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ON SOME OCTOCORALS FROM DEEP WATERS OF PROV. TOSA, SIKOKU¹⁾

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With Plates V-VI and 8 Text-figures

This paper represents one of a series describing the regional Octocorallian fauna along the coasts of Japan and deals only with the material collected chiefly from deep waters of Tosa Bay and its environs, Sikoku, southern Japan.

The material dealt with comes from several sources. The majority was obtained from bottom samples gathered in 1953 by bull trawlers for offshore bottom-fishes, and kindly submitted to me for examination by Prof. T. KAMOHARA of Kôchi University to whom I wish to express my indebtedness. The details of localities, etc. are thus not clearly available. A part (*Melithaea ocracea*) was collected by Mr. M. HORI of the Osaka Municipal Museum of Natural History and is lodged in that Museum.

In addition, I have had an opportunity of examining the late Dr. Kumao KINOSHITA's collection of gorgonaceans from Tosa Bay which is now contained in the collections of the Zoological Institute, Tokyo University. My thanks are due to Dr. Itiro TOMIYAMA of Misaki Marine Biological Station of Tokyo University for enabling me to examine specimens among KINOSHITA's collection and certain other specimens for comparison. My thanks are also due to Mr. Frederick M. BAYER, associate curator of the U. S. National Museum, Washington, for help and useful informations concerning the identification of Japanese telestids.

A list of the species collected from Tosa Bay is given below:

Telestacea

Fam. Telestidae

1. *Telesto tubulosa* KINOSHITA
2. *Paratelesto rosea* (KINOSHITA), comb. nov.
3. *Paratelesto kinoshitai* n. gen. et n. sp.

1) Contributions from the Seto Marine Biological Laboratory, No. 318.

Alcyonacea

Fam. Xenidiidae

4. *Anthelia tosana* n. sp.

Fam. Alcyoniidae

5. *Bellonella dofleini* (KÜKENTHAL)
6. *B. macrospina* (KÜKENTHAL)
7. *B. sibogae* UTINOMI

Fam. Nephtheidae

8. *Dendronephthya querciformis* KÜKENTHAL

Fam. Nidaliidae

9. *Siphonogorgia dipsacea* (WRIGHT et STUDER)

Gorgonacea

Fam. Melithaeidae

10. *Melithaea ocracea* (LINNAEUS)

Fam. Parisididae

11. *Parisis minor* WRIGHT et STUDER

Fam. Acanthogorgiidae

12. *Acanthogorgia multispina* KÜKENTHAL et GORZAWSKY

Fam. Paramuriceidae

13. *Muriceides collaris* NUTTING
14. *Menella indica* GRAY

Fam. Ellisellidae

15. *Ellisella rubra* (WRIGHT et STUDER)

Fam. Isididae

16. *Acanella microspiculata* AURIVILLIUS

Pennatulacea

Fam. Kophobelemnidae

17. *Kophobelemnion stelliferum* (O. F. MÜLLER)

Fam. Virgulariidae

18. *Scytalium splendens* (THOMSON et HENDERSON)

Fam. Pennatulidae

19. *Pennatula murrayi* KÖLLIKER

TELESTACEA

Fam. Telestidae MILNE EDWARDS et HAIME

Genus *Telesto* LAMOUROUX

Telesto tubulosa KINOSHITA

(Fig. 1; Pl. V, fig. 1)

Telesto tubulosa KINOSHITA, 1909, p. 114, pl. 3, figs. 1-6; KÜKENTHAL, 1913, pp. 233-234.

Clavularia japonica NUTTING, 1912, p. 13, pl. 1, figs. 1-1a; pl. 17, fig. 2.

Material. 8 specimens in fragments. Tosa Bay. T. KAMOHARA coll. 1953.

Largest one of specimens is a bent, unbranched stem, lacking basal stolon, about 6 cm long. The main stem, namely the greatly elongated anthostelar part of the axial polyp, about 1.5 mm in diameter all throughout, bears 12 widely separated lateral polyps, arising at angle of about 40°-45°.

The axial polyp at its extremity and all lateral polyps form a thin-walled, cylindrical calyx, about 3-7 mm long (mostly 5 mm long in the middle of the stem) and are provided with 8 distinct longitudinal ribs which become obscure toward the main stem. Their diameter is approximately 1-1.2 mm. The main stem is light yellowish in color, while the calycular wall of lateral polyps is paler and even brownish white.

The anthocodial armature and the spiculation of body walls agree well with the original description given by KINOSHITA (1909).

