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Shallow-Water Demosponges of Western Japan, II

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Subclass Tetractinomorpha Levi, 1953

Order Axinellida Bergquist, 1970

Family Axinellidae Ridley et Dendy, 1888 sensu Bergquist, 1970

Genus *Axinella* Schmidt, 1862

135². *Axinella convexa* n. sp.

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

Material examined: AR-1-11 (Holotype), Ariake Sea (near Aitsu M. B. S.), 16-V-1972.

Dimensions: 3 × 2 × 2.5 cm.

Habitat: Subtidal zone, 20 m in depth, on carbonate bottom.

Shape: Irregular, globular sponge.

Color: Ecreu 08ED or Light Brown Drab 18ED.

Consistency: Hard, incompressible.

Surface: Minutely hispid as if lacing braid. Oscules invisible. Numerous pores 0.2-1 mm in diameter, opening over entire surface.

Ectosome: Irregular, tangential arrangement of oxea, not clearly distinguishable from endosome.

Endosome: Confused arrangement of oxea and sinuous oxea.

Spicule: Oxeon; and Sinuous Oxeon.

Oxeon — Smooth, straight to arched, tapering from middle to each end, tapering to a point or abruptly pointed. Occasionally one end of spicule rounded as style. Size range 550-760-920 × 10-18-26 μm.

Sinuous Oxeon — Smooth, variable from slightly bent to irregularly and strongly

¹ Contribution from the Mukaishima Marine Biological Station, No. 184

² This species number follows serially from "Shallow-Water Demosponges of Western Japan I".

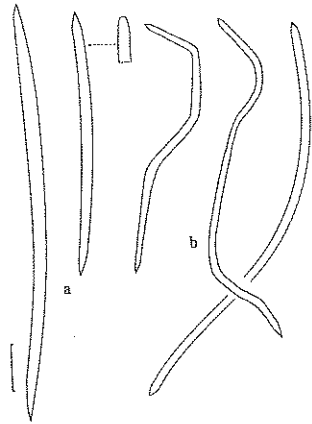


Fig. 1. *Axinella convexa* n. sp. (AR-1-11, Holotype). Spicule; Oxea (a) and sinuous oxea (b). Scale: 100 μ m.

sinuous, each end abruptly pointed, of nearly constant width throughout length. Size varies 330 \times 9 to 950 \times 20 μ m.

Remarks: This species is characterized by sinuous oxea, which are extremely and irregularly bent.

136. *Axinella cylindratus* n. sp.

(Fig. 2; Pl. 1, Fig. 2)

Material examined: SAT-064-1, Uchinoura, 5-XI-1975; JAP-009 (Holotype), Kitaura (Kunisaki Pen.), 3-XI-1977.

Dimensions: 7 \times 3 \times 13 (height) cm, (JAP-009).

Habitat: Subtidal zone.

Shape: Markedly ramose sponge, with numerous branches emanating from single short stem, reaching 13 cm in total height. Branches are solid, cylindrical,

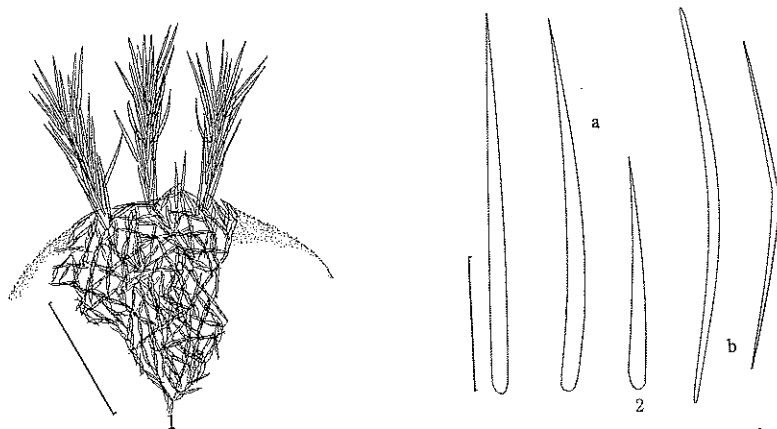


Fig. 2. *Axinella cylindratus* n. sp. (JAP-009, Holotype). 1. Portion of skeleton in cross section of branch. Scale: 1 mm. 2. Spicule; Styles (a) and oxea (b). Scale: 100 μ m.

0.5–1.5 cm in diameter, and become slender whenever ramification occurs. Sponge occasionally small, lobate.

Color: Vinaceous Tawny 20ID.

Consistency: Nearly incompressible, tough.

Surface: Hispid as lacing braid, lipostomous. Oscules and pores invisible.

Ectosome and Endosome: Numerous oxea or occasionally styles, are densely and longitudinally packed, as weak anastomosis of very vague tracts, in the central three fifths of branches or stem, and from this central axis, plumose tracts of styles protrude radially, which are 80–90 μ m thick and about 1 mm long.

Spicule: Style; and Oxeon.

Style — Smooth, straight to slightly arched or bent near base, tapering from base to sharply pointed end. Size range 295–390–480 \times 8–13–16 μ m (JAP-009).

Oxeon — Smooth, straight to slightly arched or bent at middle, with each end sharply pointed, or occasionally strongylate. Size range 250–359–470 \times 8–11.5–18 μ m (JAP-009).

Note:

	Dimensions of specimen	Spicule measurements	
		Style	Oxeon
SAT-064-1	0.3 \times 0.6 \times 2 cm, small lobate	330-410-512 \times 11-17-20	255-294-390 \times 8-12-16
JAP-009	7 \times 3 \times 13 cm, ramose	295-390-480 \times 8-13-16	250-359-470 \times 8-11.5-18

Remarks: The members of the genus *Axinella* having styles and oxea as spicule, are *Axinella australiensis* Bergquist, 1970, *Axinella reticulata* Ridley et Dendy, 1886, *Axinella mexicana* De Laubenfels, 1935, *Axinella pumila* Babic, 1922, *Axinella macrostyla* Babic, 1922 and others. This species closely resembles the former three species in the size of each spicule, but differs from *Axinella mexicana* and *Axinella reticulata* in external form, namely this species is ramose and the latter two species are massive. This species resembles *Axinella australiensis* in external form in that both are ramose sponges, but it differs in external appearance having no oscules or pores on its surface. But if we taxonomically disregard this characteristic external appearance, it is proper that this species is regarded as conspecific to *Axinella australiensis*.

137. *Axinella incrustans* Thiele, 1898

(Fig. 3; Pl. 1, Fig. 3)

Axinella incrustans Thiele, 1898, p. 49, Pl. 8, fig. 27(a-c).

Material examined: AR-1-8, Ariake Sea (near Aitsu M. B. S.), 16-V-1972.

Dimensions: 4 \times 2 \times 0.1–0.2 (thickness) cm.

Habitat: Subtidal zone, 20 m in depth, on carbonate bottom.

Shape: Small, thin encrusting sponge.

Color: Etruscan Red 21KC or Jasper Red 22LA.

Consistency: Tough, incompressible.

Ectosome and Endosome: Axial condensation of styles, with plumose structure of spicules.

Spicule: Style; Strongyle; and Oxcon.

Style — Smooth, nearly straight to slightly bent, base rounded with other end tapering to a point. Size range 420–514–590 × 10–14–20 μm.

Strongyle — Smooth, slightly bent at middle, each end tapering to a rounded tip. Size range 275–360–470 × 10–11–16 μm.

Oxcon — Smooth, slightly bent at middle, tapering to a point at each end. Size range 220–380–730 × 8–12–20 μm.

Distribution: In Japan — Sagami Bay.

Note: Spicules of this species are modified in having abundant intermediate forms.

Remarks: This is the second record of this species from Japanese waters.

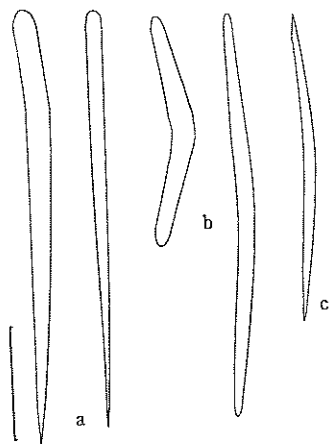


Fig. 3. *Axinella incrustans* Thielc. (AR-1-8).
Spicule; Styles (a), strongyles (b) and oxcon (c).
Scale: 100 μm.

138. *Axinella profunda* Ridley et Dendy, 1886

Axinella profunda Ridley et Dendy, 1886, p. 480; 1887, p. 181, Pl. 18, figs. 2–3, Pl. 40, figs. 3 and 3a;
Hoshino, 1976b, p. 1, figs. 1–5.

Distribution: North Pacific.

In Japan — off Kochi.

139. *Axinella profunda* var. *kurushima* Tanita, 1961

Axinella profunda var. *kurushima* Tanita, 1961d, p. 347, Pl. 3, fig. 14.

Distribution: In Japan — Inland Sea of Japan.

Genus *Bubaris* Gray, 1867

140. *Bubaris flabellata* Tanita, 1961

(Fig. 4)

Bubaris flabellata Tanita, 1961d, p. 347; Pl. 4, fig. 15, t-fig. 7; Hoshino, 1971, p. 23.

Material examined: SIS-015, Mukaishima, 20-VIII-1975; SIS-102, Sasajima, II-VI-1976; SIS-146, Hosonosu, 10-VII-1975; MIT-089, MIT-090, Mitsukue, 4-XI-1973; JAP-006, Tokushima, 26-X-1976 (Mr. S. Komatsu leg.).

Dimensions: 3.5 × 2.8 × 0.2 (thickness) cm, (MIT-089).

Habitat: Subtidal zone, 15 m in depth, on rocky substrate.

Shape: Erect, stipitate, flabellate, with several flabella about 0.2 cm thick with irregular undulated margins.

Color: Orange Red 24PA, Red Orange 22OA, or Peach Red 20LA.

Consistency: Firm and incompressible.

Surface: Even, minutely hispid, with wooly appearance. Oscules and pores invisible.

Ectosome and Endosome: Formed with axial skeleton, tightly packed with strongyles or strongyloxea, and plumose columns, radially arranged with styles which are loosely embedded in outer layer of axial skeleton.

Spicule: Style; and Strongyle or Strongyloxeon.

Style — Smooth, nearly straight to gently curved or slightly bent near base, base rounded, with other end tapered to a point. Size range 355–421–560 × 10–13–19 μm (MIT-089).

Strongyle or Strongyloxeon — Smooth, gently curved or slightly bent at middle or slightly sinuous, each end rounded or tapering to rounded or occasionally sharply pointed. Size range 270–333–480 × 10–12–13 μm (MIT-089).

Distribution: In Japan — Inland Sea of Japan.

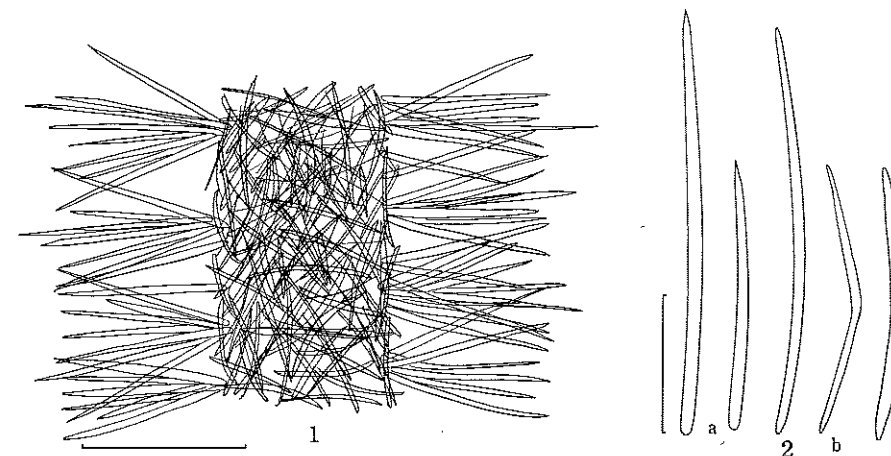


Fig. 4. *Bubaris flabellata* Tanita. (MIT-089). 1. Portion of skeleton in vertical section of flabella of sponge. Scale: 350 μm. 2. Spicule; Styles (a) and strongyles (b). Scale: 150 μm.

Note:

	Dimensions of specimen	Spicule measurements	
		Style	Strongyle or Strongyloxeon
SIS-015	7×5×0.3 cm	300-525-700×9-16-23	143-263-470×7-10-13
SIS-102	2×2.5×0.2-0.3	350-406-515×8-13-18	250-289-335×9-12-13
SIS-146	8×3×5	285-454-580×9-13-16	150-269-362×6-11-15
MIT-089	3.5×2.8×0.2	355-421-560×10-13-19	270-333-480×10-12-13
MIT-090	3×6×3	250-425-750×12-15-20	250-336-480×8-12-18
JAP-006	4.5×3.5×0.5	275-427-650×8-13-18	300-357-435×10-12-16

Remarks: This species is very abundant on rock surface in the subtidal zone of the Inland Sea of Japan.

Genus *Ceratopsis* Thiele, 1898

141. *Ceratopsis clavata* Thiele, 1898

Ceratopsis clavata Thiele, 1898, p. 57, Pl. 5, fig. 23, Pl. 8, fig. 42(a-c); Hoshino, 1975a, p. 33, Pl. 1, figs. 7-8, Pl. 4, fig. 10; 1976a, p. 253, Pl. 3, fig. 15, t-fig. 4.

Distribution: In Japan — Enoshima; Hiwasa; Kushimoto.

142. *Ceratopsis erecta* Thiele, 1898

Ceratopsis erecta Thiele, 1898, p. 58, Pl. 4, fig. 1, Pl. 8, fig. 44(a-b); Tanita, 1961b, p. 137, Pl. 4, fig. 10, t-fig. 6; Hoshino, 1975a, p. 33, Pl. 4, fig. 2.

Distribution: In Japan — Sagami Bay; Wagu; Hiwasa.

143. *Ceratopsis expansa* Thiele, 1898

Ceratopsis expansa Thiele, 1898, p. 57, Pl. 4, fig. 2, Pl. 8, fig. 43(a-c); Tanita, 1970b, p. 102, Pl. 2, fig. 9; Hoshino, 1975a, p. 33, Pl. 2, figs. 2 and 8.

Distribution: In Japan — Sagami Bay; Yuki; Hiwasa.

144. *Ceratopsis ramosa* Thiele, 1898

Ceratopsis ramosa Thiele, 1898, p. 58, Pl. 4, fig. 7, Pl. 8, fig. 45(a-b); Hoshino, 1976a, p. 252, Pl. 3, figs. 16-19, t-fig. 3; Tanita, 1977, p. 36, Pl. 2, fig. 6.

Distribution: In Japan — Shirahama; Kushimoto.

Genus *Homaxinella* Topsent, 1917

145. *Homaxinella brevistyla* n. sp.

(Fig. 5; Pl. 1, Fig. 4)

Material examined: SAT-021 (Holotype), Uchinoura, 5-XI-1975.

Dimensions: 8 cm high, trunk 0.7 cm in diameter, branches 0.5-1.0 cm in diameter.

Habitat: Subtidal zone.

Shape: Erect, dichotomously branched sponge. Branches cylindroid.

Color: Orange 16PA.

Consistency: Tough, hard.

Surface: Minutely hispid but smooth to touch.

Ectosome and Endosome: Various styles are densely and longitudinally packed in axes of trunk or branches, 1-3 mm in diameter, and from these axes vague spicule tracts ascend to the surface where they protrude in plumose fashion.

Spicule: Style only — Varying from straight to gently curved near base or slightly sinuous. Some spicules are enlarged near or at base, or in places along length. Each end sharply pointed occasionally. There may be two categories in thickness of spicules. Size varying from 300×5 to 470×14 μm.

Remarks: This species closely resembles *Axinella globula* Brøndsted, 1924 from New Zealand in spiculation, but completely differs in external form.

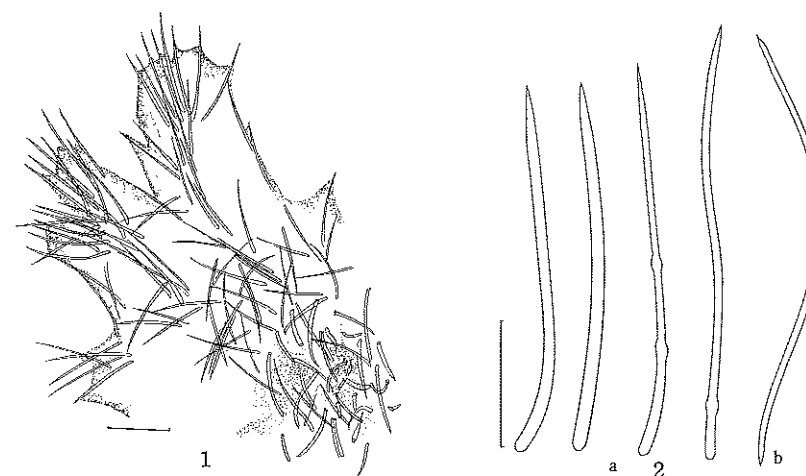


Fig. 5. *Homaxinella brevistyla* n. sp. (SAT-021, Holotype). 1. Portion of skeleton in cross section of branch. Scale: 100 μm. 2. Spicule; Styles (a) and rare oxeon (b). Scale: 100 μm.

146. *Homaxinella echidnaea* (Ridley, 1884)

(Fig. 6; Pl. 1, Fig. 5)

Axinella echidnaea Ridley, 1884, p. 462, Pl. 43, fig. a; Ridley et Dendy, 1887, p. 183, Pl. 36, fig. 3.

Material examined: SAT-022, Uchinoura, 5-XI-1975; JAP-007, Tokushima, 26-X-1976 (Mr. S. Komatsu leg.).

Dimensions: 4 cm high, branches expand to 7 cm in diameter (SAT-022).

Habitat: Subtidal zone.

Shape: Erect, highly branched sponge. Dichotomous branches expand upward around basal part. Occasionally sponge branches in one plane from single short stem.

Color: Orange 16PA or Madder Brown 23OG.

Consistency: Very hard, incompressible, not very tough.

Surface: Markedly bristly, lipostomous.

Ectosome and Endosome: Vague tracts of styles ascend to surface and protrude in plumose fashion from a central axis, which is fairly densely and longitudinally packed with long styles.

Spicule: Style only, with two forms — Straight or gently curved throughout length or slightly bent near base, varying from 400×11 to $700 \times 20 \mu\text{m}$, and long, slender, gently curved or slightly sinuous, varying from 460×7 to $1500 \times 13 \mu\text{m}$ (SAT-022).

Distribution: Torres Strait; off Bahia.

In Japan — Newly recorded.

Note:

	Dimensions of specimen	Spicule measurements	
		Style	
SAT-022	4 cm high	400×11 to 700×20 and 460×7 to 1500×13	
JAP-007	9.5 cm high	$445-700-1600 \times 15-20-25$	

Remarks: This closely resembles *Axinella mariana* Ridley et Dendy, 1886. It is possible that these two species are actually conspecific.

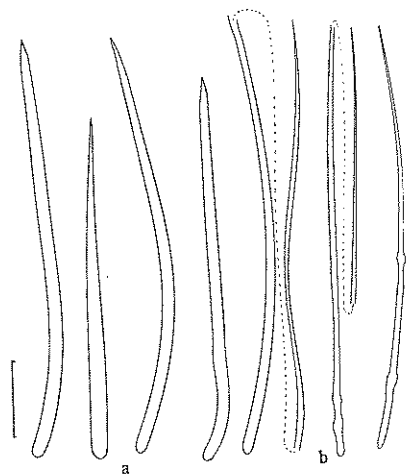


Fig. 6. *Homaxinella echidnasa* (Ridley). (SAT-022). Spicule; Styles (a) and long sinuous styles (b). Scale: $100 \mu\text{m}$.

147. *Homaxinella tanitai* new name

Homaxinella erecta Tanita, 1968, p. 51, Pl. 2, fig. 8, t-fig. 11.

Distribution: In Japan—Ariake Sea.

Remarks: Since *Hymeniacidon erecta* Brøndsted 1924 was transferred to the genus *Homaxinella* by Bergquist (1970) and *Homaxinella erecta* Tanita, 1968 results in a homonym, the writer gives the new name *Homaxinella tanitai* to the species described by Tanita (1968).

Family Raspailiidae Hentschel, 1912

Genus *Raspailia* Schmidt, 1862

148. *Raspailia folium* Thiele, 1898

(Fig. 7)

Raspailia folium Thiele, 1898, p. 60, Pl. 3, fig. 7, Pl. 8, fig. 46(a-c); Hoshino, 1976c, p. 6, Pl. 1, figs. 6-7.

Material examined: SAT-060, Uchinoura, 5-XI-1975.

Dimensions: $6 \times 6 \times 7$ (height) cm.

Habitat: Subtidal zone.

Shape: Funnel-shaped, 6 cm in diameter at opening of upper part, with single short round stalk attached to substrate.

Color: Pinkish Cinnamon 08GB.

Consistency: Tough.

Surface: Rough to touch, minutely hispid. Oscules and pores invisible.

Ectosome and Endosome: Typical structure of the genus *Raspailia*, which is composed of ascending, branching tracts, formed with trachystyles echinated as plume, with several stout styles protruding at tips of plumose tracts, and with

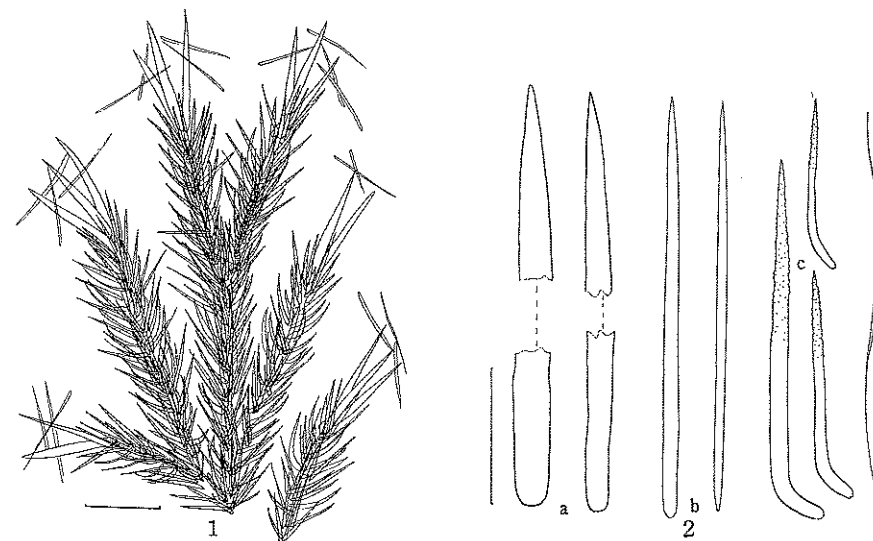


Fig. 7. *Raspailia folium* Thiele. (SAT-060). 1. Portion of skeleton in vertical section of sponge. Scale: $300 \mu\text{m}$. 2. Spicule; Stout styles (a), slender styles (b), trachystyles (c) and raphide (d). Scale: $100 \mu\text{m}$.

slender styles horizontally arranged near tips of protruding stout styles. These tracts are 250 μm in outer diameter, and 50 μm in core diameter.

