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Notes on Some Japanese Algae VI.

By

YUKIO YAMADA

With plates XI–XVI.

Ulva fasciata DELILE

"Fl. Egypte (1813), p. 155, pl. 58, fig. 5"; J. AGARDH, Till Alg. Syst. vol. 6 (1883), p. 174; DE TONI, Syll. Alg. vol. 1 (1889), p. 144; VICKERS, Phyc. Barbad. (1908), pl. 2; COLLINS, Green alg. N. Amer. (1909), p. 216; BOERGESEN, Mar. alg. Dan. West-Ind. vol. 1 (1913), p. 8.

Japanese name. *Ribon-awosa.*

Hab. Garanbi and Dairi, Formosa; Ogasawara-jima.

The specimens from Dairi are exceedingly large, some of them attaining 145 cm. in height.

Chondria ryukyuensis YAMADA sp. nov.

Pl. XI.

Frons usque ad 15 cm alta, basi teretiuscula et saepe laxe irregulariterque implicata, sursum mox complanata, repetite denseque ramosa; ramis alternato-pinnatis, distichis, 2–2.5 mm latis (nonnunquam usque ad 4–5 mm latis) apicem versus dilatatis, margine brevibus ramulis saepe stichidiiferis ornatis; stichidiis cylindraceis, longe clavatis, simplicibus vel irregulariter cymosis vel paniculatis. Cellulae pericentrales maximae. Tela corticalis comparate tenuis, e 3–4 stratis cellularum parvarum composita. Cellulae peripericae longitudinaliter nonnihil elongatae.

Japanese name. *Beni-yanaginori.*

Hab. Nawa, Ryûkyû.

Frond about 15 cm high, at the base nearly cylindrical and often loosely entangled in an irregular manner, becoming flattened upwards, branched repeatedly and densely in an alternato-pinnate manner, branches distichous, 2–2.5 mm broad (sometimes reaching 4–5 mm) usually widened near the top, provided on both margins with short ultimate ramuli often forming tetrasporic stichidia; stichidia cylindrical, lengthily clavate, simple or

irregularly cymosely or paniculately branched. Pericentral cells very large; cortical layer comparatively thin, composed of 3–4 layers of small cells; epidermal cells longitudinally somewhat elongated in the surface view.

The branches which are issued from the lower portion of the frond are usually longer than those from the upper, so that the plant generally makes a cymose outline. The pericentral cells, as mentioned above, are so large that with the naked eyes we can recognise numerous transverse lines on the frond, which gives us the impression looking at a specimen of some Amansiae.

Our specimens were found on a coral reef about 2 fathoms deep.

Cryptopleura membranacea sp. nov.

Pl. XII, 1.

Frons ca. 10 cm alta, praeter basin frondis tenuiter membranacea, repetite di- vel trichotome vel palmatim in breve intervalli divisa, enervosa; segmentis ca. 1 cm latis, infra ramificationem latioribus, margine minute undulatis, apice rotundatis, venis microscopicis instructis. Sori tetrasporangiorum ad prolificationes minores rotundates vel irregulares, ad margines frondes gerentes, producti.

Japanese name.

Hab. Hutae, Amakusa, Hizen Prov. (T. TANAKA).

Frond about 10 cm high, thinly membranous except near the base of the frond, repeatedly di- or trichotomously or somewhat palmately divided with short interval; segments about 1 cm broad, but much broader below the di- or trichotomy, at the margin minutely undulate, rounded at apices. Microscopical veinlets conspicuous, macroscopic ones absent. Tetrasporangial sori produced on small round or irregularly shaped proliferations occurring along both margins of the segments.

Of this species there are two dried specimens before us, of which one is provided with tetrasporangial sori, though they are very few in number.

Erythrotrichia carnea (DILLWIN) J. AGARDH

Till Alg. system. vol. 6 (1883), p. 15, pl. 1, figs. 8–10; Rosenvinge, Mar. alg. Denmark, vol. 1 (1909), p. 67.

Japanese name. *Hosinoito.*

Hab. Akkesi, Kusiro Prov.

The present species was found in June, growing on the frond of

Spongomorpha sp. The frond consists always of a single row of cells, and attaches to the host by means of the basal cell which gives off short ramified rhizines radiating in all directions on the surface of the host. The diameter of the frond varies between about 14 μ and 24 μ, decreasing slightly near the base of the frond. Each cell contains a clearly star-shaped chromatophore which contains a large pyrenoid. Monospore formation is usual in June.

Hymenena tenuis sp. nov.

Pl. XIII, 1.

Frons 3–4 cm alta, ad basin decumbens, sessilis vel breviter stipitata, radicibus minutis numerosis adfixa, dichotomo-pinnatim vel irregulariter lobata, margine leviter undulata, lobis ca. 1 cm latis tenuibus, microscopicis nervis conspicuis sed non macroscopicis ornatis. Sori tetrasporangiorum rotundatis vel irregularibus, plerumque prope marginem loborum, sed postea in superiorem partem frondis sparsis. Antheridia et cystocarpia ignota.

Japanese name.

Hab. Cape Nomo, Hizen Prov. (T. TANAKA).

