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STUDIES ON THE MELOBESIOIDEAE OF JAPAN. I

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The current knowledge on the morphology and taxonomy of the recent Melobesioideae of Japan owes much to Yendo's annotated list of species which he contributed to Okamura's Enumeration of the Japanese Algae, 2nd. ed., (1916). This list has been published again in Okamura's Marine Algal Flora of Japan (1936), after having been revised by Yamada. Recently, Segawa (1956) has published a number of beautiful photographs showing the habits of some of the Japanese crustaceous corallines which he had investigated for many years, in Plate 40 of his Coloured Illustrations of the Seaweeds of Japan.

In the course of some research on the organisms growing on some economic marine algae, the writers have lately been interested in the study of the crustaceous corallines, and have launched a scheme of preparing illustrations on the habits and anatomical structures of as many Japanese species as possible.

In this first part of the writers' work under the present topic are reported their observations on a common epiphytic species collected in Hokkaido.

1. *Dermatolithon tumidulum* (FOSLIE) FOSLIE

Plates I-IV

Foslie, 1909, p. 58. Segawa, 1956, p. 71, pl. 40, fig. 315 (habit photo.).

Syn. Lithophyllum tumidulum FOSLIE, 1901, p. 5; 1929, p. 38, pl. 72, fig. 13 (habit photo.). Yendo, 1902, p. 188; 1916, *in* Okamura, 1916, p. 129; 1936, *in* Okamura, 1936, p. 512. *Lithophyllum (Dermatolithon) tumidulum* FOSLIE, 1904, p. 8; 1909, p. 50.

Japanese name: Norimaki (Yendo)

Habit and distribution in literature. - Epiphytic on *Gelidium*, *Ahnfeltia paradoxa*, and other algae. Pacific coast of middle Honshû, Japan.

Specimens collected. - Shirikishinai, near Hakodate, on *Gelidium Amansii*, 15 Sept., 1956, Tokida and Masaki; 1 Oct., 1958, Imashima. Tachimachi-misaki, Hakodate, on *Laurencia glandulifera*, 3 May, 1958, Masaki. Yamasedomari, Hakodate, on *Carpopeltis affinis*, 17 June, 1958, Yakushi. Zenikamezawa, near Hakodate, on *Rhodomela Larix*, 20 June, 1958, Masaki.

The following description is based on the specimens growing on *Gelidium* and *Laurencia*.

Thallus epiphytic on various red algae, firmly adherent to host, encircling its stem partly or completely, 0.2-2 cm. in maximum diam., surface smooth but having ridges here and there, dark purple red, adjacent thalli sometimes overgrowing one another, monostromatic at margins when young, polystromatic throughout when matured, to 200-800 μ thick and

composed of 10-30 layers of cells at the portion bearing conceptacles; hypothallium monostromatic, cells obliquely elongated and sometimes bow-shaped, pallisade-like in arrangement, 12-30 μ long, (5-)7-12 μ diam., showing no marked difference in length in one and the same individual; perithallium polystromatic, cells 15-40 (-54) μ long, (5-)7-12 μ diam., the uppermost pigmented cells 15-30 μ long, 7-12 μ diam.; cover-cells or cells of epithallium cut off by an oblique wall from hypothallium cells toward the periphery of thallus at the marginal portion of a young thallus, triangular in section, later flattened periclinally, each cell covering an underlying perithallium cell; secondary pits present between each two vertical cell rows, but coalescence of cells absent; sporangial conceptacles immersed, but fully matured ones sometimes slightly convex, (164-)190-250(-295) μ diam., 100-150(-170) μ high, tetrasporangia 45-85 μ long, 15-50 μ wide,¹⁾ 5-9 sporangia standing on the periphery of floor of each conceptacle, central part of conceptacle floor slightly upheaved and crowned with a number of hairy cells surrounded by mucilagenous substance which can be stained deeply with anilin blue; sexual plant monoecious; female conceptacles usually immersed immediately below the thallus surface, opening by a pore, but in the specimens growing on *Laurencia* conceptacles sometimes embedded deeply in the tissue without openings, nearly flat on surface, mature conceptacles just before fertilization 105-126 μ diam., to ca. 63 μ high, procarps on the central part of conceptacle floor fully developed while those in the periphery generally undeveloped; cystocarpic conceptacles 150-260 μ diam., 105-130 μ high, nearly flat on surface, provided with elongated cells or "papillae"²⁾ on the inner wall of pore, carpospores arising from periphery of floor; antheridial conceptacles slightly convex, 85-105(-117) μ diam., 42-63 μ high, immersed immediately below the thallus surface, opening by a narrow pore and in some cases provided with a spout, but in the specimens growing on *Gelidium* conceptacles sometimes embedded deeply in the tissue without openings, spermatangia small, numerous, narrowly cylindrical in shape, ca. 7 μ long, ca. 2 μ diam., while attached to their mother cells, but ellipsoidal to globular when detached and set free in the conceptacle cavity, never produced at the end of long "sterigmata" although so described in *Lithophyllum Corallinae* (CROUAN) HEYDRICH by Rosenvinge (1917, p. 267, fig. 189).

