

Report of the Biological Survery of Mutsu Bay.

8. Cyclostomatous Bryozoa of Mutsu Bay.*

By

YAICHIRO OKADA.

(With Plate XXIV.)

The collections of Bryozoa in Mutsu Bay, submitted to me by Mr. HÔZAWA, were obtained at various stations during 1926-1927. The present paper deals only with the Cyclostomatous Bryozoa, of which there are twelve species. Of these, five species have been previously described from the Southern Pacific coast of Japan, and five species seem to be new to science. As a result of our studies on this group from the viewpoint of marine zoo-geographical distribution, we find that the Bryozoan fauna in Mutsu Bay indicate condition combining the Pacific boreal subregion and the Indo-pacific coastal region elements.

I wish here to express my hearty thanks to Professors HATAI and HÔZAWA, Assistant Prof. KOKUBO, Assistant TAKATSUKI, and other members of the Asamushi Marine Biological Station who have given valuable advice and have provided me with the specimens for study.

BRYOZOA Ehrenberg.

Subclass ECTOPROCTA Nitsche.

Order GYMMNOLAEMATA Allman.

Suborder **CYCLOSTOMATA** Busk.

Family 1. **CRISIIDAE** Busk.

Genus 1. **CRISIA** LAMOUROUX 1816.

1. **Crisia crisioides** ORTMANN.

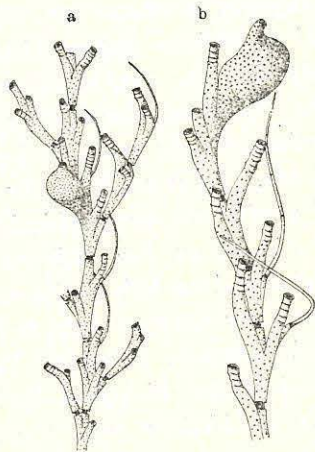
(Text-fig. 1, a, b.)

Crisia crisioides ORTMANN, 1890, Arch. für Naturgesch., 57, pl. iv, fig. 16.

Diagnosis: Zoarium forming very slender, delicate tufts, dichoto-

*A contribution from the Marine Biological Station, Asamushi, Aomori-Ken.

mously branched. Zooecia, two or three in an internode, curved inwards toward the prominently ringed distal extremity, free for a great portion of their length, coarsely punctate, with a long bristle, growing from the side at a greater or less distance from the top. Zooecial aperture circular, prominently produced into a cylindrical tube of less diameter than the diameter of the zooecia. Ooecia nearly pear-shaped, narrowed below, much inflated above. Ooeciostome somewhat long, its tube at the summit of the ooecium directed upwards and slightly backwards. Ooeciopore nearly semicircular.



Text-fig. 1. *Crisia crisioides* ORTMANN.

- a. A portion of a colony showing the mode of branching $\times 15$.
 b. An ooecial internode from somewhat lateral side $\times 20$.

Formulae of three fragments:

$$a) (2) + (3 + 0^r) + (3 + ov.) + (3) + (3)$$

$$b) (2) + (1 + r^o) + (3 + 0^r) + (2 + r^o) + (2 + ov. + o^r) + (3 + r^o) + (2)$$

$$c) (2) + (2) + (3) + (2 + ov. + 0^r)$$

There exist small colonies and fragments in the collection. They were obtained at Ôma (Station 104; Sp. no. 2142). The present species

was at one time collected from Sagami Sea at a depth of 50 fms., attached to *Maja longispina*.

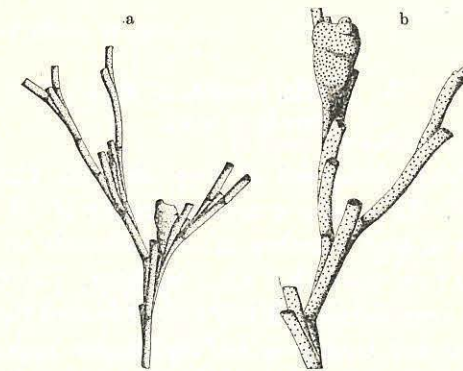
2. *Crisia franciscana* ROBERTSON.

(Plate XXIV, fig. 1; Text-fig. 2, a, b.)

Crisia franciscana, ROBERTSON, 1910, Univ. Calif. Publ. Zool., vi, 12, 233, pl. xxiii, figs. 1-4. — OKADA, 1917, Annot. Zool. Jap., ix., pt. 3, 338-339.

