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## Studies on Japanese Anascan Bryozoa 8. Division Malacostega (6)<sup>1)</sup>

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### Abstract

Three recent species of Hiantoporidae, *Hiantopora intermedia*, *H. bidenticulata*, *Tremopora dendracantha*, are described from Japan. Some systematic confusions between the two genera *Hiantopora* and *Tremopora* are discussed.

**Key Words:** Bryozoa, systematic description, Hiantoporidae.

In a previous paper (Mawatari and Mawatari, 1984), we reported three species of Chaperiidae as the seventh work of our serial studies on Japanese Anascan Bryozoa. As the eight report of the series, the present paper deals with three species of *Hiantopora* and *Termopora* in the small family Hiantoporidae, Division Malacostega, from Japan.

### Family HIANTOPORIDAE MacGillivray, 1895

Membraniporidae (Part) Auctt.

Beaniidae (Part) Kirkpatrick, 1890.

Bicellariidae (Part) Levinsen, 1909.

Hiantoporidae MacGillivray, 1895, p. 511; Canu and Bassler, 1929, pp. 27, 112; Osburn, 1940, p. 368; 1950, p. 97; Bassler, 1953, p. 166; Harmer, 1957, p. 659 foot-note; Galopim de Calvalho, 1971, p. 62.

*Diagnosis:* Zoarium encrusting, laminar. Zooecia distinct, closely joined or in some cases separated and connected by tubes. Frontal membranous, partly covered by large branching spines or a pericyst, a calcareous shield with large pores. Avicularia lateral, sessile. Ooecia burried or hyperstomial.

*Note:* According to Bassler (1953), the family contains three genera with the frontal shield in different developmental conditions. In *Tremopora*, ramified post-oral spines extend partly over the membranous frontal, not forming so-called pericyst. Species of *Hiantopora* have nearly complete pericyst with some large irregular

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pores, indicating that the shield is composed of the fusion of the horizontally branched spines. In *Tremogasterina* the pericyst is almost complete attaining close resemblance to the Ascophora.

Correlation among these three genera is more or less doubtful, and Osburn (1940) stated that the family might not be natural one. Canu and Bassler (1929) suggested that at least *Tremogasterina* would be placed near *Figularia* in Cribrimorpha. Harmer (1957) actually placed it in Arachnopusiidae under his Ascophora Imperfecta. Powell and Cook (1967) followed Harmer's opinion and noted that the mode of development of the frontal shield in *Tremogasterina* species resembled strikingly to that found in some Cribrilinidae.

Harmer (1926) treated *Tremopora* as a synonym of *Hiantopora* and this was followed by Silén (1941). Recently, however, many authors described species under the generic name *Tremopora*, e. g. Vigneaux (1949), Malecki (1952), Gautier (1955, 1962), David (1965), David and Pouyet (1974), Galopim de Calvalho (1971), Vavra (1977, 1979, 1980), etc. We here also maintain both genera mainly because of the difference in development of the frontal shield, though in both genera, the shield is made of the same mode of development, i. e. the horizontal branching of lateral-oral spines.

### Genus *Hiantopora* MacGillivray, 1887

*Lepralia* (part) Busk, 1854; MacGillivray 1868.

*Membranipora* (part) Kirkpatrick, 1890.

*Hiantopora* MacGillivray, 1887, p. 208; Levensen, 1909, p. 111; Harmer, 1926, p. 235; Canu and Bassler, 1929, p. 115; Silén, 1941, p. 45; Bassler, 1953, p. 166.

Type species: *Lepralia ferox* MacGillivray, 1868

*Diagnosis*: Zoarium encrusting or attached by radical fibres. Zooecia somewhat distinct. Membranous opesia as large as zooecia, but partly invisible by the development of pericyst. Pericyst quite calcified, leaving several large rounded or reniform pores. Orifice circular or elliptical. Distal or oral spines paired, often ramified. Oral avicularia paired, sessile. Interzooecial avicularia sometimes present. Ooecia immersed or little apparent.

*Note*: The following recent species are included in the present genus.

*Hiantopora bidenticulata* Canu and Bassler, 1929; Sulu Archipelago, Philippine Is. (19-24 m); Japan (10-30 m); Pleiocene, Pleistocene, Japan.

*Lepralia ferox* MacGillivray, 1868; Australia.

