STUDIES ON THE MELOBESIOIDEAE OF JAPAN. II

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2. **Dermatolithon Corallinae** (CROUAN) FOSLIE

Pl. I, Figs. 1-4, Pls. II, IV & V

Foslie, *in* Börgesen, 1902, p. 402.

Syn. Melobesia Corallinae CROUAN; Areschoug, 1875, p. 2; Hauck, 1885, p. 266; Foslie, 1898, p. 11. *Lithophyllum Corallinae (CROUAN) HEYDRICH*, 1897, p. 47; Rosenvinge, 1917, p. 265, textfigs. 186-190; Suneson, 1943, p. 43, textfigs. 24-26, pl. 6, fig. 28 (habit photo), pl. 8, fig. 38; Taylor, 1937, p. 268, 1957, p. 251. *Lithophyllum pustulatum (LAMOUR.) FOSLIE* f. *Corallinae (CROUAN) FOSLIE*, 1905, pp. 118, 121, 127. *Lithophyllum pustulatum* f. *similis FOSLIE*, 1909, p. 47 (tetrasporic form). *Lithophyllum (Dermatolithon) macrocarpum (ROSANOFF) FOSLIE* f. *Corallinae (CROUAN) FOSLIE*, 1909, p. 47 (bisporic form).

Japanese name. Himegoromo (n. n.).

Habit and distribution in literature. - Epiphytic on *Corallina officinalis*, *Furcellaria fastigiata*, and *Phyllophora membranifolia*. Sweden; Denmark; Germany; Atlantic coasts of Europe and North America; Mediterranean Sea; Adriatic Sea.

Specimens collected. - Epiphytic on *Corallina pilulifera*. Nanaehama, Hakodate, 13 March 1959, Masaki. Tachimachi-misaki, Hakodate, 20 June 1959, Masaki. Oshoro, 20 July 1959, Tokida & Masaki.

Thallus in the form of reddish violet crusts, epiphytic on *Corallina pilulifera*, surrounding the host partly or entirely, or peltate with free margins and up to 2-5 mm diam., mostly polystromatic consisting of (2-)5-25 cell-layers, 170-700 μ thick in the inner thicker portion, monostromatic marginal portion narrow; hypothallium consisting of oblique cells which are sometimes elongated, 12-80(-90) μ, mostly over 30 μ, long, tapering towards the base; perithallium consisting of several layers of cells of various length, 17-50 μ long, 5-12 μ diam., transversal pits present but transversal cell-fusion lacking; cells of epithallium more or less triangular, 3-7 μ high, 5-9 μ diam.; sporangial conceptacles immersed, sometimes slightly convex, up to 190-250 μ broad, sporangia tetrasporic, 75-115 μ long, 25-60 μ diam., 5-10 sporangia standing on the periphery of floor in each conceptacle, central part of conceptacle floor occupied by a columella which is stained not so dark with anilin blue, orifice with poorly developed papillae; female conceptacles nearly flat or slightly elevated on surface, matured but unfertilized conceptacles 50-85 μ high and up to 110 μ broad, cystocarpic conceptacles slightly convex, 105-155 μ high and 165-210 μ broad, orifice with more or less well developed papillae; spermatangial conceptacles 55-85 μ high and 95-140 μ broad, sometimes coexisting with female conceptacles in one and the

same crust, slightly or not elevated on surface, immersed not so deeply, orifice short, sometimes extended into a spout, conceptacles in older crust frequently overgrown, spermatia narrowly cylindrical, 8 μ long and 2 μ diam., never produced at the end of long sterigmata.

This species has been known to be rather common in Europe and the North Atlantic coasts. It is reported here for the first time to occur in Japan. The writers' specimens agree in general characters quite well with the descriptions of the species given by the authors cited above, except in dimensions; they are of somewhat thicker crusts consisting of a little fewer cell-layers. The sporangial conceptacles are always tetrasporic. Bisporic sporangia are not found in the writers' specimens, though Rosenvinge (1917), Suneson (1943) and Taylor (1937, 1957) described only bisporic sporangial conceptacles in this species. However, the plant from the Mediterranean has been known to produce tetrasporic and that from the Adriatic to produce both bisporic and tetrasporic sporangia (cf. Suneson, 1943, p. 47). In a recent treatise on the bispores in the Corallinaceae, Suneson (1950) reports that the present species from the west coast of Sweden is found to have both tetraspores and binucleate, and even uninucleate, bispores in the material collected in early May while the material collected in summer has been known to produce only uninucleate bispores. The dimensions of the sporangia in the writers' specimens are somewhat greater than those given by previous authors. Spermatangial conceptacles were described by Suneson (1943, p. 45) as very small; he gives a figure of a conceptacle resting on only six vertical cell rows (fig. 25 A). The male conceptacles illustrated by Rosenvinge (1917, fig. 189 A & B) rest on five and eight cell rows respectively. On the other hand, the male conceptacles in the writers' specimens are somewhat larger as illustrated in two figures, one of which shows a conceptacle resting on eleven cell rows (Pl. V, fig. 4) and the other a conceptacle on seventeen cell rows (Pl. IV, fig. 6). Sterigmata have been observed by Rosenvinge (1917, fig. 159 A & C, fig. 189 A & B) in spermatangial conceptacles of *Melobesia Lejolisii ROSANOFF* and the present species but not by Suneson (1943) nor by the present writers. According to Suneson's interpretation given under *Melobesia Lejolisii* (1937, p. 12), the sterigmata are nothing but long stretched spermatangium mother-cells which have become sterigma-like after having repeatedly cut off spermatangia in advanced seasons.

3. Melobesia zostericola FOSLIE

Pl. I, Figs. 5 & 6, Pls. III, VI-VIII

Foslie, 1907, p. 25 (as *Melobesia* (*Heteroderma*) *zostericola*); De Toni, 1924, p. 648.