Crisia occidentalis, ROBERTSON, 1903, Univ. Calif. Publ. Zool., i, 3, 116.

Diagnosis: Zoaria non-incrusting, composed of numerous delicate branching tufts. Internodes, consisting of a single zooecium giving rise to a branch on each side. Joints light coloured at the growing tips, but becoming black with age. Zooecia consisting of rather long, slender, calcareous tubes, sparsely punctate. Ooecia elongated, narrowed below,



Text-fig. 2. *Crisia franciscana* ROBERTSON.

- a. A portion of a colony showing the mode of branching $\times 10$.
 b. An ooecial internode showing the short ooeciostome projecting from the dorsal side of the summit of ooecium $\times 25$.

much inflated above. Ooeciostome large, its tube prominent, but backward. Ooeciopore circular, directed backward and slightly upward.

Formula of a fragment:

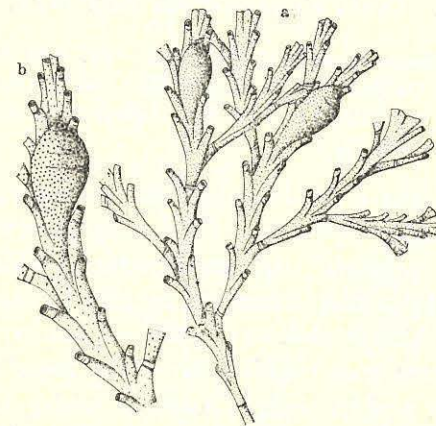
$$\begin{array}{c}
 (1^r + 1 + r^1) \\
 | \\
 (1 + 1^1) \\
 | \\
 (1^r + 1 + r^1) + (1^r + 1 + r^1) \\
 | \qquad | \\
 (1^r + 1 + r^1) \qquad (1^r + 1 + r^1) \\
 | \\
 (1^r + 1 + r^1)
 \end{array}$$

Numerous delicate colonies which may be identified with the above species, attached to Ascidea (*Chelyosoma siboya* OKA) and a branch of Hydrozoa, were obtained off Ôshima (Station unknown; Sp. no. 2245), off Yadonobe (Station 63) and off Akimae (Station 76). The present species is easily distinguished from other species by the zoecial arrangement which in one internode has a black intersegment. The present species was at one time collected abundantly from shallow water at Hakodate.

3. *Crisia tenera*, n. sp.

(Text-fig. 3, a, b.)

Diagnosis: Zoaria composed of very delicate, slender branches, 5-7 mm. in height. Internodes consisting mostly of 20 to 22 zoecia, giving rise to two to four branches in one internode on both sides of the zoecia. Basis rami somewhat long, tapering. Joints light greyish. Zoecia somewhat long, slender, slightly curved toward the end; sparsely punctate, the distal end having a slightly ringed appearance with a somewhat smaller zoeciopore than the diameter of the zoecium. Ooecia oblong, nearly straight, narrowed below, prominently inflated above and somewhat truncated on the upper surface. Ooeciostome slightly larger than the zoecial aperture, small, its tube very short, connate entirely on the ventral surface of the zoecia. Ooeciopore somewhat semicircular, slightly larger than the zoeciopore, opening directly on the ventral side. Ooecial internode has one or two ooecia, giving rise to two to four branches, half below the ooecium, and half above it.



Text-fig. 3. *Crisia tenera*, n. sp.

- a. A portion of a colony showing the mode of branching $\times 15$.
 b. An ooecial internode with a globular ooecium $\times 20$.

Formulae of three fragments:

a) $(8) + (3 + \text{ov.} + 16 + \text{ov.} + 2 + r^1 + r^5 + x)$

$$\begin{array}{c}
 | \\
 (11 + \text{ov.} + 9 + r^5 + r^7) + (3 + \text{ov.} + 4 + 2^r + x) \\
 | \qquad | \\
 (7 + \text{ov.} + 4 + 4^r + x) \quad (2 + x) \\
 | \qquad | \\
 (5 + x) \quad (2 + x)
 \end{array}$$

b) $(12 + \text{ov.} + 10 + 2_r + r^1)$

$$\begin{array}{c}
 | \\
 (12 + x) \\
 | \\
 (12 + \text{ov.} + 4 + r^5 + 1^r + x) \\
 | \qquad | \\
 (4 + x) \quad (9 + \text{ov.} + 1 + 2_r + x)
 \end{array}$$

c) $(8 + \text{ov.} + 10 + r^2 + x)$

$$\begin{array}{c}
 | \\
 (13 + \text{ov.} + 8 + r^1 + 3^r + 5^r + r^5) \\
 | \qquad | \qquad | \qquad | \\
 (9 + x) \quad (3 + x) \quad (9 + x) \quad (3 + x)
 \end{array}$$

This new species is represented in the collection by several fragments which were obtained off Ôshima and off Yadomae (Station 63; Sp. no. 648).