Frond 3–4 cm high, attaching to the substratum by means of numerous small hapters issuing from the under surface of the frond near the base, decumbent, sessile or very shortly stipitate at the base, lobed upwards in a dichotomo-pinnate manner or irregularly; segments about 1 cm broad, with margins slightly undulate, thin, composed of a single layer of cells in most parts, without macroscopical nerves, microscopical ones conspicuous. Tetrasporangial sori round or of irregular outline, produced mostly near the margins of the segments, but spreading afterwards all over the upper portion of the frond. Both antheridia and cystocarps unknown.

As mentioned above, the tetrasporangial sori of the present species are found mostly near the margin of the segments; however they are not confined there but stretch toward the middle portion of the segments, thus occupying the upper part of the frond. According to Kylin,* the distinction of the genera *Acrosorium, Hymenena, Cryptopleura* and *Botryolossum* from each other is due mainly to the position of the tetrasporangial sori, but there are actually some specimens which seem to present transition forms between them.

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* KYLIN, H.: Studien über die Delesseriaceen.

Myriogramme yezoensis YAMADA et TOKIDA sp. nov.

Pl. XIII, 2 and XIV.

Frons ca. 20 cm alta et ultra (raro 30 cm), ad basin rhizoideis tenuibus adfixa, inferiore parte caulifera, sursum latior et ad marginem ramis proliferis ornata. Rami proliferi plerumque longe obovati, basi evidentissime constricti, sed saepe irregulares et repetite proliferi. Frons in parte minima natu uno cellularum strato, deorsum pluribus stratis composita. Tetrasporangia soros irregulares formantia, per superiorem partem frondis densissime sparsa. Cystocarpia orbiculata, plerumque ca. 2 mm diam. (interdum 3 mm), leviter elevata, per frondem sparsa.

Japanese name. *Atuba-sujiginu.*

Hab. Karafuto: Higasi-siretoro (Y. SAITÔ); Kaihyôtô (R. KUBO). Hokkaidô: Syoya, Hidaka Prov. (NOZAWA); Horoizumi, Hidaka Prov. (Y. YAMADA); Muroran, Iburi Prov. (Y. YAMADA, T. KANDA); Okusiritô, Osima Prov. (M. SAKUMA); Abasiri, Kitami Prov.

Frond about 20 cm high or rarely reaching 30 cm, fastened to the substratum by means of thin rhizoids, near the base stem-like in old specimens, broadening upwards like a wedge, and sending off several proliferous branches from the margin. Proliferous branches usually lengthily obovate, very clearly constricted at the base, but often becoming irregular in outline and giving off smaller proliferous branchlets repeatedly. Anatomically, the frond consisted of a single layer of cells in the upper parts of young branchlets, becoming many-layered downwards. Tetrasporangial sori scattered all over the surface of the upper lobes, forming irregular patches. Cystocarps circular in outline, usually 2 mm or sometimes 3 mm in diam., slightly elevated on both surfaces, scattered all over the surface except on the lower parts of the fronds.

The stem-like portion near the base of the frond appears at first as an inconspicuous nerve-like thickened line, and afterwards becomes stem-like by wearing away of the thinner parts.

Whether the present plant should be referred to *Myriogramme* or to *Nitophyllum* we are not quite certain, but we describe it as a *Myriogramme* since the carpospores are produced in a chain and not singly.

Rhodopeltis(?) gracilis YAMADA et TANAKA sp. nov.

Pl. XV, 2 and Text-fig. 1.

Frons 5–10 cm alta, glabra disci parvo adfixa, densissime dichitoma

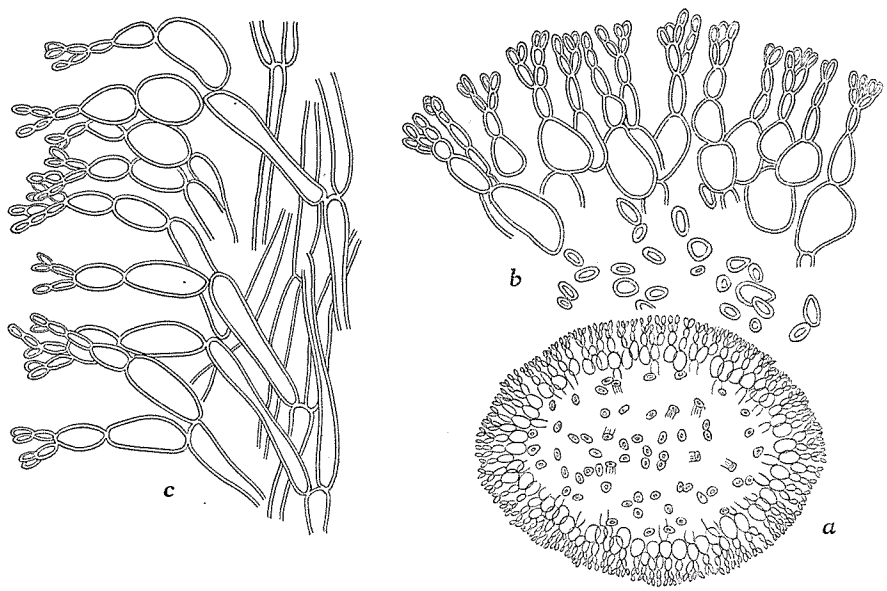


Fig. 1. *Rhodopeltis*(?) *gracilis* YAMADA et TANAKA
a. Cross-section of the frond. ×70.
b. A part of fig. a. ×260.
c. Longitudinal section of the frond. ×260.
All delineated after decalcification.

vel raro trichotoma, hic illic articulata; segmentis 1–2 cm longis et ultra, teretibus vel leviter compressis, ca. 500–700 μ crassis, in sicco compressis canaliculatisque. Medula vix incrustata, filis 7–15 μ crassis longitudinaliter percursa. Tela peripherica e 4–5 stratis cellularum constructa, multo calco incrustata.

