

BIOLOGICAL RESULTS OF THE SNELLIUS EXPEDITION
XXII. OCTOCORALLIA FROM THE MALAY ARCHIPELAGO
(PART II)

by

J. VERSEVELDT

Wipstrikkerallee 126, Zwolle, The Netherlands

With 16 plates and 59 text-figures

The material dealt with in this second part of "Octocorallia from the Malay Archipelago" comprises mainly specimens belonging to the family Nephtheidae. Most of these nephtheids were obtained during the cruise of the "Willebrord Snellius". In addition to this material I examined some specimens collected by the Siboga Expedition, which had to be identified or described again. Besides, there were in the Leiden Museum some unidentified colonies, obtained in Malayan waters. These, too, are now recorded.

Several authors have already pointed out how difficult it is to identify *Dendronephthya*, owing to the unsatisfactory description by some previous authors, and because of the great number of variations within the same species. Suffice it to refer to the discussion of the genus by Kükenthal (1905), Sherriffs (1922), Thomson & Dean (1931), Roxas (1933), Utinomi (1952), and Tixier-Durivault & Prevorsek (1959). The last-mentioned authors (1959: 5) proposed to split the genus *Dendronephthya* into three new genera, viz., *Spongodes*, *Roxasia* and *Morchellana*, agreeing with Kükenthal's sections Glomeratae, Divaricatae and Umbellatae. In a report on octocorals collected by Israel Expeditions in the Red Sea I propose to show that I do not sympathize with this creation of three new genera, but that I am inclined to follow Utinomi (1962) in distinguishing three subgenera, viz., *Dendronephthya*, *Roxasia* and *Morchellana*.

In order to detect the arrangement of the anthocodial spicules some zooids were carefully separated from the colony, then cleared in oil of cloves, and, after xylene, mounted in Canada-balsam. In *Dendronephthya* and *Stereonephthya* this method gave good results. The figures of the zooids of these genera have all been made from slides made in this way. In *Nephthea* and *Litophyton*, however, this method did not always prove to be satisfactory. Especially the small spicules at the base of the tentacles and in the tentacles themselves could not always be observed clearly. I therefore placed a few

zooids in a drop of water on a glass slide, to which I added a little hypochlorite solution. The zooids are affected by this reagent, and the spicules become visible more or less separately; they remain, however, in nearly the same place as in the zooid. The tentacle spicules, too, remain together and are clearly perceptible. It is recommendable to follow this whole maceration process under the microscope.

I found that especially in *Nephthea* there is usually an important difference between the spicules in the uppermost part of the sterile stalk and those in its most basal part. It is for this reason that I have described both types of spiculation, also in view of the possibility that a following investigator may not have the complete colonies at his disposal.

In addition to these Nephtheidae the Snellius Expedition collected material of two new species of the genus *Siphonogorgia*, and specimens of *Simularia querciformis* (Pratt) (family Alcyoniidae; this material has been overlooked during the preparation of the first part of this report, published in 1960).

I wish to express my thanks to Dr. H. Boschma, biologist of the Snellius Expedition, and to Dr. L. D. Brongersma, director of the Rijksmuseum van Natuurlijke Historie at Leiden, for the loan of the Snellius Expedition collection and other material. My thanks are also due to Dr. H. Engel, director of the Zoölogisch Museum at Amsterdam for placing the material of the Siboga Expedition at my disposal. I am extremely grateful to my colleagues Mr. W. ter Spill, who was good enough to assist me in making this paper ready for the press, and Mr. G. J. Vrijmoeth for making the excellent photographs.

LIST OF SPECIES

Family Nephtheidae Gray, 1862 (emend. Utinomi, 1954)

1. *Litophyton arboreum* Forskål, 1775
2. *Capnella imbricata* (Quoy & Gaimard, 1833)
3. *Nephthea albida* (Holm, 1894)
4. *Nephthea chabrolii* Audouin, 1828
5. *Nephthea striata* Kükenthal, 1903
6. *Nephthea bayeri* nov. spec.
7. *Nephthea compacta* nov. spec.
8. *Dendronephthya* (*Dendronephthya*) *binongkoensis* nov. spec.
9. *Dendronephthya* (*Dendronephthya*) *mucronata* (Pütter, 1900)
10. *Dendronephthya* (*Dendronephthya*) *roemeri* Kükenthal, 1911
11. *Dendronephthya* (*Dendronephthya*) *koellikeri* Kükenthal, 1905
12. *Dendronephthya* (*Roxasia*) *mirabilis* Henderson, 1909

13. *Dendronephthya (Roxasia) latipes* Tixier-Durivault & Prevorsek, 1960
 14. *Dendronephthya (Roxasia) boschmai* nov. spec.
 15. *Dendronephthya (Roxasia) snelli* nov. spec.
 16. *Dendronephthya (Morchellana) weberi* nov. spec.
 17. *Dendronephthya (Morchellana) pulchella* Utinomi, 1952
 18. *Dendronephthya (Morchellana) habereri* Kükenthal, 1905
 19. *Dendronephthya (Morchellana) minima* nov. spec.
 20. *Dendronephthya (Morchellana) aurora* (Ridley, 1887)
 21. *Dendronephthya (Morchellana) quadrata* Henderson, 1909
 22. *Dendronephthya (Morchellana) suluensis* nov. spec.
 23. *Stereonephthya ulicoides* Thomson & Dean, 1931
 24. *Stereonephthya macrospiculata* Thomson & Mackinnon, 1910
 25. *Stereonephthya multispina* nov. spec.
 26. *Stereonephthya spicata* Thomson & Dean, 1931
 27. *Stereonephthya cupuliformis* nov. spec.
 28. *Stereonephthya acicularis* nov. spec.
- Family Alcyoniidae Lamouroux, 1812 (emend. May, 1899)
29. *Sinularia querciformis* (Pratt, 1903)
- Family Nidaliidae Gray, 1869 (emend. Utinomi, 1958)
30. *Siphonogorgia boschmai* nov. spec.
 31. *Siphonogorgia chalmersi* nov. spec.

1. *Litophyton arboreum* Forskål, 1775

(pl. 1, text-fig. 1-2)

For literature and synonymy up to 1903 see: Kükenthal, 1903: 124.

Lithophytum arboreum Thomson & McQueen, 1907: 55-56; Shann, 1912: 511, pl. 61 fig. 1.

Litophyton arboreum Roxas, 1933: 385 (in his "Key" only).

Leiden Museum:

Celebes, April 18, 1878, 4 specimens (incorrectly labelled *Lithophytum formosanum* Kük.?).

The largest of the four flabby colonies looks as follows. There is a thin but strong basal membrane, adhering to the piece of madrepora to which the colony is attached. From this base four stems arise of various dimensions: the smallest is hardly 6 cm high, the largest has a total length of 11 cm. At a height of 3 cm this latter bifurcates. The basal part of the stems, the sterile stalk, has a length of about 3 to 4 cm. At different levels each stem gives off short side-branches or twigs covered with lappets. Sterile stalks and stems are strongly wrinkled longitudinally. In broad outline this colony

is rather like that figured by Savigny (1817), which figure has been reproduced by Shann (1912).

The other colonies are small. Two of them consist of only one undivided stem, the base of the sterile stalk is always somewhat broadened.

The lappets are small, round or oval; dimensions: 2×2 to 3×5 mm. Most of them, especially the terminal ones, are united into larger, conical groups, usually with rather pointed summits. These groups are 1-2 cm high and 1-1.5 cm wide.

The lappets are densely covered with zooids, in the lower ones they are less packed. The zooids have very short stalks, they are nearly sessile, the stalks gradually pass into the inturned anthocodiae. The anthocodial spicules are longitudinally arranged, not en chevron, and densely packed. Along the dorsal side they are crescentic spindles with strong spines on the convex outer side and few smaller spines on the other; length: 0.35-0.45 mm. The lateral sides of the anthocodiae are filled with mostly bent spindles, 0.12-0.25 mm long, the bent ones have likewise higher spines on the convex side. On the ventral side the spicules are 0.08-0.16 mm long, and provided with few low cones.

In some zooids there is at the base of the tentacles a wreath of small, transversely arranged spicules like those on the ventral side of the anthocodia, 0.07-0.10 mm long, and slightly spined or nearly smooth. On the dorsal side of the basal part of the tentacle the same spicules occur, lying in a more longitudinal direction. The tentacles themselves have very small spicules, 0.03-0.05 mm long. In other zooids, however, the wreath just mentioned is absent. In that case the longitudinally arranged spiny spicules gradually pass into smaller ones, which in their turn pass into the tentacular spicules.

The presence or absence of a supporting bundle is a very puzzling question. Along the lateral sides of the stalks there are usually about five spindles on each side, lying obliquely and imitating a supporting bundle of the ensheathing type. These spicules are, however, just like those in the cortex of the twigs, viz., spindles with few, low cones. Some of them extend into this cortex. Besides, there are no spicules disposed along the abaxial side of the stalk, lying parallel to its axis and supporting the anthocodiae. Sometimes one of the spindles just mentioned is curved in such a manner that it runs from one of the lateral sides of the stalk to the other, crossing the dorsal aspect of the stalk. And as regards the larger spicules along the dorsal side of the anthocodiae, they cannot very well be regarded as a supporting bundle either. So I hold the view that a real supporting bundle is absent. But by this and also by several other characters (*habitus*, size and

shape of the cortical spicules in the sterile stalk) is proved that there is a close relationship between *L. arboreum* and the genus *Nephthea*.

The cortex of the twigs has slender spindles mostly varying in length from 0.30-0.45 mm, a few are longer, up to 0.70 mm. They have spines or low cones.

In the cortex of the stems the bulk of the spicules are spindles, straight or curved or club-shaped. They measure 0.25-0.45 mm in length and 0.035-0.062 mm in width. They are provided with high spines, often bifurcated at the tip; height of the spines: 0.025-0.042 mm. Sometimes the spicules have

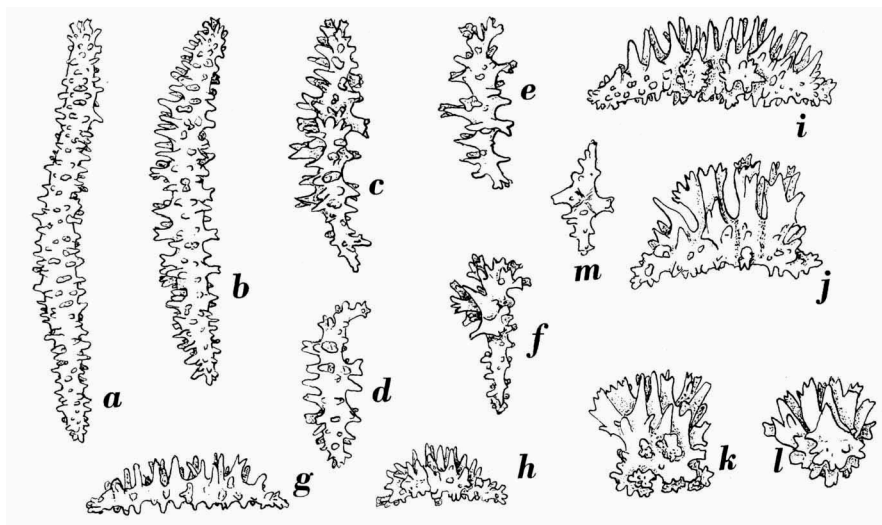


Fig. 1. *Litophyton arboreum* Forskål. a-h, spicules from the cortex of the stem; i-m, spicules from the cortex of the basal part of the sterile stalk. $\times 75$.

a convex side with higher spines (fig. 1 c-h). In addition to these there are some longer and wider spindles, up to about 0.80 mm in length and 0.05-0.07 mm in thickness, with blunt spines, 0.015-0.030 mm high (fig. 1 a, b).

In the sterile stalk the spindles are 0.25-0.60 mm long, and thickly covered with very high, split or jagged, foliate spines, 0.06-0.11 mm high, often higher than the width of the spicule. Towards the base of the stalk the spicules gradually diminish in size. Here there are numerous small spicules, 0.18-0.35 mm long, bearing the same strong prominences (0.08-0.14 mm high) mostly on one side. A few of the spindles may be larger, up to 0.50 mm long, and there are also some irregularly shaped small bodies (fig. 1 i-m).

The thin canal-walls have numerous spicules, especially in the central part of the coenenchyma. They are pointed spindles or blunt-ended cylinders, often curved, and beset with low cones or warts. Most of them are not longer

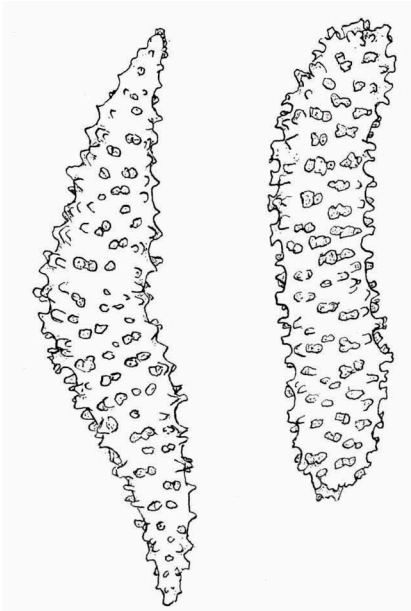


Fig. 2. *Litophyton arboreum* Forskål. Spicules from the canal-walls. $\times 75$.

than 1 mm, a few may be as long as 1.5 mm, the thickness is up to 0.21 mm (fig. 2).

Colour greyish.

Remarks. The specimens agree closely with the descriptions and figures given by Savigny (1817, figure reproduced by Shann, 1912), Klunzinger (1877) and Kükenthal (1903). In habitus they are more similar to the colony pictured by Savigny than to that figured by Klunzinger. The cortical spicules are unlike those pictured by Klunzinger, fig. 4c, but they agree with the descriptions given by Klunzinger and Kükenthal. I doubt if Klunzinger is correct in mentioning that the enlargement of the canal-wall spicules pictured by him in his fig. 4d is 80 \times .

Previously recorded from Red Sea, Zanzibar, New Britain.

2. *Capnella imbricata* (Quoy & Gaimard, 1833)

(pl. 2 fig. 1)

For references and synonymy see: Kükenthal, 1903: 129-131; Thomson & Dean, 1931: 71-73; Dean, 1932: 7; Roxas, 1933: 390-391, pl. 3 fig. 1; Macfadyen, 1936: 49.

Leiden Museum:

Snellius Expedition: Maratua, off N.E. Borneo, reef, August 14-18, 1929, 1 specimen; Obi latu, Moluccas, shore and reef, April 23-27, 1930, 1 specimen.

The colony from Maratua is the larger one, measuring 5.5 cm in height and 4.5 cm in breadth. The sterile stalk is 3.5 cm high and 1.5 cm wide, it is longitudinally furrowed. The stalk bifurcates into two short main stems, which bear the twigs. The latter are densely covered with zooids, forming cone-shaped or approximately cylindrical catkins, most of which are 1 cm long and 0.5 cm wide.

The specimen from Obi latu (pl. 2 fig. 1) is somewhat smaller. The sterile stalk is only 1.5 cm high, some of the catkins are larger and wider.

The colour of both colonies is white.

Previously recorded from New Ireland, Philippines, Malay Archipelago and Maer Island (Great Barrier Reef).

3. *Nephthea albida* (Holm, 1894)

(pl. 3 fig. 1, text-fig. 3-5)

Spongodes albida Holm, 1894: 30-32, pl. 2 fig. 8-10.

Nephtya albida Kükenthal, 1903: 160-161; Thomson & McQueen, 1907: 59; Thomson & Dean, 1931: 82-83.

Nephthea albida Roxas, 1933: 413.

Leiden Museum:

Snellius Expedition: Maratua, off N.E. Borneo, August 14-18, 1929, 2 specimens.

Island of Alkmaar, Bay of Djakarta, Java; leg. P. Buitendijk, August 1908, 2 specimens.

Island of Enkhuizen, Bay of Djakarta, Java; leg. P. Buitendijk, April 1906, 1 specimen.

Description of the colonies collected by the Snellius Expedition. The largest of both rigid colonies has a total height of 8 cm and a maximum breadth of 6.5 cm, it is flattened laterally. The flattened sterile stalk measures 2.5-3.0 cm in height and 4 cm in width, it shows fine longitudinal furrows. From this stalk two main stems arise, each giving off many short branches at different levels that bear the lappets. The latter are usually rounded cones varying in height from 4-8 mm and in width from 3-5 mm. Some of them may form larger, rounded conical lobes, about 12 mm in height and 8 mm in diameter.

The zooids, which are not closely packed on the lappets, have long stalks, often even longer than 1 mm, strongly broadening towards the base. The laterally flattened anthocodiae make right angles with the stalks. They widen upwards, at the height of the base of the tentacles they usually measure 0.70-1.00 mm in width, sometimes even 1.30 mm, the height is 0.50-0.70 mm.

As to the anthocodial spiculation there is a large variability in respect to the number and the arrangement of the spicules. Along the dorsal side

of an anthocodia stronger spicules occur, longitudinally arranged and covered with prominent thorns. On the dorso-lateral side there are spiny spindles 0.19-0.30 mm in length. Sometimes they show an indistinct arrangement en chevron, about 4-6 in a row (fig. 3 a), in other cases they are irregularly distributed (fig. 3 b). On the lateral surface the spicules are irregularly arranged, and vary in number. Some of them are spiny spindles, up to about

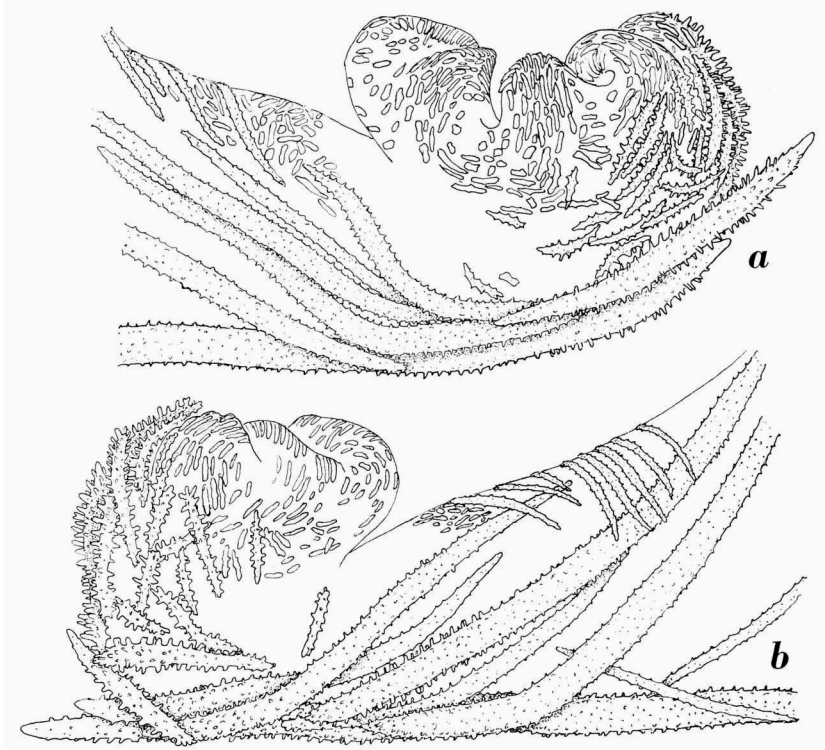


Fig. 3. *Nephthea albida* Holm. a-b, zooids of the largest specimen from Maratua. $\times 50$.

0.20 mm in length, the majority, however, consists of small, usually smooth rods, sometimes slightly constricted in the middle, and measuring 0.03-0.08 mm in length. At the base of the tentacles these rods are densely accumulated, and arranged in a more or less longitudinal direction. In the tentacles themselves these rods are transversely arranged. On the ventral side of the anthocodia the same small rods occur, they are not numerous here.

On the ventral side of the polyp stalk just below the anthocodia spicules are completely wanting; towards the base of the stalk there follow first many small rods irregularly arranged, and next to them there are some slender spindles lying transversely. Along the lateral and dorsal sides of the

stalk occur spindles composing the supporting bundle which is of the en-sheathing type; it consists of about 8-10 strong spindles and a few smaller ones. The dorsal ones are strongest, up to about 1.35 mm in length and 0.14 mm in width, they have high spines. In some zooids one or two spindles project beyond the anthocodia for a distance of up to 0.45 mm, the extreme tips are sharp and nearly smooth. In other zooids the supporting bundle does not project, the spindles being curved along the dorsal side of the polyp head.

In the cortex of the stems are slender, fragile spindles and curved rods, mostly up to 0.45 mm long, a few are up to 0.95 mm, the width is 0.045 mm. They have blunt, not jagged thorns, 0.016-0.022 mm high (fig. 4 a, b). In the uppermost part of the sterile stalk these spindles are longer, up to 1 mm, and wider, up to 0.055 mm; the thorns are 0.025-0.031 mm high (fig. 4 c-e).

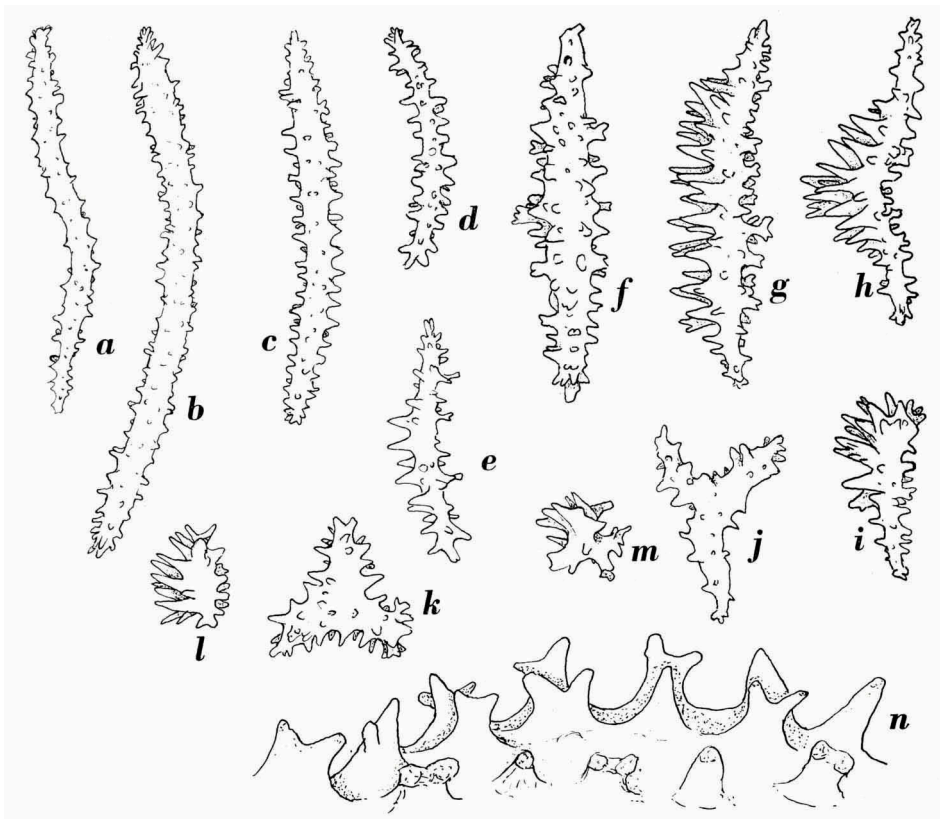


Fig. 4. *Nephthea albida* Holm. a-b, spicules from the cortex of the stem; c-e, spicules from the uppermost part of the sterile stalk; f-m, spicules from the base of the sterile stalk; n, part of a canal-wall spicule. a-m, $\times 75$; n, $\times 270$.

Towards the base of the stalk the spindles become gradually wider, 0.05-0.10 mm, but shorter, up to about 0.65 mm. The often jagged thorns, 0.075 mm in height, are frequently more strongly developed on one side of the spindle (fig. 4 f, g, h). In addition to these there are smaller tri- and quadriradiates and club-shaped types, 0.20-0.38 mm in length (fig. 4 i-k). Besides, some still smaller, irregularly shaped spicules or derivatives of the spindle type occur, usually with very high thorns on one side (fig. 4 l-m).

In the interior of the sterile stalk the canal-walls contain stout spindles, up to about 1.50 mm in length and 0.21 mm in width, richly beset with thorns or bifurcated, slightly wart-like prominences (fig. 4 n).

The whole colony is light brown.

The other colony from the same locality is a little smaller, measuring 6.5 cm in total height and 4.5 cm in diameter, it is flattened too. In all respects it agrees with the one described above.

Remarks concerning the colonies collected by P. Buitendijk.

One of the colonies collected near the Island of Alkmaar is a rather large one. It measures 7 cm in total height, 9 cm in maximum breadth and 5 cm in thickness. It is somewhat more flabby than the specimens described above. From the wide sterile basal part arise two thick main stems. The catkins may be united into larger lobes or they arise directly from the stems; they are small and rounded or slightly conical with round tips; dimensions: 2.5×2.5 , 3×5 , 4×5 , or 4×7 mm. Colour pinkish-white.

The smaller colony from the same locality, which is attached to a piece of coral, is 5 cm broad and 4 cm high. Colour white.

Both colonies differ from each other, mainly in respect of the spicules as shown by the subjoined table.

Large colony	Smaller colony
The spicules composing the supporting bundle are up to 1 mm long and 0.05-0.06 mm wide.	They are up to 1.35 mm long and 0.09-0.12 mm wide.
The supporting bundle hardly projects, if at all.	It projects more frequently, for a distance of 0.30-0.40 mm.
The cortical spicules of the stem are up to 0.80 mm in length, their thorns are up to 0.035 mm high.	They are up to 1.20 mm long, the often jagged thorns are up to 0.05 mm high.
The cortex of the sterile stalk contains:	
(a). Spindles, 0.3-0.4 mm long.	(a). The spindles are longer, 0.6-0.7 mm.
(b). Spicules with higher prominences on the convex side are rare; these prominences are up to 0.05 mm high.	(b). These spicules are more numerous, the prominences are higher, up to 0.085 mm, and jagged.
(c). Numerous small irregular bodies, 0.12-0.24 mm long or in diameter, prominences included.	(c). These bodies seem larger, owing to the much higher, jagged prominences.

In comparing these specimens with the descriptions of *N. albida* given by Holm, Kükenthal and Roxas, and with the description of the colony from Maratua given above we note the following differences:

(a). The polyps are more densely packed.

(b). The polyps are 0.40-0.50 mm high and 0.55-0.70 mm broad (Holm and Kükenthal: 0.7×1.0 mm, but in the specimen collected by Rüppell and described by Kükenthal (1903: 160) the polyps are smaller too, and more densely packed; Roxas: $0.5-0.6 \times 0.7-0.8$; specimens from Maratua: $0.5-0.7 \times 0.7-1.0$ mm).

(c). The polyp stalks are very short, up to 0.3 mm (Holm and Kükenthal: 0.6 mm; Roxas: about 0.42 mm; specimens from Maratua: 1.0 mm and more).

(d). In many cases the anthocodial armature shows no arrangement en chevron; in others there is a slight indication of such an arrangement, and in that case there are 5 spindles in a row (Holm, Kükenthal and Roxas: 6 in a row; specimens from Maratua: 4-6 in a row).

(e). In the anthocodiae the spiny dorso-lateral spicules are up to about 0.22 mm in length (Holm and Kükenthal: 0.3 mm; Roxas: 0.35 mm; specimens from Maratua: 0.19-0.30 mm).

As to the dimensions of the anthocodiae (point b) and the length of the polyp stalk (point c) we can say that the measurements recorded by Roxas lie between those given by Holm and Kükenthal and those found in my specimens from Alkmaar.

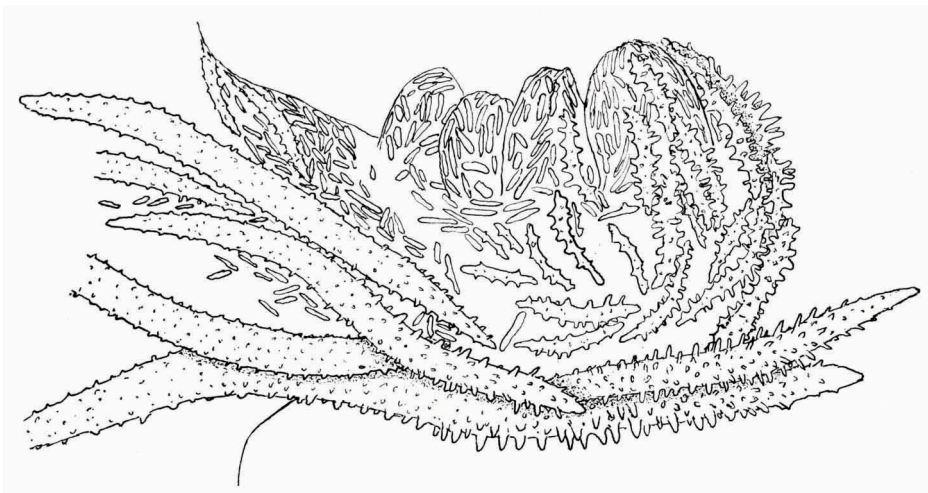


Fig. 5. *Nephthea albida* Holm. Zooid of the specimen from the Island of Enkhuizen. $\times 75$.

In spite of the differences mentioned above I am of the opinion that these colonies from Alkmaar have to be referred to *N. albida*.

The same applies to the specimen from the Island of Enkhuizen. It is a beautiful, stiff, pinkish-white colony, growing on a piece of coral. In this colony, too, the anthocodiae are small: $0.40-0.55 \times 0.55-0.75$ mm (fig. 5; did stronger contraction play a part?), the polyp stalks are very short, many zooids are nearly sessile. As far as the density of the polyp arrangement is concerned this colony stands between the colonies from Maratua and those from Alkmaar.

Previously recorded from Red Sea, Indonesian waters (Saleyer) and the Philippines.

4. *Nephthea chabrolii* Audouin, 1828

(pl. 4 fig. 1, text-fig. 6-7)

For synonymy up to 1903 see: Kükenthal, 1903: 157.

Nephtya chabrolii Shann, 1912: 511, pl. 61 fig. 2-5, pl. 62 fig. 6; Thomson & Dean, 1931: 83.

Nephthea chabrolii Roxas, 1933: 413; Utinomi, 1954: 59, fig. 2; Utinomi, 1956: 233.

Leiden Museum:

"Voyage Boie & Macklot", nos. 101 and 83, 2 specimens.

Most likely the colonies collected between 1825 and 1827 by H. Boie and H. C. Macklot come from the coast of Java.

Description of the specimen "Boie & Macklot", no. 101. The flabby colony has a total height of about 7 cm and a maximum breadth of 8 cm. From the short basal sterile part many stems arise, strongly varying in length. The smaller ones are covered with catkins, the stronger ones have short side-branches bearing the catkins. The catkins are cone-shaped, rounded at the tip or rather sharp; dimensions: 2×3 , 3×5 , 4×5 , 5×9 mm. At the tips of the stems they are united into larger conglomerations.

The zooids (fig. 6a), crowded on the catkins, have very short stalks, up to 0.15 mm in length, many of them seem to be sessile. The anthocodiae are borne at right angles to the stalk, they are globular, measuring 0.50-0.60 mm in height and in breadth. Usually the heavily spined anthocodial spicules are not arranged en chevron, in some cases, however, the dorso-lateral surface shows an arrangement in double rows, each consisting of up to six spindles. The latter are 0.15-0.25 mm long. On the ventral side a few spiny, small spicules occur, 0.05-0.10 mm long. The tentacular spicules are small, toothed rods, 0.04-0.08 mm long.

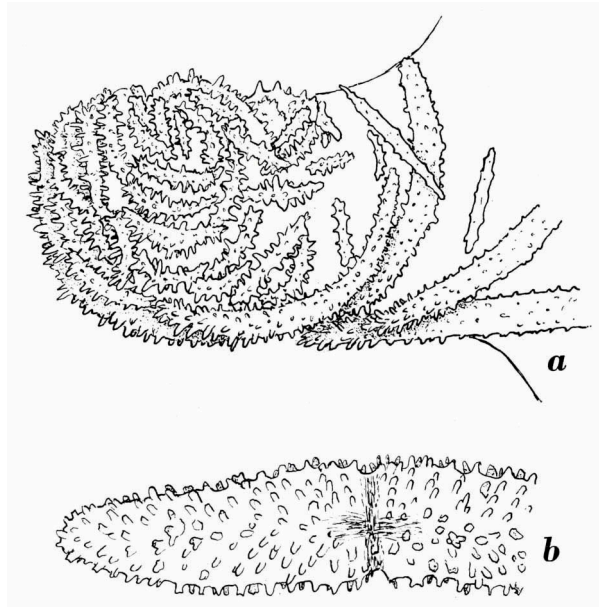


Fig. 6. *Nephthea chabrolui* Audouin. a, zooid; b, part of a spicule from the canal-walls in the sterile stalk. $\times 75$.

The weak supporting bundle consists of about 8-10 spindles, up to 1.20 mm long (usually shorter!) and about 0.07 mm wide. Towards the abaxial tip the spines are stronger and more thickly set. Sometimes the supporting bundle projects for a short distance, 0.20-0.25 mm, but mostly it does not project at all.

The cortex of the stem is covered with straight or slightly curved spindles and rods, beset with spines or warts. Most of them are 0.30-0.50 mm long and 0.035-0.055 mm wide, a few are up to 0.90 mm long and 0.085 mm wide. Sometimes the spindle is bifurcated or it bears a short side-branch, very occasionally a quadriradiated form is seen (fig. 7 a-c).

In the uppermost part of the sterile stalk the spiculation does not show any important difference from that of the stem, but in the basal part of it the spicules include the following types:

(a). Stouter and wider spindles or rod-like types, up to 1.00 mm long and 0.11 mm wide, covered with higher and coarser warts (fig. 7 d).

(b). Smaller spindles, 0.30-0.55 mm long. Most of them have a convex side with numerous high spines, 0.040-0.055 mm high, sometimes jagged at the tip (fig. 7 e, f).

(c). Numerous small, spiny bodies, cylinder- or star-shaped and irregular forms, about 0.13-0.25 mm in length or in diameter (fig. 7 j-l).

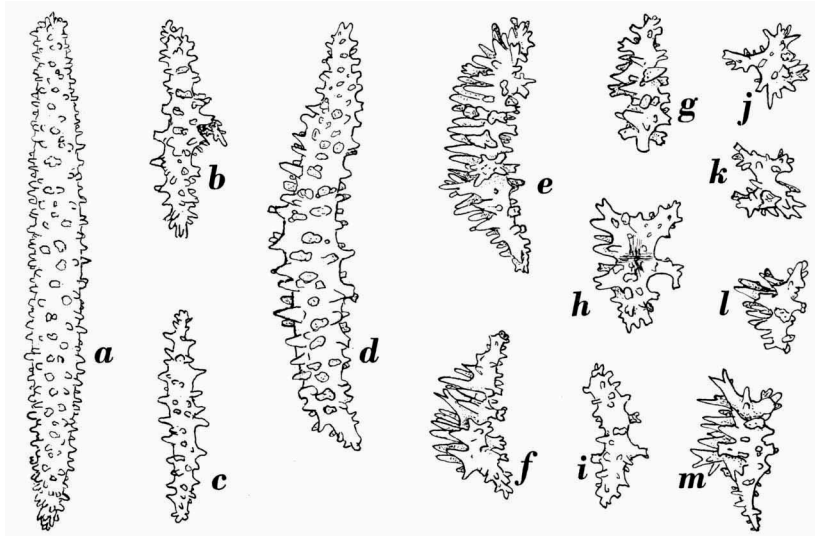


Fig. 7. *Nephthea chabrolii* Audouin. a-c, spicules from the cortex of the stem; d-m, spicules from the cortex of the base of the sterile stalk. $\times 75$.

