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A Systematic Study of Ceilostomatous Bryozoans from Oshoro Bay, Hokkaido

2. Ascophora

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Abstract

Four ascophoran species are described as the second report of a serial study of cheilostomatous bryozoans from Oshoro Bay, Hokkaido, northern Japan. Measurements and figures are given together with the full description of each species.

Key Words: Ascophoran Bryozoa, Systematic description, Northern Hokkaido.

1. Introduction

We have previously described six anascan cheilostomes in the first report of a serial study of marine bryozoans from Oshoro Bay (Kubota & Mawatari, 1985). As the second report of the study the present paper deals with four ascophoran species belonging to the family Cribrilinidae, Hippothoidae, and Schizoporellidae.

The data of materials are given in the same order as those of the first report (Kubota & Mawatari, 1985, p. 76).

2. Description

Suborder Ascophora Levinsen, 1909

Division Cribrimorpha Harmer, 1926

Family Cribrilinidae Hincks, 1880

Genus *Cribrilina* Gray, 1848

Cribrilina annulata (Fabricius, 1780)

(Figure 1)

Cellepora annulata Fabricius, 1780, p. 436.

Lepralia annulata: Johnston, 1847, p. 312, pl. 55, figs. 2, 3; Busk, 1854, p. 76, pl. 66, fig. 1.

Escharipora annulata: Smitt, 1868, pp. 4, 53, pl. 24, figs. 8-10.

Cribrilina annulata: Hincks, 1880, p. 193, pl. 25, figs. 11, 12; Kirkpatrick, 1890, pp. 10, 18, pl. 5, fig. 1; Robertson, 1900, p. 326; 1908, p. 280; Osburn, 1912, p. 232,

pl. 24, fig. 42; 1932, p. 369; 1950, p. 177, pl. 28, fig. 7; O'Donoghue & O'Donoghue, 1923, p. 172; 1926, p. 50; Marcus, 1940, p. 201; 1950, p. 13; Rogick & Croasdale, 1949, p. 54; Androsova, 1958, p. 124; Kluge, 1962, p. 390, fig. 247; Prenant & Bobin, 1966, p. 576, fig. 199; Powell, 1967 b, p. 1905, figs. 1, 2; 1968 b, p. 2291; Kubanin, 1975, p. 118; Hayward & Ryland, 1979, p. 60, fig. 15.

Material: Circular encrusting colonies, 5 MA, 0.9×1.2 , 1.2×1.3 , 1.2×1.4 , 1.3×1.3 , 1.6×1.8 cm; 0–2 m, on stones, Ebisu-Iwa, 14-IV-1983, KK.

Colony encrusting, multilaminar, brownish red or dark pink in color. Zooids have two forms, ordinary and dwarf zooids. The dwarf zooids are budded frontally from some dietellae on the proximal gymnocyst of the ordinary zooids, such that the secondary layer is formed on top of the primary layer.

Ordinary zooids (Fig. 1 A) elongate elliptical in younger state, or roundish hexagonal with age, arranged quincuncially, separated by deep furrows. Frontal shield consists of 5 pairs of flattened costae, which fuse at their tips and occasionally to form a longitudinal ridge at the midline of the zooecial front. Aperture bar broad, thickened, consisted of a pair of the distal-most costae, which projects a short blunt process mid-distally. Intercostal spaces calcified, perforated by a number of small pores, which are arranged in transverse rows when young but in radial rows with age. Gymnocyst usually well developed proximally, sometimes forming a long tapering process. Aperture semi-circular, wider than long. Operculum crescentic. Three oral spines stout and short, situated on the distal margin of the aperture. Ooecium small, smooth, triangular in outline, immersed, situated low down near the basal surface, perforated by 2 to 4 tiny pores.

Polypide of the ordinary zooids with 14 to 15 tentacles.

