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ACTINOLOGIA JAPONICA (2)
ON THE ACTINIARIAN FAMILY ACTINERNIDAE FROM JAPAN

by

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In the previous report, I have reviewed the historical sketch of the taxonomy of the suborder Endocoelantheainea, together with the description of 3 species of sea anemones of the family Halcuriidae from Japan (Uchida 2004). And now, I describe 4 species in another family, Actinernidae in the suborder. The taxonomical and ecological conditions of the family Actinernidae are almost same as those of the Halcuriidae, already mentioned in Uchida (2004).

Eight species in four genera are hitherto known as the members of the family Actinernidae. Among them, three genera are monotypic, and the type localities of these three species are all in Japan. Furthermore, no records of those three genera were reported from the localities outside Japan. Five species of *Actinernus*, the type genus of the family, are hitherto known. One species of them (*A. robustus* Hertwig, 1882) was also reported as a new species form Japan. Then, 4 species belonging to 4 different genera are hitherto known from Japanese water.

In this report, I describe 3 species of sea-anemones belonging to 3 different genera as Japanese fauna. These 3 are the species hitherto recorded from Japan, mentioned above. The remaining one species, *Synactinernus flavus* Carlgren, 1918, has never recorded after the original record, and also newly specimens have never been in my disposal.

All the specimens for this and previous (Uchida 2004) studies are deposited in the Specimens Reservation Room in the Sabiura Marine Park Research Station, Arita, Kushimoto, Japan (SMPRS-HU-Act. Collections).

I beg to express here my thanks to Dr. S. Ohta of the Ocean Research Institute, Univeristy of Tokyo, Dr. T. Imaoka (Shirahama), Mr. F. Yanagisawa of the Marine Science Museum of Fukushima, Mr. M. Kashihara of the Minamichita Beachland Aquarium, and late Mr. S. Nagai (Kushimoto), for placing the specimens at my disposal. I am indebted to Mr. K. Nomura of the Sabiura Marine Park Research Station for taking photos. Finally I wish to thank Mr. Fimihito Iwase, the Biological Institute on Kuroshio, for his kind procedure on press of this article.

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Order ACTINIARIA

Suborder ENDOCOELANTHEAINEA Carlgren, 1928
(Japanese name: Naikou Rui)

Endocoelactaria Stephenson, 1921, pp. 523 and 541-542; Stephenson, 1922, p. 257.
Endocoelantheae Carlgren, 1928, p. 132; Carlgren, 1938, p. 17; Carlgren, 1949, p. 18; Shick, 1991, p. 370; Uchida, 1982, pp. 5 and 7; Uchida, 1992, p. 128; Uchida, 2004, pp. 7-8.
Endocoelantheainea Doumenc & Van-Praët, 1987, p. 351.

Family ACTINERNIDAE Stephenson, 1921
(Jap. name: Yatsuba-Kawari-Ginchaku Ka Uchida, 1992)

Actinernidae Stephenson, 1921, pp. 524 and 545; Stephenson, 1922, p. 258; Carlgren, 1949, p. 19; Dunn, 1982, p. 694; Doumenc & Van-Praët, 1987, p. 352; Uchida, 1992, p. 129.

Endocoelanteainea with elongate body. Distal margin of column usually expanded and drawn into lobes, but sometimes not expanded nor lobed. Column with or without nematocyst batteries. Tentacles numerous, simple or with basal swellings on their aboral side. With two siphonoglyphs. Mesenteries numerous, not divisible into macro- and microcnemes, and almost or many mesenteries perfect. Retractors rather weak. All stronger mesenteries fertile. 4 genera.

There are only two families in the suborder Endocoelanteainea, and the definition of the two families is rather clearly. Lower column with only macrocnemes (12 or 20 in number) in the family Halcuriidae, but many mesenteries are presented in lower column in Actinerunidae. Another character of definition is siphonoglyphs. A pair of siphonoglyphs in the species of Actinernidae, however, the species in Halcuriidae has a single siphonoglyph.

Key to genera

1. Arrangement of mesenteries bilateral in each lateral endocoel …. *Actinernus* Verrill, 1879
1. Arrangement of mesenteries cyclic ..…….. 2
2. Body cylindrical, not lobed above ..…… *Synhalcurias* Carlgren, 1914
2. Distal part of the body broadly expanded and lobed ……... 3
3. Upper part of the body drawn out clearly into 4 large lobes … *Isactinernus* Carlgren, 1918
3. Upper part of the body drawn out into 4 large and 4 small lobes alternately ..…….*Synactinernus* Carlgren, 1918

As the arrangement manner of newly developed mesenteries may be the important and fundamental character on the view point of phylogeny and also on taxonomy, *Actinernus* may be the different group from the other 3 genera. Carlgren (1949) recognized the following two factors as the generic characters; 1) condition of nematocyst batteries on column and 2) aboral

thickenings of tentacle basal parts. However considering to the species characters in genera *Halcurias* and *Actinernus*, these factors may be specific rather than generic.

Genus ***Actinernus*** Verrill, 1879

Actinernus Verrill, 1879, p. 474; McMurrich, 1893, p. 165; Carlgren, 1914, p. 262; Carlgren, 1918, p. 31; Stephenson, 1918, p. 127; Carlgren, 1921, pp. 14 and 184; Stephenson, 1922, p. 259; Carlgren, 1949, p. 20; Dunn, 1982, p. 694; Doumenc & Van-Praët, 1987, p. 353.

Porponia Hertwig 1882a, p. 125; Hertwig, 1882b, p. 111; Carlgren, 1914, p. 261.

Column cylindrical, the upper part expanded and forms more or less distinctly 8 lobes. Mesenteries many, consist of ca. 48 perfect mesenteries and less than a half number of imperfect mesenteries. After formation of 10 pairs of the oldest mesenteries (= mesenteries of 1st and 2nd cycles, = equivalent to the macrocnemes in *Halcurias*, cf. Uchida 2004), further mesenterial formation takes place at the middle point of each 8 lateral endocoels. Then, the formation is not radial but bilateral way. Furthermore, the size in higher cycles of mesenteries is much different to its partner in each mesenterial pair (Fig. 1 A).