Spicules in the outer layer of the body wall are mostly tuberculate capstans with a median waist, about 0.15 mm long and 0.05-0.08 mm wide, or barrels with lumpy warts. The inner layer is filled with irregular formed rods, interlocking with one another by their processes, occasionally fused together. They are 0.1-0.14 mm long and 0.05-0.08 mm wide. In the mesenteries there are somewhat curved, flattened spicules smaller than the anthocodial spicules, about 0.09-0.12 mm long. Anthocodial spicules are flattened spindles with jaggy margin, about 0.12-0.26 mm long. On the

dorsal surface of tentacles, short lumpy rods, about 0.1–0.16 mm long and 0.018–0.035 mm wide, are closely placed longitudinally.

Inasmuch as I have examined, this species is usually not covered by any sponges, unlike most of other telestids.

Type locality. Kagosima Bay, Prov. Satuma, southern Kyusyu, 70 fathoms¹⁾.

Other occurrence in Japan. Nomo-zaki, west of Ryusyu, 71 fathoms, Ose-zaki Light, Gotô Islands, west of Kyusyu, 95–106 fathoms (all from the "Albatross" Exploring survey around Japan, NUTTING 1912); southwest of Kyusyu (between 28°10' N., 126°02' E. and 28°20' N., 126°11' E.), 64 fathoms, N. YANAGI coll., June 22, 1913²⁾ (together with *Pseudocladoconus hicksoni*); off Enosima, Sagami Bay, 150 m, February 3, 1956³⁾.

Fig. 1. *Telesto tubulosa* KINOSHITA.

a, Part of a colony; *b*, detail of anthostelar part of axial polyp, with three lateral polyps; *c*, spicules from outer layer of body wall; *d*, spicules from inner layer of body wall.

[*a*, $\times 1.3$; *b*, $\times 10$; *c-d*, $\times 150$.]

- 1) Unfortunately, I and Dr. TOMIYAMA also were unable to locate KINOSHITA's type specimen of *Telesto tubulosa* as well as other telestids among the collections of the Zoological Institute of Tokyo University.
- 2) The material is in the Zoological Institute, Tokyo University.
- 3) The material is in the Biological Laboratory of the Imperial Household.

Remarks. *Clavularia japonica* NUTTING (1912) the type of which I have re-examined myself through the courtesy of Mr. BAYER of the U. S. National Museum, is nothing but a telestid undoubtedly referable to this species. In fact, all the localities at which the U. S. Fisheries steamer "Albatross" collected "*Clavularia japonica*" are not far distant from the type locality of this species, as cited above.

Genus *Paratelesto* gen. nov.

Diagnosis. Low arborescent colonies of the Telestacea having some characters connecting between the genera *Telesto* and *Coelogorgia*. From a broadened base, not forming creeping stolons, profusely branched stem arise; stem and branches formed by axial polyps of high orders bear many small-sized lateral polyps in spirals; body wall of axial polyps greatly thickened by mesogloea perforated with solenia arranged in rings concentrically around a large coelenteric cavity of axial polyps, open to base; calycular part of axial polyps small, truncate-conical in form like lateral polyps and provided with 8 longitudinal ribs composing of double rows of coarsely warted blunt rods; longitudinal grooves indistinct on body walls of anthostelar part of axial polyps.

Genotype: *Telesto rosea* KINOSHITA, 1909.

Paratelesto rosea (KINOSHITA) comb. nov.

(Fig. 2; Pl. V, figs. 2-4)

Telesto rosea KINOSHITA, 1909, p. 119; KÜKENTHAL, 1913, p. 234 (listed only).

Telesto rosea (partim) KINOSHITA, 1910, p. 209.

Material. Fragments without base. Coral ground off Kasiwazima, Prov. Tosa, 80 fathoms. K. KINOSHITA coll. June 1909. Preserved in the Zoological Institute, Tokyo University.

One incomplete specimen, largest of fragments, is flabellate in form¹⁾, measuring 5×3 cm.

The stem shows 1.5 mm in diameter, and bears three branches. The colony is uniformly bright red in color, but thinly covered by a delicate silicious sponge, through which the lateral polyps protrude.

The lateral polyps are arranged alternate-spirally on all stem and branches at intervals of about 1-2 mm, usually arising at an acute angle. They are small in size as in the distalmost end of the axial polyps.

The calycular part of all polyps is truncate-conical to tubular in shape, measuring 1-3 mm high and about 1 mm in diameter, and more or less distinctly grooved longitudinally. At distal end the spicules of the 8 longitudinal ribs terminate to converging points which bend inwards to cover the retracted anthocodia.

1) In complete colonies from Prov. Kii, however, the branching is not always flabellate, but rather bushy in form.

The anthocodial spiculation shows the typical *en chevron* arrangement as usual in other telestids. The point spicules are apparently lesser in number and transverse collarets are not formed. They are somewhat flattened spindles, measuring 0.25×0.035 mm and 0.3×0.026 mm. On the aboral side of tentacles, smooth rodlets, about 0.1×0.035 mm, are longitudinally placed becoming in a single row towards the tip. Pinnules have each a curved slender rodlet.