Syn. Lithophyllum zostericolum FOSLIE f. *tenuis FOSLIE*, 1900, p. 5. *Lithophyllum zostericolum FOSLIE;* Yendo, 1902, p. 188; De Toni, 1905, p. 1795; Cotton, 1915, p. 113. *Heteroderma zostericola FOSLIE*, 1909, p. 56; Yendo, *in* Okamura, 1916,

p. 125, 1936, p. 507; Tokida, 1954, p. 159. *Fosliella zostericola* (*FOSLIE*) *SEGAWA*, 1956, p. 70, Pl. 40, fig. 311 (habit photo).

Japanese name. Mokasa (Yendo).

Habit and distribution in literature. - Epiphytic on *Zostera* and *Phyllospadix*. Pacific coast of Honshû, and Hokkaido, Japan; Saghalien; Korea; China.

Specimens collected. - Epiphytic on *Phyllospadix iwatensis*. Nobori, Saghalien, June 1937, Tokida. Akkeshi, Prov. Kushiro, Hokkaido, 26 November 1958, Yakushi. Yamasedomari, Hakodate, 3 June 1958, Yakushi.

Thallus at first small roundish patches, later becoming confluent and more or less overlapping, at last covering the host surface extensively, purple red in colour, monostromatic in the vegetative part, cells in section 5-9 μ long and 5-12 μ diam., cell-fusion frequent, each cell except those along the thallus margins cutting off obliquely a cover cell, cover cells in section 7-9 μ high and 7 μ diam., trichocysts lacking; thallus polystromatic in the neighborhood of conceptacles, composed of 3-6(-8) layers of cells, cells 7-9 μ diam., the second or third cell from the base elongated, up to 50 μ long, the basal cells or cells of hypothallium usually flattened; sporangial conceptacles nearly flat or slightly convex on surface, 60-100(-140) μ high* and (90-)100-170(-210) μ broad, floor single cell-layered, sporangia tetrasporic in the material from Hakodate but tetrasporic or bisporic in the material from Saghalien and Akkeshi, bispores binucleate, each sporangium standing on a small stalk cell in the periphery of the conceptacle, 40-85 μ long and 20-63 μ diam., central part of conceptacle floor occupied by a columella; female conceptacles slightly convex, 42-60(-105) μ high and 38-55 μ diam. when young, 55-84(-105) μ high and 84-126(-147) μ diam. when carpospores are formed, floor two cell-layered, orifice provided with a few papillae; spermatangial conceptacles slightly prominent in the center, 30-75 μ high and (40-)50-84(-112) μ broad, spermatia ellipsoidal, 4 μ long and 0.8 μ diam.; female and male conceptacles usually occurring separately in different crusts, but rarely together with each other in one and the same crust.

This species was first described by Foslie (1900) as *Lithophyllum zostericolum* f. *tenuis* on the basis of the Japanese plant collected by K. Yendo at Misaki,** Prov. Sagami, on the Pacific coast of middle Honshû. In placing the present species in the genus *Melobesia* instead of *Heteroderma* or *Fosliella*, the writers follow the idea of Kylin (1956, p. 209) in respect to the generic names.

Up to the present, the zonately divided sporangium has been the only described reproductive organ in this species (cf. De Toni, 1924, p. 648). The writers' specimens, however, are often found to have tetrasporangial conceptacles together with the bisporangial

* The height of conceptacles in this species is measured from the base of the crust to the tip of the orifice, as has been done by Suneson (1943) in *Melobesia* species.

** The "Marine Laboratory at Sagami province" (Foslie, 1900, p. 5) is situated at Misaki.

ones in one and the same crust, and sometimes even to have tetrasporangia mingled with the bisporangia in one and the same conceptacle. The bispores are always binucleate. On the other hand, sexual plants bearing female and male conceptacles are also commonly met with. The conceptacles of both sexes are rarely found in one and the same crust. In surface view, the female crust has smaller vegetative cells than both the male and sporangial crusts (cf. Pl. III, figs. 4 & 5). This difference in the size of the cells is hardly discernible in sections. The thickness of the crust in *Lithophyllum zostericolum* was given by Foslie (1900) as 60 μ for f. *tenuis* and as up to 150 μ for f. *mediocre*. This range of thickness, 60–150 μ, was cited by Yamada (*in* Okamura, 1936) without mentioning the forms in the Japanese diagnosis of *Heterodermа zostericola*. However, the Californian f. *mediocre* was later raised to the rank of species by Foslie (1907, p. 27). So the crust of *Melobesia zostericola* is now known from the literature to be 60 μ in thickness. Comparing with this value, the writers' material has a thicker crust, being up to 75 μ thick in the male, to 84–105 μ in the female, and to 100 μ (rarely even to 140 μ) in the sporangial specimens.

Summary

1. *Dermatolithon Corallinae* (*CROUAN*) *FOSLIE* which has previously been reported from Europe and the North Atlantic coasts, is here described as new to Japan on the basis of the specimens collected in Hokkaido. Tetrasporic, not bisporic, sporangial conceptacles, as well as procarpic, cystocarpic, and spermatangial conceptacles were observed.

2. *Melobesia zostericola FOSLIE*, a species originally described on the basis of the material from Japan, is reported herein to be represented not only by the previously known sporangial plant but also by female and male plants. Sporangial conceptacles are found to have not only tetrasporangia but also bisporangia, either separately or coexistently. Bispores are binucleate.