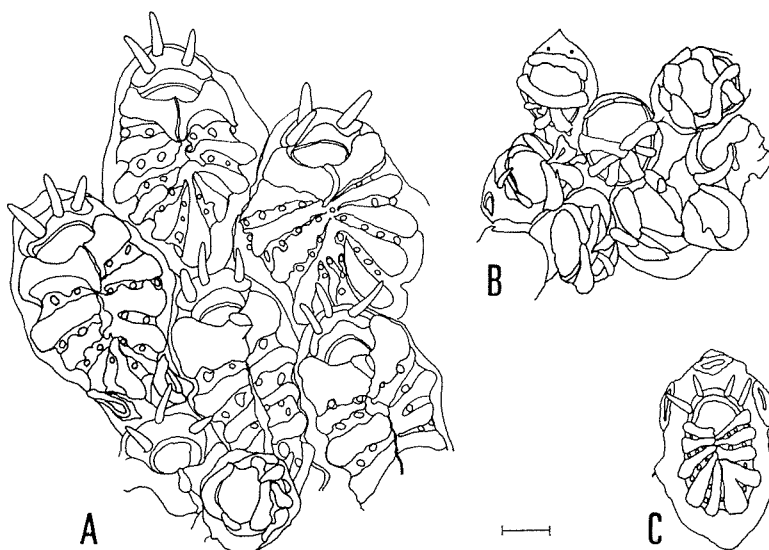


Figure 1. *Cribrilina annulata* (Fabricius, 1980). A, autozooids; B, frontally budded dwarf zooids; C, an ancestrula. Scale-bar=0.1 mm.

Dwarf zooids (Fig. 1 B) are shielded frontally by 2 to 3 pairs of inflated costae, and combined usually with a prominent oecium. A pair of distal oral spines flat, often fused, overarching the aperture.

Avicularium wanting.

Dietellae multiporous; one on each disto-lateral wall, one or two on distal septum, and one to two occasionally on the front-marginal surface of the proximal gymnocyst.

Ancestrula (Fig. 1 C) similar to the ordinary zooid in shape but smaller in size. Three dietellae occur, one on distal septum, one on each disto-lateral wall.

Embryo reddish orange in color.

Measurements (mm):		average	range	SD	n/N
Ordinary Zooid	length	0.66	(0.64-0.69)	0.012	40/4
	width	0.44	(0.34-0.56)	0.079	44/4
Orifice	length	0.12	(0.11-0.14)	0.010	34/4
	width	0.18	(0.17-0.21)	0.034	33/4
Dwarf Zooid	length	0.27	(0.22-0.31)	0.062	47/4
	width	0.24	(0.22-0.27)	0.020	39/4

Remarks: Hayward & Ryland (1979) figured an ovicellated dwarf zooid rather similar to the ordinary one in both shape and size. In our specimens, the dwarf zooids are different in shape and rather smaller than the ordinary ones.

The presence of the dwarf zooids on secondary layer of the colony is one of the major characteristics to distinguish the present species from the other species of *Cribrilina* e.g. *C. punctata* (Hassall, 1841) and *C. cryptoecium* (Norman, 1903). The present species is also distinguishable from them in wanting avicularium.

Distribution: Common in arctic waters of the Northern Hemisphere.

Other records from Hokkaido: Akkeshi, Muroran, Shirikishinai.

Family Hippothoidae Levinsen, 1909

Genus *Hippothoa* (Lamouroux, 1821)

Hippothoa hyalina (Linne, 1767)

(Figure 2)

Cellepora hyalina Linne, 1767, p. 1286.

Celleporella hyalina: Gray, 1848, p. 128; Ryland, 1969, p. 223; Hayward & Ryland, 1979, pp. 252-254, fig. 109.

Schizoporella hyalina: Hincks, 1880, p. 271, pl. 18, figs. 8-10; Robertson, 1900, p. 326; Robertson, 1908, p. 289 (in part), pl. 19, fig. 45.

Schizoporella hyalina var. *incrassata* Hincks, 1880, p. 272; O'Donoghue & O'Donoghue, 1923, p. 177.

Schizoporella hyalina var. *tuberculata* O'Donoghue & O'Donoghue, 1923, p. 177.

Schizoporella hyalina var. *intacta* O'Donoghue & O'Donoghue, 1923, p. 178.

Schizoporella hyalina var. *parva* O'Donoghue & O'Donoghue, 1923, p. 178.

