	.030	.053	.007	15	.040	.030	.053	.005
L atrialia pinular						15	.201	.160	.251	.028	15	.195	.160	.220	.017
L atrialia tangential						15	.038	.030	.053	.006	15	.032	.023	.042	.006
L canalaria pinular															
L canalaria tangential															
L microhexactin ray	15	.057	.040	.079	.013	15	.035	.029	.045	.005	15	.033	.025	.043	.007
L macroamphidisc						3	.182	.158	.230	.042	4	.189	.126	.265	.065
L macramphidisc umbel															
D macramphidisc umbel						3	.098	.090	.113	.014	4	.123	.076	.176	.050
L mesamphidisc	15	.085	.068	.115	.013	18	.106	.085	.130	.014	17	.084	.052	.119	.020
L mesamphidisc umbel	13	.023	.018	.032	.004	13	.040	.018	.059	.016	9	.026	.014	.052	.013
D mesamphidisc umbel	15	.029	.023	.047	.007	18	.033	.018	.050	.010	17	.029	.016	.049	.010
L micramphidisc	15	.037	.022	.041	.005	15	.030	.023	.040	.005	15	.030	.025	.032	.002
L micramphidisc umbel	15	.009	.007	.013	.002	15	.008	.005	.012	.002	15	.009	.005	.011	.001
D micramphidisc umbel	15	.012	.009	.018	.003	15	.008	.007	.012	.002	15	.009	.007	.011	.001

TABLE 8. — Some measurements of the spicules of *Monorhaphis* which could be referred to previous *M. intermedia* (suite).

	HCL 445					HCL 409					HCL 405				
	n	avg	min	max	std	n	avg	min	max	std	n	avg	min	max	std
L dermalia pinular	15	.159	.106	.251	.033	16	.213	.114	.441	.080	15	.156	.091	.190	.027
L dermalia tangential	15	.042	.038	.053	.005	15	.052	.038	.061	.007	15	.037	.015	.046	.008
L atrialia pinular	15	.195	.160	.228	.017						15	.172	.144	.198	.018
L atrialia tangential	15	.041	.030	.053	.006						15	.035	.030	.038	.003
L canalaria pinular															
L canalaria tangential															
L microhexactin ray	17	.050	.032	.070	.009	16	.049	.025	.063	.011	15	.034	.023	.043	.006
L macramphidisc	1	.155	.155	.155		6	.197	.151	.252	.041					
L macramphidisc umbel															
D macramphidisc umbel	1	.090	.090	.090		6	.103	.072	.140	.028					
L mesamphidisc	1	.077	.077	.077		15	.130	.072	.173	.026	5	.098	.088	.108	.009
L mesamphidisc umbel	1	.027	.027	.027		4	.040	.029	.058	.013	1	.047	.047	.047	
D mesamphidisc umbel	1	.023	.023	.023		15	.048	.027	.077	.014	5	.031	.029	.032	.002
L micramphidisc	15	.027	.022	.034	.004	15	.029	.025	.036	.003	15	.025	.021	.032	.003
L micramphidisc umbel	15	.008	.005	.011	.001	15	.008	.006	.009	.001	15	.008	.005	.009	.001
D micramphidisc umbel	15	.009	.007	.010	.001	15	.009	.007	.011	.001	15	.008	.007	.011	.001

TABLE 9. — Comparative measurements of various spicule parameters of *Monorhaphis* collected from different locations and of previously different species.

	I	II		III		IV		V		VI	
	avg	min	max	min	max	min	max	min	max	min	max
L dermalia pinular	.200	.170	.190	.108	.236	.129	.266	.265	.320	.091	.441
L dermalia tangential	.050	.045	.053	.025	.106	.015	.068	.051	.067	.015	.091
L atrialia pinular				.101	.209	.167	.281			.076	.228
L atrialia tangential				.018	.050	.030	.053			.023	.053
L canalaria pinular	.120	.075	.100	.040	.122	.061	.114				
L canalaria tangential	.050	.038	.050	.022	.053	.023	.046				
L microhexactin ray	.160	.055	.150	.097	.213	.065	.167	.070	.092	.020	.110
L macramphidisc	.320	.310	.330	.122	.334	.334	?	.160	.335	.061	.265
L macramphidisc umbel				.038	.185						
D macramphidisc umbel	.200	.200	.242	.061	.205	.175	?	.064	.214	.016	.176
L mesamphidisc				.038	.151	.084	.131	.090	.151	.050	.130
L mesamphidisc umbel				.014	.054	.016	.058	.025	.044	.014	.059
D mesamphidisc umbel				.014	.045	.020	.065			.016	.077
L micramphidisc	.040	.023	.038	.023	.056	.018	.047	.035	.048	.020	.050
L micramphidisc umbel	.012	.006	.009	.005	.013	.006	.016	.009	.012	.005	.013
D micramphidisc umbel		.010	.010	.006	.013	.006	.016	.012	.016	.006	.018

I - " *M. chuni* " according to SCHULZE (1904)
II - " *M. chuni* " according to IJIMA (1927)
III - specimens similar to " *M. chuni* ": 5/2/1422; 5/2/1352; 5/2/1408; 5/2/1351
IV - " *M. dives* ": 1908.09.24.065; 1908.09.24.064; kt476
V - " *M. intermedia* " according to LI JINHE (1987)
VI - specimens off New Caledonia and Australia similar to " *M. intermedia* "

TABLE 10. — Some measurements of the spicules of *Sericolophus calsubus*.