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EXPLANATION OF PLATES

PLATE I

Dermatolithon Corallinae (CROUAN) FOSLIE

Fig. 1. Habit of plant encircling a stem of *Corallina pilulifera* from Tachimachi-misaki, Hakodate. × 1.9

Fig. 2. Enlargement of a portion of the specimen shown in Fig. 1. × 6.7

Fig. 3. Habit of peltate plant attached to a branch of *Corallina pilulifera* from Tachimachi-misaki, Hakodate. × 2

Fig. 4. Enlargement of a portion of the specimen shown in Fig. 3. × 6.7

Melobesia zostericola FOSLIE

Fig. 5. Habit of plant growing on a leaf of *Phyllospadix iwatensis* from Akkeshi. × 2

Fig. 6. Enlargement of a portion of the specimen shown in Fig. 5. × 6.5

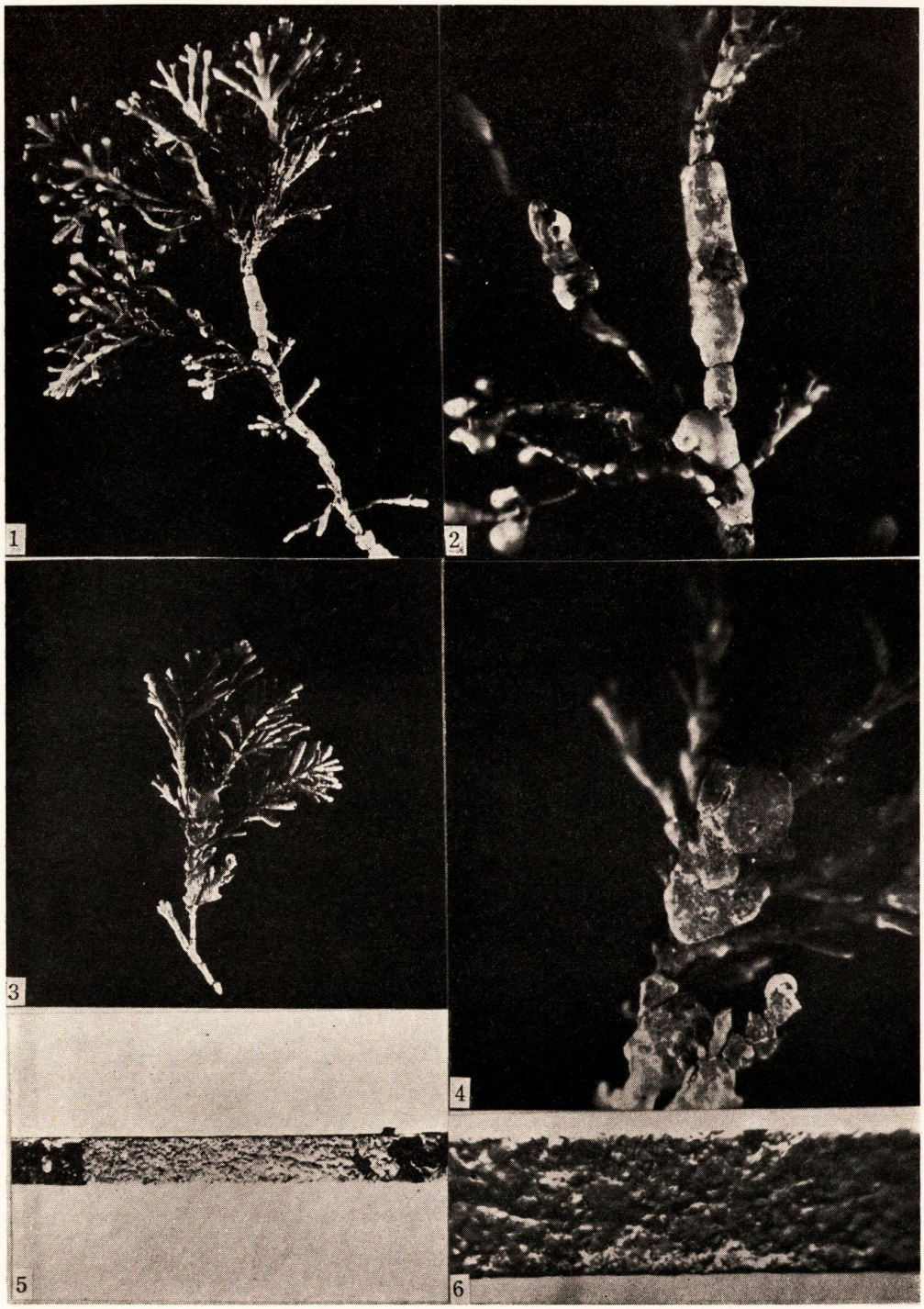

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PLATE II

Dermatolithon Corallinae (CROUAN) FOSLIE

Photomicrographs of vertical sections of plant encircling the stem of *Corullina pilulifera* from Nanaehama, Hakodate. × 89

Fig. 1. Tetrasporangial crust.

Fig. 2. Procarpic and cystocarpic crust.

Fig. 3. Cystocarpic crust.

Fig. 4. Spermatangial crust.

Fig. 5. Section of a crust bearing both cystocarpic and spermatangial conceptacles.