Hippothoa hyalina: Osburn, 1912, pp. 235–236, pl. 24, fig. 47; Canu & Bassler, 1923, pp. 92–94, pl. 35, figs. 5, 8 (in part); Okada, 1929, p. 17, pl. 1, fig. 4, pl. 4, fig. 3; Osburn, 1932, p. 372; 1952, p. 277, pl. 30, figs. 1, 3 (in part); Rogick & Croasdale, 1949, pp. 57–59, figs. 42–43; Silén, 1954, pp. 14–15; Mawatari, 1956, p. 123; Androsova, 1958, pp. 130–131, fig. 48; Soule, 1961, p. 2; Kluge, 1962, pp. 512–513, fig. 356; Hayward, 1971, p. 483; Pinter, 1973, pp. 442–443, pl. 1, figs. 5–6; Kubanin, 1975, p. 124; Morris, 1980, p. 13, text-figs. 10–14, 45–46, pl. 2, figs. 1–2, 4–6, pl. 4, fig. 1, pl. 6, figs. 1–2.

Material: Small incrusting colonies, 2 IM, 0.8×1.0 , 1.3×1.4 mm; 2 MA, 1.8×2.0 , 3.7×4.2 mm; 0–2 m, Shamodomari, 8–VI–1982, KK—1 IM, 2.0×3.8 mm; 2.4×2.5 , 2.8×3.4 , 3.4×3.5 mm; 0–2 m, Uchikabuto, 14–V–1983, KK—3 MA, 6.3×7.3 , 6.3×7.5 , 7.3×9.0 mm; 0–2 m, Uchikabuto, 24–IV–1984, KK. A small erect colony, 1 MA, 2.2×6.8 mm; 0–2 m, Uchikabuto, 14–V–1983, KK.

Colony encrusting, subcircular, multilaminar, thinly calcified, hyaline to white in appearance. Zooids have three forms, autozooid, male zooid and female zooid. Autozooids are situated on primary layer, whereas male and female zooids on secondary layer budded frontally from several marginal areolae of one or two autozooids. Matured male zooids are located usually on both sides of an autozooid, but sometimes on only one side or wanting. Female zooids are placed usually on the frontal wall of its mother autozooid and occasionally superposed upon the adjacent autozooids. Female zooids are restricted in the center of colony, developing a little later than the emergence of the male zooids.

Autozooids small, elliptical or semi-cylindrical, arranged in regular quincuncial series, separated by distinct narrow furrows with marginal areolae. No spine present. Basal wall calcified completely. Frontal wall smooth, imperforate, strongly convex, thin, glassy, translucent in younger state, with transverse stripes of cal-

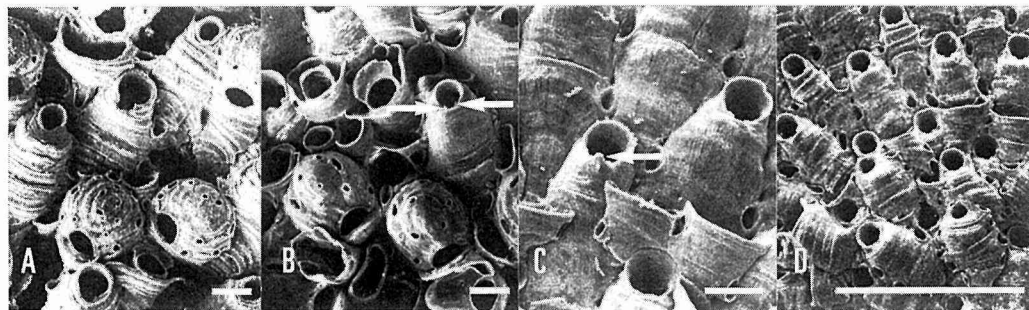


Figure 2. *Hippothoa hyalina* (Linne, 1967). A, a part of a multilaminar old colony, showing prominent stria on both the zooecial and ooecial walls; B, matured zooids with indistinct stria, indicating a pair of sharp condyles delimiting the edge of an orificial sinus (arrows); C, a unilaminar portion of a young colony, showing some male zooid buds and a prominent umbo (arrow) on mid-proximal margin of an orifice of a male zooid; D, some frontally budded male zooids on primary layer of a young colony. Scale-bars=0.1 mm (A–C), 1 mm (D).

cification, thick, opaque, milky white in aged zooid, with the stria being numerous and distinct. Umbo (Fig. 2 C) distinct, with broad base and pointed tip, usually protruded from the distal-most part of the frontal wall just proximally to the orifice, overarching to the orifice. Orifice almost circular with broad U-shaped shallow sinus at proximal end, situated at distal zooecial margin, inclined nearly perpendicularly to the frontal plane. A pair of condyles occasionally present at the edge of the sinus (Fig. 2 B). Peristome thin, usually forming a collar-like structure.