In the present species, the tetrasporangial conceptacles have been described by Foslie (1901; 1909) and by Yendo (*in* Okamura, 1916; 1936), but cystocarpic and antheridial ones have not been reported by anyone. The writers were fortunate enough to discover them in their specimens as described above and could trace the development of the sexual reproductive organs. The results obtained coincide fairly well with those reported in other species of *Dermatolithon* by Nichols (1909), Rosenvinge (1917), and Suneson (1943).

1) Foslie (1909, p. 50) gave 50-60 μ long, 20-30 μ wide for the dimensions of tetrasporangia in his description.

2) Cf. Rosenvinge, 1917, p. 251, fig. 171, A, C.

Summary

Dermatolithon tumidulum (FOSL.) FOSL., which has previously known from the Pacific coast of middle Honshû, Japan, is here reported to occur in the southern part of Hokkaido; descriptions and illustrations of both tetrasporangial and sexual, monoecious, plants are given in this paper.

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EXPLANATION OF PLATES

PLATE I

Dermatolithon tumidulum (FOSLIE) FOSLIE

Fig. 1. Habit of plant growing on the lower portion of a specimen of *Gelidium Amansii* from Shirikishinai, Kameda-gun, Prov. Oshima, Hokkaido, (1 Oct., 1958, K. Imashima). $\times 1.2$