Fig. 2. *Paratelesto rosea* (KINOSHITA).

a, Distal part of axial polyp, with two lateral polyps; *b*, cross section of axial polyp near base, diagrammatic; *c*, tentacle spicules *in situ*; *d*, anthocodial spicules arranged *en chevron*; *e*, lobate spicules of inner layers interlocking together; *f*, inner spicules with forked warts; *g*, outer spicules with simple or tuberculated warts.

[*a-d*, $\times 80$; *e-g*, $\times 130$.]

The body wall is extremely thickened and spiculiferous, so that the whole colony is rigid and brittle. On making a cross section through one of the branches, it may be seen to be perforated by a number of solenia arranged in rings concentrically around a central coelenteric cavity of the axial polyp which is open to base, not filled with any spiculiferous "intrusion tissue" as found in species of *Telestula*. Towards the base, the central coelenteric cavity becomes narrower and the rings of surrounding solenia increase in number up to 6 according to the diameter of branches and stem.

As mentioned above, the body wall consists of two layers. Spicules of the outer layer are for the most part coarsely warted blunt rods with simply rounded or slightly jagged warts. They measure: 0.26×0.09 mm, 0.3×0.09 mm and 0.32×0.11 mm. Near the ends of calyces they often assume somewhat clavate form, broader at its distal end. In the inner layer perforated by a number of solenia, there are also scarcely warted rods with warts forked at end and irregularly branched flat rods, both peculiar to *Telesto*, measuring approximately 0.17×0.07 mm, 0.23×0.07 mm, 0.26×0.09 mm and 0.3×0.26 mm. These inner spicules are in part longitudinally disposed, in part towards the periphery. They do not, however, fuse together, but are only interlocked with one another by their processes.

Remarks. This species has been originally described without any illustrations by KINOSHITA (1909), based on a single specimen from off Miyake-zima, south of Prov. Izu. Afterwards he (1910, p. 209) made some remarks about the material from Prov. Tosa. The present specimen on which the above description is based is probably one of the specimens he identified with *Telesto rosea*, the type specimen of which is lost according to Dr. TOMIYAMA (personal communication).

This species is fairly common around the southern coasts of Kii Peninsula. So in describing I have compared with a number of specimens so far collected there.

The differences of this species from many ordinary species of *Telesto* have already been recognized by KINOSHITA (1910), particularly in the multiperforated mesogloal structure of the body wall, which is not comparable with that of *Telesto rupicola*, *riisei*, *multiflora*, *smithi*, etc., as figured by LAACKMANN (1909, Taf. 7-8).

Paratelesto kinoshitai sp. nov.

(Fig. 3; Pl. V, fig. 5)

Telesto rosea (partim) KINOSHITA, 1910, p. 209.

Material. Two fragments (labelled as "*Telesto* 4 and 5"). Coral ground off Kasiwazima, Prov. Tosa. K. KINOSHITA coll. June 1909. Preserved in the Zoological Institute, Tokyo University.

Of two fragments, the larger one (Pl. V, fig. 5 on the right hand) is here designated as holotype. It, although incomplete, is scantily branched, consisting of a main stem, about 6 cm long, and one branch and three sub-branches, spreading in one

plane. All branches issue at nearly right angles. The distal part of the main stem is missing. The base is only slightly flattened, but not stoloniferous. Near the base where a single barnacle (*Balanus krügeri* PILSBRY) is attached, the main stem is about 6 mm in diameter and the proximal part of the primary branch giving off from the lower part of the stem is 4 mm in diameter. Further upwards, the stem and

Fig. 3. *Paratelesto kinoshitai* n. gen. et n. sp.

a, Part of colony; b, detail of distal part of polyp; c, anthocodial spicules; d, tentacle spicules; e, pinnular spicule; f, spicules from inner layers of body wall; g, spicules from outer layer of body wall.

[a, $\times 12$; b, $\times 20$; f-g, $\times 130$; c-e, $\times 150$.]

branches only slightly taper and bear on all sides short cylindrical lateral polyps rather irregularly at intervals of about 2 mm. These lateral polyps are rather erect in the lower part, but become to be slightly bent upwards in the narrower branches.

The calycular part of the axial polyps does not differ much from all lateral polyps in either form or size. They are all white, while the stem and branches proper are pink colored, except for one sub-branch only distally.

Another piece (Fig. 3, *a* and Pl. V, fig. 5, on the left hand), which is a terminal part of a branch from the same or different colony, measuring about 25 mm in length, bears about 6 short sub-branches and a few single lateral polyps, issuing at acute angles. This is, however, uniformly pink in color.