Japanese name. *Hosoba-garagaramodoki.*

Hab. Kôtôsyo, Formosa (S. SASAKI); Titi-jima, Ogasawara-jima (S. SEGAWA).

Frond 5–10 cm high, glabrous, attached to the substratum by means of a small disc, densely branched in a dichotomous, rarely trichotomous manner, articulated here and there; segments of rather variable length, 1–2 cm long or more, cylindrical or slightly compressed, about 500–700 μ thick but in dried specimens flattened and canaliculate. Medulla not encrusted with lime, composed of filaments; medullary filaments 7–15 μ thick, running longitudinally. Outer part strongly encrusted with lime, consisting of 4–5 layers of cells; cells of the innermost layer large; about 30 μ broad, 40 μ high, but mixed with smaller ones; those of the next layer

pyriform, about 18 μ broad, about 21 μ wide; cells of other layers lengthily elliptical, containing chromatophore, 10–15 μ high, 6–8 μ broad.

Some years ago Mr. S. SASAKI sent me a dried specimen of the present species from Formosa, which he had collected in Kôtôsyo Island, Formosa. It is extreemly fragile and therefore it was nearly impossible to obtain any good sections for studying anatomical characters. From the habit only, therefore, I have referred it provisionally to *Galaxaura*. But when afterwards Mr. S. SEGAWA made a collection in Ogasawara-jima (Bonin Islands) he found some specimens, which he handed to me. On looking at them I noticed their identity with the Kôtôsyo specimen mentioned above. Very fortunately some of Ogasawara specimens were preserved in formalin, so that the anotomical structure was satisfactorily elucidated.

The characteristics thus obtained bear some resemblance to those of *Eugalaxaura*, a section of *Galaxaura*, though, on the other hand, the resemblance to *Rhodopeltis* much stronger. I have not seen nemathecia in any specimens.

Rhodopeltis(?) **liagoroides** YAMADA sp. nov.

Pl. XVI and Text-fig. 2.

Frons ca. 7–13 cm alta, disci parvo adfixa, interdum transversim rugulosa, basi cylindracea sursum compressa, repetite dichotome ramosa, superne ramosissima, basi ca. 1 mm crassa, in partibus superioribus dilatata, in sicco canaliculata, 1.5 mm lata, plerumque supra ramificationem articulata. Tela exteriora e 4–6 stratis cellularum fere sphaericarum vel longe ellipseudearum, extrorsum sensim minorum composita, calce praeter cellulas peripherícas incrustata. Medula vix incrustata, filis ca. 6 μ crassis longitudinaliter percursa. Nemathecia ignota.

Japanese name. *Konahadamodoki.*

Hab. Nawa, Ryûkyû; Sato, Kosiki-jima, Satuma Prov. (T. MURAOKA).

Frond about 7–13 cm high, attached to the substratum by means of a small disc, sometimes weakly transversely rugose, near the base almost cylindrical, compressed upwards (strongly compressed in drying, becoming canaliculate), branched repeatedly in a dichotomous manner, very frequently in the upper portion, about 1 mm thick in the lower portion, about 1.5 mm in the upper compressed portion, rarely reaching about 2 mm at the dichotomy, articulated mostly above the dichotomy; anatomically consisting of two parts, exterior and interior; the exterior part consisting of 4–6 layers of cells, varying from nearly spherical to longly ellipsoid in

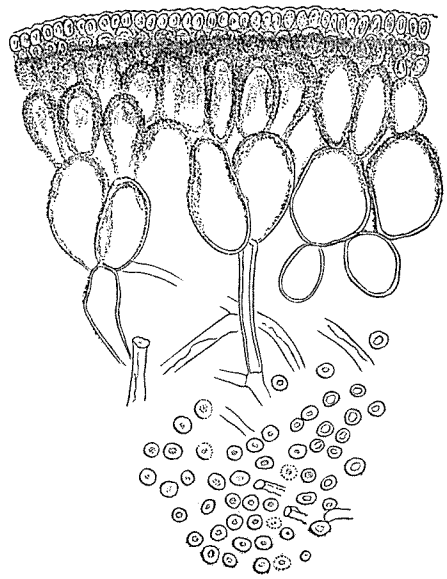


Fig. 2. *Rhodopeltis*(?) *liagoroides* YAMADA
Cross-section of the frond. ×165.

shape and becoming smaller outwards, encrusted with lime except the outermost layer; interior part not calcified, composed of medullary filaments running longitudinally; medullary filaments about 15 μ thick.

As the specific name shows, the new species bears a strong resemblance to some species of *Liagora* in habit. The characteristics in the structure of the frond show, however, that it very probably belongs to *Rhodopeltis*, though our specimens are all sterile.

Rhodopeltis Setchellii* YAMADA sp. nov.

Pl. XV, 1 and Text-fig. 3.

