

NOTEWORTHY OCTOCORALS COLLECTED OFF THE SOUTHWEST
COAST OF KII PENINSULA, MIDDLE JAPAN

PART 1, STOLONIFERA AND ALCYONACEA¹⁾

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With Plates I-II and 9 Text-figures

Introduction

During recent years, a bull trawler "Kaiun-maru" at Minabe, Kii Province, has been engaged in trawl fisheries for offshore bottom-fishes in the fishing area about 2 miles or more off the southwest coast of Kii Peninsula, middle Japan. Together with fish catches, various bottom animals of no commercial value are often caught by trawl-net.

This report covers some noteworthy octocorals which have been collected by sorting these bottom samples on many occasions by many aids of the undermentioned persons. Of the octocorallian materials the Stolonifera and Alcyonacea are considered in the present part and the other groups (Gorgonacea and Penatulacea) will be taken up in Part 2.

On this occasion, I wish to acknowledge my indebtedness to Captain Ichiro YAGURA of the trawler "Kaiun-maru" and his crew for making available all bottom samples other than commercial fishes to my study, and to Mr. Sôichiro SAKAGUCHI, Mr. Kumasaku MIHASI, Mr. Mitunosuke OZAKI, Mr. Torao YAMAMOTO and Mr. Eiji HARADA, who have tendered me pertinent assistance in collecting or sorting interesting materials necessary for my study from these bottom samples.

A list of the species thus obtained from offshore waters of the southwest coast of Kii Peninsula is given here:

Stolonifera

Fam. Clavulariidae

1. *Sarcodictyon gotoi* (OKUBO)

1) Contributions from the Seto Marine Biological Laboratory, No. 343.

Publ. Seto Mar. Biol. Lab., VIII (1), 1960. (Article 1)

Alcyonacea

Fam. Alcyoniidae

2. *Bellonella rigida* PÜTTER
3. *Bellonella dofleini* (KÜKENTHAL)
4. *Bellonella macrospina* (KÜKENTHAL)
5. *Alcyonium gracillimum* KÜKENTHAL
6. *Anthomastus granulosis* KÜKENTHAL
7. *Bathyalcyon robustum* VERSLUYS
8. *Minabea ozakii* UTINOMI

Fam. Nidaliidae

9. *Siphonogorgia dipsacea* (WRIGHT & STUDER)
10. *Siphonogorgia dofleini* KÜKENTHAL
11. *Siphonogorgia* cf. *pendula* STUDER
12. *Siphonogorgia crassa* (WRIGHT & STUDER)
13. *Siphonogorgia alba* n. sp.

Fam. Nephtheidae

14. *Daniela koreni* VON KOCH
15. *Paraspongodes spiculosa* (KÜKENTHAL)
16. *Dendronephthya spinifera* (HOLM)
17. *Dendronephthya acaulis* KÜKENTHAL

STOLONIFERA

Fam. Clavulariidae HICKSON

Genus *Sarcodictyon* FORBES

This genus was established by FORBES (1847) for a single species *S. catenatum* from British seas and its validity was discussed by HICKSON (1930a, p. 209) and GOHAR (1940, p. 12). As regards the allied enigmatic genera such as *Zoantha* LESSON (1830), *Rhizoxenia* EHRENBERG (1834), *Evagora* PHILIPPI (1842) and *Rolandia* LACAZE-DUTHIERS (1900), a further crucial examination of their type species is greatly needful to elucidate their relationships and their affinities with the genus *Sarcodictyon*, although formerly discussed by many authors besides HICKSON (VON KOCH, 1891, p. 661; MAY, 1900, p. 29; KÜKENTHAL, 1906a, p. 13; MÜLLER, 1910, p. 94; KÜKENTHAL, 1916, p. 458; MOLANDER, 1929, p. 40; BERENGUIER, 1954, p. 62).

Even if *Rhizoxenia rosea* from the Bay of Naples is identical with PHILIPPI'S

Evagora rosea from the same Bay, a supposition that *Sarcodictyon* is generically synonymous with *Evagora* (MOLANDER, 1929) is not permissible on two grounds. Spicules of '*Rhizoxenia rosea*' as figured by VON KOCH (1891) are quite unlike those of *Sarcodictyon catenatum* (HERDMAN (1883) and other species referred to the genus *Sarcodictyon*. As excellently figured in color by THOMSON (1927, pls. II and III), the stolon strands are clearly different between *Sarcodictyon catenatum* and *Rhizoxenia rosea*, if his identification proves to be accurate.

Anyhow for the present, it may be justified to retain *Sarcodictyon* as a valid genus. However, *Sarcodictyon tropicale* described by THORPE (1928, p. 483) from Abrolhos Islands, western Australia, is actually not a *Sarcodictyon*, as suggested by GOHAR (1940, p. 12), but may be a member of *Parerythropodium* near *P. coraloides* (PALLAS).

Sarcodictyon gotoi (OKUBO), 1929 (comb. nov.)

(Fig. 1; Pl. II, figs. 13-14)

Clavularia gotoi OKUBO, 1929, p. 50, fig. 1a-g, pl. I, figs. 1-5.

Sarcodictyon catenata HICKSON, 1921, p. 366 (not FORBES).

Sarcodictyon herdmani HICKSON, 1930a, p. 210, fig. 1: MACFADYEN, 1936, p. 24.

Sarcodictyon gotoi UTINOMI and HARADA, 1958, p. 147 (listed only).

Material. One specimen. 23 km west of Tanabe Bay, 150 m. 28-XI-1957. E. HARADA coll.

Description. The colony is growing on both sides of a dead valve of a bivalve shell *Glycymeris vestita* (DUNKER), forming a wide-meshed network of narrow stolon strands each about 0.5 mm wide. These strands bear at intervals of 3-6 mm cone-shaped prominences about 0.5 mm high and about 1.5 mm in diameter at the base, whence they issue one or two branches. They are wholly pale orange in alcohol.

The cone-shaped prominence, *i. e.* the anthostele, is 8-lobed at the tip and each lobe is filled with a triangular cluster of spicules.

The spicules covered on the outer surface of stolons and anthosteles are all pink-colored, coarsely warted plates of irregular shape, whose margins are strongly wavy, often branched, tending to laminate at the ends of their processes. These spicules are closely interlocked by their processes but never fused together. They measure in mm as follows:

0.088×0.053, 0.123×0.88, 0.176×0.7, 0.194×0.14, 0.212×0.194.

The anthocodiae are completely retractile and their walls are closely packed with colorless flat rods, up to 0.25 mm long, in 8 interseptal triangles. Tentacle spicules are also transparent smaller rodlets, about 0.035-0.1 mm long and transversely arranged.

Remarks. *Clavularia gotoi* to which the present specimen is referable was originally described by OKUBO (1929) from Sagami Bay (off Umezawa, 80 m in depth), as growing on a stone.

Sarcodictyon herdmani HICKSON recorded from off Adelaide, S. Australia, 20-35 fms. (HICKSON, 1921, 1930a) and later from Dredging station XII of Great Barrier Reef Expedition (MACFADYEN, 1936) should be considered as identical. Therefore, the specific name *herdmani* has to be suppressed according to the law of priority. Apparently an orange-colored stoloniferan figured in color by THOMSON and DEAN (1931, pl. III, fig. 7) under the name of '*Sympodium*', not giving any data on its locality and detailed descriptions, may be the same species or a nearest ally.