*Membranipora radificera* var. *intermedia* Krikpatrick, 1890; Torres Strait, Burma, Borneo, Japan. (80-600 m)

*Lepralia monoceros* Busk, 1854; Antarctica, Strait of Magellan, Tierra del Fuego, Falkland Is., Cape Horn, South America, Argentine; Victoria, New South Wales, New Zealand (6-600 fms), Tertiary, Victoria, Gippsland, New Zealand.

Two of the above-mentioned species are recorded along the coast of Japan.

Sakakura (1938, p. 718) listed *Hiantopora* sp. indet. from the Pleistocene strata of Tako-machi, Chiba Prefecture without any description or comment.

***Hiantopora intermedia*** (Kirkpatrick, 1890)

(Figure. 1)

*Membranipora radificera* var. *intermedia* Kirkpatrick, 1890, pp. 612, 615, pl. 16, fig.

2; Hincks, 1891, pp. 471, 479; pp. 440, 443; Thornely, 1907, p. 186; 1912, p. 142.

*Membranipora intermedia*: MacGillivray, 1895, p. 34, pl. 4, fig. 8; Waters, 1898, p. 681.

*Hiantopora intermedia*: Harmer, 1926 (in part), p. 239-(f), text-fig. 2 (not pl. 34, fig. 1); Silén, 1941, p. 45; Mawatari, 1952, p. 263.

*Tremopora intermedia*: Canu and Bassler, 1929, p. 114, pl. 11, fig. 1.

*Material*: 3 immature colonies, 30 m, off Wakayama, Wakayama Pref., 14-VIII-1952, S. Mawatari leg.; 1 immature colony, 50 m, off Kominato, Chiba Pref., 1-VII-1965, S. Mawatari leg.

Zoarium unilaminar, usually thin, greyish white in colour; attached to stones, shells or sponges by a number of delicate calcareous rootlets emanating from the basal wall of each zoecium. Rootlets sometimes stout and shorter, rarely bifurcat-

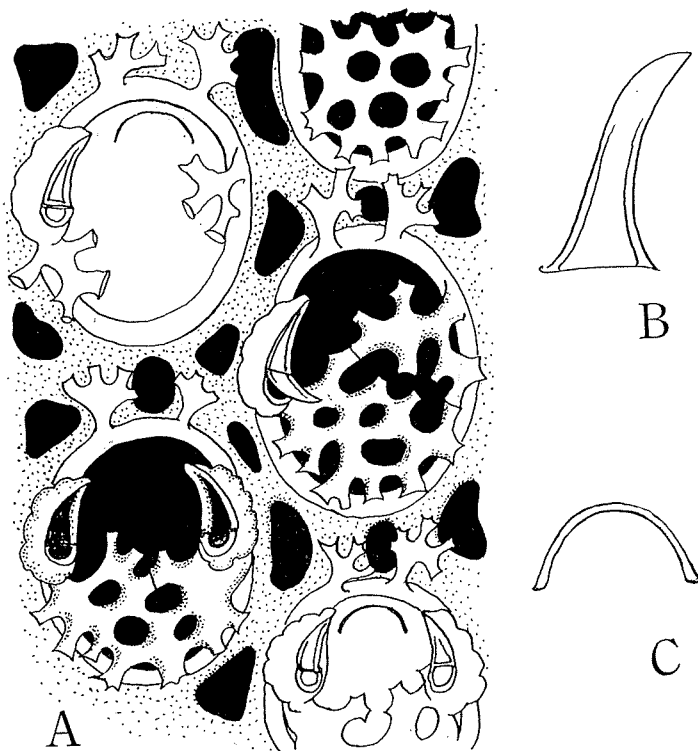


Figure 1. *Hiantopora intermedia* (Kirkpatrick, 1890). A, zoecia showing developed pericyst and massive avicularia. B, a mandible of lateral avicularium. C, an operculum.

ing at the base. Zooecia continuous or separated by narrow fenestra, connected by short tubes. Zooecia somewhat raised distally. Opeca membranous, extensive, oval, occupying the most part of the zooecial frontal, but concealed proximally by a calcified pericyst with numerous round or reniform pores. Spines 2 lateral and 2 distal. Two lateral spines extensively branched in a horizontal plane, fusing with each other to make the pericyst. Two distal spines short, stout, more or less branched in some zooecia. Cryptocyst narrow, smooth, along the proximal wall. Oral avicularia distinct, paired or single, with an asymmetrical spatulate rostrum directing distally and with a number of mound-like projections on their outer surface, situated distally to the base of the pericyst. Interzooecial avicularia large, with an elongate elliptical chamber and sometimes with a large spatulate mandible. Ooecia immersed but a little raised, globose, often indistinct.

