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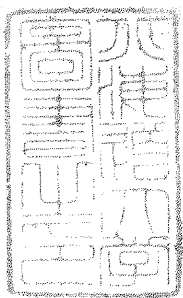
THE FAUNA OF AKKESHI BAY

XVIII. ASCIDIA

BY

Takasi Tokioka

SAPPORO, JAPAN



THE FAUNA OF AKKESHI BAY

XVIII. ASCIDIA

(*Contribution to Japanese Ascidian Fauna. III*)

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(With 16 text-figures and Plates I and II)

Here I deal with ascidians collected by Dr. S. Okuda of the Akkeshi Marine Biological Station of the Hokkaido University in the neighbourhood of Akkeshi Bay, Hokkaido. The specimens are preserved in formalin, and comprise 17 species, of which 4 seem to be new to science. The presence of some species belonging to the genera *Perophora*, *Botryllus* and *Botrylloides* among these specimens shows us an undeniable effect of the warm current along the south-eastern coast of Hokkaido.

Before going further, I want to express my hearty thanks to Dr. S. Okuda for his kindness in giving me a chance to examine the material and to Prof. T. Komai, under whose kind guidance this study has been carried out. I also record my indebtedness to the Ministry of Education for the financial aid for pursuing the present investigation.

1. *Amaroucium glabrum* VERRILL 1871

Pl. I, fig. 1)

Three colonies attached to Sargassum; the largest one is 50mm × 35mm in extent and 15mm in thickness, while the smallest one is 45mm × 32mm in extent and 9mm in thickness. Test semitransparent and pale brownish-orange in colour. System indistinct.

Zoid: Zooids seem to reach 15mm in length in life. Anterior parts of zooids are situated perpendicularly to the surface, while posterior portions are arranged rather irregularly. Postabdomen very long; and may reach more than the length of thorax and abdomen taken together. Thorax and abdomen are nearly equal in length. Branchial aperture 6-lobed; tip of atrial languet simple. Zooids flesh-coloured.

Thorax: About 13 longitudinal muscles on a side of the thorax. The number of stigmata rows 9 in many zooids, although it varies in the range of 9-12. Twelve to thirteen elongate stigmata in each row.

Dorsal languets moderately developed and displaced slightly to the left side. Tentacles consisting of ca. 5 larger and ca. 10 smaller ones. Ciliated groove a small round orifice. Anus bilobed and situated near the level of the 7th stigmata-row in individuals with 9-10 stigmata-rows, while at the level of the 9th-row in individuals with 12 stigmata-rows.

Abdomen: The posterior portion of the oesophagus is considerably swollen. Stomach near the middle of the abdomen and with 13 longitudinal plications. Mid-intestine distinct. A pair of caeca attached to the proximal end of the rectum.

Postabdomen: Ova in a zooid less than 4. The situation of the ovary can not be made out in the present material. Testicular follicles extremely minute, and arranged in many thin longitudinal rows which are then grouped into two pairs of longitudinal bands.

2. *Amaroucium constellatum* VERRILL 1871

(Pl. I, figs. 2-4)

A colony of 35mm × 35mm in extent and 15-20mm in height attached at the base of a colony of a Lafoeid hydroid. Test semitransparent and gelatinous, whitish in colour. System indistinct.

Zooid: 8-10mm in length. Postabdomen short in most zooids, although it is very long in a few zooids. Thorax and abdomen are subequal in length. Branchial aperture 6-lobed; atrial languet simple, or with 2-3 clefts. Anal opening on the level of the 7th stigmata-row.

Thorax: 10-15 stigmata in each of 11-12 rows of stigmata. Tentacles ca. 10. Embryos, up to 6, found in the brood chamber on the right side. Trunk of larvae 0.8mm in length.

Abdomen: Oesophagus not swollen. Stomach slightly in front of the middle of the abdomen and with 20-30 plications. Mid-intestine distinct. A pair of caeca at the proximal end of the rectum.

Postabdomen: Ova less than 5, and situated just behind the intestinal loop. Testis as in the preceding species.

3. *Didemnum (Didemnum) albidum* (VERRILL) 1871

(Fig. 1)

Two colonies attached to the base of a colony of a Lafoeid hydroid. One is 25mm × 10mm in extent and ca. 2mm in thickness; the

other is much smaller. They are rather poor specimens. Calcareous spicules 23–35 μ in diameter ; radiating processes in form of round masses. Zooid

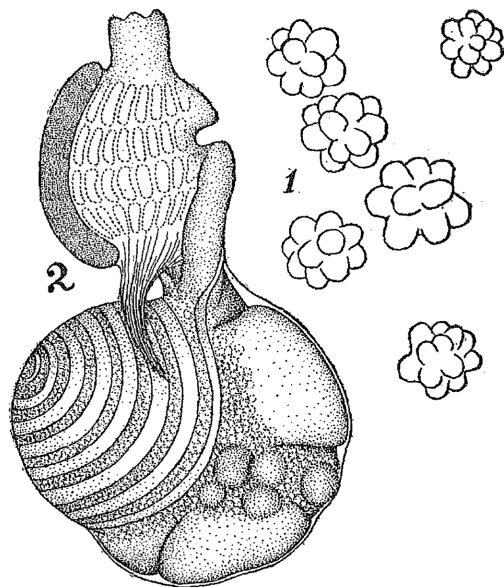


Fig. 1. *Didemnum albidum* (Verrill)
1—Calcareous spicules, $\times 400$; 2—Zooid, $\times 70$.

ca. 1mm in length. Branchial aperture 6-lobed. Proximal part of vas deferens coils ca. 3 times in smaller zooids and ca. 7 times in larger zooids.

4. *Didemnum okudai* n. sp.

(Fig. 2)

About twenty small colonies on Sargassum. The largest one is 17mm $\times$ 9mm in extent and 1mm in thickness. Test transparent and milky-white in colour. Cloacal aperture indistinct. Test contains no calcareous spicule, but a small amount of fine quartz sand grains. Through the test are shown pale fleshy zooids and many bulbs, the swollen terminals of vessels being distributed densely along the margin of the colony and in the bottom layer.

Zooid: 0.9mm in length. Branchial aperture 6-lobed; atrial aperture small. A pair of fan-shaped thoracic tubercles on the thorax. Stomach longer than wide; mid-intestine distinct. Proximal part of rectum very