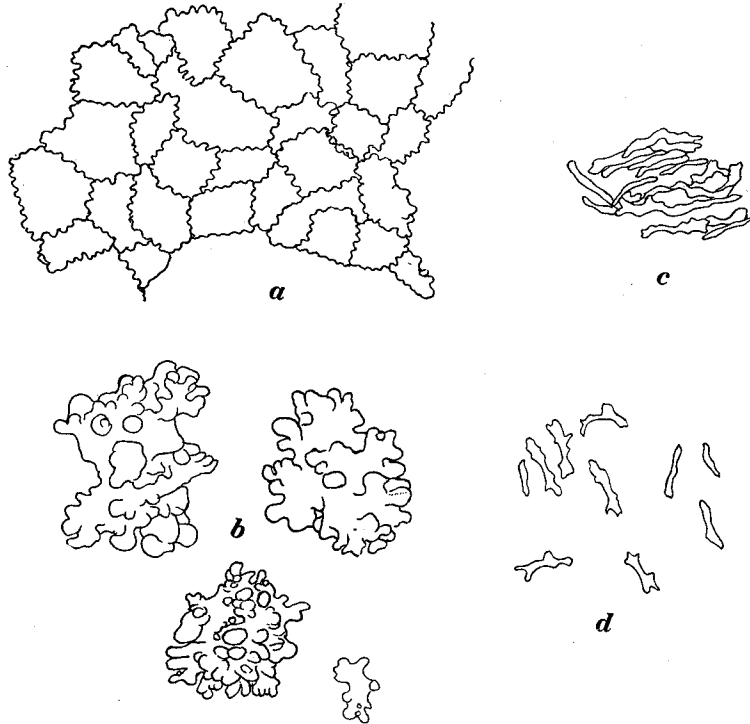


Fig. 1. *Sarcodictyon gotoi* (OKUBO).
 a, Surface of anthosteles closely packed with plate-like spicules; b, spicules of outer layer of anthosteles and stolons; c, anthocodial spicules; d, tentacle spicules. [a, $\times 50$; b-d, $\times 97$]

ALCYONACEA

Fam. Alcyoniidae LAMOUROUX

Subfam. Alcyoniinae KÜKENTHAL

Bellonella rigida PÜTTER, 1900

(Pl. I, figs. 1-2)

For description and synonymy see UTINOMI, 1957a, p. 156.

Material. 10 specimens attached to shell fragments. 23 km west of Tanabe Bay, 150 m. 28-XI-1957. E. HARADA coll.

Remarks. All specimens here examined are small, ranging from 7 mm to 40 mm in length. The capitulum is generally bright red except for the tip of calyces which is yellowish white, and the stalk is dirty white. Exceptionally one specimen has a yellow capitulum with white-tipped calyces.

Bellonella dofleini (KÜKENTHAL), 1906

(Pl. I, figs. 3-4)

For description and synonymy see UTINOMI, 1957a, p. 161.

Material. 1) 2 unbranched specimens attached to shell fragments. Off Minabe, 100-200 m. 22-I-1957. M. OZAKI coll.

2) 3 branched specimens attached to fragments of dead shells (*Glycymeris*, *Anomia* and *Guildfordia*). 23 km west of Tanabe Bay, 150 m. 28-XI-1957. E. HARADA coll.

Remarks. The specimens here examined are 22-40 mm long, and the color is dirty white, pale yellow or orangish, with brighter or paler colored at the tip of calyces.

Bellonella macrospina (KÜKENTHAL), 1906

(Pl. I, figs. 8-9)

For description and synonymy see UTINOMI, 1957a, p. 162.

Material. 8 specimens attached to a dead shell of *Glycymeris* and to an undeterminable gastropod shell. 23 km west of Tanabe Bay, 150 m. 28-XI-1957. E. HARADA coll.

Remarks. All specimens are 12-55 mm in length and the general color is pinkish cinnamon to apricot orange. This species is characterized by a slender body covered by tubular calyces upwardly directed on all sides.

Alcyonium gracillimum KÜKENTHAL, 1906

For description and synonymy see KÜKENTHAL, 1906b, p. 34 and UTINOMI, 1954, p. 45.

Material. 1) One specimen. Off Minabe, depth unrecorded. 13-IV-1956. M. OZAKI coll.

2) Two specimens. Off Minabe, depth unrecorded. 28-III-1956. M. OZAKI coll.

3) Many specimens. Off Minabe, depth unrecorded. 4-V-1958. K. MIHASI coll.

Subfam. Anthomastinae VERRILL

Anthomastus granulosus KÜKENTHAL, 1910

(Fig. 2; Pl. I, figs. 6-7)

Anthomastus granulosus KÜKENTHAL, 1910, p. 14, figs. 8-10, Pl. I, fig. 3; THOMSON, J. S., 1921, p. 169; UTINOMI and HARADA, 1958, p. 388 (listed only).

Material. 1) One specimen attached to a bivalve shell. Off Minabe, depth unrecorded. 6-IV-1956. M. OZAKI coll.

2) Four specimens attached to a *Pecten*-shell and other shell fragments. 23 km west of Tanabe Bay, 80-XI-1957. E. HARADA coll.

Description. All specimens here examined are relatively small for the genus. The longest one is clavate in form, 44 mm in length. The sterile stalk is an elongate cylinder, about 36 mm long, tapering downwards; the diameter is about 6 mm at the top.

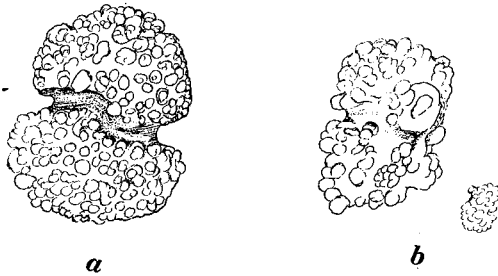


Fig. 2. *Anthomastus granulosus* KÜKENTHAL.
a, Coenenchymal spicule; b, double-sphere from the surface of capitulum and minute granule from the stalk. [a-b, $\times 150$]

The capitulum is spheroidal, 6.5 mm high and 8 mm in diameter. It bears a number of rather small autozooids which are completely retracted within the crater-like pits. Between the autozooids about 3 or 4 minute pores of siphonozooids occur.

In another specimen, the capitulum is 6 mm high, 11 mm in diameter, and the stalk is 27 mm long. Usually the sterile stalk vertically stands on either side of a shell or along the edge of a shell by a basal expansion which is tapered at the end where it is free from the substratum.

The colony is apparently hard in consistency, being closely packed with numerous, large and small, granular spicules.

The spicules are all granular capstans (double-spheres) with granulated warts. These double-spheres are somewhat smaller on the surface of the capitulum than in the stalk interior, as shown in the following measurements (in mm):

Stalk interior : 0.158×0.123 , 0.176×0.123

Surface of capitulum : 0.106×0.07 , 0.14×0.09 , 0.176×0.106

In the stalk interior, numerous minute granules are also found, filling up the spaces between them.

No longer rod-like spicules which are usual in other species are found.

The color of the colony in alcohol is uniformly yellow orange or apricot orange, but the spicules proper are practically colorless.

Occurrence. Enoura Inlet, Suruga Bay, Japan, 200 m (KÜKENTHAL, 1910); South Africa, 32 fms. (THOMSON, 1921).

Bathyalcyon robustum VERSLUYS, 1906

(Fig. 3; Pl. II, fig. 20)

Bathyalcyon robustum VERSLUYS, 1906, p. 553; KINOSHITA, 1911, p. 121, pl. 3, figs. 1-2; TOTTON, 1933, p. 107; BOCK, 1938, p. 8, figs. 1-9, pls. I-II.

Material. 1) One specimen. 4 miles off Susami, 250-270 m. 6-IV-1957. M. OZAKI coll.

2) One specimen. 8 miles southwest of Minabe, 150 m. 16-XII-1958, M. OZAKI coll.

Description. Two vividly red-colored specimens here obtained are no doubt referable to this less-known dimorphic alcyonarian.

The first one is about 34 mm in length and about 9 mm in diameter at the tip. It is attached by a thin, membranous expansion to a *Spirobranchus*-like polychaete tube. The second one is about 40 mm in length and about 15.5 mm in diameter at the tip, and is attached by a rather thick membranous expansion to a cluster of shell fragments.

In both the specimens, the cylindrical body (*i. e.* the capitulum) is vividly red and the sterile basal part is only reddish white. A single, large anthocodia is withdrawn into the large cavity within the cylindrical body, though the tentacles remain half-exsert in one specimen and folded tightly inwards in another one.

The surface of the body-wall is roughened by the dense occurrence of siphonozooids except on the basal portion. About ten siphonozooids occur in a length of 1 cm.

The anthocodia, when extended, has 8 flexible tentacles, longer than 1 cm. On each side of the laterally appressed rachis of the tentacle finger-like pinnules are arranged in a row, slightly separating from the spiculiferous dorsal edge; they are apparently 15 or more in number and incurved when contracted.

Spicules are always closely arranged in longitudinal direction on the dorsal side of both the tentacle-rachis and pinnules; in the remaining area spicules are scanty or absent. These spicules are all thorny rods with a pinkish hue, as measuring in mm:

0.09×0.035, 0.1×0.035, 0.16×0.02, 0.195×0.026

The surface of the body-wall contains small irregular spicules with rounded warts which may be derived from spindle and capstan forms; they measure about 0.035-0.18 mm across.

