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## Two Species of Myrionemaceae New to Japan

By

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As to the species of the Myrionemaceae in Japan, only one species, *Compsoneima secundum* SETCH. et GARDN. f. *terminale* SETCH. et GARDN., has been reported by Y. YAMADA and T. TANAKA<sup>1)</sup>. In the present paper two other species are described. One belongs to *Myrionema* which is characterized by monostromatic basal disks and uni- or partly biseriate plurilocular sporangia. The other belongs to *Hecatonema* which is characterized by mono- or distromatic basal disks and pluriseriate (2-3 or 4) plurilocular sporangia. Regarding the systematic position of *Hecatonema*, KYLIN<sup>2)</sup> considered it as a member of Ectocarpaceae, but for the present it seems better to place *Hecatonema* in Myrionemaceae because of its Myrionema-like structure.

Heartly thanks are expressed to Prof. Y. YAMADA for his kind guidance in the present study.

### *Myrionema corunnae* SAUVAGEAU

Figs. 1-2

Sur quelq. Myrionemac., 1898, p. 77, Fig. 14; BOERGESSEN, Mar. alg. Faeröes, 1902, p. 426, Fig. 30; KYLIN, Stud. Algenfl. schw. Westküste, 1907, p. 35, Fig. 7; Id., Phaeophyc. schwed. Westküste, 1947, p. 38, Fig. 30; NEWTON, Handb. Brit. Seaweeds, 1931, p. 151; HAMEL, Phéophyc. France, Fasc. II, 1935, p. 91; 1939, table p. XXVII; LEVRING, Zur Kenntn. Algenfl. norweg. Westküste, 1937, p. 49, Fig. 7, A-B.

Fronds epiphytic, forming a small circular patch, 1-1.5 mm. diam., often confluent, dark brown, consisting of basal disks monostromatic, composed of subdichotomously or occasionally alternately branched filaments radiating from the centre and sticking to each other; cells of basal filaments 4-5  $\mu$  high, about 1-2 times as wide as high; erect parts 60-80 (up to 100)  $\mu$  high in the centre, gradually shorter towards the margin, composed of compacted plurilocular sporangia and scattered hairs issuing one or rarely two from each of all cells of basal filaments; plurilocular sporangia of equal height, on stalks 1-3 or more celled, sometimes sessile, occasionally lateral on stalks of other sporangia, linear,

1) Mar. alg. in the vicinity of the Akkeshi Marine Biological Station (Sci. Pap. Inst. Alg. Rec., Hokkaido Univ., Vol. III, no. 1 p. 55).

2) Die Phaeophyceen der schwedischen Westküste, 1947.