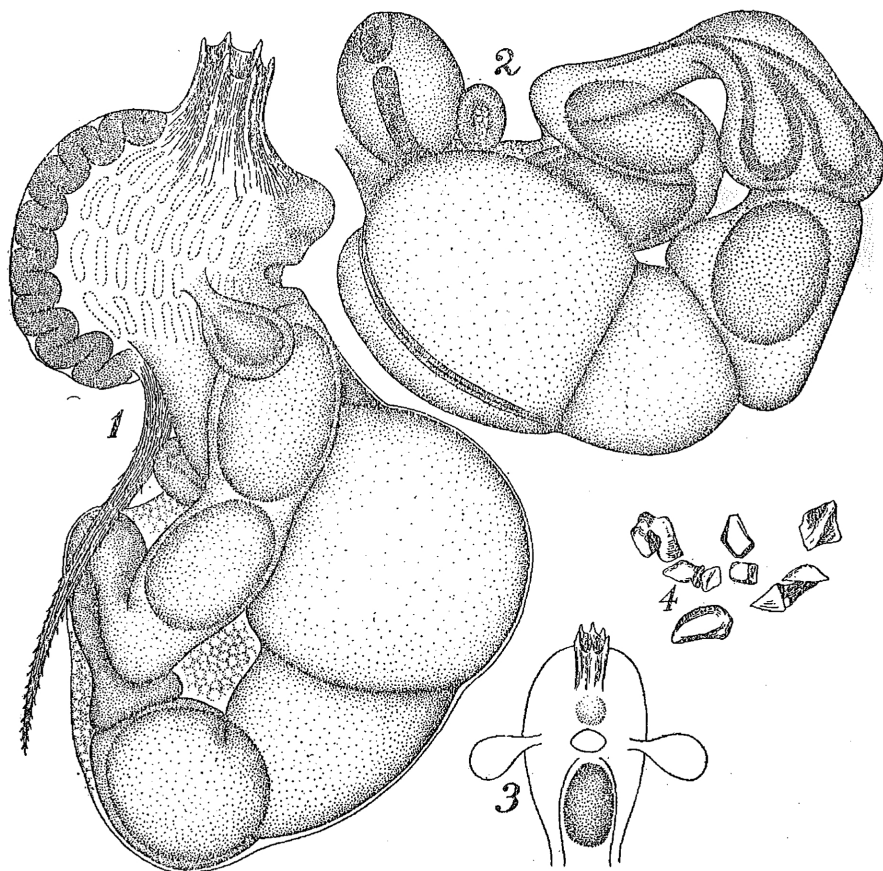


Fig. 2. *Didemnum okudai* n. sp. 1—Zooid, $\times 150$; 2—Abdomen, $\times 150$;
3—Thorax with thoracic tubercles; 4—Quartz sand in the test, $\times 150$.

thick and has a whitish glandular appearance. Rectum S-shaped. Gonad not yet developed.

Remarks: The absence of calcareous spicules and the presence of a pair of conspicuous thoracic tubercles are the characteristics of this new species.

5. *Distaplia yezoensis* n. sp.

(Fig. 3)

Several colonies, 3-4mm in thickness, surrounding the stem of a seaweed. Test bluish gray; zooids whitish. Systems very distinct, 3-8mm in length and 2-3mm in width and consisting of 6-23, mostly ± 10 zooids.

Zoid: 2mm in length. Abdomen slightly smaller than the thorax. Branchial aperture 6-lobed. Atrial languet long; tip simple, bilobed, or rarely divided into three lobules.

Thorax: Thorax with many longitudinal muscles, but without any transverse one. Twelve to thirteen elongate stigmata in each of 4 rows of stigmata. Parastigmatic vessels present. Dorsal languets displaced to

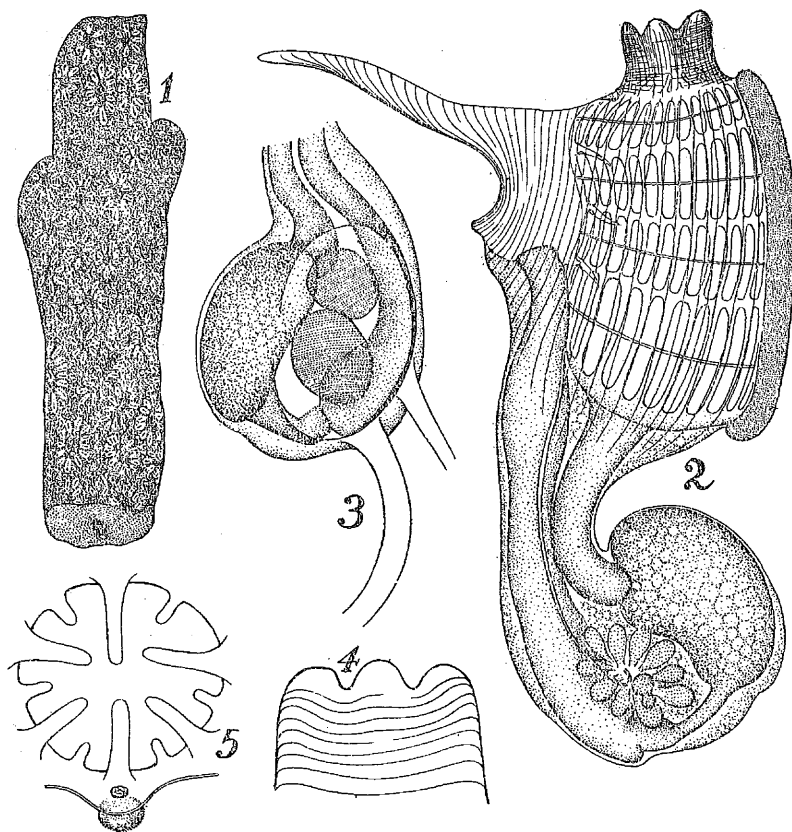


Fig. 3. *Distaplia yezoensis* n. sp. 1—A colony of 30mm long;
2—Zooid, $\times 50$; 3—Abdomen showing pericardium, $\times 50$;
4—Trident atrial languet; 5—Tentacles.

the left side. Tentacles 12; large and small ones alternate regularly. Ciliated groove a small oval orifice. Anus situated on the level between the 3rd and the 4th stigmata-rows, and with smooth margin.

Abdomen: Oesophagus curved so as to open horizontally into the stomach. Stomach elongate, and diminishes in size posteriorly, although it is distinctly distinguished from the following intestine. Surface of stomach smooth: though a reticular structure is faintly discernible on the inner wall. Proximal portion of rectum very thick. Gonad in the intestinal

loop. Testicular follicles less than 12; ova 2 in many zooids. A conspicuous pericardium on the opposite side of the gonad.

Remarks: Of the two known species of *Distaplia* found in the northern area of the Pacific, *D. occidentalis* Bancroft has the gonad behind the intestinal loop, while *D. clavata* (Sars) forms a characteristic club-shaped colony.

6. *Perophora japonica* OKA 1927

(Fig. 4)

Many zooids on the stem of Sargassum. Body globular and ca. 3mm in length. Test quite transparent, frequently with many fine sand grains adhering on the surface. Branchial aperture terminal; atrial aperture situated close to it. Both apertures 6-lobed.

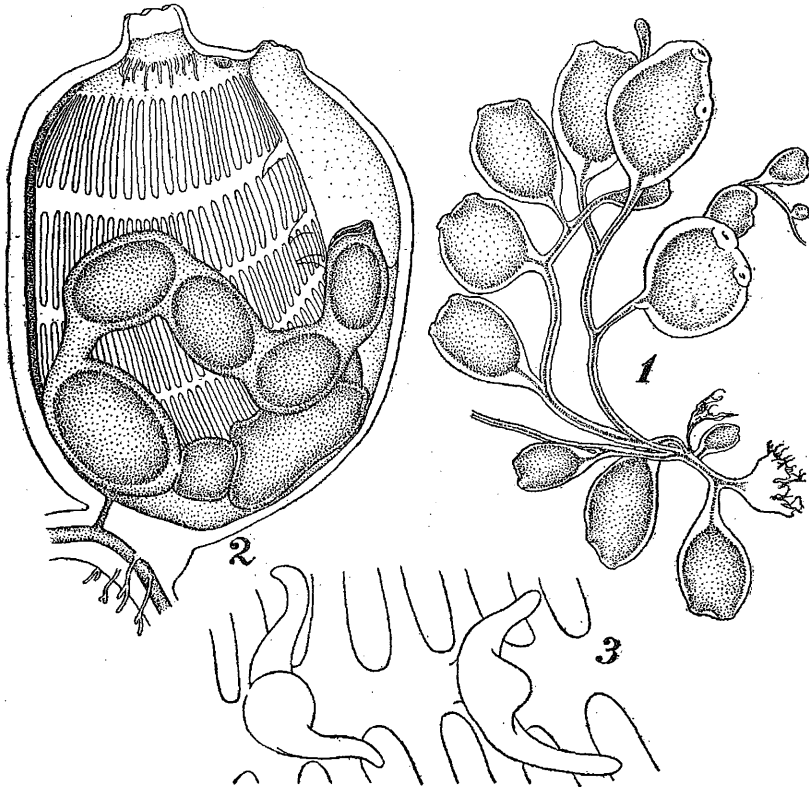


Fig. 4. *Perophora japonica* Oka 1—A part of colony; 2—Zooid, $\times 16$; 3—A part of the branchial sac, $\times 180$.