Spicule: Stout Style; Slender Style; Trachystyle; and Raphide.

Stout Style — Long, stout, smooth, nearly straight or gently arched, and tapering to a sharply pointed end or occasionally to a rounded end. Size range 1120–1236–1600 \times 16–25–34 μm .

Slender Style — Slender, smooth, gently arched, tapering from middle to each end, and sharply pointed at one end. Size range 240–292–325 \times 5–6.7–11 μm .

Trachystyle — Moderately to perpendicularly bent near base, and minutely spined along a third of spicule at pointed end. Size range 141–264–415 \times 8–12.5–18 μm .

Raphide — Or thin oxeon, found on spicule mount, very thin, and gently bent or moderately sinuous throughout length, measuring 270–320 \times 1.5–3 μm , although it is probable that they are juveniles of slender styles or trachystyles.

Distribution: In Japan — Enoshima; Ariake Sea.

149. *Raspailia hirsuta* Thiele, 1898

(Fig. 8)

Raspailia hirsuta Thiele, 1898, p. 59, Pl. 3, fig. 9, Pl. 8, fig. 46(a–d); Tanita, 1961d, p. 344, Pl. 3, fig. 10, t-fig. 4; 1970b, p. 102, Pl. 2, fig. 8; Hoshino, 1971, p. 24, 1975a, p. 32, Pl. 4, figs. 8–9.

Material examined: SIS-085, Mukaishima, 24–VI–1972; SIS-144, Hosonosu, 10–VII–1975; MIT-088, Mitsukue, 4–XI–1973; SAT-029, SAT-030, SAT-031, SAT-051, SAT-064, SAT-069, Uchinoura, 5–XI–1975; JAP-010, Kitaura (Kunisaki Pen.), 3–XI–1977.

Dimensions: 0.7 \times 0.7 \times 15 (height) cm, (MIT-088).

Habitat: Subtidal zone.

Shape: This sponge consists of single solid cylindrical trunk and several terete branches remifying from trunk at middle portion of sponge.

Color: Orange 16PA or Pinkish Cinnamon 08GB.

Consistency: Rigid, incompressible.

Surface: Bristly, like lacing braid. Oscules and pores invisible.

Ectosome and Endosome: Typical structure of the genus *Raspailia*. In cross sections of stems or branches, several plumose tracts radiate from central part to surface, and are compactly arranged with trachystyles, with several stout styles protruding at their tips, also raphides cling to brushes of stout styles. Occasionally, slender styles are found near stout styles.

Spicule: Stout Style; Trachystyle; Slender Style; and Raphide.

Stout Style — Stout, long, smooth, straight or slightly bent near base, tapering to pointed end. Size range 690–787–890 \times 14–21–32 μm (MIT-088).

Trachystyle — Bent near base or occasionally straight, tapering to pointed end, minutely spined or roughened on a half to three fifths of spicule from pointed end. Size range 210–282–345 \times 8–12–14 μm (MIT-088).

Slender Style — Smooth, straight or slightly arched, base rounded, of nearly constant width from base to near pointed end, tapering to a point, measuring up to about 250 \times 3 μm (MIT-088). Very rare on spicule mount; maybe juvenile of stout style.

Raphide — Or thin oxeon, very thin, slightly sinuous, smooth, tapering from middle to each end, and especially one end which becomes hair-like, measuring up to 400 \times 3 μm (MIT-088).

Distribution: In Japan — Sagami Bay; Kii Channel; Inland Sea of Japan.

Note: Dimensions and spicule measurements of representative specimens are as follows:

	Dimensions of specimen	Spicule measurements
		Stout Style
SIS-144	21 cm high	580–740–880 \times 12–18–25
MIT-088	0.7 \times 0.7 \times 15 cm high	690–787–890 \times 14–21–32
SAT-029	21 cm high	405–702–850 \times 25–31–40
JAP-010	11 cm high	640–844–1015 \times 9–18–29

Spicule measurements		
Trachystyle	Slender Style	Raphide
140 \times 8 to 390 \times 12	rare	up to 300 \times 2
210–282–345 \times 8–12–14	250 \times 3 very rare	up to 350 \times 2
160 \times 5 to 350 \times 20	up to 700 \times 8	up to 400 \times 3
195–267–345 \times 7–11–13	rare	up to 360 \times 1

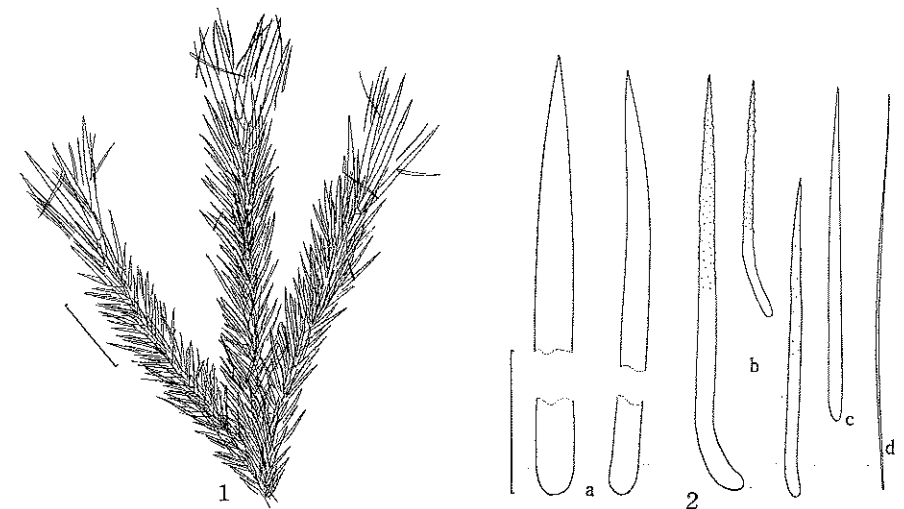


Fig. 8. *Raspailia hirsuta* Thiele. (MIT-088). 1. Portion of skeleton in cross section of branch of sponge. Scale: 300 μm . 2. Spicule; Stout styles (a), trachystyles (b), slender style (c) and thin oxeon (d). Scale: 100 μm .

Slender styles are very rare on spicule mount of all specimens, and it is concluded that these spicules are juvenile stout styles, judging from location in spicule arrangement.

Remarks: This species was first described from Sagami Bay by Thiele (1898) and subsequently from the Inland Sea of Japan by Tanita (1961). The specimen of Tanita differs from the original description in having a half-spined raphide, but all specimens in this study agree with Thiele (1898).

150. *Raspailia microacanthoxea* Hoshino, 1976

Raspailia microacanthoxea Hoshino, 1976a, p. 251, Pl. 2, figs. 8-11, t-fig. 2.

Distribution: In Japan — Kushimoto.

151. *Raspailia trachystyla* Tanita, 1868

Raspailia trachystyla Tanita, 1968, p. 46, Pl. 1, fig. 5, t-fig. 7.

Distribution: In Japan — Ariake Sea.

Order Hadromerida Topsent, 1894

Family Choanitidae De Laubenfels, 1936

Genus *Anthosigmella* Topsent, 1918

152. *Anthosigmella raromicrosclera* (Dickinson, 1945)

(Fig. 9; Pl. 2, Fig. 1; Pl. 4, Figs. 1-2)

Delaubenfelsia raromicrosclera Dickinson, 1945, p. 34, Pl. 61, fig. 122, Pl. 62, figs. 123-124, Pl. 63, figs. 125-126.

Material examined: SIS-084, Uoshima, 20-VI-1972; MIT-003, MIT-009, MIT-017, MIT-021, MIT-025, MIT-069, MIT-073, MIT-076, MIT-077, Mitsukue, 5-XI-1975; MIT-082, Shonashi, 5-XI-1975; MIT-100, Mitsukue, 4-XI-1973.

Dimensions: $9 \times 9 \times 10$ (thickness) cm, (MIT-003).

Habitat: Subtidal zone, 10-20 cm in depth, on rocky substrate.

Shape: Very thick encrusting sponge. In nature, sponge reaches $30 \times 30 \times 10$ cm quite often.

Color: Sepia 08NL.

Consistency: Slightly compressible in life, but hard when dry.

Surface: Smooth, papillate or undulating. Pores invisible. Oscules, 2-3 mm in diameter, numerous scattered on surface and weakly open on apical portion of papillae.

Ectosome: About 0.5 mm thick. Ectosomal tylostyles, compactly and perpendicularly arranged, with pointed end of spicule directed toward surface, and filled with numerous spirasters.

Endosome: Endosomal tylostyles arranged confusingly, and occasionally vague tracts of tylostyles run to surface, weakly indicating radiate architecture. Numerous spirasters are found in endosome also.

Spicule: Tylostyle; and Spiraster.

Tylostyle — No distinct differences could be observed between the sizes of the ectosomal and endosomal tylostyles. Smooth, straight or slightly arched, tapering from middle to each end, base swollen to one and half times the width of the spicule shaft, with other end tapering to a point, varying from 310×10 to $400 \times 10 \mu\text{m}$ (MIT-003). Ectosomal tylostyles are slightly shorter than those of endosome.

Spiraster — About $25 \times 1 \mu\text{m}$ (MIT-003), with one to three spirals or waves, are very peculiar spines spirally developing on spicule shaft. These spines are not pointed, but branching to three to four rounded spines.

Distribution: California.

In Japan — Newly recorded.

Note: Dimensions and spicule measurements of representative specimens are as follows:

	Dimensions of specimen	Spicule measurements	
		Tylostyle	Spiraster
SIS-084	$12 \times 4 \times 4$ and $7 \times 4 \times 3$ cm	220×10 to 390×15	up to 30×1.5
MIT-003	$9 \times 9 \times 10$	310×10 to 400×10	25×1
MIT-017	$7 \times 10 \times 5$	$325-371-420 \times 8-11-12$	up to 25×2
MIT-069	$7 \times 7 \times 5$	$230-261-305 \times 7-8-9$ (ectosome)	up to 40×1.2
		$330-386-490 \times 7-9-10$ (endosome)	

Remarks: This species was first described from the Gulf of California by Dickinson (1945) as a species belonging to a new genus *Delaubenfelsia*, a congener of *Anthosigmella*.

Genus *Choanites* Marshall, 1880

153: *Choanites ficus* (Pallas, 1766)

(Fig. 10; Pl. 2, Fig. 2)

Alcyonium ficus Pallas, 1766, p. 356.

Suberites ficus: Lambe, 1896, p. 193, Pl. 2, fig. 4, fig. 4(a-c); Topsent, 1892, p. 128; Tanita, 1965c, p. 95, figs. a-b; 1969, p. 76, Pl. 2, fig. 7; Koltun, 1962b, p. 182; Kim *et al.*, 1968, p. 40, Pl. 2, fig. 9, t-fig. 10; Rho *et al.*, 1969, p. 156, Pl. 2, fig. 7.

Suberites subereus: Lambe, 1895, p. 126, Pl. 4, fig. 3, fig. 3(a-d); Thiele, 1898, p. 38, Pl. 1, figs. 11-12, Pl. 8, fig. 7(a-c).

Suberites placenta Thiele, 1898, p. 39, Pl. 8, fig. 8(a-b).

Feculina ficus: Topsent, 1913a, p. 25; 1928, p. 156; Descatoire, 1969, p. 187.

Choanites ficus: De Laubenfels, 1949a, p. 19.

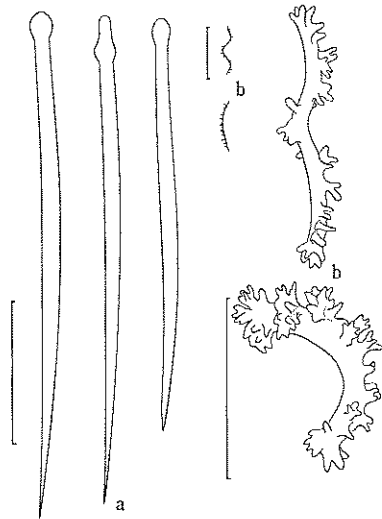


Fig. 9. *Anthosigmella raromicrosclera* (Dickinson). (MIT-003). Spicule; Tylostyles (a) and spirasters (b). Scale: 100 μm (tylostyles), 10 μm (spirasters).

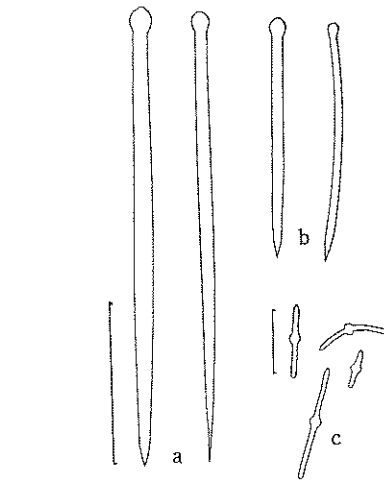


Fig. 10. *Choanites ficus* (Pallas). (SIS-044). Spicule; Long tylostyles (a), short tylostyles (b) and strongyles (c). Scale: 100 μm (tylostyles), 20 μm (strongyles).

Material examined: SIS-044, Bingonada, 7-III-1972.

Dimensions: 5 × 6 × 0.5–1.0 (thickness) cm.

Habitat: Subtidal zone, symbiotic on shell surface of *Fusinus perplexus ferrugineus*.

Shape: Thin encrusting sponge, covering entire surface of shell.

Color: Ecrú 08ED.

Consistency: Very soft, crumbling easily.

Surface: Smooth. Oscules and pores invisible.

Ectosome: About 200 μm thick. Short tylostyles perpendicularly arranged, but not densely, with numerous microscleres, present.

Endosome: Long tylostyles in a radiating and occasionally confused arrangement.

Spicule: Short Tylostyle; Long Tylostyle; and Short Strongyle.

Short Tylostyle — Short, smooth, gently curved or occasionally strongly bent near base at one fourth spicule length, base spherically swollen, nearly constant width throughout length, with other end sharply pointed. Size range 130–163–200 × 5–6–8 μm .

Long Tylostyle — Long, slender, smooth, straight or slightly arched, base spherically swollen, nearly constant width throughout length or tapering from middle to each end, with other end sharply pointed. Size range 320–369–410 × 8–9–10 μm .

Short Strongyle — Smooth, straight or gently curved, spherically swollen at middle, varying from 20 × 3 to 40 × 4 μm .

Distribution: Cosmopolitan.

In Japan — Enoshima; Sado.

Remarks: This species has been described as *Suberites ficus* by various authors, but the genus *Suberites* has no microsclere. Since the specimen examined in this study have microstrongyles, the writer designates this species as a member of the genus *Choanites*.

154. *Choanites virgultosa* (Johnston, 1842)

Halichondria virgultosa Johnston, 1842, p. 137, Pl. 15, figs. 1–3.

Hymeniacidon virgultosa: Bowerbank, 1866, p. 193; 1874, p. 89, Pl. 35, figs. 1–5.

Suberites virgultosa: Vosmaer, 1882, p. 32; Tanita, 1965c, p. 68, figs. 3–4.

Suberites ficus: Hartman, 1958, p. 3, Pl. 1, fig. 5, t-fig. 1 (*vide* Tanita, 1965c).

Distribution: England; Southern New England.

In Japan — Kasumi.

Genus *Latrunculia* Bocage, 1870

155. *Latrunculia ikematsui* Tanita, 1968

Latrunculia ikematsui Tanita, 1968, p. 53, Pl. 2, fig. 11, t-fig. 14.

Distribution: In Japan — Ariake Sea.

Genus *Oxylatrunculia* new

Type-species: *Oxylatrunculia acanthosanidastera* n. sp.

Diagnosis: Skeleton of radiate architecture, having oxeon as macrosclere and sanidaster as microsclere.

156. *Oxylatrunculia acanthosanidastera* n. sp.

(Fig. 11; Pl. 2, Fig. 3; Pl. 4, Figs. 3–4)

Material examined: MIT-046 (Holotype), Mitsukue, 5-XI-1975.

Dimensions: 9 × 5 × 5 (height) cm.

Habitat: Subtidal zone, 15 m in depth, on rocky substrate.

Shape: Irregular massive sponge.

Color: Sepia 08NL.

Consistency: Very hard, incompressible.

Surface: Smooth in appearance, but rough to touch. Oscules and pores invisible.

Ectosome: Sanidasters irregularly arranged on surface; Spongy surface is veiled in a 200–300 μm thick mass consisting of numerous foreign sponge spicules, diatoms, detritus and so forth.

Endosome: Dense, radiating arrangements of stout oxea. These arrange-

ments continue to surface without forming tracts of spicules.

Spicule: Oxeon; and Sanidaster.

Oxeon—Long, stout, smooth, slightly arched, tapering from middle to each pointed end. Size ranges up to 2000×50 from $1000 \times 20 \mu\text{m}$.

Sanidaster—Shaft straight, bi- to tetra-furcate on each end and its branches also, strongly latulate on each end, and four to eight strongly latulate arms develop around shaft at two portions, one third of shaft length in from each end. Entirely spiny, with especially large spines at each tip of branches at shaft ends or arms on shaft, shaft measuring up to $20 \mu\text{m}$ in length and $3 \mu\text{m}$ in width.

Remarks: This species is characterized by having oxea as macrosclere and acanthosanidasters as microsclere. The members of the genera *Latrunculia* and *Sigmosceptrella* have sanidasters as microsclere, but differ from this species in having monact macroscleres.

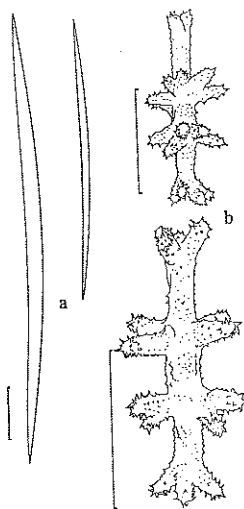


Fig. 11. *Oxylatrunculia acanthosanidastera* n. sp. (MIT-046, Holotype). Spicule; Oxea (a) and sanidasters (b). Scale: $100 \mu\text{m}$ (oxea), $10 \mu\text{m}$ (sanidasters).

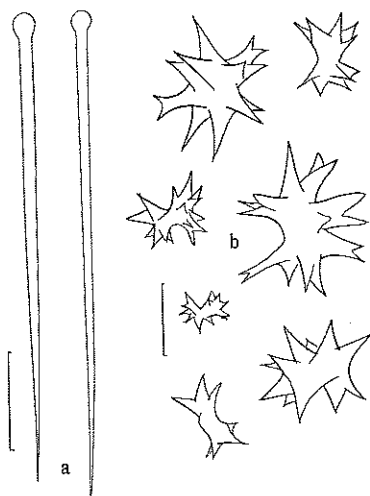


Fig. 12. *Spirastrella coccinea* (Duchassaing et Michelotti). (SAT-062-1). Spicule; Tylostyles (a) and spirasters (b). Scale: $100 \mu\text{m}$ (tylostyles), $25 \mu\text{m}$ (spirasters).

Genus *Spirastrella* Schmidt, 1868

157. *Spirastrella abata* Tanita, 1961

Spirastrella abata Tanita, 1961, p. 348, Pl. 4, fig. 16, t-fig. 8; 1967, p. 117, Pl. 2, fig. 9; 1968, p. 54; 1969, p. 75; Hoshino, 1971, p. 22.

Distribution: In Japan—Sea of Japan; Inland Sea of Japan; Ariake Sea.

158. *Spirastrella coccinea* (Duchassaing et Michelotti, 1864)

(Fig. 12; Pl. 2, Fig. 4)

Thalysias coccinea Duchassaing et Michelotti, 1864, p. 84, Pl. 18, fig. 5.

Spirastrella coccinea: Wiedenmayer, 1977, p. 163, Pl. 33, figs. 4-7, t-fig. 162.

Material examined: SAT-062-1, Uchinoura, 5-XI-1975.

Dimensions: $4 \times 5 \times 0.2$ (thickness) cm.

Habitat: Subtidal zone, on rocky substrate.

Shape: Very thin encrusting sponge.

Color: Whitish Gray when dry.

Consistency: Incompressible.

Surface: Smooth, uneven. Oscules and pores invisible.

Ectosome: Coarse radiating arrangement of tylostyles, spirasters densely packed. Ectozomal zone, densely packed with spirasters, is $100-300 \mu\text{m}$ in thickness.

Endosome: Coarse, confused arrangement of tylostyles, and spirasters present also.

Spicule: Tylostyle; and Spiraster.

Tylostyle—Smooth, straight or slightly arched, base swollen, tapering to pointed end. Size range $345-476-555 \times 9-10.5-12 \mu\text{m}$.

Spiraster—Shaft extremely shortened or lost, similar to euasteroid spicule, with ten to several tens of rays, not branched or occasionally branched near tips, and measuring $22-50 \mu\text{m}$ in maximum dimension.

Distribution: St. Thomas; Western Bahama.

In Japan—Newly recorded.

Remarks: Identification of this species is based upon the description given by Wiedenmayer (1977, p. 163); it is not conspecific to the species described by De Laubenfels (1936), Dickinson (1945) and Hechtel (1965). The specimen in this study has very short-shafted spirasters, and occasionally these spirasters are like oxyasters as a result of shafts being lost entirely. Thus, this specimen does not show meristic typical spirasters. Since the length of the shaft in the spiraster is a continuous meristic character, it is probable that there are various intermediate forms. Nevertheless, the writer concludes that *Spirastrella coccinea* described by Wiedenmayer (1977) is not conspecific to the species described by De Laubenfels (1936), Dickinson (1945) and Hechtel (1965).