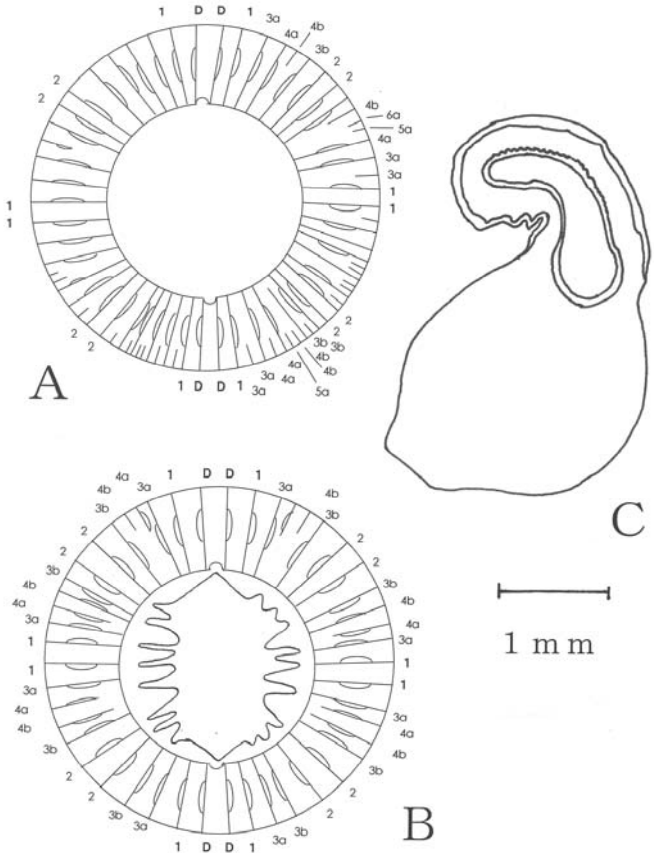

Fig. 1. *Actinernus robustus* (Herrwig, 1882).
A) Arrangement of mesenteries at upper actinopharynx.
B) Mesenterial arrangement and ridges of actinopharynx at lower actinopharynx.
C) Cross section of basal part of a tentacle, showing the basal thickening in aboral side.
Numerals in A and B indicate the cycle numbers of mesenteries, a and b show large and small mesenteries of companions in the same cycle.

***Actinernus robustus* (Hertwig, 1882)**
(Jap. name: Yatsuba-Kawari-Ginchaku Uchida, 1992)
(Fig. 1, Pls. 1 & 2 A)

Porponia robusta Hertwig, 1882a, p. 127, pl. 1 figs. 10 & 10a; Hertwig, 1882b, p. 113, pl. 1 figs. 10 & 10a; Carlgren, 1914, p. 261.
Actinernus robustus (?) Carlgren, 1918, pp. 12 and 34, pl. 1 fig. 9; Stephenson, 1922, p. 259; Carlgren, 1949, p. 21; Uchida, 2001b, p. 4.
Actinernus sp. Uchida, 1982, p. 7, Figs. 6B & 7A.

Body cylindrical, or rather rectangularly compressed (Pl. 1 A-D). Column smooth, surface with pale dull yellow ectoderm layer, but almost parts of ectoderm were peeled off. Ectoderm of column without nematocyst batteries, and nematocysts are very sparsely distributed. The naked column opaque milky white in color. Upper part of column widely expanded and thrown into 8 lobes, 4 large and 4 small ones (Pl. 1 A-C & E). Upper margin continued to tentacle bases, and the bases look like spines in the case of the tentacles being not in the good condition (Pl. 1 B-C). This is just the same as in the figure by Hertwig (1882a; 1882b, Pl. 1 fig. 10).

Tentacles ca. 70-90. Outer tentacles with strong thickenings at their aboral base, and those are look like spines or clasps as described by Hertwig (1882, p. 128), when the distal parts were torn off. The tip of tentacles rather pointed. Oral disc pale brown, with radial streaks corresponding to every tentacle.

Ectoderm and endoderm of actinopharynx purplish brown, and endoderm layer of mesenteries attached to actinopharynx are also in the same color (Pl. 1 D). Inside of throttle cylinder (= ectoderm of actinopharynx) with ca. 20 ridges (Fig. 1 B). More mesenteries distally than proximally (Fig. 1). Numerous mesenteries perfect, and all of them fertile (including directives). Mesenterial pair in different size in 3rd and the younger cycles. Mesenterial formation bilateral in each octant. Therefore, there are not the manner of a single pair of 3rd, 2 pairs of 4th, and 4 pairs of 5th cycle of mesenteries in each octant, but the manner that 2 pairs of each cycle of mesenteries in each octant. Furthermore, the companions are in different size each other in the same octant, from 4th cycle of mesenteries (Fig. 1). Dioecious.

Nematocysts (Scale in μm, average in parentheses, form of each kind of nematocysts are the same as those in Pl. 3)

Tentacles:	
Basitrichs	39-(41)-43 × 2.8-(3.6)-4.0 (numerous)
Spirocysts	24-(42)-56 × 5.0-(7.1)-10 (numerous)
Spirocysts	45-(49)-52 × 4.8-(5.5)-6.7 (few)
Column:	
Basitrichs	23.5-(26)-29 × 2.9-(3.3)-3.8 (scarce)
Spirocysts	29-(35)-39 × 5.2-(6.4)-7.2 (scarce)

Actinopharynx:	
Basitrichs	38-(41)-43 × 3.0-(3.5)-3.8 (few)
Microbasic *p*-mastigophores	33-(39)-47 × 6.0-(6.8)-8.2 (common)
Spirocysts	33-(40)-50 × 6.8-(8.8)-11 (numerous)
Filaments:	
Basitrichs	29.5-(38)-42.3 × 3.0-(3.7)-4.8 (common)
Microbasic *p*-mastigophores	32-(35)-39 × 5.7-(6.4)-7.0 (common)
Spirocysts	25-(35)-41 × 6.2-(7.7)-10 (common)
Holotrichs (?)	33-(37)-39 × 8.5-(9.2)-10 (rare)

Dimension of preserved specimens: compressed specimens, height of column 22-45 mm; width of upper column 26-42 mm; thickness of upper column 10-20 mm; breadth of pedal disc 22-35 mm; rectangular specimen (Pl. 1 E-F); height of column 20 mm; width of upper column 27 × 25 mm; diameter of pedal disc 7 mm.