Many of the lateral polyps, as large as the calycular part of the axial polyps, are short tubulo-conic in shape, about 1.5–3.0 mm long and about 1.0 mm in diameter, with eight narrow but deep, longitudinal grooves separated by broad ribs continuing downwards in narrow branches. Each longitudinal rib is composed of a double row of spicules and the components of each row overlap so that three or more abreast at any one place. Towards the lower anthostelar part of the branches and main stem, wider than 2.5 mm in diameter, spicules are irregularly arranged all over the surface, not forming any longitudinal rows or ribs.

The body wall consists of two layers as in the preceding *rosea*. Spicules of the outer layer are mostly very large, blunt rods covered with multi-tuberculated warts, measuring 0.35×0.14 mm, 0.4×0.17 mm and 0.45×0.16 mm. More irregular forms also may occur.

In the inner layer there are similar rods or spindles, or irregular forms with multi-tuberculated warts and also coarsely or irregularly warted rods or spindles, mostly smaller than the above. They measure 0.18×0.12 mm, 0.21×0.09 mm, 0.32×0.07 mm, 0.36×0.12 mm, and 0.36×0.07 mm. These inner spicules are closely but separably packed together under the outer layer in the calycular part, and in the coenenchyme surrounding the central coelenteric cavity which penetrates down to the base of the stem.

The mesogloal interior is perforated by many solenia in rings, as noticed in the preceding species.

The retractile anthocodia is comparatively small and shows the spiculation similar to that of the preceding *rosea*. The anthocodial spicules are spindles with a few transverse ribs corrugated in rings, measuring 0.18×0.036 mm and 0.21×0.032 mm. Tentacle spicules are flat rods with jagged margins, measuring 0.09×0.02 mm and 0.1×0.036 mm. Pinnules have each a curved slender rodlet, about 0.09×0.005 mm.

All of these spicules are pink or white.

Remarks. This specimen differs from the type species *Paratelesto rosea* in the form of branching, the spiculation and the coloration of the colony.

ALCYONACEA

Fam. Xenidiidae VERRILL

Genus *Anthelia* LAMARCK

According to the generally accepted concept of classification, the genus *Anthelia* (genotype: *A. glauca* SAVIGNY) is admittedly a member of the Xenidiidae, but regrettably it has been frequently confused with the stoloniferan genus *Clavularia* (genotype: *C. viridis* Q. et G.), for example as has been done by most of the Scandinavian workers as well as HICKSON (1894, 1930). The definition of this genus has been given adequately by GOHAR (1940 a, b).

In this genus, the anthocodia is not separable from the anthostele regarding the distribution and size of spicules, and the former is not retractile into the latter, as in the genus *Xenia*. The base from which the polyps arise, is invariably membranous, not forming a network of stolons. The spicules are mostly minute, flattened rodlets with rugged or toothed margins, instead of wineglass-shaped or biscuit-shaped smooth discs as in the genus *Xenia* and allies. They are all evenly scattered on the periphery and not confined to either the anthocodia or the anthostele. However, there are often species lacking spicules entirely as in the case of *Xenia* (ROXAS, 1933). In these respects, *Sarcothelia* only known from Hawaii (type: *S. edmondsoni* VERRILL, 1928) should be transferred to *Anthelia*.

From the neighboring seas three species are hitherto known: *A. lineata*¹⁾ STIMPSON (a doubtful species probably identical with or nearest to *A. longissima* (MAY)), *A. japonica* KÜKENTHAL (1906) and *A. formosana* UTINOMI (1950). The former two species are non-spiculated form, while the last-named one with spicules. To these I here add a new spiculated species from Tosa Bay.

Anthelia tosana sp. nov.

(Fig. 4; Pl. VI, fig. 6)

Material. A membranous colony from Tosa Bay. T. KAMOHARA coll. Details of locality and date of collecting unrecorded. Holotype is preserved in the Seto Marine Biological Laboratory, as designated S. M. B. L. Type 167. A part of the same colony is deposited in the Zoological Institute, Kyoto University.

From a very thin basal membrane, about 0.5 mm thick at margins, numerous unstricted polyps arise with their bases close together. The colony is entirely dirty white in alcohol.

Fully grown polyps are about 10–12 mm in height, excluding the tentacles and about 2 mm in diameter at their bases.

The surface of the anthostele is apparently smooth, without longitudinal grooves

1) Redescribed by VERRILL (1865).

along the mesenteries. At the top there is a papilla-like hypostome, about 0.8 mm high.