159. *Spirastrella insignis* Thiele, 1898

Spirastrella insignis Thiele, 1898, p. 43, Pl. 2, fig. 5, Pl. 8, fig. 18(a-c); Tanita, 1961d, p. 349, Pl. 4, fig. 17, t-fig. 9; 1964, p. 18; 1965, p. 50, Pl. 2, fig. 9; 1967, p. 117, Pl. 2, fig. 8; 1968, p. 54; Hoshino, 1970, p. 22, fig. 2(2); 1971, p. 22; 1974, p. 10; 1975a, p. 33, Pl. 2, fig. 3.

Distribution: In Japan—Sea of Japan; Inland Sea of Japan; Ariake Sea.

Remarks: According to Vosmaer (1911), this species is conspecific to *Spirastrella purpurea* (Lamarck, 1815).

160. *Spirastrella panis* Thiele, 1898

(Fig. 13)

Spirastrella panis Thiele, 1898, p. 43, Pl. 2, figs. 3-4, Pl. 8, fig. 19(a-d); Hoshino, 1976a, p. 253, Pl. 4, figs. 24-26.

Material examined: MIT-006, MIT-022, MIT-053, MIT-061, MIT-066, MIT-072, Mitsukue, 5-XI-1975; MIT-094, MIT-099, Mitsukue, 4-XI-1973; SAT-032, SAT-053, SAT-072, Uchinoura, 5-XI-1975.

Dimensions: $7 \times 10 \times 4$ (thickness) cm, (MIT-006). In nature, sponge reaches 50×50 cm in area quite often, and the writer cut off for examination a small portion from the whole organism.

Habitat: Subtidal zone, 15 m in depth, on rocky substrate.

Shape: Thick, encrusting sponge on rock surfaces.

Color: Vernonia Purple 30IF or Warm Gray or Khaki 08LD.

Consistency: Slightly compressible.

Surface: Smooth to touch, uneven, but not paillose. Several oscules open in places.

Ectosome: $400-500 \mu\text{m}$ in thickness. Subtylostyles arranged compactly with pointed ends directed towards surface. Various sizes of spirasters are found in this zone, and smaller spirasters exist compactly in most of upper surface.

Endosome: Dense or coarse confused arrangement of subtylostyles. Various sizes of canals of aquiferous system ranging from a few hundred microns to a few millimeters in diameter, are observed with naked eye running in all directions. Various sizes of spirasters are found in all portions.

Spicule: Subtylostyle; and Spiraster.

Subtylostyle — Smooth, straight or slightly arched, base slightly swollen, with other end tapering to a point. Size range $405-470-530 \times 11-11.8-14 \mu\text{m}$ (MIT-006).

Spiraster — This spicule varies extremely in size, from $20 \times 3 \mu\text{m}$ to $60 \times 10 \mu\text{m}$. Thick spiraster almost straight, with thick spines spirally protruding around axis. Slender spirasters, with two to three waves, and fine spines spirally protruding.

Distribution: In Japan — Enoshima; Kushimoto; Amami-Oshima.

Note: Dimensions and spicule measurements of representative specimens are as follows:

	Dimensions of specimen	Spicule measurements	
		Subtylostyle	Spiraster
MIT-006	$7 \times 10 \times 4$ cm	$405-470-530 \times 11-11.8-14$	20×3 to 60×10
MIT-022	$7 \times 10 \times 6$	$335-377-510 \times 8-9.4-12$	11×2 to 55×10
SAT-032	$7 \times 6 \times 4$	$325-401-440 \times 9-10-12$	15×3 to 40×8
SAT-053	$8 \times 6 \times 12$	$263-400-455 \times 8-10-12$	10×2 to 50×10

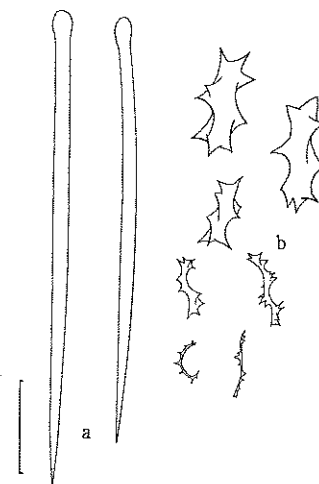


Fig. 13. *Spirastrella panis* Thiele. (MIT-006). Spicule; Subtylostyles (a) and spirasters (b). Scale: $100 \mu\text{m}$ (subtylostyles), $25 \mu\text{m}$ (spirasters).

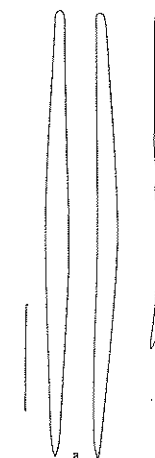


Fig. 14. *Aptos niger* n. sp. (SAT-063, Holotype). Spicule; Stout styles (a) and small styles (b). Scale: $200 \mu\text{m}$.

Remarks: Of three varieties of *Spirastrella panis* described by Thiele (1898), this species greatly resembles var. *amamensis*, and differs from *Spirastrella insignis* Thiele, 1898 in having variable sizes of spirasters. According to Vosmaer (1911), this species as well *Spirastrella insignis* Thiele, 1898, is a synonym of *Spirastrella purpurea* (Lamarck, 1815)

Family Subcritidac Ridley et Dendy, 1886

Genus *Aptos* Gray, 1867161. *Aptos niger* n. sp.

(Fig. 14; Pl. 2, Fig. 5)

Material examined: SAT-063 (Holotype), Uchinoura, 5-XI-1975.

Dimensions: $8 \times 4 \times 3$ cm.

Habitat: Subtidal zone, about 15 m in depth.

Shape: Irregular massive sponge, adhering to or embedding small molluscan, barnacle or cchinoderm shells, or coral fragments on surface or in ectosome.

Color: Black.

Consistency: Very hard, incompressible.

Surface: Minutely hispid, undulated. Oscules and pores invisible.

Ectosome: $100-200 \mu\text{m}$ thick. Small styles arranged densely and perpendicularly, and pointed end of stout style in endosome arranged into ectosome.

Endosome: Well developed, radiate architecture of stout styles, and occasionally confused arrangement.

Spicule: Stout Style; and Small Style.

Stout Style — Long, stout, smooth, nearly straight or slightly arched, fusiform, one end rounded and other end sharply pointed. Size range $540\text{--}923\text{--}1310 \times 18\text{--}33\text{--}46 \mu\text{m}$.

Small Style — Short, smooth, slightly arched, nearly constant width throughout length or slightly tapering from near pointed end to each end, one end rounded and other end sharply pointed. Size range $170\text{--}226\text{--}270 \times 5\text{--}9\text{--}10 \mu\text{m}$.

Remarks: This species somewhat resembles *Aaptos aaptos* described by Tanita (1970, p. 89), but is clearly distinguished in having stout styles, of twice the size, and different coloration. *Tuberella aaptos*: Topsent (1900, p. 285), from France, has stronglyloxea of $1000\text{--}1500 \times 17\text{--}45 \mu\text{m}$ and styles of $200\text{--}700 \times 3\text{--}10 \mu\text{m}$ and is red or rosy in coloration. *Aaptos aaptos*: Levi (1958, p. 24) from Marmar, has stronglyloxea of $1800 \times 45 \mu\text{m}$ and styles of $400\text{--}450 \times 20\text{--}30 \mu\text{m}$ and the same species from Rio de Oro (Levi, 1959) has endosomal styles of $2400 \times 70 \mu\text{m}$ and ectosomal tylostyles of $125\text{--}550 \mu\text{m}$. *Aaptos aaptos*: Bergquist (1968, p. 21) from New Zealand, has three size ranges of subtylostyles or tylostyles, and is reddish purple in coloration. *Aaptos unispicuius* De Laubenfels (1954, p. 205) has styles of up to $800 \times 18 \mu\text{m}$ and pink in coloration, and *Aaptos chromis* De Laubenfels (1954, p. 206) has styles of two size ranges, 770×21 and $160 \times 2 \mu\text{m}$ and is dull green.

The species in this study, *Aaptos niger*, resembles *Aaptos aaptos*, described by Topsent (1900), but clearly differs from the latter in coloration and size of the smaller styles. If we consider *Aaptos aaptos*: Tanita (1970) as proper *aaptos*, we should conclude that *Aaptos niger* is conspecific to *Aaptos aaptos*. This species differs from the three species of De Laubenfels in spicule size; the coloration of this species differs from any other species of this genus.

Genus *Pseudosuberites* Topsent, 1900 sensu De Laubenfels, 1936

162. *Pseudosuberites kunisakiensis* n. sp.

(Figs. 15; Pl. 2, Fig. 6)

Material examined: JAP-022 (Holotype), Kurotsusaki (Kunisaki Pen.), 5-XI-1977.

Dimensions: $4 \times 2 \times 2.5$ (thickness) cm.

Habitat: Unknown, probably subtidal.

Shape: Irregular, small massive sponge.

Color: Ecu 08ED (Ectosome) and Ivory Buff 04EB (Endosome).

Consistency: Slightly compressible, not tough.

Surface: Smooth to touch, uneven, lipostomous. Oscules and pores invisible.

Ectosome: $50\text{--}60 \mu\text{m}$ in thickness. Confused, horizontal arrangement of tylostyles.

Endosome: Very vague tracts, composed of tylostyles, ascend anastomosingly to surface; coarse, confused arrangement is found between reticulation of vague tracts.

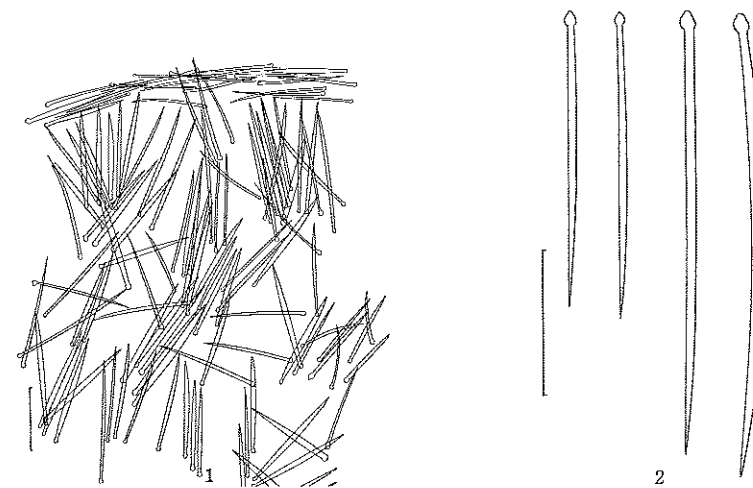


Fig. 15. *Pseudosuberites kunisakiensis* n. sp. (JAP-022, Holotype). 1. Portion of skeleton in endosome beneath ectosome. Scale: $100 \mu\text{m}$. 2. Spicule; Tylostyles. Scale: $100 \mu\text{m}$.

Spicule: Tylostyle in two size modes.

Small Tylostyle — Smooth, straight to slightly arched, spherically swollen at or near base, with other end sharply pointed. Size range $175\text{--}210\text{--}245 \times 4\text{--}5\text{--}6 \mu\text{m}$. Tylostyles in this category exist in ectosome.

Large Tylostyle — Smooth, straight to slightly arched, spherically swollen at or near base, with other end sharply pointed. Size range $255\text{--}305\text{--}378 \times 5\text{--}6.2\text{--}8 \mu\text{m}$. Tylostyles in this category exist in endosome.

Remarks: This species resembles *Suberites* (*Pseudosuberites*) *digitatus* Thiele, 1905 from Admiralitäts-Sund in spiculation, but differs in spicule arrangement of ectosome.

Genus *Ridleya* Dendy, 1888

163. *Ridleya peleia* De Laubenfels, 1954

(Fig. 16; Pl. 2, Fig. 7)

Ridleya peleia De Laubenfels, 1954a, p. 207, t-fig. 141.

Material examined: JAP-001, Kapira Bay (Ishigaki Is.), 22-VI-1977 (Prof. Kikuchi leg.).

Dimensions: $3 \times 2 \times 7$ (height) cm.

Habitat: Subtidal zone, 1-3 m in depth, on muddy bottom.

Shape: Hollow cylindrical sponge, 0.7-1.5 cm in diameter and 3-4 cm in height, developing from common basal mass of $3 \times 3 \times 2$ cm, and reaching 7 cm in total height. Basal mass is buried under muddy bottom, and encrusted with numerous coral fragments on surface.

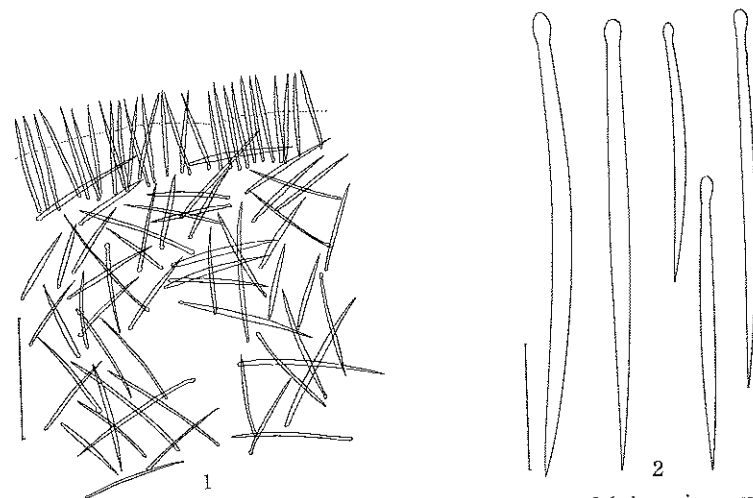


Fig. 16. *Ridleia peleia* De Laubenfels. (JAP-001). 1. Portion of skeleton in cross section of hollow cylindrical branch. Scale: 400 μm . 2. Spicule; Tylostyles. Scale: 100 μm .

Color: Orange 16PA or Orange Rufous 13NC.

Consistency: Very hard and incompressible when dry.

Surface: Smooth, lipostomous, and oscule, about 1 mm in diameter, opens at summit of cylindrical tube. Pores invisible.

Ectosome: 200–250 μm thick. Fairly dense, perpendicular and regular arrangement of tylostyles.

Endosome: Confused arrangement of tylostyles, and occasionally very vague tracts are formed.

Spicule: Tylostyle only — Smooth, gently curved, swollen at central part, base spherically swollen, and other end sharply pointed. Size range 290–460–610 \times 10–15–22 μm . Tylostyles arranged in ectosome are smaller than those in endosome.

Distribution: West Central Pacific.

In Japan — Newly recorded.

Remarks: This species was first described from the Palaus by De Laubenfels (1954a) who compared this species with all the other species of the genus *Ridleia* in his discussion.

Genus *Suberites* Nardo, 1833

164. *Suberites inflafoliatus* (Thiele, 1898)

(Fig. 17)

Papillella inflafoliata Thiele, 1898, p. 42, Pl. 3, fig. 1, Pl. 8, fig. 17.

Suberites inflafoliatus: Hoshino, 1970, p. 22.

Material examined: SIS-065, Sasajima, 27-VIII-1969, SIS-089, Mukai-

shima, 25-VIII-1969; SIS-136, Sasajima, 11-VI-1975.

Dimensions: 12 \times 12 \times 4 (thickness) cm, (SIS-065).

Habitat: Intertidal zone, low tide subzone, on rocky substrate.

Shape: Thick encrusting sponge on rocky substrate, or permeating small rock cavities.

Color: Orange Yellow 05PA.

Consistency: Dense, slightly compressible, tough.

Surface: Papillose in nature remaining so even after collection and preservation. Smooth to touch. Oscules open at top of each papilla in life, and close after preservation. Pores invisible.

Ectosome: 300–350 μm in thickness. Very dense perpendicular arrangement of tylostyles and beneath this zone, dense and confused arrangement of tylostyles exists to a thickness of 600–700 μm .

Endosome: Vague thick tracts of tylostyles 500–800 μm in thickness, run from base to surface, and dense, confused arrangements of these spicules are found between vague tracts. Many vacant spaces exist in endosome.

Spicule: Tylostyle only — Smooth, stocky, gently curved, spherically swollen at or near base, tapering from middle to each end, with other end sharply pointed. Size range 250–331–380 \times 8–9–12 μm (SIS-065).

Distribution: In Japan — Hakodate; Enoshima; Inland Sea of Japan.

Note:

	Dimensions of specimen	Spicule measurements
		Tylostyle
SIS-065	12 \times 12 \times 4 cm	250–331–380 \times 8–9–12
SIS-089	11 \times 11 \times 9	265–327–375 \times 9–10–11
SIS-136	5 \times 4 \times 2	215–297–390 \times 6–9.3–11

Remarks: This species was described as *Papillella inflafoliata* by Thiele (1898) but De Laubenfels (1954) pointed out that the genus *Papillella* was a synonym of the genus *Cliona*. Thiele (1898) did not describe spicule arrangement and coloration, but the writer, in this study, assigns several specimens collected from the Inland Sea of Japan to this species based on descriptions of spicule arrangement and coloration.

165. *Suberites japonicus* Thiele, 1898

(Fig. 18)

Suberites japonicus Thiele, 1898, p. 39, Pl. 1, figs. 13–14, Pl. 8, fig. 9(a–b); Tanita, 1963, p. 125, Pl. 4, fig. 4; 1970a, p. 90, Pl. 2, fig. 10; Hoshino, 1971, p. 22; 1974, p. 10.

Material examined: SIS-048, Mukaishima, 22-XII-1969; SIS-064, Mukaishima, 27-VIII-1969; SIS-105, SIS-131, Sasajima, 11-VI-1975; SIS-133,

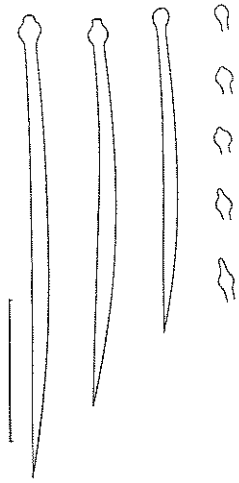


Fig. 17. *Suberites infrafoliatus* (Thiele). (SIS-065). Spicule; Tylostyles. Scale: 100 μ m.

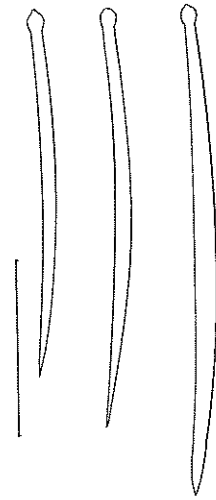


Fig. 18. *Suberites japonicus* Thiele. (SIS-064). Spicule; Small tylostyles. Scale: 100 μ m.

Mukaishima, 26-V-1975; SAT-058, Uchinoura, 5-XI-1975; AR-1-32, Matsushima Maeshima, 16-V-1972.

Dimensions: $8 \times 8 \times 4$ (thickness) cm, (SIS-048).

Habitat: Intertidal zone (low tide subzone) to subtidal zone.

Shape: Irregular massive or irregular thick encrusting sponge.

Color: Red Orange 22OA (Ectosome) and Yellow Orange 10LA (Endosome). Occasionally color of ectosome varies from Peach Red 20LA or Red 27PC or English Red 17LC to Jasper Red 22LA.

Consistency: Compressible and tough.

Surface: Smooth to touch, almost uniform surface in the greater part, but wrinkled or grooved in places. Oscules and pores invisible.

Ectosome: 300-400 μ m, or occasionally up to 800 μ m in thickness. Dense, perpendicular arrangement of small tylostyles.

Endosome: Dense and radiate arrangement of long tylostyles, or occasionally vague tracts of spicule ascend to surface between confused arrangements.

Spicule: Small Tylostyle; and Long Tylostyle.

Small Tylostyle — Smooth, straight or gently curved, base spherically swollen with other end sharply pointed. Size range 220-276-335 \times 5-5.5-6 μ m (SIS-048).

Long Tylostyle — Smooth, almost straight, or slightly arched, base spherically swollen with other end abruptly pointed or tapering to point. Size range 560-730-815 \times 7-10-12 μ m (SIS-048) and 10-15 μ m in diameter at spherical base.

Distribution: In Japan — Sea of Japan; Sagami Bay; Inland Sea of Japan; Ariake Sea.

Note:

	Dimensions of specimen	Spicule measurements	
		Small Tylostyle	Long Tylostyle
SIS-048	$8 \times 8 \times 4$ cm	220-276-335 \times 5-5.5-6	560-730-815 \times 7-10-12
SIS-064	$10 \times 9 \times 3$	210 \times 6 to 765 \times 14	
SIS-105	$6 \times 4 \times 3$	280 \times 2 to 770 \times 11	
SIS-131	$7 \times 3 \times 2$	305 \times 3 to 850 \times 10	
SIS-133	$5 \times 4 \times 3$	240 \times 2 to 890 \times 12	
SAT-058	$7 \times 7 \times 2$	110-134-175 \times 2-4-6	360-462-660 \times 6-8-11
AR-1-32	$3 \times 3 \times 2.5$	215-255-325 \times 3-4.8-8	700-780-880 \times 10-12-17

Difference in size between small and long tylostyle is not clear in cases of four specimens (SIS-064; SIS-105; SIS-131; SIS-133).

166. *Suberites sericeus* Thiele, 1898

(Fig. 19)

Suberites sericeus Thiele, 1898, p. 39, Pl. 8, fig. 10; Tanita, 1964, p. 18, Pl. 1, fig. 7, t-fig. 2; Hoshino, 1976c, p. 7.

Material examined: SIS-037, Hosonosu, 24-IV-1971; SIS-082, Mukaishima, 20-II-1970; AR-1-79, Matsushima Maeshima, 16-V-1972.

Dimensions: $7 \times 6 \times 0.1-0.2$ (thickness) cm, (SIS-037).

Habitat: Intertidal zone, low tide subzone and subtidal zone, symbiotic on shell surface of the gastropod *Fusinus perplexus ferrugineus*.

Shape: Very thin encrusting sponge on shell surface of gastropod.

Color: Peach Red 20LA.

Consistency: Slightly compressible, and tough.

Surface: Smooth to touch, even. Oscules and pores invisible.

Ectosome: About 250 μ m in thickness, but not clearly distinguishable from endosome. Small tylostyles are packed irregularly or perpendicularly.

Endosome: Dense, confused arrangement of large tylostyles.

Spicule: Small Tylostyle; and Large Tylostyle.

Small Tylostyle — Smooth, slightly bent, base spherically swollen, nearly constant in width throughout length or slightly thickening to pointed end, with that end usually sharply pointed but occasionally rounded. Size range 100-143-155 \times 4-6-9 μ m (SIS-037).