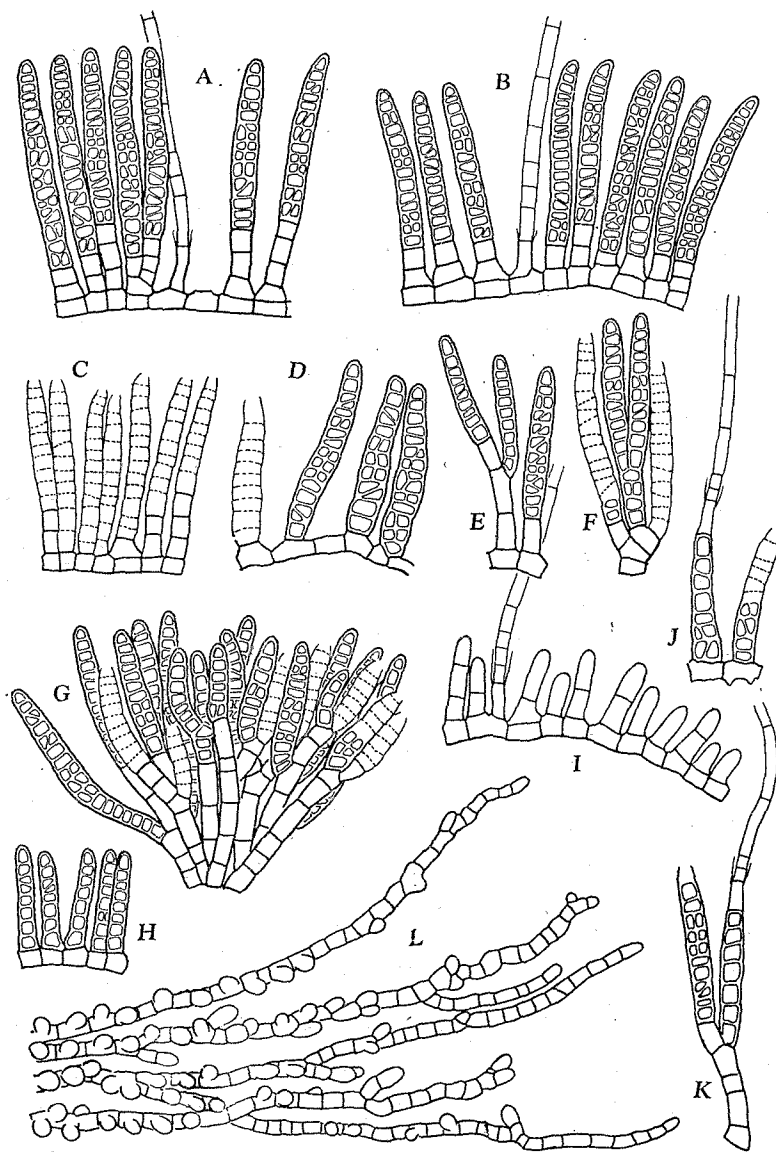


Fig. 1. *Myrionema corunnae* SAUV.

A, B. erect part showing pluril. sporangia and hairs; C. sessile, or stalked empty pluril. sporangia; D. somewhat undulate, broad and sessile pluril. sporangia; E. lateral pluril. sporangia; F. branched pluril. sporangia; G. crowded pluril. sporangia with lateral ones in the center of frond; H. young pluril. sporangia near the marginal part; I. marginal erect part; J, K, terminal hairs on pluril. sporangia; L. marginal basal part (pressed). About  $\times 420$ .

often slightly swollen in the middle part, obtuse at the apex, 37.5–80 (commonly 50–70)  $\mu$ . long, 6–10 (commonly about 7)  $\mu$  broad, showing an apical opening in empty ones; lateral plurilocular sporangia sessile or stalked; in the centre of the fronds plurilocular sporangia crowded, situated on relatively long stalks, rather short and somewhat broad, frequently provided with lateral ones on the stalk; sessile plurilocular sporangia abundant near the margin; loculi uniseriate or here and there biseriate, transversely 10–20 seriated, 2.5–5  $\mu$  high; cells of the stalk 4–6  $\mu$  broad, 1–1.5 (up to 2.5) times as long as broad; unilocular sporangia not found; hairs scattered here and there, with stalks one or more celled, up to 300–400  $\mu$  long, with a growing zone in the basal part; cells of hairs elongated, colourless, 4–5  $\mu$  broad, up to 13 times as long as broad; basal cells of hairs enclosed with a sheath, generally longer than the cells of the growing zone, 1.5–4 times as long as broad; growing zones of hairs consisting of 2–4 short cells, 0.5–1 times as long as broad, often not conspicuous; chromatophores of vegetative cells 1 or occasionally 2 in each cell, plate-like, parallel to the wall.

Loc.: Muroran, Iburi Prov. (Oct. 1, 1949).

Geogr. distrib.: France, England, West coast of Sweden and Norway, Faeröes.

The present alga was abundantly found growing on the old lamina of *Alaria crassifolia* KJELLM. in the lower littoral and upper sublittoral belts at Muroran, Hokkaido. The fronds are often colourless in the central part. This is due to the empty plurilocular sporangia or to falling off of the central part of the fronds. In the erect part, besides plurilocular sporangia and hairs, peculiar erect filaments (it is uncertain whether they are vegetative or reproductive) were sometimes met with on the plants provided with plurilocular sporangia (Fig. 2). They are of the same height as plurilocular sporangia, and consist of cylindrical cells which are about 5  $\mu$  broad and 1–2 times as long as broad. One to five apical cells of them are frequently empty and show an apical opening. Nevertheless, apical cells with contents do not differ from other vegetative cells in appearance. Some branched plurilocular sporangia (Fig. 1, F), and terminal hairs on plurilocular sporangia (Fig. 1, J, K) were observed. These appear to show the transformation of stalks into plurilocular sporangia. Rhizoids described by SAUVAGEAU<sup>1)</sup> are not developed in the

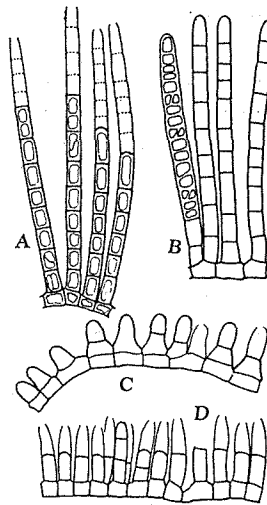


Fig. 2.