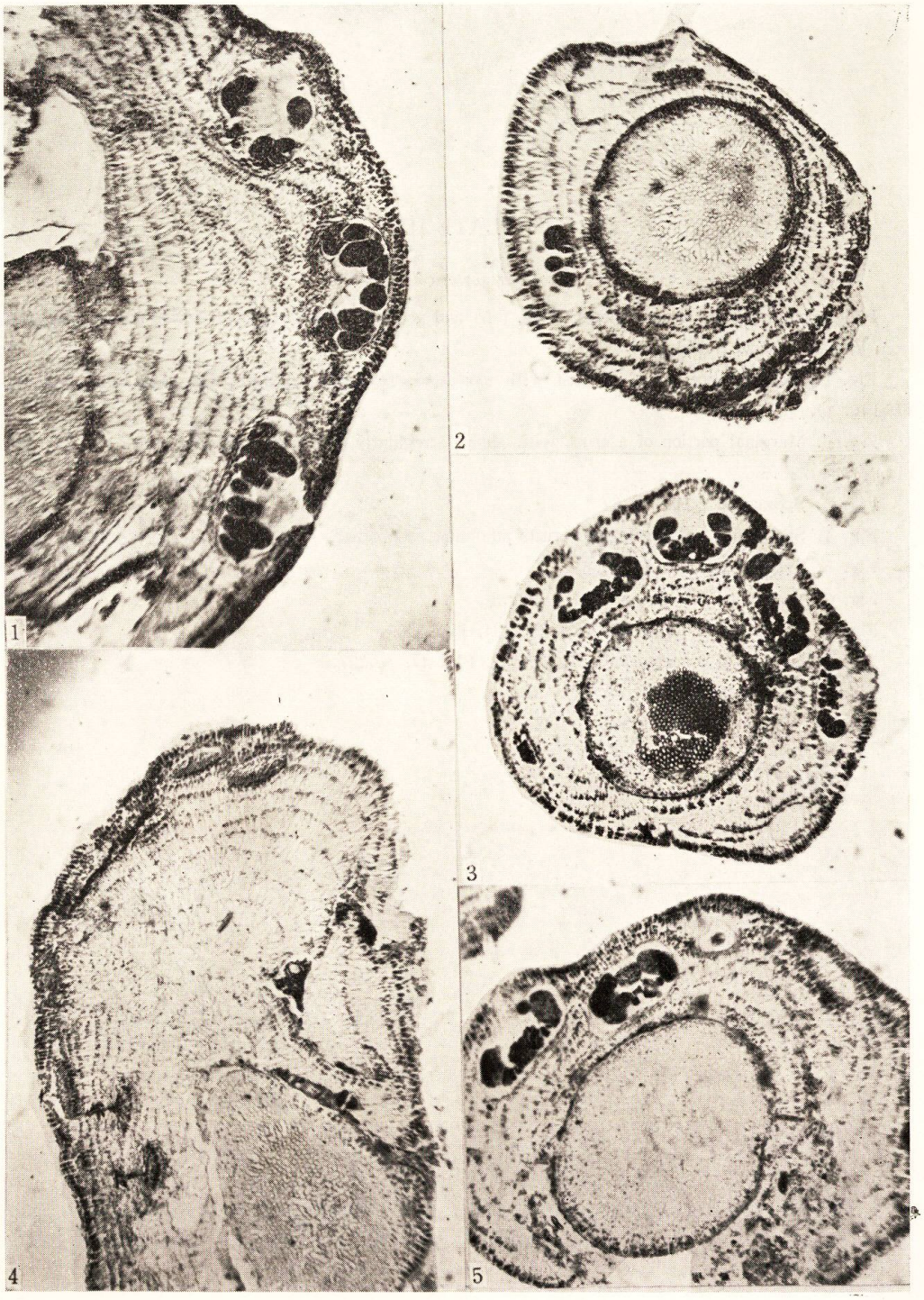

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PLATE III

Melobesia zostericola Foslie

Photomicrographs of surface views (Figs. 1–5) and vertical sections (Figs. 6–10) of fertile specimens from Yamasedomari, Hakodate.

Fig. 1. Marginal portion of a crust with elongated, regularly arranged, marginal cells. (Cf. Pl. VI, Fig. 3). × 227.5

Fig. 2. Marginal portion of a crust with short, irregularly disposed, marginal cells. (Cf. Pl. VI, Fig. 4). × 227.5