Large Tylostyle — Smooth, straight or slightly arched, base spherically swollen, with other end tapering to point, or nearly constant width throughout length, with other end abruptly pointed. Size range 245-293-345 \times 6-8-10 μ m (SIS-037).

Distribution: In Japan — Tsukumo Bay; Kagoshima; Ariake Sea.

Note:

	Dimensions of specimen	Spicule measurements	
		Small Tylostyle	Large Tylostyle
SIS-037	7×6×0.1-0.2 cm	100-143-155×4-7-9	245-293-345×6-8-10
SIS-082	6×5×0.3	120-146-176×6-7-8	280-313-356×8-9-10
AR-1-79	4×5×0.1	130-164-195×5-7.5-8	247-280-332×9-10

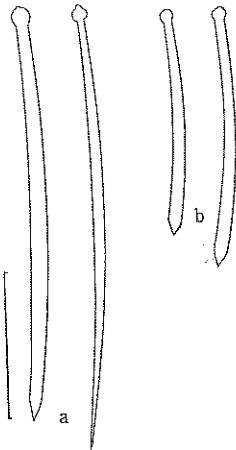


Fig. 19. *Suberites sericeus* Thiele. (SIS-037). Spicule; Large tylostyles (a) and small tylostyles (b). Scale: 100 μ m.

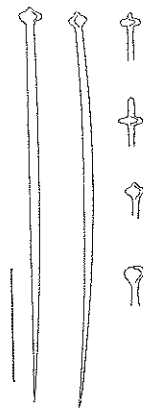


Fig. 20. *Terpios zeteki* (De Laubenfels). (JAP-029). Spicule; Tylostyles. Scale: 100 μ m.

Remarks: This species is an abundant symbiotic sponge found on certain gastropods in the same manner as *Choanites ficus*, and is common in the Inland Sea of Japan and the Ariake Sea.

Genus *Terpios* Duchassaing et Michelotti, 1864

167. *Terpios zeteki* (De Laubenfels, 1936)

(Fig. 20)

Laxosuberites zeteki De Laubenfels, 1936b, p. 450; Dickinson, 1945, p. 37, Pl. 69, fig. 137, Pl. 70, fig. 139. *Terpios zeteki*: De Laubenfels, 1950, p. 28; 1951, p. 265; 1954a, p. 339; Hechtel, 1965, p. 59, Pl. 7, fig. 3.

Material examined: JAP-029, Kurotsusaki (Kunisaki Pen.), 5-XI-1977.

Dimensions: About 0.7 cm in diameter.

Habitat: Unknown (probably subtidal).

Shape: Irregular, hemispherical massive sponge, with several short sulci on surface.

Color: Orange 16PA. Orange color of sponge is well-retained after fixation.

Consistency: Incompressible.

Surface: Smooth to touch, uneven, lipostomous. Oscules and pores invisible.

Ectosome: 40-50 μ m in thickness, dense, confused horizontal arrangement of tylostyles.

Endosome: Very vague tracts of tylostyles radiately ascend to surface, or occasionally show dense, confused arrangement of tylostyles, pointed end directed toward surface.

Spicule: Tylostyle only — Smooth, almost straight, with four blunt protrusions at base, with other end tapering to point. Blunt protrusions of base vary from rudimentary to well developed. Size range 275-349-520×6-8.4-13 μ m.

Distribution: Bolboa; Caribbean; Port Royal; Gulf of California; Hawaii. In Japan — Newly recorded.

Remarks: This species was originally described by De Laubenfels (1936, p. 450) as belonging to the genus *Laxosuberites* from Bolboa and the Caribbean. He stated that this species is frequently as massive and as large as a person's head, has tylostyles of up to 700 μ m long and 3-20 μ m thick, and is greenish or reddish in coloration. Dickinson (1945, p. 37) reported on this species from the Gulf of California and reported that the tylostyles were 540-840×2-20 μ m and bright yellow in coloration. Hechtel (1965, p. 59) reported the species from Port Royal as having tylostyles of 140-877×3-10 μ m and green or red or lavender or red orange coloration. De Laubenfels stated that this species is the most abundant species in the Hawaiian Islands. This study reports on only one small specimen, but the writer believes that, based on spiculation and coloration, it is clearly different from any known species of the genus *Terpios*.

Family Clionidae Gray, 1867

Genus *Cliona* Grant, 1826

168. *Cliona celata* Grant, 1826

(Fig. 21)

Cliona celata Grant, 1826, p. 78; Topsent, 1887, p. 76, Pl. 7, fig. 1; 1900, p. 32, Pl. 1, figs. 5-9, Pl. 2, fig. 1; Annandale, 1915, p. 7; De Laubenfels, 1949a, p. 23, figs. 21-22; Bergquist, 1961a, p. 44; 1961b, p. 190, fig. 14(a-c); 1968, p. 29, Pl. 4, fig. c; Little, 1963, p. 57; Descatoire, 1969, p. 187; Rho *et al.*, 1969, p. 156, Pl. 1, fig. 5, t-fig. 2; Hoshino, 1971, p. 23; 1976c, p. 7; Boury-Esnault, 1973, p. 275, fig. 19 (for detailed synonymy before 1900, see Topsent, 1900)

Material examined: SIS-032, Mukaishima, 20-V-1970; SIS-039, Mukaishima, 26-VIII-1969; SIS-045, Mukaishima, 13-IX-1970; SIS-145, SIS-162, Mukaishima, 7-VII-1975; AR-1-50, Matsuhima Maeshima, 16-V-1972.

Dimensions: 10×5×less than 0.1 (thickness) cm, (SIS-039).

Habitat: Intertidal zone, mid tide subzone.

Shape: Very thin encrusting sponge on shell surface of the barnacle, *Balanus albicostatus*, or in narrow cavities of barnacle shells, or on serpuloid mass, or boring in dead shell of *Serpulorbis imbricatus*.

Color: Orange Yellow 05PA or Yellow Orange 10LA or Golden Yellow 08PB.

Consistency: Very slightly compressible.

Surface: Smooth to touch, even, or papillate. Oscules and pores invisible.

Ectosome: 100–200 μm in thickness, coarse, perpendicular arrangement of tylostyles, but not clearly distinct from endosome.

Endosome: Confused arrangement of tylostyles.

Spicule: Tylostyle only — Smooth, nearly straight or slightly arched, tapering from base to sharply pointed end, with base spherically swollen. Size range 250–349–520 \times 8–10–11 μm and base 12–13 μm in diameter (SIS-039).

Distribution: Cosmopolitan.

In Japan — Inland Sea of Japan; Ariake Sea.

Note:

	Dimensions of specimen	Spicule measurements	
		Tylostyle	
SIS-032	unrecognizable	250–320–370 \times 8–11–13	
SIS-039	10 \times 5 \times less than 0.1 cm	250–349–520 \times 8–10–11	
SIS-045	10 \times 7 \times 2	350–388–460 \times 6–9–11	
SIS-145	4 \times 4 \times less than 0.5	210–290–340 \times 7–8.6–10	
SIS-162	8 \times 6 \times 0.3	201–303–450 \times 4–8.4–12	
AR-1-50	9 \times 5 \times 2	245–315–390 \times 7–9.3–11	

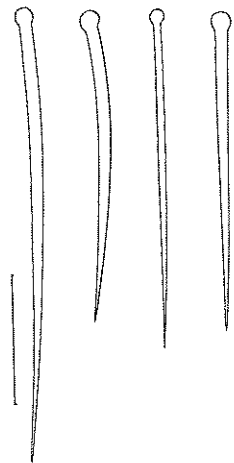


Fig. 21. *Cliona celata* Grant. (SIS-039).
Spicule; Tylostyles. Scale: 100 μm .

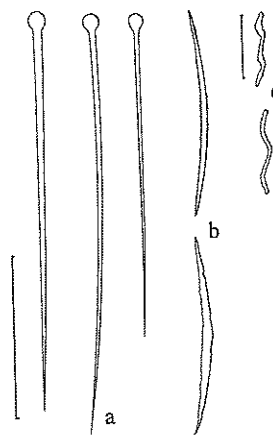


Fig. 22. *Cliona vastifica* Hancock. (SIS-067).
Spicule; Tylostyles (a), oxea (b) and spirasters (c).
Scale: 10 μm (spirasters), 100 μm (others).

169. *Cliona vastifica* Hancock, 1849

(Fig. 22)

Cliona vastifica Hancock, 1849, p. 342; Topsent, 1900, p. 56, Pl. 2, figs. 3–9; Annandale, 1915, p. 8; Hartman, 1958, p. 21, fig. 5; Little, 1963, p. 57.

Cliona concharum Thiele, 1898, p. 42, Pl. 8, fig. 16(a–c).

(for detailed synonymy before 1900, see Topsent, 1900)

Material examined: SIS-067, Mukaishima, 20–VIII–1972.

Dimensions: Unrecognizable.

Habitat: Intertidal zone, mid tide subzone, infesting living shell of *Pseudochama retroversa* or *Chama reflexa* (Bivalvia).

Shape: Infests living bivalve shells, as described above.

Color: Orange Yellow 05PA.

Consistency: Slightly compressible.

Surface: Unrecognizable.

Ectosome: Unrecognizable.

Endosome: Confused arrangement of oxea and tylostyles, with spirasters.

Spicule: Tylostyle; Oxea; and Spiraster.

Tylostyle — Smooth, straight or nearly straight, tapering from base to sharply pointed end, base spherically swollen to one and a half times thickness of spicule shaft. Size range 180–230–275 \times 3–4–5 μm .

Oxea — Rough, fusiform, arched or weakly bent at middle, each end tapering to a point. Size range 90–121–140 \times 4–4.5–5 μm .

Spiraster — Rough, straight to twisted, measuring 10–15 \times 2 μm .

Distribution: Cosmopolitan.

In Japan — Hakodate; Enoshima.

Remarks: This is the second report of this species from Japanese waters. *Cliona truitti* Old, 1941 closely resembles this species, and it is quite possible that they are one species. *Cliona concharum* Thiele, 1898 is conspecific to this species.

170. *Cliona lobata* Hancock, 1849

Cliona lobata Hancock, 1849, p. 341; Topsent, 1900, p. 70, Pl. 2, figs. 2 and 10, Pl. 3, fig. 1, Pl. 4, fig. 1; 1918, p. 558; Burton, 1935a, p. 78; 1937, p. 16, Pl. 8, fig. 53; De Laubenfels, 1954a, p. 215, t-fig. 147; Vacquet *et al.*, 1976, p. 37, fig. 16; Hoshino, 1977b, p. 8, Pl. 3, figs. 9–12, t-fig. 2.

(for detailed synonymy before 1900, see Topsent, 1900)

Distribution: Cosmopolitan.

In Japan — Hiwasa.

Order Epipolasida Sollas, 1888 sensu De Laubenfels, 1936

Family Tethyidae Gray 1867, sensu Topsent, 1900

Genus *Tethya* Lamarck, 1814

171. *Tethya aurantium* (Pallas, 1766)

(Fig. 23)

Alcyonium aurantium Pallas, 1766, p. 210.

Tethya aurantium: Topsent, 1900, p. 294; 1928b, p. 144; De Laubenfels, 1936b, p. 462; Dickinson, 1945, p. 40, Pl. 75, figs. 149–150; Burton, 1956, p. 120; 1959, p. 15; Levi, 1959, p. 122; 1960a, p. 748, fig. 4;

Descatoire, 1969, p. 185; Vacelet, 1969, p. 169; Boury-Esnault, 1971, p. 299; Pulitzer-Finali, 1977, p. 20.

Tethya aurantia var. *californiana* De Laubenfels, 1932, p. 44.

Tetilla aurantia: Hoshino, 1970, p. 22, fig. 2(2), fig. 3(1).

Material examined: SIS-139, Sasajima, 11-VI-1975, (three individuals).

Dimensions: 1-1.5 cm in diameter.

Habitat: Intertidal zone, mid tide subzone, on rocky substrate.

Shape: Spherical or subspherical sponge, with numerous short-rooted gemmules, 0.3-0.4 mm in diameter, over entire surface.

Color: Olive Ocher 04IC.

Consistency: Slightly compressible and tough.

Surface: Numerous gemmules develop at tips of short stalks from tubercles on surface. Pores and oscules invisible, but occasionally single oscule opens at summit of sponge.

Ectosome: 500-700 μm in thickness, tylasters are densely packed.

Endosome: Typical radiate structure of densely packed styles. Several euasters and tylasters scattered in the flesh. Pointed end of styles reach to surface in ectosome.

Spicule: Style; Euaster; and Tylaster.

Style — Long, smooth, straight, thin to thick, base rounded with other end sharply pointed. Size range 330×4 to $1500 \times 25 \mu\text{m}$.

Euaster — 30-40 μm in diameter, with several to ten or more conical rays.

Tylaster — About 15 μm in diameter, with several rays, swollen at tips.

Distribution: Cosmopolitan.

In Japan — Inland Sea of Japan.

Remarks: This species is very abundant on rock surface in the mid tide subzone near the Mukaishima M. B. S. in the Inland Sea of Japan.

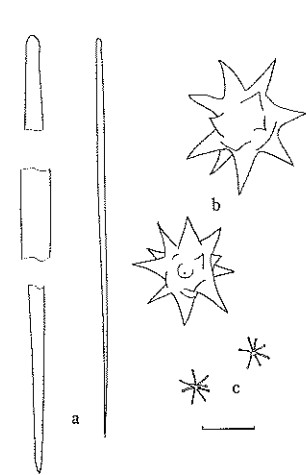


Fig. 23. *Tethya aurantium* (Pallas). (SIS-139). Spicule; Styles (a), euasters (b) and tylasters (c). Scale: 20 μm .

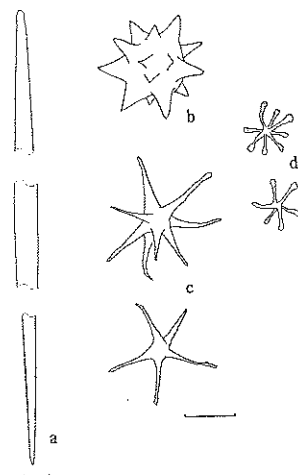


Fig. 24. *Tethya diploderma* Schmidt. (AR-1-72). Spicule; Style (a), spheraster (b), oxyasters (c) and tylasters (d). Scale: 20 μm .

172. *Tethya deformis* Thiele, 1898

Tethya deformis Thiele, 1898, p. 29, Pl. 1, fig. 18, Pl. 5, fig. 26, Pl. 7, fig. 18(a-d); Topsent, 1918, p. 593.

Tethya amamensis Thiele, 1898, p. 30, Pl. 7, fig. 19(a-f); Topsent, 1918, p. 593; Tanita, 1961d, p. 350, Pl. 4, fig. 18, t-fig. 10; 1969, p. 77; Hoshino, 1971, p. 21.

Distribution: In Japan — Enoshima; Amami Oshima; Tobishima; Inland Sea of Japan.

Remarks: *Tethya deformis* Thiele, 1898 and *Tethya amamensis* Thiele, 1898 are identical in spiculation but differ somewhat in external form. The writer concludes that *Tethya amamensis* is a synonym of the former in agreement with Topsent (1918).

173. *Tethya diploderma* Schmidt, 1870

(Fig. 24)

Tethya diploderma Schmidt, 1870, p. 52, Pl. 4, fig. 2; Topsent, 1918, p. 574; De Laubenfels, 1936b, p. 451; 1950, p. 30, fig. 20; 1951, p. 265; 1953, p. 545; 1954a, p. 232, t-fig. 160; 1954b, p. 339; 1955b, p. 141;

Burton, 1937, p. 12, Pl. 4, fig. 56; Levi, 1956a, p. 7; Tendal, 1969, p. 37

Donatia diploderma: Topsent, 1918, p. 563; Burton, 1924, p. 1039.

Material examined: AR-1-72, Matsushima Maeshima, 16-V-1972.

Dimensions: About 2 cm in diameter.

Habitat: Intertidal zone, low tide subzone.

Shape: Hemispherical sponge, basal part spreading on rock surface. Several hemispherical bodies are connected with common spreading part.

Color: Orange Red 24PA to Orange 16PA.

Consistency: Tough, compressible.

Surface: Tuberculate. Oscule opens at summit of hemispherical body. Pores invisible.

Ectosome: Up to 1 mm in thickness. Styles densely packed, and tylasters arranged compactly.

Endosome: Radiate structure of styles. Spherasters and oxyasters present in the flesh.

Spicule: Style; Spheraster; Oxyaster; and Tylaster.

Style — Long, straight, tapering to base and other end, base rounded with other end sharply pointed or not. Size range $565-1250 \times 10-23 \mu\text{m}$.

Spheraster — 35-50 μm in diameter, with ten or more smooth conical rays.

Oxyaster — 22-30 μm in diameter, with several conical rays that may or may not be straight. Rays may or may not be rough.

Tylaster — About 15 μm in diameter, with several tylote rays. Each ray roughened at end.

Distribution: Gulf of Manaar; Madagascar; Marshall Islands; Fiji Islands; Hawaii; Gilbert Island.

In Japan — Sea of Japan.

Remarks: This species is very abundant in the low tide subzone near the Aitsu M. B. S. (Kumamoto Univ.) in the Ariake Sea. Topsent (1918) described the following nine species as synonyms of this species: *Tethea ingalli* Bowerbank, *Tethea cliftoni* Bowerbank, *Tethya maza* Selenka, *Alema seychellensis* Wright, *Donatia multifida* Carter, *Tethea philippensis* Lendenfeld, *Tethya loevis* Lendenfeld, *Donatia viridis* Baer and *Donatia parvistelle* Baer. It remains to be seen whether these are actually synonyms.

174. *Tethya japonica* Sollas, 1888

(Fig. 25)

Tethya japonica Sollas, 1888, p. 430, Pl. 44, figs. 7-14; Lindgren, 1898, p. 317; Burton, 1934b, p. 568; 1937, p. 13; Tanita, 1964, p. 19, Pl. 1, fig. 8, t-fig. 3; 1969, p. 77, Pl. 2, fig. 8; Kim *et al.*, 1968, p. 42, Pl. 3, fig. 15, t-fig. 16; Hoshino, 1970, p. 22, fig. 3(3); 1971, p. 21.
Donatia japonica: Dendy, 1916, p. 262, Pl. 48, fig. 2; Brøndsted, 1924, p. 441.

Material examined: SIS-106, Ategishima, 8-IX-1975; SIS-116, Mukaishima, 9-VII-1975; SIS-129, Sasajima, 11-VI-1975.

Dimensions: About 2 cm in diameter, (SIS-106).

Habitat: Intertidal zone, low tide subzone.

Shape: Spherical sponge, with several attached roots from basal part, and gemmules developed at tips of thin fibrous stalks, 0.1-0.3 mm thick and 1-3 mm long, from tubercles on surface.

Color: Red Orange 22OA or Carmine 24PA.

Consistency: Slightly compressible and tough.

Surface: Tuberculate, tubercles rounded, 0.3-0.4 mm high and about 1 mm in diameter, 1-2 mm apart with very long fibrous stalks developing from these tubercles.

Ectosome: 50-120 μ m in thickness. Tylasters are densely packed in this zone, as are occasionally euasters.

Endosome: Markedly dense, typical radiate arrangement of tracts of long styles, 0.2-0.3 mm in diameter, several tylasters and euasters are found in the flesh.

Spicule: Style; Euaster; and Tylaster.

Style — Smooth, straight, tapering from middle to each end, base rounded with other end usually sharply pointed but occasionally not. Size range 650 \times 10 to 2000 \times 30 μ m (SIS-106).

Euaster — About 50 μ m in diameter, with fifteen to seventeen conical rays. Not abundant.

Tylaster — About 15 μ m in diameter, with several to ten or more rays, swollen at tips.

Distribution: Philippines; Malay Area; Java; Indian Ocean; Gulf of Manaar; Red Sea; New Plymouth; Korea Strait; Australia.

In Japan — Tsukumo Bay; Sado; Inland Sea of Japan.

Note:

	Dimensions of specimen	Spicule measurements		
		Style	Euaster	Tylaster
SIS-106	2 cm in diameter	650 \times 10 to 2000 \times 30	about 50	about 15
SIS-116	2.5	390 \times 8 to 1800 \times 30	50-60	15
SIS-129	2	up to 2000 \times 26	50-60	about 15

Remarks: This species differs ecologically from the sympatric species *Tethya aurantium*, near the Mukaishima M.B.S. The habitat of *T. japonica* is the low tide subzone where it is able to easily convert gemmule fibers to attaching fibers on the substratum, but it is not able to do so in the mid tide subzone where *T. aurantium* lives. It is appropriate to consider the following three varieties of this species, var. *nucleata* Lindgren (1909, p. 372), var. *globosa* Lindgren (1909, p. 373) and var. *albanensis* Lindgren (1909, p. 374) as independent subgroups.

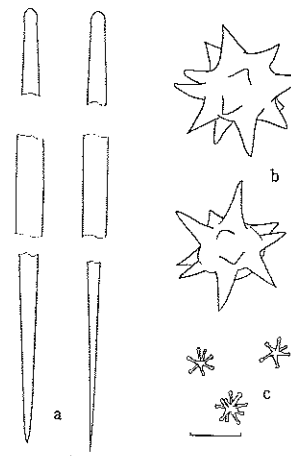


Fig. 25. *Tethya japonica* Sollas. (SIS-106). Spicule; Styles (a), euasters (b) and tylasters (c). Scale: 20 μ m.

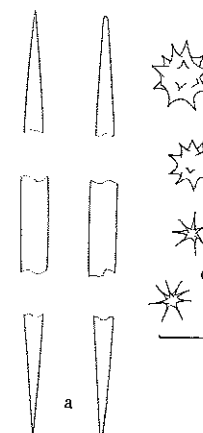


Fig. 26. *Jaspis duoaster* n. sp. (MIT-060, Holotype). Spicule; Oxys (a), sphaerasters (b) and oxyasters (c). Scale: 20 μ m.

Family Jaspidae De Laubenfels, 1936

Subfamily Jaspinae De Laubenfels, 1936

Genus *Jaspis* Gray, 1867

175. *Jaspis hiwasaensis* Hoshino, 1977

Jaspis hiwasaensis Hoshino, 1977b, p. 9, Pl. 4, figs. 1-2, t-fig. 3.

Distribution: In Japan — Hiwasa.

176. *Jaspis duoaster* n. sp.