Locality:

off Izu Toi, 1105-1200 m deep, Suruga Bay, Shizuoka Prefecture, by the beam-trawl, Nov. 21, 1975, collected by the Ocean Research Institute, University of Tokyo, 2 specimens (mature females).

off Izu Toi, 1008-1054 m deep, Suruga Bay, Shizuoka Prefecture, by the beam-trawl, Feb. 28, 1976, collected by the Ocean Research Institute, University of Tokyo, 3 specimens (inside of all specimens heavily macerated, may be due to alcohol fixation).

Remarks: *Actinernus robustus* was reported only twice by actual collections of specimens, namely, an original type specimen (Hertwig 1882a: off Katsuura, Boso Peninsula, 3400 m deep; 1 specimen), and Sixten Bock's Collection in Japan (Carlgren 1918: Misaki, Sagami Bay, depth unknown, 1 specimen). Considering of localities of five known species in the genus, localities of two specimens are closely approached, namely inside and outside of Boso Peninsula in Japan. Furthermore, the curious form of tentacles, which "look like long, wide, thin, membraned sacs, and do not become smaller at the ends" (Hertwig 1882a, p. 128). However, form of the tentacles may be artifact, after tore off the distal parts and peeled off the soft tissue. Some of the specimens in my disposal have tentacles with slender tips, especially those situated at the valley between lobes. Such location may be the protective shelter for tentacles during trawling and treatments on ship deck. The tentacles located near the summit of lobes may be larger than the other tentacles described by Carlgren (1949) in the diagnosis of the genus, but this is quite uncertain in the present materials, because of the damage of the parts in all specimens.

The present materials differ from the description by Carlgren (1918) on some points as follows. 1) Same size in breadth, but different in height (Carlgren: 7.5 cm H, 4 cm B). 2) On oral 8 lobes, those consist of 4 large and 4 small lobes in the present materials (Pl. 1 C & E), but may be 8 lobes of equal or sub-equal in size in Bock's materials. Carlgren (1918) described simply "läuft da in 8 grossen Loben aus." 3) Number of tentacles ca. 190 in Carlgren (1918), but ca. 70-90 in the present materials. 4) Mesenterial pairs of uneven size appeared from the third cycle, and new mesenteries appeared at the middle zone of each octant (see Carlgren 1918, Fig. 13), but newly established mesenterial companions are equivalent in Bock's material (see the same Fig. 13, mesenteries of 7th and 8th cycles). In the present materials, however, size of newly established mesenterial companions is not equivalent. The new mesentery faced to the

mesentery of the first cycle is larger than its companion faced to the mesentery of the second cycle (or the mesentery faced to 1st cycle of mesentery appears earlier than the other) (Fig. 1, difference of size in the same cycle are distinguished by letters, such as 4a and 4b). The unequal development of mesenteries leads to make 4 large and 4 small lobes. As *A. novilis* Verrill, 1879, the type species of the genus, is also has 4 large and 4 small lobes, the arrangement manner of mesenteries may be the same as that of *A. robustus*. 5) Nematocysts are rather slender in Bock's material. Basitrichs in all the part with the width of 2-2.5 μm in Bock's, but 2.8-3.8 μm in the present materials, and microbasic *p*-mastigophores in actinopharynx with the width of 3.5 μm in the former, but 6.0-7.7 μm in the latter.

Original description by Hertwig (1882a; 1882b) is rather well fitted with the present materials. A single row of arrangement of tentacles in Hertwig's description may be the simple mistake, already pointed out by Carlgren (1918). The original figure (Pl. 1 fig. 10) also shows the alternate arrangement of tentacles. Hertwig described that the type specimen with the form of compressed cylinder, same as the present materials. Four large lobes may be divided into 2 groups, 2 larger lobes with triangular pointed apex, and 2 smaller a little, with dull apex (Pl. 1 E). Larger lobes situated at the position of two siphonoglyphs (Pl. 1 D), and other 2 lobes situated across them. The compression occurred to the direction of two siphonoglyphs, namely dorso-ventral direction. The compression may be the result of quick shrink, and the shrink may lead the triangular lobes to turn over towards the oral disc. Then two larger lobes strike on each summit in front, and slip out sideways each other. Finally, 2 larger lobes gear with each other, and circular sectional plan of the body is changed to long rectangular in form (Pl. 1 C).

The type specimen with 38 mesenteries in lower column level, and the present materials with 44 macromesenteries. These are rather near values, comparing with the difference of the number of tentacles between 90 in the present materials and 190 in Bock's material. Carlgren (1914) reported the size of nematocysts in actinopharynx as 48 μm long during check of the type specimen. The nematocysts perhaps may mean the microbasic *p*-mastigophores, the value is rather well fitted with the present materials.

Difference of the depth of collection sites may be remarkable. Depth record is unknown on Bock's specimen, but the specimen was surely collected by trawl in the depth 150-600 m during his stay at Misaki Marine Biological Station, from May 5 to July 3, 1914, according to other reports on Bock's Collection, such as Johansson (1922, p. 8).

All the facts mentioned above indicate that there may be two difference species in Japan. It is probable that Carlgren also had the same consideration. He indicated only the type locality of Challenger Expedition (3429 m) in the species list of his monograph (Carlgren 1949, p. 21). Further new specimens will be clear the problem.

Key to the species of *Actinernus*

1. Aboral thickenings of tentacles well developed ……..……..……... 2
1. Aboral thickenings of tentacles not so remarkable ……..……..…….. 3
   (this point of view was indicated by Carlgren [1918, p. 34] when the specimens of all the species of the genus were actually in his disposal)
2. In the mesenteries of 4th cycle and onward ones, companions in different size in each octant ...……... *A. robustus* (Hertwig, 1882)
2. In the mesenteries of 4th cycle and onward ones, companions in the same size in each octant ...…….. *A. antarcticus* (Carlgren, 1914)
3. Distal margin of column never forms typical lobes. Body cylindrically long: ..……..... *A. elongatus* (Hertwig, 1882)
3. Distal margin of column stretched into lobes more or less remarkably ...…...…… 4
4. 4 large and 4 small lobes. Tentacles and mesenteries numerous (ca. 120) …… *A. nobilis* Verrill, 1879
4. 8 distal lobes almost in the same size. Tentacles and mesenteries rather few (ca. 70) …… *A. michaelsarsi* Carlgren, 1918

Genus ***Synhalcurias*** Carlgren, 1914

Synhalcurias Carlgren, 1914, p. 253 et 261; Carlgren, 1918, p. 27; Stephenson, 1922, p. 260; Carlgren, 1949, p. 19; Dunn, 1982, p. 694; Doumenc & Van-Praët, 1987, p. 352.
Ilyanthopsis sensu Wassilieff, 1908, p. 8 (not Hertwig 1888, p. 13).