Fig. 3. Sporangial crust. × 62

Fig. 4. Sporangial and cystocarpic crusts adjoining each other. × 62

Fig. 5. Spermatangial crust. × 62

Fig. 6. Spermatangial conceptacle. × 227.5

Fig. 7. Sporangial conceptacles. (Cf. Pl. VII, Fig. 1). × 154

Fig. 8. Sporangial conceptacle. (Cf. Pl. VII, Fig. 4). × 227.5

Fig. 9. Spermatangial conceptacle. × 560

Fig. 10. Cystocarpic conceptacle. × 227.5

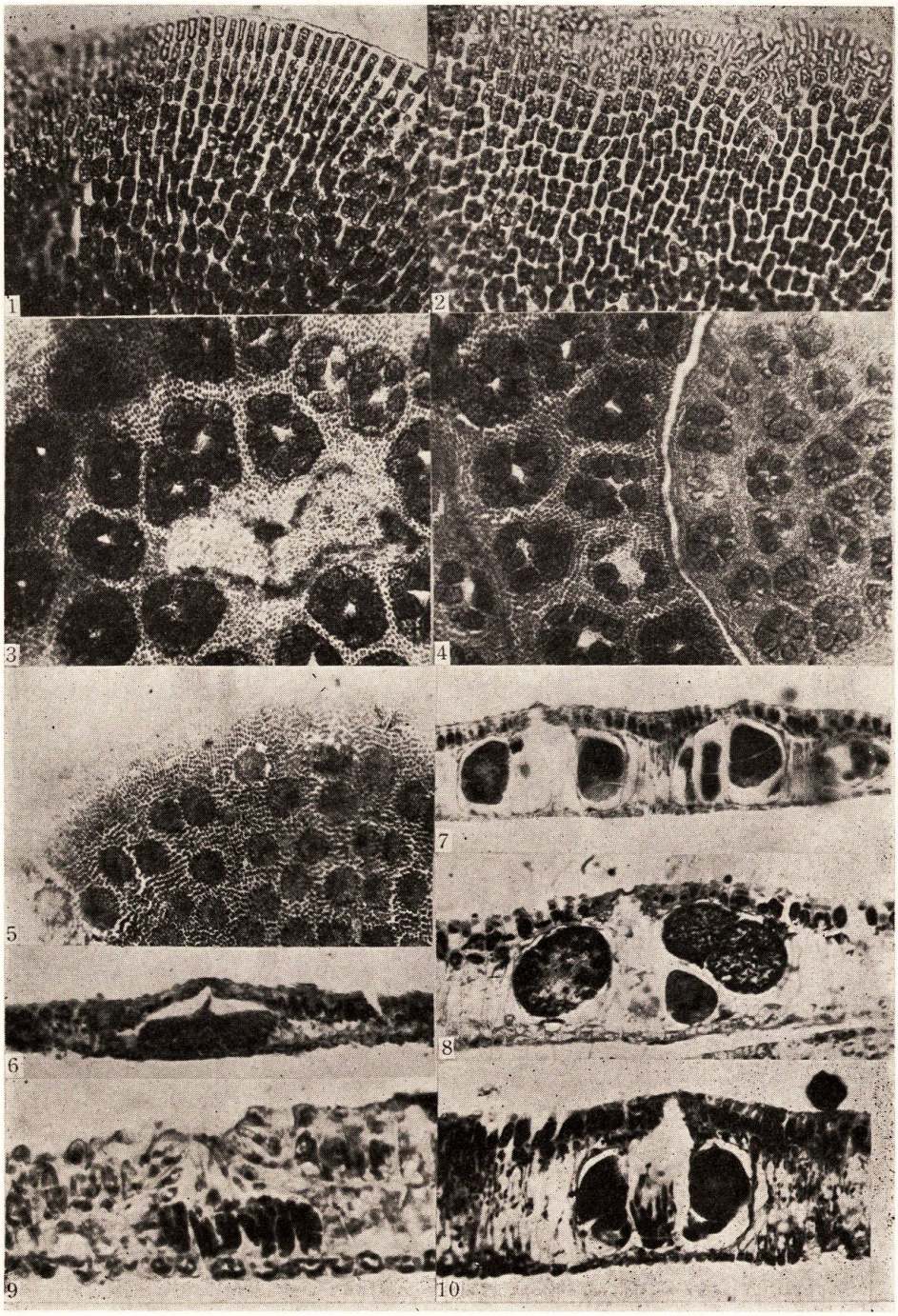

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PLATE IV

Dermatolithon Corallinae (CROUAN) FOSLIE

Fig. 1. Vertical section through marginal portion of a crust. × 500

Fig. 2. Vertical section through marginal portion of a crust thickened abruptly within the margin. × 500

Fig. 3. Tetrasporangial conceptacle. × 275

Fig. 4. Section through the center of a young ring-shaped sporangial conceptacle. × 300

Fig. 5. Section through the periphery of a young ring-shaped sporangial conceptacle. × 300

Fig. 6. Spermatangial conceptacle. × 650

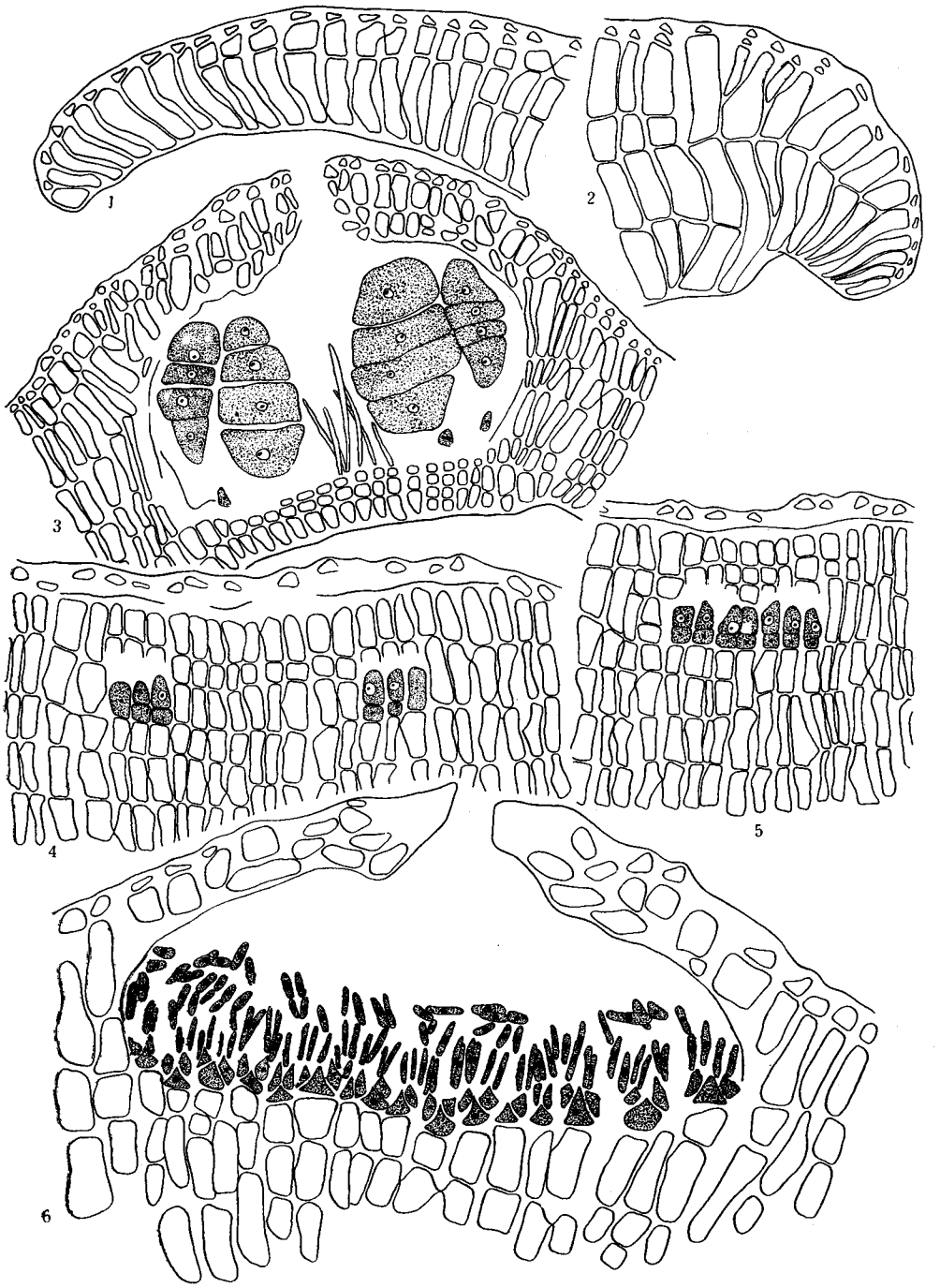
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PLATE V