Frons 5–10 cm alta, disco parvo adfixa, articulata, calce incrustata, densissime dichotoma, interdum fasciculatim ramosa, lubrica, sanguinea; internodiis plerumque compressis, saepe complanatis, sed in partibus superioribus frondis cylindraceis, saepe transverse striatis, plerumque sursum brevioribus, inferioribus ca. 5–10 cm longis, ca. 2 mm latis, ca. 700 μ crassis, superioribus brevioribus, ad apicem ramulorum obtusiusculis. Medula

* The present species is respectfully dedicated to the late Mrs. W. A. SETCHELL who, with Prof. W. A. SETCHELL, was very kind to me during my sojourn in Berkeley, California, and especially helped me in studying *Rhodopeltis borealis* YAM.

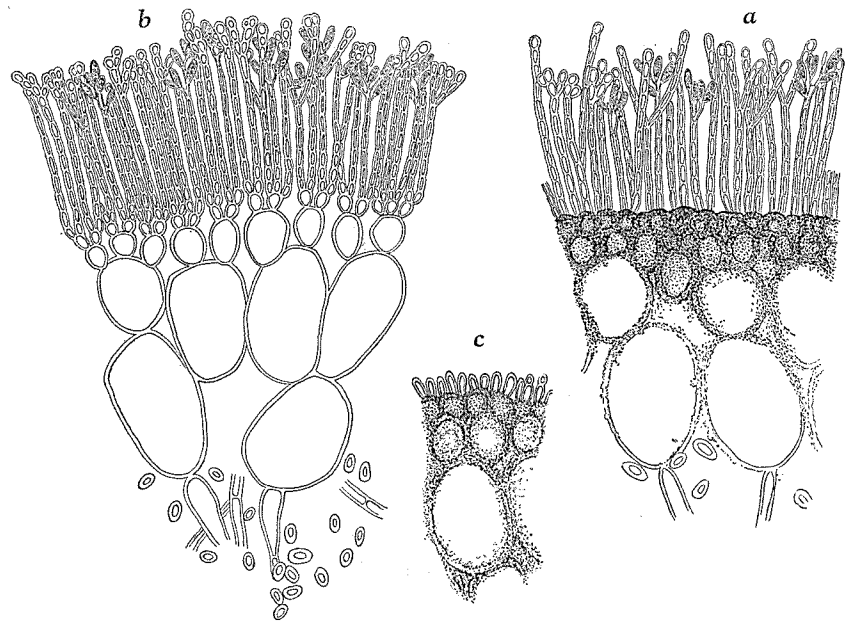


Fig. 3. *Rhodopeltis Setchellii* YAMADA
a, b. Cross-sections of a nemathecium, showing tetrasporangia and structure of the frond. b. after decalcification. ×200.
c. Cross-section of a sterile part of the frond. ×200.

calce vix incrustata, filis dense intricatis ca. 5–6 μ crassis percursa. Tela externa e 5–6 stratis cellularum composita, subparenchymatica, calce praeter cellulas peripherica incrustata; cellulis 1–2 stratorum interiorum ovalibus vel longe ellipsoideis, ca. 70–90 μ longis; cellulis strati peripherici ellipsoideis vel longe ellipsoideis, minimis, ca. 7–12 μ longis, a calce destitutis. Nemathecia tetrasporangifera rotunda vel ovata vel saepe nonnihil irregularia, a calce destituta, diam. ca. 1.5 cm attingentia, plerumque in partibus frondis mediis superioribusque sparsa; tetrasporangiis longe ellipticis vel clavatis, ca. 27 μ longis, ca. 6 μ crassis, zonatim divisis.

Japanese name. *Nanban-garagaramodoki.*

Hab. Kasyôto (Formosa).

Frond 5–10 cm. high, attached to the substratum by means of a small disc, articulate, encrusted with lime, very densely dichotomous with wide angles or sometimes fasciculately branched, lubricous, blood-red; internodes usually compressed, often complanate, but in the upper parts of the frond cylindraceous, often provided with transverse striations, usually shorter in the lower part of the frond than in the upper, lower ones about 5–10 cm

long, about 2 mm wide, nearly 700 μ thick, nearly obtuse at the end of branches. Medullary filaments entangled rather densely, about 5–6 μ thick, free from lime. Outer layer consisting of 5–6 layers of cells, nearly parenchymatic, encrusted with lime except 1–2 outermost layers of small assimilating cells; cells of 1–2 innermost layers oval or longly elliptical, about 70–90 μ long; those of 1–2 outermost layers elliptical, very small, about 7–12 μ long, containing chromatophores, free from lime. Tetrasporangial nemathecia mostly in the middle and upper parts of the frond, round or oval or often somewhat irregular in outline, reaching the diam. of 1.5 mm, somewhat elevated, free from lime, blackish in colour; filaments constructing nemathecia simple or sparingly ramified; tetrasporangia mostly on the sides of the upper parts of filaments, sessile, lengthily elliptical or clavate, about 27 μ long, about 6 μ thick, zonately divided, often produced successively in the old emptied sporangia.

The present species has been met with only once, namely, in the rather deep rock-pools in Kasyôto. In habit it reminds one of some species of *Amphiroa* on the one hand, and some species of *Galaxaura* on the other. The inner characteristics of the frond, and especially the nemathecia peculiar to the present genus, prove at once that it is a member of *Rhodopeltis*.