*Distribution*: Torres Strait (15–20 fms, Kirkpatrick, 1890); Burma (75 fms, Thornely, 1907); Malay Archipelago (0–113 m, Harmer, 1926); Japan.

*Other records from Japan*: 115 m, Tokyo Bay, "Vega" exped. (Silén, 1941); 100–113 m, Chichi-jima, Ogasawara, S. Bock leg. (Silén, 1941); off Tokyo, Owston leg. (Harmer, 1926); 150–600 m, Okinose, off Misaki, Sagami-Bay, Kanagawa Pref., S. Bock leg. (Silén, 1941).

#### ***Hiantopora bidenticulata* Canu and Bassler, 1929**

*Hiantopora bidenticulata* Canu and Bassler, 1929, p. 115, pl. 11, figs. 9–11; Kataoka, 1961, p. 233, pl. 27, figs. 3, 6; Hayami, 1980, p. 39; Sakagami, Arakawa and Hayami, 1980, p. 324.

*Material*: several colonies, 30 m, Miyazaki Pref., 3–VII–1958, S. Mawatari leg.; 2 colonies, 5 m, Kagoshima Pref., 5–VII–1958, S. Mawatari leg.

Zoarium encrusting. Zooecia more or less distinct, somewhat elongate oval with a thin mural rim. Opeca as large as the zooecial front, usually concealed under the calcareous pericyst with 5 to 6 large round pores. Orifice subterminal, transversely elliptical, limited by a salient proximal lip with a bidentate mucro. A pair of oral sessile avicularia on the mural rim, with an elliptical rostrum directing distally. A pair of oral spines sometimes simple, not clearly bifurcated. A pair of salient tubercles seen on the frontal shield laterally. Ooecia immersed in the distal zooecia, a little apparent and convex.

*Remarks*: The present species differs from *H. ferox* in occurrence of paired avicularia and mucro on the frontal.

*Distribution*: Philippine Is. (19–24 fms, Canu and Bassler, 1929); Japan.

*Other records from Japan*: Pleistocene, Kikaijima, Kagoshima Pref. (Kataoka, 1961); Pliocene, Kochi Pref. (Hayami, 1980).

#### **Genus *Tremopora* Ortmann, 1890**

*Membranipora* Hincks, 1881.

*Hiantopora* Levinsen, 1909.

*Tremopora* Ortmann, 1890, pp. 12, 29; Canu and Bassler, 1920, p. 139; 1929, p. 112; Bassler, 1953, p. 166; Galopim de Calvalho, 1971, p. 62.

Type species: *Tremopora dendracantha* Ortmann, 1890

*Diagnosis*: Zoarium encrusting or attached by radical fibres, uni- or bilaminar. Basal surface sometimes with radial depressions and circular fenestra. Zooecia distinct, oval or subhexagonal, joined by connecting short tubes. Membranous frontal complete, as large as zooecium. Opesia circular or oval, somewhat restricted by a proximal cryptocyst. Distal spines on mural rim paired, short, simple or minutely bifurcated. Another pair of lateral-oral spines present, sometimes greatly developed in large cervicorns with many branches, overarching the frontal membrane. One of them usually originated from an avicularian chamber on one side of the mural rim. Mural avicularia rarely paired. Ooecia hyperstomial, salient, closed by an opercular valve.

*Note*: The following recent species are included in the present genus.

*Tremopora dendracantha* Ortmann, 1890, Japan. (50-600 m)

*Tremopora ovalis* Canu and Bassler, 1929, Philippine, Sulu Isl., Japan (19-24 fms); Pleistocene, Japan.

*Membranipora radificera* Hincks, 1881, Philippine, Borneo, Australia (20-240 fms); Miocene, Europe, Australia.

*Tremopora prenanti* Gautier, 1955, Algeria.