Column cylindrical, the upper part not expanded, nor forms lobes. Mesenteries up to ca. 100, and almost all mesenteries perfect and fertile. After formation of 10 pairs of the oldest mesenteries (= mesenteries of 1st and 2nd cycles, = equivalent to the macrocnemes in *Halcurias*, cf. Uchida 2004), further mesenterial formation by cyclic in each 8 lateral endocoels, just same manner as those in *Halcurias*. With two siphonoglyphs. Column ectoderm with small nematocyst batteries.

***Synhalcurias elegans* (Wassilieff, 1908)**
(Japanese name: Seitaka-Kawari-Ginchaku Uchida, 1992)
(Figs. 2 & 3, Pls. 2 B-F & 3)

Ilyanthopsis elegans Wassilieff, 1908, p. 8, textfigs 2-5, pl. 1 fig. 2, pl. 3 fig. 38, pl. 4 figs. 39, 40a and 40b.
Synhalcurias elegans Carlgren, 1914, pp. 250-253 and 261, pl. figs. 1-4; Carlgren, 1918, pp. 6 and 27, textfigs 2-4; Stephenson, 1922, p. 260; Carlgren, 1940, p. 22; Carlgren, 1949, p. 20; Uchida, 1983, p. 108; Uchida, 1992, p. 129, pl. 29 fig. 5; Uchida, 2001a, p. 21; Uchida, 2001b, pp. 4-5, Figs. 13-15.
Synactinernus flavus Uchida, 2001b, p. 5 (as ?).

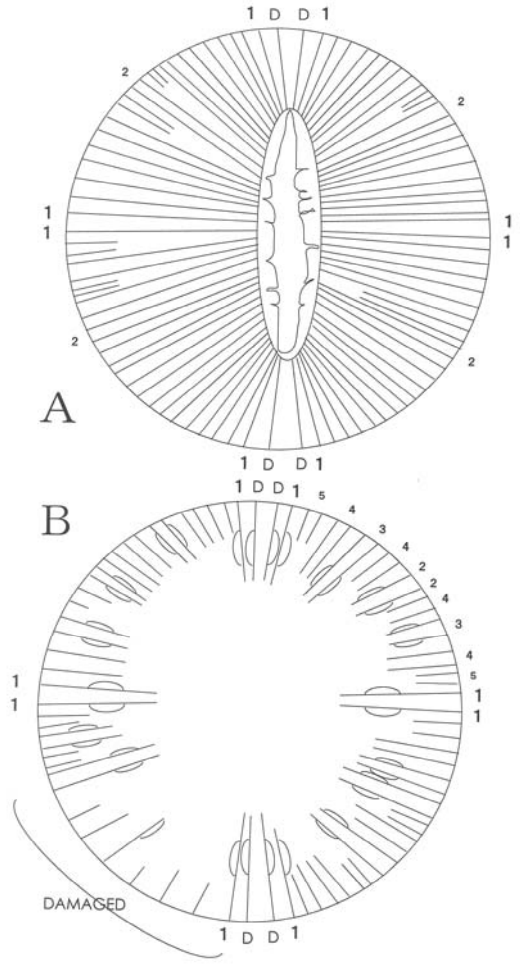

Fig. 2. *Synhalcurias elegans* (Wassilieff, 1908).
A) Arrangement of mesenteries and ridges of actinopharynx at actinopharynx.
B) Mesenterial arrangement at lower column. Roman numerals indicate the cycle numbers of mesenteries.

Body cylindrical, without formation of lobes in the upper part. Column smooth. Upper margin tentaculated. Tentacles long and slender, ca. 100 in number. Oral disc with radial streaks corresponding to the tentacles, and with remarkable oral cone projecting at the center of the disc. Tentacles arranged into 2 rows on the disc margin. Tentacles without aboral thickenings. Actinopharynx with a pair of siphonoglyphs, and with 10-22 ridges (Fig. 2 A). Mesenteries 76 (smallest specimen, 18 mm H × 20 mm W) to 108. Muscle system of mesenteries very weak, and retractor muscles and parietobasilar muscles of mesenteries are hardly recognized (Pl. 2 E). Mesenterial arrangement is cyclic as mentioned in the diagnosis of the genus. Each pair of mesenteries almost in same size, but mesenterial developments are not so clearly synchronized among quarters or octants (Fig. 2). The smallest specimen has longitudinal muscles only in upper part of the column (Pl. 2 F). The muscle fibers are continuation of longitudinal muscles of tentacles, situated between mesogloea and endoderm (!) (not ectoderm). Carlgren (1914, p. 251) mentioned that so-called ectoderm muscles in column may be the basal thickness of ectoderm cells. However, it seems that those in upper column of the young specimen of this species is not the case.