Solieria mollis (HARVEY) KYLIN

Pl. XII, 2.

Florideengattung Gigartinales (1932), p. 20.

Syn. *Rhabdonia mollis* HARVEY, Alg. Austr. Exsicc. no. 388, Phyc. Austr. Syn. no. 518; YENDÔ, Notes alg. new Japan, III. (Bot. Mag., Tokyo, vol. 29, 1915), p. 109.

Japanese name. *Hosoba-mirin.*

Hab. Maze, Etigo Prov. After Prof. YENDÔ, found also in the Provinces of Higo and Tikuzen in our territory.

Among the algal specimens sent me for determination from Prof. T. HIROHASHI of the Yamagata Higher School, there are some which agree fairly well with the description of the present species. They are most probably the same as the specimens called *Rhabdonia mollis* HARV. by Prof. YENDÔ. Very fortunately our specimen bears some cystocarps, and, having examined them, I found that they showed good agreement with the figures of a cystocarp of *S. Chordalis* J. AG. given by Prof. KYLIN.

PLATE XI

PLATE 11

Chondria ryukyuensis sp. nov. The type specimen. Slightly reduced.

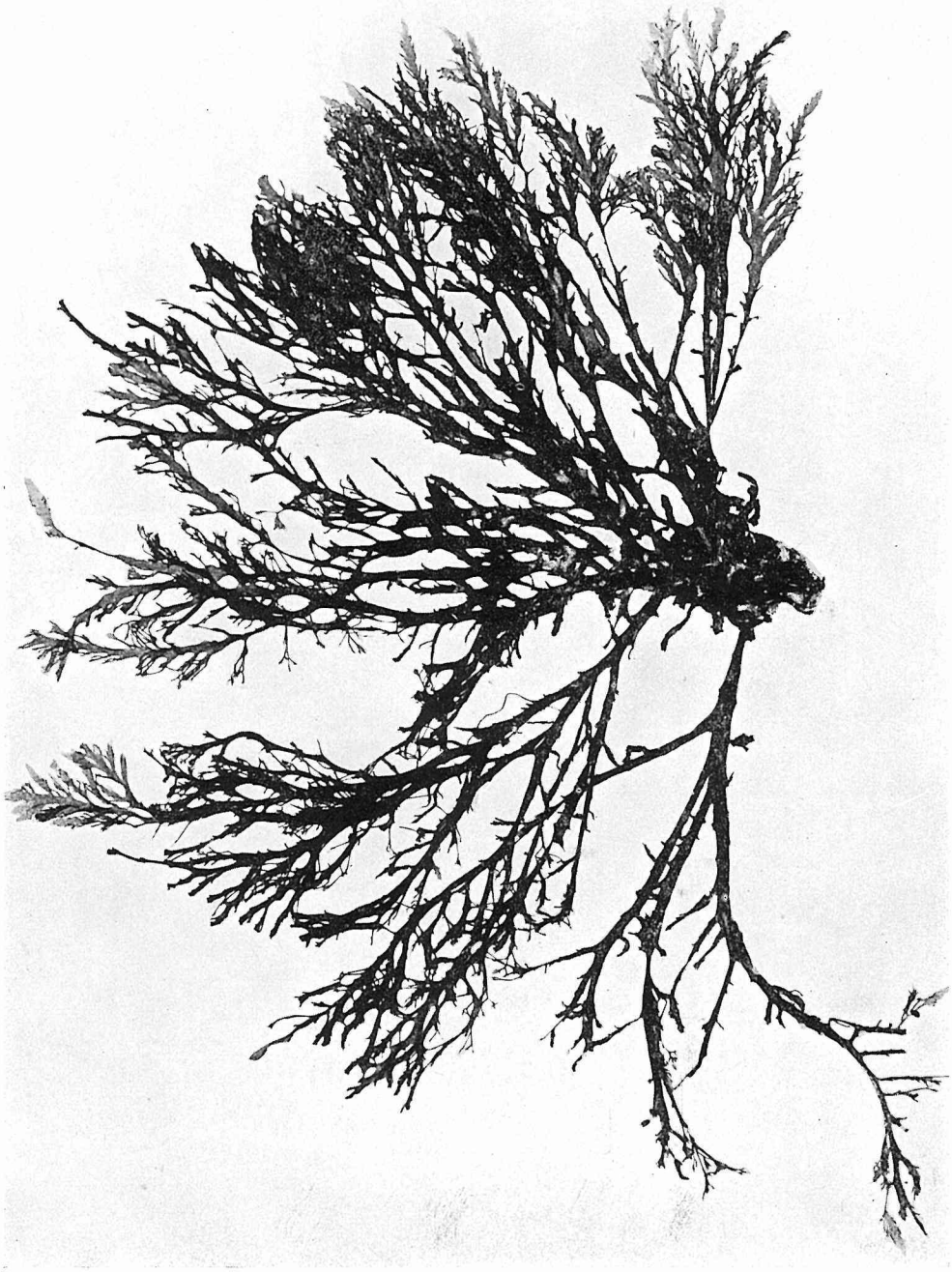
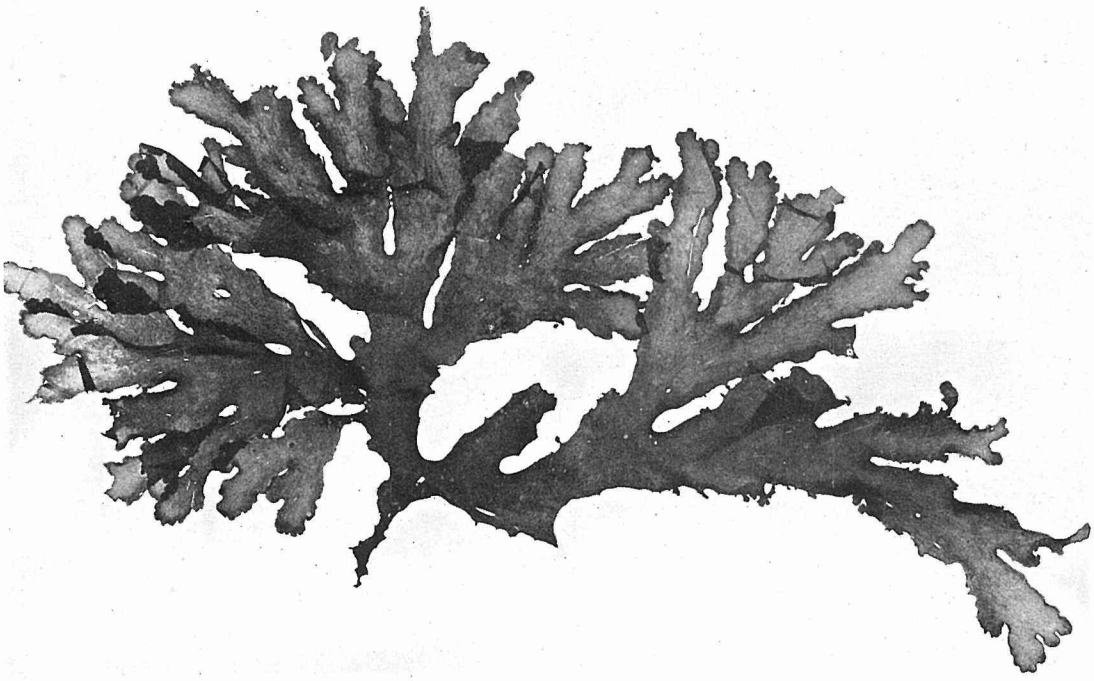