(d). Transitional forms between the types mentioned sub (b) and (c) (fig. 7 g-i), a single one is club-shaped (fig. 7 m).

The canal-walls are filled with massive spindles, up to 1.35 mm long and 0.28 mm wide, they bear low spines and warts, often placed in oblique sloping rows (fig. 6 b). Many spindles are bifurcated at one end or have one or two side-branches, gradually merging into tri- or quadriradiated forms. Besides these larger spindles (and derivatives of them) there are many smaller ones, about 0.40-0.60 mm long, and tri-, quadri- and multiradiates, but the prominences are now less dense set and low cone-shaped.

Colour greyish-brown.

The specimen "Boie & Macklot", no. 83 agrees fairly well with that described above.

5. *Nephthea striata* Kükenthal, 1903

(pl. 2 fig. 2, text-fig. 8-10)

Nephthya striata Kükenthal, 1903: 166-167, pl. 7 fig. 12, pl. 9 fig. 60; Thomson & Dean, 1931: 89.

Nephthea striata Roxas, 1933: 414-415.

Leiden Museum:

Snellius Expedition: Morotai, N. Moluccas, June 3-10, 1930, 1 specimen and a fragment.

The stiff colony measures 4 cm in total height and a good 3 cm in maximum breadth. The short, wide sterile stalk has been torn off obliquely, a small part of the base is still present. The stem is wide, about 1.5 cm, and gives rise to closely set side-branches and twigs bearing the catkins. The latter are oval-shaped or slightly conical with rounded tips; dimensions: 2-5 × 2-7 mm. The smaller ones (2 × 2, 3 × 4 mm) are usually united into larger, more or less cone-shaped groups of catkins, 1 cm long or more.



Fig. 8. *Nephthea striata* Kükenthal. a, zooid; b, a small zooid showing slightly better the en chevron arrangement of the spicules. × 75.

The catkins are so closely packed that stem and branches are hardly visible, which gives the whole a cauliflower-like appearance. Stem and stalk are striate longitudinally and transversely.

The zooids, 0.45-0.70 mm in height and in breadth, are densely arranged on the lobes, and make right angles with the very short stalks, up to about 0.25 mm in length.

The anthocodial spicules are usually irregularly arranged in a more or less longitudinal direction, sometimes they show an indistinct arrangement in double rows, five to six in a row (fig. 8). On the dorso-lateral sides the spindles measure 0.19-0.30 mm in length, a single one may be 0.38 mm long, their width is 0.025-0.040 mm, they have high spines. On the inner side of the anthocodiae are numerous small, spiny rods, about 0.08-0.11 mm long. The tentacles have two rows of transversely arranged spicules, 0.03-0.07 mm long, and nearly smooth.

The spicules of the supporting bundle (fig. 9 a, b) are curved spindles. Some of them may be 0.90-1.20 mm long, but mostly they are shorter; their width is 0.07-0.09 mm. They are closely beset with simple warts or spines,

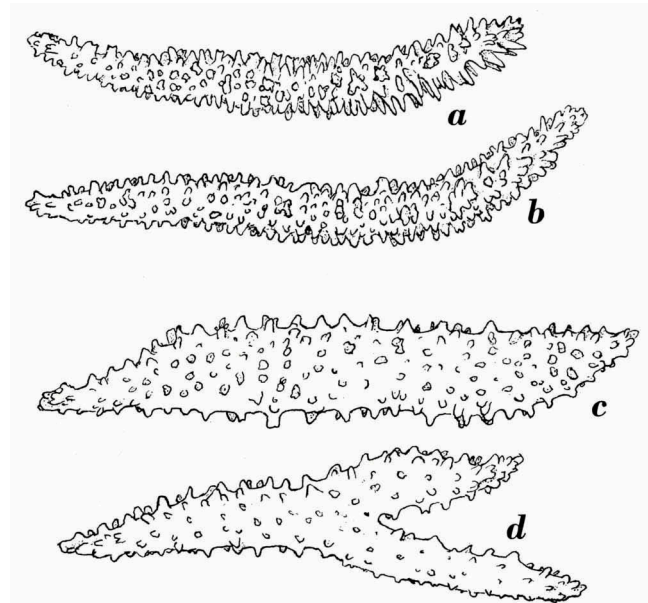


Fig. 9. *Nephthea striata* Kükenthal. a-b, spicules from the supporting bundle; c-d, spicules from the canal-walls. $\times 75$.

at the abaxial end the spines are higher and more densely packed. In many zooids one of the spindles projects, and that for a distance of up to 0.22 mm. In other zooids the supporting bundle does not project.

In the cortex of the stem are curved rods and spindles; most of them are 0.12-0.40 mm long, some are up to 0.70 mm long (these longer ones are more spindle-shaped), their width is 0.022-0.037 mm (the long spindles are 0.05-0.07 mm wide). They bear relatively high spines or wart-like prominences, 0.028-0.034 mm high (fig. 10 a-d).

In the uppermost part of the sterile stalk the spicules are still spindles, usually 0.30-0.55 mm long and 0.022-0.042 mm wide, but a few are 0.70 mm long and 0.068 mm wide. They have high (0.045 mm), often jagged spines, sometimes on one side of the spicule they are higher than on the other side; other spicules have only cone-shaped prominences (fig. 10 e-h).

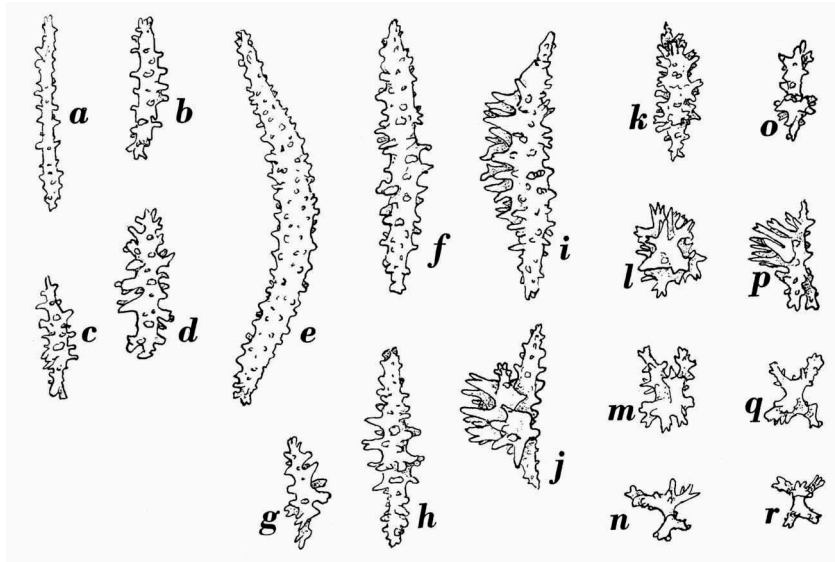


Fig. 10. *Nephthea striata* Kükenthal. a-d, spicules from the cortex of the stem; e-h, spicules from the cortex of the uppermost part of the sterile stalk; i-r, spicules from the cortex of the basal part of the sterile stalk. $\times 75$.

In the basal part of the sterile stalk the number of spindles has diminished (fig. 10 i, j). The large majority now consists of small stars, double-stars, capstans and irregular bodies with high, jagged spines; their diameter or length varies from 0.07-0.15 mm (fig. 10 k-r).

The canal-walls contain numerous massive spindles, sometimes bifurcated at one or at both ends, or provided with a side-branch; especially the smaller ones may be three- or four-radiated. The prominences are low cones or simple warts, the dimensions are 0.45-1.35 \times 0.06-0.17 mm (fig. 9 c, d).

Colour white.

I compared my specimen with that collected by the Siboga Expedition and described by Thomson & Dean (1931: 89). In that specimen the sterile stalk is much longer, for the rest it agrees in all respects with my specimen.

6. *Nephthea bayeri* nov. spec.

(pl. 5 fig. 1, text-fig. 11-13)

Leiden Museum:

Snellius Expedition: Obi latu, Moluccas, shore and reef, April 23-27, 1930, 2 specimens.

One of the rather flabby colonies, which I choose as the holotype, has a maximum breadth of 2.5 cm and a total height of 5.5 cm, of which 1.5 cm goes to the sterile stalk, which is 8 mm wide. The base of the stalk continues into a ribbon-like strip, 2 cm long and 4 mm wide, bearing two groups of small lobes, one in the middle and one at the end. The other colony is 3.5 cm wide, the sterile stalk is shorter (1 cm), at the base of it there are now two flat, stolon-like, narrow strips. One of them is 3 cm long and about 3 mm wide. At regular distances it bears some small lobes, the other strip is shorter. The occurrence of these strips is a remarkable thing, especially because of the fact that both colonies have them. They are thin, and contain spindle-shaped spicules, which fully agree with those occurring in the cortex of the stem (see below and fig. 12 a-c). On the underside there are longitudinal membranes reminding us of canal-walls. The edges of the strips are jagged, giving the impression that the strips have been torn off from other parts of the colonies. They cannot be real stolons.

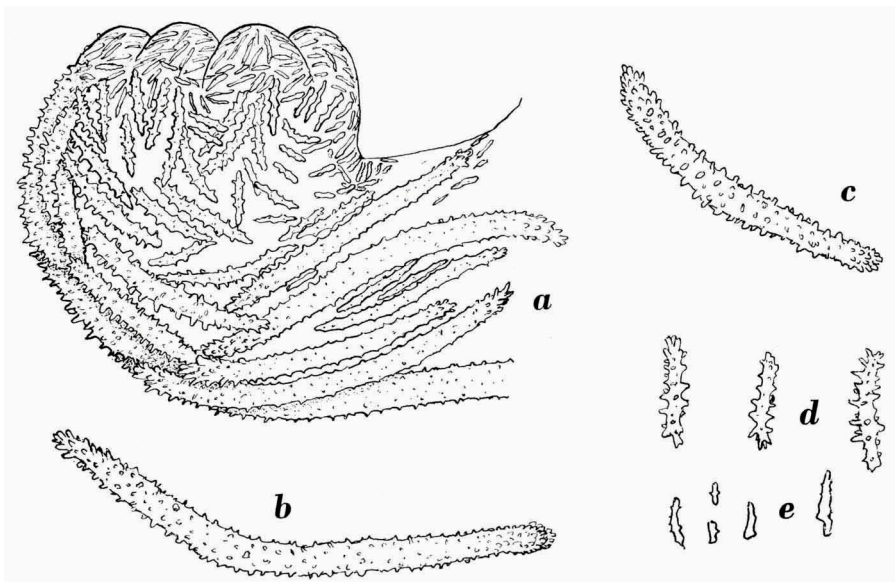


Fig. 11. *Nephthea bayeri* nov. spec. a, zooid; b-c, spicules from the supporting bundle; d, three point spicules; e, some small spicules from the tentacles. $\times 75$.

The sterile stalk passes into the main stem, which gives rise to short side-branches; stem and branches bear short twigs, densely covered with polyps. These lobes are small; dimensions: 2-4 × 3-5 mm; they are rounded cones or nearly spherical. The terminal ones are united into larger groups.

The zooids are borne at right angles to the very short stalks, up to 0.30 mm in length. The anthocodiae measure 0.60-0.70 mm in height and in breadth (fig. 11 a). On their dorso-lateral sides the spicules are sometimes indistinctly arranged in double rows, four to five in a row. These spindles are 0.15-0.32 mm long and have high spines (fig. 11 d). On the inner side are numerous smaller rods, 0.05-0.10 mm long, toothed or smooth. At the base of the tentacles and in the tentacles themselves the same small rods abound. Most of them are only 0.05-0.07 mm long (fig. 11 e).

The supporting bundle is of the ensheathing type. In addition to a few smaller spindles it is composed of about six to eight larger ones, 0.40-0.70 mm long, in a few cases as long as 1.05 mm; they are 0.045-0.055 mm wide, and bear warts and wart-like spines. Towards the tip the prominences are higher and more numerous (fig. 11 b, c). Usually the supporting bundle does not project, in a few cases one spindle may project for a distance of up to 0.20 mm.

The cortex of the main stem has spindles only, 0.25-0.55 mm long and 0.040-0.055 mm wide; the narrow ones have blunt cones, the wider ones

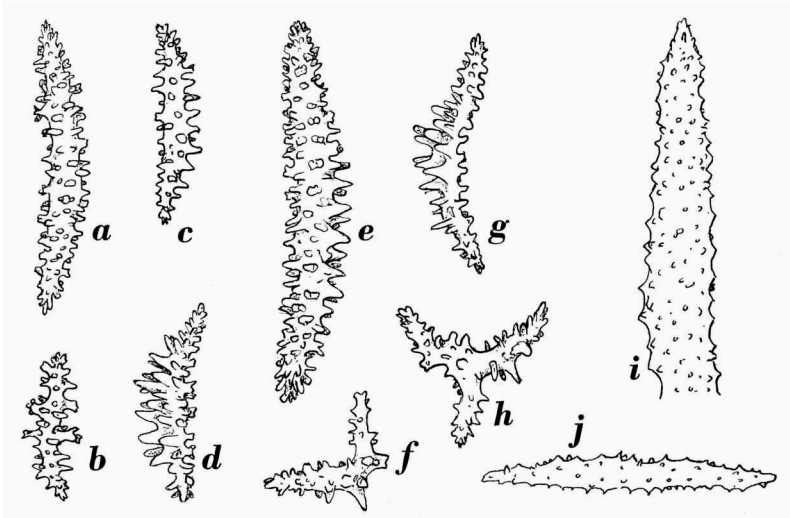


Fig. 12. *Nephthea bayeri* nov. spec. a-c, spicules from the cortex of the stem; d-h, spicules from the uppermost part of the sterile stalk; i-j, spicules from the canal-walls of the sterile stalk. × 75.

are covered with higher spines (about 0.03 mm high), mostly split at the tip (fig. 12 a-c).

In the uppermost part of the sterile stalk the spindles are wider, viz., 0.055-0.075 mm, the prominences are higher (0.04 mm). Besides these spindles there are some smaller spicules such as clubs and star-shaped types (fig. 12 d-h).

In the basal part of the sterile stalk (in one of the colonies this part is wanting) the following types are present:

(a). Spindles, still wider than those mentioned above (up to about 0.10 mm) and as long as 0.75 mm. In many cases they bear longer, sometimes jagged spines on one side; length of these spines 0.05 mm (fig. 13 a, b).

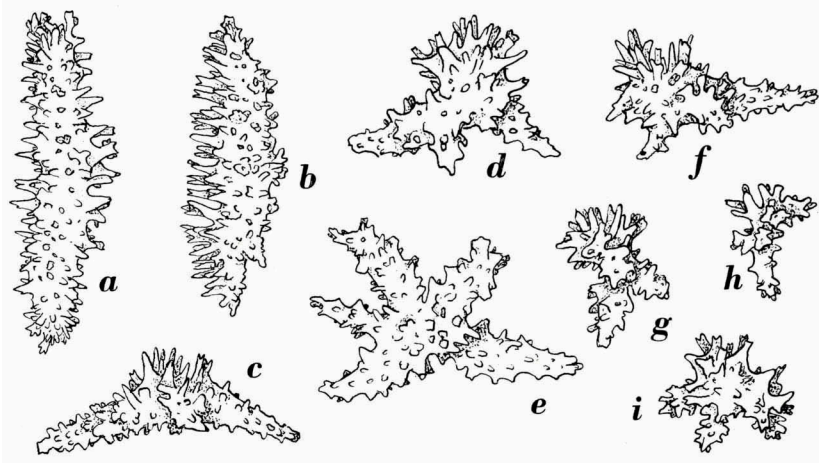


Fig. 13. *Nephthea bayeri* nov. spec. a-i, spicules from the cortex of the basal part of the sterile stalk. $\times 75$.

(b). Curved spindles with high spines on the convex side, often these spindles are more or less "kneed"; length: 0.40-0.65 mm (fig. 13 c, d).

(c). Tri-, quadri- or multi-radiated forms, clubs, bifurcated spindles, etc.; length or diameter 0.35-0.55 mm (fig. 13 e, f).

(d). Smaller bodies, radiated types or small spindles, measuring 0.15-0.28 mm in length or in diameter; they are not numerous (fig. 13 g-i).

The canal-walls are scantily furnished with spicules. There are spindles only, sometimes bifurcated at one end, and bearing low cones; length: up to 1 mm but usually much shorter; width: 0.06-0.12 mm (fig. 12 i, j).

Colour light greyish-brown.

I was unable to refer these specimens to any of the *Nephtheas* known up

to now. According to Kükenthal's scheme this species should be placed among his group C₂, when following Roxas's scheme it is nearest to *N. striata*, *N. laevis* and *N. brassica* but it agrees with none of them, nor with other *Nephtheas* hitherto described.

It is with great pleasure that I propose to name this species after Dr. Frederick M. Bayer as a token of appreciation for his excellent studies on octocorals.

7. *Nephthea compacta* nov. spec.

(pl. 5 fig. 2, text-fig. 14-15)

Leiden Museum:

"Voyage Boie & Macklot", nos. 87 and 91, 2 specimens; locality most likely the coast of Java.

Both colonies, limp, and light brown in colour, agree with each other in all respects; the one labelled no. 91 I choose as holotype.

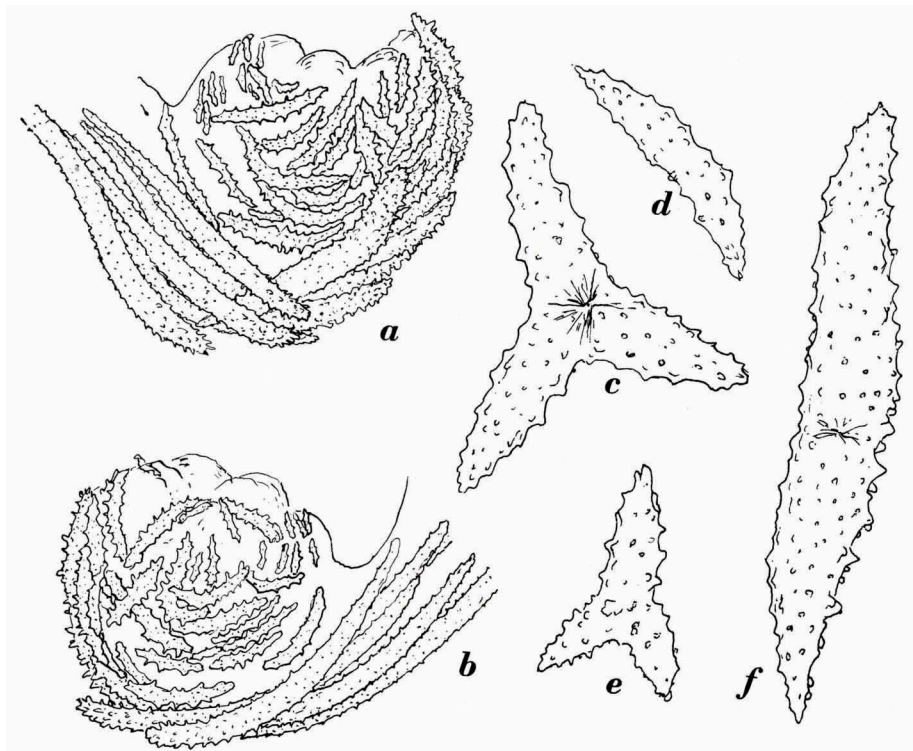


Fig. 14. *Nephthea compacta* nov. spec. a-b, zooids; c-f, spicules from the canal-walls of the sterile stalk. $\times 75$.

The colony is flattened laterally. The sterile stalk is 3 cm high, 5.5 cm broad and no more than 0.5 cm thick. On one side it continues into a flap apparently torn off from the sterile stalk of another part of the colony. From the sterile stalk many stems arise, 3-4 cm high, all nearly lying in one plane, and composing the flattened polyparium, which measures 9 cm in maximum breadth and 4 cm in thickness.

The stems bear short twigs, densely covered with catkins that are spherical or slightly conical, with rounded summits. They measure $2-4 \times 2-6$ mm. Usually they are united into dense, rounded masses hiding the surface of the stems from view.

The catkins bear very closely set small zooids (fig. 14 a, b). The anthocodiae are globular, 0.45-0.60 mm high and wide, and are borne at right or acute angles to the polyp stalk, which is so short that in many cases the zooids seem to be sessile. The anthocodial spicules are mostly irregularly arranged, in some cases the dorso-lateral ones are placed in double rows, five or six in a row. The spindles are 0.15-0.23 mm long and have strong spines. Those on the ventral side are much smaller, about 0.07-0.10 mm long, they are smooth or slightly toothed. In the tentacles there are only few spicules of the type just mentioned.

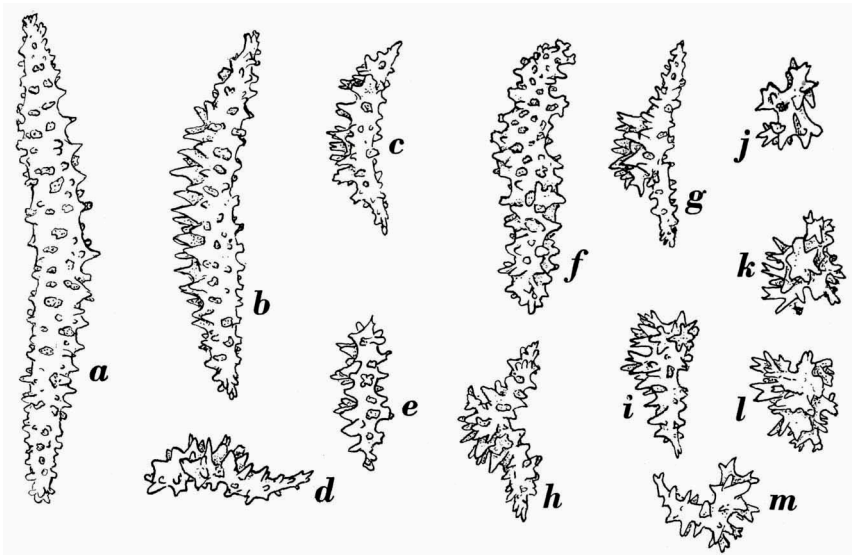


Fig. 15. *Nephthea compacta* nov. spec. a-e, spicules from the cortex of the stem; f-m, spicules from the cortex of the basal part of the sterile stalk. $\times 75$.

The supporting bundle consists of about eight larger spindles, 0.60-0.85 mm long and 0.05-0.09 mm wide, beset with low cones or spines. Towards

the tip the spines are stronger and more crowded. In some zooids one or two spindles project for a short distance, up to 0.3 mm, but generally they do not project at all.

In the cortex of the stems relatively wide spindles are met with. A good many of these are 0.20-0.30 mm long and 0.04-0.06 mm wide, but also larger ones occur, up to 1 mm long and 0.85 mm wide. They are straight or curved, and are thickly covered with spines, 0.014-0.028 mm high. A few have higher spines on one side; spines 0.05 mm high (fig. 15 a-e).

In the uppermost part of the sterile stalk the same spindles are present, but further down the spiculation changes. Here we find:

(a). Curved spindles or rod-like forms, up to 0.70 mm long, thickly covered with sometimes jagged spines and warts (fig. 15 f).

(b). Spindles with higher spines on the convex side (fig. 15 g, h).

(c). Numerous small, irregular bodies: clubs, spindles or stellate types, with high, jagged, foliar spines: length or diameter: 0.15-0.25 mm (fig. 15 i-m).

In the canal-walls of the sterile stalk we find massive spindles, sometimes bifurcated at one end or forming large triradiates; they are not thickly beset with low cones; dimensions: up to 1.40×0.21 mm. In addition to these large spindles there are numerous smaller ones and tri- or quadriradiated forms (fig. 14 c-f).

Colour light brown.

Of the colony labelled no. 87 the sterile stalk fails. In my opinion it is not impossible that the flap at the base of the specimen described above has formed part of this specimen no. 87, so that both colonies are originally parts of one and the same colony.

8. *Dendronephthya (Dendronephthya) binongkoensis* nov. spec.

(pl. 4 fig. 2, text-fig. 16)

Leiden Museum:

Snellius Expedition: Binongko, Tukang Besi Islands, off S.E. Celebes, depth about 10 m, March 7-10, 1930, 3 specimens, preserved in formol.

Diagnosis. Glomerate; polyparium flattened; lower branches not foliaceous; zooids in bundles of about 7-12; anthocodiae in obtuse angles with the very short stalks; anthocodial spicules in eight double rows of 4-6 in a row, one or two larger and projecting markedly; grade III: supporting bundle very strong, largely projecting.

Formula. III = 1P + (3-5) p + 0 Cr + very strong S.B. + 0 M.

Description. Three small colonies, which are in all respects identical, have been collected at the same place. The largest is 5 cm in height and 5.5 cm in breadth, the others are slightly smaller. In all three colonies the sterile stalk is absent. The polyparium is flabby and flattened in one plane. It consists of two or three main stems, which bear the short branches with the groups of polyps. In the lowermost part of the stem the clusters are well separated from one another, so the contour is interrupted. Higher up, however, the contour is almost continuous. The lowest branches are not foliaceous. Probably the specimens belong to the *studeri*-group of Kükenthal, but, in view of the smallness of the colonies, this cannot be said with absolute certainty.

The zooids are arranged in groups of 7-12. The anthocodiae make obtuse angles with the short stalks of 0.5-0.7 mm in length. Up to the base of the tentacles the anthocodiae are 0.35-0.55 mm in height, their breadth varies from 0.55-0.90 mm. The anthocodial armature shows eight double rows of converging, curved, brick-red spindles, the number in each row is 4-6, sometimes 3 (fig. 16 a-b). In the lateral points the ventral row has usually more spindles, often 6, than the dorsal row which has about 4. In each double row one or two hockey-stick-shaped spicules are considerably larger, they may reach a length of up to 1.45 mm, the projecting point being up to 1.0 mm long. Usually this large spicule is uppermost in a row, but sometimes it is the second spindle from the top, in this case a smaller one occurs alongside and close to the basal part of that long spicule. The other spicules are 0.3-0.6 mm in length, they have low spines, the large projecting spindles have somewhat higher spines. In addition to these anthocodial spicules some accessory spindles are sometimes present. The tentacles are armed with small, light red spicules, the largest measure about 0.08 mm in length.

The supporting bundle is composed of some smaller spindles and one or two very large ones. The largest of them is as long as 4.5-5.3 mm and 0.16-0.25 mm wide and projects considerably, up to 2.6 mm, beyond the anthocodia. One or two other long spindles may also project for some distance. These long extending points give the bundles of zooids a spiny appearance.

The cortex of the stem contains slender, white spindles lying transversely, up to 5 mm in length and 0.32 mm in width, and covered with low blunt spines (fig. 16 c).

As the sterile stalk is wanting nothing can be said about the cortical spicules in it.

In the canal-walls many white spindles occur of greatly varying size, up to 3.5 mm long and 0.38 mm wide. They resemble the spicules in the cortex

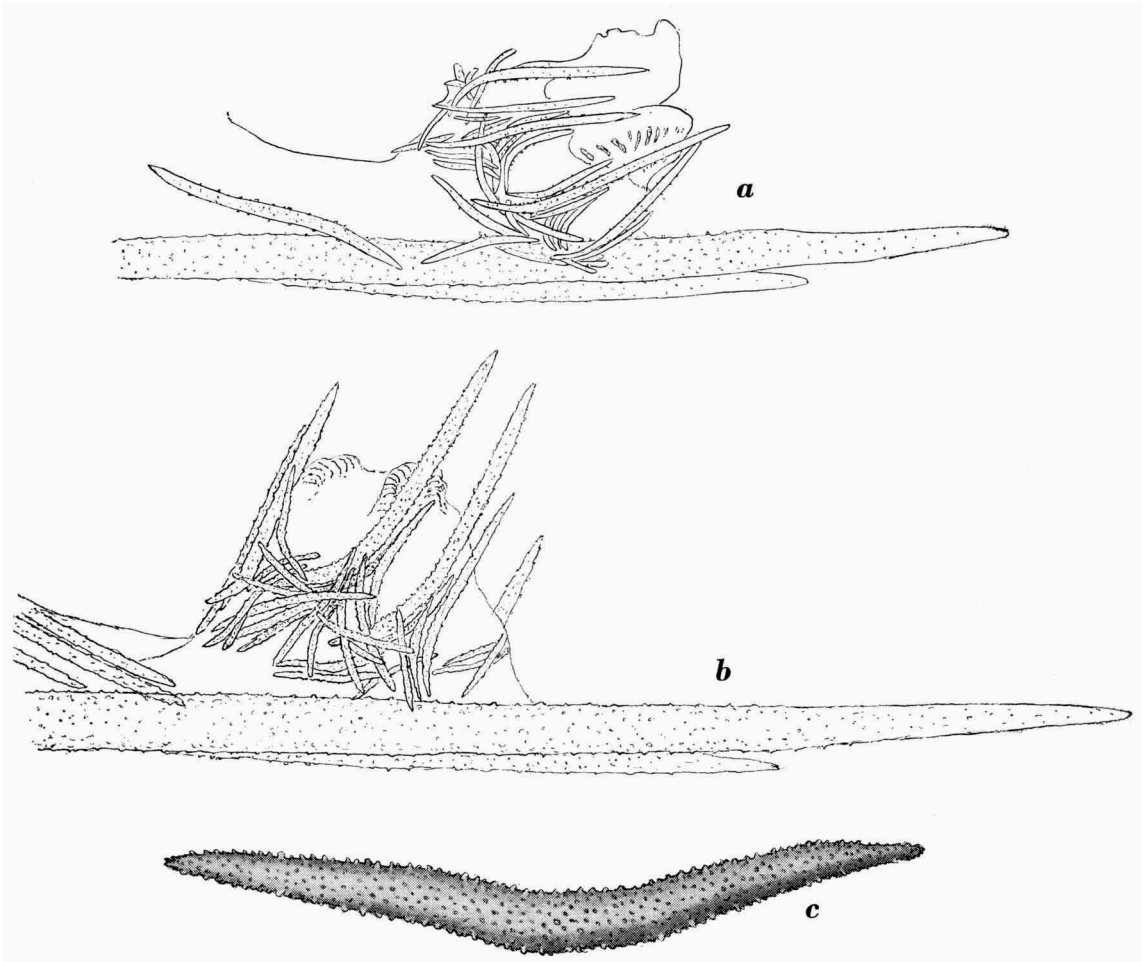


Fig. 16. *Dendronephthya (Dendronephthya) binongkoensis* nov. spec. a, zooid with smaller and smoother point spicules; b, zooid with larger and more spinose point spicules; c, spindle from the cortex of the stem. $\times 40$.

of the stem, but some of them are wider and more irregularly curved.

Colour. Stem and branches are white, the spicules of the supporting bundles, the anthocodiae and the tentacles are brick-red.

Remarks. This species approaches *D. spinifera* (Holm). An important difference, however, is that in our specimens all projecting point spicules are nearly of the same length, and they project for a marked distance, whereas in *D. spinifera* projecting spicules occur only on the sides of the polyp (cf. Kükenthal, 1905: 567, and Utinomi, 1952: 172, fig. 6). Moreover, the projecting spicules in our specimens are much longer.

There is also some agreement with *D. gigantea* (Verrill), but in this species the projecting anthocodial spicules are much shorter, too, and the supporting bundle projects for a shorter distance. A comparison with the material collected by the Siboga Expedition (recorded by Thomson & Dean, 1931: 105, 107, Sta. unrecorded) revealed a clear difference.

9. ***Dendronephthya (Dendronephthya) mucronata*** (Pütter, 1900)

(pl. 6 fig. 1, text-fig. 17)

Spongodes mucronata Pütter, 1900: 454, pl. 29 fig. 5; Tixier-Durivault & Prevorsek, 1959: 81, fig. 42-44.

Dendronephthya mucronata Kükenthal, 1905: 555, pl. 26 fig. 7.

Leiden Museum:

Snellius Expedition: Paleleh, N. Celebes, depth 3-5 m, August 22, 1929, 1 specimen; Mamudju, W. Celebes, reef and shore, August 4-5, 1929, 1 specimen.

Diagnosis. Glomerate; polyparium flattened; stem and branches closely covered with bundles of zooids; anthocodiae at obtuse to right angles to the zooid stalks, the latter of medium size; point spicules mostly four pairs, one of the uppermost stronger and prominently projecting; grade IV; one intermediate sometimes present; supporting bundle strong, usually two spindles projecting, moreover many spindles in the polyp stalk.

Formula. $IV = 1P + 3p + 0Cr + \text{strong S.B.} + (0-1/2) M.$

Description of the colony from Paleleh. The sterile stalk is wanting. The flattened polyparium measures 8 cm in height and 8.5 cm in breadth. It is composed of three stems densely beset with bundles of zooids. The stems give off short branches fully covered with bundles of zooids, forming large rounded lobes; so this form belongs to Kükenthal's *hemprichi*-group. The lower branches are foliaceous.

The zooids are arranged in bundles of 8-12. The zooid-stalks are about 1 mm long, sometimes up to 1.5 mm. The laterally flattened anthocodiae make obtuse or nearly right angles with the stalks; they are only about 0.45 mm high and 0.85 mm broad (fig. 17a-b). The armature consists of eight double rows of mostly four pairs of spindles; one of the uppermost is larger, 0.7-0.9 mm in length, hockey-stick-shaped, and projects for a distance of 0.40-0.65 mm. The other anthocodial spicules are 0.30-0.50 mm in length. All spicules bear a few small knobs, the projecting points are smooth or have spines directed towards the tip. Sometimes one intermediate is present. The tentacles are thickly armoured with small spicules.

The supporting bundle is strongly developed, one of the spicules may

reach a length of 5 mm and a thickness of 0.35 mm. Its smooth point projects for a distance of 1-1.5 mm, sometimes 2 mm. In addition to this there are one or two somewhat shorter spindles, of which one projects likewise, but for a shorter distance. In the polyp-stalk we find a good many spindles, regularly arranged along its lateral sides; viewed from above they show an arrangement en chevron.