4. *Crisia eburneo-denticulata* BUSK.

Crisia eburneo-denticulata BUSK, 1875, Cat. Cycl. Poly. Brit. Mus., 5-6, pl. vi.—ORTMANN, 1890, Arch. für Naturg., LVI, 58, pl. iv, fig. 18.—WATERS, 1904, Journ. Linn. Soc., xxix, 165.—WATERS, 1916, Ann. Mag. Nat. Hist., xviii, 8, 474.—CALVET, 1927, Bull. L'inst. Ocean., No. 503, 37.

Diagnosis: Zoaria erect, branched dichotomously, attached to the substratum by numerous rootlets. Internode somewhat flat, broad, narrowed on the proximal part and gradually wider to the distal part. Zooecia 9-17 in each internode, connate throughout, contracted at the aperture, which is somewhat produced into a short cylindrical tube of less diameter than the diameter of the zooecia, and projecting forwards at nearly a right angle. Branches arising from first to fifth zooecia on either side. Ooecia ventricose, closely adnate.

Formulae of two fragments :

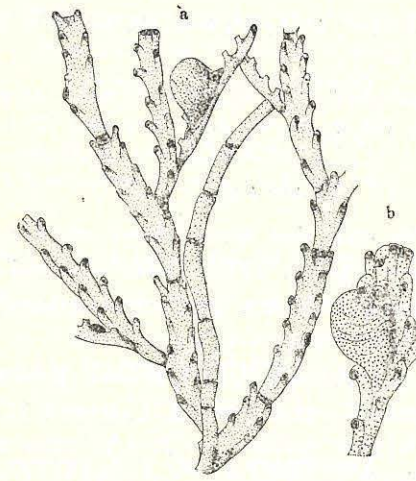
$$\begin{array}{l} a) \quad (16 + 1^r + r^4) + (13 + 1^r) + (13 + r^2) \\ \qquad \qquad | \qquad \qquad | \qquad \qquad | \\ \qquad \qquad (8) + (9 + r^1 + x) \quad (15 + 2^r) + (15 + 2^r) + (10 + 2^r + x) \\ \qquad \qquad \qquad | \qquad \qquad | \\ \qquad \qquad (13 + 2^r) + (13 + r^1) + (10 + 1^r + x) \\ b) \quad (13 + 2^r) + (10 + r^2 + x) \\ \qquad \qquad | \\ \qquad \qquad (15 + 3^r) + (15 + r^4) \\ \qquad \qquad | \\ \qquad \qquad (19 + 3^r) \end{array}$$

A small colony and a fragment which may be identified with the above species are in the collection. They were obtained at Ōma (Station 104; Sp. no. 2150, 2166) and off Hirakata (Sp. no. 1772).

5. *Crisia bucinaform*, n. sp.

(Plate XXIV, fig. 2; Text-fig. 4, a, b.)

Diagnosis: Zoaria composed of numerous, delicate, branching tufts 15 to 20 mm. in height; attached by flexible rootlets to the substratum. Internodes consisting mostly of odd zooecia, numbering 9 to 11, rarely the even number 10, giving rise to a branch on either side. Each branch arising in a basis rami adnatè to the zooecium giving origin to it. Joints light greyish. Zooecia consisting of somewhat short,



Text-fig. 4. *Crisia bucinaform*, n. sp.

- a. A portion of a colony showing the mode of branching and the arrangement of zooecia in the internodes $\times 15$.
b. An ooecial internode with a globular ooecium and a trumpet-like ooeciostome $\times 20$.

slender, calcareous tubes, usually slightly curved at the end; sparsely punctate. Ooecia globular, somewhat narrowed below, much inflated above. Ooeciostome large, trumpet-like, its tube prominent, directed upward. Ooeciopore circular, its diameter larger than that of the zooeciopore, directed upward. Ooecial internode frequently exists on the terminals, consisting of ten or more members, the first to fourth being the ordinary zooecia, the first being the ooecium.