	HCL 155					HCL 446				
	n	avg	min	max	std	n	avg	min	max	std
dermal pinular ray	25	.214	.133	.361	.052	15	.222	.099	.281	.048
dermal tangential ray	25	.086	.053	.114	.015	15	.058	.034	.106	.024
atrial pinular ray	25	.273	.144	.429	.077	15	.313	.213	.608	.096
atrial tangential ray	25	.066	.046	.087	.012	15	.056	.046	.068	.007
microhexactin ray	25	.115	.091	.137	.014	19	.100	.068	.175	.027
L micramphidisc	25	.023	.018	.031	.004	15	.040	.027	.056	.008
L micramphidisc umbel	25	.009	.007	.012	.001	15	.012	.007	.018	.003
D micramphidisc umbel	25	.008	.006	.012	.001	15	.011	.007	.014	.002
L micruncinate	16	.051	.034	.076	.013	16	.062	.032	.108	.021

TABLE 11. — Some measurements of the spicules of *Sericolophus neocaledonicus*.

	HCL 156					HCL 159					HCL 163				
	n	avg	min	max	std	n	avg	min	max	std	n	avg	min	max	std
L dermal pinular ray	25	.163	.118	.190	.021						15	.208	.084	.289	.053
L dermal tangential ray	25	.075	.046	.129	.017						15	.073	.046	.106	.021
L atrial pinular ray	25	.219	.144	.289	.048						15	.387	.213	.532	.094
L atrial tangential ray	25	.076	.046	.114	.015						15	.102	.068	.144	.022
L thick microhexactin ray	25	.090	.067	.131	.017	2	.080	.068	.091	.016	15	.084	.046	.114	.018
L thin microhexactin ray	25	.120	.059	.204	.038	4	.082	.061	.091	.014	11	.082	.053	.122	.019
L mesamphidisc	25	.074	.057	.092	.008	14	.048	.032	.076	.011	15	.085	.063	.103	.010
L mesamphidisc umbel	25	.030	.024	.034	.002	14	.016	.011	.022	.003	15	.033	.022	.040	.005
D mesamphidisc umbel	25	.025	.020	.031	.002	14	.015	.010	.022	.003	15	.026	.023	.029	.001
L micramphidisc	25	.033	.019	.048	.007	14	.027	.020	.036	.005	15	.033	.025	.047	.007
L micramphidisc umbel	25	.010	.007	.015	.002	14	.010	.007	.013	.002	15	.010	.008	.016	.002
D micramphidisc umbel	25	.009	.005	.013	.002	14	.009	.007	.013	.002	15	.009	.007	.014	.002
L micruncinate	4	.074	.044	.115	.031	13	.067	.045	.086	.015	8	.090	.056	.115	.023
	HCL 161					HCL 170					HCL 165				
L dermal pinular ray						25	.219	.114	.285	.039	25	.165	.095	.262	.041
L dermal tangential ray						25	.090	.053	.137	.024	25	.084	.057	.118	.016
L atrial pinular ray						25	.310	.182	.456	.069	25	.226	.114	.327	.051
L atrial tangential ray						5	.074	.042	.118	.020	25	.099	.053	.141	.023
L thick microhexactin ray	4	.072	.053	.084	.013	25	.068	.056	.087	.008	25	.107	.068	.148	.021
L thin microhexactin ray	9	.069	.046	.084	.013	10	.076	.061	.085	.007					
L mesamphidisc	2	.041	.038	.043	.004	25	.074	.056	.085	.008	25	.077	.058	.090	.008
L mesamphidisc umbel	2	.016	.014	.018	.003	25	.029	.022	.033	.003	25	.031	.020	.036	.004
D mesamphidisc umbel	2	.014	.013	.014	.001	25	.024	.019	.028	.002	25	.026	.018	.029	.003
L micramphidisc	4	.023	.020	.025	.003	25	.040	.027	.047	.005	25	.032	.015	.040	.006
L micramphidisc umbel	4	.009	.009	.011	.001	25	.015	.011	.019	.002	25	.012	.006	.017	.002
D micramphidisc umbel	4	.008	.007	.009	.001	25	.011	.009	.014	.001	25	.010	.007	.014	.002
L micruncinate	15	.063	.031	.097	.019	16	.073	.041	.100	.015	16	.067	.043	.099	.016

TABLE 12. — Some measurements of the spicules of *Sericolophus hawaiicus*.

	co475					co471				
	n	avg	min	max	std	n	avg	min	max	std
L pinular ray one side	50	.118	.068	.175	.022					
L tangential ray one side	50	.053	.038	.072	.009					
L pinular ray another side	50	.135	.068	.182	.024					
L tangential ray another side	50	.055	.038	.072	.008					
L microhexactin ray	25	.082	.065	.098	.009	25	.086	.063	.117	.013
L microamphidisc	50	.030	.020	.045	.005	29	.034	.021	.065	.009
L microamphidisc umbel	50	.009	.005	.018	.002	29	.010	.007	.021	.003
D microamphidisc umbel	50	.008	.005	.014	.002	29	.011	.008	.019	.003

TABLE 13. — Some measurements of the spicules of *Sericolophus cidaricus*.

	HCL 180				
	n	avg	min	max	std
dermal pinular ray	25	.437	.217	.813	.135
dermal tangential ray	25	.079	.038	.129	.026
atrial pinular ray	25	.569	.186	.904	.213
atrial tangential ray	25	.089	.057	.148	.022
microhexactin ray	25	.091	.076	.107	.010
L mesamphidisc	25	.080	.058	.104	.011
L mesamphidisc umbel	25	.027	.013	.032	.005
D mesamphidisc umbel	25	.026	.018	.030	.003
L micramphidisc	9	.034	.016	.040	.007
L micramphidisc umbel	9	.009	.005	.013	.002
D micramphidisc umbel	9	.010	.005	.014	.003
L micruncinate	25	.086	.061	.120	.016

TABLE 14. — Ranges of spicule measurements of *Sericolophus* species.