Branchial sac: With 4 rows of stigmata. Eight longitudinal rows of papillae on each side. Each papilla with long anterior and posterior

processes. In one case, the anterior process of one papilla was connected with the posterior process of the corresponding papilla on the preceding transverse vessel. Ca. 25 stigmata in each row. Tentacles ca. 25, including minute ones. The anterior end of the intestinal loop reaches near the first transverse vessel. In other features the present specimens agree very well with the description given by Oka. Gonad undeveloped as yet.

7. *Botryllus primigens* OKA 1928

(Fig. 5)

Several colonies on a laminarian leaf; the largest one 13mm $\times$ 20mm in extent and 1mm in thickness. Test transparent; zooids and vessels purplish brown; the latter form bulbs especially along the periphery of the colony. System indistinct, though partly radial as shown in the figure.

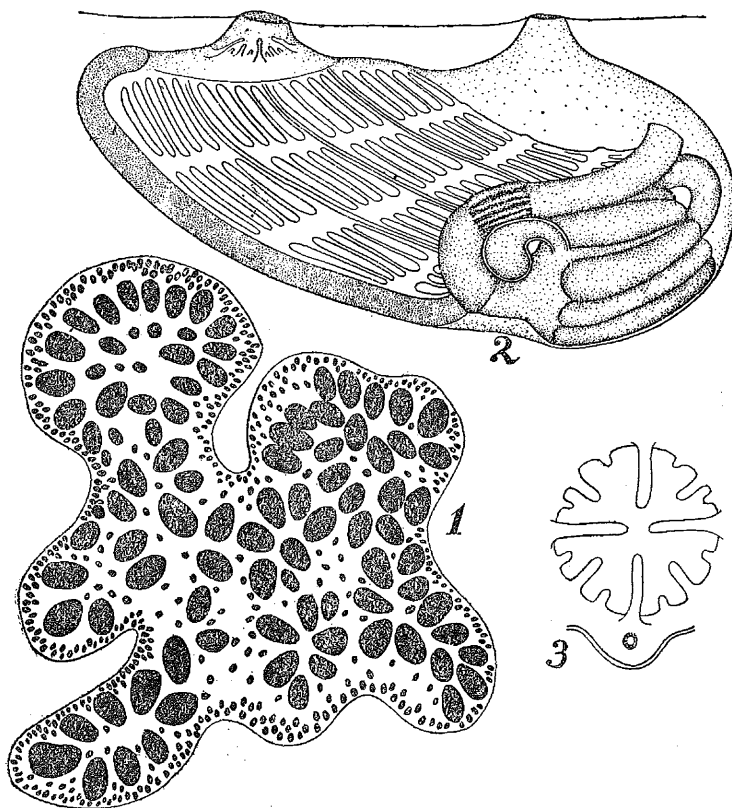


Fig. 5. *Botryllus primigens* Oka 1—A colony;
2—Zooid; 3—Tentacles.

Zooid: Body oblique, 1mm in length. Both apertures round. Stigmata arranged in each of 4 rows as follows: D. 4-6. 4. 4-5. 5 V. Tentacles

9-12, comprising large and small ones. Ciliated groove a longitudinally oval orifice. The anterior margin of the intestinal loop reaches the middle of the third stigmata row. Ten plications on stomach.

8. *Botryllus communis* OKA 1927

(Fig. 6)

Many colonies attached to Sargassum. Smaller colonies are globular; larger ones are encrusting and may be 25mm×10mm in extent and 2mm

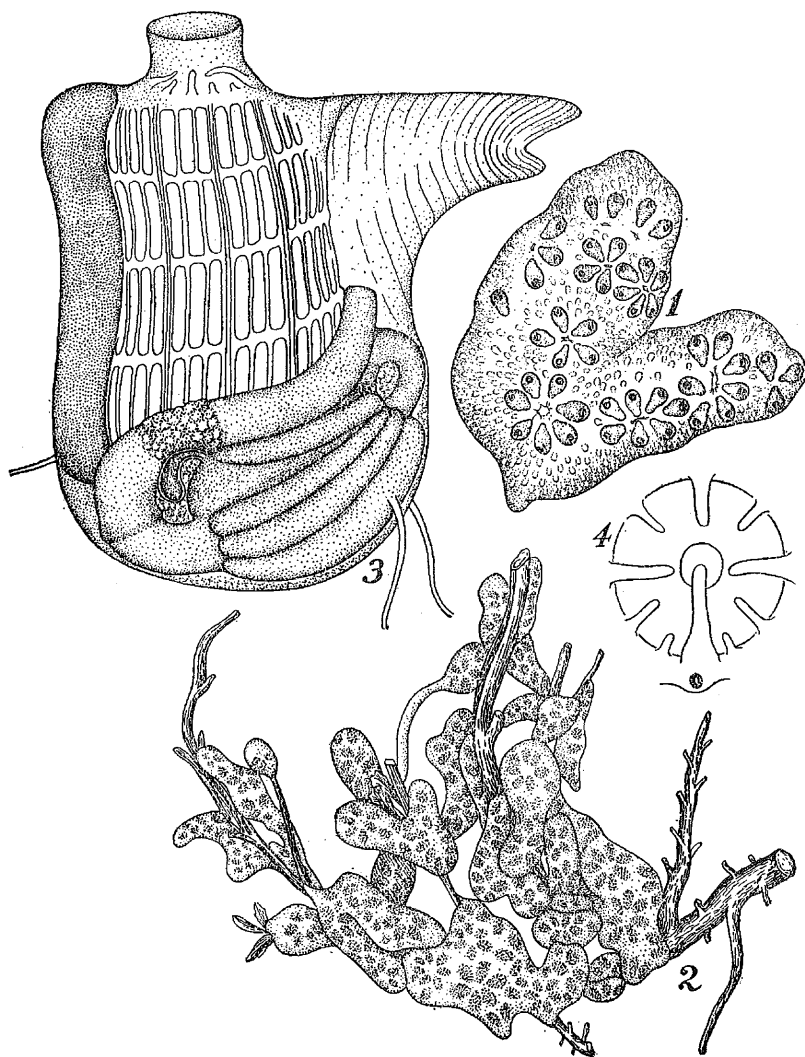


Fig. 6. *Botryllus communis* Oka 1—Encrusting colony; 2—Colonies on sargasso, × 1; 3—Zooid; 4—Tentacles.

in thickness Test transparent; zooids chocolate or brownish purple in colour. System distinct and consisting usually of 5-7 zooids.

Zooid: Zooids nearly vertical and about 1mm in length. Branchial aperture round; atrial aperture opens at the tip of a siphon. Stigmata arranged in each of 4 rows as follows: D. 3-4. 3-4. 3-4. 3-4 V. Tentacles 10-14, comprising large, small and minute ones. Ciliated groove a small round orifice. Anterior margin of the intestinal loop along the level of the middle of the 4th stigmata-row. Eight plications on stomach. Anus situated on the level of the 3rd transverse vessel. Gonad not developed in any zooid.

9. *Botryllus schlosseri* (PALLAS) 1766

(Fig. 7)

Many small colonies on a laminarian leaf. They are 10mm × 10mm in extent and 1mm in thickness. Test transparent and faintly flesh in colour. System indistinct.