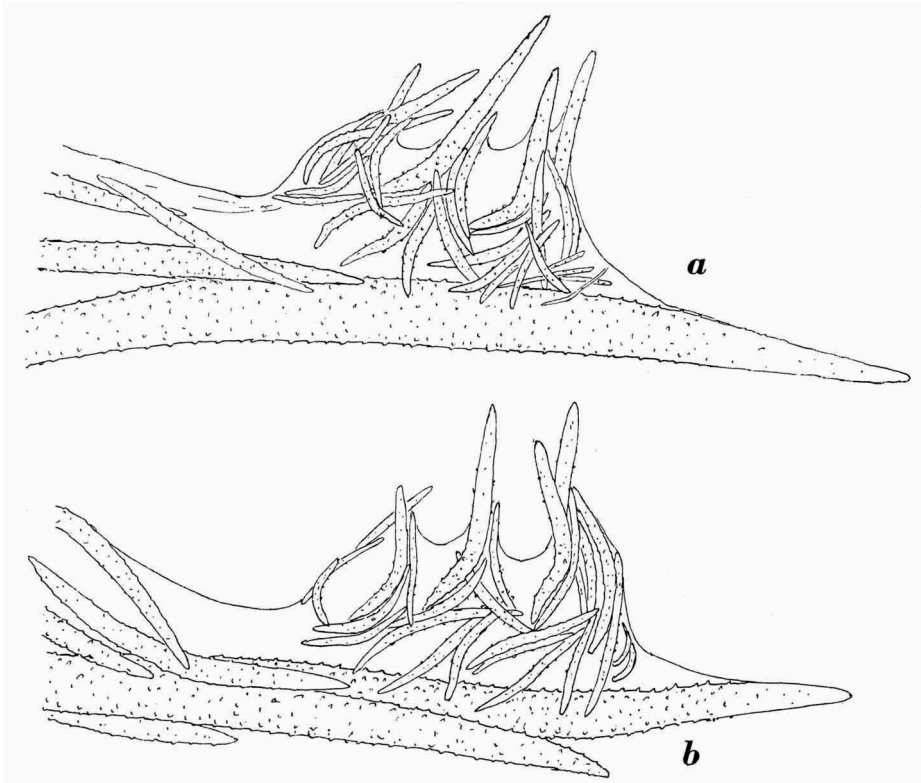


Fig. 17. *Dendronephthya* (*Dendronephthya*) *mucronata* (Pütter). a-b, zooids. $\times 45$.

In the cortex of the stem straight or curved spindles occur, varying strongly in size, the largest measuring up to 5.5 mm in length and 0.45 mm in thickness (warts included). These large spindles are covered with simple, low warts, the smaller ones have spines. In addition numerous very small spicules occur with an average length of only 0.15 mm.

In the canal-walls of the stem irregularly curved spindles are met with, measuring up to 4 mm in length and 0.4 mm in width and covered with low, blunt, conical prominences. Besides, a great quantity of very small (0.08-

0.15 mm) sclerites is present. They have high, pointed spines, and agree closely with those in the cortex.

Colour. The cortex of the stem and branches is white owing to the white cortical spicules, the bundles of zooids are brown, the large spicules of the supporting bundles are light brown.

Remarks. This specimen differs from Kükenthal's description of *D. mucronata* (Pütter) in having larger and wider spicules in the supporting bundles and in the cortex of the stem, whereas the height of the anthocodiae does not exceed 0.50 mm. But this difference is probably due to contraction. The colour of the zooids is not dark red, but brown. For the rest there is a considerable agreement with *D. mucronata*, especially as regards the armature of the anthocodiae and the canal-wall spicules (numerous small rods or spindles with high prominences).

The colony from Mamudju is much smaller, it measures a good 3 cm in height and breadth; the sterile stalk is here also absent. In some respects it differs from the specimen from Paleleh, viz.,

(a). The anthocodiae are larger and wider: the breadth is 0.85-1.10 mm, the height is 0.55 mm.

(b). The uppermost anthocodial spicules are sometimes longer, 0.85-1.30 mm in length, and they may project for a greater distance, up to 0.90 mm. It is remarkable, however, that according to Kükenthal these uppermost point spicules may reach a length of 0.86 mm, but according to Pütter they are as long as 1.36 mm.

Previously recorded from Pacific Ocean, Port Denison, Bowen, Fiji Islands, East China Sea (W. of Kyushu) and Nha Trang (Viet-nam).

10. ***Dendronephthya (Dendronephthya) roemeri*** Kükenthal, 1911
(pl. 3 fig. 2, text-fig. 18-19)

Dendronephthya roemeri Kükenthal, 1911: 317, fig. 17-20, pl. 19 fig. 5; Roxas, 1933: 437, pl. 5 fig. 5.

Spongodes roemeri Tixier-Durivault & Prevorsek, 1959: 77, fig. 39-41.

Leiden Museum:

Amboina, leg. D. S. Hoedt, 1 specimen.

Diagnosis. Glomerate; colony strongly flattened; lower branches foliaceous; zooids in small bundles; polyp stalks usually short; anthocodiae at obtuse angles to the stalks; point spicules: eight double rows of three to five spindles in a row, one of the uppermost markedly predominating and projecting; no crown; grade IV-V; supporting bundle mostly strong and largely projecting, in young zooids it is weak.

Formula. IV-V = 1 P + (2-4)p + 0 Cr + strong S.B. + 0 M.

Description. A badly preserved, flabby specimen. The sterile stalk, which is heavily damaged, probably measured 5 cm in length. The polyparium has a height of about 5 cm, a maximum breadth of 9 cm and a thickness of only 1 cm, so it is strongly flattened. The stem divides into two or three flattened main branches; owing to the damaged condition the exact number could not be ascertained. These main branches bear along their margins short side branches dividing into the twigs with the bundles of zooids. These bundles also arise from the flattened sides of the main branches. The lower branches are foliaceous. The outline of the polyparium is fairly regular.

Each bundle of zooids probably consists of about five zooids. Some have long stalks, up to 1.5 mm, but most zooids have short stalks. The anthocodiae are 0.45-0.60 mm in height and 0.80-1.15 mm in breadth, they make obtuse angles with the polyp stalks. The anthocodial armature consists of eight double rows of curved spindles, three to five in a row (fig. 18). Of the ventral and ventro-lateral double rows one of the uppermost spindles is much larger than the others, it is 0.70-0.85 mm in length, sometimes as long as 1.00 mm, and 0.07-0.12 mm wide, hockey-stick-shaped, the basal part has small knobs, the projecting part, 0.40-0.60 mm long, is thickly covered with

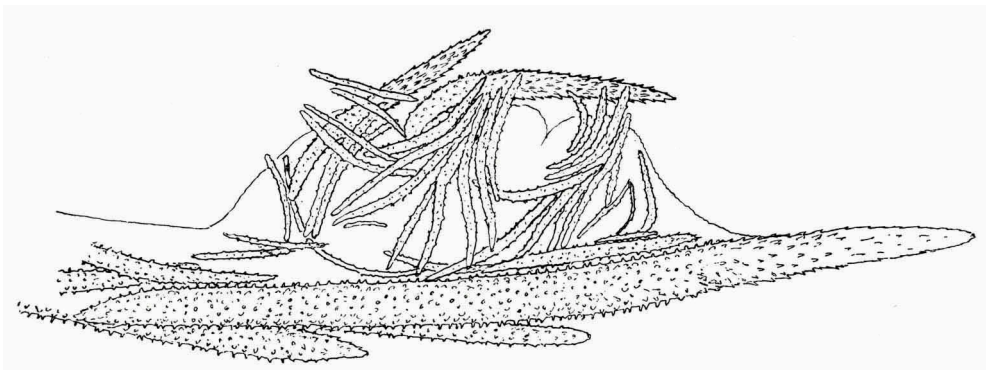


Fig. 18. *Dendronephthya (Dendronephthya) roemeri* Kükenthal. Zooid. $\times 45$.

sharp spines directed obliquely towards the tip. It is remarkable that in many zooids these projecting spindles, three to five in total number in each zooid, bend over the anthocodia in a direction more or less parallel to the supporting bundle. The other anthocodial spindles are nearly smooth or bear a few small spines; they measure 0.40-0.60 mm in length and only 0.025-0.033 mm in width. Crown spicules and intermediates are absent. In the tentacles flat, toothed rods occur, 0.11-0.15 mm in length, arranged in two rows.

In most zooids the supporting bundle is composed of usually two, sometimes one or three large spindles, up to 5 mm long and 0.23 mm wide, closely covered with low, blunt spines. One of them projects for a considerable distance, viz., 0.80-1.90 mm, the basal part of this projecting point is covered with small spines directed towards the tip, the extreme tip is smooth. In addition to these large spindles a few smaller ones may participate in the structure of the supporting bundle. Young zooids with very short stalks have weak supporting bundles, which hardly project.

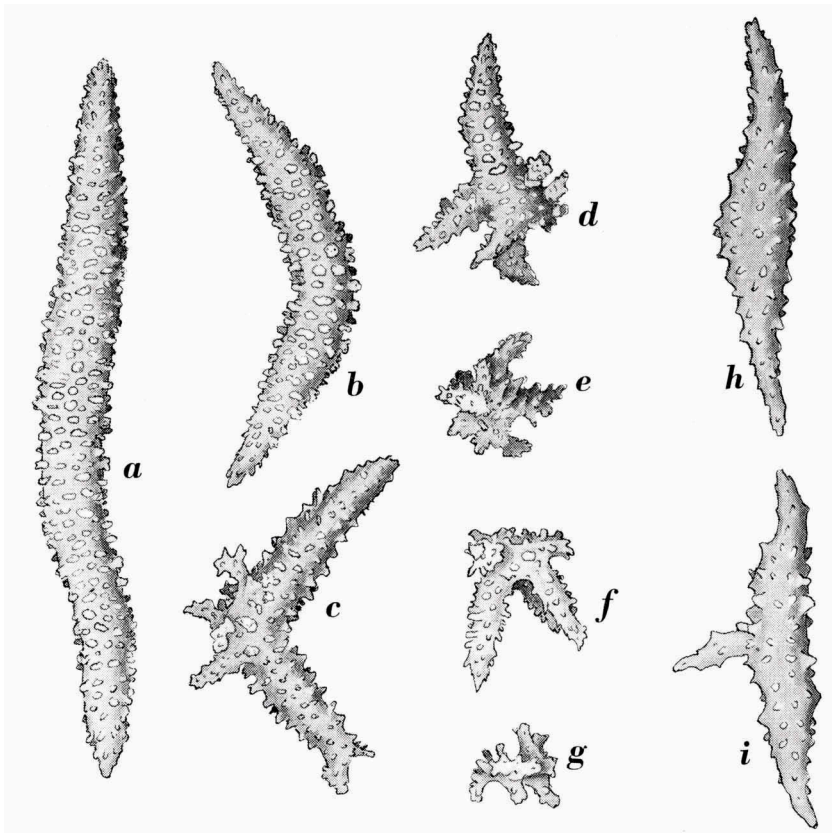


Fig. 19. *Dendronephthya (Dendronephthya) rocmeyri* Kükenthal. a-g, spicules from the cortex of the sterile stalk; h-i, spicules from the canal-walls of the sterile stalk. $\times 45$.

In the cortex of the stem only spindles occur, on the whole disposed transversely, but irregularly distributed in other places; sometimes they are forked at one end. They are rather closely beset with small, blunt spines. Measurements: up to about 2.5 mm in length and 0.30 mm in width.

The cortical spicules of the sterile stalk include:

(a). Usually curved spindles, up to 2.5 mm in length and 0.28 mm in width, thickly covered with blunt spines or simple warts (fig. 19a-b).

(b). "Kneel" spicules, 0.70-0.95 mm long, densely beset with rough spines or warts, which sometimes have developed into branched prominences (fig. 19c).

(c). Smaller, fantastically shaped bodies, several with three branches curved in the same direction (tripod-shaped) (fig. 19f), others with irregular prominences (fig. 19d, e, g); they are mostly 0.20-0.50 mm in diameter.

The canal-walls of the stem contain red spindles, which are similar to the cortical spicules of the stem, but they differ slightly from the latter in bearing fewer spines. They measure up to 2.10 mm in length and 0.25 mm in width.

In the sterile stalk the canal-wall spicules are flattened spindles, thick in the middle and tapering to a point at either end (fig. 19h), at times they give off short branches about the middle of their length (fig. 19i), others are forked at one end or slightly resemble triradiate forms. Most of them vary from 0.50-1.30 mm in length, some are longer, up to 1.80 mm; maximum width 0.28 mm (prominences included). They are scantily covered with high blunt spines, and are white in colour.

Colour. The sterile stalk is light grey, stem and branches are pale brown-red, the reddish colour of the polyparium is broken by the large, white spindles of the supporting bundles; the zooids are again brown-red.

Remarks. In view of the fact that the colony has been badly preserved it is difficult to decide to which of Kükenthal's groups the specimen belongs. Presumably it belongs to the *hemprichi*-group, as Kükenthal says. This is supported by the fact that the colony inclines to the Divaricate or the Umbellate type (cf. Kükenthal, 1905: 544, and this paper, p. 37).

In some respects our specimen differs from those described by Kükenthal and Roxas. The anthocodiae are shorter and broader, there are three to five spindles in each row of point spicules (Kükenthal and Roxas have three to four), the uppermost point spicules have very spiny projecting parts, whereas those figured by Kükenthal (1911: fig. 17) seem to be smooth. The long-stalked zooids are not mentioned by these authors. As regards the spicules in the cortex of stem and sterile stalk and especially those in the canal-walls there seems to be much resemblance. In spite of the differences mentioned I am inclined to identify the specimen as belonging to *D. roemeri*.

Previously recorded from Kei Islands, Puerto Galera Bay (Philippines), and Nha Trang (Viet-nam).

II. **Dendronephthya (Dendronephthya) koellikeri** Kükenthal, 1905
(pl. 7 fig. 1, text-fig. 20-21)

Dendronephthya köllikeri Kükenthal, 1905: 573, fig. J, pl. 27 fig. 15; Thomson & Mackinnon, 1910: 184; Utinomi, 1956: 233, fig. 7.

Spongodes köllikeri Tixier-Durivault & Prevorsek, 1959: 142, fig. 82-85.

Leiden Museum:

Snellius Expedition: Maratua, off N.E. Borneo, depth 4-6 m, August 14-18, 1929, 2 specimens; Sumatra, leg. G. A. J. van de Sande, 1902, 5 specimens.

Diagnosis. Glomerate; colony not or slightly flattened; lower branches foliaceous; zooids in bundles of 10-15 on stem and branches; polyp stalk short, the anthocodia making an obtuse angle with it; anthocodial armature consisting of eight double rows of two to three or four spindles in a row, one of the uppermost pair predominating; no crown; grade V; supporting bundle strong, projecting.

Formula. $V = 1 P + (1-3) p + 0 Cr + \text{strong S.B.} + 0 M.$

Description. As in the specimens collected by the Snellius Expedition the sterile stalks are wanting I may describe first the largest specimen from Sumatra.

The rigid colony has a total height of 11 cm, of which 3-3.5 cm belongs to the sterile stalk. This stalk is 4 cm wide at its base, and gradually narrows upwards. The tree-like polyparium has a maximum breadth of 7 cm, it is not flattened laterally and has no regular outline. The stem, which is 2.5-3 cm wide at its base, has many thick, cylindrical side-branches, which rise from the whole surface of the stem. The polyparium is loose and open, the bundles of zooids are placed on stem and branches in an open arrangement, at the tips of the branches the bundles are more crowded together. The lowest branches are leaf-like and arched towards the base.

The zooids are compactly arranged in bundles of 10-15, in each bundle there are larger and smaller zooids. The larger ones are about 0.45-0.60 mm high and 0.65-0.90 mm wide (fig. 20 a-b). They make a very obtuse angle with the short stalk, which is up to about 1 mm in length. The other zooids are smaller, their stalks are much shorter.

The anthocodial armature often consists of eight double rows, two to three spindles in a row. Of the uppermost, usually hockey-stick-shaped pair one is larger, its length varies from 0.70-0.92 mm. It projects for a distance of 0.20-0.45 mm, the projecting point is thickly covered with spines directed obliquely towards the tip. The other anthocodial spindles are straight or curved, they are 0.30-0.60 mm in length, and are provided with spines. In some zooids, however, the anthocodial spicules are not arranged en chevron,

they lie more or less parallel to each other. They as well as the projecting ones may be straight. In the smaller zooids the spicules are smaller, the uppermost spindles protrude for a shorter distance. Crown sclerites and tentacle spicules are absent.

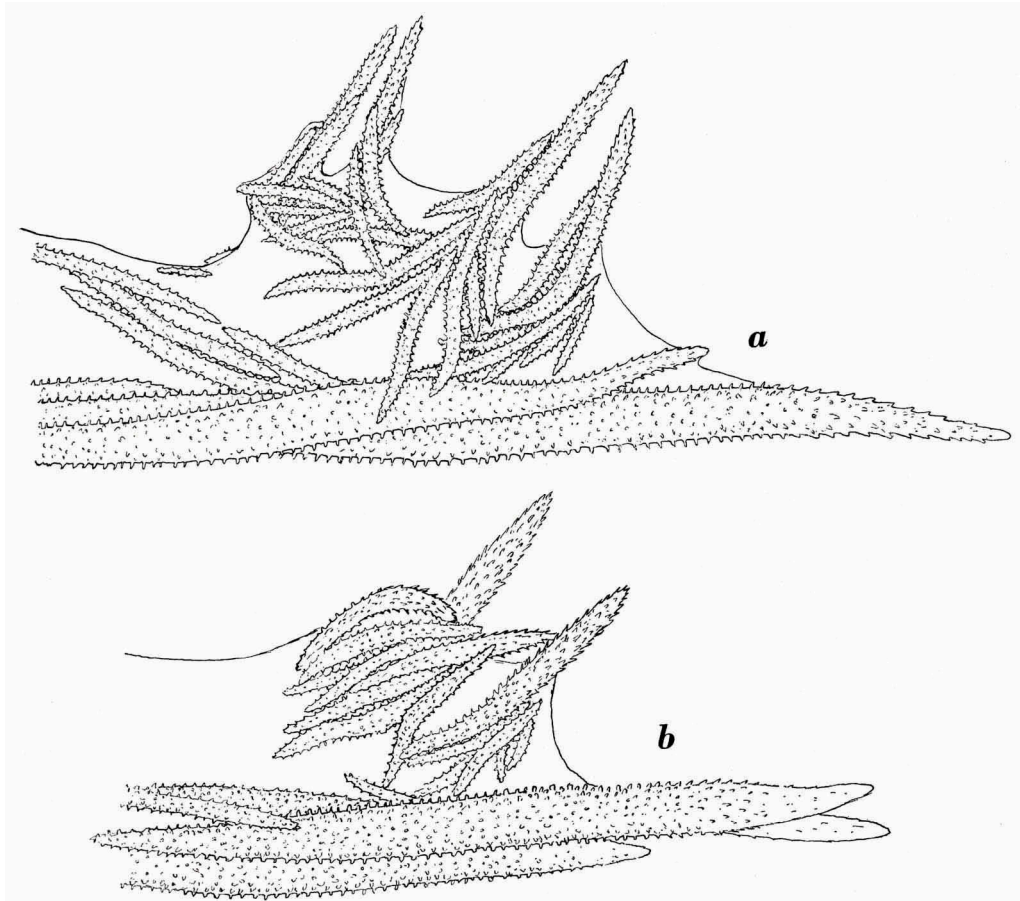


Fig. 20. *Dendronephthya (Dendronephthya) koellikeri* Kükenthal. a-b, zooids. $\times 45$.

The strongly developed supporting bundle is usually composed of two or three large spindles, up to 3.5 mm long and 0.29 mm wide (warts included). One or two project for a distance of up to 1.5 mm, sometimes a third projects for a short distance. These spindles are densely spined, of the protruding part the extreme end is smooth. In addition there are some smaller spindles, composing the supporting bundle.

In the cortex of the stem curved or crooked, often at one end bifurcated

spindles occur, lying transversely; they are densely packed with small warts, and they may reach a length of 5 mm and a width of 0.42 mm.

The cortex of the sterile stalk contains the following types:

(a). Spindles usually "kneed", sometimes bifurcated or with side-branches (triradiates), closely beset with high blunt spines or simple warts, especially on their convex sides; measurements: 0.55-1.50 × 0.17-0.29 mm (prominences included) (fig. 21 a-b).

(b). Clubs, 0.22-0.50 mm in length, provided with high thorns or warts (fig. 21 c).

(c). Small, irregular bodies, "stars", with high, often bifurcated spines; 0.15-0.22 mm in diameter (fig. 21 d).

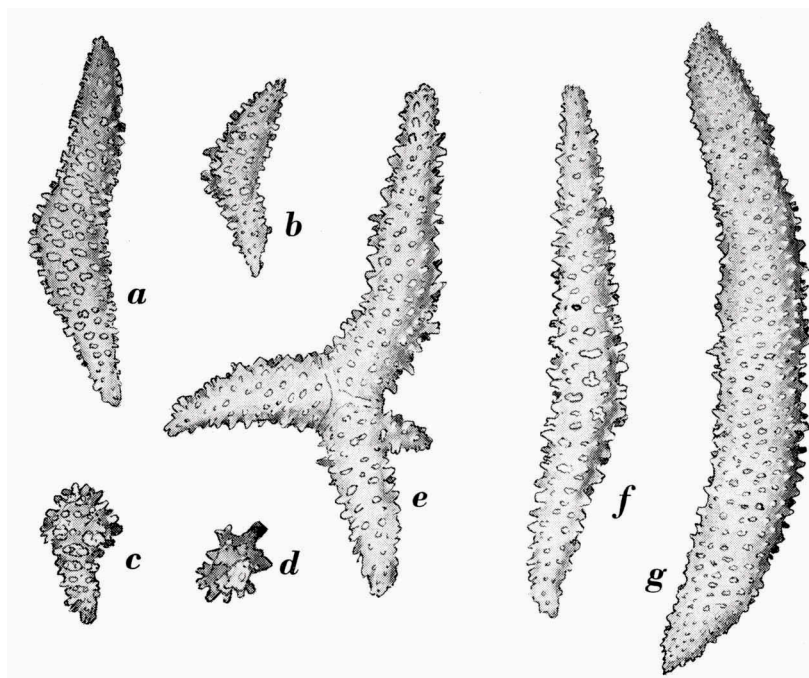


Fig. 21. *Dendronephthya* (*Dendronephthya*) *koellikeri* Kükenthal. a-d, spicules from the cortex of the sterile stalk; e-f, spicules from the canal-walls of the stem; g, spicule from the canal-walls of the sterile stalk. × 45.

In the canal-walls of the stem many thick, irregularly curved and sometimes bifurcated spindles are met with, densely covered with low warts or blunt spines; they measure up to about 3.5 mm in length and 0.50 mm in width (warts included) (fig. 21 e-f). In the canal-walls of the sterile stalk the same type occurs (fig. 21 g).

Colour. Sterile stalk, stem, branches and anthocodiae are white, the spindles of the supporting bundles are light brown.

Remarks. The question to which of Kükenthal's groups this specimen belongs is not at all simple to be answered owing to the far from clear difference between the *hemprichi*-group and the *studer*-group. Here subjective considerations may play a part. In comparing the colonies figured by Kükenthal (1905) I wonder why, for instance, *D. doederleini* (pl. 17 fig. 11) is referred to his *hemprichi*-group and *D. koellikeri* (pl. 17 fig. 15) to the *studer*-group. For also in *D. doederleini* the stem seems to be wide and massive, it does not seem to be reduced in bulk compared with the stronger development of the polyp-bearing branchlets. In my opinion the tree-like branching of the polyparium in our specimen in connection with the clear reduction in bulk of the stem shows that it should be referred to the *hemprichi*-group. Kükenthal himself remarks (p. 544) that in some forms of the *hemprichi*-group the more or less round bunches of polyp-bundles may be looser so that the Glomerate type may pass into the Divaricate or into the Umbellate type. At first sight our specimen is actually somewhat like an Umbellate.

Description of the other specimens. There is another rather "open" colony, collected near Sumatra. It is smaller, measuring 6 cm in total height and 4 cm in maximum breadth; the sterile stalk is 3 cm high. The polyparium is slightly flattened. The bundles of zooids are not compactly arranged, stem and branches are everywhere visible through them. A third specimen, growing on a large *Balanus*, is 5 cm high and 5.5 cm wide, the sterile stalk is short, 1-1.5 cm high. The polyparium is not flattened. This colony, however, shows a much compacter structure, the bundles of zooids are densely united into rounded clusters, hiding stem and branches from view.

A fourth colony, grown on three specimens of *Balanus*, has the same compact surface. It is remarkable that at a height of 1-1.5 cm above the base of attachment the sterile stalk divides into three stalks, each of them being 1 cm in height and bearing a polyparium. The undivided flattened basal part of the stalk is 3.3 cm in maximum breadth, the colony measures 5 cm in total height and 6 cm in maximum breadth, which is the total breadth of all three polyparia. As these polyparia arise side by side, the colony as a whole is somewhat flattened, but each single polyparium is not flattened.

A fifth colony from Sumatra, the smallest of them all (its total height is 4 cm), may be regarded as an intermediate form between the compact colonies and those with a loose and "open" polyparium.

Apart from these differences in structure the five colonies are fully in agreement with each other: in anthocodial armature, in length of the polyp

stalks, in supporting bundles, in cortical and canal-wall spicules and in colour no real differences could be discovered.

The specimens collected by the Snellius Expedition differ from those described above in some respects, viz.,

(a). The colonies are "open", but stem and main branches are more prominent, so they may be referred to the *studerii*-group.

(b). One of the polyparia is flattened, the other partly too, but from the base of the main stem there arise two relatively large branches, 4 cm in height, in a direction obliquely to one of the flat sides, so this specimen inclines to the not-flattened type. The polyparium of this specimen is 9.5 cm in height and 6.5 cm in maximum breadth.

(c). The anthocodial armature consists of eight double rows of two to four spindles, four being not at all unusual. The uppermost spicules may be somewhat larger than in the specimens from Sumatra, viz., up to 1.1 mm, they project for a distance of up to 0.6 mm.

(d). The spindles composing the supporting bundles are larger, up to 5 mm in length and 0.30 mm in width.

(e). Stem and branches are white, but the supporting bundles and the anthocodial spicules are brown-red.

I consider these differences of little importance.

Previously recorded from the Palau, Kei, and Amirante Islands.

12. ***Dendronephthya (Roxasia) mirabilis*** Henderson, in Thomson,

Simpson & Henderson, 1909

(pl. 8 fig. 2, text-fig. 22-23)

Dendronephthya mirabilis Henderson in Thomson, Simpson & Henderson, 1909: 49, fig. 26; Sherriffs, 1922: 55, text-fig. 15; Thomson & Dean, 1931: 114, pl. 20 fig. 1.

Roxasia mirabilis Tixier-Durivault & Prevorsek, 1960: 281, fig. 248-251.

Amsterdam Museum:

Siboga Expedition: Sta. 99, off North Ubian, Sulu Islands, 6° 7.5' N 120° 26' E, Lithothamnion bottom, 16-23 m, June 28-30, 1899, 1 specimen; Sta. 282, between Nusa Besi and N.E. Timor, 8° 25.2' S 127° 18.4' E, sand, coral and Lithothamnion, 27-54 m, January 15-17, 1900, 1 specimen.

Diagnosis. Divaricate; polyparium strongly flattened, lowest branches not foliaceous; zooids in small bundles of 4-7; polyp stalk short, the anthocodia make a right angle with it; two kinds of anthocodial armature: (a) one pair of point spicules, a crown of 2-3 rows, and below this 2-3 pairs of supplementary spindles en chevron: grade VI; (b) anthocodial spicules arranged in eight double rows of 6-7 pairs of chevroned spindles: grade III; one

intermediate sometimes present; supporting bundle strong or medium, projecting, in young zooids weak, hardly projecting.

Formula. VI = 1 P + (2-3) Cr + (2-3) SS + strong or medium S.B. + (0-1/2) M, or: III = 1 P + (5-6) p + strong or medium S.B. + (0-1/2) M.

Description. The following description is based on the specimen from Sta. 99, which colony is complete. It has a total height of 14 cm, of which 4 cm belongs to the flaccid, slender sterile stalk. The much flattened, flabby polyparium measures 10 cm in height and 10 cm in width, it is an open colony, irregular in outline. The lowest branches are not leaf-like, the sterile stalk gradually passes into the stem. The latter gives off four principal branches, which lie all in the same plane; two of them arise on opposite sides near the base of the stem, the others just above the base of the two just mentioned, also on opposite sides. These four main branches and the stem itself have about the same length, they are strongly flattened. Loosely placed over their surface smaller branches arise, which give rise to the polyp-bearing twigs. The species belongs to the *cervicornis*-group.

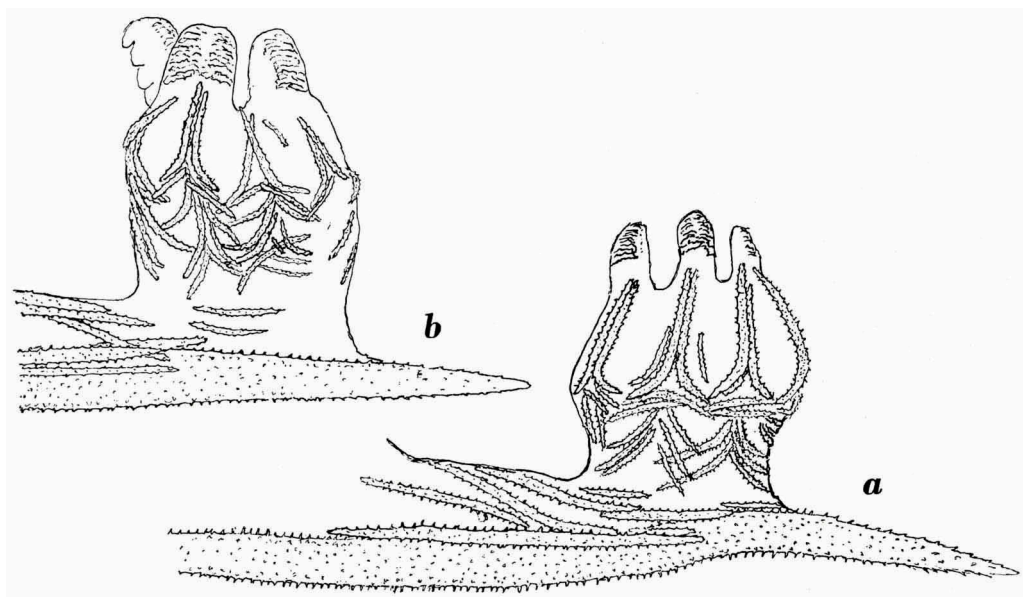


Fig. 22. *Dendronephthya (Roxasia) mirabilis* Henderson. a-b, zooids. X 45.

The zooids stand in small bundles of four to seven, close together on short stalks which are up to 0.5 mm in length; young zooids are nearly sessile. The anthocodiae measure on an average 0.45-0.65 mm in height and 0.60-0.70 mm in breadth, they are placed at right angles to the stalks. The anthocodial spicules may be arranged in two different manners:

(a). The lowermost two or three pairs of supplementary spicules are placed en chevron; above these there is a crown of horizontally placed spindles, two or three deep; surmounting this are eight points, each consisting of one pair of hockeystick-shaped spicules. Often one of them is accompanied by a smaller spicule at its base. In these cases the anthocodial grade and formula is: VI = 1 P + (2-3) Cr + (2-3) SS + etc. (fig. 22a).

(b). In some zooids all spicules composing a point are arranged en chevron, so the ring of horizontally placed spicules is absent. Each point consists of six to seven pairs of spicules. The anthocodial grade and formula must be now: III = 1 P + (5-6) p + etc. (fig. 22b).

Apparently Sherriffs (1922) and Thomson & Dean (1931) merely observed this latter type of arrangement, but the type mentioned sub (a) is, in fact, the most frequent one.

The lower anthocodial spicules are 0.16-0.34 mm in length, the uppermost spicules, of which one is larger, measure 0.28-0.45 mm, sometimes up to 0.52 mm in length, and project for a distance of 0.15-0.22 mm. All these spicules bear minute spines. In the spaces between the points there sometimes lies one intermediate spicule, but in many cases intermediates are absent. Each tentacle contains two rows of toothed, flat spicules, up to 0.09 mm in length.

The supporting bundle is well developed and consists of a few large, slender spindles, the longest reaches a length of 2.5-3.0 mm and a width of 0.15 mm; it projects for a distance of 0.50-0.85 mm beyond the anthocodia, the projecting point is smooth; in many cases a second spicule slightly projects. In young polyps the supporting bundle is of the ensheathing type, it hardly projects. The spicules have small spines. On the ventral side of the polyp stalk there are only a few small spindles.

The cortex of the stem contains fragile, slender rods or spindles, up to 2.7 mm in length and only 0.12 mm in width (without prominences), they are often blunt-ended or somewhat bifurcated at one end (fig. 23a). Some of them bear low spines (fig. 23b), the others have low blunt spines on one side and long, pointed spines on the other (fig. 23a). In addition a few smaller spicules occur, about 0.30 mm in length, bearing long spines.

In the cortex of the sterile stalk there is a marked difference between the spicules in the uppermost part and those in the basal part. The uppermost part has the same fragile, slender spindles as those in the stem, they are up to about 2 mm in length and 0.07-0.09 mm in width (without prominences), on one side they have much higher spines, up to about 0.10 mm in length (fig. 23c). In addition V-shaped spicules with very high and branched spines in the middle of the spicule are found (fig. 23d). In the central part

of the stalk the same V-shaped spicules occur, but usually both arms of the spicule now form a less acute angle. This type gradually merges into the "kneed" form (fig. 23e and f). Perhaps Henderson (in Thomson, Simpson & Henderson, 1909) alluded to this type of spicules in writing: "curved spindles with a band of huge warts near the middle". Besides, the number of stars increases (fig. 23g). Pseudo-clubs are also present (fig. 23h). In the basal part of the sterile stalk the slender spindles have disappeared. The great majority of the spicules now consists of very irregularly shaped stars and bodies with high, branched spines (fig. 23i-m), a single small spindle-shaped spicule occurs too (fig. 23n).