Formulae of three fragments :

$$\begin{array}{l} a) \quad (11 + r^2) + (11 + 2^r) + (9 + r^1) + (9 + 1^r) \\ \qquad \qquad | \qquad \qquad | \\ \qquad \qquad (13 + r^1) \quad (11 + r^1) \\ \qquad \qquad | \qquad \qquad | \\ \qquad \qquad (9 + r^1 + x) \quad (4 + \text{ov.} + 4 + x) \\ b) \quad (9 + 1^r) \quad (9 + 1^r) \\ \qquad \qquad | \qquad \qquad | \\ \qquad \qquad (10 + 2^r) + (9 + 1^r) + (9 + r^1) \\ \qquad \qquad \qquad | \\ \qquad \qquad (9 + 1^r) + (9 + r^1) + (7 + x) \\ \qquad \qquad \qquad | \\ \qquad \qquad (4 + \text{ov.} + 6 + x) \end{array}$$

$$\begin{array}{c}
 \text{c) } (10+2^r) + (11+r^2) + (9+1^r) + (11+r^2) + (11+2^r) \\
 | \qquad \qquad \qquad | \qquad \qquad \qquad | \qquad \qquad \qquad | \\
 \qquad \qquad \qquad (9+r^2) + (9+1^r) + (9+r^1) \\
 | \qquad \qquad \qquad | \qquad \qquad \qquad | \\
 (11+1^r) + (9+r^2) + (9+1^r) \\
 | \\
 (6+r^1+x)
 \end{array}$$

There are in the collection several large colonies, from which may be established a new species. They were obtained at Ōma (Station 104; Sp. no. 2172) and exhibit a light yellowish brown color in alcohol.

Family 2. TUBULIPORIDAE Johnston.

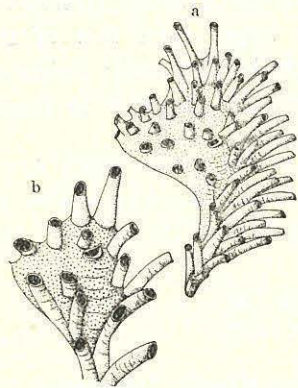
Genus 2. TUBULIPORA Lamarck 1916.

6. *Tubulipora pacifica* ROBERTSON.

(Plate XXIV, fig. 4; Text-fig. 5, a, b.)

Tubulipora pacifica ROBERTSON, 1910, Univ. Calif. Publ. Zool., vol. 6, 248-249, pl. 22, figs. 27, 28.

Diagnosis: Zoaria incrusting. Zoecia radiating, suberect, the distal half or two-thirds frequently quite erect, connate in single or double rows, sometimes irregularly interlacing. Ooecia large, lobed, extending among the zoecia. Ooeciostome large, its tube bent and flattened, and ending in a funnel-shaped expansion which may be circular. Ooeciopore when flaring, larger than the zoecial aperture; otherwise compressed and more or less slit-like.



Text-fig. 5. *Tubulipora pacifica* ROBERTSON.

- A complete colony with an ooecium, seen from lateral side $\times 15$.
- An ooecium with the ooeciopore $\times 20$.

The present species has been found in considerable abundance at various localities. They were obtained at several Stations: 31 (I), 75 (III), 76 (III), 104 (Sp. no. 2123, 2141 b). Zoarial features of the specimens before me are quite different from those of the typical ones, being an irregular mass or of lobate form, instead of fan-shaped or circular forms.

7. *Tubulipora pulchra* MAC GILLIVRAY.

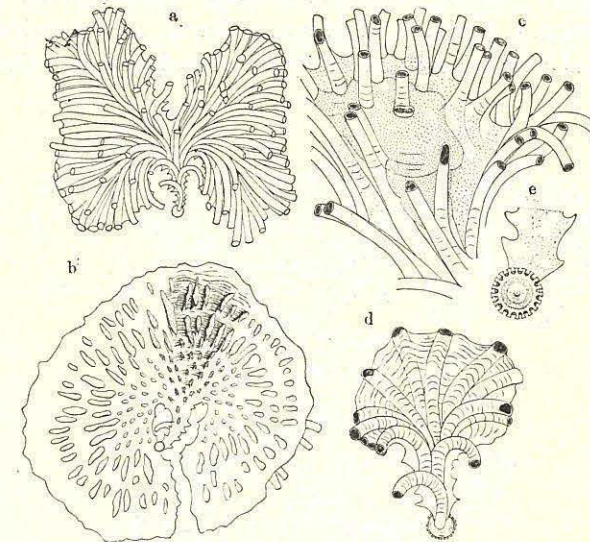
(Plate XXIV, fig. 3; Text-fig. 6, a, e.)