In the interior are found slightly larger spindles and capstans (6- or 8-radiates); they measure in mm as follows;

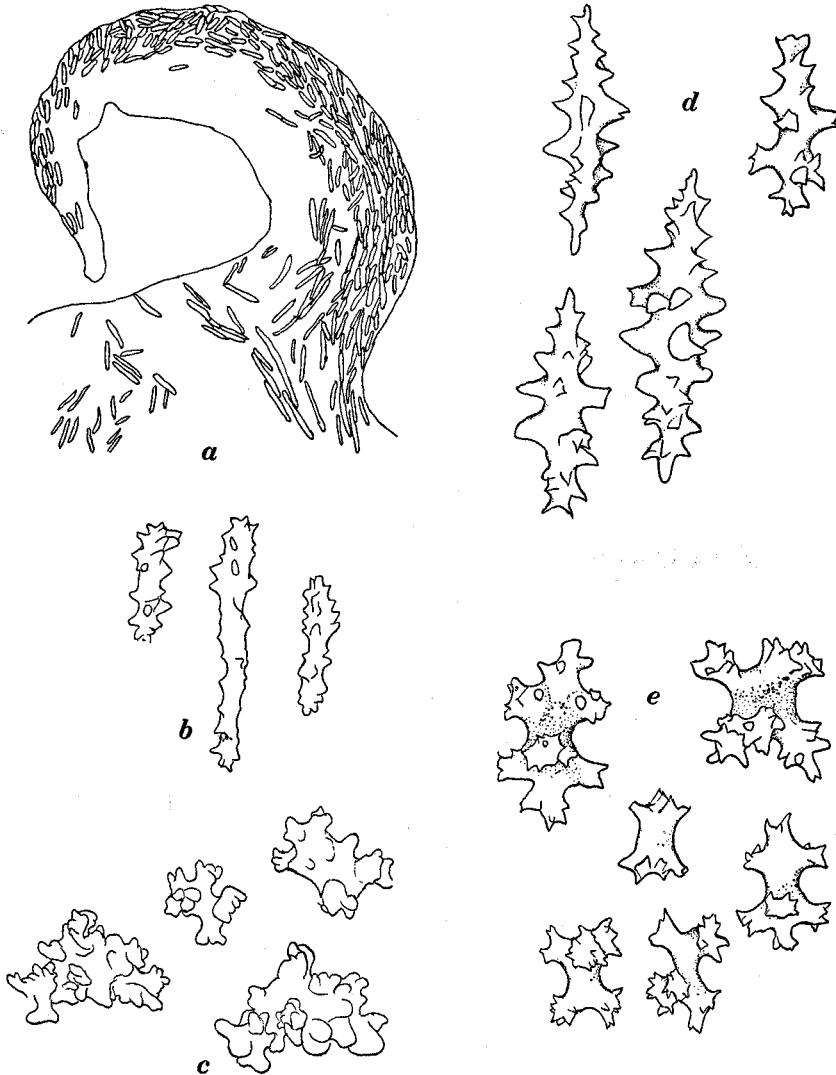


Fig. 3. *Bathyalcyon robustum* VERSLUYS.

a, Pinnule, showing the arrangement of spicules; *b*, spicules of pinnules; *c*, spicules of outer surface of body wall; *d*, spindles from coenenchymes; *e*, capstans from coenenchymes. [*a*, ×33; *b-e*, ×150]

Spindles : 0.176×0.088 , 0.246×0.007 , 0.4×0.007

Capstans : 0.07×0.05 , 0.105×0.05 , 0.123×0.088

All these coenenchymal spicules are pink by reflected light.

Occurrence. Off Ceram, West Indies, 924 m (VERSLUYS, 1906); Malay Archipelago and Philippines (TOTTON, 1933); off Bonomisaki, west of Kyusyu, Japan, 135 fms. and 220 fms. (BOCK, 1938); Sagami Bay, Japan, 400 fms. (KINOSHITA, 1911).

Minabea ozakii UTINOMI, 1957

(Pl. I, fig. 5)

For description see UTINOMI, 1957b, p. 139.

Material. 1) One specimen (Holotype). Southwest of Minabe, probably about 250 m. III-1950.

2) Two specimens (Paratypes). 25 miles southwest of Minabe, 250-260 m. 22-I-1957. M. OZAKI coll.

3) Three specimens (Paratypes). 4 miles southwest of Susami, 250-270 m. 6-IV-1957. M. OZAKI coll.

4) Six specimens. 23 km west of Tanabe Bay, 120-150 m. 8-XII-1957. E. HARADA coll.

5) One specimen. 10 miles southwest of Minabe, 150 m. 23-I-1958. M. OZAKI coll.

6) One abnormally branched specimen. 8 mile southwest of Kirimezaki, 150 m. 14-XII-1958. M. OZAKI coll.

Occurrence. Hitherto known only from the southwest offshore waters of Kii Peninsula.

Fam. Nidaliidae GRAY (UTINOMI emended)

Subfam. Siphonogorgiinae KÖLLIKER

Siphonogorgia dipsacea (WRIGHT and STUDER), 1889

(Pl. II, fig. 15)

Chironephthya dipsacea WRIGHT and STUDER, 1889, p. 231, pl. 37, figs. 1-1a.

Siphonogorgia aff. *dipsacea* KÜKENTHAL, 1906b, p. 82, figs. 63-65, pl. III, fig. 19.

Siphonogorgia dipsacea UTINOMI, 1956, p. 15, pl. 8, fig. 3; UTINOMI, 1958b, p. 100; UTINOMI and HARADA, 1958, p. 388 (listed only).

Material. 1) One specimen. Off Minabe, 100-200 m. III-1950. S. SAKAGUCHI coll.

2) Three specimens. Southwest of Tanabe Bay, 120 m. 8-XII-1957. E. HARADA coll.

Description. The first one, about 80 mm long, is shown in color in UTINOMI (1956, p. 15, pl. 8, fig. 3).

The second three recently obtained are all short, about 25–40 mm in length, lacking the lower part of the stem. From the upper third of the stem a few short branches arise radially and larger ones divide again into a few secondary branchlets. These branches and branchlets are all directed obliquely upwards, not diminishing in size and terminate distally with two or three polyps close together.

All polyps are widely separated around the branches and branchlets, though nearly crowded near the ends. The calyces are directed obliquely upwards, rather large in size and slightly tubular, but their marginal spines are slightly exsert.

The anthocodiae are not fully retractile into calyces. They have a wide collaret of about 10 transverse rows of curved spindles and eight points each consisting of 2 or 3 pairs of spindles, which are all purple red.

The stem is slender, somewhat flabby and covered by colorless warty spindles, about 2 mm long, longitudinally. The gastrovascular cavities of the stem are broad and their walls are thin and sparsely packed with red or colorless, slender spindles, about 0.17–0.4 mm long.

Occurrence. *Hyalonema*-ground (=Dōketuba), Sagami Bay, 345 fms. (WRIGHT and STUDER, 1889); Tosa Bay, Sikoku, Japan (UTINOMI, 1958b); 2° N. Long., 107° E. Lat. (=between Borneo and Malay Peninsula) (KÜKENTHAL, 1906b).

Siphonogorgia dofleini KÜKENTHAL, 1906

(Fig. 4)

Siphonogorgia dofleini KÜKENTHAL, 1906b, p. 78, figs. 56–58, pl. III, figs. 20–21; UTINOMI, 1956, p. 15, pl. 8, fig. 4.

Material. 1) One specimen. Off Sirahama. Collecting data unrecorded.

2) One specimen. Off Minabe, depth unrecorded. 13–IV–1956. M. OZAKI coll.

Description. The first specimen, a color photograph of which is shown on Plate 8 of UTINOMI (1956), is an upright bushy colony, about 56 mm in height, consisting of 5 main branches arising radially from a short stalk, 6 mm in diameter at the base.

These main branches are loosely branched into a few secondary branches which are more slender than the main branches, about 5–10 mm long and about 1.5–2 mm wide. The general color of the colony is dull orange, tinged with reddish purple towards the ends of branches. The texture is rigid and brittle; the canal-walls are thick and closely packed with robust spindles.

The anthocodiae, about 0.7 mm across, are not completely retractile into the calyces, whose distal margins are strongly protruded up to the tip of the anthocodiae in retraction. The anthocodial armature consists of a wide collaret of red, short spindles (up to 20 transverse rows) and eight points of red, short spindles

(as many as 5 pairs), and between the points usually 4 somewhat smaller intermediate spindles, each arranging in a fan-like shape.