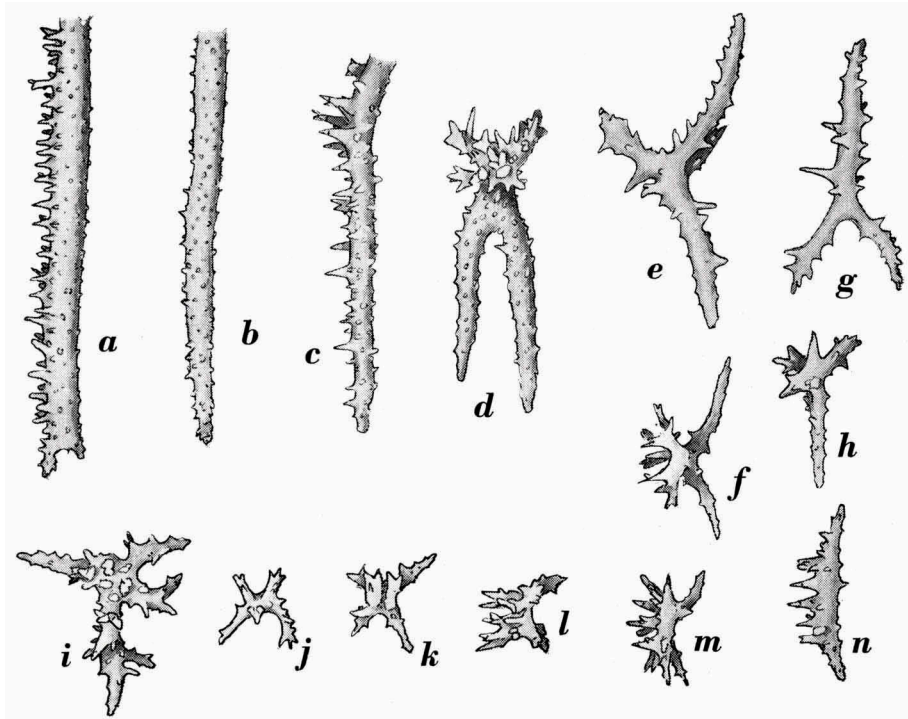


Fig. 23. *Dendronephthya (Roxasia) mirabilis* Henderson. a-b, parts of spicules from the cortex of the stem; c-d, spicules from the uppermost part of the sterile stalk; e-h, spicules from the middle part of the sterile stalk; i-n, spicules from the basal part of the sterile stalk. $\times 45$.

The thin canal-walls of the stem and the sterile stalk are nearly devoid of spicules; sporadically a small, irregularly curved spindle is present, 0.20-0.35 mm in length, provided with high prominences. This is not in accordance with Henderson's description (in Thomson, Simpson & Henderson, 1909: 51): "numerous flat, smooth spindle-shaped to star-shaped forms".

Colour. The sterile stalk, the stem and the branches are white, the supporting bundles and the polyps are light brown.

The specimen from Sta. 282 is not complete, the sterile stalk being missing. In all respects it agrees with the specimen described above.

Remarks. In their description of these specimens Sherriffs and Thomson & Dean remark that the anthocodial armature is not in agreement with Henderson's description and figure. As has been said above many of the zooids show an arrangement of the spicules which fully agrees with that described by Henderson.

The specimen from Sta. 260 referred to *D. mirabilis* by Thomson & Dean differs largely from both specimens described above. It has seemed necessary to me to establish a new species, *D. weberi*, for this specimen (cf. p. 52).

Previously recorded from the Andamans and Mauritius.

13. **Dendronephthya (Roxasia) latipes** (Tixier-Durivault & Prevorsek, 1960)

(pl. 8 fig. 1, text-fig. 24-25)

Roxasia latipes Tixier-Durivault & Prevorsek, 1960: 58, fig. 41-44.

Leiden Museum:

Snellius Expedition: Amboina, pier, depth 0-2 m, May 6, 1930, 1 specimen.

Diagnosis. Divaricate; polyparium not decidedly flattened; stem profusely branched, lowest branches may be foliaceous; polyps in bundles of 10-20, about 5-10 are long-stalked; anthocodiae at obtuse angles to the stalks; point spicules usually 4-5 pairs, the uppermost pair stronger and projecting; grade IV; crown absent; supporting bundle very strong, consisting of one long and markedly projecting spindle and some more spindles in the polyp stalk.

Formula. IV = 1 P + (2-4) p + 0 Cr + very strong S.B. + 0 M.

Description. The handsome, very stiff colony has a total height of 12 cm, a breadth of 10 cm and a thickness of 6.5 cm. It consists of two parts, for just above the base of attachment, which has many stolons, the colony divides into two: each part has a sterile stalk about 3 cm in length, the thickest one is 3 cm wide, the other is somewhat thinner. Both polyparia lie close together flattening each other. The colony as a whole is flattened, in consequence of the fact that it consists of two polyparia, but these polyparia themselves show no distinct flattening.

The stem of each polyparium is tree-like, in a divaricate fashion it gives off branches, which after repeated division bear the twigs with the groups of zooids. The general contour is not uniform, so the specimen belongs to Kükenthal's *suensoni*-group. In the largest polyparium some of the lowest



Fig. 24. *Dendronephthya (Rorasia) latipes* Tixier-Durivault & Prevorsek.
a-b, zooids. X 45.

branches are slightly foliaceous, but in the other leaf-like branches are absent.

At the ends of the clearly-stalked terminal twigs the zooids are located in divergent groups of 10-20. Some of them, about 5-10, have long stalks measuring 1.70-2.25 mm in length, the others have short stalks or are nearly sessile, arising from the base of the long-stalked ones, or in the angles between the latter.

The anthocodiae, which stand at an obtuse angle to their stalks, are 0.60-0.80 mm in height and 0.90-1.10 mm in breadth (fig. 24). The anthocodial armature consists of eight points of usually four to five pairs of curved, converging, spined spindles, sometimes there are two or six spindles in a row. The uppermost spindle is largest, up to 1.00 mm in length, and projects for a distance of 0.30-0.50 mm. The lower spindles measure 0.30-0.55 mm in length. Crown spicules are absent. The tentacles are armed with rows of small spicules, up to 0.075 mm in length, and provided with laterally flattened, transversely placed prominences.

The supporting bundle consists of one strong spindle, up to 5 mm long and 0.28 mm wide (without prominences); it projects for a distance of 1.20-1.60 mm, the projecting point being nearly smooth. In addition to this spindle there are some smaller ones lying in the polyp stalk and reaching to the base of the anthocodia. Below the latter the lateral and ventral sides of the stalks are nude, but at the base of the stalk several smaller spindles occur arranged en chevron along the lateral side of the stalk. All spicules are covered with low, blunt spines.

In the cortex of the stem only slender spindles occur, up to 4 mm long and 0.35 mm wide (without prominences). Most of them are slightly curved. In the basal part of the stem these white spindles are placed transversely, in the branches they are irregularly arranged, becoming more longitudinal in the twigs. They bear low spines or low warts, a few have a side branch.

In the sterile stalk the cortical spicules include the following forms:

(a). Spindles thickly covered with wart-like spines and measuring 0.35-1.15 mm in length and up to 0.22 mm in width (0.26 mm, prominences included); at times a Y-shaped form occurs. Some of them are nearly straight on one side and convex on the other, on the convex side the spines are higher than those on the other side (fig. 25 a-c).

(b). Clubs with large heads, towards the head the prominences increase in height; length: 0.28-0.62 mm (fig. 25 d-e).

(c). Some quadriradiates, 0.25-0.35 mm in diameter (fig. 25 f).

(d). Small irregular bodies, but true stars are absent (fig. 25 g).

In the stem the canal-walls have a few small spindles, 0.15 -0.28 mm long,

but occasionally they are longer, up to 0.65 mm; they are provided with some cone-shaped spines. Towards the sterile stalk the spindles increase in number, length and width. The majority of them measure 0.45-0.70 mm in length and 0.10-0.16 mm in width (without prominences), but some are larger, as long as 1.00 mm and 0.19 mm wide; they are scantily provided with spines (fig. 25 h-i).

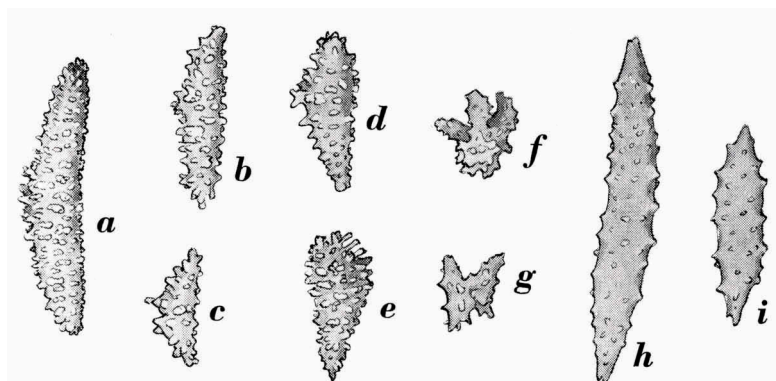


Fig. 25. *Dendronephthya (Roxasia) latipes* Tixier-Durivault & Prevorsek. a-g, spicules from the cortex of the sterile stalk; h-i, spicules from the canal-walls of the sterile stalk. $\times 45$.

Colour. Sterile stalk, stem and branches are white. The supporting bundles are brown, the anthocodiae are light brown.

Remarks. The specimen agrees best with *Roxasia latipes* Tixier-Durivault & Prevorsek. It differs, however, from the specimen described by these authors in the following respects:

- (a). In our specimen the anthocodiae are larger.
- (b). The polyp stalks are much longer.
- (c). The supporting bundle projects for a greater distance.
- (d). The anthocodial spicules are larger, the uppermost ones project more strongly.

In spite of these differences I identify the specimen with *D. (Roxasia) latipes*.

14. ***Dendronephthya (Roxasia) boschmai*** nov. spec.
(pl. 6 fig. 2, text-fig. 26-27)

Leiden Museum:

Snellius Expedition: Amboina, pier, depth 0-2 m, May 6, 1930, 1 specimen, preserved in formol.

Diagnosis. Divaricate; polyparium not flattened; stem much branched, lowest branches foliaceous, forming a collar; polyps in bundles of 15-20,

5-9 of them have long and narrow stalks; anthocodiae at obtuse angles to the stalks; point spicules two, sometimes three in a row, one of the uppermost pair of spicules predominating and projecting markedly; grade V; crown absent; supporting bundle very strong, consisting of one long spindle projecting for a long distance, and in addition to this a few spindles in the polyp stalk.

Formula. $V = 1 P + (1-2)p + 0 Cr + \text{very strong S.B.} + 0 M.$

Description. The rigid colony has a total height of 15 cm by a greatest breadth of 8 cm. The sterile stalk is about 3 cm long and 3 cm wide, it is ridged and wrinkled and leathery in texture. The polyparium is not flattened. The lower branches are reflexed, leaf-like structures and encircle the top of the stalk forming a complete collar. This collar is covered with numerous bundles of zooids all over its surface. Just above the collar the stem gives off several main branches of different lengths (it would appear that these branches arise from the collar). These branches divide tree-like into smaller

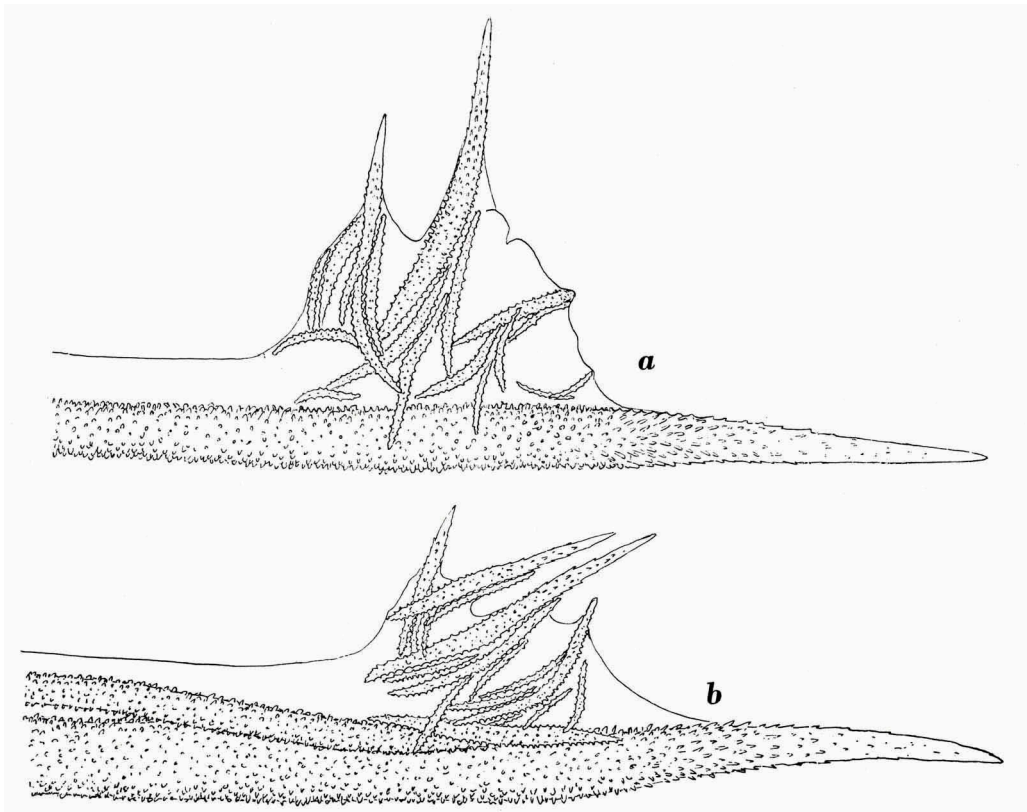


Fig. 26. *Dendronephthya (Roxasia) boschmai* nov. spec. a-b, zooids. $\times 40$.

branches, which, in their turn, have ramifications, ending in the polyp-bearing twigs. The polyparium shows a spiny appearance on account of the long-stalked polyps and the strongly projecting supporting bundles. This new species belongs to Kükenthal's *suensoni*-group, for the polyparium is not flattened and as a whole it has no uniform outline.

The zooids are arranged in bundles which stand close together, hiding stem and branches from view. Each bundle consists of about 15-20 polyps, only 5-9 of them being long-stalked, the others having short stalks, and arising in the angles between the long-stalked polyps. The widely divergent stalks of the latter are narrow, slender and conspicuously long, up to 2.5 mm. The anthocodiae measure as much as 0.90 mm in breadth and 0.60 mm in height, they are somewhat flattened laterally, and placed at obtuse angles on their stalks (fig. 26). The anthocodial armature usually shows two pairs of slightly curved spindles en chevron, sometimes there are three pairs. One of the uppermost pair is always larger than the other, and projects considerably beyond the anthocodia. It is striking, however, that in the lateral rows these predominating spindles are larger than in the ventral rows. They measure 0.90-1.30 mm in length, and project for a distance of 0.45-0.90 mm. At the dorsal side of the polyps the uppermost spicules are much shorter and project hardly or not at all. Therefore we usually see only six long spicules protruding above the polyp head. The lower spicules average 0.65 mm in length. All anthocodial spicules are densely covered with low thorns, on the projecting parts the thorns are directed obliquely towards the tip, but the extreme end itself is smooth. Neither crown nor intermediate spicules are present, one or a few accessory spicules may occur, measuring 0.30-0.70 mm in length. The tentacles are armoured with two rows of spicules measuring 0.075-0.140 mm in length.

The supporting bundle consists of one straight or slightly curved spindle, up to 5.2 mm in length and 0.30-0.40 mm in width; it projects beyond the anthocodia for a distance of 1.0-1.8 mm. In the narrow polyp stalk a few more spindles are present lying parallel to each other and to the large spindle. They are all thickly covered with thorns; near the base of the anthocodia the thorns are directed obliquely towards the tip, but the tip itself is smooth.

In the stem the cortex has only spindles, irregularly arranged and measuring up to 5.5 mm in length and 0.5 mm in width (prominences included). They are densely beset with thorns or low warts.

In the sterile stalk the cortical spindles are shorter, up to 2.5 mm in length and 0.20-0.25 mm in breadth (as broad as 0.30 mm, prominences included); they are thickly covered with simple thorns or thorns split into two at their tips forming wart-like prominences (fig. 27 a). In some cases a spindle has

thorns on one side and warts on the other side. In addition to these relatively long, curved spindles there are:

- (a). "Kneed" forms, about 0.8-1.0 mm long, with very high spines on their convex side (fig. 27 b).
- (b). Clubs, measuring 0.25-0.55 mm in length (fig. 27 c, d).
- (c). Triradiates and quadriradiates (fig. 27 f, g).
- (d). Stars and irregular bodies with high thorns, 0.15-0.30 mm in diameter (fig. 27 e, h).

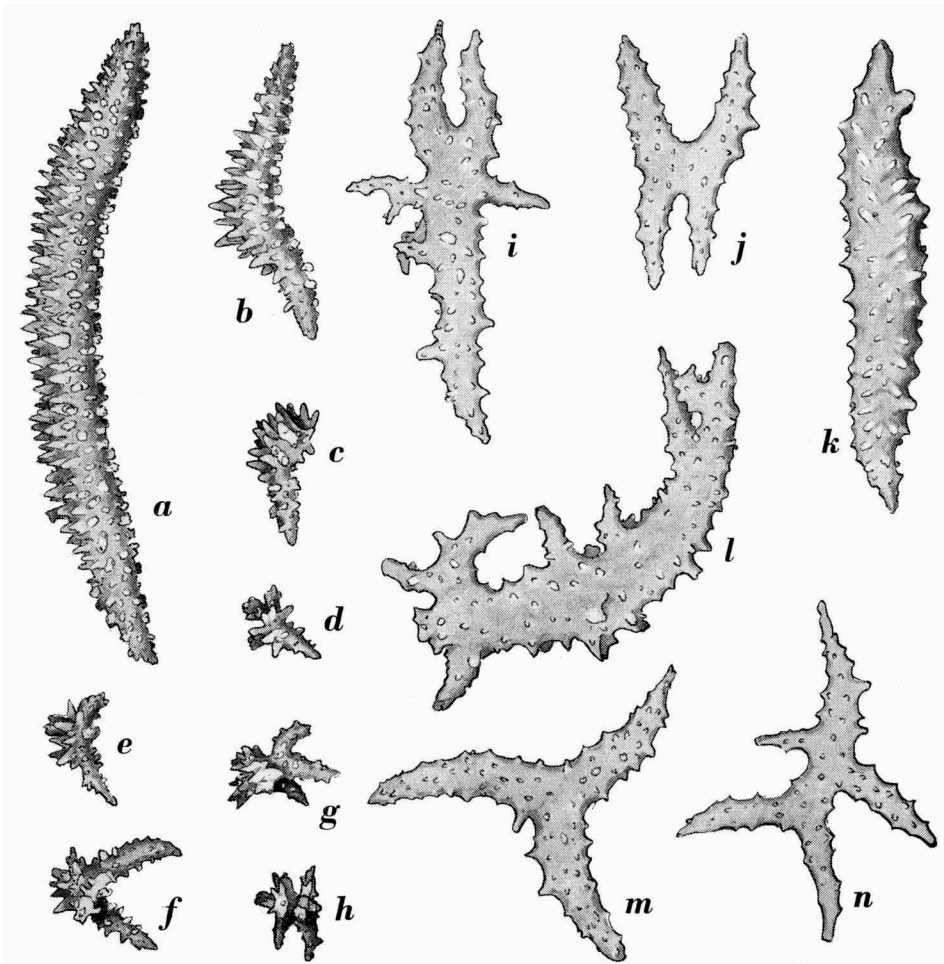


Fig. 27. *Dendronephthya (Roxasia) boschmai* nov. spec. a-h, spicules from the cortex of the sterile stalk; i-n, spicules from the canal-walls of the sterile stalk. $\times 40$.

In the canal-walls of the sterile stalk numerous flat spicules occur, as long as 2.16 mm (fig. 27 i-n). Though the primitive form is the spindle, they are very irregular in shape. They are often bifurcated at one end, or they have one or more side branches. Besides these there are triradiates, quadriradiates and multiradiates, the three-rayed and four-rayed forms have their rays often in one plane, and in some forms they tend to be foliaceous. The canal-wall spicules are not thickly beset with high, simple or compound spines.

Colour. The colony as a whole is light brown owing to the light brown polyps, but the large spindles of the supporting bundles and the cortical spicules of the stem and branches are white.

Remarks. In general appearance this specimen shows a striking resemblance to *D. latipes*. In both the spiny appearance is caused by the long-stalked divergent polyps with their strongly projecting supporting bundles. But on the other hand it differs from *D. latipes* as regards the anthocodial armature, the spicules composing the supporting bundles, the cortical spicules and the spicules in the canal-walls, and, moreover, it has a complete collar.

The specimen also agrees in many respects with *Roxasia hirsuta* Tixier-Durivault & Prevorsek, 1960. Especially in respect to the anthocodial armature it approximates this species. There are, however, important reasons for separating it, viz.,

- (a). Our specimen has much larger spicules in the cortex of the stem and branches and of the sterile stalk.
- (b). The spicules occurring in the canal-walls of *R. hirsuta* are quite different from the remarkable forms in our specimen.
- (c). The polyp stalks are longer.
- (d). The large spicule in the supporting bundle is much stronger than that in *R. hirsuta*.
- (e). The uppermost anthocodial spicules are larger and project for a greater distance.

So I feel justified in establishing a new species. It is with great pleasure that I name this species after Dr. H. Boschma, biologist of the Snellius Expedition.

15. ***Dendronephthya (Roxasia) snelliusi*** nov. spec.

(pl. 9 fig. 1, text-fig. 28-29)

Leiden Museum:

Snellius Expedition: Sta. 60*, Sulu Islands, 6° 58.0' N 121° 52.5' E, depth 72-80 m, September 5, 1929, 2 fragments of probably the same colony.

Diagnosis. Divaricate; polyparium flattened; lowest branches foliaceous; polyps in bundles of 5-10; anthocodiae at obtuse angles to their stalks, the

latter up to 1.5 mm long; point spicules one or two pairs, projecting markedly; crown spicules: 2-3 rows of horizontally placed spindles, below these are 2-3 pairs of acutely converging spindles; grade VI; supporting bundle strong, projecting markedly.

Formula. VI = (1-2) P + (2-3) Cr + (2-3) SS + strong S.B. + 0 M.

Description. Two fragments of most likely the same specimen. One fragment consists of a short sterile stalk and the lowermost part of the polyparium, which is flattened in one plane. The stalk is almost completely hidden by the reflexed foliaceous lowest branches. Above these the stem gives off many side branches which by repeated division give rise to the polyp-bearing twigs. The other fragment seems to be the upper part of the colony or at least a part of it; it has obviously broken off and consists of two main branches with their side branches etc. I cannot say with certainty to which of Kükenthal's groups the specimen belongs.

The zooids are arranged in bundles of five to ten, some of them have long stalks, 0.8-1.5 mm long, they do not diverge, and in the angles between these stalks and at their bases young polyps with very short stalks arise.

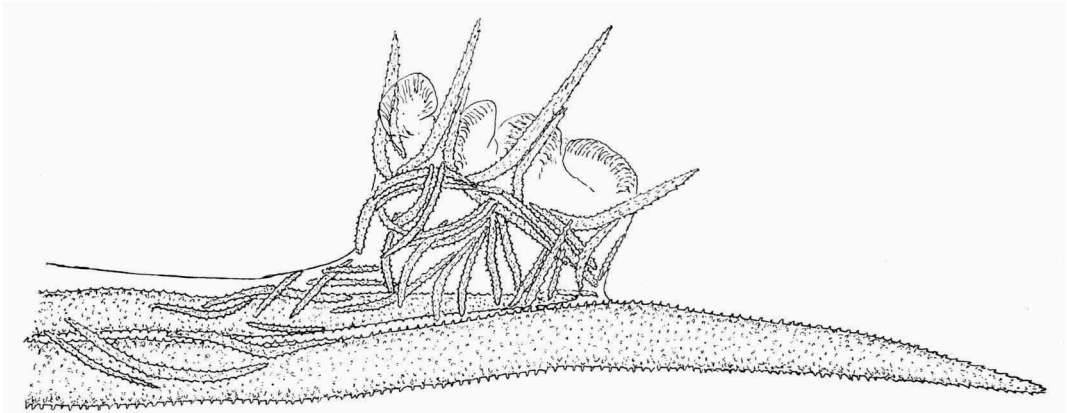


Fig. 28. *Dendronephthya (Roxasia) snelli* nov. spec. Zooid. $\times 40$.

The anthocodiae are cup-shaped, measuring 0.43-0.50 mm in height and 0.55-0.80 mm in breadth, they are placed at obtuse angles to the stalks (fig. 28). The supplementary spicules are usually arranged in two to three pairs of converging, slender spicules (0.30-0.45 mm long), which meet at a very acute angle; above these there is a crown of two to three rows of horizontally placed spicules, averaging 0.30 mm in length; surmounting this crown there are eight points, each consisting of one pair, sometimes two

pairs of hockeystick-shaped spicules of which one is much larger than the other or others, measuring 0.45-0.70 mm in length and projecting for a distance of 0.35-0.45 mm. All spicules bear spines, the projecting part of the point spicules has spines directed obliquely towards the tip.

On the aboral surface of the tentacles there are two rows of small, brown-red, flat spicules, 0.04-0.08 mm long and provided with rounded prominences along their sides.

The supporting bundle is strongly developed, it has usually one long spindle, 3.0-4.5 mm in length and up to 0.23 mm in width, the projecting part may be as long as 1.8 mm; it bears simple thorns, those on the extreme point are directed obliquely towards the tip. Sometimes a second spindle projects, but for a shorter distance. On the dorsal side of the polyp stalk there are some more strong spindles; on the ventral side many smaller, slender spindles, about 0.39-0.65 mm in length, are present.

The cortex of the branches contains slender spindles, straight or curved, measuring up to about 3 mm in length and 0.16 mm in width, with blunt, short spines (fig. 29 a-b).

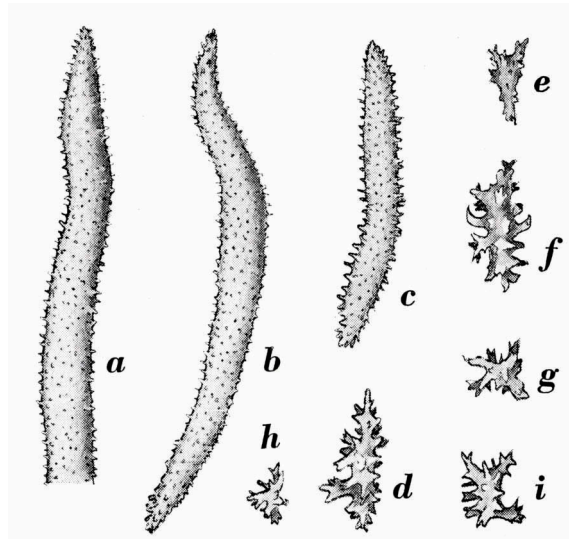


Fig. 29. *Dendronephthya (Roxasia) snelli* nov. spec. a-b, spicules from the cortex of a branch; c-i, spicules from the cortex of the sterile stalk. $\times 45$.

In the cortex of the sterile stalk there are:

- (a). Spindles, up to about 0.85 mm in length and 0.09-0.12 mm in width

(without prominences), they have huge cone-shaped prominences or simple or compound spines (fig. 29c).

(b). Smaller, more or less spindle- or club-shaped spicules with high, often branched spines (fig. 29 d-f).

(c). Small, irregular, sometimes radiated forms, about 0.20-0.40 mm in length, densely packed with huge, often branched prominences (fig. 29 g, h, i).

In the canal-walls of the stalk no spicules could be found.

Colour. The sterile stalk and the branches are white, but the anthocodiae have a brown-reddish colour, chiefly caused by the spicules in the tentacles.

16. *Dendronephthya (Morchellana) weberi* nov. spec.

(pl. 9 fig. 2, text-fig. 30-31)

Amsterdam Museum:

Siboga Expedition: Sta. 260, N. of Nuhu Jaan, Kei Islands, 5° 36.5' S 132° 55.2' E, sand, coral and shells, 90 m, December 16-18, 1899, 1 specimen.

Diagnosis. Umbellate; polyparium flattened; lowest branches foliaceous; zooids in small bundles; anthocodiae at obtuse angles to their long or short stalks; point spicules: 6-8 pairs en chevron or sometimes forming a pseudo-crown, the uppermost slightly longer and projecting; grade II; intermediates one or two; in the long-stalked zooids the supporting bundle is strong and projecting, in the short-stalked zooids it is weak and hardly projecting.

Formula. II = (6-8) p + 0 Cr + strong or weak S.B. + (½-1) M, or: VI = 1P + 1p + 3 Cr + 3 SS + strong or weak S.B. + (½-1) M.

Thomson & Dean (1931: 115) referred this specimen to *D. mirabilis* Henderson. As appears from the following description and from the comparison of the figures 22, 23 and 30, 31 it differs largely from this species. In point of fact I found that the specimen does not belong to the Divaricatae. In my opinion the zooids are arranged in umbel-like aggregates, the anthocodiae reaching the surface of the colony. I therefore transfer it to the Umbellatae.

Description. The small colony has a total height of 4 cm and a maximum breadth of 3.5 cm. The lowermost part of the colony seems to be somewhat damaged, presumably the sterile stalk has been cut off straight, the remaining part of it is only 0.5 cm in length. The polyparium, which is regular in outline, is strongly flattened. It measures 3.5 cm in height. The stem is wide, flattened in one plane; from both flat surfaces some short side-branches

arise bearing twigs with zooids, but on the whole these flat sides are rather bare. In the plane of flattening, however, two wide, flattened main branches are given off, opposite one another. Especially along the margins of these branches and of the uppermost part of the stem the zooid-bearing twigs arise, so that most of the zooids are to be found along the margin of the polyparium. Possibly the species belongs to Kükenthal's *collaris*-group. The lower branches are foliaceous and reflexed.

The zooids are arranged in umbels of five to eight, in the lowermost part of the polyparium some of them have long stalks, up to about 2 mm in length, but for the rest the stalks are shorter, 1 mm in length or less. The anthocodiae, which form an obtuse angle with the stalks, are low and broad,

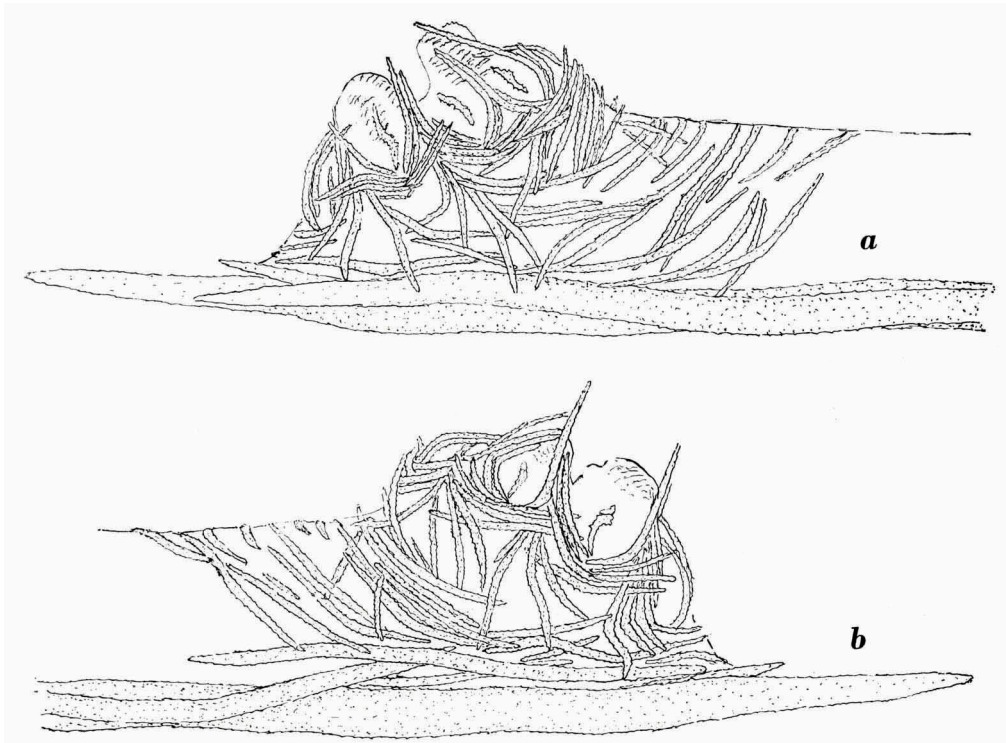


Fig. 30. *Dendronephthya (Morchellana) weberi* nov. spec. Zooid viewed from two opposite sides. $\times 40$.

cup-shaped, octangular seen from above, measuring 0.60-0.65 mm in height and 0.80-1.10 mm in breadth, but smaller ones occur too. Usually the stalk gradually passes into the anthocodia (fig. 30). The anthocodial armature

consists of eight double rows, the lateral rows consisting of six to eight pairs of slender spindles. In most cases the uppermost are larger, up to 0.55 mm in length, and project for a short distance. The lower spicules are 0.30-0.45 mm in length. All these spicules have inconspicuous spinules. In some cases the arrangement of the spindles shows a tendency to form a pseudo-crown about three deep; below these more or less horizontally placed spindles there are some supplementary ones arranged en chevron, above the crown one or two pairs of curved spindles form the points. In most cases one or two intermediates occur. In the tentacles the armature consists of two rows of toothed, flat spicules, 0.13-0.21 mm in length.

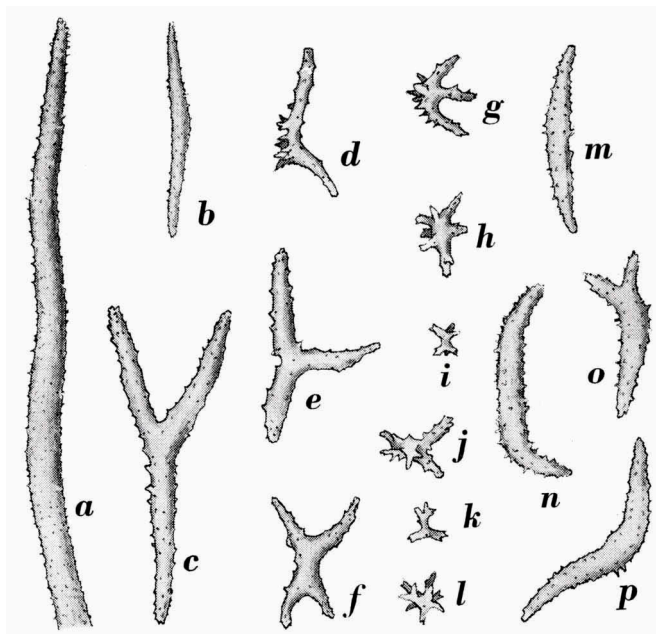


Fig. 31. *Dendronephthya (Morchellana) weberi* nov. spec. a-b, spicules from the cortex of the stem; c-l, spicules from the cortex of the sterile stalk; m-p, spicules from the canal-walls of the sterile stalk. $\times 45$.

In the long-stalked zooids the supporting bundle may be called strong, in those with short stalks it is weak. In the first-mentioned zooids it consists of a few large spindles, as much as 5.3 mm long and 0.26 mm wide. In addition there are some shorter ones. One of the larger spindles projects for a distance of 0.70-0.90 mm, but one or two more spindles usually also project but for a shorter distance. The supporting bundle being medium or

weak, the eight to ten spindles composing it are shorter (up to 2-3 mm) and narrower; usually a few project for a short distance. All spicules in the supporting bundles bear very low spines. On the ventral and lateral sides of the polyp stalks many curved spindles occur, which are usually diagonally placed; where the stalk passes into the anthocodiae these spindles are densely arranged forming something like a collar.

The cortex of the stem contains slender, fragile spindles or rods showing considerable variations in length. The largest are up to about 3 mm in length and only 0.12 mm in width. They are irregularly arranged, and provided with very low spinules (fig. 31 a, b).