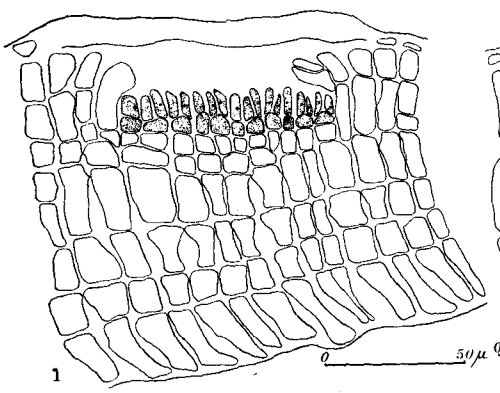
Dermatolithon Corallinae (CROUAN) FOSLIE

Fig. 1. Vertical section of young procarpic conceptacle.

Fig. 2. Vertical section of procarpic conceptacle.

Fig. 3. Vertical section of cystocarpic conceptacle.

Fig. 4. Vertical section of spermatangial conceptacle with a spout.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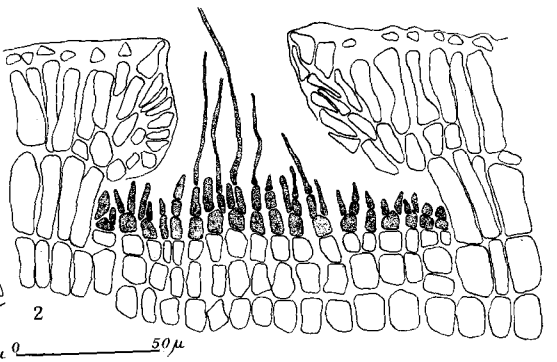
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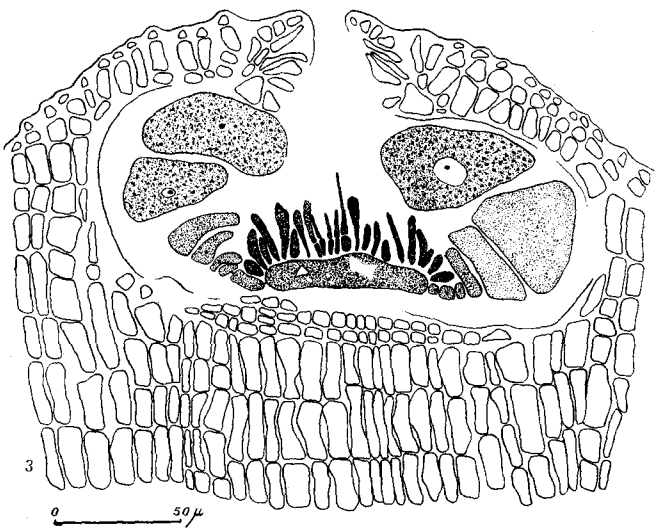
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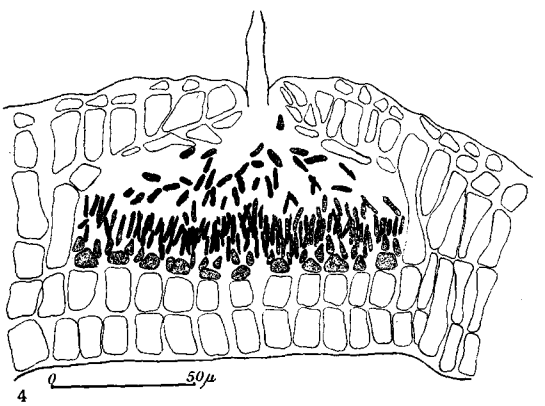
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PLATE VI

Melobesia zostericola FOSLIE

Fig. 1. Vertical section of the marginal monostromatic portion of a crust. × 650

Fig. 2. Vertical section of the marginal monostromatic and distromatic portions of a crust. × 650

Figs.3. & 4. Surface view of the marginal portion of a crust. (Cf. Pl. III, Figs. 1 & 2). × 550