Tentacles are generally short, up to 4 mm long and 0.6 mm wide at their bases. In younger polyps, short, finger-like pinnules (6-12) are arranged in one row on either side, but in fully grown polyps, in two rows, counting about 13 or 14 in one row. Pinnules are longest in the middle, about 0.7 mm long and 0.03 mm wide, becoming shorter towards the distal and proximal parts, down to 0.1 mm long.

Fig. 4. *Anthelia tosana* n. sp.

a, Distal part of polyp; *b*, tentacle, aboral side; *c*, tentacle, adoral side; *d*, spicule from tentacles; *e*, spicule from anthostele; *f*, spicules from basal membrane.

[*a*, $\times 10$; *b-c*, $\times 27$; *d-f*, $\times 420$.]

Spicules are more or less evenly scattered all over the surface and not crowded at any particular parts. They are all minute flattened rodlets, usually truncated at

both ends and their flattened surface may look slightly roughened. Careful examination by high-power microscope reveals, however, that their minor structure and size are not always homogeneous. On the tentacles and pinnules they are smallest, with minutely granular surface, 0.04–0.05 mm long and 0.012–0.014 mm wide. (Fig. 4 *d*). On the anthostelar part, they are more elongate discs with radially striated or slightly granulated surface and jagged margins, about 0.05–0.07 mm long and 0.01–0.014 mm wide (Fig. 4 *e*). Spicules on the basal membrane are a little wider, elongate rhombic discs with jagged margins, often radially striated on flattened faces, about 0.05–0.07 mm long and 0.01–0.014 mm wide (Fig. 4 *f*).

Remarks. In every respect, this specimen from Tosa Bay seems to be different specifically from all the known species of this genus mentioned in a key given by ROXAS (1933, p. 62) and also from *A. formosana* UTINOMI (1950) from Garanbi, Formosa.

Fam. Alcyoniidae LAMOUROUX

Genus *Bellonella* GRAY

Bellonella dofleini (KÜKENTHAL)

Bellonella macrospina (KÜKENTHAL)

Bellonella sibogae UTINOMI

These three species of *Bellonella* have already been described in detail based largely on materials from Tosa Bay, presented by Dr. KAMOHARA (UTINOMI, 1957, p. 161, p. 162 and p. 164).

Fam. Nephtheidae GRAY

Dendronephthya querciformis KÜKENTHAL

(PL. VI, fig. 7)

This species also has already been described, based on three complete colonies from Tosa Bay, presented by Dr. KAMOHARA (UTINOMI, 1954, p. 328).

Fam. Nidaliidae GRAY (UTINOMI emended)

(=Siphonogorgiidae KÖLLIKER auct.)

Siphonogorgia dipsacea (WRIGHT et STUDER)

Chironephthya dipsacea WRIGHT et STUDER, 1889, p. 251, pl. 37, figs. 1, 1 a.

Siphonogorgia dipsacea KÜKENTHAL, 1906, p. 76, 82, pl. 3, fig. 19.

Material. 2 colonies, 3.5 cm long and 4.0 cm long. Tosa Bay. T. KAMOHARA coll. 1953.

GORGONACEA

Subord. Scleraxonia

Fam. Melithaeidae GRAY

Melithaea ocracea (LINNAEUS)

(Pl. VI, fig. 8)

Melithaea ocracea UTINOMI, 1956, p. 236, fig. 8, *a-k* (synonymy).

Material. 8 colonies. Okinosima, Prov. Tosa, 10–50 m. H. HORI coll. July 23, 1952. Preserved in the Osaka Municipal Museum of Natural History.

This large-sized melithaeid is well known from the tropical region of the West-Pacific Ocean, but so far not recorded from Japanese waters. However, I have already confirmed its occurrence around the coasts of Kii Peninsula, where it has often been stranded ashore after storm.

According to Mr. HORI's field note, this species occur abundantly on the rocky cliff of Okinosima at a depth of 10–50 m, the habitat being deeper than that of the small-sized species *M. flabellifera* (KÜKENTHAL) which is more common in warm waters of southern Japan from Sagami Bay south to Kyusyu.

The largest one of specimens he has collected attains about 50 cm in height and 30 cm in width.

Fam. Parisididae AURIVILLIUS

Paris minor WRIGHT et STUDER

(Fig. 5; Pl. VI, fig. 9)

Paris minor WRIGHT et STUDER, 1889, p. 184, pl. 41, fig. 6; KÜKENTHAL, 1924, p. 83; AURIVILLIUS, 1931, p. 30, fig. 5.

Material. Fragments. Kasiwazima. T. KINOSHITA coll. June 1909. Preserved in the Zoological Institute, Tokyo University.

One of larger fragments consists of a stem and a primary branch, broken at both ends. It is about 7 cm in total height and the stem shows about 2 cm in diameter in the lower part. When complete in life, the colony may spread in one plane. The specimen is wholly white.