	S. reflexus (after IJIMA & OKADA, 1932, REISWIG, 1991)		*S. calsubus*		*S. neocaledonicus*	
	L min-max	D min-max	L min-max	D min-max	L min-max	D min-max
dermal pentactin pinular ray	0.07-0.30	0.034	0.10-0.36	0.007-0.019	0.07-0.34	0.007-0.015
dermal pentactin tangential ray	0.09-0.11	0.006-0.007	0.03-0.11	0.004-0.006	0.03-0.14	0.006
atrial pentactin pinular ray	0.07-0.30	0.034	0.14-0.61	0.007-0.022	0.08-1.08	0.015-0.019
atrial pentactin tangential ray	0.09-0.11	0.006-0.007	0.05-0.09	0.004-0.011	0.01-0.18	0.007
microhexactin ray (thin-rayed)	0.08-0.17	0.004-0.010	0.07-0.18	0.007-0.011	0.05-0.21	0.004-0.007
microhexactin ray (thick-rayed)					0.05-0.21	0.015-0.030
micruncinate	0.04-0.19		0.03-0.11	0.004	0.04-0.14	0.004
macramphidisc	0.16-0.17					
mesoamphidisc	0.04-0.12				0.03-0.12	
microamphidisc	0.016-0.050		0.018-0.056		0.015-0.050	
	S. cidaricus		*S. hawaiicus*			
dermal pentactin pinular ray	0.22-0.81	0.004-0.022	0.07-0.18	0.004-0.011		
dermal pentactin tangential ray	0.04-0.13	0.004-0.013	0.04-0.07	0.004		
atrial pentactin pinular ray	0.19-1.90	0.015-0.019	0.07-0.18	0.004-0.011		
atrial pentactin tangential ray	0.06-0.15	0.013	0.04-0.07	0.004		
microhexactin ray (thin-rayed)	0.08-0.11	0.007-0.009	0.06-0.12	0.007		
microhexactin ray (thick-rayed)						
micruncinate	0.06-0.12	0.011-0.015	0.10-0.50	0.004		
macramphidisc						
mesoamphidisc	0.06-0.10					
microamphidisc	0.016-0.040		0.020-0.065			

TABLE 15. — Some measurements of the spicules of *Semperella varioactina.*

	HCL 202				
	n	avg	min	max	std
L pinular pentactin, pinular ray	25	.149	.099	.198	.027
L pinular pentactin, tangential ray	25	.092	.061	.137	.018
L micropentactin ray	26	.122	.053	.220	.050
L micromonactin	26	.212	.099	.327	.067
L amphidisc	28	.066	.032	.108	.021
L amphidisc umbel	28	.023	.009	.038	.008
D amphidisc umbel	28	.020	.007	.032	.008

TABLE 16. — Some measurements of the spicules of *Semperella abyssalis.*

	HCL 203					HCL 204					HCL 205				
	n	avg	min	max	std	n	avg	min	max	std	n	avg	min	max	std
L pinular pentactin pinular ray	44	.180	.122	.303	.042	15	.135	.106	.160	.015	15	.148	.114	.198	.024
L pinular pentactin, tangential ray	44	.098	.053	.211	.031	15	.100	.068	.122	.014	15	.090	.053	.106	.015
L micropentactin ray	15	.082	.046	.129	.028	15	.093	.068	.114	.014	15	.087	.061	.114	.016
L amphidisc	27	.055	.020	.115	.027	25	.047	.022	.095	.018	25	.047	.020	.092	.022
L amphidisc umbel	27	.013	.004	.027	.007	25	.013	.007	.027	.005	25	.015	.005	.031	.008
D amphidisc umbel	27	.012	.005	.023	.006	25	.011	.006	.023	.004	25	.012	.006	.022	.005
	HCL 206					HCL 207					HCL 208				
L pinular pentactin pinular ray	15	.143	.122	.175	.017	15	.148	.122	.175	.015	15	.139	.099	.167	.021
L pinular pentactin, tangential ray	15	.086	.068	.114	.015	15	.085	.061	.114	.016	15	.084	.053	.106	.013
L micropentactin ray	15	.082	.049	.114	.018	15	.104	.061	.167	.033	15	.077	.046	.114	.018
L amphidisc	25	.061	.027	.119	.024	16	.038	.016	.072	.017	15	.039	.020	.085	.019
L amphidisc umbel	25	.019	.007	.036	.008	16	.012	.006	.025	.006	15	.012	.006	.022	.005
D amphidisc umbel	25	.015	.005	.025	.006	16	.010	.005	.020	.004	15	.009	.005	.018	.004

TABLE 17. — Some measurements of the pinular pentactins of *Semperella crosnieri* (HCL 209) collected from different places of the surface.

	HCL 209				
	n	avg	min	max	std
L # pinular pentactin from one side, pinular ray	15	.132	.084	.190	.031
L # pinular pentactin from one side, tangential ray	15	.062	.046	.084	.013
L * pinular pentactin from one side, pinular ray	15	.152	.129	.182	.020
L * pinular pentactin from one side, tangential ray	15	.066	.046	.084	.009
L # pinular pentactin from another side, pinular ray	15	.135	.091	.167	.019
L # pinular pentactin from another side, tangential ray	15	.062	.038	.084	.013
L * pinular pentactin from lateral side, pinular ray	15	.168	.137	.205	.022
L * pinular pentactin from lateral side, tangential ray	15	.071	.053	.091	.010

- areas of the surface covered with small-meshed laticework - probably dermalia
* - areas of the surface covered with big-meshed laticework - probably atrialia