Fig. 2. Enlargement of a portion of specimen. $\times 2.5$

Fig. 3. Detail of thallus surface. $\times 10$

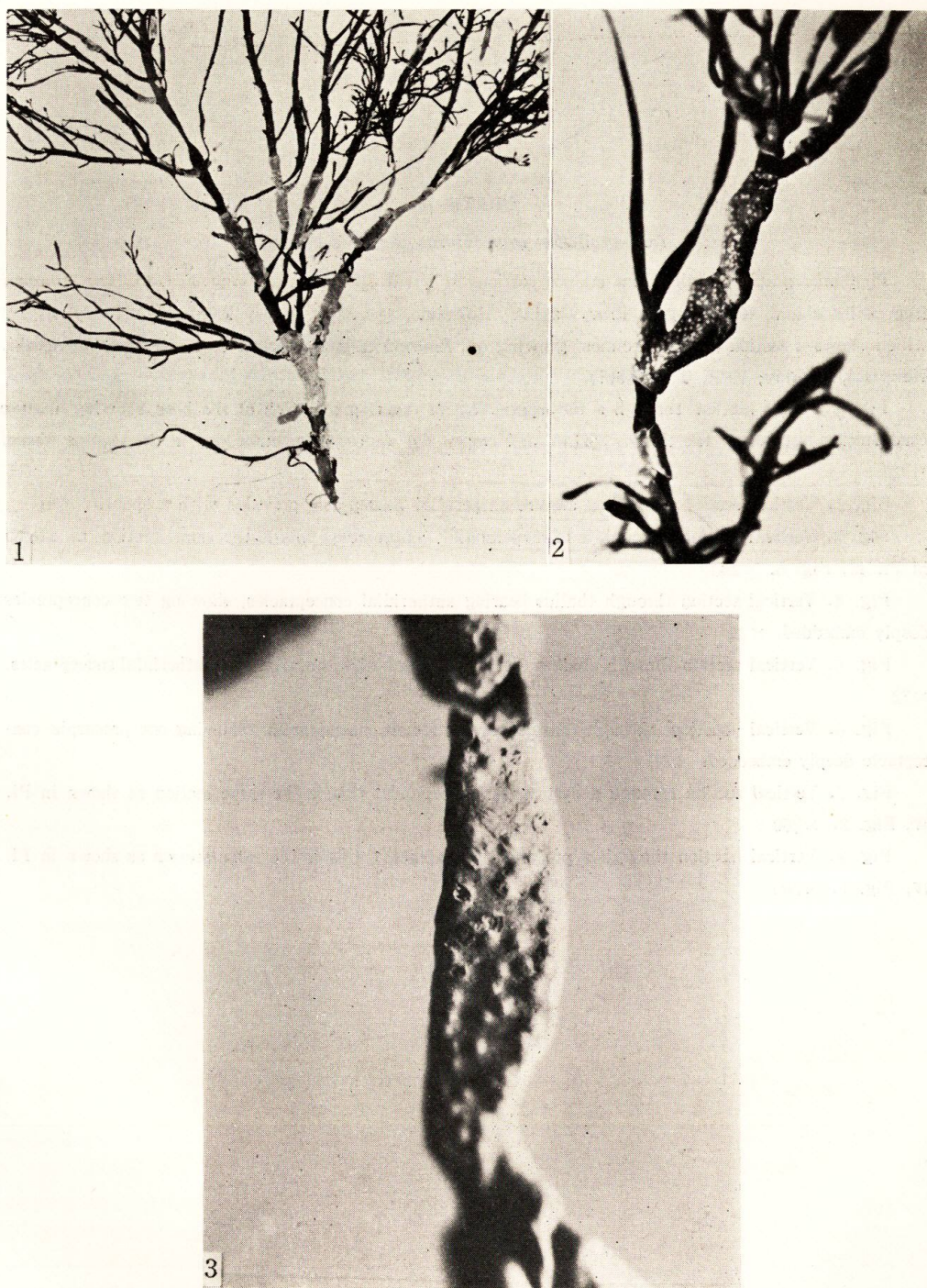


PLATE II

Dermatolithon tumidulum (FOSLIE) FOSLIE

Photomicrographs of microtome stained sections of fertile specimens growing on *Gelidium Amansii* from Shirikishinai, Kameda-gun, Prov. Oshima, Hokkaido, (15 Sept., 1956, T. Masaki), except Fig. 6 which shows a section of the specimen growing on *Laurencia glandulifera* from Tachimachi-misaki, Hakodate, (3 May, 1958, T. Masaki).

Fig. 1. Cross section through a tetrasporic thallus covering a branch of the host, showing mature conceptacles just below the thallus surface and empty old conceptacles embedded in the thallus tissue. $\times 72$

Fig. 2. Vertical section through a mature antheridial conceptacle provided with a spout. $\times 260$

Fig. 3. Vertical section through a tetrasporangial conceptacle; this is the same section as shown in Pl. III, Fig. 5. $\times 260$

Fig. 4. Vertical section through thallus bearing antheridial conceptacles, showing two conceptacles deeply embedded. $\times 72$

Fig. 5. Vertical section through thallus portion bearing both cystocarpic and antheridial conceptacles. $\times 72$

Fig. 6. Vertical section through thallus bearing female conceptacles, showing one procarpic conceptacle deeply embedded. $\times 72$

Fig. 7. Vertical section through a cystocarpic conceptacle; this is the same section as shown in Pl. IV, Fig. 2. $\times 260$

Fig. 8. Vertical section through a procarpic conceptacle; this is the same section as shown in Pl. IV, Fig. 1. $\times 260$