Male zooids (Fig. 2 D) similar to autozooids in shape, but shorter and smaller. Orifice also almost similar to autozooid, but much smaller, rather elliptical, with broad and a little deeper sinus proximally.

Female zooids shorter than autozooid, with truncate end, surmounted with an oecium. Orifice combined with external opening of the oecium, distinctive in shape, wider than long, with a broad and shallow sinus. Oecium hyperstomial, prominent, globose, with average of 12 pores and concentric stripes of calcification. Both the pores and external opening of the oecium surrounded by thickly calcified rim.

Avicularium wanting.

Dietellae 4 to 5 along each lateral margin of the basal wall, 2 to 3 along the distal septum.

Ancestrula oval, smooth, glassy, translucent, without any spines. Orifice oval with a broad and shallow sinus proximally. A pair of dietellae present at distolateral basal wall. A primary zooid budding unilaterally from an ancestrula through one of the dietellae.

Embryo light pink to reddish orange in color.

Larva depressed oval, with one or a pair of red pigments distally.

Measurements (mm) :

		average	range	SD	n/N
Autozooid	length	0.38	(0.22-0.51)	0.079	34/6
	width	0.16	(0.11-0.23)	0.034	33/6
Orifice	length	0.07	(0.04-0.10)	0.015	38/6
	width	0.08	(0.06-0.12)	0.015	38/6
Male zooid	length	0.18	(0.11-0.24)	0.034	34/4
	width	0.05	(0.03-0.07)	0.013	34/4
Orifice	length	0.05	(0.02-0.09)	0.018	34/4
	width	0.03	(0.01-0.05)	0.008	34/4
Female zooid (incl. oecium)					
	length	0.31	(0.26-0.40)	0.036	15/4
Female zooid	width	0.15	(0.10-0.25)	0.035	23/4
Oecium	width	0.20	(0.18-0.23)	0.012	22/4
Orifice of female zooid					
	length	0.04	(0.03-0.05)	0.036	20/4
	width	0.09	(0.08-0.11)	0.006	20/4

		average	range	SD	n/N
No. of pores on ooecium		12	(9- 13)	0.584	20/4
No. of tentacles		12	(10- 13)	0.623	44/7
Ancestrula	length	0.18	(0.17-0.20)	0.014	9/9
	width	0.13	(0.10-0.14)	0.015	9/9
Orifice	length	0.03	(0.02-0.04)	0.009	9/9
	width	0.04	(0.03-0.05)	0.008	9/9

Note: The present species is collected on Algae (*Iridaea cornucopiae*, *Rhodoglossum pulcherum*, *Sargassum confusum* etc.), bivalves (*Mytilus corus*us, etc.), gastropods shells, carapace of crabs, and stones.

The following variations were observed in the material here examined.

1. The stria of calcification on the frontal wall of zooids vary in number and shape with age; in younger zooid, the stria are somewhat obscured, but become distinct in older ones (Fig. 2 A).

2. The umbo protruded from mid-proximal margin of the autozooeal orifice greatly varied in shape; a well-developed umbo projected distally, and overhanged to the orifice, contrasting an undeveloped one with a low and blunt tip.

Above-mentioned variations were observed both intra- and intercolonially.

3. Several nodular colonies were obtained on the stems of *Sargassum*. These colonies are multilaminar, thickly calcified, white, of *Cellepora*-type in external appearance, having some special features of zooids as follows: 1) autozooids erect, separated by narrow grooves without marginal areolae; 2) orifice sometimes become smaller because of the thickening of orificial edge; 3) male zooids have elongate orifice with thickened orificial border; 4) male and female zooids without sinus.