(Fig. 26; Pl. 3, Fig. 1; Pl. 4, Figs. 5-6; Pl. 5, Fig. 1)

Material examined: MIT-027, MIT-060 (Holotype), Mitsukue, 5-XI-1975.

Dimensions: 4×5×7 (height) cm, (MIT-060).

Habitat: Subtidal zone, 15 m in depth, on rocky substrate.

Shape: Irregular massive or thick encrusting sponge with several thick lobate projections.

Color: Ocharaceous Salmon 12GB or Khaki 08LD (Ectosome), and Maple 07GD or Ivory Buff 04EB (Endosome).

Consistency: Incompressible, hard.

Surface: Minutely hispid with projecting oxea, but since the specimens collected in this study are veiled with thin foreign sponge, it feels soft to touch. Oscules and pores invisible.

Ectosome: Up to 2 mm in thickness. Oxea protruded from endosome.

Endosome: Radiate structure, formed with vague tracts of stout oxea. Two kinds of asteroid microscleres present in the flesh.

Spicule: Oxeon; Spheraster; and Oxyaster.

Oxeon — Stout, smooth, straight or occasionally slightly bent at middle, usually tapering to a point at each end, but occasionally not pointed, measuring up to 1400×40 μm (MIT-060).

Spheraster — 20 μm in total diameter, about 12 μm in core diameter, with sixteen to twenty conical rays (MIT-060).

Oxyaster — 22 μm in total diameter, 3-6 μm in core diameter, with ten or more smooth rays, sharply pointed (MIT-060).

Note:

	Dimensions of specimen	Spicule measurements		
		Oxeon	Spheraster	Oxyaster
MIT-027	4×7×4 cm	900×25 to 1400×60	18	15
MIT-060	4×5×7	up to 1400×40	20	22

Remarks: This species is closely related to *Jaspis novaezealandi*, but the latter is easily distinguished by having larger spheraster diameter than that of oxyaster in *Jaspis duoaster* n. sp.

Family Sollasellidae Lendenfeld, 1887

Genus *Epipolasis* De Laubenfels, 1936177. *Epipolasis kushimotoensis* Hoshino, 1977

(Fig. 27)

Epipolasis kushimotoensis Hoshino, 1977b, p. 11, Pl. 4, figs. 3-5, t-fig. 4.

Material examined: MIT-065, Mitsukue, 5-XI-1975; SAT-042, Uchinoura, 5-XI-1975.

Dimensions: 17×12×8 (height) cm, (SAT-042).

Habitat: Subtidal zone, 15 m in depth, on rocky substrate.

Shape: Irregular funnel-like or irregular massive, developing on rock or stone surfaces. Funnel-like specimen (SAT-042) is 7×8 cm in inner diameter, wall 1-2 cm thick, budding small funnel from side.

Color: Pansy Purple 30NF.

Consistency: Hard as stone, incompressible.

Surface: Minutely hispid, uneven. Pores invisible. Oscules 2-3 mm in diameter open on inside surface of funnel-like specimen.

Ectosome: Oxea, a mix of both small and large spicules, arranged nearly vertically, and densely to a thickness of about 300 μm.

Endosome: Somewhat confused arrangement of oxea, a mixture of both small and large spicules, resulting in vague radiate structure in endosome.

Spicule: Oxeon only — Smooth, slightly arched, or curved with two bends, tapering to point at each end, but occasionally not pointed. Size range 200×7 to 930×31 μm (SAT-042). It is possible to discriminate two size categories, since large spicule is twice the length and thickness of small one.

Distribution: In Japan — Kushimoto.

Note:

	Dimensions of specimen	Spicule measurements
		Oxeon
MIT-065	2.5×3.5×1 cm	530-678-770×10-17-22
SAT-042	17×12×8	200×7 to 930×31

Remarks: This is the second record of this species from Western Japan.

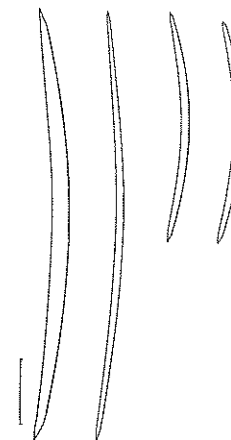


Fig. 27. *Epipolasis kushimotoensis* Hoshino. (MIT-065). Spicule; Oxea. Scale: 100 μm.

Order Choristida Sollas, 1880

Family Ancorinidae Schmidt, 1870 sensu De Laubenfels, 1936

Subfamily Ancorininae Schmidt, 1870

Genus *Penares* Gray, 1867178. *Penares incrustans* Tanita, 1963*Penares incrustans* Tanita, 1963, p. 127, Pl. 4, fig. 6, t-fig. 5; Kim *et al.*, 1968, p. 41, Pl. 3, fig. 14, t-fig. 15.Distribution: Korea Strait.
In Japan — East Coast of Noto Peninsula.Genus *Thenea* Gray, 1867179. *Thenea calyx* Thiele, 1898*Thenea calyx* Thiele, 1898, p. 24, Pl. 5, figs. 9–10.

Distribution: In Japan — Oshima near Tango.

Subfamily Stelletinae Sollas, 1888 sensu De Laubenfels, 1936

Genus *Stelletta* Schmidt, 1862180. *Stelletta atrophia* n. sp.

(Fig. 28; Pl. 3, Fig. 2; Pl. 5, Figs. 2–5)

Material examined: MIT-028 (Holotype), Mitsukue, 5-XI-1975.

Dimensions: 7 × 10 × 5 (thickness) cm in specimen studied. The writer collected only a small portion from the original very large, sponge.

Habitat: Subtidal zone, 15 m in depth, on rocky substrate.

Shape: Irregular massive or thick encrusting sponge, with many lobate projections, straight or curved 2–3 cm high and 0.5 cm in diameter.

Color: Olive 98PI (Ectosome) and Pale Cinnamon Pink 10BB (Endosome).

Consistency: Hard, incompressible.

Surface: Conspicuously hispid with long oxea, extremely uneven with many lobate projections and a hollow portion. Oscules and pores invisible.

Ectosome: Over the zone in which plagiotriaenes are densely packed to 1–2 mm in thickness, there occurs a very thick zone of vertically arranged oxea 2–5 mm in thickness. Oxea zone is easy to exfoliate from plagiotriaenes zone.

Endosome: Oxea are densely and radiately packed. Oxyasters and strongylasters present in the flesh.

Spicule: Plagiotriaene; Oxeon; Oxyaster; and Strongylaster.

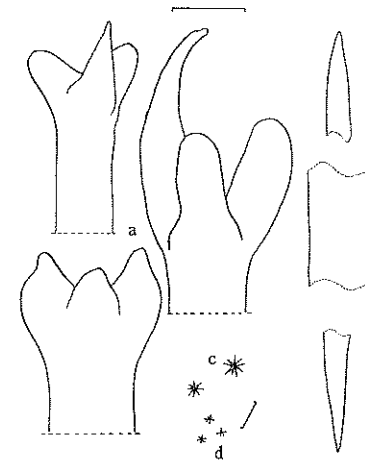
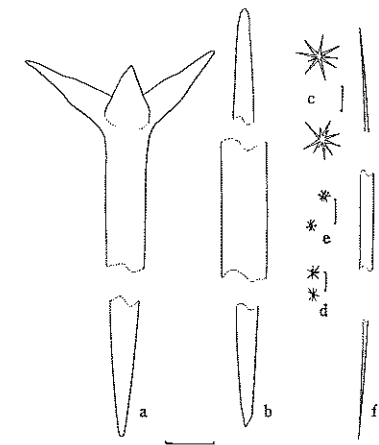
Plagiotriaene — Rhabdome stout, straight, sharply pointed or rounded, measuring 1300–2000 × 30–100 μm. Each clad varies in size and form, namely conical

to rounded, elongate to short, some cladi are occasionally entirely reduced, and measures 80–120 × 30–40 μm.

Oxeon — Smooth, stout, tapering to each end, sharply pointed or not, measuring up to 3200 × 84 μm.

Oxyaster — With about fourteen, slender conical rays, 7 μm in length and 13 μm in total diameter.

Strongylaster — 6–7 μm in total diameter with about fourteen rough, strongylate rays, 2.5 μm in length.

Remarks: This species is closely allied to *Stelletta crater* Dendy, 1924 from New Zealand in that the two species have plagiotriaenes with abnormal cladi. The two differ in that without exception plagiotriaenes develop with abnormal cladi in *Stelletta atrophia*, and only occasionally do abnormal cladi develop in *Stelletta crater* Dendy. Also, *Stelletta atrophia* has strongylasters in addition to oxyasters as microscleres.Fig. 28. *Stelletta atrophia* n. sp. (MIT-028, Holotype). Spicule; Cladomes of plagiotriaenes (a), oxeon (b), oxyasters (c) and strongylasters (d). Scale: 100 μm (plagiotriaenes, oxeon), 30 μm (others).Fig. 29. *Stelletta grubii* Schmidt. (MIT-026). Spicule; Plagiotriaene (a), oxeon (b), large oxyasters (c), small oxyasters (d), tylasters (e) and juvenile of oxeon (f). Scale: 100 μm (plagiotriaene, oxea), 50 μm (large oxyasters), 20 μm (others).181. *Stelletta grubii* Schmidt, 1862

(Fig. 29; Pl. 3, Fig. 3)

Stelletta grubii Schmidt, 1862, p. 46, Pl. 4, fig. 2; Sollas, 1888, p. 186; Lendenfeld. 1903, p. 40 (partim).
Stelletta collingsii: Sollas, 1886, p. 185.

Material examined: MIT-026, MIT-047, MIT-048, MIT-057, MIT-064, Mitsukue, 5-XI-1975.

Dimensions: 3 × 5 × 3 (thickness) cm, (MIT-026). Since each sponge is very large in nature, the writer collected only a small portions from the original large sponges.

Habitat: Subtidal zone, 15 m in depth, on rocky substrate.

Shape: Massive or irregular thick encrusting, or irregular spherical, or globular sponge, with single cloaca at summit of sponge. Cloaca reaches half the diameter and thickness of sponge.

Color: Ochraceous Salmon 12GB (Ectosome) and Ivory Buff 04EB (Endosome).

Consistency: Very hard, incompressible.

Surface: Minutely hispid, uneven and wrinkled. Oscules, 2–3 mm in diameter, open sparsely on surface of cloaca. Pores invisible. All specimens examined in this study, were veiled over outer surface by another thin encrusting sponge.

Ectosome: Up to 4 mm thick. Plagiotriaenes and oxea arranged compactly and protrude. Tyasters and small oxyasters are densely packed in this zone.

Endosome: Radiate structure of densely packed oxea or occasionally plagiotriaenes. Large oxyasters, small oxyasters and tyasters present in the flesh.

Spicule: Plagiotriaene; Oxcon; Large Oxyaster; Small Oxyaster; and Tyaster.

Plagiotriaene — Rhabdome, straight, with conical end, up to $1200 \times 60 \mu\text{m}$.

Cladome with short, conical cladi, up to $150 \mu\text{m}$ long (MIT-026).

Oxeon — Smooth, stout, straight, tapering from middle to sharply pointed end. Size range $2000\text{--}2200 \times \text{ca. } 60 \mu\text{m}$ (MIT-026).

Large Oxyaster — Abundant in endosome, with straight, sharply pointed rays, varying from eight to twelve in number. $50\text{--}70 \mu\text{m}$ in total diameter (MIT-026).

Small Oxyaster — $15\text{--}20 \mu\text{m}$ in diameter (MIT-026). Numerous in ectosome.

Tyaster — About $10 \mu\text{m}$ in diameter (MIT-026). Numerous in ectosome.

Distribution: North Atlantic Ocean; Mediterranean Sea.

In Japan — Newly recorded.

Note:

	Dimensions of Specimen	Spicule measurements	
		Plagiotriaene (Rhabdome)	Plagiotriaene (Individual cladi)
MIT-026	$3 \times 5 \times 3 \text{ cm}$	up to 1200×60	up to 150 long
MIT-047	$3 \times 6 \times 5$	up to 1300×50	up to 150×30
MIT-048	$7 \times 8 \times 7$	up to 1300×70	up to 150×30
MIT-057	$7 \times 8 \times 7$	up to 1200×50	up to 150×40
MIT-064	$7 \times 7 \times 7$	up to 1200×60	up to 150×40

Spicule measurements			
Oxeon	Large oxyaster	Small oxyaster	Tyaster
$2000\text{--}2200 \times 60$	$50\text{--}70$	$15\text{--}20$	10
up to 2500×65	60	15	12
up to 2000×70	70	$15\text{--}20$	10
up to 2100×60	60	13	10
up to 2100×60	67	15	10

Remarks: The writer identified five specimens from Mitsukue as belonging to this species, but the problem of the distribution of this species to Japan remains to be solved.

182. *Stelletta japonica* Lebwahl, 1914

(Fig. 30)

Stelletta japonica Lebwahl, 1914, p. 8, Pl. 1, figs. 20–32.

Material examined: SAT-043, Uchinoura, 5–XI-1975.

Dimensions: $13 \times 10 \times 5 \text{ cm}$.

Habitat: Subtidal zone.

Shape: Irregular massive sponge, with several lobes at margin.

Color: Ivory Buff 04EB.

Consistency: Very hard, incompressible.

Surface: Minutely hispid, uneven and slightly undulated. Oscules and pores invisible.

Ectosome: 1–1.5 mm thick. Plagiotriaenes, oxea, and occasionally dichotriaenes are packed vertically and densely. Numerous strongylasters present in this zone.

Endosome: Radiate structure of densely packed plagiotriaenes, oxea and dichotriaenes, but confused arrangement of spicules in deep portion. Oxyasters and strongylasters scattered in the flesh.

Spicule: Plagiotriaene; Dichotriaene; Oxcon; Oxyaster; and Strongylaster. Plagiotriaene — Rhabdome thick, straight, tapering from middle to cladome and other end pointed. Each clad conical, not sharply pointed, up to $150 \mu\text{m}$ long and up to $50 \mu\text{m}$ thick.

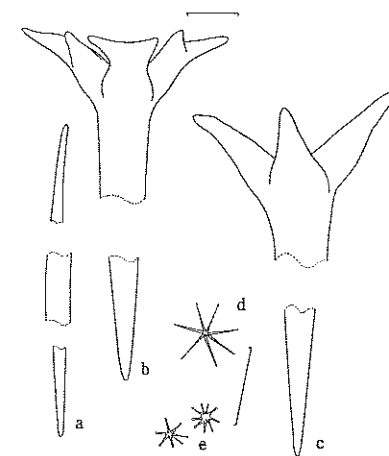


Fig. 30. *Stelletta japonica* Lebwahl. (SAT-043). Spicule; Oxcon (a), dichotriaene (b), plagiotriaene (c), oxyaster (d) and strongylasters (e). Scale: $30 \mu\text{m}$ (oxyaster, strongylaster), $100 \mu\text{m}$ (others).

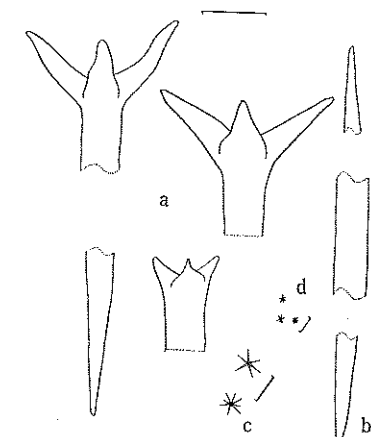


Fig. 31. *Stelletta maxima* Thiele. (MIT-097). Spicule; Plagiotriaenes (a), oxcon (b), oxyasters (c) and strongylaster (d). Scale: $100 \mu\text{m}$ (plagiotriaenes, oxcon), $30 \mu\text{m}$ (others).

Dichotriaene — Rhabdome similar to that of plagiotriaene in form, measuring up to $1300 \times 50 \mu\text{m}$. Each clad bifurcated, measuring up to 130×30 and up to $60 \times 20 \mu\text{m}$ in bifurcated part. Each end of clad conical, not sharply pointed.

Oxeon — Smooth, straight, stout, tapering to each end, and not sharply pointed. Size range up to $1300 \times 50 \mu\text{m}$.

Oxyaster — $26 \mu\text{m}$ in total diameter, with ten to twelve conical rays, sharply pointed. Each ray about $12 \mu\text{m}$ long, $1-2 \mu\text{m}$ thick.

Strongylaster — About $12 \mu\text{m}$ in total diameter, with several to ten or more strongylate rays.

Distribution: In Japan — Yodomi.

Remarks: This is the second record of this species from Japanese waters.

183. *Stelletta maxima* Thiele, 1898

(Fig. 31)

Stelletta maxima Thiele, 1898, p. 15, Pl. 1, fig. 8, Pl. 7, fig. 3(a-f).

Material examined: MIT-097, MIT-104, Mitsukue, 4-XI-1973.

Dimensions: $4 \times 4.5 \times 7$ (height) cm, (MIT-097).

Habitat: Subtidal zone, 15 m in depth, on rocky substrate.

Shape: Irregular, erect, massive, or thick encrusting sponge.

Color: Sea-form Yellow 94CA or Cream Yellow 06GA (Ectosome) and Ivory Buff 04GB (Endosome).

Consistency: Hard, only slightly compressible.

Surface: Minutely hispid, verrucose, uneven. Oscules and pores invisible.

Ectosome: Up to 5 mm thick, plagiotriaenes and oxea densely packed, and with numerous strongylasters.

Endosome: Oxea are densely and radiately packed. Oxyasters present.

Spicule: Plagiotriaene; Oxeon; Oxyaster; and Strongylaster.

Plagiotriaene — Rhabdome, straight, up to $2000 \times 70 \mu\text{m}$, not sharply pointed. Each clad conical, up to $110 \times 40 \mu\text{m}$ (MIT-097).

Oxeon — Smooth, straight, tapering from middle to each conical end, not sharply pointed. Size range up to $2500 \times 50 \mu\text{m}$ (MIT-097).

Oxyaster — Up to $15 \mu\text{m}$ in diameter.

Strongylaster — Up to $10 \mu\text{m}$ in diameter.

Distribution: In Japan — Enoshima.

Note:

	Dimensions of specimen	Spicule measurements	
		Plagiotriaene	
MIT-097	$4 \times 4.5 \times 7$ cm	Rhabdome up to 2000×70 , individual cladi 110×40	
MIT-104	$8 \times 11 \times 5$	Rhabdome up to 1800×70 , individual cladi 150 long	

Spicule measurements		
Oxeon	Oxyaster	Strongylaster
up to 2500×50	about 15	about 10
up to 4000×95	15-25	about 12

Remarks: This is the second record of this species from Japanese waters.

184. *Stelletta misakiensis* Lebewohl, 1914

Stelletta misakiensis Lebewohl, 1914, p. 13, Pl. 1, figs. 33-38; Tanita, 1965a, p. 55, Pl. 3, fig. 16, t-fig. 10; Hoshino, 1975a, p. 34, Pl. 4, fig. 4.

Distribution: In Japan — Misaki; Sado; Hiwasa.

185. *Stelletta morikawai* Tanita, 1961

Stelletta morikawai Tanita, 1961, p. 351, Pl. 4, fig. 19; Hoshino, 1971, p. 22.

Distribution: In Japan — Inland Sea of Japan.

186. *Stelletta naseana* Thiele, 1898

Stelletta naseana Thiele, 1898, p. 16, Pl. 7, fig. 4(a-d); Lendenfeld, 1903, p. 47.

Distribution: In Japan — Amami Oshima.

187. *Stelletta solida* Tanita, 1963

Stelletta solida Tanita, 1963, p. 126, Pl. 6, fig. 5, t-fig. 4.

Distribution: In Japan — Ushitsu.

188. *Stelletta subtilis* (Sollas, 1886)

(Fig. 32)

Myriastras subtilis Sollas, 1886, p. 113, Pl. 14, figs. 23-28; Hoshino, 1971, p. 22.

Stelletta subtilis: Lendenfeld, 1903, p. 48.

Material examined: SAT-070-1, Uchinoura, 5-XI-1975.

Dimensions: $0.8 \times 0.7 \times 0.6$ cm.

Habitat: Subtidal zone, 15 m depth, attached to another sponge.

Shape: Very small, irregular, spherical sponge, attached to basal part of *Myxilla lobatus* n. sp. (SAT-070).

Color: Seashell Pink 12BA.

Consistency: Hard and tough.

Surface: Minutely hispid, with spicules, about 1 mm long, projecting from surface. Oscules and pores invisible.

Ectosome and Endosome: Typical radiate structure. Dichotriaenes and anatriaenes are densely packed, their cladomes arranged at surface of sponge. Further, numerous anatriaenes project from surface to a height of 1 mm, their cladomes directed outward, and in deep portion numerous oxea are densely and radiately arranged. Numerous tylasters are packed at or near surface.

Spicule: Dichotriaene; Anatriaene; Oxeon; and Tylaster.

Dichotriaene — Rhabdome straight, may taper to sharply pointed end, or thin and hair-like in juvenile, measuring up to 2000 μm long and 50 μm thick. Cladome up to 550 μm in diameter, each clad up to 300 μm long and 50 μm thick, bifurcated end conical, up to 220 μm long and up to 40 μm thick.

Anatriaene — Rhabdome up to 2000 μm long and up to 20 μm thick, tapering to end, distal half very thin. Each clad conical, pointed, strongly bent, up to 60 μm long and up to 15 μm thick and cladome about 90 μm in diameter.

Oxeon — Smooth, fusiform, each end sharply pointed, measuring up to 2000 \times 40 μm .

Tylaster — With several to ten or more rays, swollen at end, measuring about 11 μm in diameter.

Distribution: In Japan — Inland Sea of Japan.

Remarks: The specimen that was described as *Myriastra subtilis* by Sollas (1886), was collected from Kobe, and subsequently this species was transferred to the genus *Stelletta* by Lendenfeld (1903).

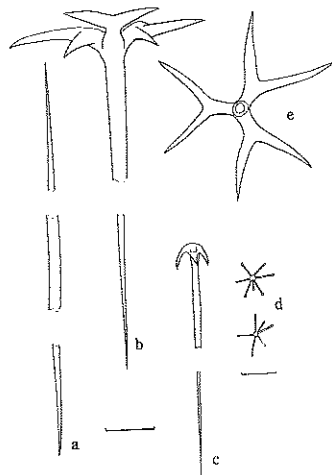


Fig. 32. *Stelletta subtilis* (Sollas). (SAT-070-1). Spicule; Oxeon (a), dichotriaene (b), anatriaene (c), tylasters (d) and cladome of dichotriaene (e). Scale: 10 μm (tylasters), 100 μm (others).