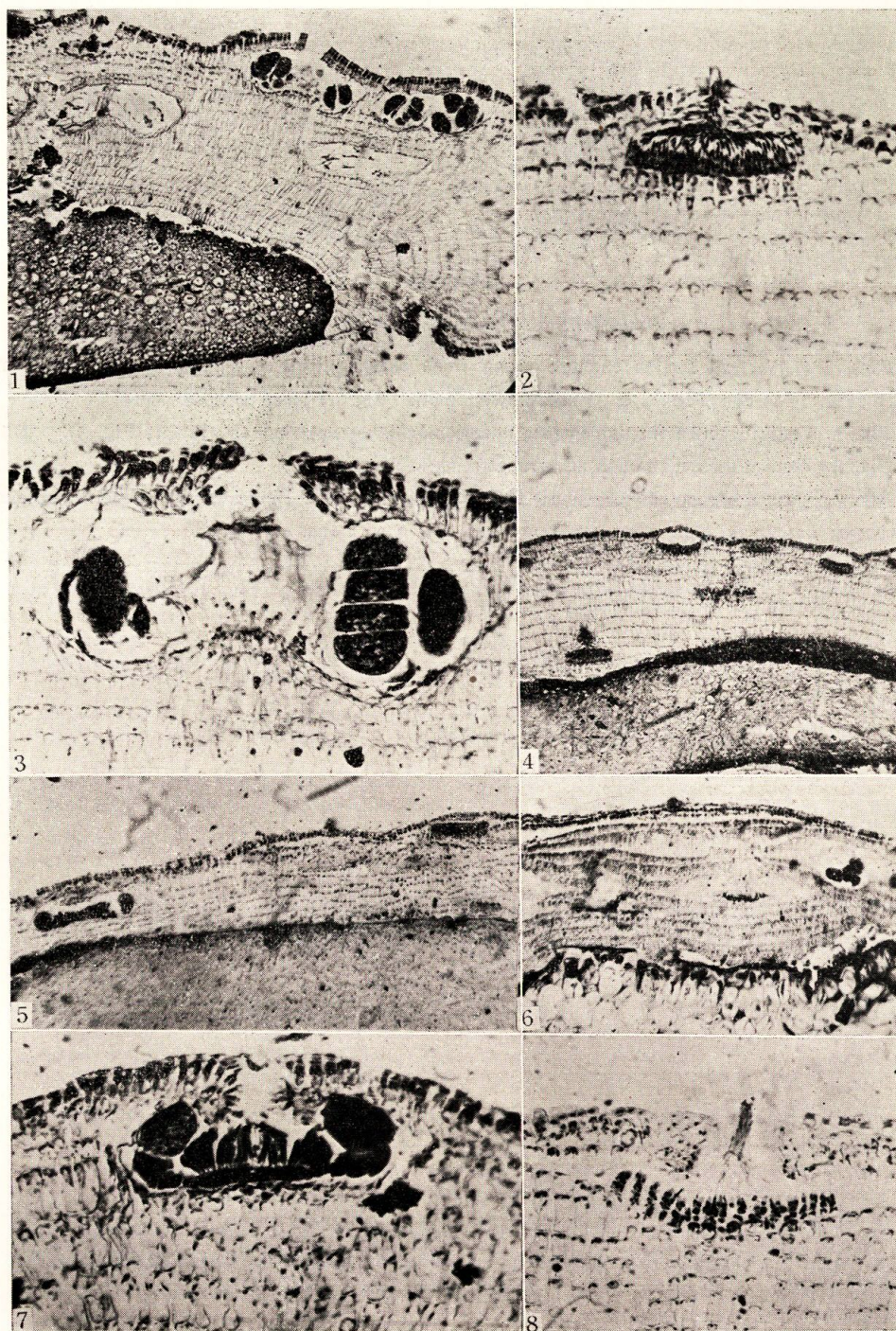


PLATE III

Dermatolithon tumidulum (FOSLIE) FOSLIE

Figs. 1-4. Vertical section through young frond showing various portions from monostromatic border (Fig. 1) to di- (Figs. 2 & 3) and poly-stromatic (Fig. 4) inner portions. $\times 650$

Fig. 5. Vertical section through mature tetrasporangial conceptacle. (Cf. Pl. II, Fig. 3). $\times 275$

Fig. 6. Vertical section through antheridial conceptacle. $\times 650$

Fig. 7. Vertical section through young female conceptacle. This figure was drawn with a specimen growing on *Laurencia* while other figures were all drawn with that on *Gelidium*. $\times 650$