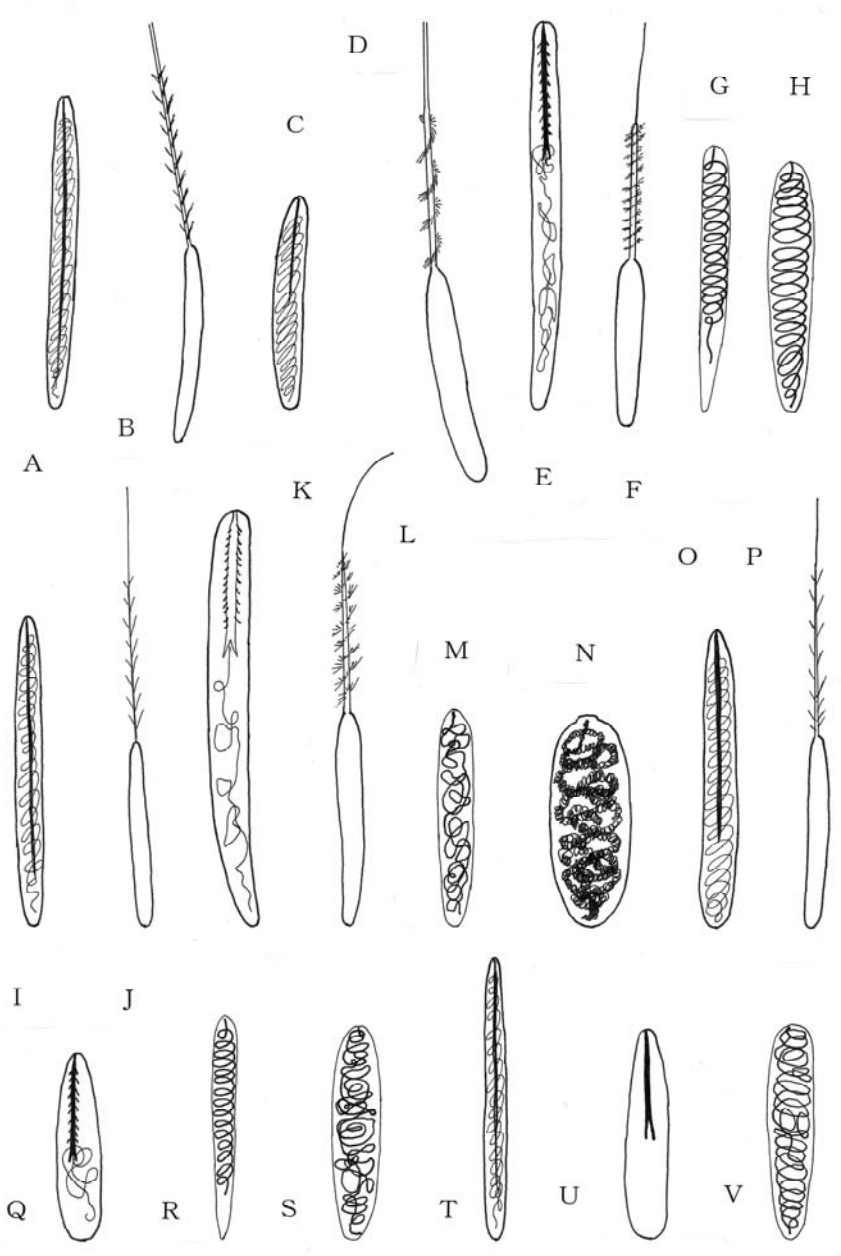

Fig. 3. *Synhalcurias elegans* (Wassilieff, 1908); Nematocysts. A-H) Tentacles, I-N) Column, O-S) Actinopharynx, T-V) Filaments.
Basitrichs I: A, B, I, J, O, P, T (turns of basal spines, length (μm) of capsule & spinous shaft: B, 9-10, 48.5, 42.5; J, 8-9, 44, 43; P, 7, 37, 30). Basitrichs II: C, D (turns of basal spines, length (μm) of capsule & spinous shaft: D, 4-5, 39, 22). Microbasic *p*-mastigophores: E, F, K, L, Q, U (turns of basal spines, length (μm) of capsule & spinous shaft: F, 12, 71, 46; L, 9, 67, 52). Spirocysts: G, H, M, R, S, V. Holotrich: N (nematocysts of filaments (T-V) figured from fixed specimens, others from living tissues).

Nematocysts (Scale in μm, average in parentheses, form of each kind of nematocysts are the same as those in Fig. 3 & Pl. 3)

Tentacles:

Basitrichs (tips)	34.5－(44)－49 × 3.6－(3.9)－4.0 (very numerous)
(middle pt.)	47.2－(50)－51.5 × 3.6－(3.9)－4.2 (very numerous)
Basitrichs-II* (tips)	30－(36)－39 × 4.0－(4.6)－5.0 (common)
(middle pt.)	38－(45)－52 × 4.9－(5.1)－5.3 (common)
Microbasic *p*-mastigophores	73－(75)－78 × 5.9－(6.1)－6.6 (rare)
Spirocysts	49－(42)－62 × 8.0－(7.1)－12.5 (very numerous)
Spirocysts	39.4－(44)－50 × 4.7－(5.3)－5.8 (very numerous)

Column:

Basitrichs	39.8－(44)－48.5 × 3.7－(3.8)－4.0 (numerous)
Microbasic *p*-mastigophores	55－(68)－83 × 5.3－(6.4)－7.0 (few)
Spirocysts	38.5－(42)－50 × 6.2－(7.1)－8.2 (numerous)
Holotrichs	66－(74)－89 × 21－(25)－28 (few)

Actinopharynx:

Basitrichs	35.5－(39)－43 × 3.6－(3.9)－4.0 (very numerous)
Microbasic *p*-mastigophores	30.5－(33)－35 × 5.7－(6.2)－7.7 (rare)
Spirocysts	35－(42)－49 × 6.8－(7.0)－9.4 (numerous)
Spirocysts	40－(42)－43 × 5.6－(5.7)－5.8 (rare)

Filaments:

Basitrichs	33－(35)－38.5 × 2.6－(2.9)－3.0 (common)
Microbasic *p*-mastigophores	27－(31)－33 × 4.7－(5.3)－6.2 (common)
Spirocysts	30－(33)－40 × 5.0－(5.9)－8.0 (common)

* Basitrichs-II: stouter than usual forms, with short shaft and with opaque figure (Pl. 3 C-D).

Dimension of preserved specimens: height of column 18-100 mm; diameter at upper margin of column 20-45 mm.

Specimen	Collection date	Size (fixed condition) height × width (mm)	Number of mesenteries
1	1973. VI. 11.	70 × 45	96
2	1978. II. 10	60 × 45	92
3	1980.	(damaged: mature ♀)	
4	1982. XII. 16	60 × 45	94
5	1990. I. 15.	30 × 30	ca. 108
6	1991. XII. 20	35 × 34	82
7	1993. III. 03	40 × 30	90
8	1994. VI. 08	? × 33	ca. 100
9	1995. I. 17	18 × 20	76

Color of living state: Column ivory white, with small nematocyst batteries as minute white dots. Proximal part yellow green. Tentacles white with pinkish tint. Oral disc pale ivory white with wide radial streaks of pale pink, continuing to the tentacles of oral side. A pair of white narrow zones remaining on both sides of each streak. Outside of lip of the oral cone brilliant lemon yellow, and inside of lip pale orange. Color variation is observed on orange hue of oral cone and pink hue of oral disc and tentacles (Pl. 2 B-C).