*Myrionema coronatae* SAUV.  
peculiar erect filaments  
whose nature is uncertain.  
A, B. in the middle part of  
frond; C, D. in the marginal  
part. About  $\times 350$ .

1) Sur quelque Myrionémacées, 1897, pp. 77–82.

present material.

The present alga seems to be referable to *M. corunnae* SAUV., although it sometimes shows peculiar erect filaments as mentioned above.

SETCHELL and GARDNER<sup>1)</sup> described three formae of *M. corunnae*: f. *uniforme*, f. *angulatum* and f. *sterile*. These three formae differ from the plant at hand in the absence of hairs and of lateral plurilocular sporangia (and in other characteristics as SETCHELL and GARDNER mentioned). The present plant has a close similarity to *M. primarium* SETCH. et GARDN. in the presence of hairs, but the latter is distinguished from the former by sessile plurilocular sporangia with acute conical apices and by the absence of lateral sporangia. Moreover *M. primarium* f. *acuminatum* SETCH. et GARDN. is nearer to this plant in the possession of short-stalked plurilocular sporangia, but it differs from the latter by the presence of erect vegetative filaments attaining a length 2-3 times as long as plurilocular sporangia and by the absence of lateral sporangia.

#### *Hecatonema terminale* (KÜTZING) KYLIN

Figs. 3-4

Bemerk. über Entwicklungsges. einig. Phaeophyc., 1937, p. 8, Fig. 2; HAMEL, Phaeophyc. France, Fasc. V, 1939, table p. XXVIII.

*Ectocarpus terminalis* KÜTZING, Phyc. germanica, 1845, p. 236; KUCKUCK, Bemerk. zur mar. Algenveg. von Helgoland, II, 1897, p. 376, Fig. 3; BOERGENSEN, Mar. alg. Canary Isl., II, 1926, p. 52, Fig. 27-28; HAMEL, Phaeophyc. France, Fasc. I, 1931, p. 51.

Fronds epiphytic, dark brown, forming a small patch, about 0.5-1 mm. diam., usually irregularly expanding, consisting of basal disks and erect parts; basal disks monostromatic, composed of irregularly branched, closely compacted filaments; cells of basal filaments of irregular and angular shape in surface view, sinuate in side view, 7.5-12.5  $\mu$  high, 1-2 times as broad as high; erect parts composed of erect filaments and plurilocular sporangia which issue from the basal filaments of unequal height, erect filaments unbranched, occasionally sparingly branched near the base, 150-550  $\mu$  or longer, of equal breadth throughout, slightly narrowed near the base, showing intercalary growth, ending in a hair; cells of erect filaments quadrate or cylindrical, not constricted at the joint, 8.5-15  $\mu$  broad, (0.5)-1-2-(3) times as long as broad; chromatophores plate-like, 2-4 in each cell; hairs terminal on erect filaments, at the base provided with a sheath enclosing the growing zone; cells of hairs colourless, elongated, 5-7.5  $\mu$  broad, up to 10 times as long as broad; plurilocular sporangia on stalks composed of 1-5 or more cells, rarely sessile, occasionally lateral on the basal part of erect filaments, linear-lanceolate or elongated-fusiform, 62.5-100-(140)  $\mu$  long, 12.5-20  $\mu$  broad, showing an apical opening in empty ones; lateral sporangia

1) Phycological contributions, II, 1922, pp. 339-340.