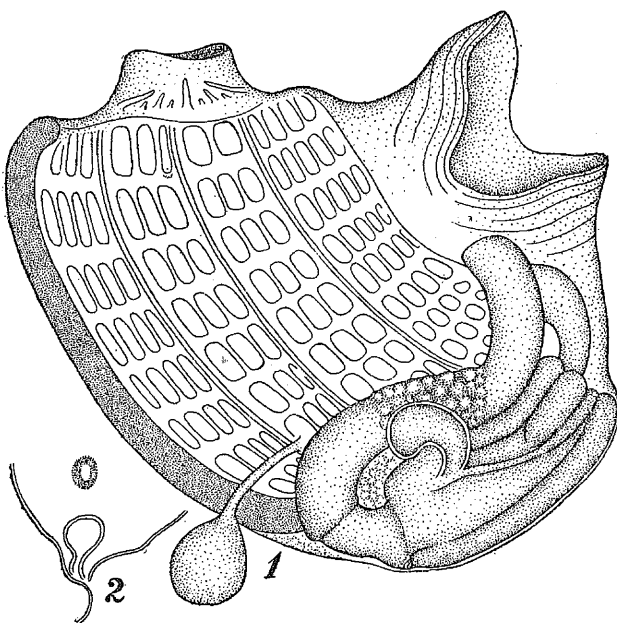


Fig. 7. *Botryllus schlosseri* (Pallas) 1—Zooid;
2—Ciliated groove, × 180.

Zooid: Zooids oblique, 1mm in length and faintly flesh in colour. Branchial aperture round; atrial aperture large. Stigmata row varies from 6 to 10, usually 8-9. Stigmata in each row 12-15 and arranged as D. 4-5. 2-3. 2-3. 4 V. Tentacles 12-16. Stomach situated behind the branchial sac and provided with 11 plications on the surface. Anus opens on the level between the 6th and the 7th stigmata-rows. Gonad can not be seen in any zooid.

Remarks: Oka (1931) stated in his description on *Myxobotrus japonicus*, that Japanese species of *Botryllus* are divided into two groups, one with 4 rows of stigmata and the other with 9 rows of them. There has been found, however, no description in his papers on the group with 9 stigmata rows. The present species is probably a representative of this group just mentioned.

10. *Botrylloides violaceum* OKA 1927

(Fig. 8)

Two colonies attached to Sargassum. They are 40mm×20mm in extent and 5mm in thickness. Two other colonies attached on a laminarian root, are 50mm×30mm in extent and 3mm in thickness. Test soft and transparent; faintly pinkish in colour. Zooids vertical, 1.5mm–2mm in length and pinkish or flesh in colour. Number of stigmata rows

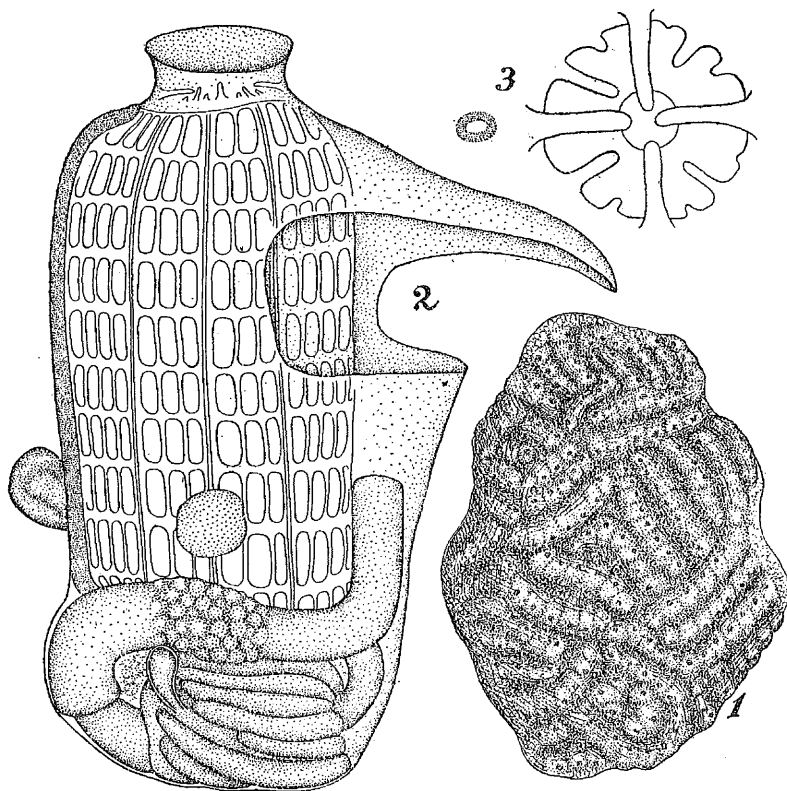


Fig. 8. *Botrylloides violaceum* Oka 1—Colony;
2—Zooid; 3—Tentacles.

varies in the range of 11–13, usually 11 on the right and 12 on the left side; the posterior three rows are covered by alimentary canal on

the left side. Stigmata arranged in each row as: D. 4-5. 2-3. 2-3. 3-4 V. Stomach with 12 (rarely 13) plications on surface. Intestine is slightly swollen in front of the stomach. This portion is the excretory glandular tissue and reddish orange in colour. The situation of the anus varies from the 7th to the 9th stigmata-row. Gonad not fully developed; only two testicular follicles found in front of the alimentary canal.

11. *Polyzoa vesiculiphora* n. sp.

(Fig. 9; Pl. II, figs 1-2)

Many specimens attached on a Lafoeid hydroid, bryozoa and egg capsules of a certain gastropod. Body 3-5mm in length, globular, with

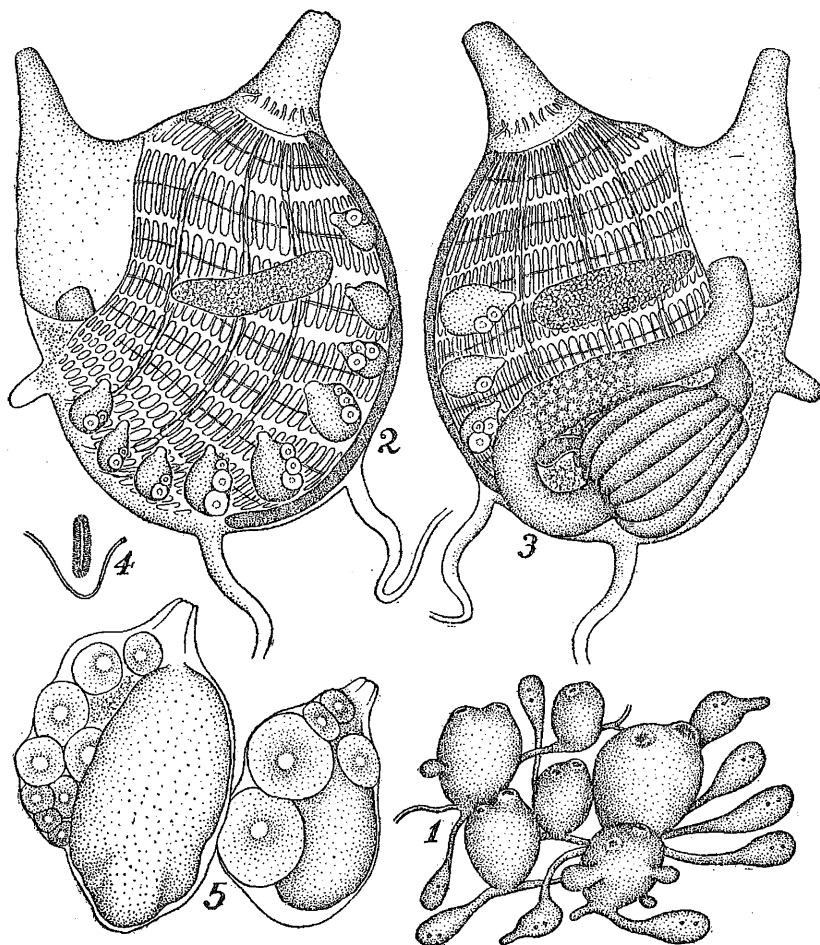


Fig. 9. *Polyzoa vesiculiphora* n. sp. 1—A part of colony; 2—Zooid from right side; 3—Zooid from left side; 4—Ciliated groove; 5—Gonad, $\times 70$.

several knobs on the surface in some individuals. The ascidian is attached to the substratum by its postero-sinistral part of the body. Branchial aperture terminal and 4-lobed; atrial aperture situated close to it and round. Test whitish and semitransparent, frequently with fine sand grains adhering on the surface. Mantle faintly flesh in colour and provided with some processes corresponding to knobs on the test. An elongate vesicle is found near the centre of the inner surface on each side.