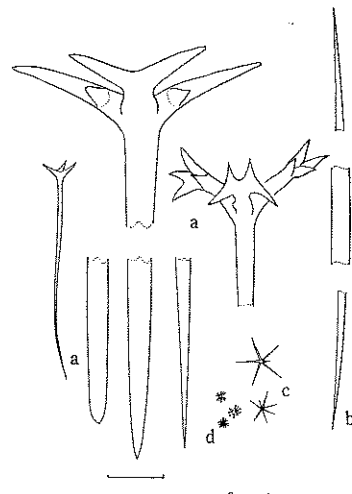


Fig. 33. *Stelletta tetrafurcata* n. sp. (SAT-065, Holotype). Spicule; Dichotriaenes and its juveniles (a), oxeon (b), oxyasters (c) and tylasters (d). Scale: 50 μm .

189. *Stelletta tetrafurcata* n. sp.

(Fig. 33; Pl. 3, Fig. 4)

Material examined: SAT-065 (Holotype), Uchinoura, 5-XI-1975.

Dimensions: 9 \times 6 \times 3 cm

Habitat: Subtidal zone, 15–20 m in depth.

Shape: Irregular massive sponge attached to dead coral.

Color: Maple 07GD.

Consistency: Very hard, incompressible.

Surface: Smooth to touch, wrinkled. Oscules and pores invisible.

Ectosome: Dichotriaenes densely packed, and over this zone, strongylasters arranged to a thickness of 50 μm . Cladome zone arranged with dichotriaenes, reaching 800–1000 μm in thickness.

Endosome: Radiate structure of densely packed oxea, numerous oxyasters and tylasters present in the flesh, tylasters especially abundant near aquiferous system.

Spicule: Dichotriaene; Oxeon; Oxyaster; and Tylaster.

Dichotriaene — Rhabdome smooth, straight, tapering to end, end not sharply pointed, measuring up to 800 \times 40 μm . Cladome 150–250 μm in diameter, and each clad bifurcate or occasionally tetra-furcate, end of each clad conical, not sharply pointed. Small plagiotriaenes are found as juvenile forms of this spicule.

Oxeon — Smooth, stout, straight, each end tapering to a sharp point, measuring up to 1600 \times 27 μm .

Oxyaster — About 50 μm in diameter, with several conical and sharply pointed rays, about 20 μm long and 2 μm thick.

Tylaster — About 10 μm in diameter, with ten or more rays.

Remarks: This species is allied to *Stelletta aruensis* Hentschel, 1912 from the Aru Islands in that the cladi of the dichotriaenes is tetra-furcated, but it differs in having tylasters in place of roughened strongylasters.

Family Craniellidae De Laubenfels, 1936

Genus *Craniella* Schmidt, 1870

190. *Craniella globosa* Thiele, 1898

Craniella globosa Thiele, 1898, p. 26, Pl. 5, fig. 15, Pl. 7, fig. 14(a–e); Lendenfeld, 1903, p. 24.

Distribution: In Japan — Tango.

191. *Craniella globosa* var. *anamonaena* Tanita, 1968

Craniella globosa var. *anamonaena* Tanita, 1968, p. 54, t-fig. 15; Hoshino, 1974, p. 11, Pl. 1, fig. 6, Pl. 2, figs. 9–11.

Distribution: In Japan — Ariake Sea.

192. *Craniella japonica* (Lampe, 1886)

Tetilla japonica Lampe, 1886, p. 1, Tab. I; Sollas, 1888, p. 46; Lendenfeld, 1903, p. 21; Hoshino, 1971, p. 22.

Tethya japonica: Lebwahl, 1914, p. 19.

Material examined: SIS-120, Hosonosu, 11-VII-1975.

Dimensions: $3 \times 3 \times 4$ (height) mm.

Habitat: Intertidal zone, low tide subzone, on muddy bottom.

Shape: Very small, ellipsoidal sponge, with single skeletal fiber string, 70–100 μm in diameter and 2–3 cm long, extending into muddy substratum from basal part of sponge.

Color: Vandyke Red 26PE.

Consistency: Soft, compressible.

Surface: Smooth to touch, even. Single small oscule opens at summit of ellipsoidal part. Pores invisible.

Ectosome and Endosome: Radiate structure of protriaenes and oxea in ellipsoidal part of sponge. Spicules radiate from a point close by summit of ellipsoidal part arranging their base at surface. Skeletal string from basal part is a tract of anatriaenes in an arrangement at base of spicule located at opposite side from main body.

Spicule: Oxeon; Protriaene; Anatriaene; and Sigma.

Oxeon — Long, smooth, nearly straight, tapering to each hair-like end, measuring up to $2000 \times 9 \mu\text{m}$.

Protriaene — Long, smooth, very thin, each clad dissimilar to others in size, measuring up to $2000 \times 10 \mu\text{m}$.

Anatriaene — Long, smooth, very thin, measuring up to $2000 \times 10 \mu\text{m}$.

Sigma — Very rare.

Distribution: In Japan — Sagami Bay; Inland Sea of Japan.

Remarks: This species was originally described as *Tetilla japonica* from Sagami Bay by Lampe (1886). Later this species was described as *Tethya japonica* by Lebwahl (1914) based upon a specimen from the same area as Lampe (1886), and was described as *Tetilla japonica* by Hoshino (1971) from the Inland Sea of Japan. In this study, the writer transfers this species to the genus *Craniella* according to De Laubenfels (1936).

193. *Craniella serica* (Lebwahl, 1914)

(Fig. 34)

Tethya serica Lebwahl, 1914, p. 12, Pl. 2, figs. 1–38.

Tetilla serica: Hoshino, 1971, p. 22.

Material examined: SIS-020, Hosonosu, 6-XI-1971.

Dimensions: $2.5 \times 2.5 \times 3$ cm.

Habitat: Intertidal zone, low tide subzone, on muddy bottom.

Shape: Irregular ellipsoidal, similar to pumpkin in shape and surface unevenness, with inner part almost empty. Main part of sponge settled on muddy bottom with numerous long roots emanating from basal part of sponge.

Color: Pale Burnt Lake 28PF or Pansy Purple 30NF.

Consistency: Very soft in life as if elastic bag filled up with water, but after desiccation sponge becomes thin as paper.

Surface: Smooth to touch, uneven. Single oscule, about 1 cm in diameter, opens at center of summit of sponge. Pores invisible.

Ectosome and Endosome: Made up of long ascending spicules, densely packed, running from the basal part to the summit of sponge, under this arrangement are long spicules, coarsely, confusedly, and horizontally arranged. Spicules comprising those structures on main part of sponge are very long, thin oxea and very long, thin protriaenes. The roots projecting from basal part of sponge are made up of numerous, long and thin anatriaenes densely arranged. Numerous sigmoid microscleres are scattered throughout.

Spicule: Oxeon; Protriaene; Anatriaene; and Sigma.

Oxeon — Very long, thin, straight or sinuous or arched, smooth, each end thin and hair-like, measuring up to 3 mm long and up to 10 μm in maximum diameter.

Protriaene — Very long, thin, straight or sinuous, measuring up to 3 mm long and up to 10 μm wide, each clad conical and sharply pointed, dissimilar to others in size, measuring up to 100 μm long.

Anatriaene — Very long, thin, measuring up to 5 mm long and up to 6 μm wide, clad conical, sharply pointed.

Sigma — Small, C- or S-shaped, 15 μm long and 0.5 μm wide.

Distribution: In Japan — Sagami Bay; Inland Sea of Japan.

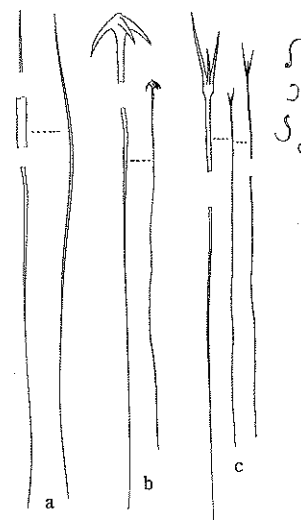


Fig. 34. *Craniella serica* (Lebwahl). (SIS-020). Spicule; Oxea (a), anatriaenes (b), protriaene (c) and sigmata (d). Scale: 10 μm (sigmata), 20 μm (others).

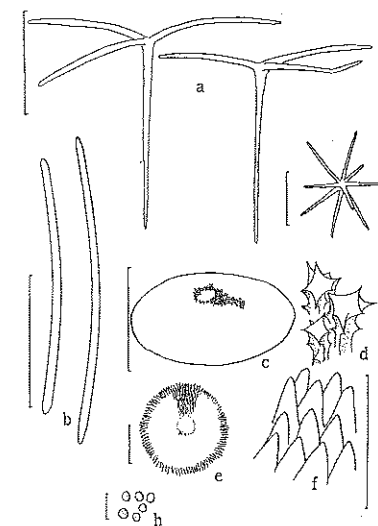


Fig. 35. *Geodistrongyla strongyla* n. sp. (SAT-014, Holotype). Spicule; Tetracts (a), strongyles (b), fully developed sterrasters (c) and young (e), their surface views (d, f), oxyaster (g) and spherules (h). Scale: 400 μm (tetracts), 200 μm (strongyles), 50 μm (sterrasters), 1 μm (surface view of fully developed sterraster), 10 μm (others).

Remarks: The writer transfers this species to the genus *Craniella* for reasons similar to the case of *Craniella japonica*.

194. *Craniella varians* Thiele, 1898

Craniella varians Thiele, 1898, p. 27, Pl. 5, figs. 17-18, Pl. 7, fig. 16(a-c), fig. 17(a-b).

Distribution: In Japan — Oshima near Tango.

Family Geodidae Gray, 1867 sensu De Laubenfels, 1936

Genus *Geodia* Lamarck, 1815

195. *Geodia exigua* Thiele, 1898

Geodia exigua Thiele, 1898, p. 11, Pl. 6, fig. 8(a-h); Lendenfeld, 1903, p. 115.

Distribution: In Japan — Amami Oshima.

Genus *Geodistrongyla* new

Type-species: *Geodistrongyla strongyla* n. sp.

Diagnosis: Geodidae having strongyle as endosomal monaxon spicule without triaene.

196. *Geodistrongyla strongyla* n. sp.

(Fig. 35; Pl. 3, Fig. 5; Pl. 6, Figs. 1-6; Pl. 7, Figs. 1-2)

Material examined: SAT-014 (Holotype), SAT-015, SAT-016, SAT-017, SAT-040, SAT-079, Uchinoura, 5-XI-1975.

Dimensions: $3 \times 10 \times 5$ (height) cm in whole mass, but each body spherical, about $2 \times 2 \times 3$ cm, (SAT-014).

Habitat: Subtidal zone, 10-20 m in depth, on stone surface.

Shape: One to several irregular or elongated spherical bodies, developing from thin base expanded on stone surface.

Color: Purple Drab 29IG or Ecu 08ED.

Consistency: Hard as stone due to peculiar ectosomal structure, but endosome coarse and fragile.

Surface: Smooth, even, but forming a pattern of ripples, each ripple less than 1 mm diameter. Pores invisible. One to several oscules, 1-2 mm in diameter, opening near summit of spherical body.

Ectosome: About 1.2 mm thick, very hard, composed of densely packed sterrasters primarily, plus spherules.

Endosome: Irregular, confused reticulation of strongyles. Tetracts, sterrasters in various developmental stages, spherules and oxyasters present in the flesh.

Spicule: Tetract; Strongyle; Sterraster; Oxyaster; and Spherule.

Tetract — Very rare on spicule mount. Smooth, with three similar, gently arched and occasionally bent, strongylate arms, about $420 \mu\text{m}$ long and $20-25 \mu\text{m}$ thick. Shaft strongylate to oxeate, straight, up to $500 \mu\text{m}$ long and $15-20 \mu\text{m}$ thick (SAT-014).

Strongyle — Smooth, straight or slightly arched or occasionally sinuous. Size range 380×12 to $645 \times 18 \mu\text{m}$ (SAT-014).

Sterraster — On fully grown spicule, ellipsoid form, with surface ornament of star-like projections set close together, but with conical, blunt rays on entire surface of juvenile spicules. At one spot on surface these projections are absent (called a hylum). Size range ca. $135 \times 100 \mu\text{m}$ (major \times minor axis), ca. $12 \mu\text{m}$ in diameter of hylum on fully grown spicule, and about $30 \mu\text{m}$ in diameter on juvenile (SAT-014).

Oxyaster — About $22 \mu\text{m}$ in total diameter, with three to ten or more rough rays, each ray $10-16 \mu\text{m}$ long (SAT-014).

Spherule — Small, spherical, surface rough, $3 \mu\text{m}$ in diameter (SAT-014).

Note:

	Dimensions of specimen	Spicule measurements	
		Tetract (Arm)	Tetract (Shaft)
SAT-014	$3 \times 10 \times 5$ cm	$420 \times 20-25$	$500 \times 15-20$
SAT-015	$5 \times 4 \times 2.5$	290×15	465×17
SAT-016	$4 \times 4 \times 5$	290×15	465×17
SAT-017	$2 \times 4 \times 3$	rare	
SAT-040	$13 \times 10 \times 4.5$	450×20	625×20
SAT-079	$10 \times 5 \times 2$	450×26	760×28

Spicule measurements			
Strongyle	Sterraster	Oxyaster	Spherule
380×12 to 645×18	135×100	22	3
380×16 to 600×20	120×95	30	3
$555-609-660 \times 13-14-15$	110×80	30	3
$520-607-690 \times 12-16-19$	130×100	20	3
$476-591-690 \times 13-16-17$	130×105	35	3-4
$415-551-650 \times 13-15-20$	125×80	30	5

Remarks: This species is very abundant in Uchinoura of the Uwa Sea District.

Genus *Erylus* Gray, 1867

197. *Erylus placenta* Thiele, 1898

Erylus placenta Thiele, 1898, p. 5, Pl. 1, fig. 1, Pl. 6, fig. 1(a-h); Lendenfeld, 1903, p. 87.

Distribution: In Japan — Kagoshima.

Family Kaliapsidae De Laubenfels, 1936

Genus *Discodermia* Bocage, 1869

198. *Discodermia calyx* Döderlein, 1883

Discodermia calyx Döderlein, 1883, p. 73, Pl. 5, figs. 4-5; Sollas, 1888, p. 327; Lendenfeld, 1903, p. 129; Tanita, 1970b, p. 102, Pl. 2, fig. 12; Hoshino, 1975a, p. 34, Pl. 4, figs. 5-6.

Distribution: In Japan — Sagami Bay; Yuki; Hiwasa.

199. *Discodermia japonica* Döderlein, 1883

Discodermia japonica Döderlein, 1883, p. 73, Pl. 5, figs. 1-2; Sollas, 1888, p. 329; Lendenfeld, 1903, p. 129; Burton et Rao, 1932, p. 306; Tanita, 1961b, p. 139, Pl. 4, fig. 12; 1970b, p. 102, Pl. 2, fig. 11; Hoshino, 1975a, p. 34, Pl. 2, fig. 9; 1976a, p. 255, Pl. 5, fig. 27; Vacelet et Vasseur, 1971, p. 58; Vacelet, Vasseur et Levi, 1976, p. 24.

Distribution: Burma; Tulear.

In Japan — Pacific Coast of Japan.

200. *Discodermia irregularis* Hoshino, 1976

Discodermia irregularis Hoshino, 1976a, p. 254, Pl. 5, figs. 28-34.

Distribution: In Japan — Kushimoto.

201. *Discodermia kiiensis* Hoshino, 1977

(Fig. 36; Pl. 7, Figs. 3-6)

Discodermia kiiensis Hoshino, 1977b, p. 12, Pl. 5, figs. 3-7, t-fig. 5.

Material examined: SAT-038, SAT-041, SAT-050, Uchinoura, 5-XI-1975.

Dimensions: $8 \times 8 \times 17$ (height) cm, (SAT-038).

Habitat: Subtidal zone, 15-20 m in depth.

Shape: Irregular massive or hollow cylindroid sponge.

Color: Apricot Yellow 05IA.

Consistency: Very hard and rock-like.

Surface: Smooth or rough, nearly even. Oscules and pores invisible.

Ectosome: Up to 400 μm thick. Phyllostriaenes spread over entire surface of sponge, with microstrongyles densely accumulated over phyllostriaene zone.

Endosome: Rigid skeleton of desma, fused between tips with numerous irregular nodules of branches, with vague tracts of oxea running radiately through gaps in these branches. Numerous microxea present in the flesh or near principal spicules.

Spicule: Phyllostriaene; Tetracrepid Desma; Oxeon; Microstrongyle; and Microxeon.

Phyllostriaene — Cladome varies from a simple plate with wavy margin to highly armoured plate with repeatedly branched cladi, 300 to 600 μm in total diameter. Rhabdome short, nearly conical, not sharply pointed, measuring up to $300 \times 100 \mu\text{m}$ (SAT-038).

Tetracrepid Desma — About 800 μm in total diameter. Each clone repeatedly branched near end, and armoured with numerous round nodules.

Oxeon — Long, slender, smooth, slightly arched or sinuous, tapering to sharply pointed end, measuring up to $1300 \times 13 \mu\text{m}$ (SAT-038).

Microstrongyle — Small, bean-shaped, rough over entire surface, measuring $15 \times 3 \mu\text{m}$ (SAT-038).

Microxeon — Slightly arched, tapering to pointed end, rough over entire surface, measuring $40 \times 2.5 \mu\text{m}$ (SAT-038).

Distribution: In Japan — Kushimoto.

Note:

	Dimensions of specimen	Shape	Spicule measurements	
			Phyllostriaene	
SAT-038	$8 \times 8 \times 17$ cm	Hollow cylindroid, with numerous projections on side surface, with single cloaca.	Cladome, 300-600	Rhabdome, up to 300×25
SAT-041	$9 \times 9 \times 7$	Upright irregular massive with several lobes with opened oscules on tips.	Cladome, 265-500	Rhabdome, 150×24
SAT-050	$19 \times 17 \times 6$	Irregular dish-like, with long narrow irregular cavity on surface.	Cladome, 200-700	Rhabdome, up to 200×20

Spicule measurements			
Tetracrepid Desma	Oxeon	Microstrongyle	Microxeon
about 800	up to 1300×13	15×3	40×2.5
500-700	$300-1400 \times 5-9$	15×3	55×2
up to 700	$380-1200 \times 6-7$	$13-18 \times 2.5-4$	50×3

Remarks: This species was originally described from Kushimoto by Hoshino (1977b). This is the second record of *Discodermia kiiensis* from Japan.

Genus *Siliquariaspongia* new

Type-species: *Siliquariaspongia japonica* n. sp.

Diagnosis: Sponge having Discotriaene and Microacanthostrongyle as ectosomal spicule, and Tetralophe as endosomal spicule.

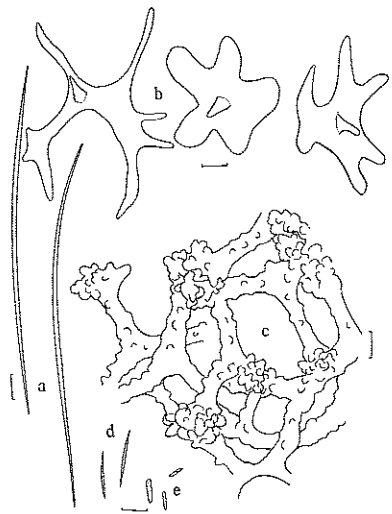


Fig. 36. *Discodermia kiiensis* Hoshino. (SAT-038). Spicule; Oxea (a), phyllotriacnes (b), desma (c), microoxea (d) and microstrongyles (e). Scale: 20 μ m (microsclere), 100 μ m (macrosclere).

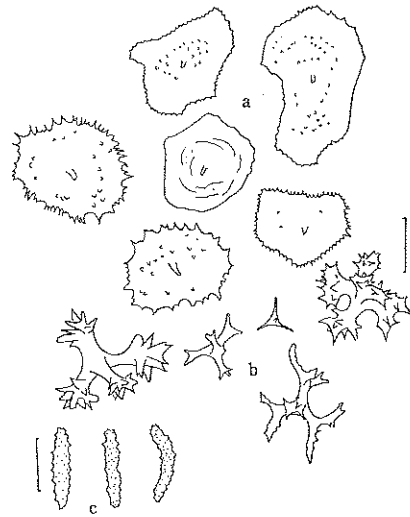


Fig. 37. *Siliquariaspongia japonica* n. sp. (SAT-078, Holotype). Spicule; Discotriaene (a), tetralophes (b) and microacanthostrongyles (c). Scale: 20 μ m (microacanthostrongyles), 100 μ m (others).

202. *Siliquariaspongia japonica* n. sp.

(Fig. 37; Pl. 3, Fig. 6)

Material examined: SAT-078 (Holotype), Uchinoura, 5-XI-1975.

Dimensions: 3 \times 3 \times 3 cm.

Habitat: Intertidal zone, mid tide subzone.

Shape: Irregular massive sponge, symbiotic with *Siliquaria cumingi* (Mörch), (Gastropoda).

Color: Orange 16PA.

Consistency: Very slightly compressible, quite hard.

Surface: Smooth, even. Oscules and pores invisible.

Ectosome: 50–60 μ m in thickness, discotriaenes fully packed in a jigsaw puzzle arrangement, with numerous microacanthostrongyles arranged densely over them.

Endosome: Tetralophes densely packed and numerous microacanthostrongyles present.

Spicule: Discotriaene; Tetralophe; and Microacanthostrongyle.

Discotriaene — Discoid, orbicular, or elliptical, regular or irregular polygonal, with smooth, saw-toothed or deeply invaginated margin, measuring 100–200 μ m in diameter, and with several low, small projections on surface. Rhabdome irregular conical, rounded or sharply pointed, 20–30 μ m long and 8–10 μ m wide.

Tetralophe — With four arms similar in size and form. Each arm generally bifurcated or occasionally trifurcated, with spines throughout length and well

developed, large conical spines near and at tip of arm, measuring 100–200 μ m in total diameter, each arm 80–100 μ m long and 15–30 μ m wide.

Microacanthostrongyle — Rough, straight to bent, bean-shaped, measuring 20–30 μ m long and 4–5 μ m wide.

Remarks: This species is apparently abundant in the mid tide subzone in the area where materials examined in this study were collected.