Following the anthocodial formula for the genus *Dendronephthya*, which was first proposed by SHERRIFFS (1922) and modified by UTINOMI (1952), I propose herein an anthocodial formula for the genus *Siphonogorgia* too to facilitate the discrimination of species. Based on the degree of retractility of anthocodia and

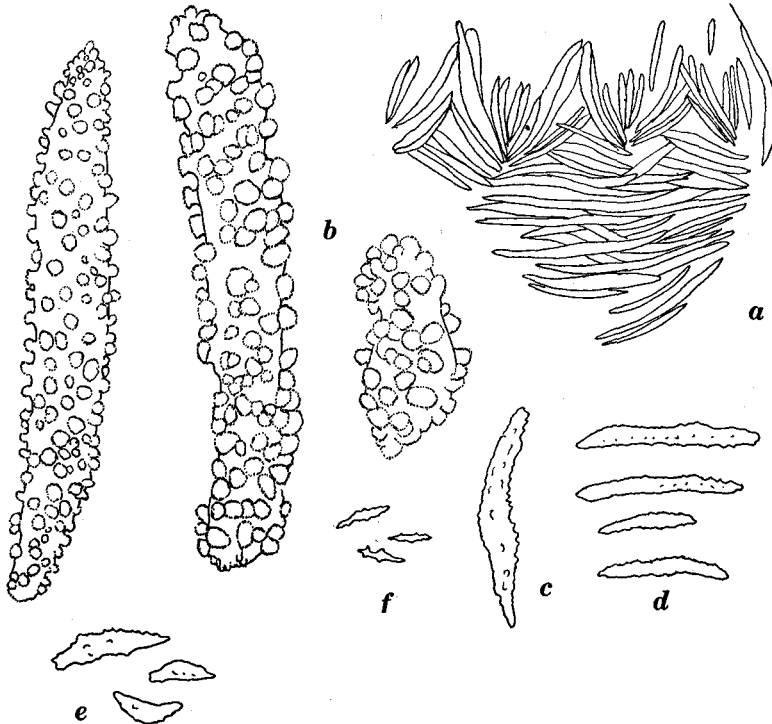


Fig. 4. *Siphonogorgia dofleini* KÜKENTHAL.

a, Anthocodial armature; b, spicules from upper cortex; c, point spicule; d, crown spicules; e, tentacle spicules; f, spicules from neck zone of polyps. [a-b, $\times 50$; c-e, $\times 127$]

the anthocodial armature, described above, the anthocodial formula of this species can be expressed as below :

$$\text{Incompletely retractile} = 5 P + 20 Cr + 2 M^{1)}$$

Details of spicules and their measurements (in mm) are as follows:

Verruca and upper cortex: Large, blunt spindles with tuberculate warts
(yellow or reddish yellow)—up to 1.23×0.12

1) The pairs of point spicules are denoted by 'P' if nearly similar in size or strong, and those of smaller accessory spicules down the strong ones are by 'p'; the transverse rows of crown spicules by 'Cr'; and the pairs of intermediate spicules between points are by 'M'.

Canal-walls: Robust spindles with tuberculate warts (yellowish or colorless)
— 0.5×0.1 , 0.6×0.12 , 1.5×2.2

Points: Thorny spindles with small warts (red)— 0.17×0.017 , 0.26×0.035

Intermediates: Small spindles or rods (red)— 0.09 long

Crown: Slender spindles with few warts (red)— 0.14×0.017 , 0.25×0.035

Tentacle: Flattened rods (red)— 0.05×0.017 , 0.1×0.035

Neck zone: Simple spiny rods (transparent, colorless)— 0.035 – 0.05 long

Occurrence. Near Izu Peninsula in Sagami Bay (KÜKENTHAL, 1906b).

Siphonogorgia cf. *pendula* STUDER, 1889

(Fig. 5; Pl II, fig. 18)

Siphonogorgia pendula STUDER, 1889, p. 5, pl. I, figs. 1a-1b, pl. V, fig. 2.

Siphonogorgia pendula var. *ternatana* KÜKENTHAL, 1896, p. 135, pl. VIII, figs. 28, 28b and 29;
THOMSON and MACKINNON, 1910, p. 190.

Chironophthya pendula var. *bengalensis*¹⁾ HARRISON, 1909, p. 33, pl. 3, fig. 8, pl. 5, figs. 41-42,
pl. 6, fig. 58.

Siphonogorgia pendula var. *ramosa* THOMSON and MACKINNON, 1910, p. 190, pl. 14, fig. 2.

Material. Three fragments lacking basal parts. Collecting data unrecorded.

Description. The colonies are loosely branched and rather small for the genus, measuring respectively 20 mm, 30 mm and 45 mm in length. The general color of the colony is pansy purple, polyp heads bright lemon-yellow.

In all specimens, a few branches arise approximately at right angles around the stem, and they are less rigid. The canal-walls are very thin and contain a few red spicules of two kinds.

The anthocodiae are small, longer than wide, with a conical upper part which is exsert beyond the calyces at rest.

The tentacles have 5 pairs of pinnules and pale yellowish. The upper part of the anthocodiae is provided with eight prominent points, each consisting one pair of strong spindles (widened upwards) and 2-4 pairs of accessory smaller ones. Between the points one small intermediate spicule is present. Below the yellow points, there are 8-10 transverse rows of red spicules; those in the uppermost row are rarely tinged with yellow.

The anthocodial formula of this species is thus given as follows:

$$\text{Incompletely retractile} = 1P + (1-2)p + (8-10)Cr + \frac{1}{2}M$$

Details of spicules and their measurements (in mm) are:

Verrucae and upper cortex: Warty spindles (dark red)— 1.0×0.1 , 1.8×0.17

Tentacles and pinnules: Flattened rods (pale yellow)— 0.056 – 0.075 long

Points: Spiny spindles, partly club-like (yellow)— 0.53×0.07

1) Erroneously cited by THOMSON and SIMPSON (1909, p. 138) and by THOMSON and DEAN (1931, p. 162, p. 162) as *S. pendula indica*.

Intermediates: Spiny spindles (yellow)— 0.2×0.035

Crown: Warty spindles (dark red)— 0.53×0.05

Canal-walls: Warty spindles of two kinds (dull red)—small type 0.03×0.002 ,
 0.05×0.002 ; large type 0.8×0.01 , 0.9×0.012

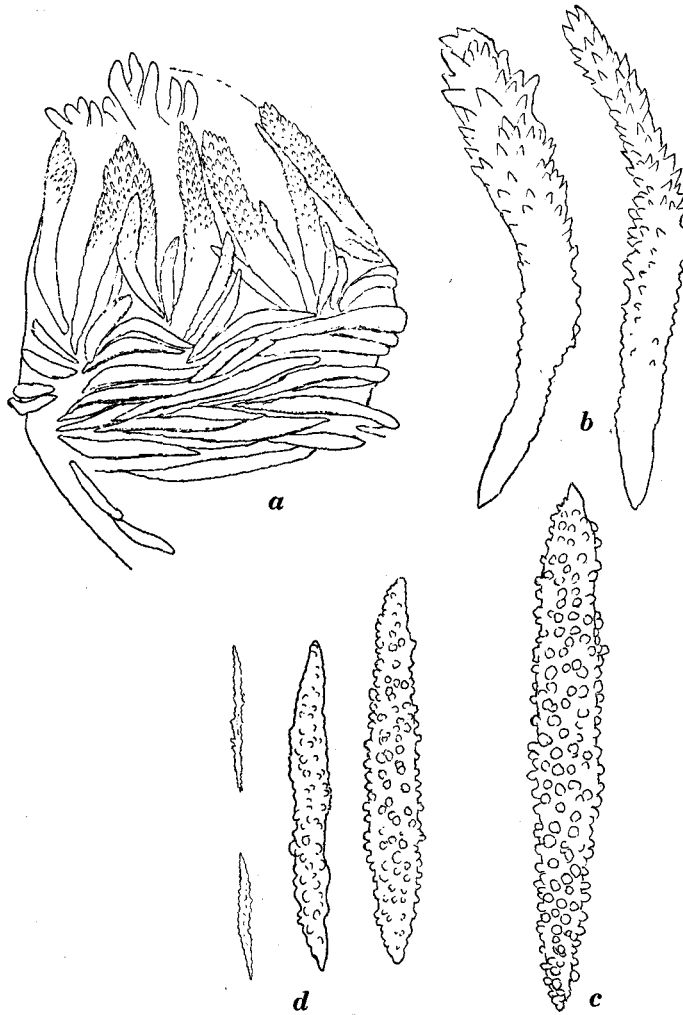


Fig. 5. *Siphonogorgia* cf. *pendula* STUDER.

a, Anthocodial armature, *b*, point spicules; *c*, spicule of outer cortex;
d, spicules of canal-walls. [*a*, *c*, *d*, $\times 50$; *b*, $\times 127$]

Occurrence. Bay of Amboina (STUDER, 1889); Ternate (KÜKENTHAL, 1896 as var. *ternatana*); Salomon, 75 fms. (THOMSON and MACKINNON, 1910, 1910, as var. *ternatana*); Providence, 58-78 fms. (THOMSON and MACKINNON, 1910, as var. *ramosa*); Bay of Bengal (HARRISON, 1909, as var. *bengalensis*); Nikobar (KÜKENTHAL, 1906b).