TABLE 18. — Some measurements of the spicules of *Semperella crosnieri.*

	HCL 209					HCL 210				
	n	avg	min	max	std	n	avg	min	max	std
L dermal pentactin, pinular ray	30	.134	.084	.190	.025	25	.127	.076	.163	.024
L dermal pentactin, tangential ray	30	.062	.038	.084	.013	25	.064	.038	.084	.012
L atrial pentactin, pinular ray	30	.160	.129	.205	.022	25	.161	.076	.236	.038
L atrial pentactin, tangential ray	30	.068	.046	.091	.010	25	.073	.046	.106	.014
L micropentactin ray	25	.094	.053	.137	.020	25	.113	.057	.171	.032
L amphidisc	25	.020	.014	.029	.003	25	.020	.016	.025	.002
L amphidisc umbel	25	.006	.005	.009	.001	25	.006	.005	.008	.001
D amphidisc umbel	25	.007	.005	.011	.001	25	.007	.006	.008	.001
	HCL 212					HCL 211				
L dermal pentactin, pinular ray	25	.133	.072	.179	.028	25	.200	.133	.300	.038
L dermal pentactin, tangential ray	25	.063	.042	.103	.013	25	.068	.046	.087	.012
L atrial pentactin, pinular ray	25	.146	.084	.205	.032	25	.206	.114	.342	.058
L atrial pentactin, tangential ray	25	.069	.038	.133	.020	25	.069	.049	.087	.009
L micropentactin ray	35	.063	.031	.080	.011	25	.078	.052	.093	.013
L amphidisc	25	.019	.016	.023	.002	25	.020	.016	.023	.002
L amphidisc umbel	25	.006	.005	.007	.001	25	.006	.005	.009	.001
D amphidisc umbel	25	.008	.006	.010	.001	25	.007	.006	.008	.001

TABLE 19. — Some measurements of the pinular pentactins of *Poliopogon micropentactinus* collected from different places of the surface.

	HCL 215				
	n	avg	min	max	std
L pentactin of the convex surface, pinular ray	15	.176	.129	.213	.023
L pentactin of the convex surface, tangential ray	15	.094	.076	.122	.014
L pentactin of one concave surface, pinular ray	15	.176	.137	.213	.020
L pentactin of one concave surface, tangential ray	15	.090	.076	.106	.012
L pentactin of the other concave surface, pinular ray	15	.174	.144	.220	.021
L pentactin of the other concave surface, tangential ray	15	.090	.076	.114	.012
L pentactin of the rib, pinular ray	15	.216	.175	.258	.024
L pentactin of the rib, tangential ray	15	.089	.030	.137	.028

TABLE 20. — Some measurements of spicules of *Poliopogon micropentactinus*.

	HCL 213					HCL 215					HCL 214				
	n	avg	min	max	std	n	avg	min	max	std	n	avg	min	max	std
L pinular pentactin of one side pinular ray	25	.194	.122	.300	.041	15	.176	.137	.213	.020	25	.263	.190	.334	.033
L pinular pentactin of one side tangential ray	25	.070	.034	.122	.026	15	.090	.076	.106	.012	25	.114	.084	.148	.017
L pinular pentactin of another side pinular ray	25	.172	.114	.262	.036	15	.174	.144	.220	.021	25	.158	.129	.186	.016
L pinular pentactin of another side tangential ray	25	.080	.034	.122	.017	15	.090	.076	.114	.012	25	.081	.053	.106	.013
L micropentactin ray	25	.095	.057	.137	.021	20	.124	.076	.198	.034	25	.092	.052	.126	.022
L amphidisc	25	.048	.027	.095	.022	24	.048	.029	.085	.013	50	.063	.015	.115	.028
L amphidisc umbel	25	.016	.009	.031	.007	24	.016	.009	.027	.004	50	.022	.005	.041	.010
D amphidisc umbel	25	.013	.008	.024	.004	24	.010	.007	.016	.002	50	.016	.005	.026	.006

TABLE 21. — Some measurements of spicules of *Poliopogon claviculus*.

	HCL 458				
	n	avg	min	max	std
L dermal pentactin pinular ray	25	.243	.078	.392	.092
L dermal pentactin tangential ray	25	.064	.044	.096	.015
L atrial pentactin pinular ray	25	.133	.078	.174	.019
L atrial pentactin tangential ray	25	.055	.030	.078	.010
L microhexactin ray	25	.092	.061	.122	.016
L macramphidisc	25	.222	.131	.287	.040
D macramphidisc umbel	25	.143	.070	.183	.032
L mesamphidisc	25	.121	.061	.200	.035
L mesamphidisc umbel	25	.043	.017	.078	.015
D mesamphidisc umbel	25	.031	.010	.052	.010
L micramphidisc	25	.043	.032	.058	.006
L micramphidisc umbel	25	.015	.012	.018	.002
D micramphidisc umbel	25	.012	.008	.016	.002

TABLE 22. — Some measurements of spicules of *Poliopogon zonecus* (HCL 459).

	HCL 459				
	n	avg	min	max	std
L dermal pentactin pinular ray	25	.148	.113	.200	.023
L dermal pentactin tangential ray	25	.085	.070	.131	.017
L atrial pentactin pinular ray	25	.147	.104	.191	.021
L atrial pentactin tangential ray	25	.080	.061	.122	.015
L microhexactin ray	25	.121	.078	.191	.027
L micramphidisc	25	.034	.025	.047	.005
L micramphidisc umbel	25	.008	.006	.010	.001
D micramphidisc umbel	25	.009	.007	.012	.001

TABLE 23. — Some measurements of the spicules of *Pheronema pilosum*.