Branchial sac: Nine to ten rows of stigmata are present. Stigmata very slender, and arranged between three longitudinal vessels as follows:

Small individuals

D. 3. 3-4. 3-4. 6-8 V.

Large individuals

D. 6-7. 7-9. 7-9. 10-15 V.

Parastigmatic vessels present in large specimens. Dorsal lamina a plain membrane. Tentacles ca. 20. Ciliated groove a short longitudinal slit.

Alimentary system: The frontal margin of the intestinal loop reaches anteriorly the 5th transverse vessel. Stomach with 13 plications and a conspicuous pyloric coecum. Anus situated near the level of the 5th stigmata-row and plainly margined.

Gonad: Three to five on the left and 6-9 on the right side. Each gonad with a large testicular follicle. Embryos, up to 35 including immature ones, found in the atrium. Trunk of larva 0.5mm in length and with 8 ampullae in the anterior part behind the three conical attachment processes.

Remarks: This new species closely resembles *P. translucida* Ritter & Forsyth which has, however, no vesicle on the inner surface of the mantle, and is provided with 12 rows of stigmata.

12. *Dendrodoa aggregata* RATHKE 1806

(Fig. 10; Pl. II, fig. 3)

Many specimens attached to the bark of wood immersed in the sea. Large individuals measure 14-16mm in length. Body ovate and attached by the posterior end. Both apertures terminal. Test grayish white; many longitudinal and transverse grooves divide the surface into many small quadrates. Mantle thin, but strong, brownish in colour and with a orange tint around the apertures. Atrial tentacles 30-35. A few endocarps exist on the inner surface of the mantle. Many small tentacle-like processes are found on the inner surface of the mantle and also on the surface of the branchial sac, around the opening of the gonad.

Branchial sac: Intermediate longitudinal vessels entirely missing. Vessels on folds are arranged as follows:

left D. 0 (7-8) 0 (2) 0 (4) 0 (2) 0 V.

right D. 0 (6-7) 0 (2-2+*) 0 (4-5*) 0 (2-4*) 0 V.

(* in the anterior part of the branchial sac in rare cases)

Transverse vessels arranged in the following scheme:-- large-small-medium-small-large ---. Parastigmatic vessels present in some parts of the branchial sac. Stigmata elongate and very numerous, reaching 25

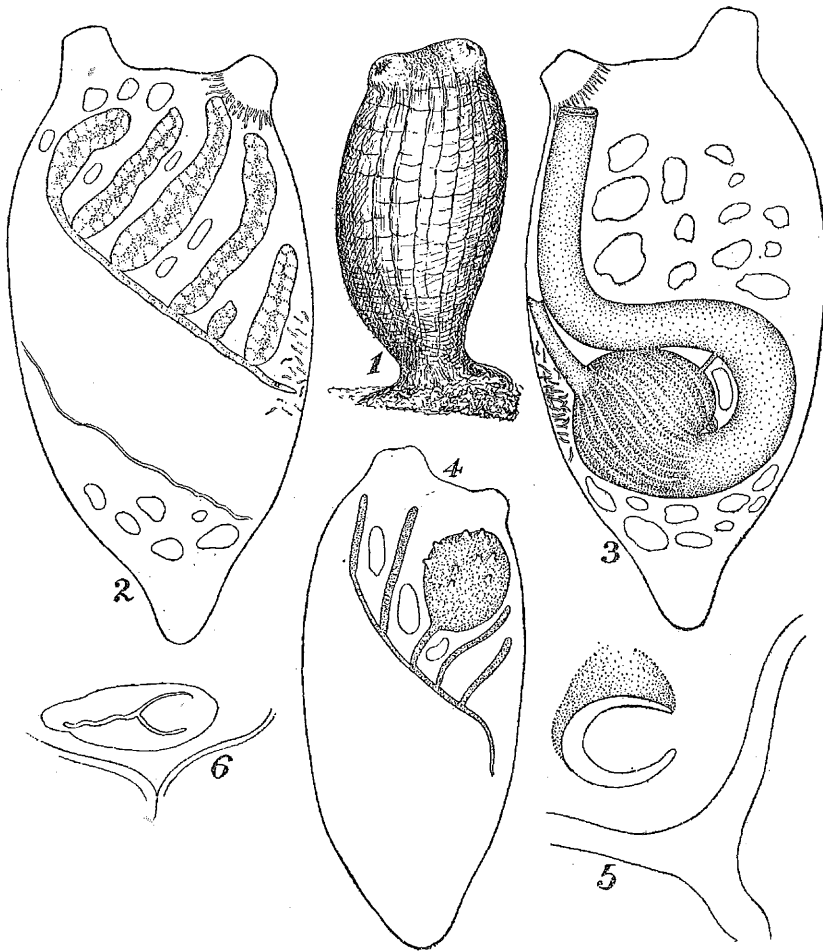


Fig. 10. *Dendrodoa aggregata* (Rathke) 1—Entire animal, $\times 3$;
2—Right half from inside; 3—Left half from inside;
4—Right half from inside, with abnormally swollen
gonad; 5 & 6—Dorsal tubercles, $\times 70$.

in number, in the space between the endostyle and the IVth fold. Tentacles 30-35, comprising large and small ones. Some tentacles may be bifurcated. Ciliated groove U- or Y-shaped, with the opening facing to the right.

Alimentary system: Stomach round, with 10-15 plications on the surface and a small pyloric coecum. A thin vessel bridges the space between the pyloric portion of the stomach and the intestine. Anus plainly margined.

Gonad: Gonad present on the right side only. Divided into 5-6 branches; genital aperture on the level near the middle of the body. In one specimen, one of the branches of the gonad is considerably swollen as shown in the figure. Larva with a long tail and a trunk 0.2mm in length, and with ca. 15 finger-shaped buds of the vessel in the anterior part.

Remarks: The present specimens show an intermediate state between *D. aggregata* and *D. lineata* (Traustedt). The small body and the fewer longitudinal vessels are the features resembling *D. lineata*, while the external appearance of the test and the number of tentacles are the same as in *D. aggregata*. The decrease in body size and in the number of vessels may be found as a local or a racial variation. I prefer, therefore, to treat the present specimens as a minor form of *D. aggregata*.

13. *Syndendrodoa composita* n. g., n. sp.

(Fig. 11)

Syndendrodoa: n. g.

Many individuals aggregated very compactly, with their tests fused completely one another forming a common test. The structure of each individual as in *Dendrodoa*.

