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Title	Notes on Some Japanese Algae IX
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Citation	北海道帝國大學理學部海藻研究所歐文報告, 2(2), 195-215
Issue Date	1941-02
Doc URL	https://hdl.handle.net/2115/48066
Type	departmental bulletin paper
File Information	2(2)_195-215.pdf

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Notes on Some Japanese Algae IX.

By

YUKIO YAMADA

With Plates XL–XLVIII.

Chaetomorpha pachynema MONTAGNE

Text-fig. 1.

in KUETZING's Spec. Alg. (1849) p. 379; BOERGESEN, Mar. alg. Canary Isl. I (1925) p. 41.

Japanese name: *Bō-zyuzumo.*

Loc.: Cape Bō, Satuma Prov.

The plant is almost always arcuated and grows caespitosely, forming rather large patches. They are fastened to the substratum by means of branched rhizoids which are described and figured by BOERGESEN in detail (l. c. Text-figs. 11–12). Small buds are found also in the material at hand. The basal cell of the filament is always much longer than in the above ones, usually attaining about 1 mm. The diameter of the filaments is about 500μ. The cell wall is extremely thick, it not rarely reaching 100μ, and it is conspicuously stratified. The cells are usually not contracted, but some times there are light contractions at the dissepiments.

This plant grows above high water mark, on the nearly perpendicular wall, together with *Bostrichia tenella* etc.

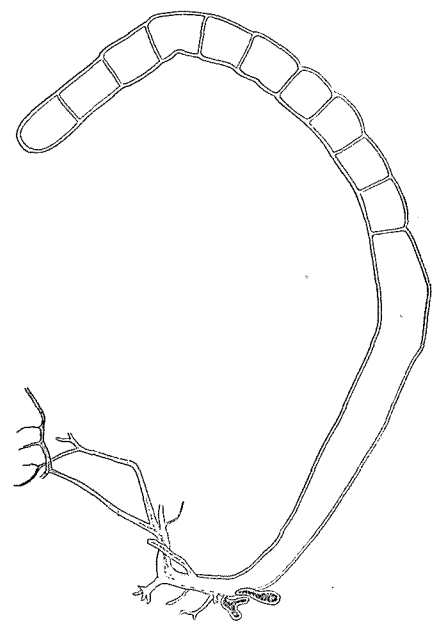


Fig. 1. *Chaetomorpha pachynema* MONT. ×10.

Sphacelaria furcigera KUETZING var. **tenuis** YAMADA var. nov.

Text-figs. 2–3.

Filamenta erecta brevia, ca. 1–1.5 mm alta, tenuia, simplicia vel raro ramosa.

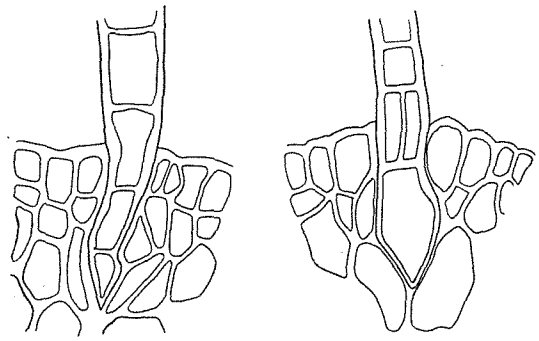


Fig. 2. *Sphacelaria furcigera* KG. var. *tenuis* YAMADA. Two bases of the frond. ×400.

Japanese name: *Koba-no-waizigata-kurogasira.*

Loc.: Kelung, Formosa (T. TANAKA).

Erect filaments short, about 1–1.5 mm. high, slender, about 10–25μ in diam., simple or rarely branched.

S. furcigera KG. seems to be an extremely variable species in the thickness of the erect filaments; according to SAUVAGEAU it fluctu-