Genus *Theonella* Gray, 1868

203. *Theonella swinhoei* Gray, 1868

Theonella swinhoei Gray, 1868, p. 566, figs. 1–3; Sollas, 1888, p. 284, Pls. 29–30; Topsent, 1897, p. 431; Thiele, 1899, p. 6; 1900, p. 52, Pl. 3, figs. 3–4; Wilson, 1925, p. 448; Burton et Rao, 1932, p. 307, t-fig. 2; Levi, 1958, p. 5, fig. 1; 1961, p. 4, fig. 1; Vacelet et Vasseur, 1971, p. 58, fig. 1; Hoshino, 1976a, p. 253, Pl. 4, figs. 20–23, t-fig. 5; Vacelet, 1976, p. 24.

Distribution: Tulear; Celebes; Ternate; Amboina; Manila; Formosa; Mergui Archipelago.

In Japan — Kushimoto.

Order Homosclerophorida Dendy, 1905

Family Halinidae De Laubenfels, 1934

Genus *Plakortis* Schulze, 1880

204. *Plakortis simplex* Schulze, 1880

Plakortis simplex Schulze, 1880, p. 430, 449; Sollas, 1888, p. 279; Topsent, 1895, p. 557, Pl. 21, fig. 7; 1897, p. 428, Pl. 18, fig. 1; Lendenfeld, 1903, p. 121; Hentschel, 1912, p. 305; Basic, 1922, p. 292, t-fig. Z; De Laubenfels, 1950, p. 33, fig. 22; 1951, p. 267; 1954a, p. 246; Vacelet, Vasseur et Levi, 1976, p. 14, Pl. 4, fig. a, t-fig. 3; Boury-Esnault, 1971, p. 295.

Monotria japonica Hoshino, 1977b, p. 13, Pl. 4, fig. 6, Pl. 5, figs. 1–2, t-fig. 6.

Distribution: Cosmopolitan

In Japan — Hiwasa.

Genus *Pachastrella* Schmidt, 1868

205. *Pachastrella tenuilaminalis* (Sollas, 1886)

(Fig. 38)

Normania tenuilaminalis Sollas, 1886, p. 186.

Pocillastra tenuilaminalis: Sollas, 1888, p. 95, Pl. 5, figs. 17–18; Dickinson, 1945, p. 47, Pl. 93, fig. 186, Pl. 94, fig. 187.

Pachastrella (*Pachastrella*) *crassiuscula*: Lendenfeld, 1903, p. 77 (partim).

Pachastrella tenuilaminalis: Labwohl, 1914, p. 72, Pl. 7, figs. 16–25, Pl. 9, fig. 21; Dendy, 1916, p. 230, Pl. 45, fig. 2; Tanita, 1965a, p. 52, Pl. 3, fig. 12, t-fig. 6.

Material examined: SAT-024, SAT-049, SAT-059, Uchinoura, 5-XI-1975.

Dimensions: 7 \times 7 \times 3.5 cm, (SAT-024).

Habitat: Subtidal zone, 15–20 m in depth.

Shape: Irregular massive sponge, occasionally with a few hollow cloaca, and with small pebbles caught in basal part of sponge.

Color: Naples Yellow 03GB or Maple 07GD.

Consistency: Hard, non-clastic, fragile.

Surface: Smooth, uneven, with innumerable pores of less than 0.2 mm in diameter on outer side surface. Oscules open on cloaca surface.

Ectosome: Up to 60 μm in thickness. Confused horizontal arrangement of oxea, or vague tracts of oxea, and confused arrangement of microxea and metasters.

Endosome: In deep part, confused arrangement of long oxea, tetracts and microxea. Oxea ascend to surface near ectosome. Metasters acattered in the flesh.

Spicule: Tetract; Microxeon; and Metaster.

Tetract — With four similar rays arranged into faces of tetrahedron, occasionally three rays slightly arched, and only rarely abnormally developed. Each ray invariably tapers to end, but is not pointed. Size range of rays 200×15 to $280 \times 25 \mu\text{m}$ (SAT-024).

Oxeon — Fusiform, nearly straight or gently curved, tapering to each end, may or may not be sharply pointed. Size range up to $1300 \times 25 \mu\text{m}$ (SAT-024).

Microxeon — Rough, slightly arched, tapering to a point at each end. Size range $105\text{--}134\text{--}170 \times 4\text{--}5.6\text{--}7 \mu\text{m}$ (SAT-024).

Metaster — Two to four rays radiate at each end of shaft, measuring $10\text{--}25 \mu\text{m}$ in maximum length (SAT-024).

Distribution: Amirante; California Bay.

In Japan — Sagami Bay; Sado.

Note:

	Dimensions of specimen	Spicule measurements	
		Tetract (ray length)	
SAT-024	$7 \times 7 \times 3.5 \text{ cm}$	200×15 to 280×25	
SAT-049	$7 \times 4 \times 6$	$180\text{--}360 \times 10\text{--}22$	
SAT-059	$9 \times 5 \times 4$	$250\text{--}300 \times 17\text{--}20$	

	Spicule measurements		
	Oxeon	Microxeon	Metaster
up to 1300×25	$105\text{--}134\text{--}170 \times 4\text{--}5.6\text{--}7$		$10\text{--}25$
up to 2200×35		$140\text{--}170\text{--}190 \times 5\text{--}6\text{--}7$	up to 35
up to 2300×30		$125\text{--}146\text{--}175 \times 4\text{--}5\text{--}6$	up to 13

Remarks: This species is characterized by having tetracts, oxea, roughened microxea and metasters as spicules. Lendenfeld (1903) considered this species to be a synonym of *Pachastrella crassiuscula* (Sollas, 1886), but *P. crassiuscula* has triaenes that are discriminated from the tetracts with respect to the rhabdome

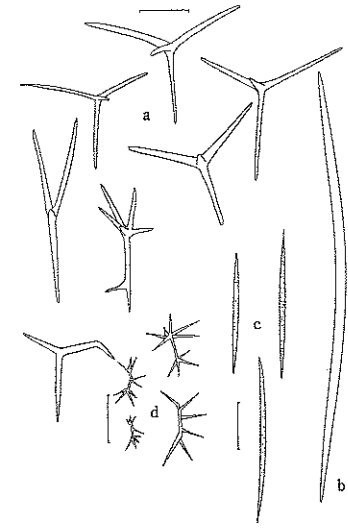


Fig. 38. *Pachastrella tenuilaminalis* (Sollas). (SAT-049). Spicule; Tetracts (a), oxeon (b) microxea (c) and metasters (d). Scale: $40 \mu\text{m}$ (microxea), $30 \mu\text{m}$ (metasters), $200 \mu\text{m}$ (others).

being longer than the three other cladi. These triaenes are in addition to four kinds of spicules. Therefore, it is not appropriate to consider this species as a synonym of *Pachastrella crassiuscula*.

IX. KEY TO THE GENERA TREATED

(I.) Order Keratosa Grant, 1861

No proper spicules at all, and usually well provided with horny skeleton.

A brief keys to the genera treated in this study

1. [Main fibers, fascicular 1.
- [Main fibers, not fascicular 2.
1. [Filaments, present *Ircinia*
- [Filaments, absent *Polyfibrospongia*
2. [Main fibers, abundantly cored *Dysidea*
- [Main fibers, cored but not abundantly 3.
3. [Fleshy dermis, with foreign materials *Thorecta*
- [Fleshy dermis, without foreign materials 4.
4. [Fibers, stratified *Cacospongia*
- [Fibers, not stratified 5.
5. [External form, honey-comb-like *Hyattella*
- [External form, not honey-comb-like *Spongia*

(II.) Order Haplosclerida Topsent, 1928

Only diactinal spicule as macrosclere, and no microsclere.

i. A brief keys to the genera treated in this study

- [Without ectosomal skeleton *Haliclona*
- [With ectosomal skeleton 1.
- [With oxeon only 2.
- 1. [With strongyle only *Siphonochalina*
- 2. [Endosomal fibers packed abundantly with spicules *Callyspongia*
- [Endosomal fibers packed with several rows of spicules in the central part *Ceraochalina*

ii. A brief keys to the subgenera of *Haliclona* treated in this study

- [Skeleton, regular arrangement of spicules 1.
- [Skeleton, confused arrangement of spicules *Amphimedon*
- 1. [Isodictyal or subisodictyal arrangement in somewhere ... 2.
- [Isodictyal or subisodictyal arrangement not in anywhere *Reniera*
- 2. [External form, ramose *Haliclona*
- [External form, massive or encrusting *Reniclona*

(III.) Order Poecilosclerida Topsent, 1928

Two or more categories of macroscleres, and with microscleres, but occasionally microscleres absent.

A brief keys to the group of Poecilosclerida

- [Principal spicules, diactinal 1.
- [Principal spicules, monactinal 2.
- 1. [Auxiliary spicules, diactinal Phorbasiformes
- [Auxiliary spicules, monactinal Plocamiiformes
- 2. [Auxiliary spicules, diactinal Myxilliformes
- [Auxiliary spicules, monactinal Microcioniformes

i. Group Phorbasiformes De Laubenfels, 1936

A brief keys to the genera treated in this study.

- [With oxeon as macrosclere 1.
- [With tornote as macrosclere *Anchinoe*
- [With strongyle as macrosclere 2.
- [With tylote as macrosclere *Coelosphaera*
- 1. [With microscleres 3.
- [Without microscleres 4.
- 2. [Spicule size, widely varied *Petrosia*
- [Spicule size, fairly uniform *Strongylophora*
- 3. [With sigma or toxon as microsclere 5.
- [With sigma and toxon as microsclere 6.
- 4. [With dermal skeleton *Pellina*
- [Without dermal skeleton *Adocia*
- 5. [With sigma as microsclere *Sigmatocia*
- [With toxon as microsclere *Toxadocia*

- 6. [With centrangulated sigma *Biminia*
- [With normal C-shaped sigma *Orina*

ii. Group Plocamiiformes De Laubenfels, 1936

The genus *Lissoplocamia* only is assigned to this group, in this study.

iii. Group Myxilliformes De Laubenfels, 1936

A brief keys to the genera treated in this study.

- [Without tylote as macrosclere 1.
- [With tylote as macrosclere 2.
- 1. [With style as macrosclere *Iotrochota*
- [With tornote as macrosclere 3.
- 2. [With style as macrosclere 4.
- [Without style as macrosclere 5.
- 3. [With sigma and isochela as microsclere *Myxilla*
- [With isochela as microsclere *Hymedesmia*
- 4. [With cladotylote as macrosclere *Acarnus*
- [Without cladotylote as macrosclere *Tedania*
- 5. [With acanthostyle as macrosclere *Lissodendoryx*
- [Without acanthostyle as macrosclere *Forcepia*

iv. Group Microcioniformes De Laubenfels, 1936

A brief keys to the genera treated in this study.

- [With subtylostyle as macrosclere 1.
- [With style as macrosclere 2.
- 1. [With anisochela as microsclere *Mycale*
- [Without anisochela as microsclere 3.
- 2. [With acanthostyle as macrosclere 4.
- [Without acanthostyle as macrosclere 5.
- 3. [With toxon as microsclere *Thalysias*
- [With sigma as microsclere *Esperiopsis*
- 4. [With microsclere 6.
- [Without microsclere 7.
- 5. [With toxon as microsclere 8.
- [Without toxon as microsclere 9.
- 6. [External form, thin encrusting *Microcionia*
- [External form, ramose *Clathria*
- 7. [External form, thin encrusting *Eurypon*
- [External form, ramose *Thalysseurypon*
- 8. [External form, thin encrusting *Ophilitaspongia*
- [External form, ramose *Litaspongia*
- 9. [With anisochela as microsclere *Paresperella*
- [With isochela as microsclere *Amphilectus*

(IV.) Order Halichondrida Vosmaer, 1885

Not radiate structure, macrosclere oxeon or style or strongyle or their combinations, without microsclere.

A brief keys to the genera treated in this study.

- [With oxeon as macrosclere *Halichondria*
- [With style as macrosclere 1.
- 1. [With style exclusively *Hymeniacion*
- [With other kinds of spicule in addition of style 2.
- 2. [With strongyle as macrosclere *Acanthella*
- [With acanthostyle as macrosclere *Prianos*

(V.) Order Axinellida Bergquist, 1970

With axial condensed skeleton and with oxeon, or strongyle or their combination as macrosclere, microsclere present.

A brief keys to the genera treated in this study.

- [With trachystyle as macrosclere *Raspailia*
- [Without trachystyle as macrosclere 1.
- 1. [With style exclusively as macrosclere *Homaxinella*
- [With other kinds of spicules in addition to style 2.
- 2. [Without oxeon as macrosclere *Ceratopsis*
- [With oxeon as macrosclere 3.
- 3. [With strongyoxeon as macrosclere *Bubaris*
- [Without strongyloxeon as macrosclere *Axinella*

(VI.) Order Hadromerida Topsent, 1894

With radiate structure, and with tylostyle, occasionally style or oxeon as macrosclere and with or without astrose microsclere.

A brief keys to the genera treated in this study.

- [Boring into calcareous substrate *Cliona*
- [Not boring 1.
- 1. [With microscleres 2.
- [Without microscleres 3.
- 2. [With microstrongyle as microsclere *Choanites*
- [Without microstrongyle as microsclere 4.
- 3. [With style as macrosclere *Aaptos*
- [With tylostyle as macrosclere 5.
- 4. [With spiraster as microsclere 6.
- [With sanidaster as microsclere 7.
- 5. [Ectosome, radiate structure *Suberites*
- [Ectosome, not radiate structure *Pseudosuberites*
- 6. [With typical spiraster as microsclere *Spirastrella*
- [With peculiar spiraster as microsclere *Anthosigmella*

- 7. [With tylostyle as macrosclere *Latrunculia*
- [With oxeon as macrosclere *Oxylatrunculia*

(VII.) Order Epipolasida Sollas, 1888

With typical radiate structure, and with style or occasionally oxeon as macrosclere, and with or without typical astrose microsclere.

A brief keys to the genera treated in this study.

- [With microsclere 1.
- [Without microsclere *Epipolasis*
- 1. [With style as macrosclere *Tethya*
- [With oxeon as macrosclere *Jaspis*

(VIII.) Order Choristida Sollas, 1880

With radiate structure, with various kinds of triaenes or its variations as macrosclere and with astrose microsclere.

A brief keys to the genera treated in this study.

- [With desmoid spicule as macrosclere 1.
- [Without desmoid spicule as macrosclere 2.
- 1. [With oxeon as macrosclere *Discodermia*
- [With strongyle as macrosclere *Theonella*
- 2. [With sterraster as microsclere 3.
- [Without sterraster as microsclere 4.
- 3. [With oxeon as macrosclere 5.
- [With strongyle as macrosclere *Geodistrongyla*
- 4. [With sigmoid microsclere *Craniella*
- [Without sigmoid microsclere 6.
- 5. [With peculiar sterraster *Erylus*
- [With normal sterraster *Geodia*
- 6. [With tetralophe as macrosclere *Siliquariaspongia*
- [Without tetralophe as macrosclere 7.
- 7. [With spiraster as microsclere *Thenea*
- [Without spiraster as microsclere 8.
- 8. [With microxeon as microsclere *Penares*
- [Without microxeon as microsclere *Stelletta*

(XI.) Order Homosclerophorida Dendy, 1905

With triactin or tetractin or its variations as macrosclere. Microsclere is not clearly distinguished from macrosclere.

A brief keys to the genera treated in this study.

- [With metastar as microsclere *Pachastrella*
- [Without metastar as microsclere *Plakorites*

X. FAUNISTIC AND ZOOGEOGRAPHICAL REVIEWS

A brief summary of the fauna and zoogeography of the shallow water demossponges of Western Japan is given in conclusion of this work.

The numbers of species and genera of each order recorded in this study are given in the following:

Order	Number of genera	Number of species
Keratosa	7	12
Haplosclerida	4	47
Poecilosclerida	29	63
Halichondrida	4	12
Axinellida	5	17
Hadromerida	11	19
Epipolaside	3	7
Choristida	10	26
Homosclerophorida	2	2

As can be seen in this table, 110 species, or more than 50% of the total number of species in this study belong to the order Haplosclerida and Poecilosclerida.

Two possible reasons for the dominance of these two order are; 1. that Western Japan comprises a temperate zone and only those species which are adapted to warm waters are abundant in this area, and 2. that the area investigated in this study was restricted to shallow waters.

Further, the dominant genera in Western Japan are enumerated as follows:

Genus	Number of species
<i>Haliclona</i>	28
<i>Callispongia</i>	16
<i>Stelletta</i>	10
<i>Myxilla</i>	9
<i>Mycale</i>	9

A total of 72 species comprise these five genera which is about one third of the total number of species recorded.

The number of species of each order reported by De Laubenfels (1954) from the West Central Pacific, are as follows:

Order	Number of species
Keratosa	29
Haplosclerina	29
Poecilosclerina	52
Halichondrina	15
Axinellida	8
Hadromerina	19
Epipolaside	10
Choristida	6
Homosclerophorida	10

In comparison with De Laubenfels (1954) the writer recorded more species of the orders Haplosclerida and Choristida but fewer species of Keratosa. Furthermore, De Laubenfels (1954) did not record any common species of the genus *Haliclona* which was the dominant genera of the present study, totaling 28 species. Previous to this study the writer thought that spongin-abundant demossponges such as Keratosa, Haplosclerida and Poecilosclerida were adapted to shallow warm waters, and in contrast to this, that spongin-poor demossponges such as Choristida, Epipolaside and Hadromerida were adapted to cold water and the deep sea.

According to this idea, it is reasonable to believe that number of species of Keratosa is more and, that the number of species of Choristida is less than that of the Western Central Pacific, but this can not apply to Haplosclerida. Further, *Mycale adhaerens* and *Myxilla behringensis* belong to the order Poecilosclerida, but these species are apparently adapted to cold water, and in contrast, *Ridleya peleia*, belonging to the order Hadromerida, is apparently adapted to warm waters.

The report of Thiele (1898), mainly described demossponges from Sagami Bay, and does not contain species of the orders Keratosa, Haplosclerida and Poecilosclerida, but reports species of the subclass Tetractinomorpha. Quite a few species are common to this study and Thiele (1898), but since Sagami Bay is a relatively deep sea, it is inappropriate to compare those species to this study.

Koltun (1959) described demossponges from the boreal area of the northern Pacific, namely the Okhotsk Sea, the Behring Sea and the Sea of Japan. His report does not contain the species belonging to the subclass Tetractinomorpha. He reported a great number of species belonging to the genera *Mycale*, *Lissodendoryx*, *Hymedesmia*, *Gellius*, and *Haliclona*, but very few species belonging to the order Keratosa. Considering that Koltun (1959) did not report all of the specimens collected from his investigated area, it is not appropriate to compare that work with the fauna of this study.

This study presents a much more complete account of the distribution of most species than has heretofore been reported.

In particular, it can be noted that;

1. Species distributed from the Tropics to Western Japan include: *Spongia hispida*, *Spongia zimocca*, *Ircinia strobilina*, *Thorecta boleta*, *Callyspongia subarmigera*, *Coelosphaera calcifera*, *Tedania brevispiculata*, *Homaxinella echidanea* and *Ridleya peleia*.
2. Species distributed throughout the coast of Western Japan include: *Callyspongia flabelliformis*, *Axinella incrustans*, *Raspailia folium* and *Pachastrella tenuilaminalis*.
3. Species distributed from the boreal waters of the Northern Pacific to Western Japan include: *Myxilla behringensis*, *Myxilla parasitica* and *Mycale adhaerens*; and,
4. Species distributed in the temperate sea area of the Northern Pacific include: *Terpios zeteki*.

According to these results it has become clear that many species are distributed toward the north along the Kuroshio and only a few boreal species are distributed toward the south along the continental shelf.

Considering further the affinities of the fauna between Western Japan and other areas, it is apparent that the demosponges of Western Japan show a high affinity to Northern Australia. This is shown by the following species: *Spongia hispida*, *Cacospongia lamellosa*, *Hyattella intestinalis*, *Callyspongia subarmigera* and *Coelosphaera calcifera*, among others.

There is also a high affinity to the West Central Pacific, shown by the following species: *Callyspongia rectangularis*, *Clathria fasciculata*, *Mycale aegropila* and *Ridleya peleia*, among others.

The writer believe that more taxonomic study will reveal even greater affinities to the Western Central Pacific. At present, however, the taxonomic study of demosponges is severaly lacking and further faunistic and zoogeographical reviews are dependant on a greater commitment to taxonomic studies as has been attempted here.

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PLATES

PLATE I

EXPLANATION OF FIGURES

1. *Axinella convexa* n. sp. (AR-1-11, Holotype), $\times 0.8$.
2. *Axinella cylindratus* n. sp. (JAP-009, Holotype), $\times 2$.
3. *Axinella incrustans* Thiele. (AR-1-8), $\times 1.6$.
4. *Homaxinella brevistyla* n. sp. (SAT-021, Holotype), $\times 1.6$.
5. *Homaxinella echidnaea* (Ridley). (JAP-007), $\times 1.4$.