The polyps, occurred biserially in the branching plane, at intervals of about 1–3 mm, are short, truncate-conical in shape and measure about 0.5–1.0 mm high and 0.7–0.8 mm wide at base.

The coenenchymal spicules covered on the stem and polyps are all tuberculate plates, more or less larger in the outer layer (Fig. 5 *e*) than in the inner layer (Fig. 5 *d*); when smaller in size, they often may take a flattened rod or capstan-like

form. Measurements in mm: 0.26×0.18 , 0.18×0.14 , 0.18×0.09 , 0.1×0.07 , 0.07×0.05 and 0.07×0.03 .

The axis of the stem and branches, including the internode and node together, is deeply furrowed longitudinally all throughout. The calcareous internode, entirely white, is approximately 2.5 mm long, while the horny node, yellow in color, is approximately 0.5 mm long.

The longitudinal furrows surrounding the axis are not so numerous as in *P. fruticosa* VERRILL¹⁾, as numbering only 14 in a branch with a diameter of 1 mm (cf. BAYER, 1956, p. 201, fig. 145, 2d, 2e). More interesting is that each one of the longitudinal furrows locating on the opposite sides is markedly widest. This widest furrows are clearly visible through the coenenchyme.

Fig. 5. *Parisia minor* WRIGHT et STUDER.

a, Distal part of axis, corticated; *b*, detail of polypal verruca; *c*, lobate rods of axial nodes; *d*, spicules from inner layer of coenenchyme; *e*, spicules from outer layer of coenenchyme.

[*a*, $\times 18$; *b*, $\times 66$; *c-e*, $\times 128$.]

The horny nodes are filled with lobate rods, about 0.05–0.09 mm long.

Distribution. Previously recorded from Hyalonema-ground (Dōketuba), Sagami Bay, 345 fathoms (WRIGHT et STUDER); Gotō Islands, west of Kyusyu, 160 m and east of Titizima (Chichijima), Bonin Islands, 80 fathoms (AURIVILLIUS).

1) This species is occasionally collected along the southern coast of Kii Peninsula.

Subord. Holaxonia

Fam. Acanthogorgiidae GRAY (KÜKENTHAL emend.)

Acanthogorgia multispina KÜKENTHAL et GORZAWSKY

(Fig. 6)

Acanthogorgia multispina KÜKENTHAL et GORZAWSKY, 1908, p. 61, Taf. 4, fig. 21; KÜKENTHAL, 1924, p. 246; STILASNY, 1947, p. 41, figs. E. F. (synonymy).

Material. Fragments. Tosa Bay. T. KAMOHARA coll. 1953.

The colony, broken into fragments, is loosely branched dichotomously but not in

Fig. 6. *Acanthogorgia multispina* KÜKENTHAL et GORZAWSKY.

a, Detail of polyp; b, crown spicules; c, spindles of calyx wall; d, irregular bodies of polypal base.
[a, $\times 33$; b-d, $\times 97$.]

one plane. Branches arise perpendicularly. The axis is about 1 mm in diameter and brownish in color.

The spiculiferous polyps are mostly small, about 1-2 mm long, having large long-spined crown spicules at the top and minute irregular-shaped spicules, about 0.05×0.05 mm, at the base, which are peculiar to this species.

Distribution. Common around Japanese waters from Sagami Bay to Amoy, South China.

Fam. Paramuriceidae BAYER

(=Muriceidae STUDER auct.)

Muriceides collaris NUTTING

(Fig. 7)

Muriceides collaris NUTTING, 1910 a, p. 28, pl. 4, figs. 3 and 3 a; pl. 19, fig. 10; KÜKENTHAL, 1924, p. 164.

Material. One incomplete specimen. Tosa Bay. T. KAMOHARA coll. 1953.

Fig. 7. *Muriceides collaris* NUTTING.

a, Polyp, extended; b, anthocodial spicules; c, spicules from branch cortex; d, spicules from stem cortex. [a, $\times 45$; b-d, $\times 80$.]

A single specimen, lacking the distal part of the stem, is about 17 cm in total height and very loosely branched in one plane. The colony is dirty white in alcohol and flexible.

From the main stem with the membranous basal expansion, two lateral branches are given off perpendicularly to the stem and a few secondary and tertiary branches are again given off from the one primary branch. All of these branches turn upwards and bear prominent polyps rather spirally arranged at intervals of about 2 mm. The

lower parts of the main stem and primary branches, however, have no polyps. The lower part of the stem is about 2 mm in diameter, covered by thick coenenchyme.

The polyps, including semi-extended operculum, are approximately 1.2 mm high and 0.8 mm wide. The operculum is highly projecting from the calycular margins at preserved state, and each point consists of long spindles disposed longitudinally, but not distinctly paired. These anthocodial spicules are slightly curved, tuberculate spindles, 0.39–0.44 mm long and 0.035 mm wide.