Remarks: The present materials agree well with the previously published descriptions of *Hippothoa hyalina* (Linne, 1767) in the following features: 1) multilaminar colony, 2) the presence of female and male zooids, 3) transverse stripes on the frontal wall, 4) orifice with U-shaped sinus, and 5) perforate ooecium. However, some differences are found between the present specimens and the previous descriptions. First, Hincks (1880), Robertson (1908), Okada (1929), and Morris (1980) described an umbo protruded from the mid-frontal of ooecium, but such structure was not observed in our specimens. Second, Kluge (1962) described the orifice of female zooids with straight proximal end without sinus. Morris (1980) also reported that sinuses were absent from female apertures, though she referred in her discussion of the species to their variations as "the female aperture generally lacks any indication of a sinus; occasionally a dip in lower lip occurs". In the present specimens, a distinctive sinus is always present at proximal end of orifice even in female zooids. Third, Hayward & Ryland (1979) described the orifice without inset condyles. Moreover, most of the other authors did not yet mention whether condyles were present or not. In our specimens, a pair of condyles was often observed on basal edge of the sinus (Fig. 2 B). Fourth, Robertson (1908)'s circular calcified ridges found on ooecium is a usual feature of the present specimens. Some of the above-mentioned variations were observed both intra- and intercolonially in our

specimens.

The present species is very close to *H. cornata* (Busk, 1854) in multiserial colony feature, presence of female and male zooids, and transverse stria on the frontal wall. But present species is distinctive from *H. cornata* in having such feature as: 1) multilaminar colony, 2) orifice with U-shaped sinus, and 3) no umbo in each sides of orifice. The present species is also distinguishable from *H. santacruzana*, Pinter, 1973 in having perforate ooecia and multilaminar colony.

Distribution: Arctic and temperate waters in the Northern Hemisphere, and temperate waters in the Southern Hemisphere.

Other records from Hokkaido: Abashiri, Akkeshi, Samani, Muroran, Mori, Shirikishinai, Kikonai, Rishiri.

Family Schizoporellidae Jullien, 1908

Genus *Schizoporella* Hincks, 1880

Schizoporella unicornis (Johnston, 1847)

(Figure 3)

Lepralia unicornis Johnston, 1847, p. 320.

Schizoporella unicornis: Hincks, 1880, pp. 238-241, pl. 35, figs. 1-5; Ortmann, 1890, p. 49, pl. 3, fig. 35; Norman, 1909, p. 417; Waters, 1909, p. 143, pl. 12, figs. 12, 13; 1913, pp. 501-502; 1918, pp. 14-15, pl. 2, figs. 14-17, 22; Osburn, 1912, p. 236, pl. 25, fig. 48, pl. 30, fig. 91; 1932, p. 13; 1952, p. 317, pl. 37, figs. 1, 2; Okada, 1929, p. 20, text-fig. 7; Marcus, 1937, pp. 215-216; 1940, p. 237, fig. 121; MacDoughall, 1943, p. 340; Mawatari, 1952, p. 264; Androsova, 1958, p. 138, fig. 60; Kluge, 1962, p. 476, fig. 319; Ryland, 1965, pp. 65-66, fig. 32; 1968, p. 535; Soule & Soule, 1967, p. 268; Powell, 1970, p. 1847, figs. 2, 3; Kubanin, 1975, p. 123; Hayward & Ryland, 1979, pp. 168-169, fig. 67.

Material: Orange extensive incrusting colonies, 1 MA, 5.2×6.4 cm; Ebisu-Iwa—1 MA, 4.5×5.0 cm; Uchikabuto—1 MA, 4.8×5.2 cm; Gangan-Iwa, 0-2 m, on stones, 14-IV-1983, KK/1 MA, 4.2×6.3 cm; 0-2 m, on a stone, Shirikoshi, 2-VIII-1983, KK.

Colony encrusting, unilaminar, thickly calcified, reddish orange or brown in color.

Zooids broad, rhomboid hexagonal or rectangular, arranged in regular quincuncial series, separated by concaved grooves. Frontal wall convex, granulated, perforated densely by numerous minute pores. An umbo present on the frontal wall proximally to the sinus, considerably prominent in older zooids, but rather indistinct in younger ones. Oral spines wanting. Orifice semicircular, wider than long, with a proximal U-shaped, shallow and broad sinus between a pair of blunt condyles (Fig. 3 B).