Tubulipora pulchra MAC GILLIVRAY, 1885, Trans. & Proc. Roy. Soc. Vict., xxi, 92, pl. xii-xiv. — ROBERTSON, 1910, Univ. Calif. Publ. Zool., vi, 2, 250, pl. xxiii, figs. 32-35. — OKADA, 1917, Annot. Zool. Japon., vol. ix, pt. 3, 347.

Tubulipora fimbria form *pulchra* WATERS, 1887, Ann. Mag. Nat. Hist., 5, xx, 258, pl. vii, figs. 1-3.

Tubulipora continua ORTMANN, 1890, Arch. für Naturg., 63, pl. iv, fig. 36.

Diagnosis: Zoarium incrusting, composed of fan-shaped or lobate forms, originating in a circular disc surrounded by minute quadrangular teeth. Triangular teeth visible from the upper side of the colony on many of the lateral zoecia. Ooecium large, opening beside and often in front of a zoecium; tube of ooeciostome low, widening somewhat upward, compressed. Ooeciopore considerably larger than the ooecio-



Text-fig. 6. *Tubulipora pulchra* MAC GILLIVRAY.

- A small lobate zoarium showing the arrangement of zoecia $\times 10$.
- A dorsal view of a zoarium showing the distribution of the teeth for the attachment to substratum $\times 10$.
- The outer margin of a circular zoarium to show the ooecium with an elliptical ooeciopore $\times 25$.
- A small zoarium showing the ancestral disc and the lateral teeth along the outer margin of proximal zoecia $\times 25$.
- An ancestral disc from the dorsal side $\times 25$.

stome, compressed, the rim somewhat higher in the middle than at the sides, then sloping downward and upward.

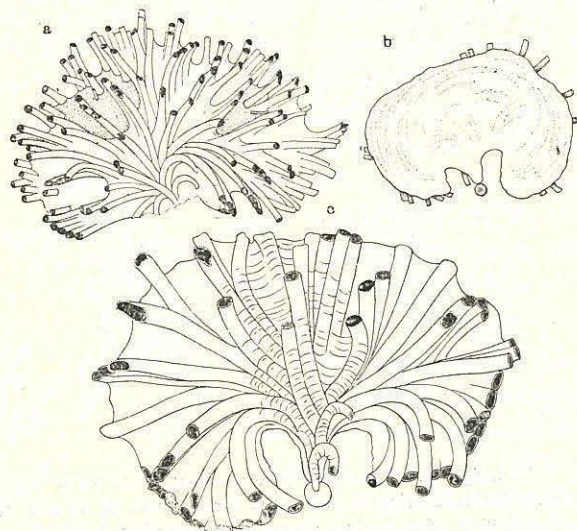
This species is represented by numerous colonies in the collection. They were obtained off Ishihama (Station 43; Sp. no. 616) and attached to *Ulva*. This has already been found abundantly in shallow water along the coast of Sagami Bay.

8. *Tubulipora misakiensis* OKADA.

(Plate XXIV, fig. 8; Text-fig. 7, a, c.)

Tubulipora misakiensis OKADA, 1917, Annot. Zool. Jap., vol. ix, pt. 3. 345-346.

Diagnosis: Zoarium incrusting, flabelliform or circular. Zooecia long, slender, erect or suberect, basal third of the length immersed, the remaining two-thirds being free; radiating from the centre. Dorsal surface smooth; margin of primitive disc without teeth. Zooecial aperture circular, 0.1 mm. in diameter. Ooecia an extensive inflation of the zooecial surface, with minutely punctured surface. Ooeciostome



Text-fig. 7. *Tubulipora misakiensis* OKADA.

- A complete colony with two ooecia $\times 10$.
- A dorsal view of a colony $\times 10$.
- A small, flabellate colony to show an ancestral disc and the zooecial arrangement $\times 25$.