Two colonies, of which one attached around the stem of sargassum and the other on the shell of a gastropod, *Fusitriton oregonensis* (Redfield). The colony on the shell is 100mm x 50mm in extent and 40-50mm in thickness, the other one around the stem of a sea-weed is 60mm in length and 45mm in diameter. Common test grayish violet to black, leathery and very tough. Surface with many prominences on which the apertures of zooids are found. Zooids 20mm long and 8mm wide. Mantle, alimentary canal and branchial sac purplish black in colour. Several endocarps on the inner surface of the mantle. Atrial tentacles present. Both apertures terminal and 4-lobed.

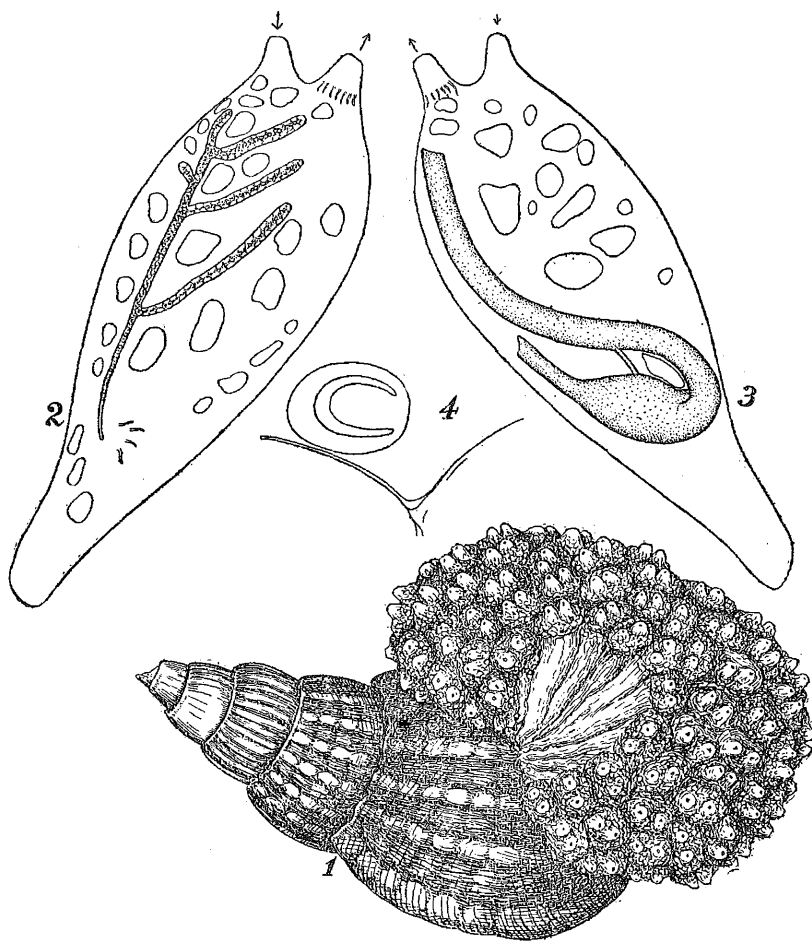


Fig. 11. *Syndendrodoa composita* n. g., n. sp.
 1 — Entire colony; 2 — Zooid, right half from inside;
 3 — Left half from inside; 4 — Dorsal tubercle.

Branchial sac: Longitudinal vessels arranged as follows:

left D. 0 (7-8) 1 (1) 0 (2) 0-1 (1-2) 0 V.

right D. 0 (7) 1 (1) 0 (3) 0-1 (1-2) 0 V.

Transverse vessels arranged in the scheme: --- large-small-medium-small-large ---. Parastigmatic vessels present in many places. Stigmata elongate; they may reach 25 in number in the space between the first fold and the dorsal lamina which is a plain membrane. Tentacles ca. 30. Ciliated groove U-shaped with its opening facing to the right.

Alimentary system: As in the preceding species except that the stomach has no plication or striation on its surface.

Gonad: Found only on the right side and consisting of 2-5 branches Genital opening situated in the posterior portion of the body. A few tentacle-like prominences around the opening.

14. *Styela clava* HERDMAN 1881

(Fig. 12)

Many specimens, up to 100mm in length including the peduncles which may occupy nearly a half of the body length. As this species is described fully by previous authors, I record here only the structure of the branchial sac and the number of gonads. Arrangement of longitudinal vessels :

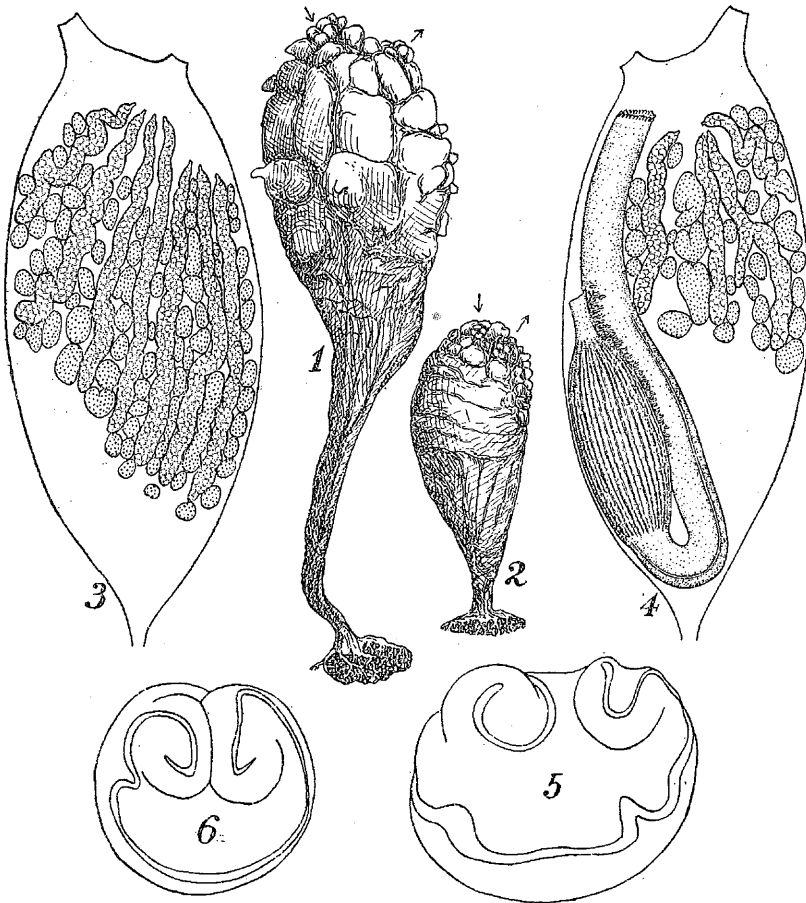


Fig. 12 *Styela clava* Herdman 1 & 2—Entire animals;
 3—Right half from inside; 4—Left half from inside;
 5 & 6—Dorsal tubercles.

Large specimen

left D. 6 (27) 10 (24) 7 (29) 7 (18) 3 V.

right D. 3 (31) 8 (20) 10 (21) 12 (15) 4 V.

Small specimen

left D. 4 (24) 6 (19) 5 (23) 6 (10) 3 V.

right D. 4 (17) 8 (18) 8 (18) 7 (12) 5 V.

There is a vesselless area on the right side along the dorsal lamina near the oesophageal opening. 5-10 thinner transverse vessels between each pair of thicker ones. Six to ten elongate stigmata in a mesh. Gonads 5-7 on the right, 3-4 on the left.

15. *Boltenia echinata* (LINNAEUS) 1767

(Pl. II, fig. 4)

Three specimens, 10mm x 8mm in extent and 6-8mm in height. Both apertures 4-lobed. Longitudinal vessels arranged in the central portion of the branchial sac as follows:

D. 0-2 (9-15) 1-2 (6-8) 1-2 (10-13) 1-2 (14-15) 2-3 (11-12) 1-2 (6-8) 1-2 V.
Branches of tentacles in 3 orders.

16. *Halocynthia aurantium* (PALLAS) 1787

(Fig. 13)

Many specimens, up to 60mm in length.