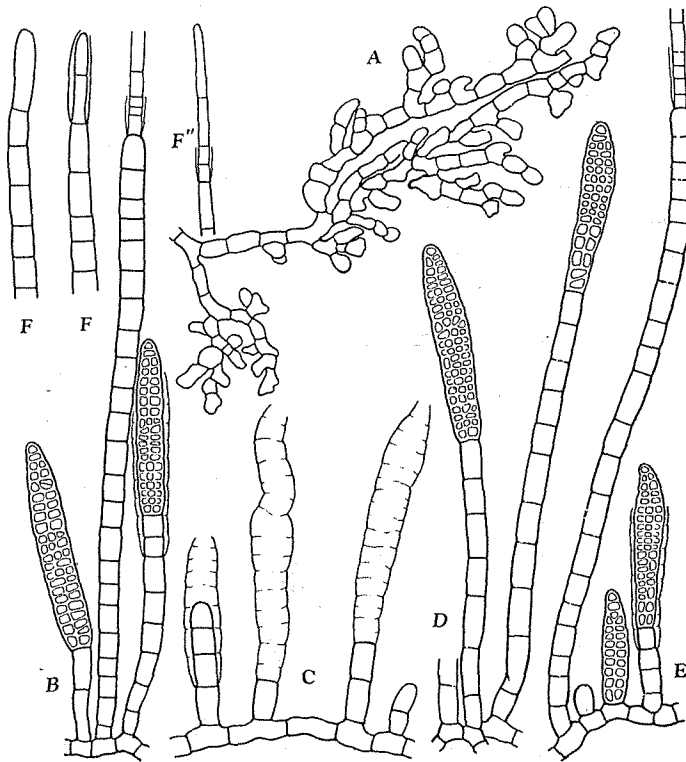


Fig. 3. *Hecatonema terminale* (KÜTZ.) KYLIN.

A. basal filament in the marginal part; B-E. pluril, sporangia and erect filaments ending in hairs, showing shortly or longly stalked, sessile, empty, or regeneratively developed pluril. sporangia from empty ones; F-F'', development of hairs. Aabout  $\times 350$

sessile or short-stalked; loculi pluriseriate, longitudinally 2-3 (occasionally 4) seriated, about  $2.5 \mu$  high; unilocular sporangia not found.

Loc.: Muroran, Iburi Prov. (Sept. 12, 1946); Shirakami, Oshima Prov. (Apr. 8, 1947).

Geogr. distrib.: Northern and western coasts of Norway; Western and southern coasts of Sweden; Baltic coast of Germany; Helgoland; Canary Islands; Tangier; Eastern and Western Coasts of North America.

The present plant was found in Muroran growing on *Fucus evanescens* AG. or covering the old thallus of *Sargassum thunbergii* (MERT.) O. KUNTZE mingled with other small algae, or growing on *Punctaria* sp. at Shirakami. It agrees

well in almost all respects with *Ectocarpus terminalis* KÜTZ. described and figured by KUCKUCK (1897) and BOERGESEN (1926) l. c.

In the present plant basal disks are always monostromatic, distromatic part never having been found. Cells of the erect filaments are generally short, and the apical cells from which hairs issue are obtuse and fairly broader than the hairs. The hairs develop in the same manner as in *Hec. maculans* (COLLINS) SAUV. When young erect filaments grow to a certain height, their apical cells elongate and become the mother cells of hairs. The hairs grow through the apex of the mother cell, and the cell wall remains as a sheath enclosing the growing zone of hairs (Fig. 3, F-F'). Hairs directly arising from the basal filaments were not found. Lateral plurilocular sporangia near the base of the erect filaments were not found. Lateral plurilocular sporangia near the base of the erect filaments are frequently met with in the crowded middle part of the fronds (Fig. 4, A). But lateral ones on the upper part are not common. As regenerative and secondary phenomena new plurilocular sporangia are produced from the empty ones as KUCKUCK and BOERGESEN have already mentioned (Fig. 3, B, E). There were also observed pseudolateral hairs on the erect filaments, lateral plurilocular sporangia on the upper part (Fig. 4, B-C and D-E), and intercalary plurilocular sporangia formed by the transformation of vegetative cells of the erect filaments (Fig. 4, F-F').

Concerning the present species KUCKUCK (1897) and BOERGESEN (1926) did not mention the occurrence of distromatic basal disks and normal lateral plurilocular sporangia on the erect filaments. In 1937 KYLIN<sup>1)</sup> referred the present species to the genus *Hecatonema* because it has perhaps here and there distromatic parts of basal disks and is closely related to the type species of *Hecatonema*, *Hec. maculans* (COLLINS) SAUV. (*Phycocelis maculans* COLLINS, 1896). Kylin mentioned that it might be identical with the latter species.

As to the relationship of *Hec. terminale* with other species, LEVRING<sup>2)</sup> considered *Hec. maculans* which has here and there distromatic parts in the basal disk and often lateral plurilocular sporangia on the erect filament, as a synonym of *Hec. terminale*, because the development of the basal disk is influenced by the environmental condition of the host. Moreover *Ect. reptans* KJELLMAN (1890) (not CROUAN, 1867), *Phycocelis reptans* KJELLMAN (1890), *Hec. reptans* (KJELLM.) KYLIN (1907), *Hec. Kjellmani* NORDSTEDT (1912), *Ect. repens* REINKE (1889), of which the last four species have names employed from the first, and *Myrionema majus* FOSLIE (1894), were treated as synonyms of *Hec. terminale*. On the other hand, KYLIN<sup>3)</sup> enumerated only *Hec. maculans* besides *Ect. terminalis* as the synonym of *Hec. terminale*. And *Ect. reptans* KJELLM., *Phycocelis reptans*

1) Bemerkungen über die Entwicklungsgeschichte der Phaeophyceen, 1937, p. 8.