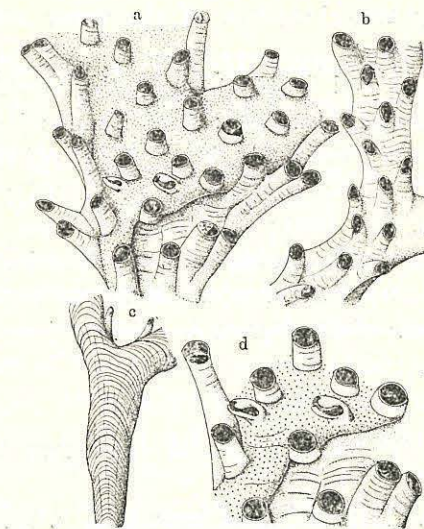
simple, at first vertically standing but soon bending in a transverse direction, frequently entirely straight, arising close to the zooecial bundles on the proximal side or between the rows of zooecia. Ooeciopore nearly circular, 0.04 mm. in diameter, sometimes elliptical.

A large number of colonies, which may be identified with this species were collected at Station 64 (Sp. no. 476). They were attached to *Zostera*, a species of seaweed. This species occurs abundantly in shallow water along the Misaki coast, attached to seaweed and stones.

9. *Tubulipora mutsu*, n. sp.

(Plate XXIV, fig. 5; Text-fig. 8, a, d.)

Diagnosis: Zoarium erect or decumbent, composed of numerous dichotomously branching stems. Branches 0.5 to one millimeter wide, commonly in one layer, often nearly in one plane, but sometimes variously curved. Stout rooting processes, consisting of a bundle of



Text-fig. 8. *Tubulipora mutsu*, n. sp.

- A branch with an ooecium $\times 15$.
- A branch showing the arrangement of zooecia $\times 15$.
- Dorsal surface of a branch $\times 15$.
- An ooecium enlarged with two ooeciopores $\times 20$.

parallel kenozoecia, are usually given off here and there from the basal surface of the branches. Basal surface not limited by sharp edges, gently convex, the longitudinal septal lines weakly developed, usually with distinct transverse lines of growth. Zooecia tubular, somewhat long, arranged nearly biserially on both sides; series consisting of 2-3 zooecia, rarely 4, the outer zooecia the longest. Some of the median peristomes are commonly somewhat separated from their neighbours of the same series, and appear more or less isolated. The arrangement of the zooecia is irregularly proximal to the zoarium, growing somewhat regular in the middle and at the distal end of the branches. They are commonly directed straight forward, but infrequently half of them are slightly inclined to the lateral sides. Ooecium a prominent inflation of the surface, large, involving many zooecia, coarsely punctured over the surface. Ooeciostome large, compressed transversely, tube of the ooeciostome short, arising beside a zooecium near the proximal end of the ooecium, growing somewhat smaller than a zooecial tube and curving freely downwards. Ooecipore ∞ shaped, inserted by the elongation of the upper and lower middle edges of the ooeciostome.

Numerous colonies and fragments are in the collection. They were obtained at the following localities: Off Namiuchi (Station 50, Sp. no. 466); off Itanozaki (Station 31, Sp. no. 610); off Hanaguri (Station 46, Sp. no. 602); off Tozawa (Station 66, Sp. no. 461); off Shimizugawa (Station 73, Sp. no. 626, 655); off Akemae (Station 76, Sp. no. 482, 601, 607) off Ushizawa (Station 80, Sp. no. 450) and off Noheji. They are attached to stones and Hydrozoa. The outer feature is somewhat allied to *Tubulipora radicata* OKADA but differs from it in the shape of the ooeciostome.

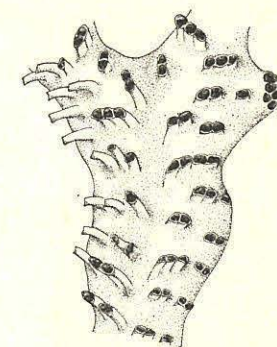
Genus 3. REPTOTUBIGERA D'ORBIGNY 1853.

10. *Reptotubigera incrustata*, n. sp.

(Plate XXIV, fig. 7; Text-fig. 9, a.)

Diagnosis: Zoarium incrusting, entirely adherent, formed by four elongated, strap-like lobes which may diverge from one another. Zooecial series mostly very close together, unfrequently isolated into one

or two zooecia, nearly alternate, but becoming nearly opposite at the ends of the lobes. Number of zooecia in a series, two to five, less in the proximal parts of the lobes. The two or four zooecia nearest the middle of the lobe are connate, the outermost zooecium usually separate from the others, being the longest or shortest. Peristome short, completely connate or partially free; curved in the more distal parts, nearly straight at the proximal parts.