PLATE XII

PLATE 12

1. *Cryptopleura membranacea* sp. nov.
   The type specimen. × 4/5
2. *Solieria mollis* KYLIN. × 5/6



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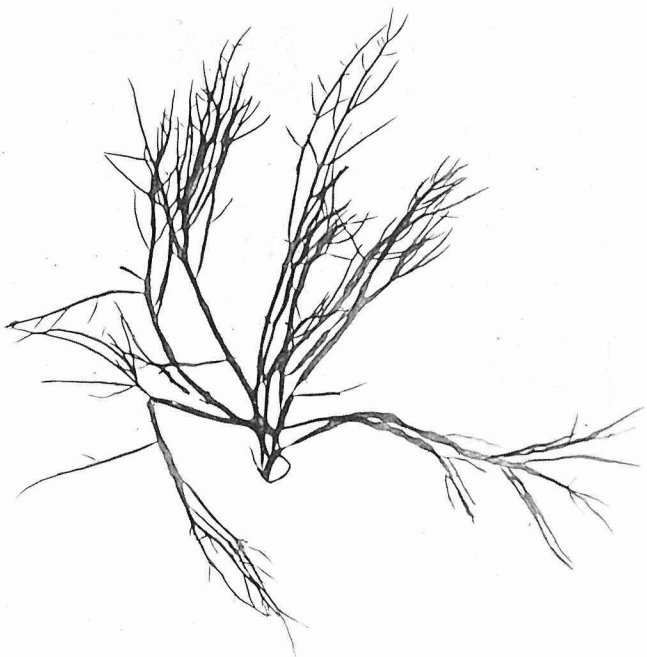

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PLATE XIII

PLATE 13

1. *Hymenena tenuis* sp. nov.
   Three original specimens. ×1

2. *Myriogramme yezoensis* YAMADA et TOKIDA sp. nov.
   A tetrasporic specimen from Tokotan near Akkesi, Kusiro Prov. ×ca. ½