Branchial sac: Longitudinal vessels arranged as follows:

Specimen 1 (60mm long) 10 folds on the left, 9 folds on the right side.

left D. 2 (13) 2 (19) 3 (25) 3 (27) 2 (28) 4 (24) 4 (20) 3 (17) 3 (16)
2 (4) 1 V.

right D. 0 (16) 2 (23) 2 (25) 2 (25) 2 (25) 3 (22) 3 (24) 2 (18) 0 (6) 0 V.

Specimen 2 (45mm long) 10 folds on each side.

left D. 2 (8) 2 (19) 2 (23) 2 (19) 3 (20) 3 (13) 4 (14) 3 (13) 3 (9)
2 (4) 1 V.

right D. 1 (13) 2 (22) 2 (22) 2 (23) 3 (23) 3 (19) 2 (20) 3 (15) 3 (14)
2 (6) 1 V.

Specimen 3 (11mm long) 8 folds on each side.

Three thinner transverse vessels between each pair of thicker ones. Parastigmatic vessels present and arranged regularly. Ten to twelve elongate stigmata in a mesh. Tentacles 16-29, comprising large and small ones alternating rather regularly; branches in 3 orders. Ciliated groove U-shaped in the 11mm long individual, while it is a rosette in grown individuals.

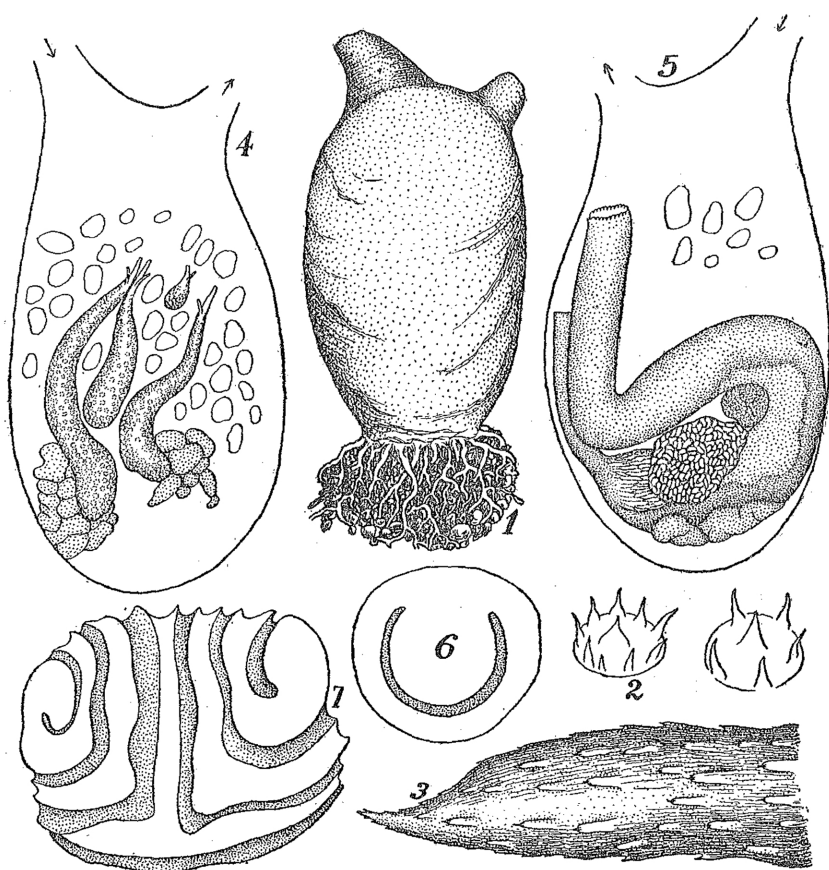


Fig. 13. *Halocynthia aurantium* (Pallas) 1—Entire animal; 2—Spinules on the test, $\times 70$; 3—A spine from the anterior portion, $\times 180$; 4—Right half from inside; 5—Left half from inside; 6 & 7—Dorsal tubercles, 6, 11mm long individual, 7, 60mm long individual.

Alimentary system: Liver consists of an anterior portion with longitudinal plications and a posterior portion consisting of many lobules. Margin of anus with fine lobules.

<i>Gonad</i> :	Specimen 1 (60mm long)	left — 1, right — 4.
	Specimen 2 (45mm long)	left — 1, right — 2.
	Specimen 3 (11mm long)	not yet developed.

17. *Molgula redikorzevi* OKA 1914

(Figs. 14 and 15)

Many specimens attached to a bryozoan, with a peduncle which is as long as body. The attachment is by the tip and the left side of the peduncle. Large ones 40–45mm in length including peduncle. Body oval, apertures terminal, and situated considerably apart from each other; branchial aperture 5–6 lobed, atrial aperture 4-lobed. Test white and semitransparent, somewhat wrinkled in the anterior portion, especially around the apertures. Mantle thin, pale flesh in colour and with feeble musculature.

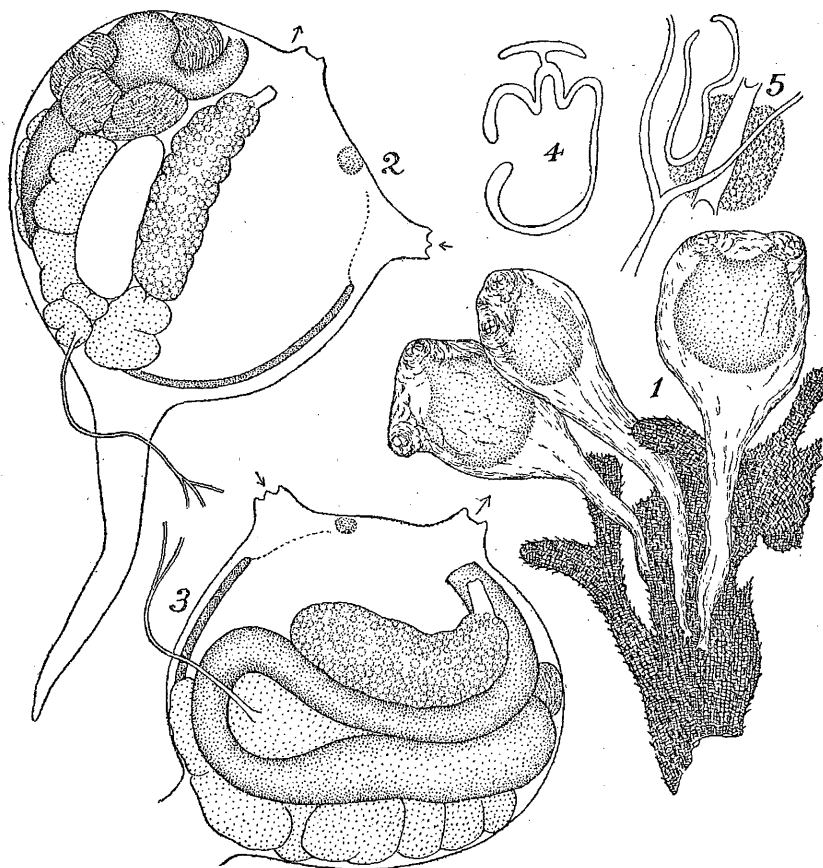


Fig. 14. *Molgula redikorzevi* Oka 1—Three animals on bryozoa;
2—Right half from outside; 3—Left half from
outside; 4 & 5—Ciliated grooves.