Text-fig. 9. *Reptotubigera incrustata*, n. sp.

A branched portion of a colony $\times 15$.

A complete, somewhat large colony and two small fragments, from which are erected the present new species, were obtained at Ôma (Station 104; Sp. no. 2109, 2124, 2141 a, 2153).

Family 3. DIASTOPORIDAE Busk.

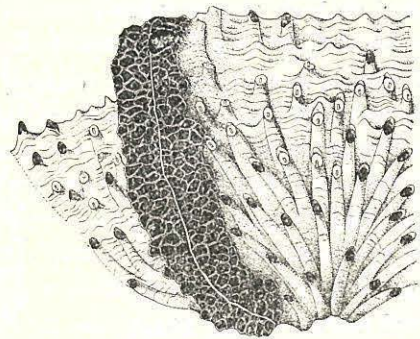
Genus 4. BERENICEA LAMOUROUX 1821.

10. *Berenicea coralliform*, n. sp.

(Plate XXIV, fig. 6; Text-fig. 10.)

Diagnosis: Zoarium semi-incrusting, showing a wavy lamella, without a border, attached to the substratum at the distal margin. Zooecia arranged in somewhat radial rows from the zoarial base. In the marginal parts of the zoarium, zooecia immersed for the greater part of their length, while in the proximal parts they freely project with more than half of their length. Zooecial aperture elliptical with a slightly elongated upper margin, usually provided with a closure, those in the proximal and marginal parts always without it. From the closure there arises, either centrally or proximally at the centre, a short and slender tube open at the end. Ooecia unknown.

This new species is represented in the collection by several complete colonies which were attached to coral obtained at Station 104. They are milky white in alcohol.



Text-fig. 10. *Berenicea coralliform*, n. sp.
A part of a colony to show the arrangement of zooecia $\times 20$.

Family 4. LICHENOPORIDAE Smitt.

Genus 5. LICHENOPORA DEFRANCE 1823.

11. *Lichenopora radiata* (AUDOUIN).

(Text-fig. 11.)

Lichenopora radiata HINCKS, 1880, Hist. Brit. Mar. Poly., 32, pl. LXVIII, figs. 9, 10. — WATERS, 1884, Quart. Journ. Geo. Soc., XL, 345. — KIRKPATRICK, 1890, Ann. Mag. Nat. Hist., 6, v, 612. — ORTMANN, 1890, Arch. für Naturg. Berlin, Lvi, 64, pl. iv, fig. 23. — NEVIANI, 1900, Bull. Soc. Zool. Ital., 2, v. ann. xiii, 246. — ROBERTSON, 1900, Proc. Wash. Acad. Sc., vol. ii, 329. — CALVET, 1906, Bull. Mus. d'Hist. Nat., IV, 467. — CALVET, 1906, Exped. Scient. du Trav. et du Talism., viii, 215. — NORMAN, 1909, Ann. Mag. Nat. Hist., 7, xi, 281. — WATERS, 1909, Journ. Linn. Soc., xxxi, 237. — OKADA, 1917, Annot. Zool. Jap., vol. ix, pt. 3, 355. — MARCUS, 1920, Sitz.-ber. Ges. Nat. Freunde Berlin, no. 2, 98-99. — ROBERTSON, 1921, Rec. Ind. Mus., vol. xxii, pt. 1, no. 8, 62. — BARROSO, 1922, Bol. Soc. Esp. Hist. Nat., xxii, 6.

Melobesia radiata, AUDOUIN, 1826, Jahresb. Schl. Gessel. für Veterl. Cultur., 235, pl. vi, fig. 3.

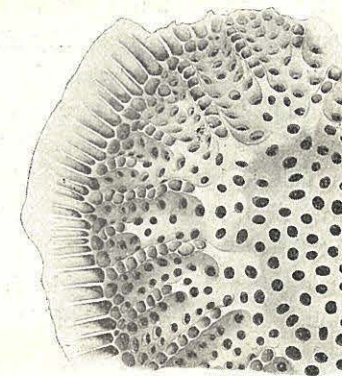
Unicavea radiata D'ORBIGNY, 1850-52, Pal. farn. terr. Cret. v. Bryoz., 971.