In the cortex of the sterile stalk, of which presumably only the uppermost part is present, the following types of spicules are found:

(a). Curved spindles, often ramified or Y-shaped, sometimes "kneed"; they may reach a length of about 1 mm and a width of 0.08 mm; the "kneed" forms are somewhat shorter, 0.50-0.70 mm (fig. 31 c, d).

(b). Tri-, quadri- and multiradiates, the arms are 0.15-0.30 mm in length and up to 0.09 mm in width at the base (fig. 31 e, f).

(c). Small radiated, tripod-like forms, clubs, spindles, stellate and dumb-bell shaped forms (fig. 31 g-l) with high, sometimes branched spines. Measurements: the stellate forms are about 0.16 mm in diameter (prominences included); the dumb-bells are 0.08-0.13 mm, the spindles and clubs 0.17-0.30 mm in length.

The canal-walls of the sterile stalk have irregularly curved spindles, sometimes with side-branches; they measure up to 0.80 mm in length and 0.09 mm in width, and are covered with few, cone-shaped spines (fig. 31 m-p).

Colour. Sterile stalk, stem, branches and supporting bundles are white, the anthocodiae are orange-like.

Remarks. Up to now previous authors have described about twenty species belonging to the Umbellatae with grade II. Most of these do not agree at all with our specimen, but a few bear some resemblance to it, e.g., *D. obtusa* Henderson, *D. varicolor* Henderson, *D. booleyi* Henderson and *D. hyalina* Kükenthal. They all have, however, smaller anthocodiae; those in *D. varicolor* are the broadest, having a breadth of up to 0.8 mm, which is, however, less than the breadth of the anthocodiae in our specimen. Also in other respects they differ from our specimen: the spicules in the cortex of stem and sterile stalk, the length of the anthocodial spicules, the uppermost point spicules, which in several cases are not projecting, the number of zooids in each bundle, etc. It therefore seems best to establish a new species, which I named after Dr. Max Weber, leader of the Siboga Expedition.

17. **Dendronephthya (Morchellana) pulchella** Utinomi, 1952
(pl. 10 fig. 1, text-fig. 32-33)

Dendronephthya pulchella Utinomi, 1952: 198, fig. 22, pl. 11 fig. 30.

Morchellana pulchella Tixier-Durivault & Prevorsek, 1962: 207, fig. 131-133.

Leiden Museum:

Snellius Expedition: Aloang, Paternoster Islands, Bali Sea, depth 11 fathoms, February 8, 1930, 1 specimen.

Diagnosis. Umbellate; sterile stalk long; polyparium with a regular, rounded outline, slightly flattened; lower branches foliaceous; zooids in small bundles; anthocodiae at obtuse to right angles to the short stalks; anthocodial spicules in eight double rows of about 5-8 spindles, the uppermost are somewhat larger and may project; intermediates 2-5; grade III; supporting bundle in the longer-stalked zooids strong and projecting, in the short-stalked zooids weak and not projecting.

Formula. III = 1 P + (4-6) p + 0 Cr + strong or weak S.B. + (1-2½) M.

Description. The colony has a sterile stalk of 5 cm in length and 1.5 cm in greatest width; it is rigid, granular in appearance and shows longitudinal furrows. At its base it gives off many filamentous stolons.

The polyparium is rather loose and open, roughly round in shape, it measures 5 cm in height, 5 cm in breadth and 3 cm in thickness, so it is somewhat flattened. The undermost branches are leaflike, reflexed struc-

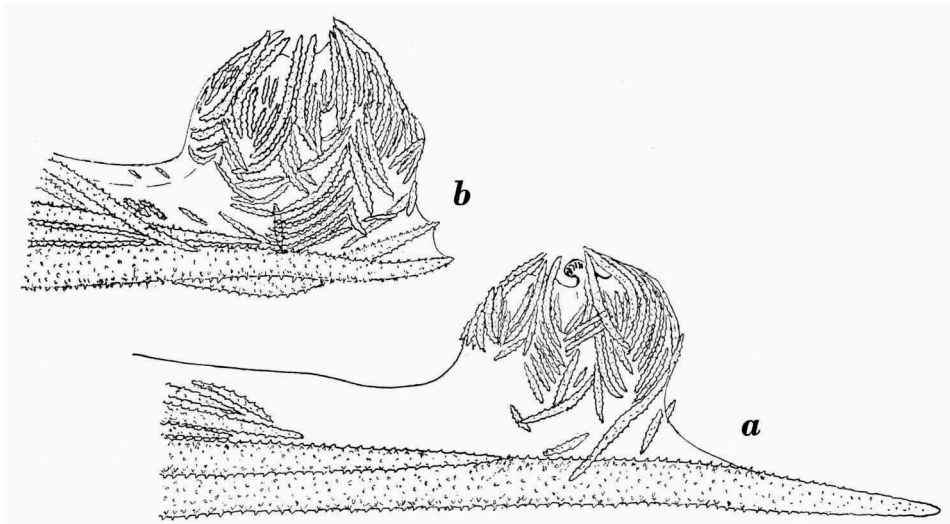


Fig. 32. *Dendronephthya (Morchellana) pulchella* Utinomi. a-b, zooids. $\times 45$.

tures, surrounding the stem and forming a collar. The stem divides bush-like into slender branches, branchlets and twigs, the latter bearing at their ends the small bundles of zooids, rather loosely arranged into what may be called umbels. There is no forming of larger hemispherical masses, it belongs to Kükenthal's *spinulosa*-group.

The zooids are arranged in small bundles of two to seven, rarely a zooid occurs singly, in this case the zooid stalk is long, viz., about 2 mm. In each bundle one or two zooids have longer stalks and strong, projecting supporting bundles, the others have much shorter stalks, their supporting bundles are weak. In all zooids the anthocodiae form obtuse or nearly right angles with their stalks. The first mentioned longer-stalked zooids, the stalks of which are up to about 0.7 mm in length, are usually 0.6 mm in height and 0.7 mm in breadth (fig. 32a). Their armature consists of eight double rows of five to eight spindles in a row. These spindles are straight or curved and thickly beset with blunt spines or warts; they measure 0.15-0.30 mm in length. The uppermost pair of each point is often clearly larger, about 0.30-0.35 mm in length, sometimes as long as 0.50 mm, one of them may project slightly beyond the anthocodia. Between these uppermost pairs of hockey-stick-shaped spindles two to four or five intermediates occur. The other zooids have very short stalks, they are nearly sessile (fig. 32 b). The anthocodiae are usually slightly smaller, their armature consists of eight points of acutely converging, densely packed, small spindles. The uppermost pairs are sometimes larger than the others, the spaces between these pairs are almost entirely filled with intermediates.

In the tentacles two densely packed rows of flattened spicules are present, 0.05-0.06 mm in length and 0.020-0.025 mm in width, with small spines along the edges. All anthocodial spicules are brown-red.

As has been said above, the supporting bundle of the longer-stalked zooids may be called strong. It is composed of two or three spindles of which one is largest, 2-4 mm in length and 0.13-0.19 mm in width; it projects for a distance of up to 1.15 mm beyond the anthocodia; a second spindle may also project. The other, short-stalked zooids have weak supporting bundles of the ensheathing type, hardly projecting. The spindles of the supporting bundles are white and bear spines.

In the cortex of the branches there are densely crowded, slender, white spindles, up to 3.75 mm in length and 0.26 mm in width and thickly beset with low spines or simple warts.

In the cortex of the sterile stalk we find:

(a). White, stout spindles, thickly covered with warts; they measure up to 1.75 mm in length and 0.22-0.35 mm in width (warts included) (fig. 33a).

(b). Brown-red ovals or elongate barrels, 0.30-0.50 mm in length (fig. 33b); between types (a) and (b) intermediate forms occur, the larger they are, the whiter.

(c). Spindles with higher, often compound spines on the middle of the convex side, the other side is nearly straight or somewhat concave; length about 0.30-0.70 mm (fig. 33c).

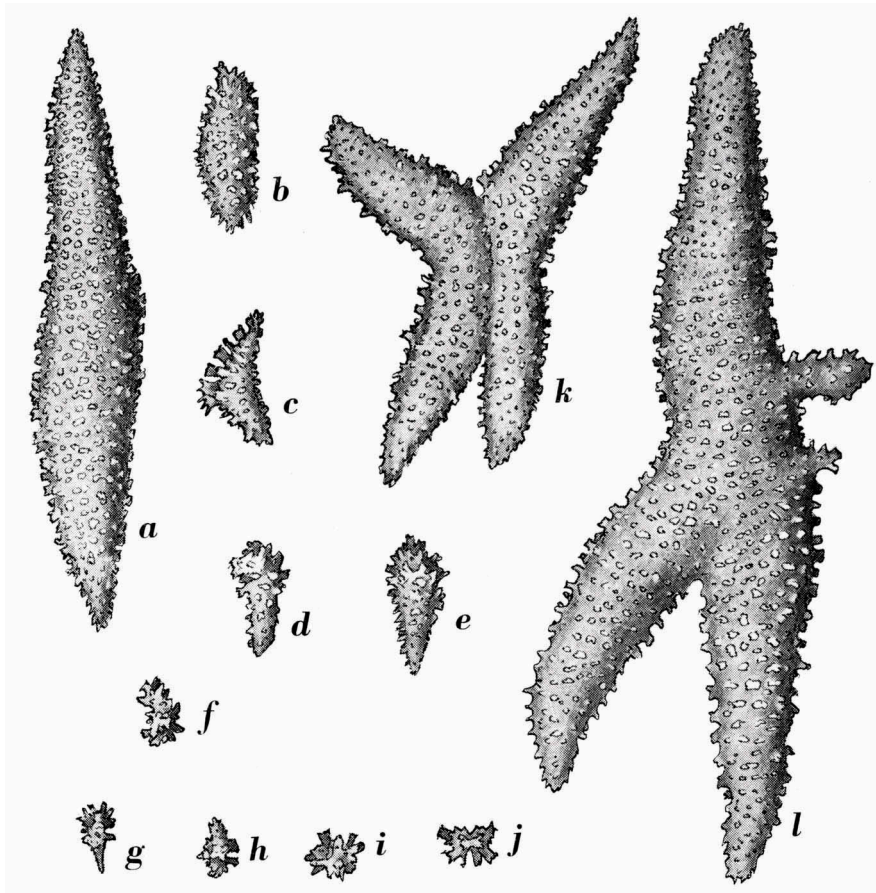


Fig. 33. *Dendronephthya (Morchellana) pulchella* Utinomi. a-j, spicules from the cortex of the sterile stalk; k-l, spicules from the canal-walls of the sterile stalk. $\times 45$.

(d). Pseudo-clubs, 0.23-0.40 mm in length (fig. 33 d-e).

(e). Small ovals, club-shaped and globular bodies, 0.10-0.20 mm in length, closely covered with high, often compound spines or high warts (fig. 33 f-j).

The canal-walls of the sterile stalk are provided with large, heavy, often

branched spindles, 1.0-2.5 mm long and as much as 0.39 mm wide (warts included), and three- to multiradiates; they are closely beset with warts (fig. 33 k-l).

Colour. The sterile stalk is purplish red, but the base with the stolons is white. The stem and the branches are white, the twigs and supporting bundles are light brown, the anthocodial spicules and the spicules in the tentacles are brown-red.

18. **Dendronephthya (Morchellana) habereri** Kükenthal, 1905

(pl. 11 fig. 1, text-fig. 34-36)

Dendronephthya habereri Kükenthal, 1905: 638, fig. K¹, L¹, M¹, pl. 30 fig. 36; Sherriffs, 1922: 66, text-fig. 23; Thomson & Dean, 1931: 121, pl. 20 fig. 9, pl. 26 fig. 4; Utinomi, 1952: 195, fig. 20, pl. 10 fig. 17.

Morchellana habereri Tixier-Durivault & Prevorsek, 1962: 39, fig. 17-18.

Leiden Museum:

Gier Expedition 12, no. 6: Java Sea, 3° 46' S 111° 6' E, October 9, 1908, depth 15-18 fathoms, 1 specimen.

Diagnosis. Umbellate; polyparium flattened, umbels forming hemispherical masses, regular in outline; lower branches foliaceous; zooids in bundles of 5-8, globular, standing at nearly right angles to the short stalks; point spicules: small, converging spindles, 5-7 in a row, the uppermost larger and projecting; crown absent; intermediates 1-2 pairs; grade III; supporting bundle strong or weak, if strong it projects markedly.

Formula. III = 1 P + (4-6) p + 0 Cr + strong or weak S.B. + (1-2) M.

Description. The rigid colony is distinctly umbellate, it measures 8 cm in total height. The sterile stalk is 3 cm high, stiff, it has longitudinal ridges and furrows, the upper part is concealed by the reflexed lower branches.

The stiff, flattened polyparium is 5 cm in height, 6 cm in breadth and 2.5-3.0 cm in thickness. It shows a tendency to divide into three hemispherical masses, corresponding with the three primary branches into which the stem is divided. They lie in one plane and have their base of attachment above the lower foliaceous branches. The three branches have ramifications, which bear the twigs with the bundles of zooids. These bundles are not closely placed together, the polyparium is rather loose and open, but the outline is regular.

Each bundle of zooids consists of about five to eight zooids, which do not reach the same level. Most of them have short stalks, less than 0.5 mm in length, a few have somewhat longer stalks, about 0.5 mm, on the lower

branches some zooids have stalks up to about 1 mm. The anthocodiae are placed at nearly right angles to the stalks, they are cup-like bodies about 0.60 mm in height and 0.60-0.70 mm in breadth (fig. 34). The armature consists of eight double rows, in each of which there are five to seven pairs of small, converging, straight or slightly curved spindles, measuring 0.07-0.16 mm in length, and bearing a limited number of small spines. The uppermost pair is larger, measuring 0.26-0.36 mm in length, they project for a short distance (about 0.07-0.20 mm), and are more thickly beset with somewhat higher spines. Long spindles of this kind are found especially on the dorsal side of the zooids. The tentacles are armoured with flattened, toothed rods, 0.07-0.15 mm long, arranged in double rows.

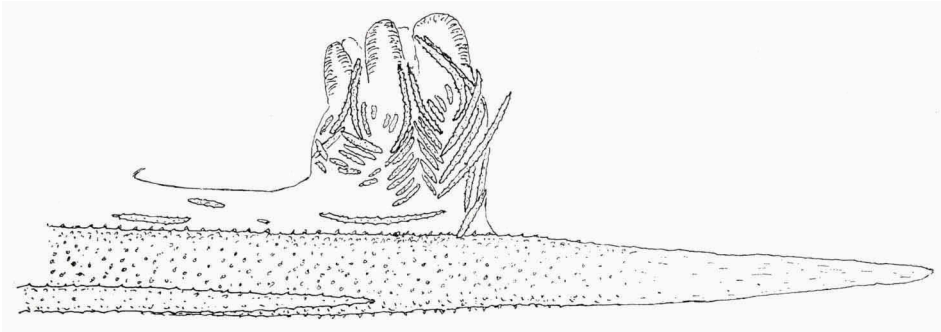


Fig. 34. *Dendronephthya (Morchellana) habercri* Kükenthal. Zooid with a strong supporting bundle from the specimen collected by the Gier Expedition. $\times 40$.

In each bundle a few zooids have very strong supporting bundles (fig. 34). In these cases it consists of one large spindle which may reach a length of more than 5 mm and a width of 0.20-0.30 mm, it usually projects for a distance of 1 mm, sometimes up to 1.5 mm. This projecting point is nearly smooth, the rest of the spindle is covered with very small spines. Besides this large spindle a few smaller spindles occur. The other, very short-stalked zooids have weak supporting bundles, projecting very slightly if at all.

The cortex of the stem contains only slender spindles arranged transversely. They are thickly covered with spines or warts. They measure up to 4 mm in length and 0.43 mm in width (warts included; 0.39 mm without warts).

In the cortex of the sterile stalk there are:

(a). Spindles up to 3 mm in length and 0.32 mm in width (warts included; 0.26 mm without warts), closely covered with warts (fig. 35 a).

- (b). "Kneed" spindles, usually shorter than (a), often with higher warts or wart-like prominences on their convex side (fig. 35 b).
- (c). A few clubbed spicules, 0.30-0.48 mm in length (fig. 35 c).
- (d). Spindles, 0.30-0.60 mm in length, bearing spines or small warts, not so thickly placed (fig. 35 d).
- (e). Small, irregularly shaped bodies and capstans, small tri- and quadri-radiates, 0.15-0.22 mm in length or in diameter (fig. 35 e-g).

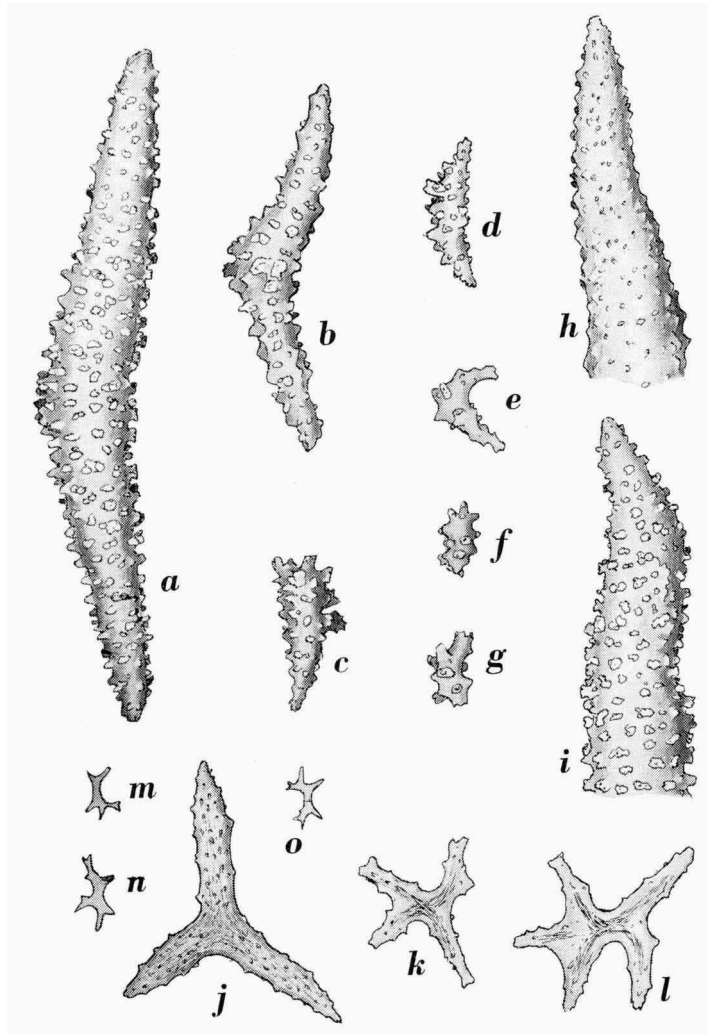


Fig. 35. *Dendronephthya (Morchellana) habereri* Kükenthal. a-g, spicules from the cortex of the sterile stalk; h-o, spicules from the canal-walls of the sterile stalk. $\times 45$.

The canal-walls of the stem have:

(a). Large spindles with blunt cones or simple warts, up to 2.8 mm in length and 0.32 mm in width (prominences included).

(b). Very small "antlers", 0.08-0.16 mm in length.

The canal-walls of the sterile stalk show:

(a). Numerous spindles with blunt cones or simple warts; measurements: up to 3.5 mm in length and 0.39 mm in width (prominences included) (fig. 35 h-i).

(b). Some tri-, quadri- and multiradiates, a few of them are very large, but usually they are relatively small (fig. 35 j-l).

(c). Small "antlers", 0.13-0.25 mm in length (fig. 35 m-o).

Colour. The sterile stalk is greyish-white, in the middle pinkish; stem, branches and anthocodiae are white. This white colour of the polyparium is only broken by the large red coloured spicules of the supporting bundles.

Remarks. I have compared this colony with some specimens collected by the Siboga Expedition, from unrecorded station(s), described by Thomson & Dean (1931: 121, 123). It is worth noticing that these authors did not make mention of the canal-wall spicules. And these are curious enough. For it appears that particularly in the canal-walls of the sterile stalk, besides large spindles, many robust tri-, quadri- and multiradiated forms occur with rays up to 1.40 mm in length and 0.40 mm in width at base (warts included), all densely covered with rough warts or spines. The small "antlers" occur too. In the specimen from the Gier Expedition these large radiated forms are in the minority.

Another difference is the length and width of the large spicule in the supporting bundle: in the specimen from the Gier Expedition it is more than 5 mm in length and up to 0.30 mm in width; Kükenthal (1905: 640) has 2.6×0.23 mm, but in the material from the Siboga Expedition (only a few colonies have been examined by me) the spindles composing the supporting bundle may be more than 4 mm in length. I suppose therefore, that this difference is of little value.

Leiden Museum:

Snellius Expedition: Sta. 60*, Sulu Islands, $6^{\circ} 58.0' N$ $121^{\circ} 52.5' E$, September 5, 1929, depth 72-80 m, 1 fragment.

In the collection of the Snellius Expedition there is a small fragment of a polyparium, 4 cm in breadth and 2 cm in thickness. As the rest of the polyparium together with the sterile stalk is absent the identification is far from easy. One has to rely almost exclusively on what can be learned from

the examination of the anthocodial armature and the supporting bundle. In the longer-stalked zooids (fig. 36 a) the anthocodial armature consists of eight points of mostly five to six pairs of spindles arranged en chevron, but in contracted polyps some of them lie more or less transversely. One of the uppermost pair is longer, up to 0.65 mm in length, and projects from the anthocodia for about half its length. The other point spicules are 0.25-0.40 mm long. They are all slightly curved and covered with spines. From this description it appears that the uppermost spindles are nearly twice as long as those in the specimen collected by the Gier Expedition and also in the material from the Siboga Expedition. Utinomi (1952: fig. 20 b), however, shows a zooid of which the uppermost spicule is about 0.55 mm long. The other anthocodial spicules are also longer, viz., 0.25-0.40 mm. In the short-stalked zooids the spicules are much smaller (fig. 36 b-c).

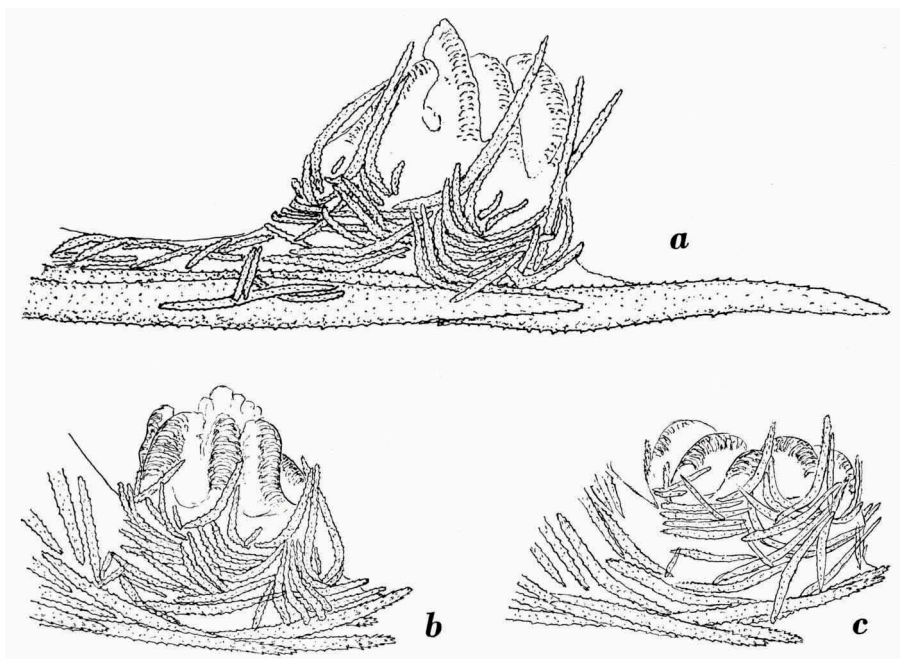


Fig. 36. *Dendronephthya (Morchellana) habereri* Kükenthal. Zooids from the specimen collected by the Snellius Expedition. $\times 45$.

In the polyps with longer stalks the supporting bundle is composed of some large spindles, which may reach a length of 2.0-2.5 mm, two or three of them project, the dominating one for a distance of up to 0.70 mm. In the zooids with short stalks it is of the ensheathing type, the projecting point is very short. The spindles are covered with small spines.

In the cortex of the branches there are slender spindles, up to 3 mm in length and 0.25 mm in width, they have small spines. The canal-walls contain spindles, up to 1.5 mm in length, but it is quite possible that in the missing part of the polyparium larger spindles occur. Besides these there are triradiates and the very small "antlers".

Conclusion. Although the anthocodial spicules are larger than "normal" the fragment may be identified with *D. habereri*.

Amsterdam Museum:

Siboga Expedition: Sta. 164, off N.W. New Guinea, 1° 42.5' S 130° 47.5' E, sand, small stones and shells, 32 m, August 20, 1899, 1 specimen.

In the collection of the Siboga Expedition there was a colony identified with *D. costatorubra* Henderson. This specimen is not mentioned in the monograph of the Alcyonacea by Thomson & Dean (1931). A re-examination of this specimen has led me to the conclusion that it is wrong to refer it to *D. costatorubra*. The chief reason is that the colony is not divaricate but umbellate. Besides this the colony is stiff, and the spicules in the canal-walls are quite different from those in *D. costatorubra*, they are, in fact, much larger: in the stem their measurements are up to 3.00 × 0.35 mm, in the sterile stalk they are as long as 4 mm and up to 0.40 mm in width. "Antlers" are also present.

In my opinion the specimen has to be referred to *D. habereri*, with which it agrees in many details. In the anthocodial points there are four to six pairs of spicules, five being "the predominant number" (cf. Thomson & Dean, 1931: 122).

Previously recorded from Japan (Sagami Bay, Tanabe Bay and Kusi-moto) and from several stations in the Malayan waters.

19. ***Dendronephthya (Morchellana) minima*** nov. spec.

(pl. 10 fig. 2, text-fig. 37)

Leiden Museum:

Snellius Expedition: Binongko, Tukang Besi Islands, off S. E. Celebes, March 7-10, 1930, depth 10 m, 1 specimen.

Diagnosis. Umbellate; sterile stalk short, with a basal expansion; polyparium compact, not flattened, contour continuous; lower branches foliaceous; polyps very small, at right angles to the short polyp stalks; anthocodial spicules arranged en chevron in 4-6 pairs or irregularly distributed in groups of about 4 rods, here and there one larger spicule projects beyond

the anthocodia; grade III; supporting bundle medium or weak, composed of many, nearly smooth, spicules, 2-5 project.

Formula. III = 1 P + (4-5) p + 0 Cr + medium or weak S.B., or = (4-6) p + 0 Cr + medium or weak S.B.

Description. A small, very rigid colony of 3.3 cm in height and 2.2 cm in greatest width, not flattened. The sterile stalk is short (about 1 cm), in the upper part it is 1 cm in diameter, towards the base it passes into an expansion 1.5 cm in diameter. There is one stem, which gives off many short branches. These are not ramified, but bear at their ends hemispherical groups of closely aggregated umbels of zooids, giving the colony a uniform surface. The species should be referred to Kükenthal's *spinosa*-group. The lower branches are foliaceous and reflexed.

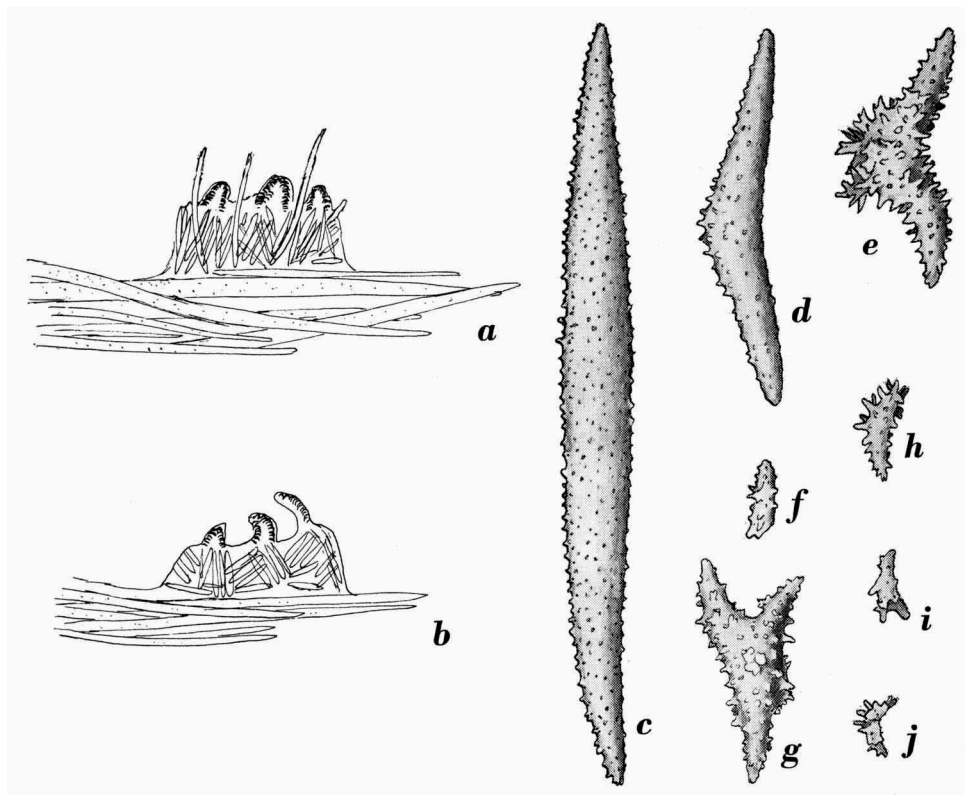


Fig. 37. *Dendronephthya (Morchellana) minima* nov. spec. a-b, zooids; c, white spicule from the cortex of the uppermost part of the sterile stalk; d-j, red spicules from the cortex of the basal part of the sterile stalk. $\times 45$.

The umbels consist of many zooids. The zooid stalks are short (0.3-0.6 mm). The anthocodiae are very small, hence the name of this species; they measure only 0.15-0.25 mm in height and 0.40-0.50 mm in breadth, and form nearly right angles with the stalks (fig. 37 a, b).

The anthocodial armature shows some variation. In certain cases there is an arrangement en chevron, in each row there are four to six spicules, in others the spicules are arranged parallel to each other and to the longitudinal axis of the anthocodia in groups of four to six rods, in others, again, they are rather irregularly distributed in the anthocodial wall. At times one spicule of each point (not the uppermost) is larger (0.30-0.45 mm) and projects for a distance of 0.15-0.30 mm, the projecting part may break off easily. In other anthocodiae there are no projecting spicules. All these spicules are smooth, small rods, averaging 0.14 mm in length, colourless and rather transparent, and because of this it is not easy to observe their mutual position, and whether or not the intermediates occur.

The tentacles are strongly armoured with two compact rows of small, flat, irregular spicules, measuring 0.030-0.065 mm \times 0.02-0.03 mm; they are very conspicuous owing to their red-violet colour.

The supporting bundle is of the ensheathing type. At the base of the anthocodiae it is composed of about six to eight spindles, the largest of them may reach a length of 3 mm and a width of 0.13 mm. Two to five spindles project for varying distances beyond the anthocodiae, the largest for 0.30-1.20 mm. In other zooids the supporting bundle hardly projects. All spicules are fairly smooth and deep red in colour.

In the uppermost part of the stem the cortical spicules are arranged transversely; they are slender spindles, nearly smooth and red. Their length is up to 2.6 mm, their width only 0.12 mm or less. In the uppermost part of the sterile stalk the cortical spicules are all arranged in a longitudinal direction. The larger ones may reach a length of 2.3 mm and a width of 0.25 mm; they have low, blunt thorns, and are white in colour (fig. 37 c).

In the red broadened base of attachment the spicules show various types:

(a). Spindles up to about 1.45 mm in length and 0.23 mm in width, covered with low, blunt spines (fig. 37 d).

(b). Shorter spindles, often bifid, with higher thorns.

(c). "Kneed" spindles or boomerangs with thorns which are strongly developed on one side and often compound (fig. 37 e).

(d). Tri-, quadri- and multiradiates, clubs, etc. (fig. 37 f-j).

The spicules mentioned sub (c) and (d) vary in length from 0.30-0.80 mm. All these cortical spicules are red.

In the canal-walls of the sterile stalk irregularly curved spindles are met with, measuring up to 2.3 mm in length and 0.30 mm in width. The low, blunt thorns are often placed in regular transverse rows.

Colour. The basal expansion is deep red, the upper part of the stalk, the lower part of the stem and the lower branches are white. Towards the ends stem and branches become gradually redder. The supporting bundles and the tentacles are red as well, but the point spicules are colourless.

20. ***Dendronephthya (Morchellana) aurora*** (Ridley, 1887)

(pl. 12 fig. 1, text-fig. 38)

Spongodes aurora Ridley, 1887: 228, pl. 17 fig. 20-24.

Dendronephthya aurora Kükenthal, 1905: 669.

Morchellana aurora Tixier-Durivault & Prevorsek, 1962: 173.

Leiden Museum:

Malay Archipelago, locality unrecorded, leg. W. von Bülow, 1 specimen.

Diagnosis. Umbellate; polyparium flattened; lower branches foliaceous, forming a collar; zooids very densely packed, almost upright, sessile; point spicules about 3-4 pairs, sometimes en chevron, uppermost spicules not or hardly projecting; grade IV; supporting bundle weak, one or two spindles may project for a short distance.

Formula. IV = (3-4) p + 0 Cr + weak S.B. + 0 M.

Description. The rather flabby colony, flattened in one plane, measures fully 6.5 cm in total height and 5 cm in maximum breadth with a thickness of 2.7 cm. The sterile stalk is 1.8 × 1.0 cm wide and 2 cm long, flabby, slightly parchment-like in texture, and has fine stolons at the base of attachment.

The lower branches of the polyparium are leaf-like and form a nearly complete collar. Above this the thick stem has short branches, but about half way up the polyparium the stem divides into three main branches which are short, thick and rounded and give rise to the thick twigs which widen apically and bear the polyps. The latter are closely arranged into compact umbels in which the polyps reach the same level; these umbels are exteriorly flattened or somewhat convex. On both sides of the polyparium the umbels are closely pressed together forming hemispherical masses with a uniform outline. In consequence of this compact structure stem and branches are almost entirely hidden from view.

The polyps are small, rounded, sessile, 0.30-0.45 mm in diameter and 0.45-0.55 mm in height (fig. 38 a). In some cases the anthocodial armature

consists of eight double rows of 3 or 4 pairs of white, curved, slender spindles, 0.18-0.32 mm long. In others these spindles are irregularly arranged, more or less longitudinally. At the base there is no true crown, but there may be some red spicules (just like those of the supporting bundle) lying transversely. So they are quite distinct from the white point spicules.