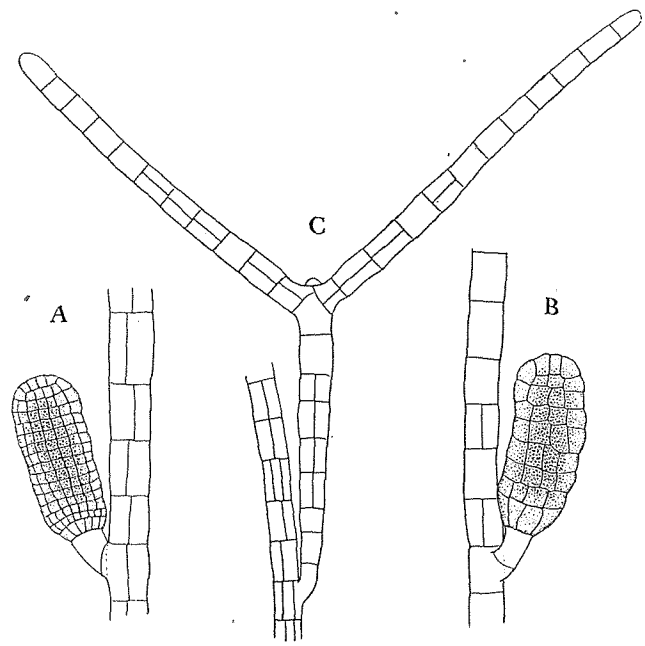


Fig. 3. *Sphacelaria furcigera* KG. var. *tenuis* YAMADA. A. B. Plurilocular sporangia. ×440. C. Propagulum. ×175.

ates between about 16μ and 50μ. In Kelung specimens, however, it fluctuates between about 10μ and 25μ as diagnosed above. The filaments bearing plurilocular sporangia are usually slenderer than those with propagula.

The present variety grows on the stem of a *Sargassum* as an endophyte, inserting the basal part into the outer tissue of the host. But sometimes the rhizoidal filaments are produced from the basal part of the erect filaments, spreading over the surface of the host. It is also noticeable that the erect filaments are usually simple, being ramified rarely. Hairs usually occur. They also are slenderer than those in the type species. The propagula, the plurilocular sporangia with large cells, and those with small cells are found in different individuals, but uniloclar sporangia are unknown.

Callophyllis hayamensis YAMADA spec. nov.

Plate XL, and Text-fig. 4.

Frons erecta, circumscriptione flabellata, ca. 2–7 cm. alta, stipitata; stipitibus fere cylindraceis, 3–10 mm. longis, in segmenta membranacea subito dilatatis; segmentis bis-quater regulariter dichotome vel trichotome vel palmatim divisis, linearibus, plerumque ca. 5 mm. latis margine minutissime crenulatis vel denticulatis vel obsoletis, apice obtusis. Segmenta ca. 240μ crassa; cortici ex 2–3 stratis cellularum parvarum, medulla ex 1–2 stratis cellularum magnarum composito, rhizoideis mutabilibus. Tetrasporangia per totam superficiem segmentorum sparsa; cystocarpia in partibus superioribus segmentorum disseminata, 1–3 cornibus armata.

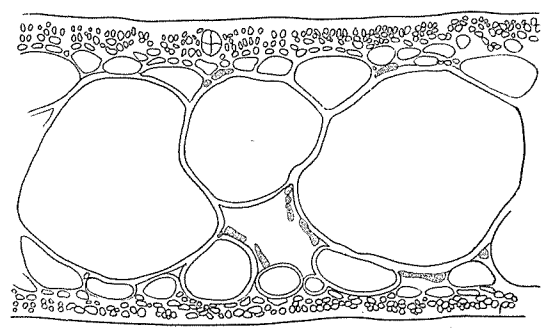


Fig. 4. *Callophyllis hayamensis* YAMADA. Transverse section of a tetrasporic specimen. ×165.

Japanese name: *Etuki-no-tosakamodoki.*

Loc.: Hayama, Sagami Prov. (Herb. Biol. Labor., Imp. Palace, Tokyo).

Frond erect, flabellate in outline, about 2–7 cm high, stipitate; stipe nearly cylindrical, 3–10 mm long, abruptly broadened upwards into membranaceous leaf-like parts; leafy parts 2–4 times rather regularly di-trichotomous or rarely palmate with narrow angle; segments linear,

usually about 5 mm. broad, at margin very minutely crenulate or denticulate or obsolate, at apices obtuse.

Segments about 240μ thick; cortex composed of 2–3 layers of small coloured cells; medulla of 1–2 large cells; rhizoidal filaments variable in amount. Tetrasporangia scattered all over the surface of the segments; cystocarps produced on the surface of the upper parts of segments scatteredly, provided with 1–3 horn-like protuberances. Colour scarlet, in drying not adhering to the paper.

The present species seems to show a strong resemblance to *C. angustifolia* J. AG. which is described rather briefly and known only in the sterile state, in having a narrow stipitate frond the segments of which are crenulate at margin. In anatomical characteristics, however, the two species are different from each other. The cross section of a segment of *C. angustifolia* J. AG. is figured in J. AGARDH's Florid. Morphol. t. 14, fig. 6 which shows a thin cortical layer only one cell thick. As described above it is composed on 2–3 layers of cells in the present species.