Avicularium adventitious, sessile, single or paired laterally to the orifice, but frequently wanting (Fig. 3 A). Avicularian chamber swollen adjacent to the sinus.

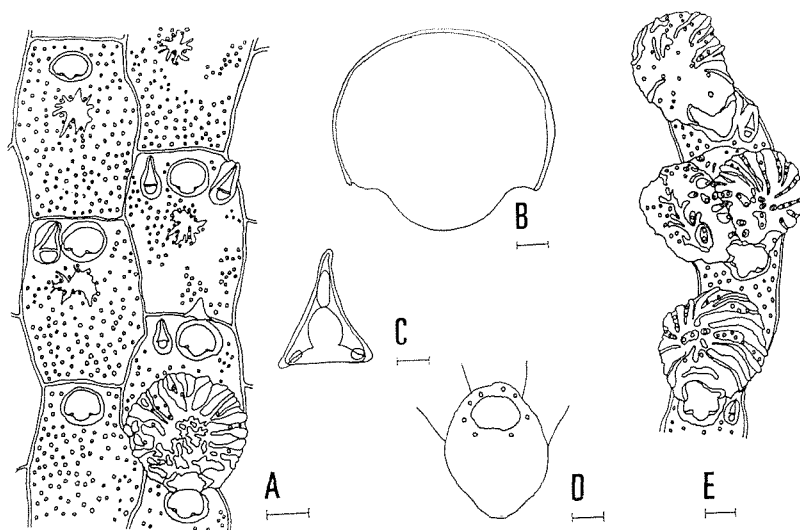


Figure 3. *Schizoporella unicornis* (Johnston, 1847). A, some autozooids, an oecium, and single or paired lateral-oral avicularia; B, an operculum; C, a mandible of an avicularium; D, an ancestrula; E, two zooids with single oecium and a zooid (center) with paired oecia fusing with each other on their side margin. Scale-bars=0.1 mm (A, D, E), 0.02 mm (B, C).

Mandible acute triangular with thickened margin and hollow center (Fig. 3 C), directing distally or disto-laterally upwards.

Ooecium hyperstomial, prominent, comparatively large, globose, granulated, with distinct radial sclerites frontally. Portions between the sclerites have some small pores. Margin of the ooecial aperture thick, often ridged. Multiple ooecia sometimes occur disto-laterally to the zooecial orifice, fusing with each other on their side extremities, narrower and smaller than the ordinary ooecia (Fig. 3 E).

Dietellae 4 to 6 on distal and lateral walls.

Ancestrula oval, glassy, with no pores. Orifice semicircular without sinus, large, occupying about one-third of the length of ancestrula, with 8 to 9 oral spines (Fig. 3 D). A distal triplet of primary zooids is budded from an ancestrula.

Embryo reddish orange in color.

Measurements (mm):

		average	range	SD	n/N
Zooid	length	0.69	(0.63–0.77)	0.039	43/4
	width	0.39	(0.30–0.47)	0.045	40/4
Orifice	length	0.14	(0.12–0.16)	0.014	20/4
	width	0.16	(0.14–0.18)	0.009	24/4
Ooecium	diameter	0.44	(0.37–0.50)	0.029	16/4
No. of tentacles		20	(18– 21)	0.958	34/2

Remarks: Powell (1970) discussed ooecial multiplicity of *S. unicornis* (Johnston, 1847) in his collections from East Canada and Japan (Onagawa Bay). Paired ooecia

were observed only in the center of the two colonies from Shirikoshi, but triads and proximally reversed ooecia reported by Powell (1970, Fig. 5) were not found in our specimens.

The present species is often confused with *S. errata* (Waters, 1878), but is distinctive from *S. errata* in the features of both orifice and mandible. The present species is also similar to *S. magnifica* (Hincks, 1886), but distinguishable from it by the orifice and sinus morphologies. Motoda *et al.* (1971) reported *S. nivea* (Busk, 1854) from Oshoro. The present species differs from *S. nivea* in the shape of sinus and also in the presence of an umbo on the frontal wall of zooecia.