Locality:

off Osezaki, Uchiura Bay, 112-123 m deep, Suruga Bay, Shizuoka Prefecture, by beam trawl, June 11, 1973, collected by the Ocean Research Institute, University of Tokyo, 1 specimen.

Uchiura Bay, 98-101 m deep, Suruga Bay, Shizuoka Prefecture, by beam trawl, Feb. 10, 1978, collected by the Ocean Research Institute, University of Tokyo, 1 specimen.

off Shionomisaki Cape, Kushimoto, Wakayama Prefecture, by dredging, 1980, collected by late S. Nagai and late Hamamoto, 1 specimen.

off Taiji, 400 m deep, Wakayama Prefecture, by gill net for slipper lobsters, *Ibacus ciliatuds* Siebold, 1824, Dec. 16, 1982, collected by F. Yanagisawa, 1 specimen.

off Shionomisaki Cape, 70 m deep, Kushimoto, Wakayama Prefecture, by dredging, Jan. 15, 1990, collected by late S. Nagai, 1 specimen.

off Shionomisaki Cape, 100 m deep, Kushimoto, Wakayama Prefecture, by dredging, Dec. 20, 1991, collected by late S. Nagai, 1 specimen.

Enshu-Nada, 50-150 m deep, Aichi Prefecture, by trawl (Shoei-Maru), March 3, 1993, collected by M. Kashihara, 1 specimen.

off Shionomisaki Cape, 120 m deep, Kushimoto, Wakayama Prefecture, by dredging, June 8, 1994, collected by late S. Nagai, 1 specimen.

off Tanami, 120 m deep, Kushimoto, Wakayama Prefecture, by dredging, Jan. 17, 1995, collected by late S. Nagai, 1 specimen.

Remarks: This monotypic species is endemic to Japan. The specimens ever recorded are only 7 individuals, except for the specimens in my own collection. The syntype of *Ilyanthopsis elegans*, also checked afterward by Carlgren (1914), were collected at 110 m deep in Sagami Bay. Other 5 specimens were collected by Bock also in Japan, and were reported by Carlgren (1918), some from 210 m deep in Bonin Islands (Ogasawara) and the other from 137 m deep in Gotoh Islands, Nagasaki Prefecture (cf. Uchida 2004, p. 23 on Gote Inseln by Bock). The depth range of habitat 70-400 m deep. Column longitudinal muscle may clearly observable in upper column in only young stage. Those tissues can be observed in the smallest specimen in my disposal.

All the specimens except for the smallest one, fertile. However, no evidences are found on hermaphroditism of the species.

The size range of basitrichs of present study is rather thicker than those from Gotoh Islands by Carlgren (1940). However basitrichs in column in holotype (Carlgren 1914, p. 251) are the same thickness as basitrichs of opaque type or thicker than those of translucent type in the present materials, and far thicker than those from Gotoh Islands (1940).

Brilliant yellow color in lip margin may have some ecological value, as mentioned elsewhere (Uchida 2004, p. 19).

Genus ***Isactinernus*** Carlgren, 1918

Isactinernus Carlgren, 1918, p. 29; Stephenson, 1922, p. 260; Carlgren, 1949, p. 20; Dunn, 1982 p. 694; Doumenc & Van-Praët, 1987, p. 352.

Column cylindrical, the upper part expanded, and forms 4 large lobes. With many tentacles. Mesenteries up to ca. 34 pair of large and many small ones, and at least ca. 60 mesenteries perfect and fertile. After formation of 10 pairs of the oldest mesenteries (= mesenteries of 1st and 2nd cycles, = equivalent to the macrocnemes in *Halcurias*, cf. Uchida 2004), further mesenterial formation by cyclic in each 8 lateral endocoels, just same manner as those of *Halcurias*. With two siphonoglyphs. Column ectoderm with minute nematocyst batteries.

Isactinernus quadrilobatus Carlgren, 1918
(Jap. name: Yotsuba-Kawari-Ginchaku Uchida, 2001a)
(Fig. 4, Pl. 4)

Isactinernus 4-lobatus Carlgren, 1918, pp. 7 and 29, textfigs 5-6, pl. 1 figs. 4-5; Carlgren, 1940, p. 22; Carlgren, 1949, p.20.
Isactinernus quadrilobatus Stephenson, 1922, p. 260; Uchida, 1982, p. 8. Fig. 7 B; Uchida, 2001a, p. 153; Uchida, 2001b, p. 5, Fig. 16.

Shrunken specimen rather stout club-shaped, with expanded distal part. Proximal half to 2/3 of the body being typical cylinder (Pl. 4 A). Distal lobes, 4 in number, unusually large (Pl. 4 B-C), and with the ability of covering all the part of oral disc and mouth completely, according to close the lobes side by side compactly (Pl. 4 A). Column ivory white, and almost ectoderm tissues peeled off completely. It may be clear that the column has minute nematocyst batteries, by the check of slightly remaining pieces of tissues. The batteries are at least of 2 sorts, one with spirocysts dominantly, and another with basitrichs dominantly. It is not clear that the presence of nematocyst batteries with microbasic *p*-mastigophores dominantly. Each outer tentacle with a thickening at basal part of aboral side (Fig. 4 C). Aboral thickenings of tentacles not so remarkable. Actinopharynx with very thick mesogloea, and almost pharyngal space filled by mesogloea (Fig. 4 A, Pl. 4 D). Pharyngeal space slit-like, and slit divided into 6 branches. Two are siphonoglyphs situated dorso-ventrally, and without branching. Other 4 side branches with the second branchings. Two lobes in distal part of column situated on siphonoglyphs, namely dorso-ventrally. Other two lobes situated along the line square with the dorso-ventral line. The side lobes, therefore, situated on a couple mesenteries in the first cycle. Body at the level of middle actinopharynx with ca. 100 mesenteries, and all of them perfect. The number of mesenteries almost the same in middle actinopharynx and in middle or lower column.