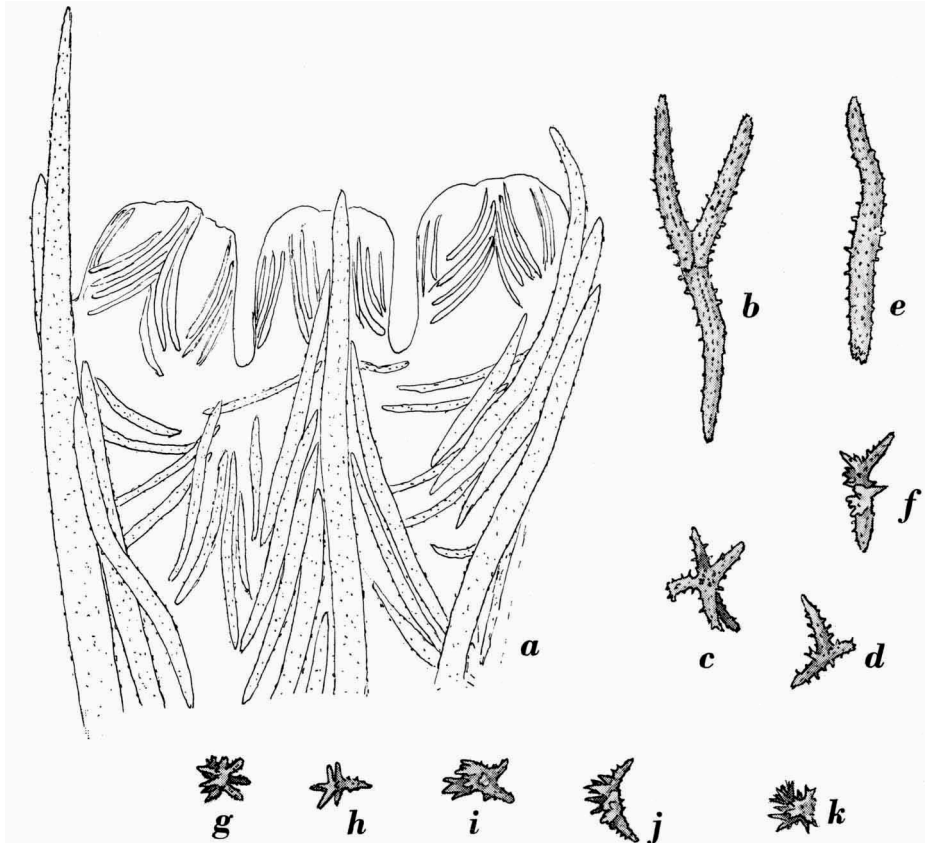


Fig. 38. *Dendronephthya (Morchellana) aurora* (Ridley). a, three zooids; b-d, spicules from the cortex of the stem; e-k, spicules from the cortex of the sterile stalk. $\times 45$.

The weak supporting bundle is of the ensheathing type. At the periphery of the umbels the zooids have somewhat stronger and projecting supporting bundles, while the interior zooids have very weak ones. In the latter the supporting bundle consists of a number of spindles which are all of the same length, on an average 0.75 mm, while none of them projects. But in the first-mentioned external zooids one or two spindles are larger, 0.80-1.20 mm long, sometimes one spindle is as long as 2.25 mm; the width is up to 0.10 mm; they may project for a distance of 0.2-0.4 mm, sometimes up to 0.6 mm,

beyond the anthocodiae. The zooids make a very obtuse angle with their supporting bundles; the spindles composing these bundles are beset with very small thorns, they are red in colour, the projecting point, if present, is light red.

The examination of the polyps and the supporting bundles is hampered by the fact that the sessile zooids are so small and so closely packed together that they are difficult to separate from each other without damaging. Consequently fig. 38 a has not been made with a drawing-prism, it is a sketch as true to nature as possible. Already at this moment I may point out the striking resemblance to *D. aurora*, figured by Ridley (1887: pl. 17 fig. 21).

In the cortex of the stem there are:

(a). Spindles, irregularly curved, thin and slender, often bifid at one end, fragile, up to 2-2.5 mm long and 0.06-0.11 mm wide; they bear low, rounded knobs or spines (fig. 38 b).

(b). Smaller, strongly branched spicules, tri-, quadri- and multiradiates, the arms of which vary from 0.15-0.40 mm in length and 0.03-0.06 mm in width (without prominences), they have relatively high spines (fig. 38 c-d). On stem and branches most of the spindles are arranged transversely.

In the cortex of the sterile stalk the vast majority of the spicules consist of very small, irregular bodies, "stars", with prominent, often branched spines (fig. 38 g, k); they are 0.12-0.16 mm in diameter (spines included). In addition to these there are some "kneed" spicules, 0.30-0.45 mm long with high thorns on their convex side (fig. 38 j), some spindles, 0.20-1.00 mm long (fig. 38 e-f), some tri- and quadriradiates, their arms may reach a length of 0.14 mm (fig. 38 i), and some clubs, 0.18-0.28 mm long (fig. 38 h).

The canal-walls of the stem show slender spindles, up to 1.7 mm long and 0.17 mm wide, they bear very low knobs or spines.

In the sterile stalk the canal-walls have spindles often bifid at one end or provided with lateral branches. They are less numerous than in the stem, and they measure up to 1.25 mm in length and 0.14 mm in width, the spines are higher here.

Colour. The sterile stalk is grey, stem and branches are white, but the twigs and the supporting bundles are red, while the collar formed by the lower branches gradually turns red towards the edge; the anthocodial spicules are white.

Remarks. As was said above there is a striking resemblance between our specimen and Ridley's figure of *D. aurora* (pl. 17 fig. 21): in both the zooids are small, erect and closely packed. But also as regards Ridley's description there is a close agreement: the measurements of the spicules,

the "slug-like" cortical spicules in the stalk with their "prominent, conical tubercles" and the colour of the colony are nearly the same. Unfortunately Ridley did not describe the anthocodial armature. Nevertheless I consider my specimen identical with *D. aurora* (Ridley).

Kükenthal (1905: 669, 670) supposed that later investigations would possibly show the identity of *D. aurora* (Ridley) with *D. lanxifera* (Holm). In my opinion, however, the differences between both species are too great.

It may be noted that, as a character of Kükenthal's *aurora*-group, the author (Kükenthal, 1905: 627, 669) mentions the flattened or even concave surface of the umbels, but *D. aurora* has flattened or convex (!) umbels (cf. Ridley, 1887: 228). Besides, the umbels are densely arranged and united into large rounded masses. In my opinion it has to be referred to Kükenthal's *spinosa*-group.

Previously recorded from King Island Bay (Mergui Archipelago).

21. ***Dendronephthya (Morchellana) quadrata*** Henderson, 1909

(pl. 12 fig. 2, text-fig. 39-40)

Dendronephthya quadrata Henderson, 1909: 107, fig. 52.

Morchellana quadrata Tixier-Durivault & Prevorsek, 1962: 170, fig. 106.

Leiden Museum:

Bay of Djakarta, Java, leg. P. Buitendijk, August 1927, 1 specimen.

Diagnosis. Umbellate; polyparium flattened, very regular in outline; lowest branches foliaceous; zooids in bundles of 10-20, each standing at a nearly right angle to the short stalk; point spicules: 3-5, usually 4 spindles in a row, the uppermost larger and slightly projecting; crown and intermediates absent; grade IV; supporting bundle medium or weak, projecting very slightly if at all.

Formula. IV = 1 P + (2-4) p + 0 Cr + medium to weak S.B. + 0 M.

Description. The colony measures 5 cm in total height. The sterile stalk is 2 cm long and 1-1.5 cm wide, at the base it has numerous stolons. The uppermost part of it is hidden by the lowest branches, which are foliaceous and reflexed. The laterally flattened polyparium is 3.5 cm in height, 5.5 cm in width and 2.5 cm in thickness. Henderson's description of the polyparium of his specimen is nearly fully in agreement with our specimen. For, in our specimen, too, "the polyparium is large, greatly flattened in one plane, almost regular in outline, and with an even, unbroken surface. It is more or less quadrilateral in shape with the corners rounded off and the sides slightly irregular, and consists of a number of branches which vary little in size,

the upper being slightly the longer, and are most developed in the plane of flattening. The branches are short and thick, and by repeated division give rise to the blunt stump-like polyp-bearing twigs. In addition to the larger branches numerous smaller branches arise on the lateral surface of the stem." (Henderson, 1909: 107). Some notes may be added to this. The branches are cylindrical (except the lowermost which are leaf-like), those arising from the lateral surfaces of the stem are 3-4 mm in width and up to about 8 mm in height, the other branches divide into short, thick branchlets, in their turn they may divide into the twigs, which bear the umbels of zooids at their tips. The twigs just mentioned are about 2 mm in width and in height. The umbels are so densely packed together that it is impossible to distinguish the single umbels from each other. Each umbel consists of ten to twenty zooids, which all reach the same level. Single zooids never occur, not even on the margins of the lower, leaf-like branches. The species should be referred to Kükenthal's *aurora*-group.

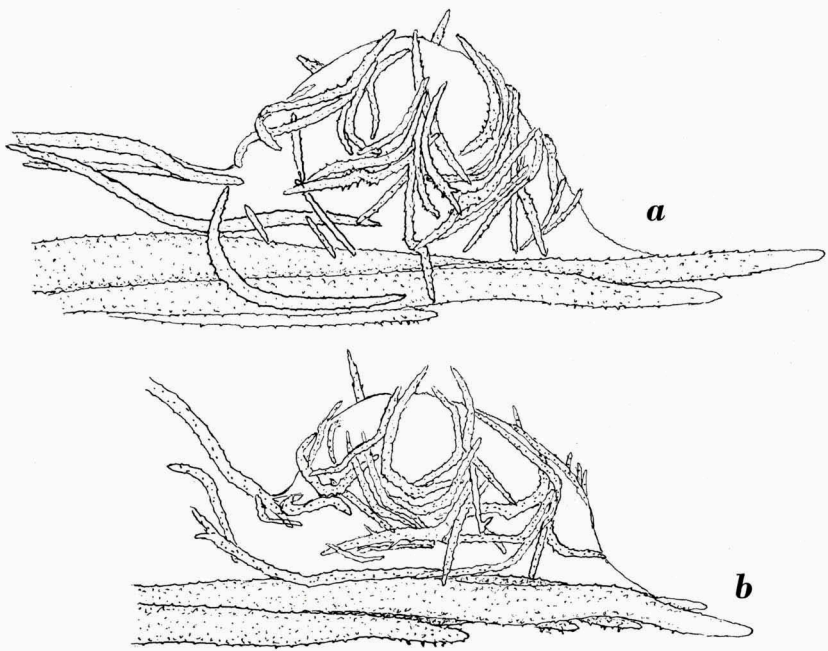


Fig. 39. *Dendronephthya (Morchellana) quadrata* Henderson. a-b, zooids. $\times 45$.

The zooids have short stalks (fig. 39). In each umbel a few have stalks up to 1 mm in length, but most zooids have much shorter stalks or are nearly sessile. The anthocodiae, which form a right or a slightly obtuse angle

with the stalks, measure 0.45-0.60 mm in height and 0.65-0.90 mm in width. In the anthocodiae the spicules are arranged in eight double rows, mostly four in a row. The outermost are usually larger, 0.29-0.58 mm long, and they project for a short distance (0.07-0.10 mm). The lower spicules measure 0.22-0.37 mm in length and 0.043-0.058 mm in width. Below these converging point spicules there are sometimes a few accessory spicules placed more or less horizontally. All these spicules, which are often irregularly curved, are covered with spines that are usually very small, but sometimes unexpectedly large; they are white in colour. Spicules in the tentacles and intermediates are absent.

In the somewhat longer-stalked zooids the supporting bundle may be called medium; in these cases it consists of some spiny spindles, the largest of them may reach a length of 1.90 mm and a width of 0.13 mm. The projecting tip has a length of 0.60 mm or less, a second spindle may also project for a shorter distance. In the short-stalked zooids the supporting bundles are of the ensheathing type; they hardly project. On the ventral side of the polyp stalk some spindles occur, which are larger than the anthocodial spindles but smaller than the spindles composing the supporting bundle. All these spicules in the polyp stalks and in the supporting bundles are red, only the projecting tips of the latter are white; owing to this red colour they contrast strongly with the white spicules in the anthocodiae.

In the cortex of the stem there are curved or irregularly bent, fragile, slender spindles and rods, up to 1.5 mm in length and 0.085 mm in width, and, besides, Y-shaped and triradiated spicules; they all vary considerably in size, and are covered with spines, which at the ends of the spindles are usually more densely crowded (fig. 40 a-c).

The spicules in the cortex of the sterile stalk include:

(a). Spindles, sometimes Y-shaped, 0.30-0.70 mm in length, provided with high, sharp, often branched spines (fig. 40 d-e).

(b). Tri-, quadri- and multiradiated forms or irregularly ramified spicules, the arms often directed to one side and very spiny at the centre of the spicule; the arms are 0.12-0.25 mm in length (fig. 40 f-h).

(c). Spiny clubs, 0.15-0.30 mm in length (fig. 40 i).

(d). Small dumb-bells, 0.13 mm in length, spindles, 0.15-0.20 mm in length, stars and irregularly shaped bodies, 0.10-0.25 mm in diameter; they all bear numerous markedly long, often branched, sharp spines (fig. 40 j-n).

In the canal-walls of the stem there are few spindles, usually 0.50-0.80 mm in length and 0.05-0.07 mm in width, occasionally as long as 1.40 mm; they are not thickly beset with low, blunt spines, sometimes a spindle bears a

side-branch (fig. 40 o-p). In the canal-walls of the sterile stalk the same type of spindles occurs, but here also they are sparse; they are usually somewhat shorter than those in the stem and slightly more densely covered with spines (fig. 40 q).

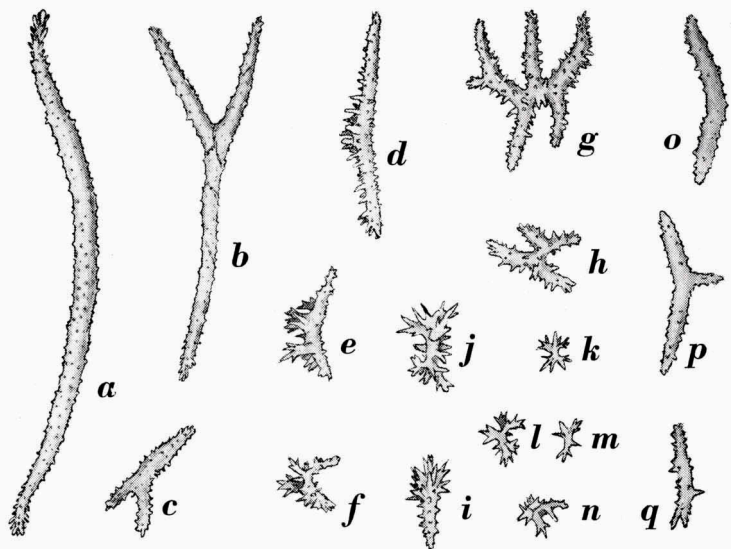


Fig. 40. *Dendronephthya (Morchellana) quadrata* Henderson. a-c, spicules from the cortex of the stem; d-n, spicules from the cortex of the sterile stalk; o-p, spicules from the canal-walls of the stem; q, spicule from the canal-walls of the sterile stalk. $\times 45$.

Colour. Sterile stalk, stem and branches are white, only at the ends of the smallest ramifications the colour of the spicules gradually passes into red; the supporting bundles and the spicules in the polyp stalks are red, but the anthocodial spicules are white again.

Remarks. In nearly all characters there is a close resemblance with *D. quadrata* Henderson, even the coloration is fairly the same. Only in three points there seems to be disagreement:

(a). In our specimen the angle between the anthocodia and the polyp stalk is nearly right and not "very obtuse".

(b). The anthocodiae are somewhat broader.

(c). The spicules occurring in the canal-walls are longer and wider.

I consider these differences, however, of too little importance to establish a new species or variety.

Previously recorded from the Andamans.

22. **Dendronephthya (Morchellana) suluensis** nov. spec.

(pl. 11 fig. 2, text-fig. 41-42)

Leiden Museum :

Snellius Expedition: Sta. 60*, Sulu Islands, 6° 58.0' N 121° 52.5' E, depth 72-80 m, September 5, 1929, 2 specimens.

Diagnosis. Umbellate; polyparium distinctly flattened, with regular contour; lowest branches foliaceous; zooids in bundles of 5-10, anthocodiae at right to obtuse angles to their stalks; point spicules one pair, hockeystick-shaped, projecting; crown spicules in 2 rows, 2-3 pairs of supplementary spicules; grade VI; supporting bundle strong, projecting markedly.

Formula. VI = 1 P + 2 Cr + (2-3) SS + strong S.B. + 0 M.

Description. This species is represented by two complete colonies, slightly differing from one another in dimensions and coloration only. The now following description is based on the larger specimen, which measures 10 cm in total height, 9 cm in breadth and rather more than 3 cm in thickness. The white sterile stalk is 2.5 cm long and 2.5 cm broad, it is stiff and parchment-like in texture, and shows longitudinal furrows; at the oblique base it gives off several short stolons.

The polyparium is flattened in one plane, one surface being flat, the other slightly convex. The outline is regular and oval, the long axis of the oval corresponds with that of the stem. The lowest branches are leaf-like, and form a collar. A little above this collar we find two main branches on opposite sides of the stem. The latter then continues upward, and then divides into two branches, which lie in the same plane with the two lower branches. These main branches give off many secondary branches, which divide and subdivide into diverging slender twigs bearing the bundles of zooids. Corresponding with the four main branches mentioned the outline of the polyparium shows four lobes, but for the rest it is perfectly regular. I refer the species to Kükenthal's *disciformis*-group.

All bundles of zooids are uniformly scattered on the outer surface of the polyparium, though not compact. Each bundle consists of about five to ten zooids of which one to three or four have longer stalks, up to 1 mm, and are characterized by one very long and considerably projecting white spicule in the supporting bundle; in the other zooids the stalk is shorter, and the supporting bundle projects for a shorter distance (fig. 41).

The larger anthocodiae measure about 0.43-0.50 mm in height and 0.55-0.85 mm in breadth, and are placed on the stalk at an angle which varies from right to obtuse. The anthocodial armature is composed of eight points of only one pair of hockeystick-shaped spicules, the ventral one is largest,

it measures 0.65-0.85 mm in length and projects for a distance of 0.35-0.50 mm. In rare cases it is accompanied by a very small spicule at its base. Below these points there are usually two rows of crown spicules and two or three converging supplementary spicules. In other cases all crown spicules are arranged more or less horizontally. In the space just below the sharply bent basal part of the point spicules there may be a curved spindle with the convex side upwards. The crown spicules are 0.20-0.35 mm in length. All anthocodial spicules are covered with blunt spines, on the projecting parts the spines are directed obliquely towards the tip. On the aboral surface of the tentacles there are two rows of flat, sharply toothed spicules, 0.05-0.09 mm in length.

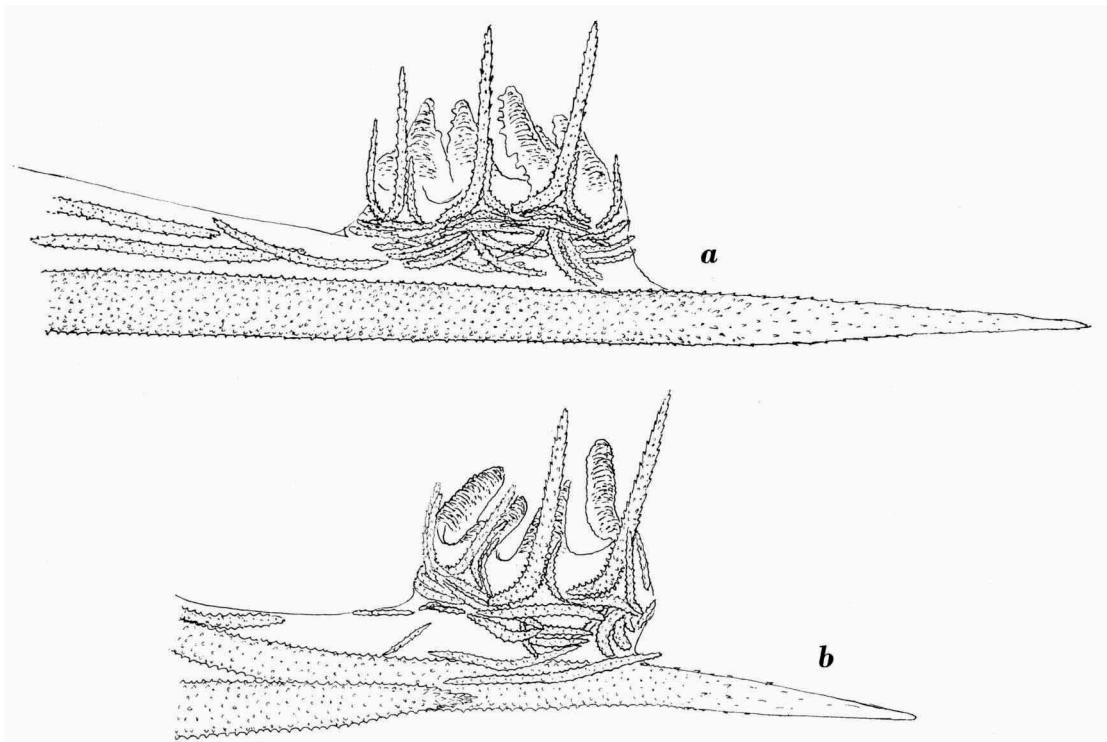


Fig. 41. *Dendronephthya (Morchellana) suluensis* nov. spec. a, b, zooids. $\times 40$.

In the larger and longer-stalked zooids the supporting bundle consists of one, a few times two, large spindles, up to 5 mm long and 0.3 mm wide, it projects for a distance of up to 2 mm, the projecting part is nearly smooth. On the ventral side of the polyp stalk there are some more spindles. In the

smaller zooids the supporting bundle is moderately developed and extends for a very short distance.

In the cortex of the branches there are slender, white spindles, sometimes ramified or bifid at one end, and varying from 0.25-4.00 mm in length, the largest ones being 0.25-0.30 mm wide (without prominences). They are thickly and regularly covered with flat warts or blunt spines, on the smaller spindles the spines are less crowded.

The cortex of the sterile stalk contains a variety of spicules. They include the following forms:

(a). Thick spindles, "kneed" or irregular in shape, covered with relatively large blunt spines which are sometimes bifid, or with coarse warts which may have developed into short branches. Measurements: 1-2 \times 0.20-0.32 mm (fig. 42 a-b).

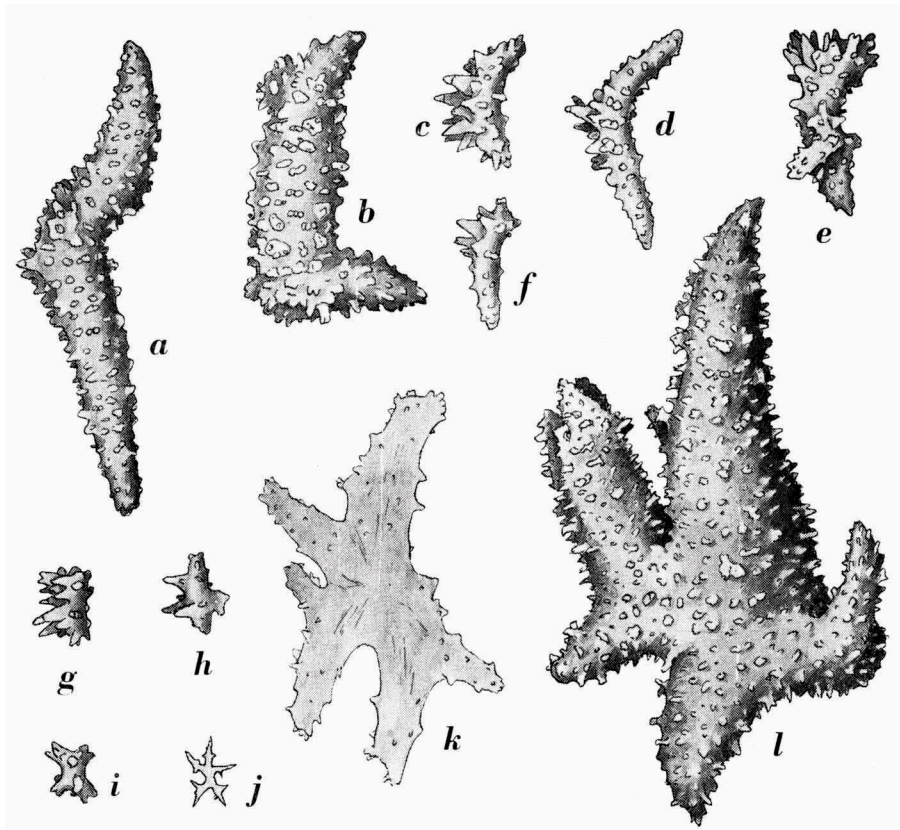


Fig. 42. *Dendronephthya (Morchellana) suluensis* nov. spec. a-i, spicules from the cortex of the sterile stalk; j-l, spicules from the canal-walls of the sterile stalk. \times 45.

(b). "Kneed" spindles with high blunt prominences on their convex side; length: 0.40-0.85 mm (fig. 42 c-d).

(c). Clubs, 0.45-0.75 mm long, with high spines or warts on their heads, these prominences often being higher on one side of the head; smaller clubs also occur, 0.23-0.30 mm long (fig. 42 e-f).

(d). Numerous small bodies and capstans, 0.17-0.23 mm, up to 0.30 mm in length, with high spines (fig. 42 g-i).

In the very thin canal-walls of the branches there are small, flat antler-like spicules in abundance, 0.075-0.155 mm in length.

In the canal-walls of the sterile stalk the same antlers occur, though somewhat larger; 0.12-0.20 mm in length (fig. 42 j). In addition large tri-, quadri- and multiradiate, flat spicules are found, measuring 0.80-1.10 mm in diameter (fig. 42 k). Intermediate forms between the small antlers and these large spicules are rare. I may point out now that in the canal-walls of the smaller specimen (see below), besides these flat radiate forms, there are large, thick, roughly tuberculate and irregularly branched spicules (fig. 42 l). They are 1.10-1.80 mm long and 0.3-0.5 mm wide. These forms seem to occur in the centre of the stalk region only.

Colour. Sterile stalk, stem and branches are white, the bundles of zooids are light brown, but the large spindles of the supporting bundles are white.

The smaller specimen has a total height of 8 cm and a breadth of 6 cm. It differs slightly in colour from the specimen described above: many zooids are white, others show a brown-red colouring, in some parts of the colony the spicules in the twigs have the same tint. I have already drawn attention to the large irregularly shaped spicules in the canal-walls, which seem to be absent in the large specimen.

Remarks. To my knowledge there are four species of Umbellates referred to the anthocodial grade VI by previous authors, viz., *D. longicaulis* Kükenthal, *D. simplex* Sherriffs, *D. gloriosa* Utinomi, and *D. composita* Tixier-Durivault & Prevorsek. As our specimens are in many respects quite different from these I am compelled to establish a new species.

23. *Stereonephthya ulicoides* Thomson & Dean, 1931

(pl. 7 fig. 2, text-fig. 43-45)

Stereonephthya ulicoides Thomson & Dean, 1931: 149.

Amsterdam Museum:

Siboga Expedition: Sta. 60?, Haingsisi, Samau Island, Timor, 5 specimens and some fragments.

Leiden Museum :

Snellius Expedition: Maratua, off NE Borneo, depth 4-6 m, August 14-18, 1929, 2 specimens; Maratua, depth unrecorded, August 14-18, 1929, 4 specimens; Paleleh, N. Celebes, depth 3-5 m, August 22, 1929, 1 specimen (now broken into two pieces).

Diagnosis. Sterile stalk short; polyparium flabby or stiff, sometimes flattened laterally; polyp stalks short; anthocodiae at very acute angles to the stalks; anthocodial armature: five double rows of spiny spindles arranged en chevron or spindles lying more or less longitudinally or spindles rather irregularly distributed, when arranged en chevron mostly six or seven in a row, up to nine; the uppermost anthocodial spicules are larger, club-shaped, they project for some distance; intermediates sometimes numerous and opaque, in other cases few in number, spindle-shaped, transparent; ventral points reduced or absent; supporting bundle of the ensheathing type, mostly two spindles project for a distance of 0.2-1.45 mm.

Description. As Thomson & Dean (1931: 149) described this species unsatisfactorily and as they omitted giving pictures of the most important characters I first give a more detailed description of the type specimens collected by the Siboga Expedition. Of these colonies Thomson & Dean remark "Station. Not recorded", but a label which accompanies the specimens records "Station 60? Haingsisi".

In my opinion there are five complete colonies, the largest of which measures 4 cm in total height and 7-8 cm in maximum breadth. The sterile stalk is very short, or absent, in which latter case the stems arise from an encrusting base. In the larger colonies several stems radiate to all sides, they are always flabby. From these stems rather stiff, finger-like branches rise upwards, 3-20 mm in length and covered with zooids, which arise always singly.

The zooids (fig. 43 a, b) have very short stalks, less than 1 mm in length. The anthocodiae make very acute angles with them. The height of the anthocodiae, measured along their dorsal side, is 0.85-1.30 mm, upwards they widen gradually, at the height of the oral margin they measure 0.50-0.70 mm.

At the dorsal and lateral sides the armature consists of five points, in each of which there are six or seven spindles but the number may vary from five to nine. In some cases the spicules are arranged en chevron, in many others, however, the en chevron arrangement is very indefinite, the spindles being disposed more or less longitudinally. In each single row one of the uppermost spicules is sometimes larger, up to 0.43 mm in length, in other zooids it is small; but always it is clavate, with a pointed tip. This white, opaque, nearly smooth thickened end projects for a distance of 0.07-0.14 mm. The lower spindles are usually curved, they are beset with relatively

high spines and they measure 0.22-0.50 mm in length, rarely up to 0.58 mm. The ventral anthocodial points are reduced or totally absent. The occurrence of a number of intermediate spicules between the anthocodial points is indeed highly remarkable; they are oval or club-shaped, opaque, and white in colour. The tentacles are armoured with flat, rod-shaped spicules, with irregularly toothed edges; they measure 0.06-0.13 mm in length.

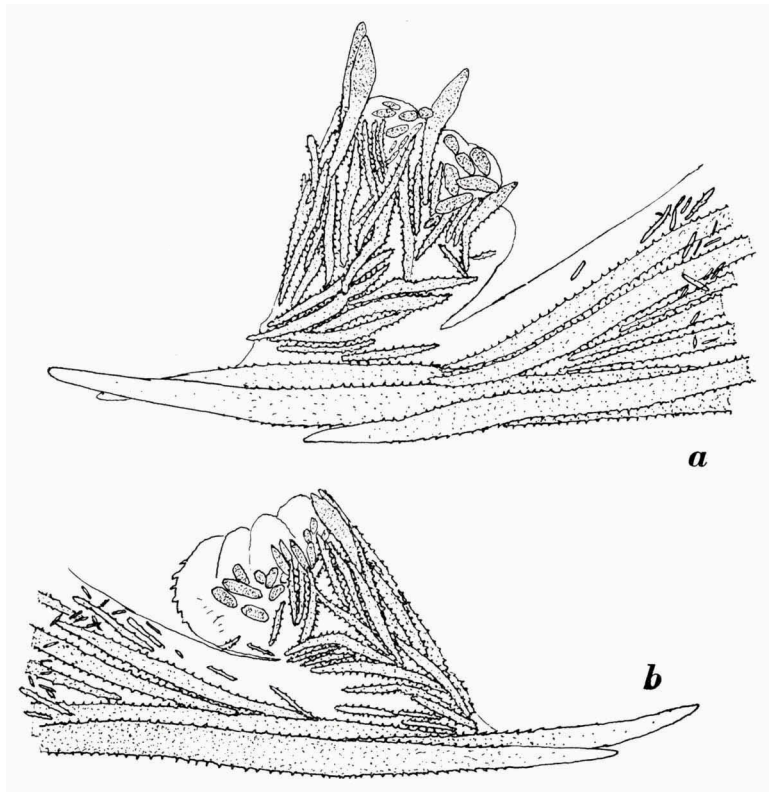


Fig. 43. *Stereonephthya ulicoides* Thomson & Dean. a-b, zooids of the type specimens. $\times 45$.

The supporting bundle is of the ensheathing type. It is composed of about twelve large spindles: at the lateral sides of the stalk there are some sloping spindles, 0.60-1.10 mm in length, at the dorsal side of it the spindles are larger, 2-3 mm in length and up to 0.21 mm in width (spines included; 0.17 mm without spines). Two to four of these dorsal spindles project beyond the anthocodia but two farther than the others, up to 0.7 mm. All

these spindles are curved, and beset with sharp spines, but the projecting points are smooth. Just below the anthocodia the ventral side of the polyp stalk is nude, but further down towards the base, and on the sides of the stalk, many tiny, rod-like spicules are met with, which are 0.06-0.12 mm in length.

In the cortex of the stem transversely arranged, curved spindles are present, strongly varying in size: the largest are up to about 2.3 mm in length and 0.13 mm in width (without spines); they are covered with sharp spines or simple warts.

In the basal portion of the sterile stalk (or in the base of attachment) the cortex contains:

- (a). Some spindles, closely resembling those in the cortex of the stem (fig. 44 a-c).
- (b). Numerous short, more or less cylindrical, spindle-shaped, clavate or kneed spicules, about 0.20-0.36 mm in length; they have high, often branched thorns (fig. 44 d-i).

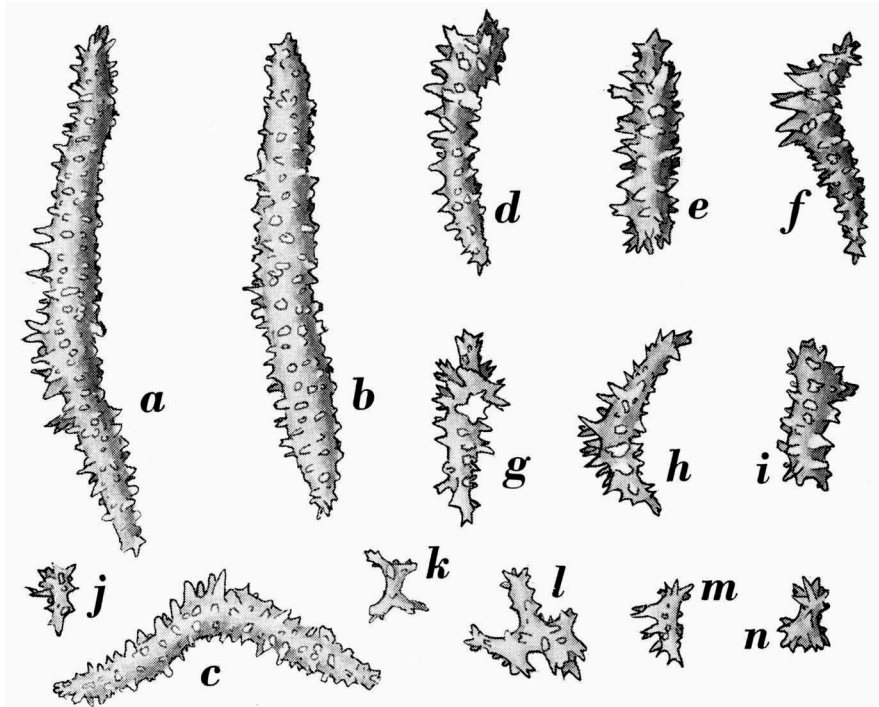


Fig. 44. *Stereonephthya ulicoides* Thomson & Dean. a-n, spicules from the cortex of the basal part of the sterile stalk of one of the type specimens. $\times 100$.