Remarks. The general appearance of the present specimens comes most closely to var. *ternatana* KÜKENTHAL (1896). They differ from the type originally described and figured by WRIGHT and STUDER (1889) in the absence of furrows on the branches. Although other variants were recorded from the Indian Ocean by later authors, these samples from Japanese waters generally agree so well with the original description of *S. pendula* in the mode of branching and the texture and coloration of the colony and in the anthocodial armature that there seems to be no need for separation as varieties.

Siphonogorgia crassa (WRIGHT and STUDER), 1889

(Fig. 6; Pl. II, fig. 17)

Chironophthya crassa WRIGHT and STUDER, 1889, p. 234, pl. 38, fig. 3.

Siphonogorgia crassa KÜKENTHAL, 1906b, p. 77.

Material. One complete specimen. Off Tanabe Bay. Collecting data unrecorded.

Description. The specimen here examined is about 14 mm in length, uniformly pansy purple in color and has a very rigid consistency.

From a thick basal expansion arise 8 robust branches, about 2-5 cm long, each of which is secondarily branched in a few number. These branches are all directed upward and robust with an almost equal diameter (3-5 mm) up to the end, not diminishing in size.

The verrucae occur all round the branches and branchlets; they form projecting cups (about 1 mm across at the tip) more developed externally and all directed upwards. They are strongly armoured with plump, multituberculate spicules protruding from the outer coating of branches where similar spicules are thickly arranged longitudinally.

The canal-walls are thick and densely packed with red, slender spindles covered by high simple warts.

The anthocodiae are completely retractile at rest, and their armature resembles that of *S. pendula*, though different in details. The anthocodial formula is given as follows:

$$\text{Completely retractile} = 1P + 1p + (6-8)Cr + 0M$$

Details of spicules and their measurements (in mm) are as follows:

Tentacles: Flattened rods (yellow)— 0.3×0.06

Points: Club-like spiny spindles (yellow)— 0.35×0.09 , 0.4×0.05

Crown: Slender, curved, thorny spindles (red, rarely in uppermost row yellowish)— 0.35×0.026 , 0.42×0.03 , 0.45×0.035

Verrucae: Plump, multituberculate spindles (red)— 0.7×0.12 , 1.5×0.24 , 2.0×0.35

Upper cortex: Multituberculate spindles (red)— 0.47×0.18 , 1.0×0.12 , 2.4×0.3

Canal-walls: Slender spindles with high warts (red)— 0.2×0.026 , 0.26×0.035 ,
 0.4×0.035

Occurrence. Hyalonema-ground (=Dōketuba), Sagami Bay, 345 fms. (WRIGHT and STUDEP, 1889).

Remarks. According to HICKSON (1903, p. 490), who examined the type specimens in the British Museum, three species in the Challenger collection (*dipsacea*,



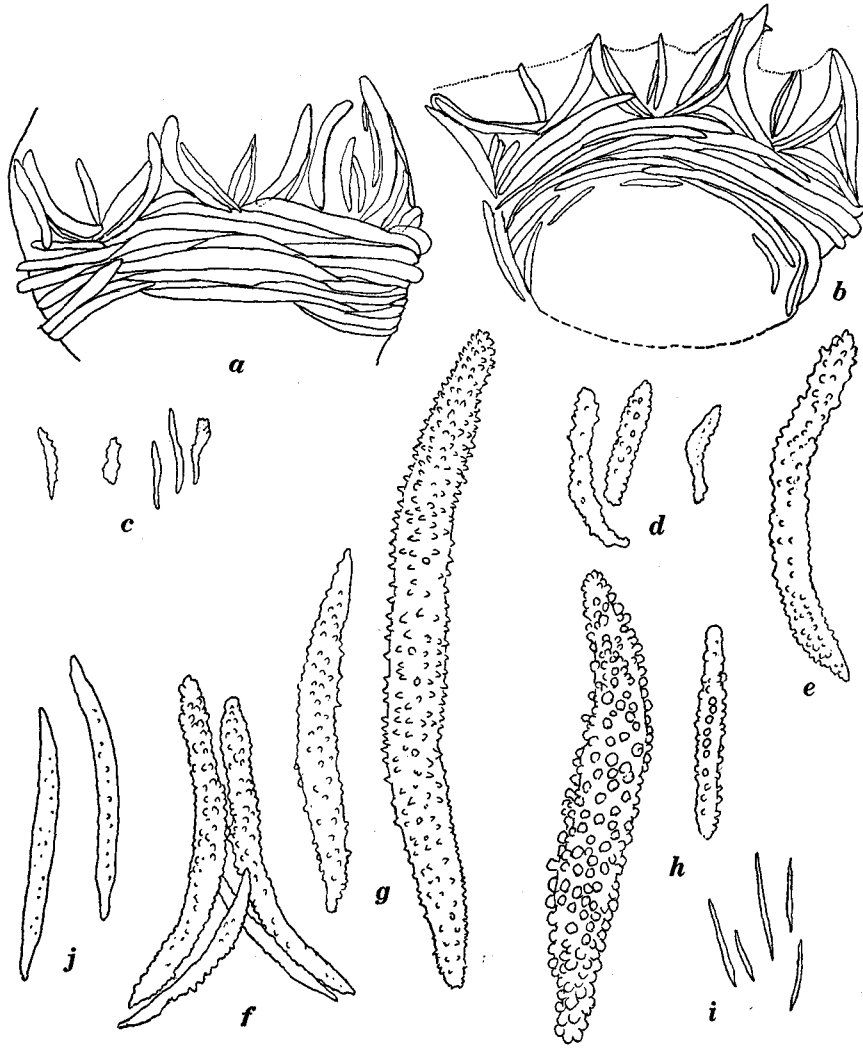
Fig. 6. *Siphonorgia crassa* (WRIGHT and STUDER).
 a, Anthocodial armature, with a verrucal spicule; b, tentacle spicules; c, point spicules; d, crown spicule; e, coenenchymal spicules; f, verrucal spicule. [a, $\times 50$; f, $\times 80$; c-e, $\times 127$]

scoparia and *crassa*) are one and the same thing and essentially identical with his *S. variabilis*. This opinion was cited by KÜKENTHAL (1906b, p. 77) and by THOMSON and DEAN (1931, p. 154). However, a crucial examination of siphonogorgiids from Japan, as described above, seems to be in conflict with his view, at least with regard to the two species *dipsacea* and *crassa*, if my identification is accurate.

Siphonogorgia alba n. sp.

(Fig. 7; Pl. II, fig. 16)

Material. One specimen (SMBL Type 184). Off Kirimezaki, depth unrecorded. 2-IV-1957. M. OZAKI coll.

Fig. 7. *Siphonogorgia alba* n. sp.

a-b, Anthocodial armature; *c*, pinnular spicules; *d*, tentacle spicules; *e*, point spicule; *f*, point spicules in pairs *in situ*; *g*, cortical spicules of stem; *h*, warty spindles of stem interior; *i*, needle-like small spicules of stem interior; *j*, verrucal spicules. [*g-j*, $\times 33$; *a-b*, $\times 50$; *c-f*, $\times 127$]

Description. The holotype consists of a long barren stem, arborescent in form, very rigid and brittle in texture. The total height is about 10 cm and the basal diameter is about 1 cm.

The stem and branches in the upper part are nearly directed obliquely upwards, and the longer branches gradually diminish in size to the distal ends. They are wholly dirty white.