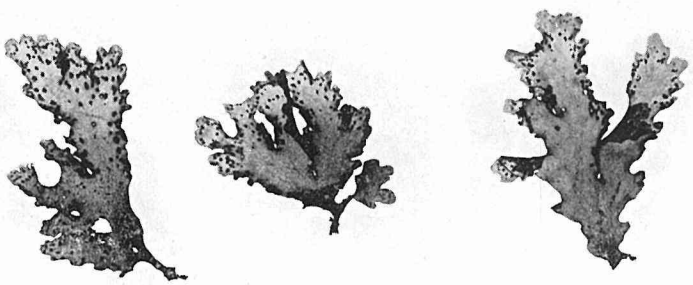

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PLATE XIV

PLATE 14

Myriogramme yezoensis YAMADA et TOKIDA sp. nov.
The type specimen. × ½

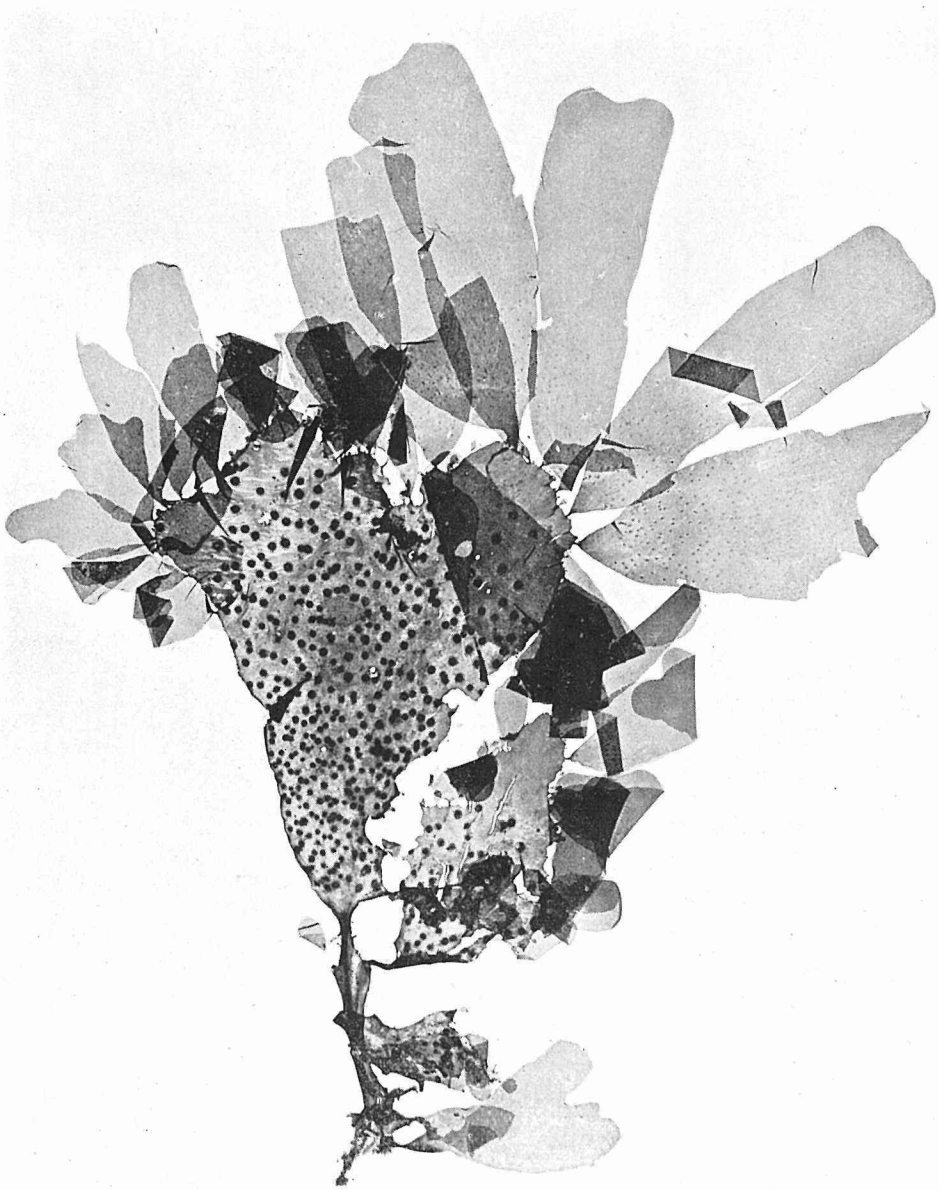
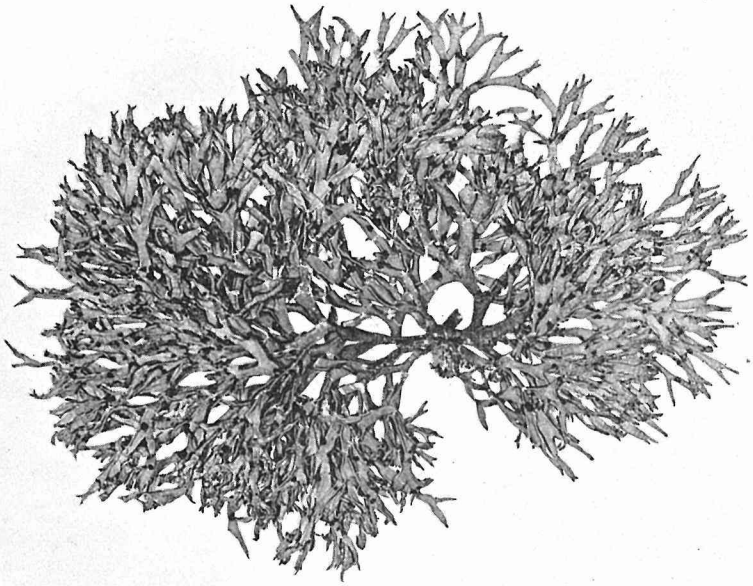


PLATE XV

PLATE 15

1. *Rhodopeltis Setchellii* sp. nov.
   The type specimen. ×1
2. *Rhodopeltis*(?) *graciiis* YAMADA et TANAKA sp. nov.
   The type specimen. ×1