Branchial sac: Five folds on each side. Longitudinal vessel exclusively on the upper side of each fold.

left D. 0 (4) 0 (4) 0 (4) 0 (4) 0 (3) 0 V.

right D. 0 (5) 0 (5) 0 (5) 0 (5) 0 (4) 0 V.

Eight transverse rows of infundibula are present. They are arranged in 6 longitudinal rows, one row under each fold, except the ventral-most one which is situated in the space between the endostyle and the Vth fold, and consisting of incompletely developed infundibula. Tentacles very large; ca. 20 in number, excluding minute ones; branches in 3 orders. Ciliated groove traces a rather complexly curved course.

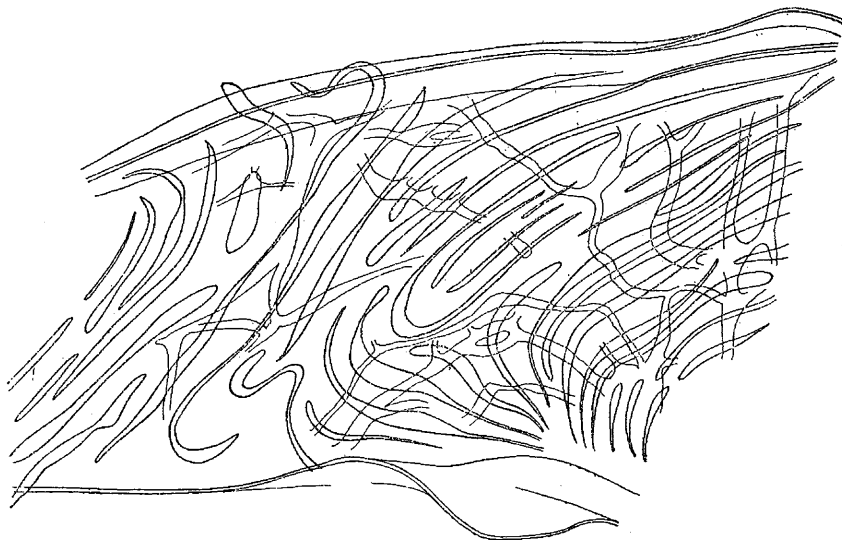


Fig. 15. *Molgula redikorzevi* Oka A part of the branchial Sac between the folds, $\times 42$.

Alimentary system: Arrangement of the alimentary canal as shown in the figure. Liver whitish. Anus plainly margined.

Gonad: Gonad pinkish to pinkish orange. Ovary along the anterior side of the excretory organ on the right side, along the anterior margin of the intestine on the left side. Testis along the ventro-posterior side of the excretory organ on the right side, in the intestinal loop and along the posterior margin of the alimentary canal on the left side.

APPENDIX

(I)

The followings are the notes on some ascidians found on a laminarian leaf, 600mm long $\times$ 80mm wide, which was found in the autumn of 1936 near Otaru on the western coast of Hokkaido and preserved in formalin by Mr. S. Takehara of the Otaru Commercial School. I express here my thanks to Prof. D. Miyadi who offered me this material.

Ascidians found here belong to the following 4 species.

1. *Leptoclinum takeharai* n. sp.
2. *Distaplia yezoensis* Tokioka (p. 4)
3. *Perophora japonica* Oka (p. 6)
4. *Botryllus schlosseri* (Pallas) (p. 9)

***Leptoclinum takeharai* n. sp.**

(Fig. 16)

Three colonies, each about 15mm $\times$ 25mm in extent, and 1-2mm in thickness. Test extremely soft and quite transparent.

Zoid: 1.5mm in length and flesh in colour, with a few brownish purple pigment spots along the vessels of the branchial sac. Branchial aperture 6-lobed. Atrial aperture a huge opening.

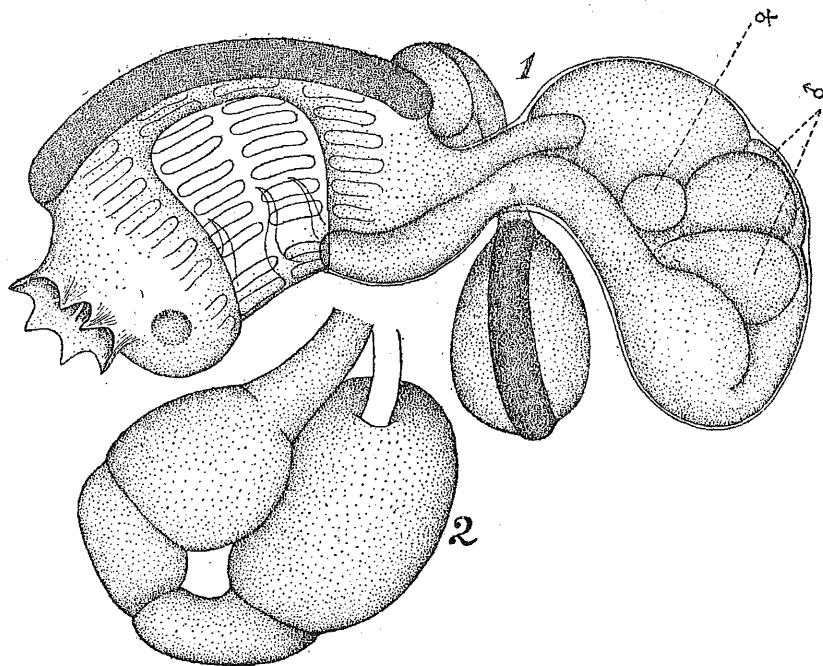


Fig. 16. *Leptoclinum takeharai* n. sp. 1—Zoid, $\times 70$;
2—Abdomen, $\times 70$.

Branchial sac: About 8 elongate stigmata in each of 4 rows. Dorsal languets long. Tentacles 12, comprising large and small ones alternating somewhat regularly.

Alimentary system: Alimentary canal does not form a loop on the horizontal plane, but assumes the appearance shown commonly in the

species belonging to *Didemnum*. Stomach longer than wide; mid-intestine distinct. The proximal portion of the rectum is considerably swollen.

Gonad: Two testicular follicles are present.

Remarks: (1) The loop of the alimentary canal is not on the horizontal plane. (2) Proximal portion of the rectum forms a remarkable bulb. These features are the most remarkable characteristics of this new species.

***Distaplia yezoensis* TOKIOKA 1951**

Several small encrusting colonies are found in the material. They are flesh in colour and ca. 2mm in thickness. Test semitransparent.

***Botryllus schlosseri* (PALLAS) 1766**

Several colonies, fleshy red in colour. Test transparent. Testis is not yet fully matured and consisting of only 3-4 follicles.

(II)

Dr. Isao Taki gave me a specimen of *Chelyosoma* found at the station 69°58' N × 175°14' W on 30/VII, 1937. This specimen is identified as *Chelyosoma macleayanus* Broderip & Sowerby 1830. It is 36mm × 22mm in size and 8mm in height (Pl. II, fig. 5).

EXPLANATION OF PLATES

Plate I

- Fig. 1 — *Amaroucium glabrum* Verrill; zooid, × 22.
 Fig. 2 — *Amaroucium constellatum* Verrill; zooid and bifurcated atrial languet.
 Fig. 3 — " " " ; larva, × 100.
 Fig. 4 — " " " ; surface of the stomach.

Plate II

- Fig. 1 — *Polyzoa vesiculiphora* n. sp.; larva, × 80.
 Fig. 2 — " " " ; trunk of larva, × 110.
 Fig. 3 — *Dendrodoa aggregata* (Rathke); larva (× 80) and a part of its test (× 200).
 Fig. 4 — *Boltenia echinata* (Linnaeus)
 Fig. 5 — *Chelyosoma macleayanus* Broderip & Sowerby