The anthocodiae are cream yellow in color and singly scattered all round the larger branches, though somewhat crowded towards the distal ends and on the shorter branches, less than 2 mm wide.

The anthocodiae are all small, about 0.7 mm across and fully retractile into the calyces which are 1 mm high, slightly protruded over the surface.

The outer cortex of the stem and branches are irregularly packed with colorless curved spindles, less than 1.5 mm long. The canal-walls are thickly filled with similar spindles, less than 2 mm long and also needle-like smaller ones, less than 0.04 mm long.

The anthocodial formula is as follows:

$$\text{Completely retractile} = 1P + 1p + (8-10)Cr + (\frac{1}{2}-1)M$$

Details of anthocodial spicules and their measurements (in mm) are as follows:

Tentacles: Thorny rods (colorless or slightly yellowish)—0.02–0.05 long

Points: Thorny spindles (yellow)—0.26 long

Intermediates: Short, thorny spindles (yellow)—0.12 long

Crown: Curved, thorny spindles (yellow)—0.5 long

Remarks. In the mode of branching, this specimen resembles *S. splendens* KÜKENTHAL from China Sea (KÜKENTHAL, 1906b) and Malay Archipelago (THOMSON and DEAN, 1931) and *S. rotunda* HARRISON from Bay of Bengal (HARRISON, 1909, p. 35) but differs from both in the coloration and polyp armature.

Fam. Nephtheidae GRAY

Daniela koreni VON KOCH, 1891

(Fig. 8; Pl. I, fig. 10)

Daniela Koreni VON KOCH, 1891, p. 669, text-figs. 20–22, pl. 25, figs. 1–2; THOMSON and DEAN, 1931, p. 44; STIASNY, 1941, p. 21, figs. 11–14; UTINOMI and HARADA, 1958, p. 388 (listed only).

Cereopsis Studeri VON KOCH, 1891, p. 671, text-figs. 23–24; THOMSON and DEAN, 1931, p. 45; STIASNY, 1941, p. 17, figs. 8–10.

Gersemia studeri KÜKENTHAL, 1906b, p. 58; KÜKENTHAL, 1907, p. 384.

Kochella studeri UTINOMI, 1958a, p. 111 (renamed only); UTINOMI and HARADA, 1958, p. 388 (listed only).

Material. Two specimens. 23 km southwest of Tanabe Bay, 80–150 m. 28–XI–1957. E. HARADA coll.

Description. A colony (Pl. I, fig. 10) is attached to a dead shell of a gastropod *Xenophora pallida* (REEVE) and apparently conical in shape, expanded at the base. It is about 22 mm in total length and about 16 mm wide at the base.



Fig. 8. *Daniela koreni* VON KOCH.

a, A well developed colony from Sagami Bay (I.B.L. Coel. 747); *b-c*, polyp, showing the arrangement of spicules; *d*, tentacle with moniliform pinnules, side view; *e*, anthocodial spicules from a large colony; *f*, those from a young colony. [*a*, $\times 1$; *b-c*, $\times 18$; *d*, $\times 35$; *e-f*, $\times 530$]

Another colony, attached to a dead shell of a bivalve *Glycymeris vestita* (DUNKER) is a more stunted smaller lobe, only 12 mm long, bearing a few polyps crowded at the tip. So at first I considered it to be *Cereopsis* (*Kochella*) *studer*i. However, from a careful re-examination of both materials and for comparison some more developed fine specimens obtained from Sagami Bay, which are contained in the collection of the Biological Laboratory of the Imperial Household and fortunately now available to me for study, I am now convinced that both species (*Daniela koreni* and *Cereopsis studeri*) have to be merged into one and the same species, as formerly suggested by THOMSON and DEAN (1931, p. 45).

The present specimens obtained from offshore waters of Kii Peninsula, which are preserved in alcohol, are wholly colorless and semitransparent, but a color photograph prepared by the Biological Laboratory of the Imperial Household shows that the colony is vividly orange in living state; this indicates the occurrence of alcohol-soluble carotenoids in the coenenchymal tissue.

In a flaccid colony attached to a *Xenophora*-shell, the polyps are scattered all round the less-developed branches and branchlets arising from the sterile basal stalk in a bushy form, though grouped towards the ends of branches.

The polyps are not retractile; they are all transparent, flexible and cylindrical in shape, measuring about 6 mm long and about 1.5 mm in diameter at the base.

The tentacles are about 1.5-2 mm long, with moniliform pinnules counting up to 16 on each side. Below the tentacles, a number of minute spicules are arranged rather irregularly; they are scarcely found on the aboral side of the basal part of the tentacle rachis, often *en chevron*. On the remainder no spicules are found at all.

These spicules are all medially constricted elongate scales, often dotted on surface and pointed or rounded at both ends. They measure in μ as follows:

56.2 \times 9.37, 65.6 \times 9.37, 93.7 \times 9.37, 112.4 \times 18.7, 123 \times 28, 131 \times 18.7, 141 \times 18.7

In another smaller colony attached to a *Glycymeris*-shell, 5 small flaccid lobes, each of which is only 12 mm wide at the base, vertically set on the flattened base growing on the shell, and only 5 polyps are grouped at their ends, as figured by STIASNY (1941, fig. 8) for *Cereopsis studeri*.

In this specimen, the tentacles bear about 12 or 13 pairs of pinnules of which the moniliform structure is not so distinct as in the former specimen.

The spicules, which are arranged more irregularly or somewhat transversely below the tentacles, are likewise minute, biscuit-like scales with dotted surface. They measure in μ as follows:

37.5 \times 9.37, 47 \times 9.37, 56.2 \times 18.8, 65.6 \times 14, 75 \times 18.7

The gastrovascular canals are wide and provided with eight prominent mesenteries, bearing large gonads in a chain-form deeply downwards. The canal-walls are very thin and consist only of muscles transversely arranged, as figured by STIASNY (1941, fig. 14) for *Daniela koreni* and by VON KOCH (1891, fig. 23) for

Cereopsis studeri. Such stout thorny spindles as figured by both authors for *Daniela koreni* and *Cereopsis studeri* are not found at all in the coenenchymes.

Remarks. In some specimens from Sagami Bay which are more developed, curiously enough, I failed to detect such spicules of two types despite of their freshness. It seems probable that this species may apt to lack spicules partially or totally.

Under the observations given here, the synonymy between *Daniela koreni* and *Cereopsis studeri* is permissible, considering the latter as a young stage of the former. Accordingly, the generic name *Kochella*, which I (UTINOMI, 1958a) formerly proposed for *Cereopsis studeri* VON KOCH, has to be suppressed.

This species was first placed among the family Alcyoniidae, but the mode of branching and the polypal and coenenchymal structures undoubtedly prove to be a member of the family Nephtheidae.

Occurrence. Bay of Naples (VON KOCH, 1889; KÜKENTHAL, 1906b, 1907; STIASNY, 1941); Malay Archipelago, undefined locality (THOMSON and DEAN, 1931); Sagami Bay, Japan (UTINOMI, 1958a).

Paraspongodes spiculosa (KÜKENTHAL), 1906 (comb. nov.)

(Fig. 9; Pl. II, fig. 19)

Eunephtya spiculosa KÜKENTHAL, 1906b, p. 67, text-figs. 53-55, pl. III, fig. 17; KÜKENTHAL, 1907, p. 348; UTINOMI, 1951, p. 30, fig. 1.

Stereacanthia spiculosa THOMSON and DEAN, 1931, p. 182.

Material. One specimen. Off Minabe, 150 m. 21-IV-1958. M. OZAKI coll.

Description. This species has been known as *Eunephtya spiculosa* since KÜKENTHAL's original assignment, and commonly inhabits in offshore waters in Sagami Bay and along the Kii coast.

In fresh state it is orange-colored, but in alcohol the orange color fades away promptly; all spicules are quite colorless. This proves the abundance of alcohol-soluble carotenoids within the coenenchymal tissue.

A colony here described is about 45 mm in length and about 25 mm in greatest width. The sterile stalk is only 10 mm long and slightly contracted.

The polyparium is irregularly branched and bear many large, club-shaped polyps in groups on lobular branches and smaller branchlets or lobes.

The polyps are non-retractile, hard and clavate in shape, with incurved head; they are mostly 2 mm long and 1 mm wide.

The polyp armature, as seen in the figure of *Paraspongodes crassa* given by KÜKENTHAL (1896, pl. VIII, fig. 27), is not close-fitting and not distinctly demarcated between the head and stalk.