The coenenchymal spicules are all small tuberculate spindles and their derivatives, measuring about 0.24–0.33 mm long and 0.035 mm wide. They are imbricated on the calyx walls. In the lower part of the colony free from the calyces, spicules are generally smaller in size and more irregular in form.

Distribution. Previously known only from "Siboga" Station 253 (5°48.2' S., 132°13' E.) near Kei Islands, 304 m.

Menella indica GRAY

Menella indica GRAY, 1870, p. 407; NUTTING, 1912, p. 86; KÜKENTHAL, 1924, p. 184.

Material. An incomplete specimen, terminal part only. Tosa Bay. T. KAMOHARA coll. 1953.

The specimen is a very slender, flexible, unbranched, filiform stem, about 13 mm long, with a diameter of only 1 mm. It is dirty white all throughout. The calyces are distributed irregularly on all sides, but very low almost at levels of the general surface of spiculiferous coenenchyme, and their positions are only discriminable by the deeply sunken operculum of the completely retracted polyps below the surface.

Distribution. Previously recorded from off Ose-zaki Light, Gotô Islands, west of Kyusyu, 57 fathoms other than the type locality (Back Bay, Bombay, India).

Remarks. As criticized by STIASNY (1942), the coenenchymal spicules of this little-known *Menella* are of the *Echinomuricea*-type. But, I will discuss as to its validity as distinct genus in a paper dealing with the material from off the coasts of Kii Peninsula.

Fam. Ellisellidae GRAY (BAYER emended)

Ellisella rubra (WRIGHT et STUDER)

Scirpearella rubra WRIGHT et STUDER, 1889, p. 107, pl. 34, fig. 5; NUTTING, 1910 b, p. 24, pl. 6, figs. 1–5; NUTTING, 1912, p. 98.

Scirpearia rubra KÜKENTHAL, 1924, p. 372.

Material. A single young specimen, lacking the base, about 9 cm long. Tosa Bay. T. KAMOHARA coll. 1953.

The colony is unbranched, whip-like, with short calyces nearly 1.2 mm high arranged biserially. The color of the colony is rather salmon pink.

Distribution. Very common in warm waters of Japan, from Sagami Bay (type locality) far southwards.

Fam. Isididae LAMOUROUX (STUDER emended)

Acanella microspiculata AURIVILLIUS

(Fig. 8)

Acanella microspiculata AURIVILLIUS, 1930, p. 317, text-fig. 65, pl. 6, fig. 9.

Material. Fragments. Tosa Bay. T. KAMOHARA coll. 1953.

The colonies are radially branched, taking together a bushy form, with rootlike basal processes.

In a largest fragment the diameter of the main stem, just above the basal processes is about 2.5 mm. The axis is composed of alternating snowy white calcareous internodes and amber-colored transparent horny nodes. The internodes are generally longer than the nodes, and their length successively increase towards the branch terminals. For example, in one colony they measure from the base upwards in mm: 5, 2.8, 2, 2.5, 2, 2.5, 5, 5.5, (first branch), 6, 4.5, (second branch), 7, 7, ...

The surface of the axis is almost smooth. But when carefully examined, it reveals that it is finely furrowed longitudinally everywhere and that the tip of each internode is invariably pointed or peaked (Figs. 8, *e*, *f*).

The coenenchyme is thin, with scattered spicules, especially around the horny nodes. The polyps are arranged either tri- or biserially on the terminal branches, at intervals of about 2 mm.

Each polyp stands obliquely upwards to the axis and measures about 2 mm long and 0.5-1.0 mm wide, including slightly extended tentacles. It is covered by spicules of varying size arranged in lengthwise rows.

Spicules in the distal part of polyps are large, apparently smooth, rods with blunt ends, measuring 0.032×0.002 mm, 0.52×0.035 mm and 0.009×0.007 mm. (Fig. 8, *l*) Basal ones which are somewhat irregularly arranged are smaller, measuring 0.009×0.0017 mm to 0.017×0.0035 mm. (Fig. 8, *m*). In addition, there are much smaller inner spicules densely packed between the distalmost outer spicules; they are also rod-shaped but slightly warted, measuring about 0.12×0.032 mm and 0.05×0.01 mm (Fig. 8, *k*).

The tentacles are provided with dorsal and pinnular spicules, measuring respectively about 0.12×0.032 mm and 0.05×0.01 mm. (Figs. 8, *i*, *j*).

Spicules in the stem coenenchyme are also rod-shaped, with blunt ends and prickly surfaces, about 0.13-0.18 mm long and 0.035 mm wide.