Discoporella radiata BUSK, 1875, Cat. Brit. Mus., iii, 32, pl. xxxiv, fig. 3. — WATERS, 1879, Ann. Mag. Nat. Hist., 5, iii, 276, pl. xxiv, fig. 1.

Discoporella patina HELLER, 1867, Verh. der K. K. Zool. Bat. Ges., xviii, 122.

Diastopora catillus JOHNSON, 1897, Ann. Mag. Nat. Hist., 6, xx, 61.

Diagnosis: Zoarium orbicular, bordered with a thin adherent lamina, convex, the centre of the disc slightly concave or flat, destitute of zooecia, cancellated. Zooecia much raised, connate, disposed in uniserial radiating rows, alternately longer and shorter; zoecial aperture



Text-fig. 11. *Lichenopora radiata* (AUDOUIN).
A portion of the colony showing the arrangement of zooecia $\times 25$.

with the upper margin usually mucronate, and sometimes the lower also; one or two rows of rather large subcircular pores between the lines of the zooecia. Ooeciopore large, trumpet-shaped, tubular, placed near the margin of the central area.

Several colonies which may be identified with the above species are in the collection. They were attached to a shell of *Clamys ruscherbergi* TRYON.

12. *Lichenopora verrucaria* (FABRICIUS).

Lichenopora verrucaria SMITT, 1878, Oefr. K. Vetensk. Ak. Förch., no. 3, 15. — HINCKS, 1880, Hist. Brit. Mar. Poly., 476, pl. LXIV, figs. 4-5. — RIDLEY, 1881, Ann. Mag. Nat. Hist., 5, vii, 452. — NORDGARD, 1896, Berg. Mus. Aarb., no. 11, 6. — HARMER, 1897, Quart. Journ. Mic. Soc., vol. 39, pl. vii, figs. 1-9. — NORDGARD, 1900, Den Norsk. Nord. Exp., xxvii, 20. — BIDENKAP, 1900, Fauna Arct., 1, 529. — NORDGARD, 1906, Rep. Sec. Norw. Arct. Exp., no. 8, 37. — OSBURN, 1911, Bull. Bur. of Fish., vol. xxx, 219, pl. xviii, figs. 13, 13a, 13b. — OSBURN, 1912, Proc. Unit. St. Nat. Mus., vol. 43, 276. — OKADA, 1916, Jap. Zool. Mag., vol. 30, no. 359, 383. — OSBURN, 1919, Bull. Am. Mus. Nat. Hist., vol. XL, art. xix, 607.

Madrepora verrucaria, FABRICIUS, 1780, Faun. Groenl., 430.

Discoporella verrucaria SMITT, 1866, Krit. Fört. öfver Skand. Hafs- Bry., 405, pl. x, figs. 6-8, pl. xi, figs. 1-6. — BUSK, 1875, Cat. Brit. Mar. Pol., iii, 31. — WATERS, 1879, Ann. Mag. Nat. Hist., 5, iii, 276.

Diagnosis: Zoarium subcircular, convex, entirely adherent, with a small central area destitute of zooecia, the laminar border narrow.

Zooecia rather stout, moderately raised, disposed more or less regularly in radiating lines, not connate; aperture obliquely elliptical, the margin carried up into a tall acuminate process; zooecia around the border of the disc not elevated, quincuncial; aperture subcircular. Ooecium an inflation of the surface of the disc, ooeciostome raised, with a rounded or sometimes elliptical trumpet shaped ooeciostome. The central area, which is free from zooecia, as well as the spaces between the zooecia, are cancellated.

A somewhat large colony which may be identified with the above species is in the collection. It was collected off Itanozaki (Station 31).

February 29, 1928.

EXPLANATION OF PLATE.

- Fig. 1. *Crista franciscana* ROBERTSON $\times 1$.
 Fig. 2. *Crista buciniform*, n. sp. $\times 1$.
 Fig. 3. *Tubulipora pulchra* MAC GILLIVRAY $\times 1$.
 Fig. 4. *Tubulipora pacifica* ROBERTSON $\times 1$.
 Fig. 5. *Tubulipora mutsu*, n. sp. $\times 1$.
 Fig. 6. *Berenicea coralliform*, n. sp. $\times 1$.
 Fig. 7. *Reptotubigera incrastata*, n. sp. $\times 1$.
 Fig. 8. *Tubulipora misakiensis* OKADA $\times 1$.