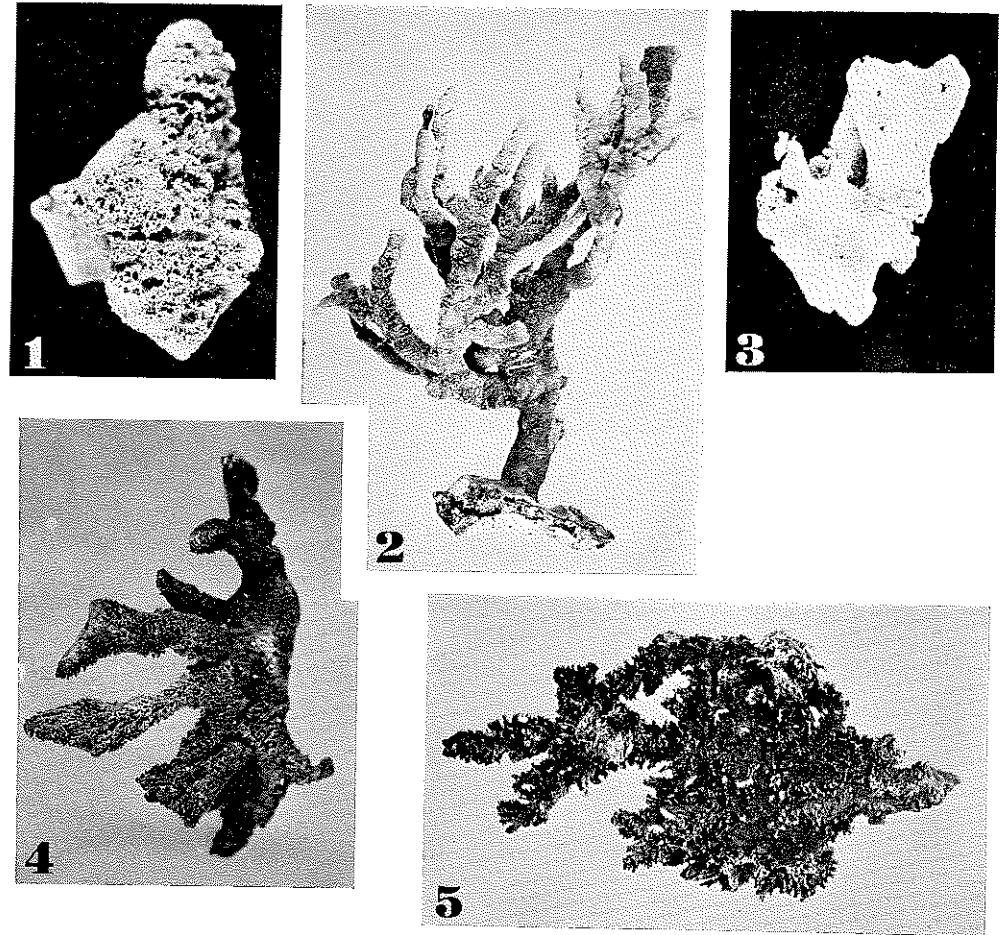


PLATE II

EXPLANATION OF FIGURES

1. *Anthosigmella raromicrosclera* (Dickinson). (MIT-003), $\times 1.6$.
2. *Choanites ficus* (Pallas) (SIS-044), $\times 1.4$.
3. *Oxylatrunculia acanthosanidastera* n. sp. (MIT-046, Holotype), $\times 1.5$.
4. *Spirastrella coccinea* (Duchassaing et Michelotti). (SAT-062-1), $\times 1$.
5. *Aaptos niger* n. sp. (SAT-063, Holotype), $\times 1.5$.
6. *Pseudosuberites kunisakiensis* n. sp. (JAP-022, Holotype), $\times 0.9$.
7. *Ridleia peleia* De Laubenfels. (JAP-001), $\times 1$.

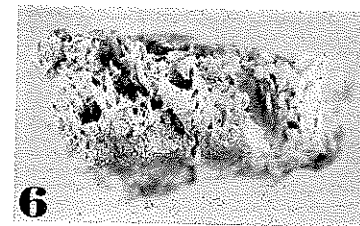
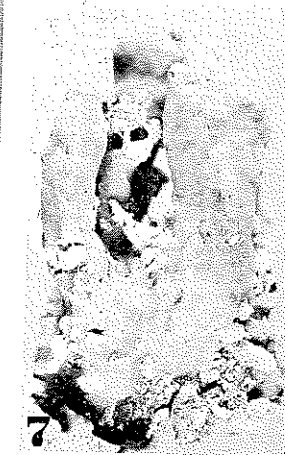
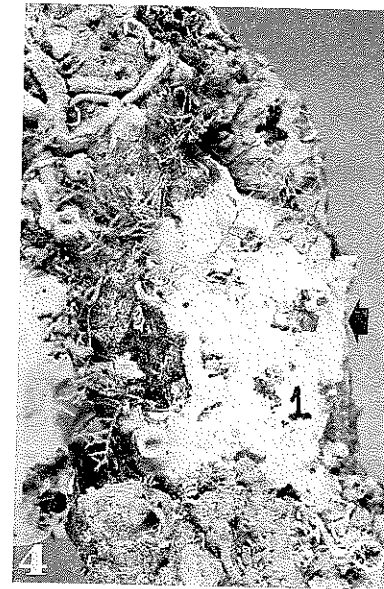
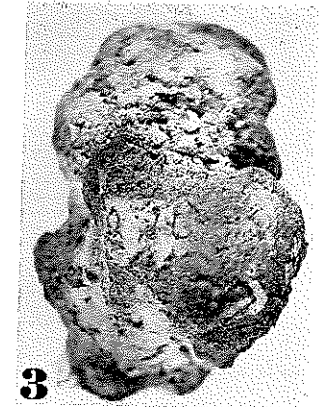
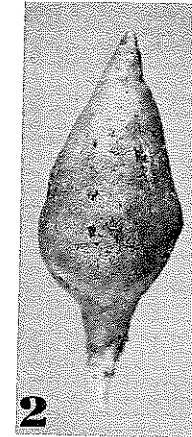
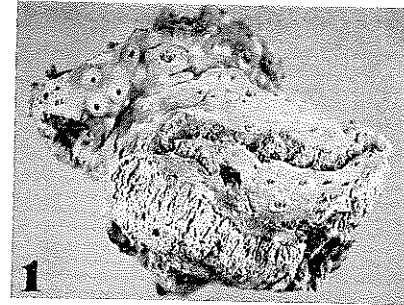


PLATE III

EXPLANATION OF FIGURES

1. *Jaspis duoaster* n. sp. (MIT-060, Holotype), $\times 1$.
2. *Stelletta atrophia* n. sp. (MIT-028, Holotype), $\times 1.5$.
3. *Stelletta grubii* Schmidt. (MIT-048), $\times 1$.
4. *Stelletta tetrafurcata* n. sp. (SAT-065, Holotype), $\times 1.4$.
5. *Geodistromyia strongyla* n. sp. (SAT-014, Holotype), $\times 1.5$.
6. *Siliquariaspongia japonica* n. sp. (SAT-078, Holotype), $\times 1$.

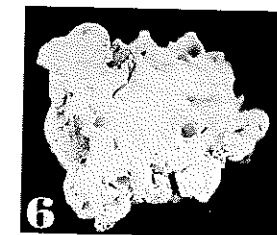
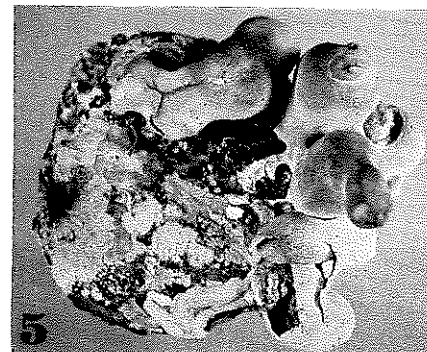
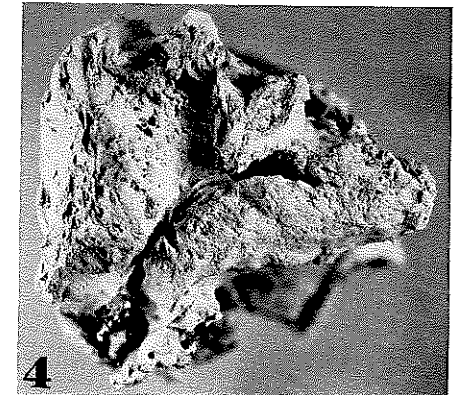
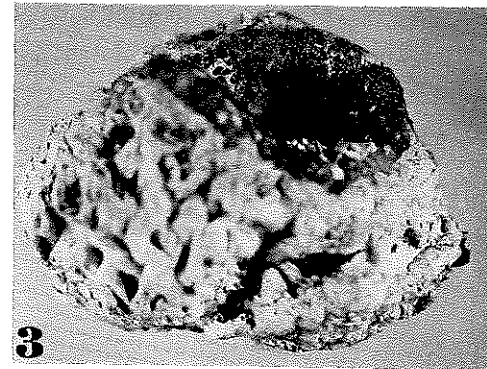
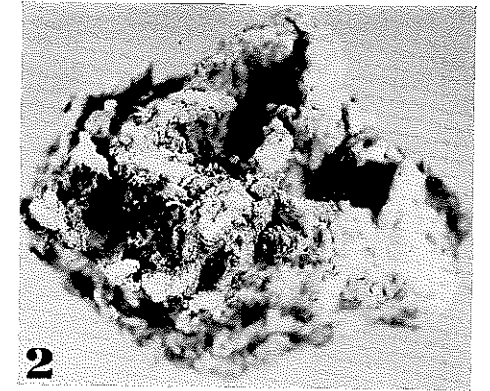
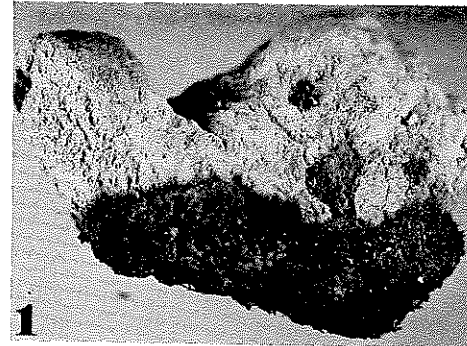


PLATE IV
EXPLANATION OF FIGURES

- 1-2. *Anthosigmella raromicrosclera* (Dickinson). (MIT-003).
1-2. Spiraster.
3-4. *Oxylatrunculia acanthosanidastera* n. sp. (MIT-046, Holotype).
3-4. Sanidaster.
5-6. *Jaspis duoaster* n. sp. (MIT-027, Paratype).
5-6. Spheraster.
Scale bar with two spots: 100 μ m.

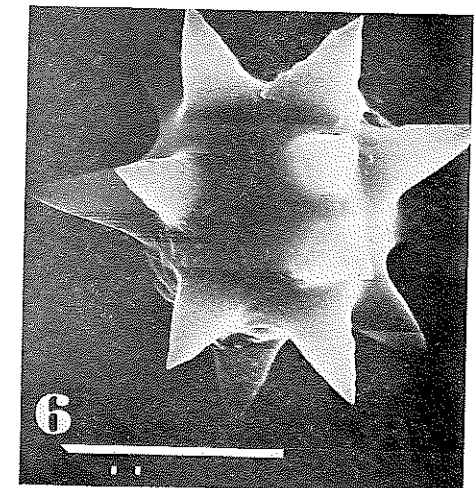
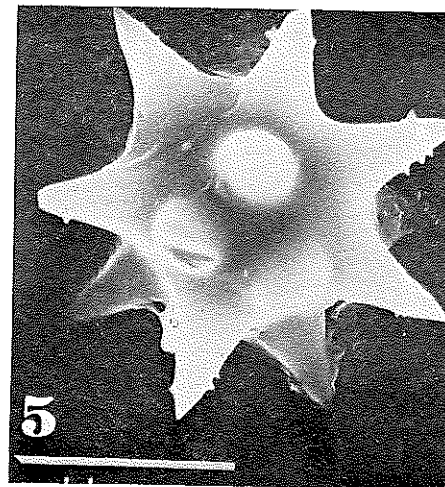
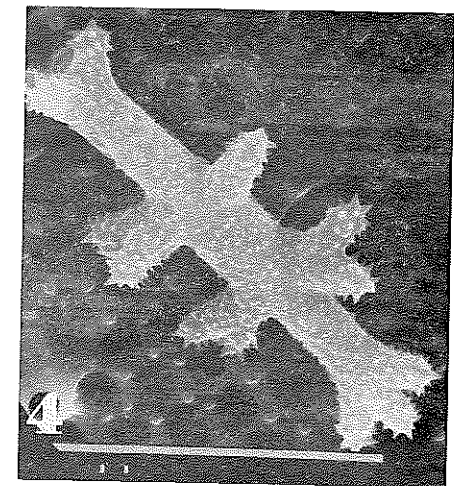
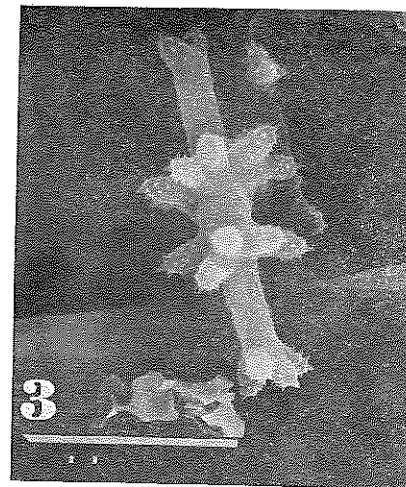
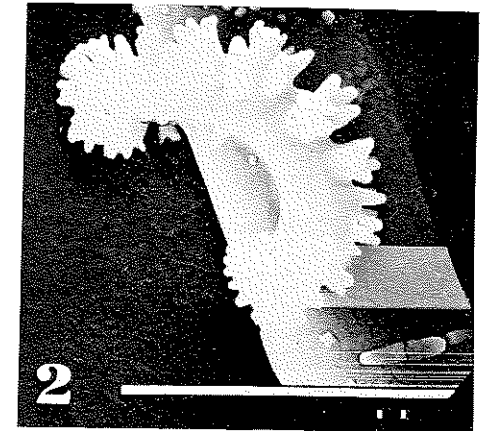
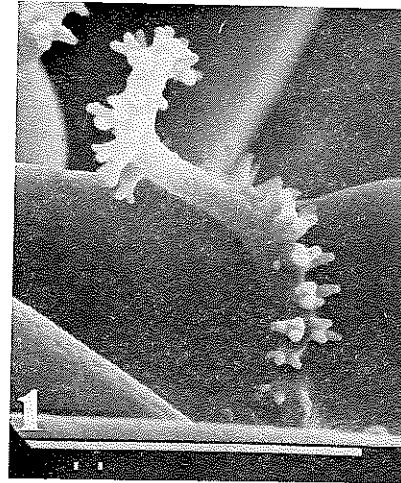


PLATE V

EXPLANATION OF FIGURES

1. *Jaspis duoaster* n. sp. (MIT-027, Paratype).

1. Oxyaster.

2-5. *Stelletta atrophia* n. sp. (MIT-028, Holotype)

2. A cladome of plagiotriane. 3-4. Oxyaster. 5. Strongylaster.

Scale bar with two spots: 100 μ m. Scale bar with three spots: 1000 μ m.

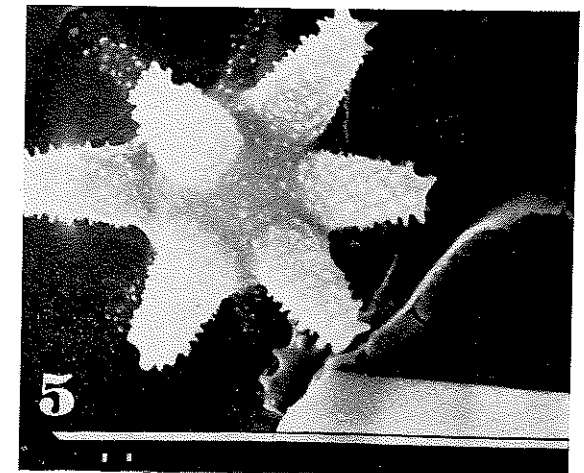
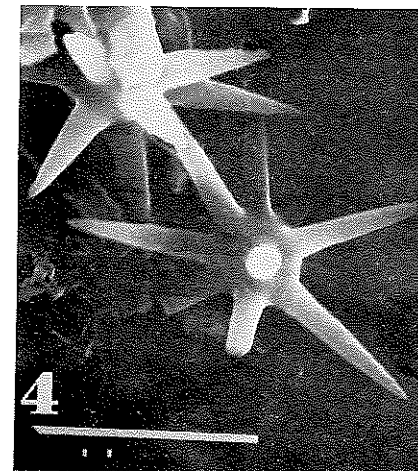
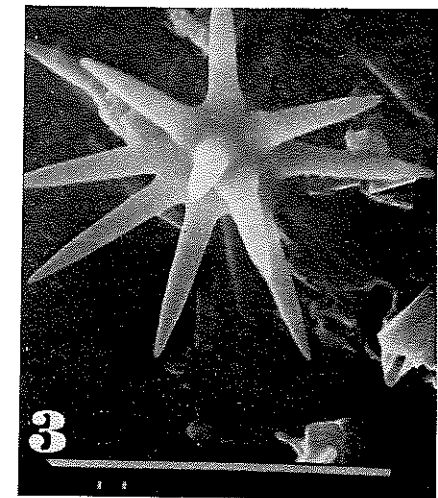
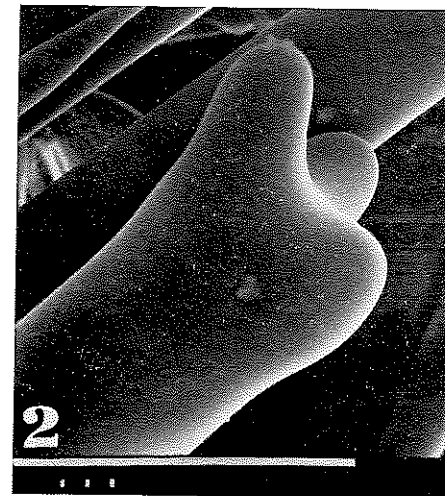
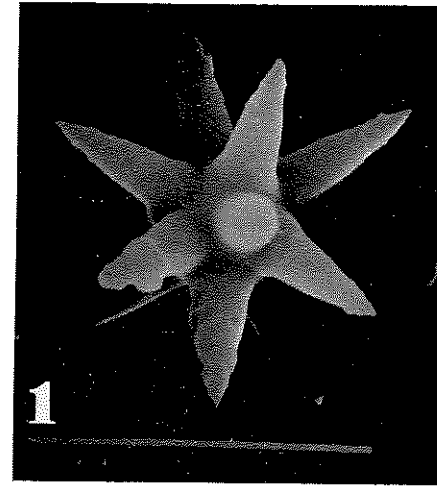


PLATE VI

EXPLANATION OF FIGURES

1-6. *Geodistrongyla strongyla* n. sp. (MIT-079, Paratype).

1-4. Young sterraster. 5-6. Fully developed sterraster and oxytter.

Scale bar with two spots: 100 μ m. Scale bar with three spots: 1000 μ m.

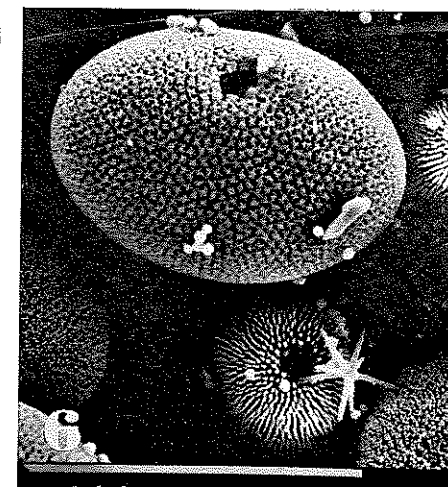
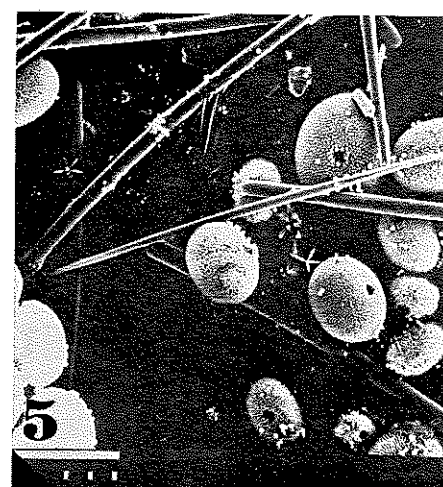
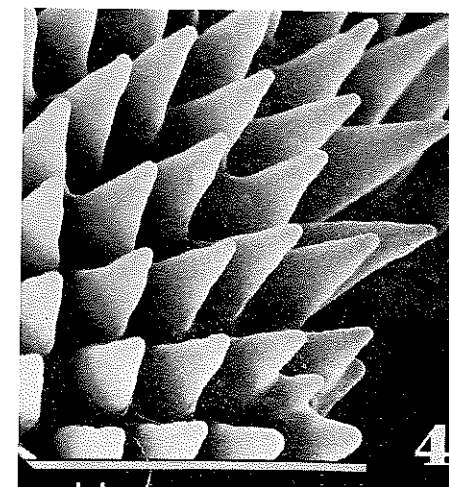
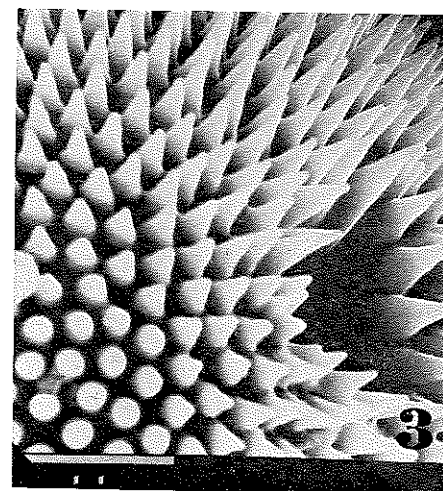
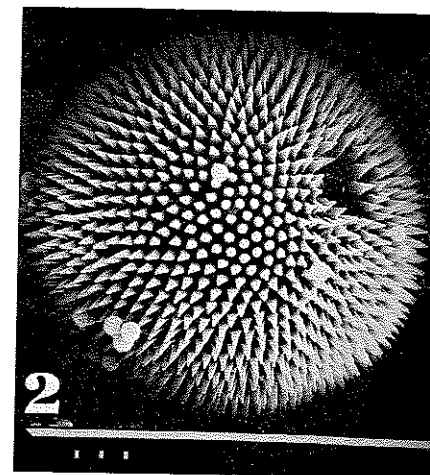
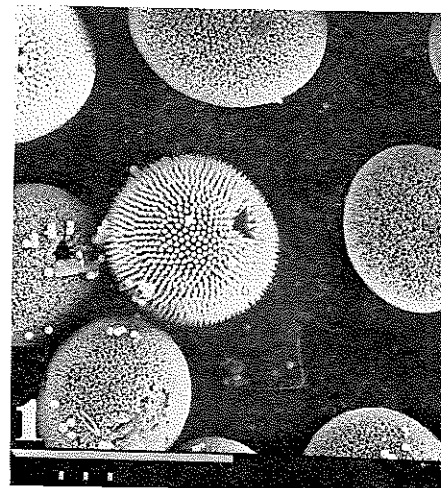


PLATE VII

EXPLANATION OF FIGURES

1-2. *Geodistrongyla strongyla* n. sp. (MIT-079, Paratype).

1-2. Fully developed sterraster.

3-6. *Discodermia kiiensis* Hoshino.

3. Skeleton formed with desmas. 4. Microxeon. 5-6. Microstrongyle.

Scale bar with one spot: 10 μm . Scale bar with two spots: 100 μm . Scale bar with three spots: 1000 μm .