At the tip of the polyp head, point spicules, each consisting of one or two pairs of curved spindles on the lateral sides, are widely apart; further downwards larger curved spindles are arranged rather irregularly on the sides of the head

portion and obliquely on the sides of the stalk portion.

The abcauline side of the polyps is much more strongly armed with spicules longitudinally which are much more powerful than those of the lateral and adcauline side, though not so markedly bundled as to warrant their being classified as "Stützbündel".

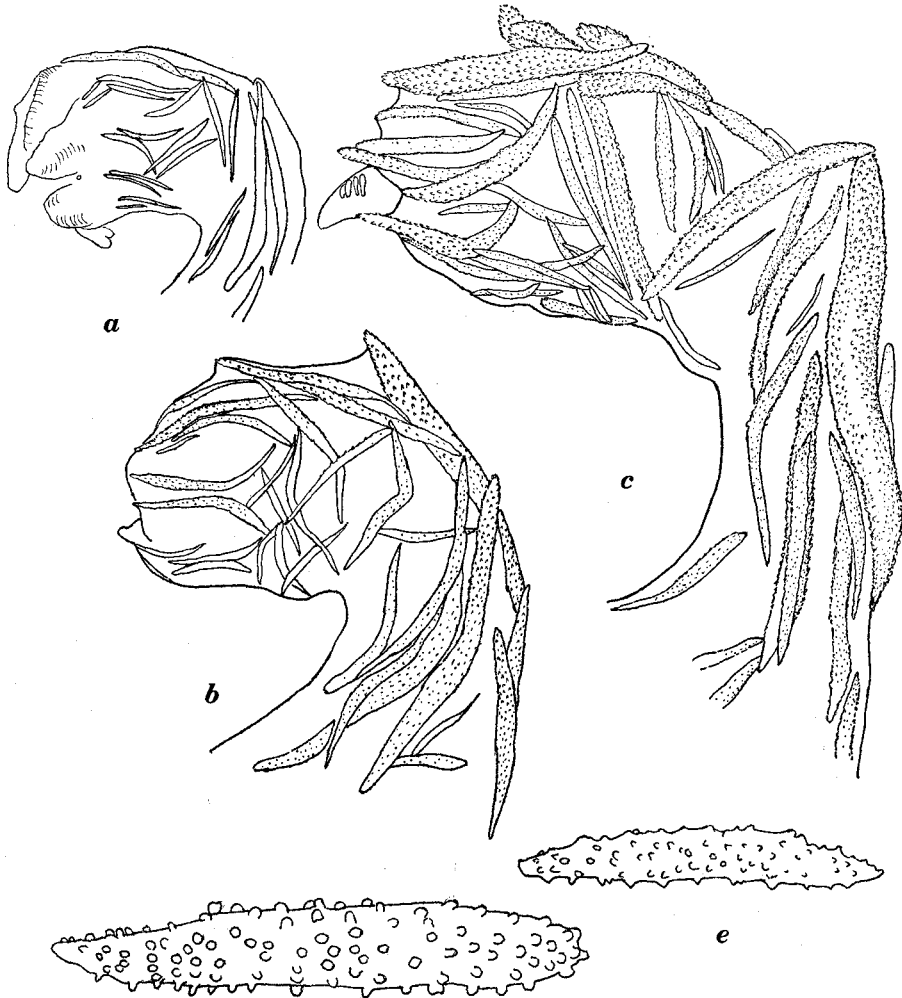


Fig. 9. *Paraspongodes spiculosa* (KÜKENTHAL).
 a-c, Polyps of various size; d, cortical spicule of stalk; e, coenenchymal spicule.
 [a-c, $\times 27$; d-e, $\times 80$]

All cortical spicules, including those of points, are sharply pointed at both ends and thorny throughout.

The canal-walls in the upper branches are thin and sparsely packed with warty

spindles bluntly ended, while those in the lower stalk are thick and closely packed with similar but a little larger spindles.

Measurements (in mm) of these spicules in larger polyps are:

Points: 0.14×0.02 , 0.26×0.03 , 0.35×0.035 , 0.4×0.05 , 0.6×0.05

Stalk cortex: 0.2×0.07 , 0.35×0.07 , 0.5×0.1

Branch interior: 0.05×0.017 , 0.2×0.02 , 0.3×0.02 , 0.35×0.06 , 0.5×0.05

Stalk interior: 0.35×0.05 , 0.6×0.1 , 1.0×0.05

Remarks. The genus *Paraspongodes* was first established by KÜKENTHAL (1896) to cover a number of nephtheid groups without "Stützbündel" such as *Eunephthya*, *Paranephthya*, *Scleronephthya*, *Voeringia*, *Fulla*, *Barathrobius*, *Gersemia*, *Gersemiopsis*, *Drifa* and *Duva*, and to include a new species (*P. crassa*) from Ternate. Later this genus name has long been disused and overlooked by all taxonomists including KÜKENTHAL himself, after his extensive works on the revision of the family Nephtheidae.

However, a valid species (*P. crassa*), on the finding of which the establishment of his genus *Paraspongodes* was based, is designated as the type species in the restricted sense, all northern boreal forms nearly or quite lacking spicules in the coenenchymes (*e.g.* *Gersemia*, *Drifa* and *Duva*) and some tropical or warm-water forms densely or feebly packed with spicules in coenenchymes (*e.g.* *Eunephthya*, *Paranephthya*, *Scleronephthya*, etc.) should be discarded from the genus *Paraspongodes* s. str. (A further detailed discussion concerning this problem will be given in a series of papers dealing with the revision of the Nephtheidae in the future.)

As evident from the description and figures given above and also in the literature, the generic name *Paraspongodes* should be retained as a distinct genus (in the restricted sense) for four Japanese species, *spiculosa*, *japonica* (KÜKENTHAL), *hirotai* and *serratospiculata* (UTINOMI) all of which were formerly assigned to the genus *Eunephthya* (*sensu* KÜKENTHAL).

The genus *Stereacanthia* erected by THOMSON and HENDERSON (1906, p. 13) is literally considered as a synonym of *Paraspongodes* (*s. str.*).

Occurrence. Sagami Bay, Japan (KÜKENTHAL, 1906b; UTINOMI, 1951); Malay Archipelago (THOMSON and DEAN, 1931, as *Stereacanthia spiculosa*).

Dendronephthya spinifera (HOLM), 1895

For description and synonymy see UTINOMI, 1952, p. 172.

Material. One specimen. Off Minabe, depth unrecorded. 4-V-1958. M. OZAKI coll.

Dendronephthya acaulis KÜKENTHAL, 1906

(PI. I, figs. 11-12)

For description and synonymy see UTINOMI, 1952, p. 202.

- Material.* 1) Two specimens. 23 km west of Tanabe Bay, 80-150 m. 6-IV-1956. M. OZAKI coll.
- 2) Eight specimens of variable coloration. 23 km west of Tanabe Bay, 80-150 m. 28-XI-1957. E. HARADA coll.
- 3) Three specimens. West of Tanabe Bay, 80-150 m. XII-1957. M. OZAKI coll.
- 4) Six specimens. 10 miles south of Minabe, 150 m. 23-I-1958. M. OZAKI coll.

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(* Not directly consulted.)