Distribution: Great Britain, the Mediterranean, West Europe, West Africa, Brazil, Red Sea, Indian Ocean, China, North America, Australia, Japan.

Other records from Hokkaido: Akkeshi, Muroran, Shirikishinai.

Genus *Dakaria* Jullien, 1903

***Dakaria subovoidea* (d'Orbigny, 1852)**
(Figure 4)

Cellepora subovoidea d'Orbigny, 1852, p. 402.

Cellepora subtorquata d'Orbigny, 1852, p. 339.

Lepralia cucullata Busk, 1854, p. 81, pl. 96, figs. 4, 5; Calvet, 1902, p. 52; Waters, 1909, p. 150, pl. 15, figs. 1-5, 10; Osburn, 1914, p. 211.

Dakaria chevreuxi Jullien & Calvet, 1903, p. 90, pl. 10, fig. 6.

Schizoporella cucullata var. *labiosa* Jullien & Calvet, 1903, p. 141, pl. 16, figs. 7 a-c.

Schizoporella oenochros: Okada, 1934, p. 12, pl. 1, fig. 2.

Watersipora cucullata: Hastings, 1930, p. 729, pl. 15, figs. 97-104; Marcus, 1937, p. 118, pl. 24, figs. 63 a, b; Osburn, 1940, p. 449; 1947, p. 40; Mawatari, 1952 b, p. 14, fig. 1.

Dakaria typica: Okada & Mawatari, 1937, p. 438, text-figs. 2 a-d, pl. 11, fig. 6; 1938, p. 455.

Watersipora cucullata var. *watersi* Mawatari, 1952 a, p. 285; Kubanin, 1975, p. 120.

Dakaria subovoidea: Harmer, 1957, p. 1022, pl. 59, figs. 11, 12, 14, text-fig. 111.

Material: Some middle sized incrusting colonies, 1, 0.9×1.2 cm; 7-IV-1983—2, 0.9×2.2 , 1.5×1.6 cm; 22-VII-1983—1, 1.3×1.8 cm; 24-IV-1984; 0-2 m, on shells of *Mytilus corus*, Uchikanuto, KK, respectively/and 1, 2.4×3.6 cm; 0-2 m, on stones, Ebisu-Iwa, 7-IV-1983, KK.

Colony encrusting, lobate, thickly calcified, often unilaminar but sometimes bilaminar, erect as free-frilled margin, characteristically reddish brown or pale wine red in color with numerous black spots of opercula scattered all over the surface.

Zooids large (Fig. 4 C), elongate elliptical or rectangular, transversely expanded in distal half with broadest width at about the middle, arranged in regular quincuncial series, separated by distinct salient threads on which frontal membrane is tintured dark brown. Frontal wall thick, a little convex, sometimes granulated,