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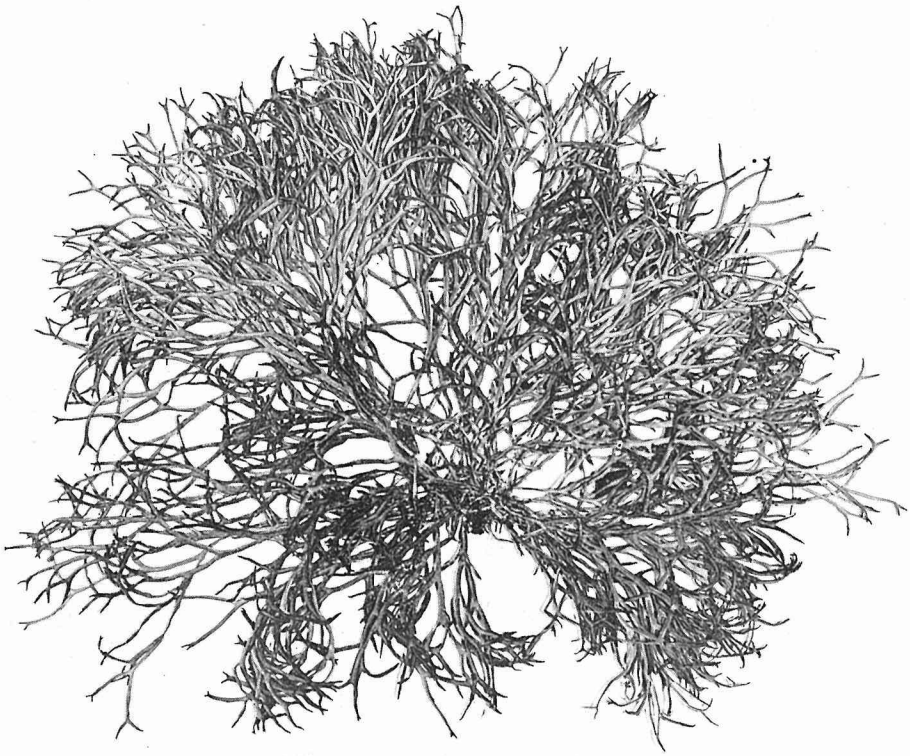

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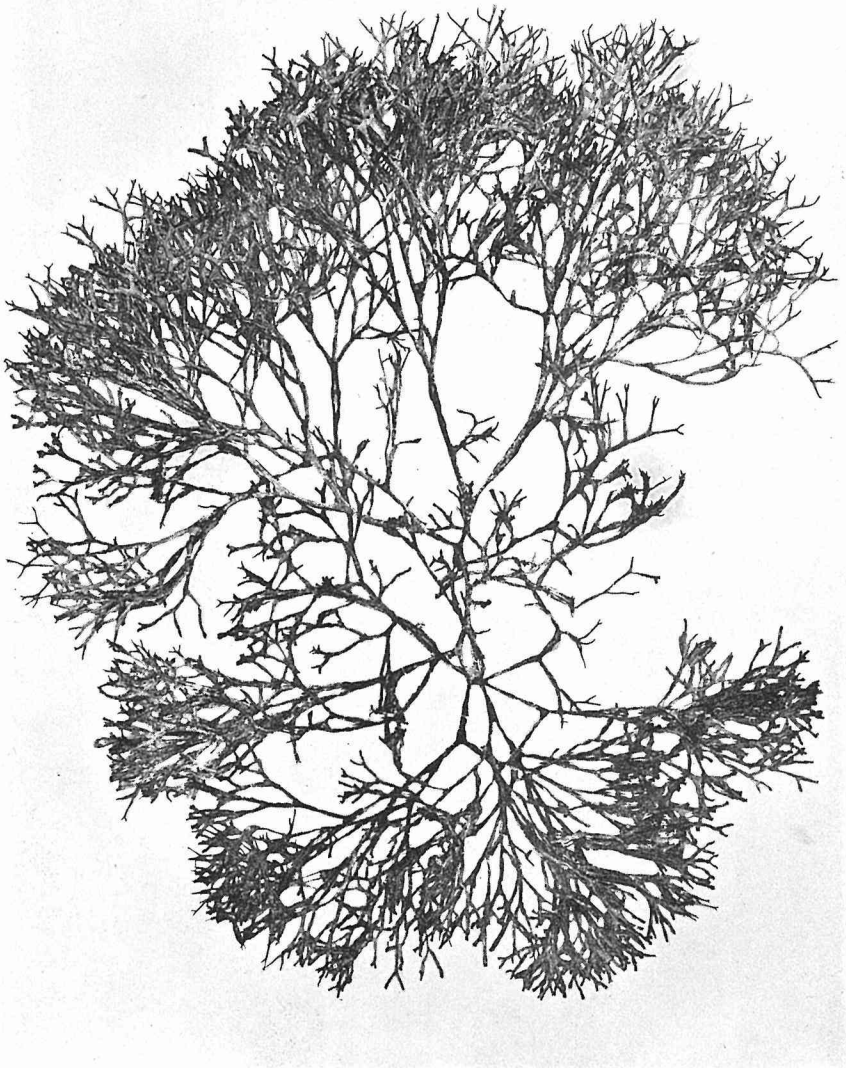
PLATE XVI

PLATE 16

Rhodopeltis(?) *liagoroides* sp. nov.
The type specimen. ×ca. ⅔