Fig. 5. Vertical section of procarpic conceptacle. × 1300

Fig. 6. Vertical section of spermatangial conceptacle. × 650

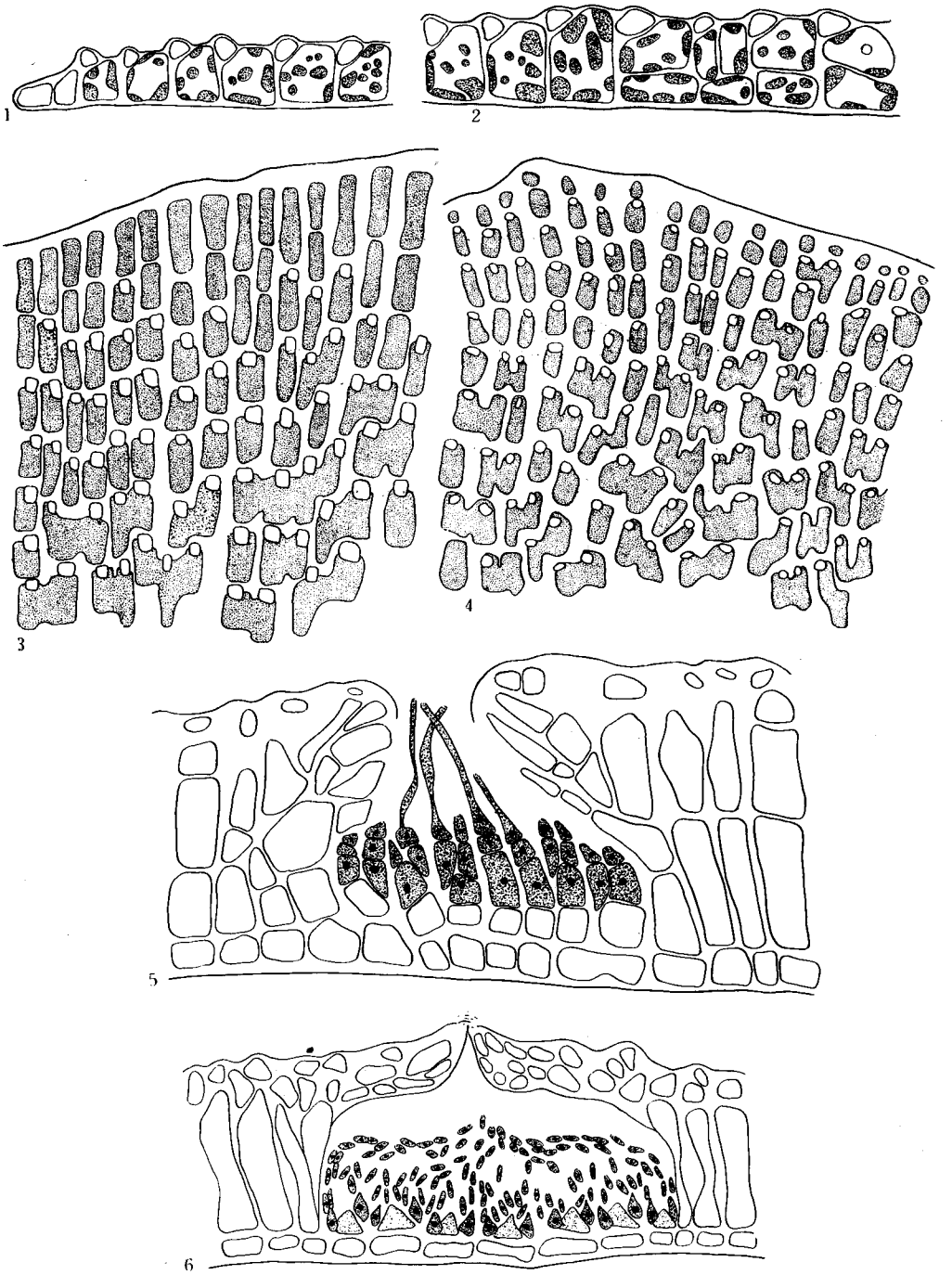
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PLATE VII

Melobesia zostericola FOSLIE

Vertical sections of sporangial conceptacles. × 400

Fig. 1. Tetra- and bisporangia in one and the same conceptacle. (Cf. Pl. III, Fig. 7).

Fig. 2. A large tetrasporangium lying on the central part of conceptacle floor, pushing aside the columella.

Fig. 3. A typical tetrasporangial conceptacle with a columella at the center of the floor.

Fig. 4. Bisporangial conceptacle with binucleate spores. (Cf. Pl. III, Fig. 8).