	holotype					PQR 9402					fr 870				
	n	avg	min	max	std	n	avg	min	max	std	n	avg	min	max	std
Length of the body															
Diameter of the body												50			
L dermalia pinular			.080	.096		25	.089	.061	.129	.016	25	.126	.068	.171	.024
L dermalia tangential			.100	.120		25	.084	.065	.118	.013	25	.117	.053	.148	.020
L atrialia pinular			.125	.160		25	.134	.080	.190	.033	25	.128	.095	.213	.027
L atrialia tangential			.140	.160		25	.121	.076	.163	.025	25	.104	.076	.133	.014
L micropentactin ray	6	.076	.056	.098	.014	25	.092	.054	.131	.019	25	.068	.044	.115	.020
L amphidisc			.050	.065		25	.056	.043	.071	.007	25	.049	.041	.063	.006
L amphidisc umbel			.023	.025		25	.020	.014	.032	.004	25	.014	.011	.016	.001
D amphidisc umbel			.015	.025		25	.016	.011	.023	.003	25	.013	.011	.016	.001
L micruncinate						3	.200	.114	.296	.092	21	.377	.243	.486	.057
	HCL 253					HCL 461					HCL 235				
Length of the body		40					40					55			
Diameter of the body			25	40			35						32	55	
L dermalia pinular	25	.198	.099	.274	.047	15	.094	.068	.122	.016	25	.133	.084	.243	.041
L dermalia tangential	25	.164	.068	.236	.038	15	.099	.076	.129	.016	25	.107	.061	.137	.021
L atrialia pinular	25	.098	.053	.144	.025	15	.105	.061	.129	.018	25	.118	.084	.175	.023
L atrialia tangential	25	.086	.038	.129	.026	15	.103	.068	.144	.022	25	.103	.068	.137	.019
L micropentactin ray						25	.090	.068	.122	.017	15	.090	.053	.122	.018
L amphidisc	25	.058	.045	.072	.006	11	.054	.022	.110	.023	25	.066	.033	.081	.010
L amphidisc umbel	25	.017	.014	.022	.002	11	.017	.013	.027	.005	25	.025	.009	.033	.004
D amphidisc umbel	25	.015	.012	.019	.002	11	.015	.011	.020	.003	25	.021	.009	.026	.003
L micruncinate						15	.484	.281	.692	.140	25	.371	.129	.798	.235
	1936.03.04.080.					HCL 242					5/2/390.9				
Length of the body		70					75					80			
Diameter of the body		70						45	55				35	40	
L dermalia pinular	15	.097	.068	.129	.018	25	.105	.068	.137	.018	25	.088	.046	.144	.023
L dermalia tangential	15	.101	.068	.129	.019	25	.099	.053	.137	.021	25	.090	.065	.107	.011
L atrialia pinular	15	.133	.084	.198	.033	25	.126	.068	.175	.021	25	.092	.068	.118	.013
L atrialia tangential	15	.127	.099	.167	.021	25	.131	.057	.175	.026	25	.096	.072	.118	.011
L micropentactin ray	25	.067	.026	.129	.032						25	.079	.048	.113	.015
L amphidisc	15	.056	.045	.065	.006	25	.067	.029	.079	.010	25	.063	.029	.092	.014
L amphidisc umbel	15	.015	.011	.020	.002	25	.026	.010	.034	.005	25	.020	.007	.030	.006
D amphidisc umbel	15	.014	.012	.018	.002	25	.021	.011	.027	.003	25	.018	.008	.023	.004
L micruncinate	15	.259	.220	.304	.024	25	.407	.198	.593	.138	25	.128	.091	.236	.028
	HCL 218					HCL 220					HCL 252				
Length of the body		80					100					120			
Diameter of the body		50					70						10	65	
L dermalia pinular	15	.091	.076	.122	.017	15	.134	.061	.304	.069	15	.205	.152	.266	.033
L dermalia tangential	15	.084	.053	.129	.017	15	.112	.068	.190	.038	15	.131	.091	.160	.022
L atrialia pinular	15	.090	.068	.106	.012	15	.168	.091	.357	.077	15	.124	.084	.266	.047
L atrialia tangential	15	.088	.068	.122	.016	15	.133	.099	.205	.037	15	.097	.068	.167	.026
L micropentactin ray															
L amphidisc	3	.059	.034	.072	.021	25	.096	.058	.151	.031	15	.050	.041	.061	.005
L amphidisc umbel	3	.021	.009	.027	.010	25	.034	.020	.052	.010	15	.013	.009	.016	.002
D amphidisc umbel	3	.015	.010	.020	.005	25	.026	.016	.045	.008	15	.013	.010	.016	.002
L micruncinate	15	.464	.304	.912	.145	8	.485	.296	.631	.110	15	.420	.228	.540	.084

TABLE 24. — Some measurements of the spicules of *Pheronema semiglobosum*.

	HCL 48					HCL 220					HCL 49 (p4324)				
	n	avg	min	max	std	n	avg	min	max	std	n	avg	min	max	std
Length of the body		60					7					12			
Diameter of the body			90	95				10	12				15	20	
L dermalia pinular	25	.128	.076	.213	.040	15	.100	.068	.129	.017	15	.100	.076	.122	.014
L dermalia tangential	25	.054	.034	.091	.012	15	.062	.053	.076	.008	15	.063	.046	.076	.008
L atrialia pinular	25	.254	.144	.372	.062	15	.109	.076	.152	.021	15	.131	.099	.175	.025
L atrialia tangential	25	.060	.027	.103	.021	15	.059	.038	.076	.010	15	.063	.046	.099	.014
L macramphidisc	25	.117	.068	.167	.027	7	.168	.099	.236	.060	16	.178	.137	.228	.026
L umbel macramphidisc	25	.042	.027	.053	.007	7	.047	.030	.061	.013	16	.054	.038	.068	.008
D umbel macramphidisc	25	.042	.027	.057	.008	7	.055	.030	.076	.019	16	.064	.049	.076	.007
L micramphidisc	25	.021	.017	.032	.003	15	.036	.027	.045	.005	8	.030	.018	.036	.005
L umbel micramphidisc	25	.007	.005	.013	.002	15	.011	.009	.013	.001	8	.010	.005	.013	.003
D umbel micramphidisc	25	.006	.005	.010	.001	15	.009	.007	.013	.001	8	.008	.005	.011	.002
L micruncinate	25	.190	.099	.327	.071	2	.635	.623	.646	.016	6	.224	.137	.289	.053