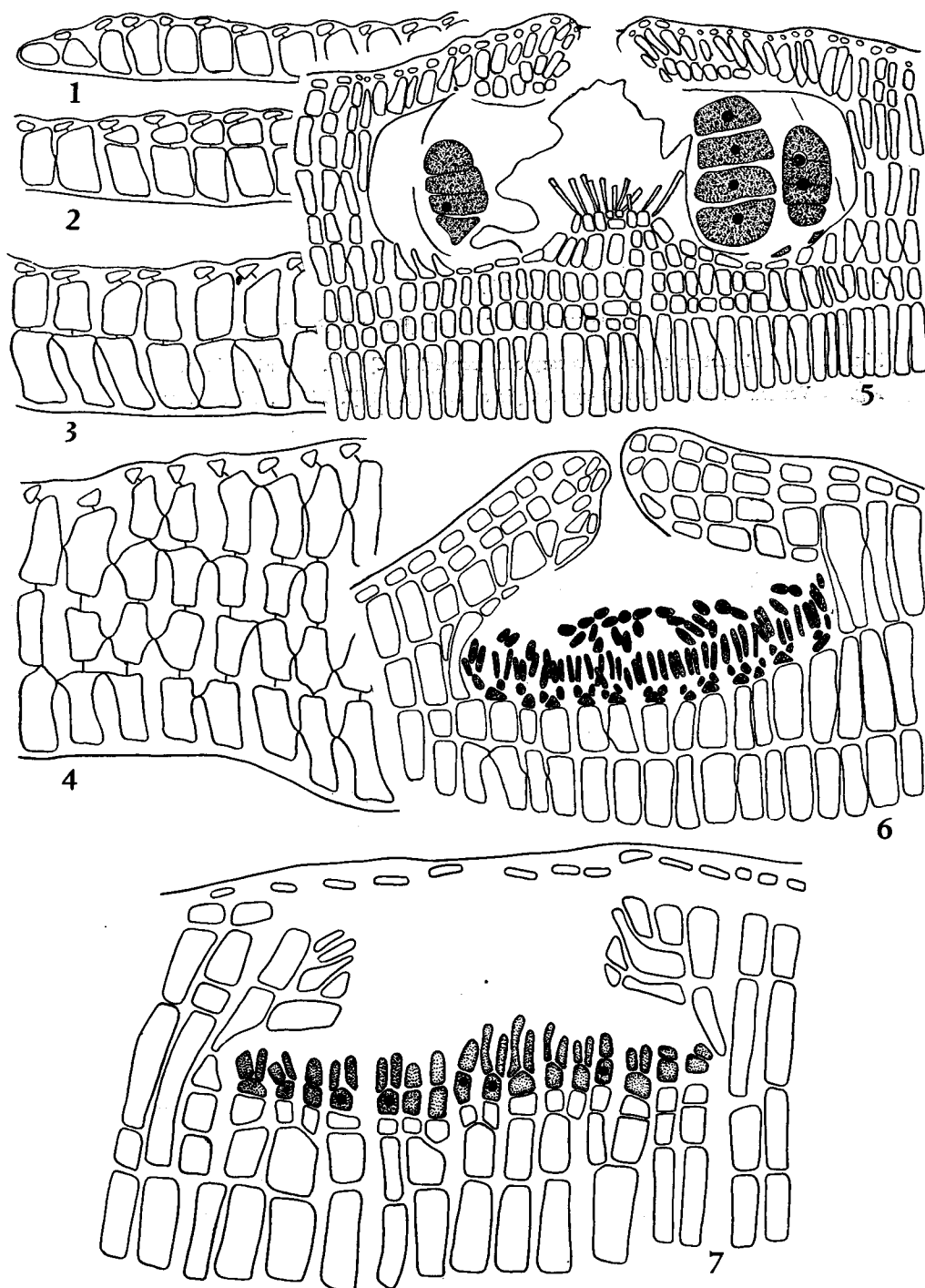


PLATE IV

Dermatolithon tumidulum (FOSLIE) FOSLIE

Fig. 1. Vertical section through procarpic conceptacle. (Cf. Pl. II, Fig. 8). $\times 600$

Fig. 2. Vertical section through cystocarpic conceptacle. (Cf. Pl. II, Fig. 7). $\times 550$