(c). Smaller bodies: club-shaped, quadriradiated, kneed, globular or irregular in shape, 0.15-0.22 mm in length, and small capstans, 0.06-0.10 mm in length (fig. 44 j-n).

Of course these types are connected by all kinds of transitional forms.

In the canal-walls very few spicules are present, they are spindles, 0.22-0.35 mm in length, and have few short prominences.

Colour. All colonies collected by the Siboga Expedition are entirely white.

Description of the specimens collected by the Snellius Expedition.

1. A colony, 5 cm in height and 5 cm in maximum spread. The colony is rigid, the finger-like branches are shorter, up to 10 mm in length, some of them are bent downwards. The uppermost anthocodial spicules are slightly stronger and project for a larger distance, up to 0.32 mm. As to the intermediates the zooids differ from each other. In some zooids they are absent, in others there are 3-6 of them between two points. In shape and colour the intermediates may be different too: usually they are more or less spindle-shaped, in this case they are of the same colour as the other anthocodial spicules, but now and then (especially between the dorsal points) they are short and plump, nearly smooth, and opaque. In some zooids the supporting bundle may project farther, as much as 1.45 mm. The colony is white but the anthocodial spicules are light violet.

Locality. Maratua.

2. Another stiff colony, attached to a piece of coral, has a total height of 3 cm and a maximum spread of 4 cm; the polyparium is slightly flattened. The anthocodial spicules, which are a little darker violet, are larger than in the specimens described up to now: the uppermost clavate spicules are as long as 0.95 mm and project for a distance up to 0.40 mm, the lower spicules are up to 0.65 mm in length. For the rest the colony agrees in all respects with the specimen described sub 1.

Locality. Maratua.

3. A young, rigid, slightly flattened colony, 3 cm in height and 2.3 cm in maximum width. It does not differ from the specimens described sub 1 and 2.

Locality. Maratua.

4. A small colony, basally attached to a piece of coral; it has a height of 2.5 cm and a width of 3 cm, it is strongly flattened laterally. The uppermost anthocodial spicules are very small, somewhat smaller still than those in the Siboga-specimens, they hardly project. The supporting bundle projects for a very short distance, usually 0.2-0.3 mm. The colony as a whole looks redder, which is caused by the fact that not only the anthocodial spicules

but also the spicules of the supporting bundles are reddish-violet, though their projecting points are white.

Locality. Maratua.

5 and 6. Two other, very rigid colonies, 6.5 cm in width and 4 and 6 cm in height. The anthocodiae are a little higher: 1.1-1.6 mm, measured along the dorsal side (fig. 45). The polyp stalk may be slightly longer too, the supporting bundle mostly projects for a distance of 1.25 mm. Owing to this both colonies have a more coarse and spiny appearance. Stem, branches and supporting bundles are very light brown, the anthocodiae are slightly darker brown.

Locality. Maratua.

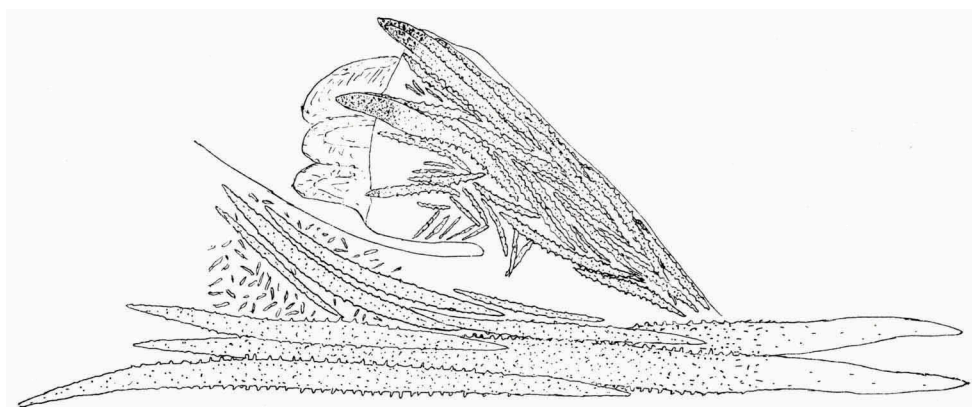


Fig. 45. *Stereonephthya ulicoides* Thomson & Dean. Zooid from a specimen collected by the Snellius Expedition. $\times 40$.

7. A stiff colony one of the stems of which is more than 7 cm in length. In size and shape of the anthocodiae, in anthocodial armature and in other characters it agrees most with the specimen described sub 2, but it differs from it in colour: many of the large spicules in the cortex of the stem are lemon-yellow, but the spicules in the supporting bundles and in the anthocodiae are nearly white. Intermediate spicules are few in number or they are absent.

Locality. Paleleh.

Remarks. The identification of the specimens described was rather a brain-racking problem, for they differ distinctly from each other, not only in colour but also in other respects.

The colonies collected by the Snellius Expedition differ from the type specimens in the fact that in the Siboga specimens the numerous intermediate

spicules are more or less oval and opaque, which is a very striking feature. In the Snellius specimens the intermediates are less numerous, in a very few cases they are oval in shape and opaque, usually, however, they are small spindles and transparent.

As to the anthocodial armature the disposition of the spicules may also be different. In some cases the spicules are clearly arranged en chevron, in others they are placed more or less longitudinally, the rows being indistinct. In one and the same colony the uppermost spicules may largely vary in size, and in comparing the several colonies we find that these spicules may be small and hardly projecting, or that they are up to 0.95 mm in length and project for a distance of up to 0.4 mm. The supporting bundle usually projects for a distance of less than 1 mm, but sometimes it projects slightly more.

It is impossible for me to draw the line between the various characters of the colonies with a view to distinguishing more than one species, and for this reason I arrived at the conclusion that all specimens discussed above should be reckoned to the same species, viz., *S. ulicoides* Thomson & Dean.

In comparing this species with *S. ulex* (Holm), Thomson & Dean (1931) observed that "the branches cannot be described as "very rigid" or Madre-pore-like". In the case of the Snellius specimens, however, the colonies are rigid, as was said above. Of greater importance I consider the difference in anthocodial armature: *S. ulex* has numerous small spindles (less than 0.25 mm in length, upwards diminishing in size) arranged in indefinite double rows, on the dorsal and lateral sides 10-15 pairs! In the specimen described by Kükenthal, 1905: 703, line 5 from the top, the anthocodial spicules are larger, in each double row there is a smaller number of them, but remarkable enough Kükenthal says nothing about projecting uppermost spicules nor about the intermediates. The description of the spicules in the canal-walls of *S. ulex* does not correspond with the canal-wall spicules in *S. ulicoides*, either. In my opinion Thomson & Dean were right in establishing this new species.

24. ***Stereonephthya macrospiculata*** Thomson & Mackinnon, 1910
(pl. 13 fig. 1, text-fig. 46)

Stereonephthya macrospiculata Thomson & Mackinnon, 1910: 186, pl. 9 fig. 8, pl. 14 fig. 8; Thomson & Dean, 1931: 146, pl. 7 fig. 7.

Leiden Museum:

Snellius Expedition: Sta. 104*, Aru Islands, 5° 50.0' S 134° 04.0' E, depth 100 m, October 15, 1929, 1 specimen.

Amsterdam Museum :

Siboga Expedition: Sta. 12, Bali Sea, $7^{\circ} 15' S$ $115^{\circ} 15.6' E$, mud and broken shells, 289 m, March 14, 1899, 1 specimen; Sta. 154, near Waigeo, $0^{\circ} 7.2' N$ $130^{\circ} 25.5' E$, grey muddy sand, shells and Lithothamnion, 59-83 m, August 14, 1899, 1 fragment; Sta. 257, Du-roa Strait, Kei Islands, coral, 0-52 m, December 11, 1899, 1 specimen; Sta. 260, near Nuhu Jaan, Kei Islands, $5^{\circ} 36.5' S$ $132^{\circ} 55.2' E$, sand, coral and shells, 90 m, December 16-18, 1899, 1 specimen; Sta. 289, off Timor, $9^{\circ} 0.3' S$ $126^{\circ} 24.5' E$, mud, sand and shells, 112 m, January 20, 1899, 1 specimen.

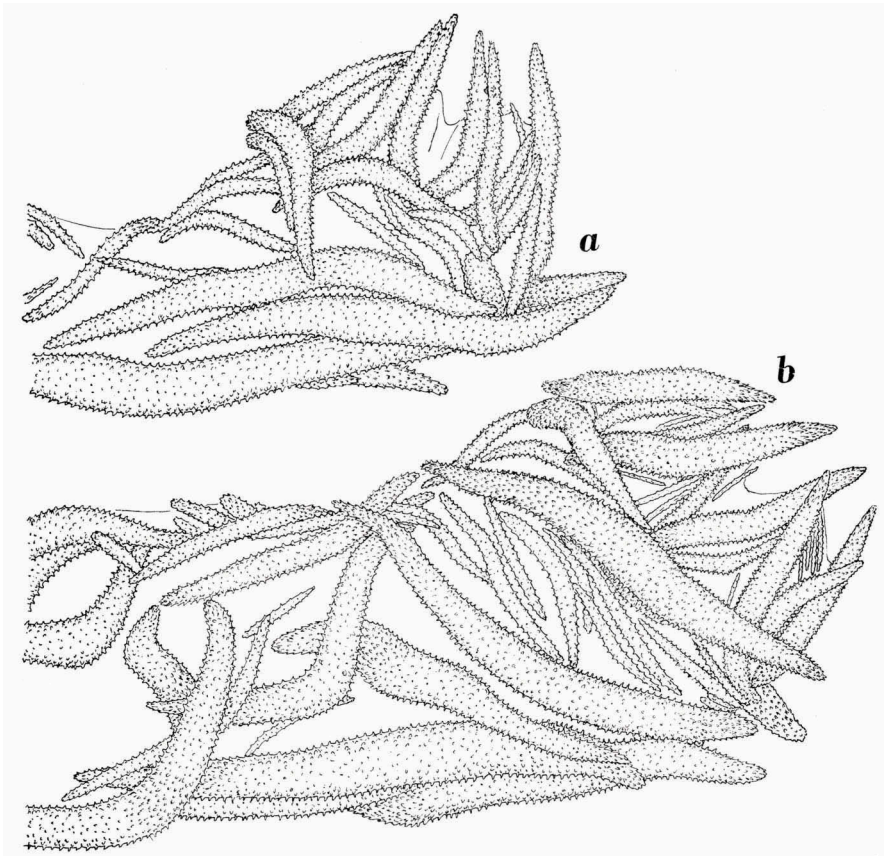


Fig. 46. *Stereonephthya macrospiculata* Thomson & Mackinnon. a-b, zooids from the specimen collected by the Snellius Expedition. $\times 30$.

Diagnosis. Colony very rigid; polyp stalk long; anthocodiae standing on the stalks at angles varying from obtuse to acute; anthocodial armature: eight points, each composed of one pair of stout, curved or hockeystick-like, projecting spindles, a second smaller spindle may lie close to one of the

larger spindles; pseudo-crown consisting of 2-5 rows, but in many cases the crown is indistinct; supporting bundle strong, slightly projecting; spindles in cortex of sterile stalk, stem and branches very stout.

Description of the specimen collected by the Snellius Expedition. The sterile stalk of this very rigid colony is 1 cm long and 1 cm wide at base; it is attached to a small piece of stone. At the top of this stalk four main branches arise of which one is largest. The main branches are all strongly bent to one side; if this was not the case the maximum total height of the colony would be 4 cm; the width is 2 cm.

The large zooids arise singly on the main branches and the smaller side-branches. They have thick (1.00-1.30 mm), robust stalks which make nearly right angles to the branches. Most of them are 1.0-1.5 mm in length (measured from base of stalk to anthocodia, of course) but often they are longer; in these cases they usually are sharply bent upwards.

The anthocodiae, about 1.8 mm in height and 1.1-1.7 mm in breadth, usually stand at a very obtuse angle to the stalks (fig. 46 a), in many cases the stalk gradually passes into the anthocodia (fig. 46 b); in a few cases the anthocodia makes a right angle with the stalk. The anthocodial armature consists of eight points, each of them being formed by one pair of stout, bent or hockey-stick-shaped, warty or spiny, spindles, one of each point is considerably larger than the other. These large spindles are 0.55-0.90 mm long, sometimes up to 1.15 mm, and 0.07-0.16 mm wide, they project for a distance of 0.30-0.45 mm. Each of the members of a point may be accompanied by a smaller spindle. At the base of the points there are some rows of transversely arranged spindles forming a pseudo-crown. The number of these rows varies from two to five, but in many zooids this number is difficult to ascertain, because there is no sharp borderline between the spicules of the crown and those of the polyp stalk; they pass into each other and agree with each other in shape, colour, etc. In the triangle formed by the point spicules and the crown a few smaller spicules may be present; between every two points a few intermediates may occur.

The tentacles are fully retracted into the anthocodiae. At their aboral side they are armoured with warty spindles and rods, 0.20-0.35 mm long and 0.025-0.050 mm wide. It is remarkable that these spicules are arranged longitudinally, at the base of the tentacle there are 4-6 rows, apically the number of rows decreases, giving place to a few horizontally arranged, flat spicules, about 0.01-0.03 mm long, provided with knobs.

The polyp stalk contains many strong, curved or crooked spindles, some of them are bent nearly rectangular in the middle. At the dorsal side of the stalk stronger spindles occur forming the supporting bundle; they reach a

length of 3-4 mm and a width of 0.36 mm. Usually one or two project for a very short distance, up to about 0.40 mm. All these spindles have blunt spines or small warts.

The cortex of the main branches shows stout, curved, spiny or warty spindles, up to 2.5 mm long and 0.27 mm wide (without warts). The cortex of the sterile stalk has the same spindles, in the lowermost part of it they are mostly smaller. The canal-walls contain spindles not thickly beset with blunt spines; they measure up to 1.5 mm in length and 0.19 mm in width.

Colour. The colony has a peculiar tint, something between light pinkish and light greyish-brown.

Remarks. At first I doubted if our specimen could be reckoned to the species *S. macrospiculata* Thomson & Mackinnon. For these authors (1910: 186) mention some characters which do not agree with those of our specimen, viz.,

1. The presence of "a down-rolled collar-like expansion".
2. The dimensions of the largest spicules in the supporting bundle: 9×2 , 10×1.5 mm.
3. The huge dimensions of the cortical spicules, up to 9×1.5 mm.
4. The heights of the polyp heads: 2.5-3 mm.
5. The polyp head "is bent down on its stalk", so the angle between anthocodia and stalk is acute. I may remark, however, that in Thomson & Mackinnon's plate 9 fig. 8 some anthocodiae seem to stand at right angles to the stalks.
6. The spindles forming the pseudo-crown are neatly and densely arranged in rows, at least on their drawing plate 14 fig. 8.

In order to obtain greater certainty I examined the material of *S. macrospiculata* collected by the Siboga Expedition; cf. Thomson & Dean, 1931: 146. I ascertained that:

1. In the Siboga specimens, too, a collar-like expansion is absent.
2. In the supporting bundle the spicules are up to 4 mm long.
3. The cortical spicules are not longer than 5 mm.
4. The height of the anthocodiae is up to about 2 mm.
5. In one of the colonies (from Sta. 257) the anthocodiae make acute or right angles with the stalks, in another colony (from Sta. 260) the angle varies from right to obtuse.
6. The spicules forming the pseudo-crown are usually not regularly and densely arranged.

Also in other respects (dimensions of the colony, colour, length of the polyp stalks, etc.) our specimen fully agrees with those collected by the Siboga Expedition.

Moreover it should be borne in mind that J. Arthur Thomson who, in collaboration with Miss Doris L. Mackinnon, established the species *S. macrospiculata*, also examined the Siboga specimens, this time in co-operation with Miss L. M. I. Dean.

So I am of the opinion that our specimen is really a *Stereonephthya macrospiculata*.

The only remaining difference from the description of Thomson & Mackinnon are the dimensions of the spicules in the cortex and the supporting bundles, for, as Thomson & Dean point out, "none of the large spicules approach the huge dimensions of 9 mm \times 1.5 mm" (in the supporting bundle: 10 \times 1.5 mm).

Previously recorded from the Solomon Islands and from several seas in the Malayan waters (Bali Sea, Timor Sea, Kei Islands, Waigeo). It is remarkable that this species obviously occurs in the deeper regions of the neritic zone (52-289 m).

25. ***Stereonephthya multispina*** nov. spec.

(pl. 14 fig. 1, text-fig. 47-48)

Leiden Museum:

Snellius Expedition: Sta. 60*, Sulu Islands, 6° 58.0' N 121° 52.5' E, depth 72-80 m, September 5, 1929, 1 specimen.

Diagnosis. Sterile stalk short; polyparium slightly flattened, fragile; polyp stalks long and narrow; anthocodiae at obtuse angles to the stalks; anthocodial armature: eight points each composed of one pair of hockeystick-shaped spindles, largely projecting, accompanied by a smaller one; pseudo-crown of 1-2 transverse rows; supporting bundle strong, projecting markedly.

Description. The fragile, rigid colony is very small, it is only 2 cm in total height and 1 cm in maximum breadth, it is a little flattened. The sterile stalk is 0.5 cm long and 0.5 cm wide. Two lower branches are foliaceous, forming an incomplete collar, hiding the top of the stalk for the greater part from view. Above these leaf-like branches the stem gives off small, slender side-branches.

The zooids (fig. 47) arise singly on stem and branches, now and then a small group of three zooids may be distinguished. They have long, narrow stalks, 1-2.5 mm long and 0.27-0.33 mm wide, at base the width is about

0.50-0.60 mm. The anthocodiae stand at obtuse angles to the stalks, they are low and broad, the full-grown ones measure 0.30-0.35 mm in height and 0.80-0.90 mm in breadth.

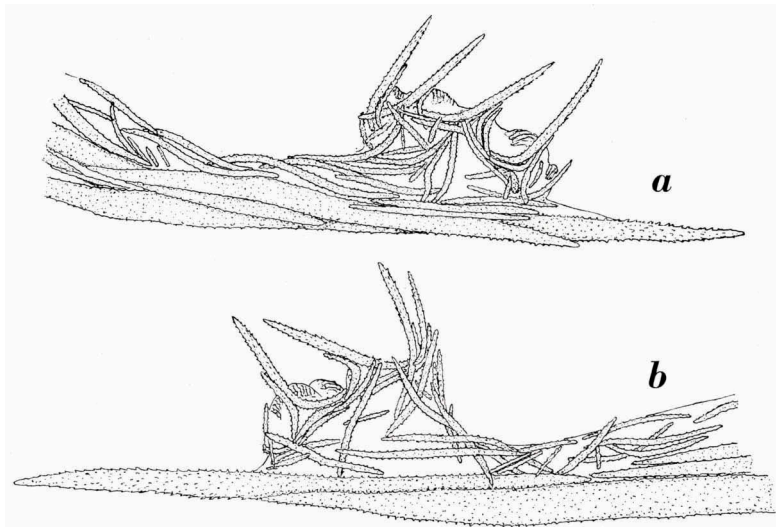


Fig. 47. *Stereonephthya multispina* nov. spec. a-b, zooids. $\times 30$.

The anthocodial armature is composed of eight points, each consisting of one pair of long, slender spindles. One of each pair is longest, 0.65-0.80 mm in length, projecting for a distance of 0.40-0.60 mm; usually they are hockey-stick-shaped, in a few cases the spindle is straight. The spicules bear low spines, those on the projecting parts are directed obliquely towards the tip. In many cases a second smaller spindle occurs alongside a larger one. Below these points there are one or two rows of transversely arranged spindles forming a crown, which is, however, not always clearly developed; the spicules of which it is composed are 0.25-0.40 mm long. Below the crown some accessory spindles are met with, which fully agree with the spindles in the polyp stalk; occasionally a few of these spindles show an arrangement en chevron.

The supporting bundle is strong; it consists of three or four long, usually rather straight, narrow spindles, up to 3 mm in length and 0.11-0.13 mm, sometimes up to 0.18 mm wide; besides these there are a few smaller ones. One of the large spindles projects for a distance of 0.80-1.10 mm, a second may project for a shorter distance. The spindles have low spines, in the polyp stalk the spines are very low and scarce, distally they are higher and more densely set, the spines on the projecting part are directed obliquely towards the tip.

Besides these spindles composing the supporting bundle the polyp stalk contains many curved, slender spindles, most of them are 0.35-0.90 mm long and 0.02-0.05 mm wide.

In the cortex of the stem spiny spindles and rods are met with, often bifurcated at one end; they are up to 1.25 mm long and mostly 0.05-0.06 mm wide (0.075-0.100 mm, spines included). At the ends the spines are often more densely crowded. They show much resemblance with the one figured in fig. 48 a, but the spines are not so densely packed as in the spicule represented there.

The cortex of the sterile stalk contains the following types:

1. The same spindles as those mentioned above, but the spines seem to be more crowded (fig. 48 a-c).
2. Many smaller spindles, usually irregularly ramified: tri- to multi-radiates, sometimes more or less club-shaped; length: 0.15-0.26 mm (fig. 48 d-i).

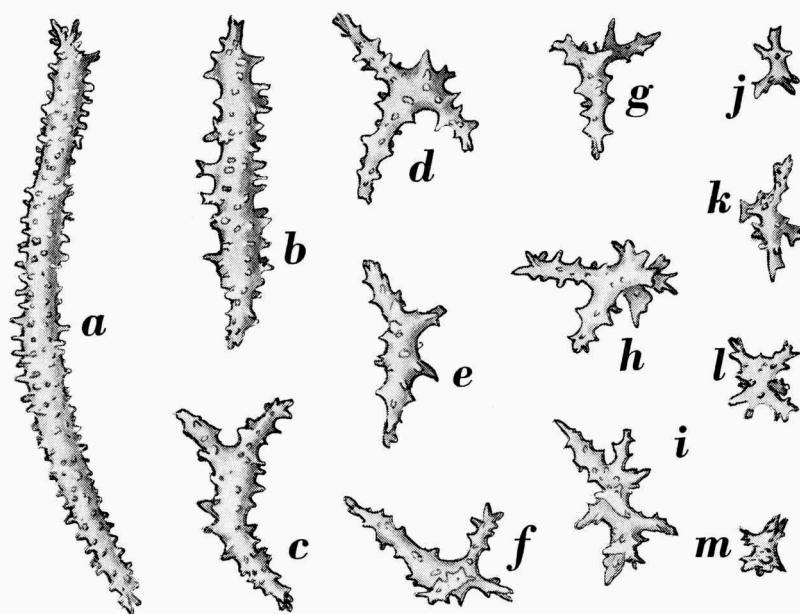


Fig. 48. *Stereonephthya multispina* nov. spec. a-m, spicules from the cortex of the sterile stalk. $\times 100$.

3. Still smaller bodies and capstans, 0.06-0.14 mm in length (fig. 48 j-m). The canal-walls are devoid of spicules.

Colour. The colony is white, but the anthocodiae are brown-red owing to the spicules in the tentacles.

Remarks. In comparing our specimen with the description of *Stereonephthya spicata* Thomson & Dean (1931: 148) it struck me that in many respects our colony seemed to agree with that species. An important difference was that "the polyp is usually bent down sharply on the stalk" (Thomson & Dean, 1931). Another difference appeared to be the anthocodial spiculation, for in *S. spicata* "all grades can be found between polyps showing no transversals and others with 3 or 4 rows" (in the crown). On receipt of the type specimens (Siboga Expedition, Sta. 50) from the Amsterdam Museum I found not only that *S. spicata* differs in many respects from our specimen but also that Thomson & Dean's description of it is quite inadequate. It is a pity, above all, that the authors omitted giving a picture of the anthocodiae. It is for this reason that I re-examined the type specimens. A description follows below.

26. ***Stereonephthya spicata*** Thomson & Dean, 1931

(pl. 14 fig. 2, text-fig. 49)

Stereonephthya spicata Thomson & Dean, 1931: 148.

Amsterdam Museum:

Siboga Expedition: Sta. 50, Bay of Badjo, west coast of Flores, Lesser Sunda Islands, mud, sand, and shells, 0-40 m, 16-18 April 1899, 2 specimens.

Diagnosis. Colony rather flabby; polyp stalk long, often curved ventrally; anthocodiae at about right angles to the stalks, their height is a striking feature; anthocodial armature shows two main types: (a) eight points each composed of two, sometimes three pairs of spindles, a crown of four to five rows and many accessory spindles; (b) each point consists of six to seven pairs of spindles en chevron, no crown, many accessory spindles; one to two pairs of intermediates, lying close to the point spicules; supporting bundle strong, projecting; in cortex of sterile stalk, stem and branches spindles only.

At the end of my description of *S. multispina* I remarked that the authors Thomson & Dean have described the species *S. spicata* unsatisfactorily. That is why I re-examined the type specimens.

Description. Both colonies agree with each other in all respects except their dimensions. The largest of them measures 4.5 cm in total height. It is a rather flabby colony. The flattened sterile stalk is 1 cm high and 1 cm wide, the base of attachment is wanting. It passes into the stem, which gives off branches of different lengths, which do not spread out but are bent towards the stem, just as the smaller side-branches and the polyp stalks. Owing to this the whole colony makes a frizzy and disorderly impression.

Stem, branches and twigs bear the zooids which usually occur singly. The zooid stalks are long, measuring 1-2.25 mm in length and about 0.55 mm in width. They are usually curved upwards, the zooids arising from a given branch are in many cases bent to one side. Mostly the angle between stalk and anthocodia is right, sometimes it is acute, so it is incorrect to say "the polyp is usually bent down sharply on the stalk" (Thomson & Dean, 1931). The anthocodiae are conspicuously high. This impression is enhanced by the fact that the tentacles are strongly expanded: the height of the anthocodiae varies from 0.70-1.10 mm when measured from the base of the anthocodia to half way the point spicules, but when the tentacles are included the height varies from 1.50-2.10 mm; the width of the anthocodiae is about 0.70 mm.

As to the armature two main types of arrangement may be distinguished:

1. Each of the eight points consists of two pairs of bent spindles, sometimes a third spindle is present lying close to the other ones. One of these spicules is largest, now it is one of the outermost (uppermost), then again one of the innermost (lowermost). This largest spicule reaches a length of 0.50-0.90 mm and projects obliquely at the sides of the anthocodia for a distance of 0.30-0.45 mm. Below these points there is a crown, 3-5 rows deep (length of these spindles: 0.37-0.60 mm), and below this irregularly distributed spindles occur "which pass imperceptibly into those of the polyp stalk" (Thomson & Dean, 1931). These spindles are of the same length as those of the crown.

2. The "point" spicules and the "crown" spicules mentioned above are all arranged en chevron forming eight points each consisting of 6-7 pairs of spicules. The lowermost pass into the irregularly distributed accessory spindles mentioned sub 1 (fig. 49 a).

Between both types transitional forms occur: in one and the same anthocodia we sometimes find part of a crown, whereas right next to it all spicules show the en chevron arrangement (fig. 49 b).

The point spicules have low knobs, especially on their projecting parts, all the other anthocodial spicules being nearly smooth.

One or two pairs of intermediates may be present; they are small (about 0.12 mm in length) and lie close to the point spicules.

The expanded tentacles are heavily armoured. In the basal part along the aboral side there are longitudinally arranged spicules, about 0.30-0.55 mm in length, in five to six rows; upwards the spicules become smaller (about 0.21 mm in length) and are arranged feather-like.

The supporting bundle is strong, it consists of some large, curved spindles,

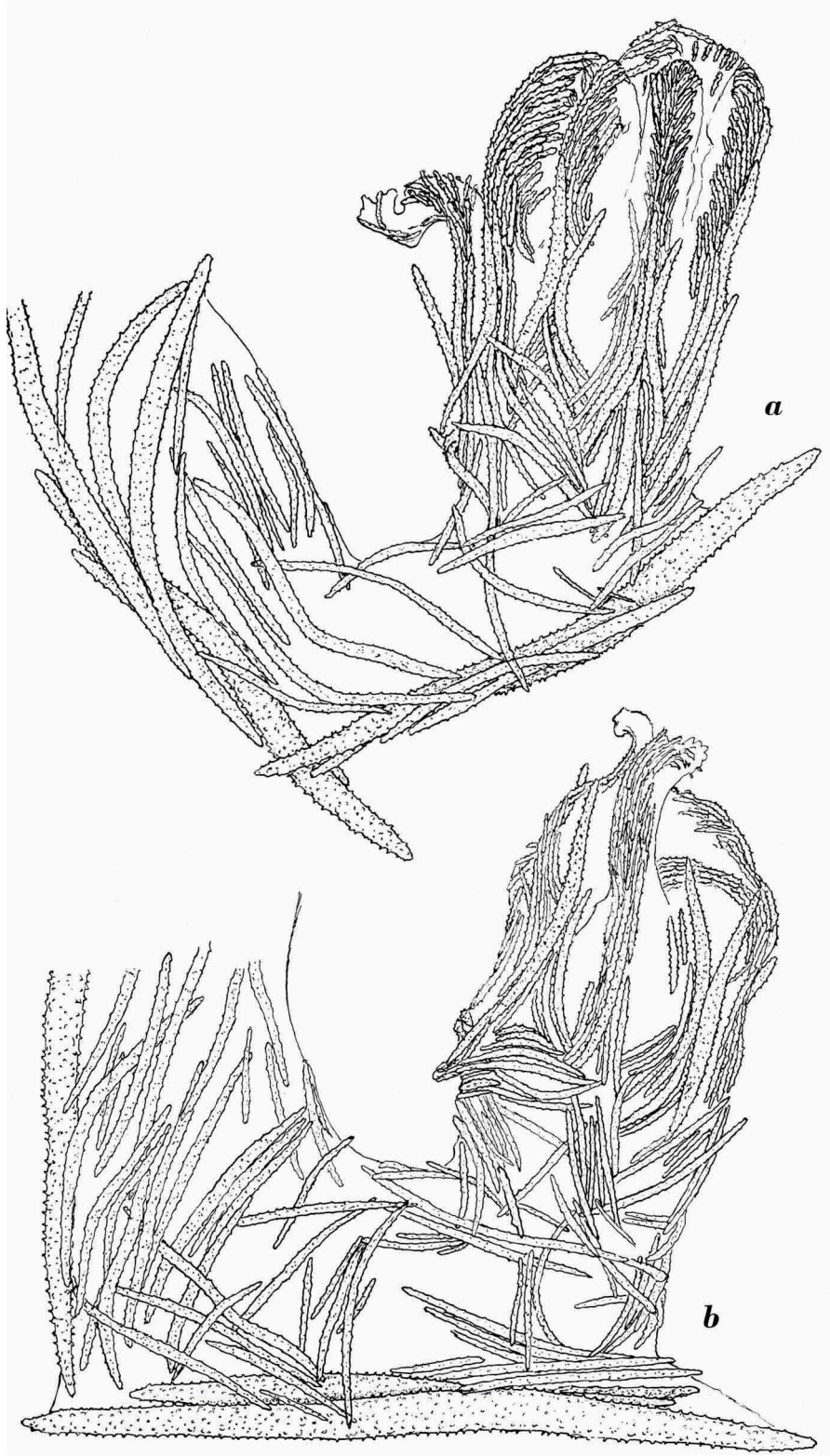


Fig. 49. *Stereonephthya spicata* Thomson & Dean. a-b, zooids. $\times 45$.

up to 3.10 mm in length and 0.17 mm in width, and beset with blunt cones. One or two project for a distance of 0.15-0.70 mm. The ventral side of the polyp stalk contains many irregularly curved, slender, nearly smooth spindles, 0.50-1.10 mm long and 0.02-0.05 mm wide.

The cortex of the stem and sterile stalk has spindles only. Those in the stem are a little shorter than those in the sterile stalk, the latter are up to 2.60 mm in length and 0.14 mm in width. The surface of the largest of them is covered with small warts, but most spicules have low spines, just as the spindles in the stem.

In the canal-walls many strong spindles occur, 1.50 mm long or more, they have few, low spines.

Colour. The colony is dirty white.

Remarks. According to Thomson & Dean this species agrees in many respects with Whitelegge's *Spongodes pallida*. I doubt very much if this species is a *Spongodes* (*Dendronephthya* or *Stereonephthya*).

From *S. whiteleggi* Kükenthal the species differs strongly, viz., in the width of the sterile stalk and the stem, in the length of the polyp stalks, the dimensions of the anthocodiae, the presence of a crown and the spinyess of the anthocodial spicules, the strength of the supporting bundle and the length of the spicules composing it, the absence of radiated cortical spicules, and the colour of the colony.

27. ***Stereonephthya cupuliformis*** nov. spec.

(pl. 13 fig. 2, text-fig. 50-51)

Leiden Museum:

Snellius Expedition: Obi latu, Moluccas, reef, April 23-27, 1930, 3 specimens.

Diagnosis. Sterile stalk short; polyparium rather flabby, not or slightly flattened; polyp stalk very short; anthocodia at right angle to the stalk, low and broad, cup-shaped; anthocodial armature: five dorsal and dorso-lateral points, each consisting of a few spiny spindles, which show no clear arrangement en chevron, between the points some intermediates may be present, and, besides, in polyp stalk and anthocodia numerous very small rods; supporting bundle weak, projecting for a short distance.

Description. Apart from small differences in size the three colonies resemble each other perfectly. One of the specimens measures 7 cm in height, 4.5 cm in breadth and 2 cm in thickness, so the polyparium is somewhat flattened. The other colonies attain heights of 6 and 8 cm, their maximum breadth is 3 cm, they are not flattened.

The sterile stalk is short, up to about 1.5 cm in length, and flaccid. It

gradually passes into the stem, which is 1.3 cm wide at base. The stem, which is also rather flabby, gives off many branches placed obliquely upon the stem. The branches are up to 2.5 cm in length, the larger they are the more side-branches they bear. The short-stalked zooids are never united into bundles, but they are regularly distributed all over branches and side-branches with mutual distances of about 1-2 mm; the stem itself bears no zooids.