	HCL 49 (p3875)					HCL 49 (p4648)					HCL 282				
Length of the body		15					35					55			
Diameter of the body		15					50						30	50	
L dermalia pinular	15	.140	.053	.236	.045	25	.163	.106	.220	.025	25	.093	.068	.129	.018
L dermalia tangential	15	.063	.038	.076	.011	25	.073	.053	.099	.014	25	.056	.046	.068	.008
L atrialia pinular	15	.212	.122	.312	.064	25	.170	.091	.289	.055	25	.103	.084	.129	.011
L atrialia tangential	15	.075	.042	.091	.017	25	.069	.038	.099	.017	25	.058	.046	.091	.010
L macramphidisc	6	.139	.068	.182	.043	25	.154	.114	.190	.024	5	.221	.205	.239	.013
L umbel macramphidisc	6	.051	.030	.061	.011	25	.055	.030	.068	.010	5	.065	.061	.068	.004
D umbel macramphidisc	6	.044	.030	.057	.009	25	.054	.042	.068	.006	5	.067	.053	.076	.009
L micramphidisc	15	.026	.022	.032	.003	25	.025	.020	.031	.003	25	.029	.020	.034	.004
L umbel micramphidisc	15	.009	.007	.011	.001	25	.008	.005	.010	.001	25	.009	.007	.011	.001
D umbel micramphidisc	15	.007	.005	.008	.001	25	.007	.005	.008	.001	25	.008	.007	.009	.001
L micruncinate	15	.215	.084	.540	.122	25	.162	.114	.304	.037	25	.138	.099	.160	.015

	HCL 287					HCL 278				
Length of the body		100					120			
Diameter of the body		110						130	155	
L dermalia pinular	15	.103	.061	.152	.033	25	.122	.091	.190	.024
L dermalia tangential	15	.055	.023	.084	.015	25	.066	.046	.091	.011
L atrialia pinular	15	.134	.084	.258	.049	25	.155	.076	.281	.041
L atrialia tangential	15	.067	.046	.099	.014	25	.074	.038	.133	.020
L macramphidisc	7	.212	.182	.243	.020					
L umbel macramphidisc	7	.045	.015	.068	.020					
D umbel macramphidisc	7	.060	.038	.076	.016					
L micramphidisc	15	.031	.023	.040	.005	25	.029	.018	.065	.009
L umbel micramphidisc	15	.009	.007	.011	.001	25	.009	.006	.013	.001
D umbel micramphidisc	15	.007	.005	.009	.001	25	.007	.005	.009	.001
L micruncinate	15	.164	.129	.205	.024	25	.142	.091	.182	.019

TABLE 25. — Some measurements of the spicules of *Pheronema conicum*.

	HCL 46					HCL 318					HCL 314				
	n	avg	min	max	std	n	avg	min	max	std	n	avg	min	max	std
Length of the body		45					15					19			
Diameter of the body		60					19					15			
L dermalia pinular	25	.162	.106	.251	.036	15	.062	.049	.068	.005	25	.105	.053	.198	.047
L dermalia tangential	25	.142	.106	.190	.022	15	.052	.038	.061	.007	25	.090	.046	.152	.036
L atrialia pinular	25	.143	.076	.319	.056	15	.155	.068	.274	.064	25	.068	.053	.084	.009
L atrialia tangential	25	.089	.053	.114	.016	15	.093	.061	.129	.018	25	.068	.038	.099	.013
L dermal macramphidisc	4	.082	.076	.091	.007	15	.194	.046	.251	.050	15	.207	.152	.243	.024
L umbel dermal macramphidisc	4	.032	.027	.038	.005	15	.064	.019	.076	.015	15	.067	.057	.076	.006
D umbel dermal macramphidisc	4	.032	.027	.038	.007	15	.069	.023	.091	.015	15	.062	.053	.076	.006
L atrial macramphidisc						20	.105	.038	.182	.054	15	.121	.049	.220	.056
L umbel atrial macramphidisc						20	.039	.018	.061	.014	15	.048	.023	.076	.018
D umbel atrial macramphidisc						20	.043	.014	.068	.017	15	.042	.019	.068	.015
L dermal micramphidisc	15	.024	.016	.041	.006	15	.035	.022	.063	.011	15	.032	.023	.050	.008
L umbel dermal micramphidisc	15	.008	.005	.016	.003	15	.014	.009	.020	.003	15	.011	.007	.016	.003
D umbel dermal micramphidisc	15	.007	.005	.012	.002	15	.010	.006	.014	.002	15	.008	.005	.012	.002
L atrial micramphidisc	15	.025	.016	.032	.004	15	.027	.022	.041	.005	15	.026	.019	.032	.003
L umbel atrial micramphidisc	15	.007	.004	.010	.002	15	.010	.009	.013	.001	15	.009	.005	.013	.002
D umbel atrial micramphidisc	15	.007	.005	.008	.001	15	.009	.007	.012	.001	15	.007	.005	.009	.001