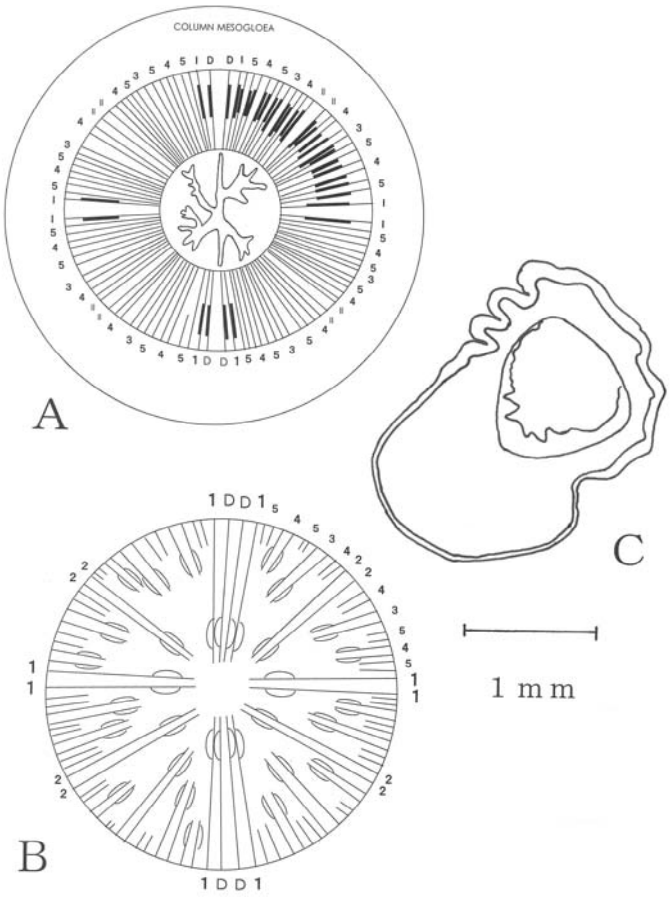

Fig. 4. *Isactinernus quadrilobatus* Carlgren, 1918.
A) Arrangement of mesenteries and ridges of actinopharynx at actinopharynx.
B) Mesenterial arrangement at lower column.
C) Cross section of basal part of a tentacle, showing the basal thickening in aboral side. Roman numerals in A and B indicate the cycle numbers of mesenteries.

Nematocysts (Scale in μm, average in parentheses, form of each kind of nematocysts are the same as those in Pl. 3)

Tentacles:

Basitrichs	29.6－(34)－40 × 2.8－(3.0)－3.3 (numerous)
Basitrichs-II*	27－(34)－42.5 × 3.9－(4.4)－4.9 (rare)
Microbasic *p*-mastigophores	29－(34)－37 × 5.0－(5.6)－6.0 (common)
Spirocysts	31－(38)－48 × 4.0－(5.7)－7.8 (numerous)

Column:

Basitrichs	23－(39)－51 × 2.8－(3.1)－4.0 (common)
Basitrichs in nematocyst batteries	50－(51)－54 × 3.2－(3.3)－3.4 (common)
Basitrichs-II*	28－(35)－39.5 × 3.2－(4.6)－5.2 (few)
Microbasic *p*-mastigophores	35－(50)－71 × 5.5－(6.2)－7.0 (rare)
Spirocysts	29－(43)－50 × 5.0－(6.6)－7.2 (numerous)
Spirocysts	30－(34)－39 × 3.7－(4.3)－4.8 (common)

Actinopharynx:

Basitrichs	36－(38)－40 × 3.0－(3.2)－3.5 (common)
Microbasic *p*-mastigophores (Pl. 4 F)	31－(35)－37 × 5.7－(6.2)－8.0 (few)
Spirocysts	32－(41)－52 × 4.2－(6.6)－8.5 (common)

Filaments:

Basitrichs	34－(38)－42 × 2.8－(3.3)－4.0 (common)
Microbasic *p*-mastigophores	34－(37)－41 × 5.0－(5.7)－6.7 (common)
Spirocysts	28－(33)－40 × 5.0－(6.0)－6.8 (rare)

* Basitrichs-II: stouter than usual forms, with short shaft and with opaque figure.

Dimension of preserved specimens: height of column 14-45 mm; diameter at upper margin of column 10-50 mm.; diameter of pedal disc 9-32 mm.

Locality:

off south coast of Koshiki Islands, 330-350 m deep, Kagoshima Prefecture, by trawl fishing, Nov. 3, 1976, collected by Dr. T. Imaoka, 6 specimens.

3 km south off Teuchi, Koshiki Islands, 350-400 m deep, Kagoshima Prefecture, by trawl fishing, Oct. 12, 1978, collected by Dr. T. Imaoka, 7 specimens.

Remarks: Only two specimens (type series) have been hitherto recorded by the original description (Carlgren 1918), except for those in the author's disposal (Uchida 2001b), which are also the materials for this study. Therefore all the specimens hitherto recorded are at the two localities rather approached each other, Gotoh Islands and Koshiki Islands, both located in the west coast off Kyushu, Japan.

The species is easily distinguished by four lobes of abnormally large size. The largest specimen (45 mm H, 40 mm W) among the materials is still sterile. Adult size may be rather larger. Nematocyst components and their size ranges of the specimens are rather well fitted with those of type series (Carlgren 1918; 1940).

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Explanation of plates

PLATE 1

***Actinernus robustus* (Hertwig, 1882)**

A-B) Two specimens collected on Nov. 21, 1975; side view (A: 45 mm H, 40 mm W of upper margin; B: 36 mm H, 42 mm W). C) Upper view of the specimen in B. D) The same specimen, showing the mesenterial arrangement and ridges of actinopharynx, and two siphonoglyphs. E) A small specimen collected on Feb. 28, 1976, upper view showing the dorso-ventral triangular lobes and lateral lobes of dull tips (27 × 25 mm). F) The same, side view.

PLATE 2

***Actinernus robustus* (Hertwig, 1882)**

A) A siphonoglyph and a pair of directive mesenteries and neighboring ones.

***Synactinernus elegans* (Wassilieff, 1908)**

B-D) Living states, B: collected on Dec. 16, 1982, C-D: collected in 1980. E) A siphonoglyph and a pair of directive mesenteries and neighboring ones. F) Longitudinal muscles of column.