Distribution. Previously known from Gotô Islands, 160 m and from off Bônomisaki, Kagosima Prefecture, both west of Kyusyu.

Fig. 8. *Acanella microspiculata* AURIVILLIUS.

a-d, Fragments of colonies, showing root-like processes (*a, c*) and polypiferous branches (*d*); *e-f*, horny nodes of stem without (*e*) or with a branch (*f*); *g*, part of branch with two polyps; *h*, detail of polyp; *i*, tentacle spicules; *j*, pinnular spicules; *k*, inner spicules from distal part of polyp; *l*, polypal spicules, distal; *m*, polypal spicules, basal; *n*, coenenchymal spicules of stem.
[*a-d*, $\times 2$; *e-g*, $\times 18$; *h*, $\times 33$; *i-m*, $\times 150$.]

PENNATULACEA

Fam. Kophobelelemnidae GRAY

Kophobelemnion stelliferum (O. F. MÜLLER)

Kophobelemnion stelliferum BALSS, 1910, p. 25 (synonymy); THOMSON et RENNET, 1927, p. 122.

Material. One specimen. Tosa Bay. T. KAMOHARA coll. 1953.

A typical specimen of this widespread species was obtained. The total length is 11 cm of which 7 cm belongs to the sterile stalk and the clavate polyparium at its distal part bears 5 pairs of large polyps, 17 mm long and 3 mm wide. The general color is grey.

Distribution. In Japanese waters, recorded only from Sagami Bay, 300-400 fathoms.

NUTTING (1912) reported another species *K. hispidum* from the waters adjacent to Tosa Bay.

Fam. Virgulariidae VERRILL

Scytalium sprengens (THOMSON et HENDERSON)

Pennatula sprengens THOMSON et HENDERSON, 1906, p. 116, pl. 8, fig. 5.

Scytalium sprengens BALSS, 1910, p. 49, Taf. 2, fig. 5; THOMSON et RENNET, 1927, p. 137.

Material. Fragments. Tosa Bay. T. KAMOHARA coll. 1953.

Distribution. Common in Japanese waters, though the type locality is the Indian Ocean (11°49'30" N., 92°55' E., 55 fathoms).

Fam. Pennatulidae EHRENBERG

Pennatula murrayi KÖLLIKER

Pennatula murrayi KÖLLIKER, 1880, p. 5; BALSS, 1910, p. 56; NUTTING, 1912, p. 29; THOMSON et RENNET, 1927, p. 133.

Material. One young colony, about 9 cm long, base missing. Tosa Bay. T. KAMOHARA coll. 1953.

The specimen is orange colored, with slender axis, 1 mm in diameter. The leaves, though much broken, are slender and 6 mm in length.

Distribution. Common in deep waters around Japan, distributing further southwards.

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EXPLANATION OF PLATES V-VI

PLATE V

- Fig. 1. *Telesto tubulosa* KINOSHITA. Colonies from Tosa Bay, Dr. T. KAMOHARA coll. 1953.
- Fig. 2. *Paratelesto rosea* (KINOSHITA). Two fragments from off Kasiwazima, Prov. Tosa, Dr. K. KINOSHITA coll. 1909.
- Fig. 3. *Paratelesto rosea* (KINOSHITA). A complete colony from Tanabe Bay, Prov. Kii, Mr. T. YAMAMOTO coll. 1955.
- Fig. 4. *Paratelesto rosea* (KINOSHITA). A complete colony from Sisôzima, Tanabe Bay, Prov. Kii, Mr. T. YAMAMOTO coll. 1958.
- Fig. 5. *Paratelesto kinoshitai*, gen. et spec. nov. Holotype from off Kasiwazima, Prov. Tosa, Dr. K. KINOSHITA coll. 1909.
- (Scale applies to all photographs.)

PLATE VI

- Fig. 6. *Anthelia tosana*, spec. nov. Holotype from Tosa Bay, Dr. T. KAMOHARA coll.
- Fig. 7. *Dendronephthya querciformis*, KÜKENTHAL. A colony from Tosa Bay, Dr. T. KAMOHARA coll. 1953.
- Fig. 8. *Melithaea ocracea* (LINNAEUS). Largest colony from Okinosima, Prov. Tosa, Mr. M. HORI coll. 1952. (Osaka Municipal Museum of Nat. Hist. Photograph. Annexed scale shows 30 cm in total length.)
- Fig. 9. *Paris minor* WRIGHT et STUDER. Fragments from off Kasiwazima, Prov. Tosa, Dr. K. KINOSHITA coll. 1909.
- (Scale at 9 applies to all photographs except only 8.)

H. UTINOMI: OCTOCORALS FROM DEEP WATERS OF PROV. TOSA, SIKOKU.

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