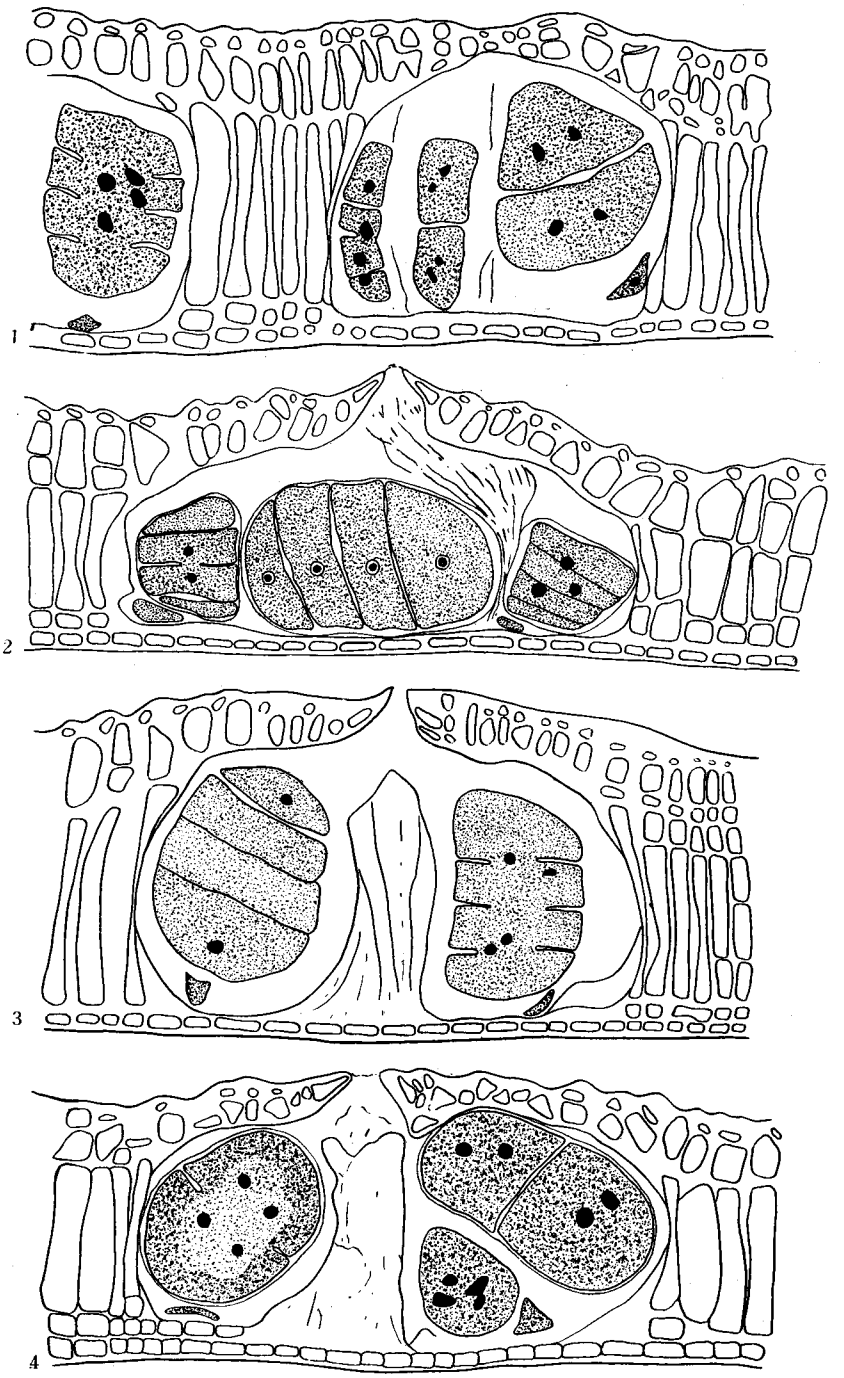
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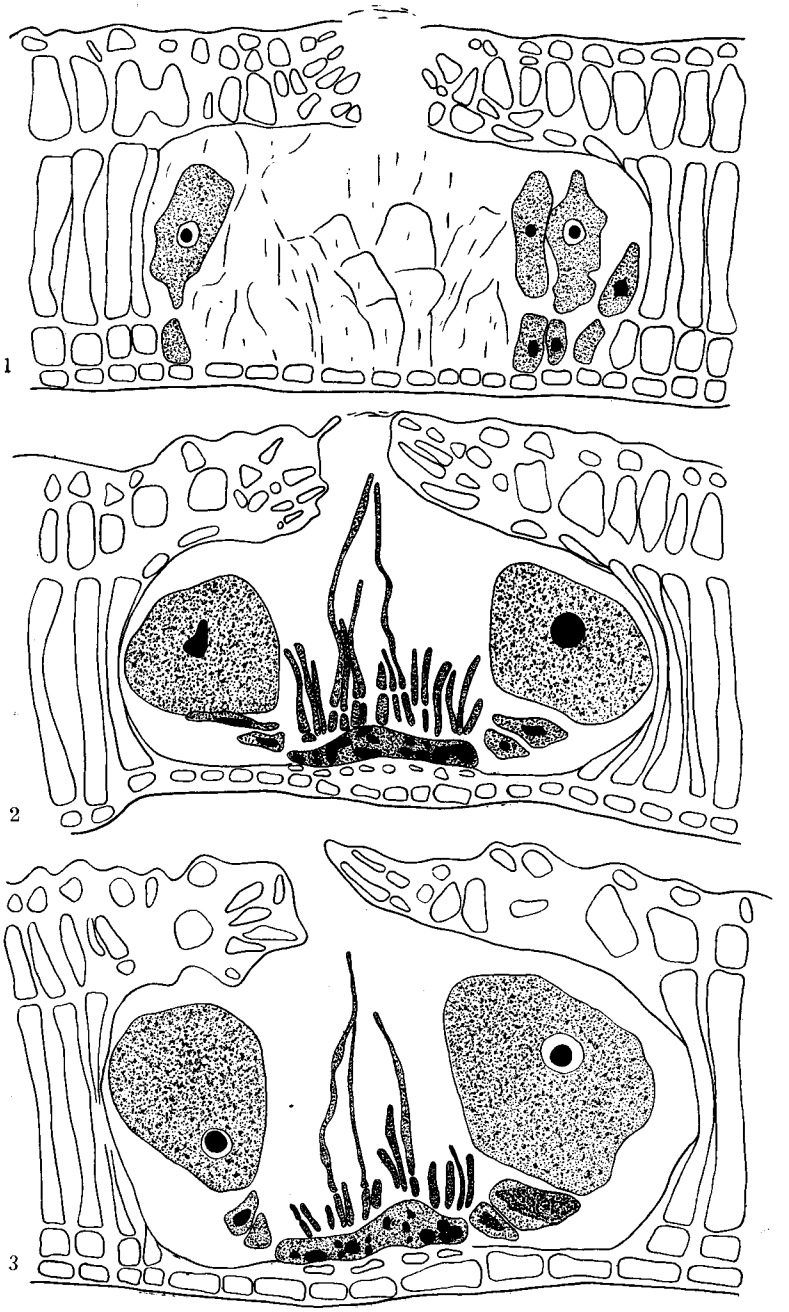
PLATE VIII

Melobesia zostericola FOSLIE

Fig. 1. Vertical section of sporangial conceptacle with young sporangia. × 550

Figs. 2. & 3. Vertical section of cystocarpic conceptacle. × 650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