	HCL 47 (p4652)					HCL 330					HCL 47 (p1162)				
Length of the body		20					30					50			
Diameter of the body		30					35					60			
L dermalia pinular	25	.124	.106	.152	.012	25	.152	.114	.198	.021	15	.078	.053	.129	.019
L dermalia tangential	25	.119	.084	.167	.018	25	.132	.106	.167	.017	15	.059	.046	.076	.009
L atrialia pinular	25	.187	.106	.319	.056	25	.223	.137	.372	.065	18	.212	.099	.350	.085
L atrialia tangential	25	.079	.053	.106	.016	25	.124	.061	.182	.029	18	.111	.065	.426	.081
L dermal macramphidisc	15	.190	.167	.220	.017	19	.257	.205	.312	.024					
L umbel dermal macramphidisc	15	.063	.053	.076	.007	19	.086	.076	.106	.009					
D umbel dermal macramphidisc	15	.066	.053	.076	.006	19	.088	.068	.106	.011					
L atrial macramphidisc	10	.128	.099	.152	.019	25	.164	.057	.243	.056					
L umbel atrial macramphidisc	10	.046	.038	.053	.005	25	.057	.028	.084	.013					
D umbel atrial macramphidisc	10	.044	.038	.055	.005	25	.062	.034	.084	.014					
L dermal micramphidisc	18	.027	.018	.052	.008	15	.028	.016	.045	.007	15	.020	.014	.025	.003
L umbel dermal micramphidisc	18	.009	.005	.016	.003	15	.010	.007	.014	.002	15	.007	.005	.009	.001
D umbel dermal micramphidisc	18	.007	.005	.011	.002	15	.008	.007	.011	.001	15	.006	.005	.007	.001
L atrial micramphidisc	15	.028	.023	.043	.005	15	.026	.022	.031	.003	15	.023	.018	.032	.003
L umbel atrial micramphidisc	15	.010	.007	.013	.002	15	.009	.007	.011	.001	15	.008	.005	.012	.002
D umbel atrial micramphidisc	15	.007	.006	.009	.001	15	.008	.006	.009	.001	15	.007	.005	.010	.001

	HCL 337					HCL 321				
Length of the body		100					150			
Diameter of the body		95					110	130		
L dermalia pinular	25	.166	.122	.243	.031	25	.150	.122	.220	.022
L dermalia tangential	25	.122	.072	.160	.020	25	.122	.084	.175	.020
L atrialia pinular	25	.161	.076	.236	.041	25	.172	.068	.486	.081
L atrialia tangential	25	.083	.046	.114	.016	25	.078	.038	.137	.025
L dermal macramphidisc	11	.175	.091	.251	.042					
L umbel dermal macramphidisc	11	.055	.034	.084	.016					
D umbel dermal macramphidisc	11	.051	.030	.076	.015					
L atrial macramphidisc	23	.154	.061	.213	.038	14	.122	.038	.175	.038
L umbel atrial macramphidisc	23	.056	.030	.068	.009	14	.053	.019	.076	.013
D umbel atrial macramphidisc	23	.052	.027	.061	.008	14	.048	.015	.068	.012
L dermal micramphidisc	15	.024	.014	.029	.004	15	.021	.018	.027	.003
L umbel dermal micramphidisc	15	.009	.005	.011	.001	15	.007	.005	.011	.001
D umbel dermal micramphidisc	15	.007	.005	.008	.001	15	.006	.005	.008	.001
L atrial micramphidisc	15	.024	.018	.031	.004	15	.021	.016	.024	.002
L umbel atrial micramphidisc	15	.008	.005	.011	.002	15	.007	.005	.010	.001
D umbel atrial micramphidisc	15	.006	.005	.010	.001	15	.006	.005	.008	.001

TABLE 26. — Some measurements of the spicules of holotype of *Pheronema giganteum*.

	holotype				
	n	avg	min	max	std
L dermalia pinular ray	25	.161	.068	.334	.077
L dermalia tangential ray	25	.053	.030	.084	.012
L atrialia pinular ray	25	.120	.076	.266	.051
L atrialia tangential ray	25	.052	.038	.068	.007
L microhexactin ray	25	.097	.061	.152	.023
L macramphidisc	25	.213	.167	.289	.026
L macramphidisc umbel	25	.075	.068	.084	.005
D macramphidisc umbel	25	.071	.053	.084	.007
L mesamphidisc	4	.041	.032	.054	.009
L mesamphidisc umbel	4	.020	.016	.027	.005
D mesamphidisc umbel	4	.020	.016	.032	.008
L micramphidisc	25	.029	.023	.041	.005
L micramphidisc umbel	25	.011	.007	.018	.002
D micramphidisc umbel	25	.008	.005	.012	.001

TABLE 27. — Some measurements of the spicules of holoype of *Pheronema pseudogiganteum*.

	original measures					IJIMA's data		
	n	avg	min	max	std	avg	min	max
L dermalia pinular ray	10	.081	.053	.114	.018		.085	.095
L dermalia tangential ray	10	.056	.042	.068	.007	70		
L atrialia pinular ray							.120	.250
L atrialia tangential ray								
L microhexactin ray	25	.263	.160	.456	.085		.300	.500
L macramphidisc	5	.242	.152	.289	.056		.170	.264
L macramphidisc umbel	5	.088	.068	.106	.016		.055	.065
D macramphidisc umbel	5	.103	.091	.114	.011		.650	.100
L micramphidisc	25	.023	.016	.083	.013		.020	.026
L micramphidisc umbel	25	.008	.005	.027	.004	.008		
D micramphidisc umbel	25	.008	.005	.020	.003	.008		
L micruncinate	12	.100	.076	.130	.017		.075	.125

TABLE 28. — Some measurements of the spicules of *Pheronema pseudogiganteum* forma *nuda*.