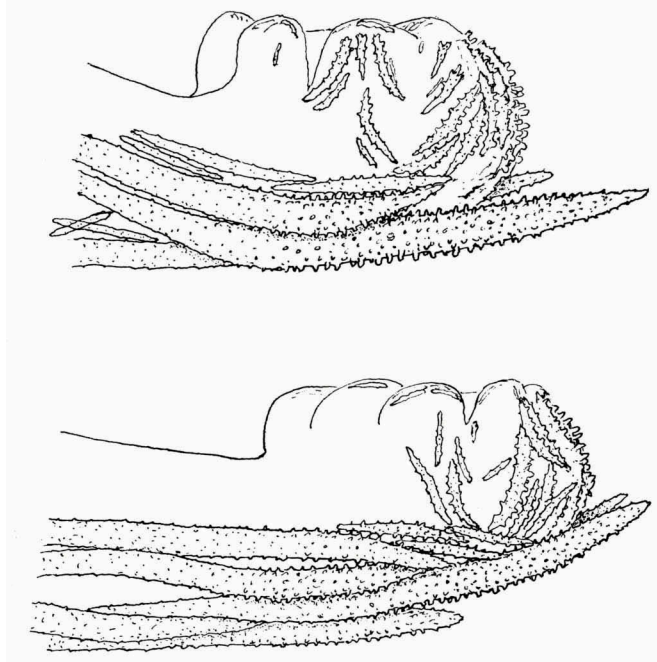


Fig. 50. *Stereonephthya cupuliformis* nov. spec. Zooids (for the sake of clearness the small rods recorded in the text have been omitted). $\times 45$.

The zooids have very short, thick stalks, which measure 0.3-0.6 mm in length and 0.6 mm in width at base. The anthocodiae are low (about 0.45-0.55 mm in height) and broad (0.75-1.00 mm), and have the shape of a low cup or basin, which is a conspicuous character of this species (fig. 50). The eight tentacles are bent inward and cover the opening of the cup. The anthocodial armature consists of five points, the three ventral ones being absent. Each point is composed of four to six spindles which usually show no clear arrangement en chevron. They measure 0.15-0.30 mm in length and do not project beyond the anthocodia. Especially those at the dorsal side have high, blunt spines, they are colourless but in the centre they are black. Between the points some smaller spindles are usually met with, 0.10-0.15 mm

in length; these spindles, which are provided with small spines, are sometimes also found at the ventral side of the anthocodia. Just as the larger spicules they often lie in a more or less longitudinal direction. A third type of spicules is found, viz., very small, smooth rods, measuring 0.025-0.060 mm in length; they occur especially at the ventral side of the anthocodiae and are very numerous in the polyp stalks.

The tentacles are armoured with double rows of slightly toothed spicules, about 0.10 mm in length.

The supporting bundle is weak. It is composed of six to eight larger spindles, up to about 1.90 mm in length and 0.11 mm in width (without prominences). In their proximal parts they have low, cone-shaped prominences but distally they are densely covered with relatively high, sometimes branched, blunt spines. One or two spindles project for a very short distance, viz., 0.15-0.40 mm.

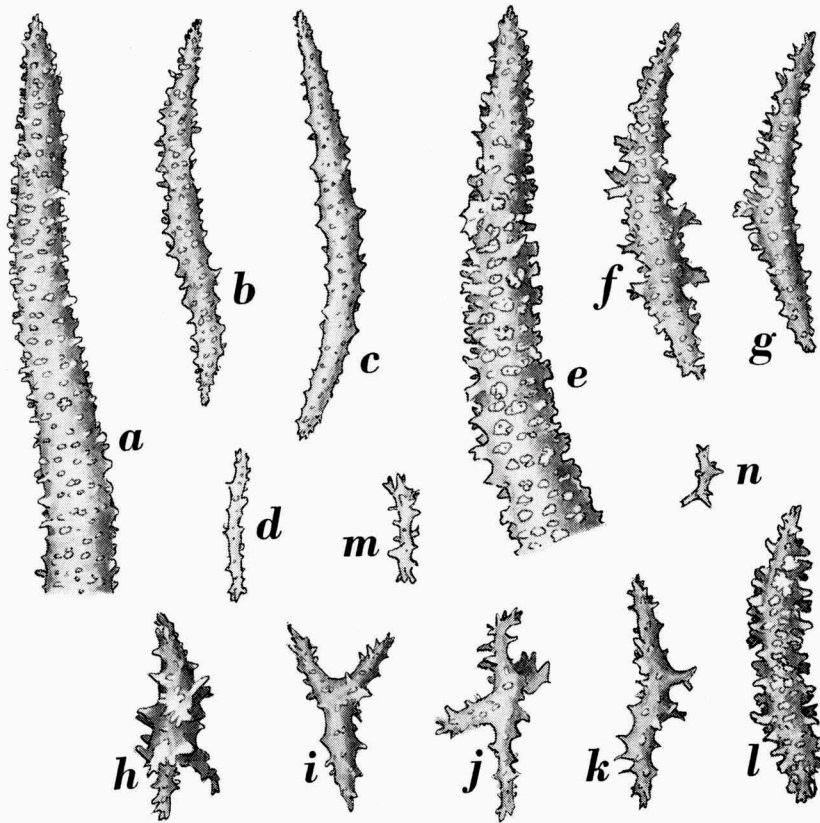


Fig. 51. *Stereonephthya cupuliformis* nov. spec. a-d, spicules from the cortex of the stem; e-n, spicules from the cortex of the sterile stalk. $\times 60$.

The cortex of the stem contains thin spindles, sometimes bifurcated at one end, and beset with blunt, sometimes branched spines. The great majority of them measures 0.35-0.90 mm in length and 0.03-0.06 mm in width (without prominences; 0.070-0.085 mm, prominences included) (fig. 51 b, c); a few may reach a length of 2.15 mm and a width of 0.13 mm (without prominences) (fig. 51 a).

In the cortex of the sterile stalk most spicules are spindles, measuring 0.25-0.85 mm in length and 0.04-0.06 mm in width (0.085-0.115 mm, spines included). In general the larger the spicules are the stronger the prominences increase in height and number: they are cones or high spines, the latter are often bifid at one end, sometimes they have developed into small side-branches: tri- or quadriradiated forms (fig. 51 f-1). But larger spindles also occur, measuring 0.85-2.15 mm in length and 0.08-0.12 mm in width (0.13-0.19 mm, prominences included), densely covered with spines or warts (fig. 51 e). Besides these spicules small spindles or tri- to quadriradiated bodies are met with, 0.10-0.25 mm in length (fig. 51 m, n).

In the canal-walls of the stem slender spindles are present, up to about 0.60 mm in length. They are provided with high, blunt spines. In the canal-walls of the sterile stalk the spindles strongly vary in size: they are 0.25-1.40 mm in length and up to 0.13 mm in width, they have few cone-shaped spines.

Colour. All three colonies are totally white.

28. **Stereonephthya acicularis** nov. spec.

(pl. 14 fig. 3, text-fig. 52-53)

Leiden Museum:

Snellius Expedition: Sta. 104*, Aru Islands, 5° 50.0' S 134° 04.0' E, depth 100 m, October 15, 1929, 1 specimen.

Diagnosis. Colony stiff, loose in structure, flattened; polyp stalks very long; anthocodiae make obtuse angles with the stalks, at the middle they are widest; anthocodial armature: eight points of one pair of hockey-stick-like spicules, markedly projecting; crown two to four rows deep: accessory spicules en chevron, sometimes projecting at the sides of the anthocodiae; supporting bundle strong, projecting for a short distance.

Description. The small, stiff colony has a total height of 2 cm and a breadth of 1.7 cm, it is distinctly flattened in one plane. The sterile stalk is only 3 mm long and 2 mm wide, and has at its base a few stolon-like processes.

The polyparium consists of one stem with slender branches. The zooids

arise singly, and at relatively great intervals, from stem and branches, so that the colony shows a loose structure, which impression is enhanced by the long, narrow polyp stalks. In the full-grown zooids these stalks are very long, up to 4 mm, and 0.33-0.45 mm wide. The anthocodiae stand at an obtuse angle to the stalks, they measure 0.70-0.85 mm in height and 0.85-1.00 mm in breadth, in the middle at the height of the crown they are widest.

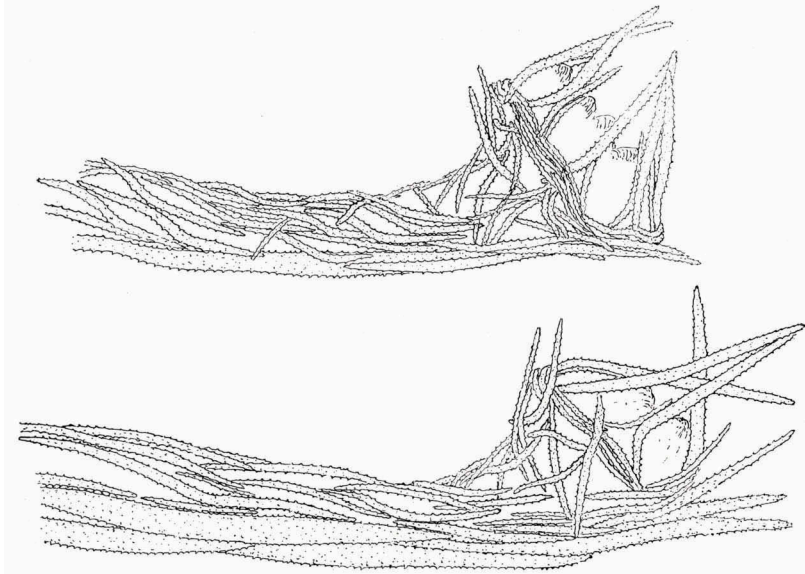


Fig. 52. *Stereonephthya acicularis* nov. spec. Zooids. $\times 30$.

The anthocodial armature is composed of eight points, each consisting of one pair of hockeystick-shaped, sometimes nearly straight spindles (fig. 52). One spicule of each pair is longest, it varies from 0.85-1.45 mm in length and from 0.045-0.076 mm in width. It projects beyond the anthocodia for a distance of 0.85-1.00 mm, the projecting parts incline toward each other over the polyp head, forming a sort of cone above it. In a few cases a second but smaller spindle lies close to a larger one. Below these point spicules 2-4 rows of horizontally arranged crown sclerites are present, 0.35-0.60 mm long. Below this crown there are some accessory spicules showing an arrangement en chevron in a straight line with the uppermost points. Of each of these groups one is largest and may project at the side of the anthocodia, giving it a special protection. All anthocodial spicules have low cones.

In each of the tentacles there are two dense rows of flat, curved spicules with rounded knobs along the edges; they are up to 0.21 mm in length.

The supporting bundle consists of a few, rather straight spindles, two or

three are largest, up to 3 mm in length and 0.22 mm in width. In some cases one of them projects for a distance of up to 0.40 mm, but usually the supporting bundle hardly projects. At the ventral and lateral sides of the polyp stalk straight or curved, slender spindles are met with, varying in length from about 0.40-1.40 mm and in width from 0.019-0.048 mm; they are not thickly beset with very low cones, whereas the spindles of the supporting bundle are more densely covered with them.

The cortical spicules of the stem are thin, curved spindles provided with few, very low cones; they are 0.40-1.70 mm long and 0.05-0.15 mm wide. The cortex of the sterile stalk contains:

(a). Spindles, often bifurcated, sparsely beset with relatively high spines; length of the spindles up to about 1 mm, their width is 0.035-0.050 mm, but if the spines are included they may be as wide as 0.1 mm.

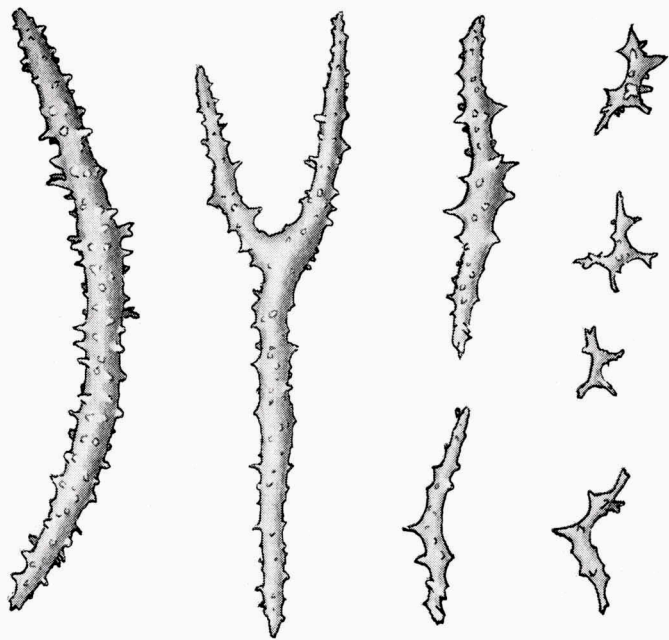


Fig. 53. *Stereonephthya acicularis* nov. spec. Spicules from the cortex of the sterile stalk. $\times 100$.

(b). Small, fantastically shaped spicules, often tri- to multiradiated; maximum diameter or length: 0.11-0.32 mm.

Canal-wall spicules seem to be absent.

Colour. The colony is light brown, the anthocodiae are dark brown; all spicules, however, are white.

29. *Sinularia querciformis* (Pratt, 1903)

(pl. 15 fig. 1, text-fig. 54-55)

For synonymy see: Tixier-Durivault, 1951: 116.

Leiden Museum:

Snellius Expedition: Paleleh, N. Celebes, depth 3-5 m, August 22, 1929, four specimens.

The colonies are arborescent, the texture of the stalk is hard, the lobes are rather firm. Two of the colonies have an undivided, cylindrical or slightly flattened stalk, in the two other colonies two sterile stalks arise from a common basal part (cf. Pratt, 1903, pl. 31 fig. 33). The stalks, smooth or wrinkled transversely, measure 2-3 cm in height and 1.5-2.5 cm in diameter. The short terminal branches bear roundish or finger-like secondary and tertiary lobes, which are 2-3 mm in diameter and 2-5 mm, sometimes 7 mm in length (pl. 15 fig. 1). The total height of the colonies is 4-5 cm.

The polyps are completely retracted, they are about 1 mm apart from one another.

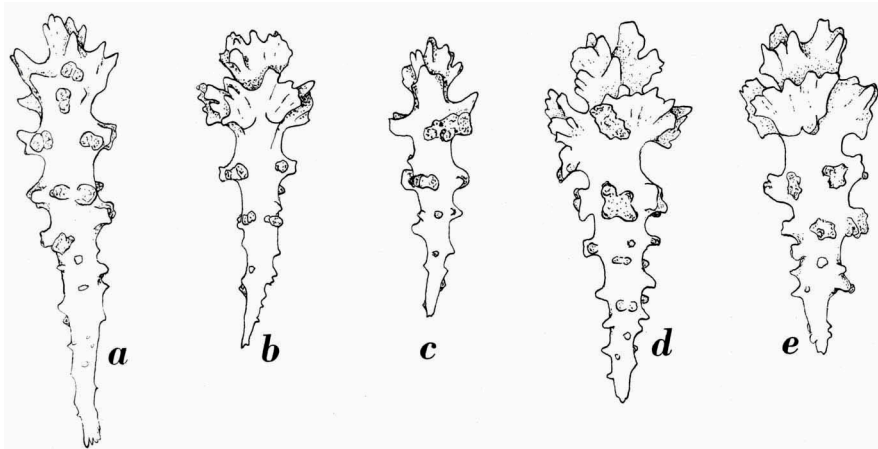


Fig. 54. *Sinularia querciformis* (Pratt). a-c, spicules from the cortex of the lobes; d-e, spicules from the cortex of the sterile stalk. $\times 180$.

In the cortex of the lobes the bulk of the spicules consists of rather large clubs (fig. 54 a-c), 0.21-0.30 mm long; their heads are 0.055-0.090 mm broad, and bear tubercles or foliaceous prominences directed obliquely upwards, in many cases imitating a central verruca at the tip of the head (fig. 54 b, c). The handles have girdles of warts or spines. In the sterile stalk the cortex has the same type of clubs, though they are slightly shorter (up to 0.27 mm)

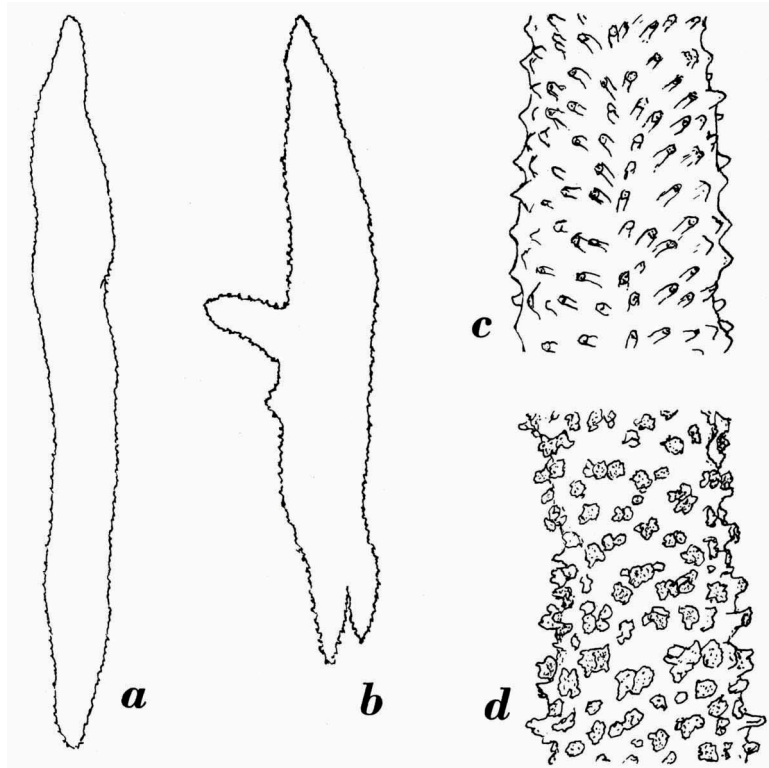


Fig. 55. *Simularia querciformis* (Pratt). a-b, spicules from the interior of the sterile stalk; c-d, parts of the spicules a and b respectively, more strongly enlarged. a, b, $\times 18$; c, d, $\times 60$.

and wider here, the heads measuring up to 0.105 mm in breadth (fig. 54 d, e).

The coenenchymal spicules are curved spindles, some of them are forked or have short side-branches (fig. 55 a, b). Their length is up to 6 mm, their maximum breadth is 0.6 mm, and they are covered with conical spines (fig. 55 c) or with warts (fig. 55 d). The diameter of the warts is about 0.06-0.09 mm.

Colour. The whole colony is creamy.

30. *Siphonogorgia boschmai* nov. spec.

(pl. 15 fig. 2, text-fig. 56-57)

Leiden Museum:

Snellius Expedition: Sta. 60*, Sulu Islands, $6^{\circ} 58.0' N$ $121^{\circ} 52.5' E$, depth 72-80 m, September 5, 1929, three complete colonies and a few fragments.

The largest of the tree-like colonies (pl. 15 fig. 2), holotype, measures 95 mm in maximum height. At a height of 25 mm the barren trunk bifurcates into two stems, of which the basal parts are still sterile. Apically they bear many branches, up to 35 mm long, which in their turn have smaller side-branches or twigs. The twigs are not pendulous. On the branches the zooids are not very numerous, on the twigs they are more crowded, especially on the somewhat flattened tip-parts.

The verrucae are slightly prominent, and they are attached obliquely to the twigs (fig. 56). On the outside they have a length of 1-1.5 mm, on this side the spicules are often largest, forming a modified supporting bundle. At the top the verrucae are open, the anthocodiae are unretracted.

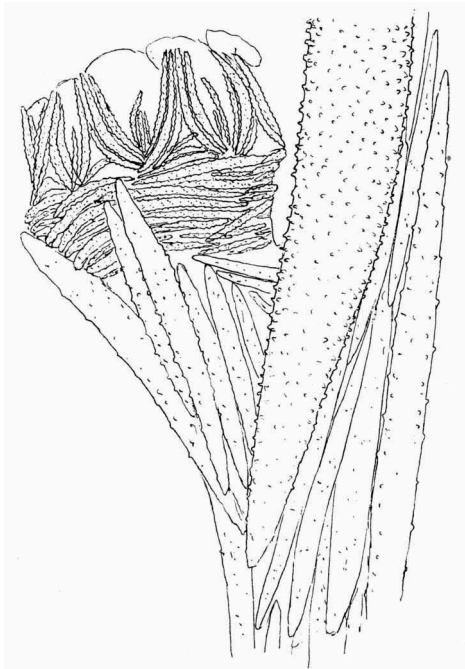


Fig. 56. *Siphonogorgia boschmai* nov. spec. Zooid (for the sake of clearness the tentacular spicules have been omitted). $\times 60$.

The anthocodial armature consists of a crown composed of ten to fifteen rows of curved, spiny spindles. Distally they measure up to 0.5 mm, proximally they diminish in size. The points are composed of one to three pairs of spicules arranged en chevron. Sometimes there are four spicules in a row but in that case the fourth spicule is very small. The largest of the point spicules measures 0.35-0.45 mm in length. They are spiny, curved spindles, the uppermost parts lying parallel to each other. Between the points there

are one to three intermediates. Formula, as proposed by Utinomi (1960: 11):
 Unretractile = (1-3) p + (10-15) Cr + (1/2-1 1/2) M.

In the tentacles we find two rows of reddish, flat, toothed spicules, about 0.15 mm long, becoming smaller towards the tips.

In the sterile trunk the cortical layer contains irregularly arranged spindles, up to 1.5 mm long and 0.20 mm wide. They are covered with dome-shaped or truncate prominences resembling simple warts. In the interior the thick coenenchymal mass has spindles, of which a few may be as long as 3 mm, but most of them are smaller (fig. 57 a-c).

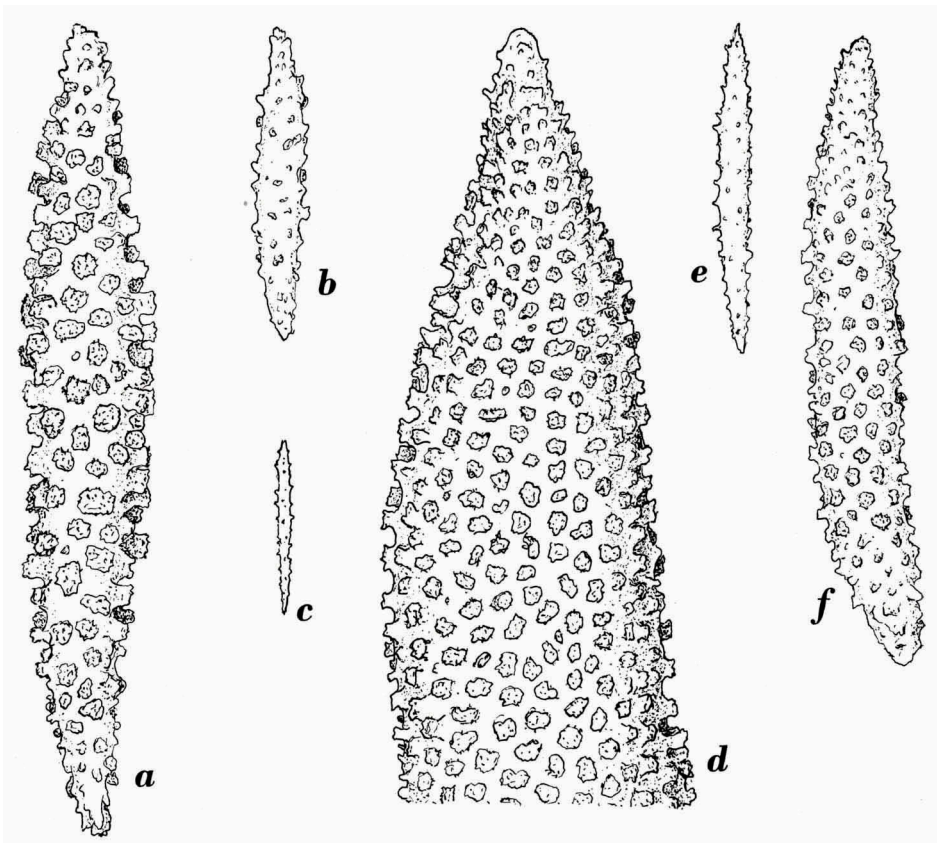


Fig. 57. *Siphonogorgia boschmai* nov. spec. a-c, spicules from the interior of the sterile basal part; d-f, spicules from a twig. $\times 80$.

In the branches the outermost spindles are likewise irregularly arranged, but in the twigs they are longitudinally disposed. The larger ones (fig. 57 d) may have a length of 5 mm and a width of 0.8 mm. Most spindles are, how-

ever, smaller (fig. 57 e, f). They are straight or curved, the warts are slightly smaller than those on the spindles of the trunk.

In the centre of the trunk one larger canal, about 0.7 mm wide, and one or two narrower ones are met with, separated from each other by a thick coenenchymal layer. In the central part of the branches there are about ten canals with very thin walls. These walls contain small needles and slender spindles, 0.20-0.45 mm long and only 0.011-0.020 mm wide, and provided with low cones. A few spindles are wider, 0.045-0.060 mm, and have simple warts.

Colour. The colonies and fragments are all of the same colour, viz., totally white, except the tentacular spicules, which are red.

31. *Siphonogorgia chalmersi* nov. spec.

(pl. 16, text-fig. 58-59)

Leiden Museum:

Snellius Expedition: Sta. 123*, Timor Sea, 10° 29.0' S 126° 44.0' E, depth about 100 m, October 28, 1929, some fragments.

Only some branches bearing twigs are present. The largest fragment has a total height of 47 mm. The branches are cylindrical. They measure 3-4 mm in width, the firm outer layer has irregularly disposed spicules. In the inte-

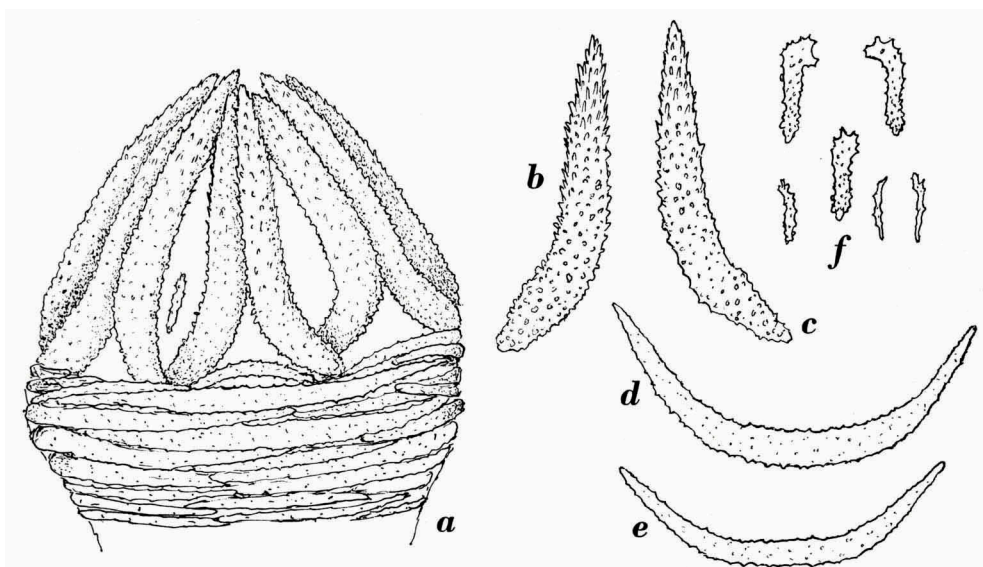


Fig. 58. *Siphonogorgia chalmersi* nov. spec. a, zooid; b-c, anthocodial point spicules; d-e, crown spicules; f, spicules from the tentacles. $\times 75$.

rior one wide central canal was found. The twigs are rather fragile, many of them are pendulous. They measure up to 10 mm in length and 1-1.5 mm in width.

The verrucae, scarce on the branches, more numerous but not crowded on the twigs, are by no means prominent. They consist of a few spicules projecting obliquely. The anthocodiae (fig. 58 a), about 0.70 mm broad, are wholly retracted within these open verrucae. The anthocodial armature consists of a crown composed of six to eight rows of spindles, up to 0.75 mm long and 0.06 mm wide, beset with small spines or low cones; they show a typical curved shape (fig. 58 d, e). Each anthocodial point consists of one pair of large, thick, curved spicules en chevron, 0.42-0.60 mm long and 0.05-0.09 mm wide. They have blunt spines but distally the spines are sharper and directed obliquely upwards (fig. 8 b, c). Towards the tip of the anthocodia these point spicules converge together in a cone-shaped manner. Be-

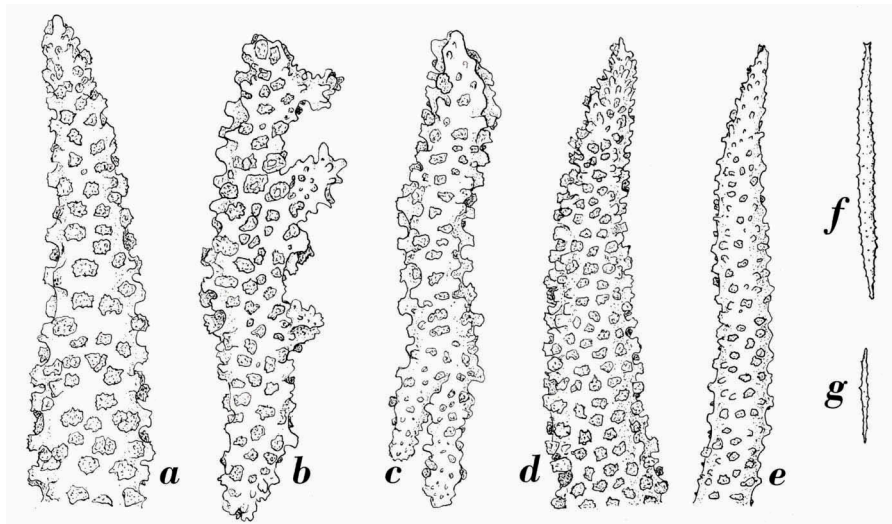


Fig. 59. *Siphonogorgia chalmersi* nov. spec. a-c, spicules from a branch; d-g, spicules from a twig. $\times 50$.

sides these large spicules a small one may be present. Between the points one intermediate may be met with, about 0.12 mm long. The tentacles are armoured with toothed spicules with a more rounded "handle" and a flattened, curved "head". They measure up to 0.22 mm in length (fig. 58 f). All anthocodial spicules are red, only the tentacle spicules are colourless.

Formula: Completely retractile = 1 P + (0-1) p + (6-8) Cr + (0-1/2) M.

In the branches the spicules are irregularly arranged, most of them lie, however, in a longitudinal direction. They are curved spindles, up to 2.5 mm long and 0.3 mm wide, and beset with low, spiny warts (fig. 59 a). Some are bifid at one end, or the prominences have grown out into short side-branches (fig. 59 b, c).

In the twigs there is one layer of longitudinally disposed, slightly curved, warty spindles measuring up to 5.5 mm in length and 0.35 mm in width (fig. 59 d-f). The interior consists of thin partition-walls between the narrow canals; in these walls there are spiny needles, 0.20-0.40 mm long (fig. 59 g).

Colour. Branches and twigs are yellowish-brown, the anthocodiae are dark red.

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EXPLANATION OF THE PLATES

Plate 1

Litophyton arboreum Forskål, Celebes. Natural size.

Plate 2

1. *Capnella imbricata* (Quoy & Gaimard), Obi latu. × 1.8.
2. *Nephthea striata* Kükenthal, Morotai. × 2.

Plate 3

1. *Nephthea albida* (Holm), Maratua. $\times 1.3$
2. *Dendronephthya* (*Dendronephthya*) *roemeri* Kükenthal, Amboina, D.S. Hoedt leg. $\times 1.1$.

Plate 4

1. *Nephthea chabrolii* Audouin, Voyage Boie & Macklot, no. 101. $\times 1.1$.
2. *Dendronephthya* (*Dendronephthya*) *binongkoensis* nov. spec., Binongko, Tukang Besi Islands. $\times 1.1$.

Plate 5

1. *Nephthea bayeri* nov. spec., Obi latu. $\times 1.1$.
2. *Nephthea compacta* nov. spec., Voyage Boie & Macklot, no. 91. $\times 0.9$.

Plate 6

1. *Dendronephthya* (*Dendronephthya*) *mucronata* (Pütter), Paleleh. $\times 1.1$.
2. *Dendronephthya* (*Roxasia*) *boschmai* nov. spec., Amboina. $\times 0.75$.

Plate 7

1. *Dendronephthya* (*Dendronephthya*) *koellikeri* Kükenthal, Sumatra, Van de Sande leg. Natural size.
2. *Stereonephthya ulicoides* Thomson & Dean, Paleleh. $\times 1.5$.

Plate 8

1. *Dendronephthya* (*Roxasia*) *latipes* Tixier-Durivault & Prevorsek, Amboina. $\times 0.7$.
2. *Dendronephthya* (*Roxasia*) *mirabilis* Henderson, Siboga Expedition, Sta. 99. $\times 0.85$.

Plate 9

1. *Dendronephthya* (*Roxasia*) *snelliusi* nov. spec., Snellius Expedition, Sta. 60*. $\times 1.7$.
2. *Dendronephthya* (*Morchellana*) *weberi* nov. spec., Siboga Expedition, Sta. 260. $\times 2$.

Plate 10

1. *Dendronephthya* (*Morchellana*) *pulchella* Utinomi, Aloang, Paternoster Islands. $\times 1.5$.
2. *Dendronephthya* (*Morchellana*) *minima* nov. spec., Binongko, Tukang Besi Islands. $\times 2.3$.

Plate 11

1. *Dendronephthya (Morchellana) habereri* Kükenthal, Gier Expedition 12, no. 6. $\times 1.5$.
2. *Dendronephthya (Morchellana) suluensis* nov. spec., Snellius Expedition, Sta. 60*. $\times 0.9$.

Plate 12

1. *Dendronephthya (Morchellana) aurora* (Ridley), Malay Archipelago, Von Bülow leg. $\times 1.3$.
2. *Dendronephthya (Morchellana) quadrata* Henderson, Bay of Djakarta, Buitendijk leg. $\times 1.7$.

Plate 13

1. *Stereonephthya macrospiculata* Thomson & Mackinnon, Snellius Expedition, Sta. 104*. $\times 2$.
2. *Stereonephthya cupuliformis* nov. spec., Obi latu. $\times 1.6$.

Plate 14

1. *Stereonephthya multispina* nov. spec., Snellius Expedition, Sta. 60*. $\times 3$.
2. *Stereonephthya spicata* Thomson & Dean, Siboga Expedition, Sta. 50. $\times 1.3$.
3. *Stereonephthya acicularis* nov. spec., Snellius Expedition, Sta. 104*. $\times 3.5$.

Plate 15

1. *Sinularia querciformis* (Pratt), Paleleh. $\times 1.4$.
2. *Siphonogorgia boschmai* nov. spec., Snellius Expedition, Sta. 60*. $\times 1.2$.

Plate 16

1. *Siphonogorgia chalmersi* nov. spec., Snellius Expedition, Sta. 123*. $\times 1.5$.