PLATE 3

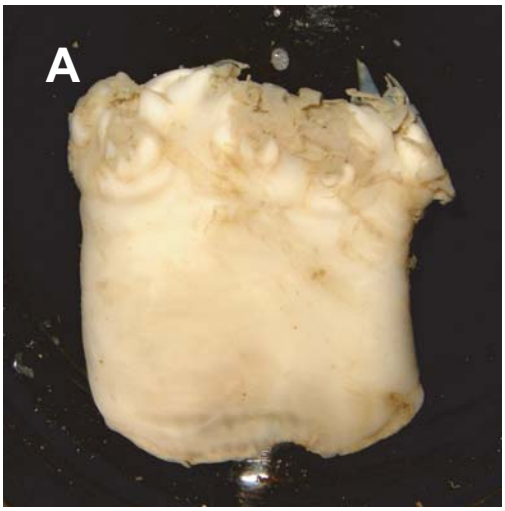
Nematocysts of *Synactinernus elegans* (Wassilieff, 1908)

A-H) Tentacles, I-L) Column, M-P) Actinopharynx. Basitrichs : A, B, I, M, N. Basitrichs II: C, D. Microbasic *p*-mastigophores: E, F, J, O. Spirocysts: G, H, K, P. Holotrich: L. 1 scale = 10 μm, scale No. 2: B, F, scale No. 1: others.

PLATE 4

***Isactinernus quadrilobatus* Carlgren, 1918**

A) Two specimens collected on Oct. 12, 1978. B-C) Side and upper views of a specimen (45 mm H, 40 mm W at upper margin) collected on Nov. 3, 1976. D) Transverse section at actinopharynx, showing the actinopharynx with bulky mesogloea and a slit-like throat. E) Mesenteries with rather remarkable retractor muscle pennons. F) A basitrich and two microbasic *p*-mastigophores (1 scale = 1 μm).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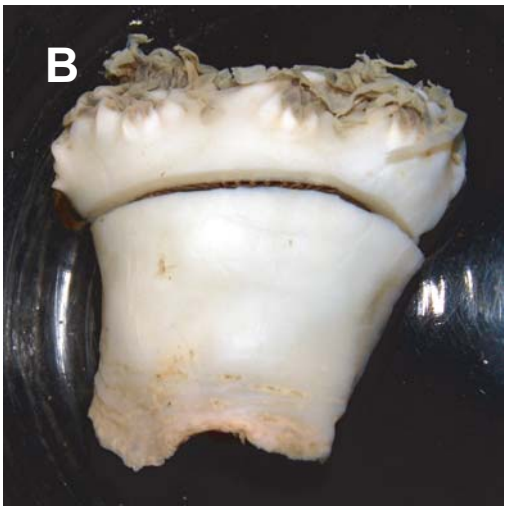
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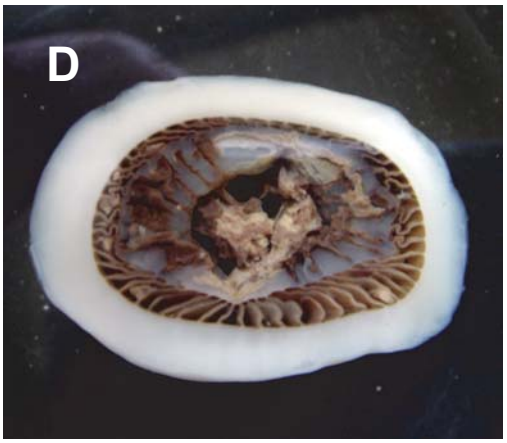
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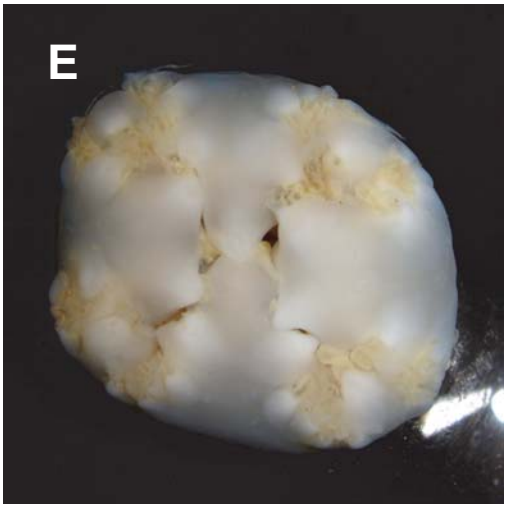
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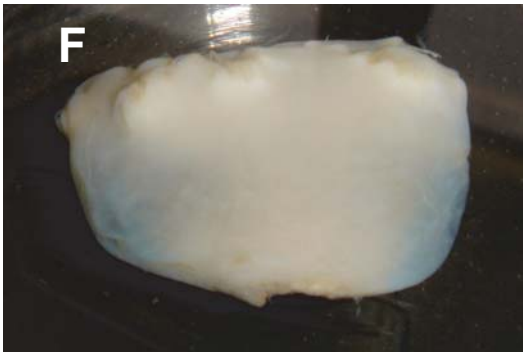
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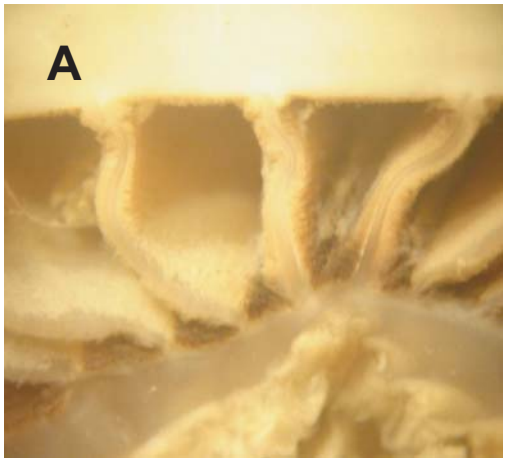
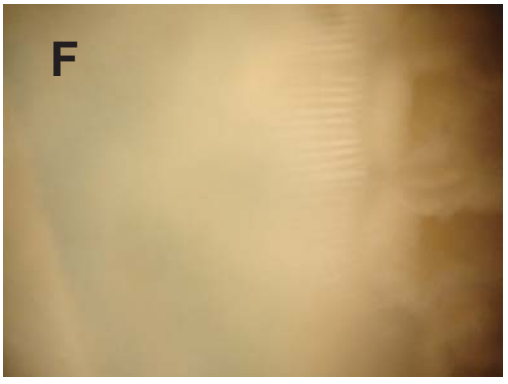
PLATE 2





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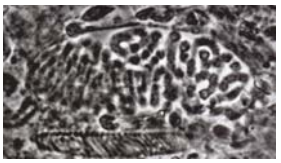
L 

M 

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No.1 

No.2 

PLATE 4