***Tremopora dendracantha* Ortmann, 1890**

(Figure. 2)

*Tremopora dendracantha* Ortmann, 1890, p. 29; Canu and Bassler, 1920, p. text-fig. 33F; 1929, p. 112.

*Tremopora intermedia*: Canu and Bassler 1929, p. 114, pl. 11, fig. 1.

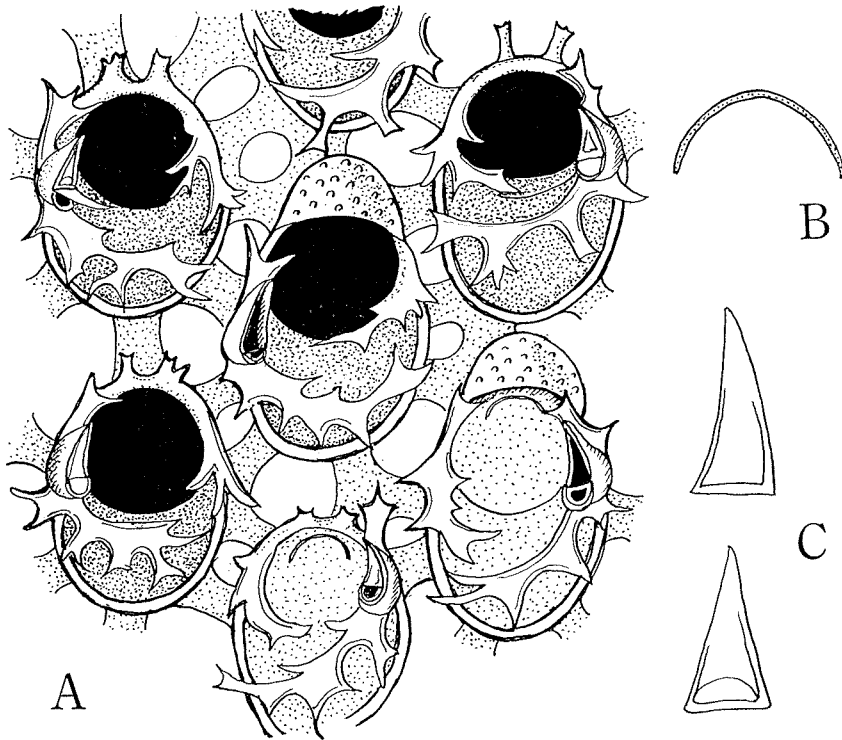
*Hiantopora intermedia*: Harmer, 1926 (in part), p. 237-(a) Siboga, 225A, pl. 34, fig. 1 (not p. 249-(f), text-fig. 2).

*Material*: 1 colony, 30 m, off Chosi, Chiba Pref., 25-VII-1961, S. Mawatari leg.; 2 colonies, 50 m, Tokyo Bay, 1-V-1968, S. Mawatari leg.

Zoarium encrusting, unilaminar. Zooecia distinct, oval, joined by several short connecting tubes. Zooecial front completely membranous. Opesia circular or oval. Cryptocyst somewhat developed proximally. Mural rim moderately thick, supporting a pair of distal stout spines, a triangular avicularium on one side, and a pair of enormously developed oral spines. Distal spines usually minutely bifurcated. A pair of oral spines flattened, cervicorn with large acute branches, extending proximally and partly covering the membranous frontal. One of them originated from the avicularian chamber. Mandible elongate triangular. Opercular valve crescentic. Ooecia hyperstomial, somewhat conical, with minute tubercles.

*Distribution*: Japan.

*Other records from Japan*: 200 fms, Sagami Bay, Kanagawa Pref. (Ortmann, 1890).



**Figure 2.** *Tremopora dentracantha* Ortmann, 1980. A, zoecia showing characteristic frontal shield, ovicells, and avicularia. B, an operculum. C, two rostra of oral avicularia.

Kataoka (1961) found Pleistocene specimens of *Tremopora ovalis* Canu and Bassler, 1929 from "Ryukyu limestone" of Kikaijima, Kagoshima Prefecture. The recent specimens of this species were recorded from 19–24 fms, Philippine (Canu and Bassler, 1929). The present species differs from *H. intermedia* (Kirkpatrick) in its oval opesia and in the constant occurrence of two avicularia on the zoecial rim.

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