	HCL 358					HCL 359					HCL 360				
	n	avg	min	max	std	n	avg	min	max	std	n	avg	min	max	std
L dermalia pinular ray	25	.120	.076	.220	.034	15	.122	.068	.167	.029	25	.130	.061	.182	.026
L dermalia tangential ray	25	.060	.046	.091	.011	15	.071	.046	.114	.017	25	.088	.053	.152	.027
L atrialia pinular ray	25	.107	.084	.144	.017	0					0				
L atrialia tangential ray	25	.060	.030	.091	.014	0					0				
L microhexactin ray	25	.082	.054	.112	.015	15	.086	.046	.122	.022	25	.102	.068	.213	.028
L macramphidisc	25	.206	.175	.236	.016	11	.171	.152	.205	.016	25	.192	.152	.236	.023
L macramphidisc umbel	25	.068	.053	.084	.008	11	.062	.053	.076	.008	25	.067	.053	.084	.008
D macramphidisc umbel	25	.089	.076	.099	.007	11	.079	.061	.091	.009	25	.084	.061	.099	.009
L micramphidisc	25	.040	.032	.049	.004	15	.037	.031	.041	.004	24	.037	.027	.045	.004
L micramphidisc umbel	25	.013	.009	.016	.002	15	.010	.009	.013	.001	24	.011	.008	.014	.002
D micramphidisc umbel	25	.010	.008	.013	.001	15	.009	.007	.012	.001	24	.010	.007	.011	.001
L micruncinate	19	.058	.041	.077	.012	19	.063	.041	.117	.018	11	.062	.049	.074	.008

TABLE 29. — Some measurements of the spicules of *Pheronema pseudogiganteum* forma *vaubana*.

	HCL 363				
	n	avg	min	max	std
L dermalia pinular ray	25	.097	.068	.114	.010
L dermalia tangential ray	25	.059	.046	.084	.009
L atrialia pinular ray	25	.105	.084	.122	.012
L atrialia tangential ray	25	.068	.038	.114	.017
L microhexactin ray	25	.110	.076	.167	.020
L macramphidisc	25	.200	.167	.251	.018
L macramphidisc umbel	25	.067	.053	.076	.007
D macramphidisc umbel	25	.084	.068	.106	.008
L micramphidisc	25	.040	.029	.058	.008
L micramphidisc umbel	25	.012	.007	.018	.003
D micramphidisc umbel	25	.010	.007	.013	.001
L micruncinate	25	.078	.038	.182	.031

TABLE 30. — Some measurements of the spicules of *Pheronema pseudogiganteum* forma *stellata*.

	HCL 355					HCL 475					HCL 473				
	n	avg	min	max	std	n	avg	min	max	std	n	avg	min	max	std
L dermalia pinular ray	25	.131	.065	.190	.036	25	.072	.042	.137	.021	25	.140	.080	.198	.033
L dermalia tangential ray	25	.067	.034	.106	.019	25	.069	.042	.106	.016	25	.060	.034	.099	.020
L atrialia pinular ray	25	.384	.171	.555	.101	25	.202	.091	.277	.038	25	.354	.220	.490	.082
L atrialia tangential ray	25	.074	.042	.144	.022	25	.061	.042	.080	.010	25	.068	.038	.095	.016
L microhexactin ray	50	.072	.046	.095	.010	50	.072	.046	.106	.014	25	.069	.056	.092	.008
L macramphidisc	3	.206	.194	.224	.016	20	.192	.152	.228	.018	5	.198	.190	.205	.008
L macramphidisc umbel	3	.054	.049	.061	.006	20	.053	.042	.065	.007	5	.058	.053	.068	.007
D macramphidisc umbel	3	.100	.095	.106	.006	20	.093	.068	.110	.011	5	.102	.084	.106	.010
L mesamphidisc	25	.063	.043	.092	.014	23	.070	.050	.084	.008	25	.062	.034	.084	.012
L mesamphidisc umbel	25	.025	.013	.034	.005	23	.027	.015	.032	.004	25	.024	.016	.032	.004
D mesamphidisc umbel	25	.022	.013	.029	.004	23	.024	.012	.030	.004	25	.020	.013	.025	.004
L micramphidisc	16	.036	.025	.043	.006	18	.032	.020	.043	.007	25	.031	.023	.041	.005
L micramphidisc umbel	16	.012	.007	.014	.002	18	.011	.005	.018	.003	25	.011	.008	.014	.002
D micramphidisc umbel	16	.011	.008	.014	.002	18	.010	.005	.014	.002	25	.010	.007	.014	.002
L micruncinate	25	.069	.049	.099	.014	25	.083	.057	.118	.014					

	HCL 477				
L dermalia pinular ray	25	.120	.065	.163	.023
L dermalia tangential ray	25	.061	.038	.087	.013
L atrialia pinular ray	25	.163	.087	.239	.035
L atrialia tangential ray	25	.060	.042	.087	.011
L microhexactin ray	25	.130	.083	.198	.033
L macramphidisc	5	.198	.167	.228	.022
L macramphidisc umbel	5	.053	.046	.061	.005
D macramphidisc umbel	5	.101	.084	.118	.012
L mesamphidisc	25	.059	.041	.080	.011
L mesamphidisc umbel	25	.023	.015	.030	.004
D mesamphidisc umbel	25	.020	.013	.027	.004
L micramphidisc	25	.033	.027	.041	.004
L micramphidisc umbel	25	.012	.009	.014	.002
D micramphidisc umbel	25	.010	.007	.014	.001
L micruncinate	25	.065	.041	.099	.016

TABLE 31. — Some measurements of the spicules of *Pheronema pseudogiganteum* forma *variodisca*.

	HCL 364				
	n	avg	min	max	std
L dermalia pinular ray	25	.096	.068	.137	.017
L dermalia tangential ray	25	.059	.042	.080	.011
L atrialia pinular ray	25	.125	.091	.160	.020
L atrialia tangential ray	25	.090	.049	.144	.030
L microhexactin ray	25	.086	.057	.129	.018
L macramphidisc	25	.193	.137	.228	.022
L macramphidisc umbel	25	.060	.046	.076	.008
D macramphidisc umbel	25	.077	.053	.091	.009
L micramphidisc	1	.040	.040	.040	
L micramphidisc umbel	1	.013	.013	.013	
D micramphidisc umbel	1	.011	.011	.011	
L micruncinate	25	.046	.030	.084	.011