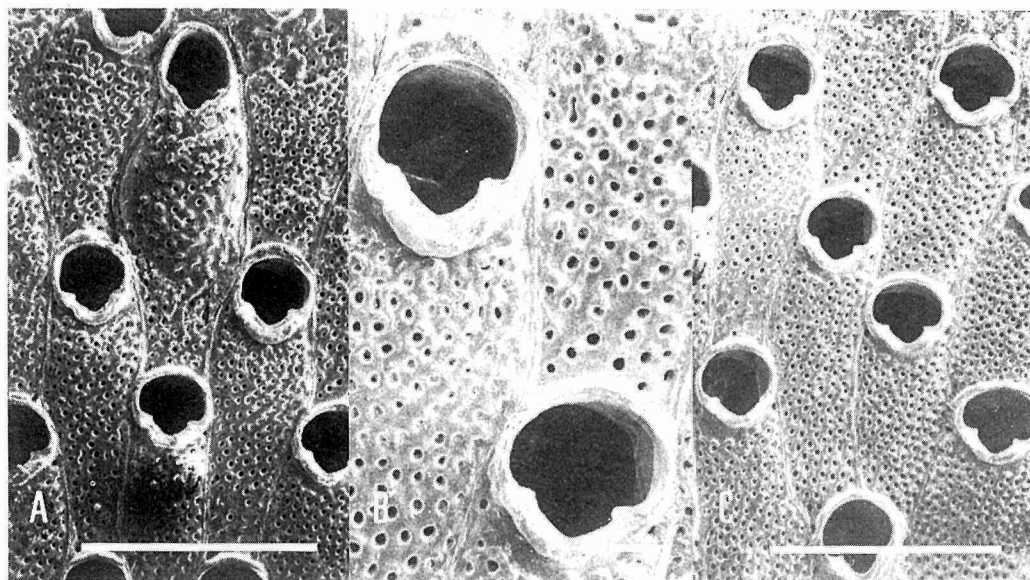


Figure 4. *Dakaria subovoidea* (d'Orbigny, 1852). A, some autozooids, showing secondary tremocystal calcification resulting in the inflated frontal wall of a zooid (center); B, close-up view of two zooecial orifices with thickly calcified and elevated margin; C, zooids without any secondary calcification. Scale-bars=1 mm (A), 0.1 mm (B).

uniformly perforated by numerous large tremopores over the entire surface except the narrow sub-orificial region. No spine present. Orifice large, transversely elliptical, with a broad semi-circular sinus proximally, situated at distal margin of zooid. Orificial border thick, often elevated to form a low peristome where frontal membrane is tintured dark brown (Fig. 4 B). Operculum dark brown or almost black with a fainter circular area on each sides of the lower margin.

Ooecium and avicularium wanting.

Polypide wine red in color.

Rosette plate elliptical, multiporous (3-20), 5 to 7 along each lateral wall of zooid.

Ancestrula similar to ordinary zooid in shape, but a little larger.

Measurements :

		average	range	SD	n/N
Zooid	length	1.08	(0.80-1.33)	0.122	50/5
	width	0.49	(0.27-0.43)	0.093	50/5
Orifice	length	0.26	(0.17-0.35)	0.048	50/5
	width	0.31	(0.21-0.39)	0.049	50/5
Sinus	length	0.06	(0.04-0.09)	0.009	50/5
	width	0.13	(0.09-0.19)	0.029	50/5
No. of Tremopores		120	(106- 142)	9.157	25/5
No. of Tentacles		24	(22- 25)	0.601	35/3

Note: In some zooids of the present specimens, secondary tremocystal calcification occurred on the distal-half of their frontal wall. These zooids have remarkably thickened, convex and granulated frontal wall with many tremopores closed (Fig. 4 A).

Although this species is well-known to incrust on algae, ascidians, corals, barnacles or others in Japan (Mawatari, 1952 a), the present specimens were collected only from shells of *Mytilus corus* and stones.

Remarks: The present materials agree with the descriptions and figures of Okada & Mawatari (1937) and Mawatari (1952 a) on *Dakaria subovoidea* (D'Orbigny, 1852) in the following features: 1) characteristic color of frontal membrane, 2) darkened operculum and orificial ridge, and 3) perforate frontal wall. But our specimens differ from the descriptions in a few aspects. First, bilaminar, free, erect and fan-shaped colony described by them from Hamajima, Mie-ken prefecture was not collected from Oshoro. Second, they reported darkened operculum with three circular, thinly tintured areas. But our specimens always have two fainter circular areas on its operculum. Third, although they described "orificial border not thickened but more or less elevated", the present specimens show well thickened and elevated orificial borders. Moreover, there are a few differences from the other authors' reports. Hastings (1930) reported that the European specimens were different from Japanese ones in operculum shape. Specimens with opercula of European type was not found by ourselves. No avicularium was found in our specimens, though Owston collected Japanese specimens with a single minute avicularium on the middle of the zooids (in Harmer, 1957).

The present species is close to *D. granulata* (Canu & Bassler, 1929) in the perforate frontal wall, but is distinctive from it in having no ooecium. Androsova (1958) reported *D. coarctata* from south-western Sakhalin and the sea near Hokkaido. The present species is distinguishable from *D. coarctata* in wanting of such structures as areolae, avicularium, and ooecium. The present specimens resemble *Dakaria* sp. (Silén, 1954) in the features of frontal wall and orifice, but differ from it in having neither avicularium nor ooecium.

Distribution: Tropical, subtropical, and temperate waters in the world.

Other records from Hokkaido: Akkeshi, Muroran, Shirikishinai, Rishiri.

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