2) Zur Kenntnis der Algenflora der norwegischen Westküste, 1937, p. 45. Studien über die Algenvegetation von Blekinge, 1940, p. 36.

3) Die Phaeophyceen der schwedischen Westküste, 1947, p. 15.

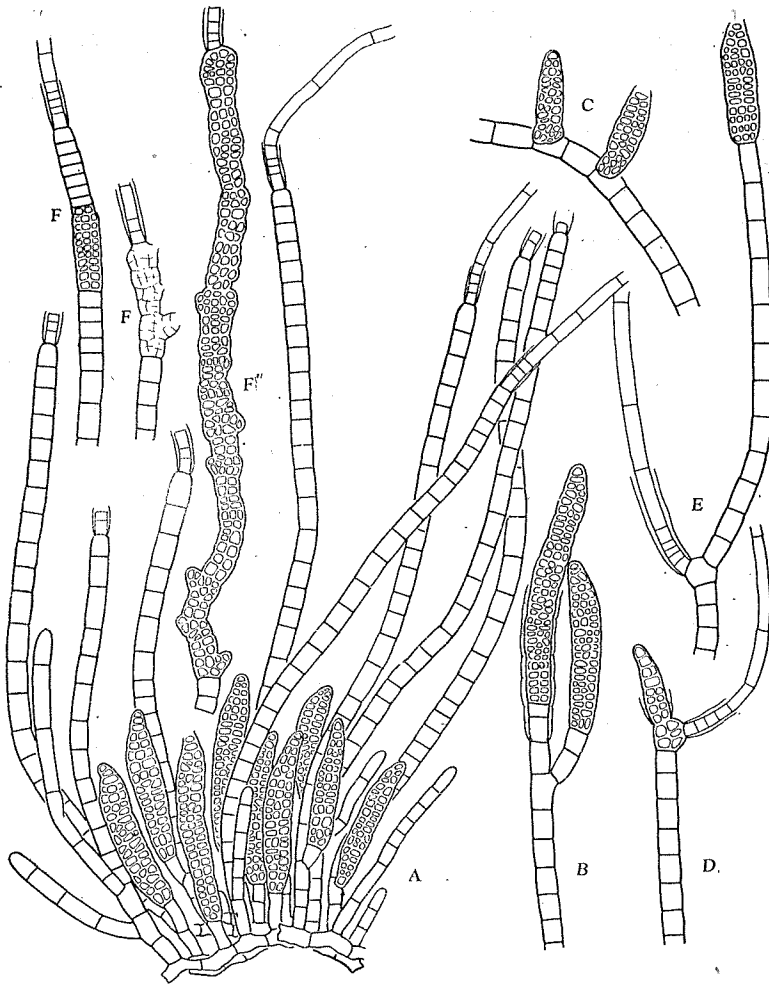


Fig. 4. *Hecatonema terminale* (KÜTZ.) KYLIN.

A. densely crowded part of the frond issuing pluril. sporangia and filaments from near the base of erect filaments; B, C. abnormal lateral pluril. sporangia on the upper part of erect filament and long stalk of pluril. sporangia; D, E. pseudolateral hairs; F-F'', intercalary pluril. sporangia on erect filaments. About  $\times 300$ .



KJELLM. and *Hec. reptans* (KJELLM.) KYLIN, which were treated by LEVRING as synonyms of *Hec. terminale*, were considered as the synonyms of *Hec. reptans* (RKE.) SAUV. (1898) (*Ascocyclus reptans* REINKE, 1889). Moreover HAMEL<sup>1)</sup> mentioned only *Ect. terminalis* as a synonym of *Hec. terminale*. Thus the relationship of *Hec. terminale* with other related species is a perplexing matter. The present writer, for the time being follows KYLIN (1937) and HAMEL (1939) who quoted only *Ect. terminalis* as a synonym of *Hec. terminale*.

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1) Phaeophyc. France, V, 1939, p. XXVIII.