EXPLANATION OF PLATES I-II

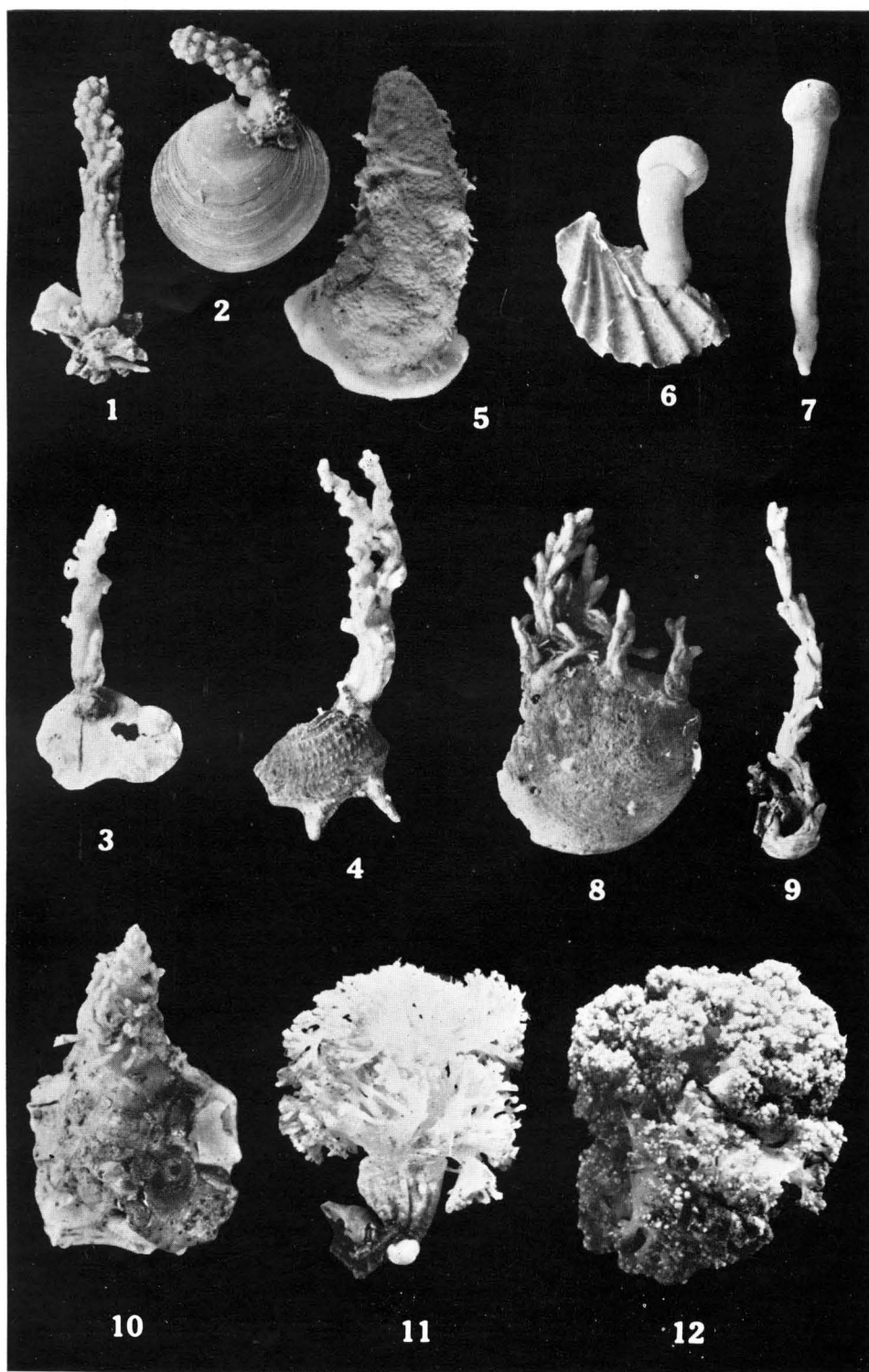
PLATE I

- Figs. 1, 2. *Bellonella rigida* PÜTTER.
 Figs. 3, 4. *Bellonella dofleini* (KÜKENTHAL).
 Fig. 5. *Minabea ozakii* UTINOMI, with fully extended autozooids.
 Figs. 6, 7. *Anthomastus granulosus* KÜKENTHAL.
 Figs. 8, 9. *Bellonella macrospina* (KÜKENTHAL).
 Fig. 10. *Daniela koreni* VON KOCH.
 Figs. 11, 12. *Dendronephthya acaulis* KÜKENTHAL.

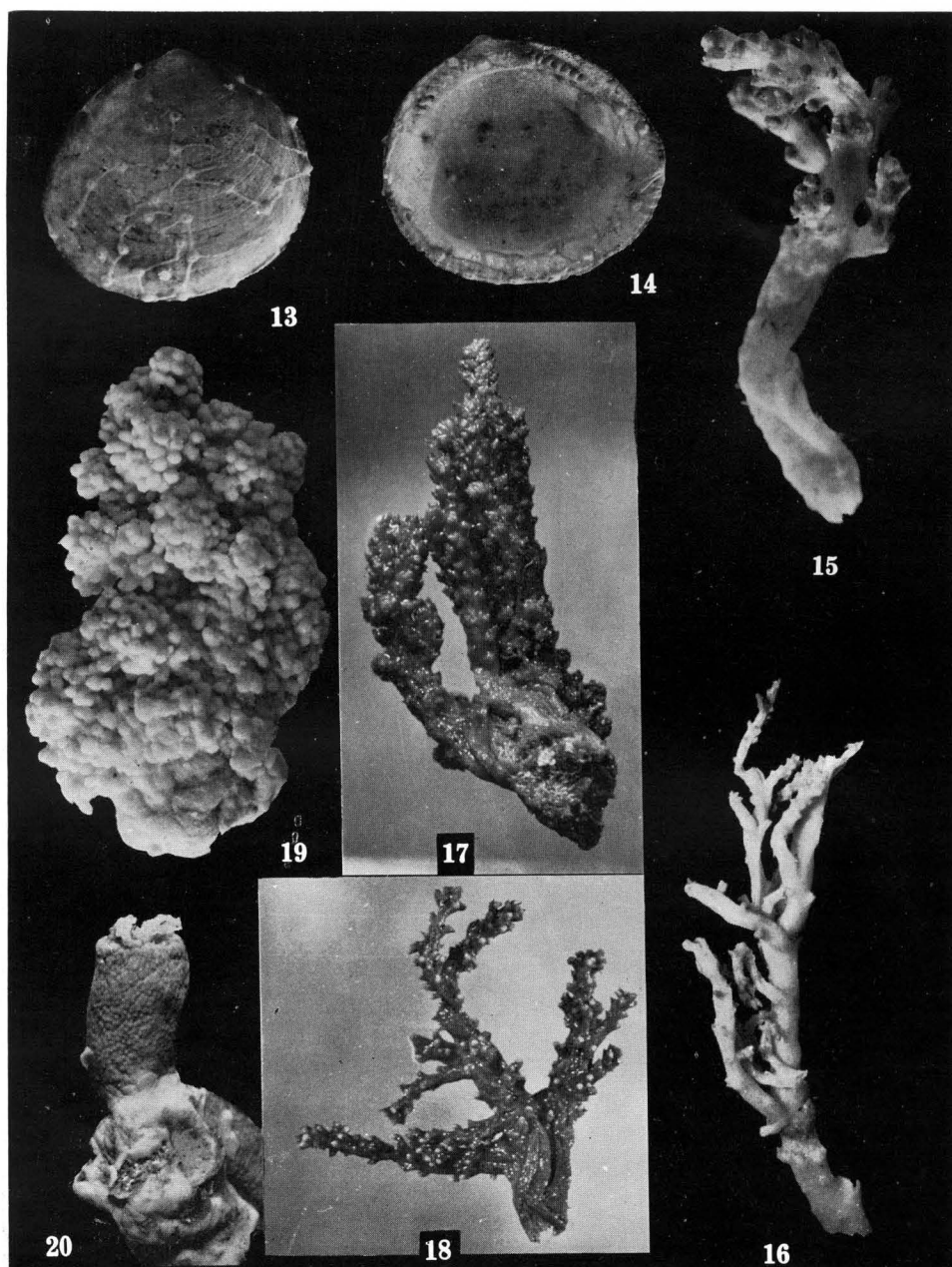
All photographs approximately of natural size.

PLATE II

- Fig. 13. *Sarcodictyon gotoi* (OKUBO), growing on the outer surface of a *Glycymeris*-shell. Approximately $\times 1$
 Fig. 14. *Sarcodictyon gotoi* (OKUBO), growing on the inner surface of a *Glycymeris*-shell. Approximately $\times 1$
 Fig. 15. *Siphonogorgia dipsacea* (WRIGHT and STUDER). Approximately $\times 2$
 Fig. 16. *Siphonogorgia alba* n. sp. Approximately $\times 0.7$
 Fig. 17. *Siphonogorgia crassa* (WRIGHT and STUDER). Approximately $\times 1$
 Fig. 18. *Siphonogorgia* cf. *pendula* STUDER. Approximately $\times 0.9$
 Fig. 19. *Paraspongodes spiculosa* (KÜKENTHAL), comb. nov.
 Approximately $\times 1.5$
 Fig. 20. *Bathyalcyon robustum* VERSLUYS. Approximately $\times 0.75$



H. UTINOMI: NOTEWORTHY OCTOCORALS COLLECTED OFF KII PENINSULA, 1.



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