In *C. hayamensis* the cystocarpic specimens seem to be rather rarely met with and the number of cystocarps which are produced on an individual is also small.

Callymenia oligonema YAMADA spec. nov.

Plate XLI, 2, and Text-fig. 5.

Frons ca. ad 4 cm. alta, ca. 6 cm. lata, tenuiter membranacea, breviter stipitata vel fere sessilis; stipitis breve, plerumque 2–5 mm. longo, fere cylindraceo, ad apicem in partem membranaceum subito cordatim dilatato;

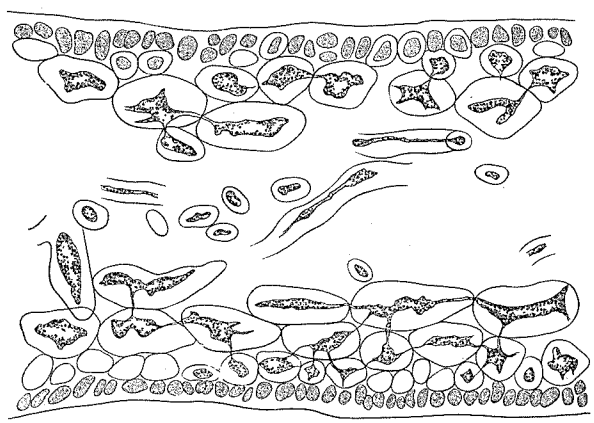


Fig. 5. *Callymenia oligonema* YAMADA. Transverse section of the frond. ×400.

partis membranaceis circumscriptione irregulariter flabelliformibus, margine profunde vel tenuiter lobatis, irregularibus, leviter undulatis, ca. 125μ crassis; corticibus ex 3–4 stratis cellularum minorum, intus magnarum compositis; filamentis medullarum paucis, ca. 9μ crassis; tetrasporangiis per totam superficiem frondis disseminatis, cruciatim divisis; cystocarpiis plerumque in partibus superioribus frondis productis, leviter elevatis, diam. vix 1 mm. attingentibus.

Japanese name: *Hime-tukasanori.*

Loc.: Hayama, Sagami Prov. (Biol. Labor., Imp. Palace, Tokyo).

Frond about 4 cm. high, about 6 cm. in breadth, thinly membranous, nearly cylindrical, at the upper end expanding abruptly into a membranous leaf-like part in a cordate manner; leaf-like part irregularly fan-shaped in outline, at margin often deeply or shallowly lobed in an irregular manner, slightly undulate, about 125μ thick; cortical layer composed of 3–4 rows of cells, the outermost ones coloured and small, becoming larger inward; medullary filaments few in amount, about 9μ thick. Tetrasporangia distributed all over the surface of the leaf-like part, crusiately divided. Cystocarps produced mainly in the upper parts of the frond ,slightly elevated, their diameter scarcely reaching 1 mm.

In colour and habit the present species resembles in some degree *C. sagamiana* YAM. from the same locality as this species. Yet the presence of the stipe, absence of spine-like protuberances at the margin, and thinness of the frond together with scantiness of the medullary filaments separate the new species from *C. sagamiana* YAM.

Cryptonemia Yendoi WEBER VAN BOSSE

Plate XLII, 1, and Text-fig. 6.

Liste alg. Siboga, vol. 2 (1921) p. 249.

Japanese name: *Usuba-no-kakureito.*

Loc.: Hayama, Sagami Prov. (Herb. Biol. Labor., Imp. Palace, Tokyo).

Frond leaf-like, with a very thin short stipe, about 8 cm. in height, simple or lobed; lobes about 2–2.5 cm. wide, broadly lanceolate, at margin slightly undulate, entire or irregularly laciniate, very thin, about 28–45μ thick; internally composed of one or two layers of cells of nearly the same size outside and medullary filaments inside. Cystocarps scattered irregularly all over the surface except in the upper parts and near the base of the frond. Antheridia and tetrasporangia unknown. Colour rosy red. Plant adhering to paper well in drying except near the base.

There are available only two dried specimens and a few others pre-

served in formalin solution. In general they accord rather well with the description and figure of *C. Yendoi* given by Me. WEBER VAN BOSSE. But there are some small discrepancies between the specimens of the two origins,

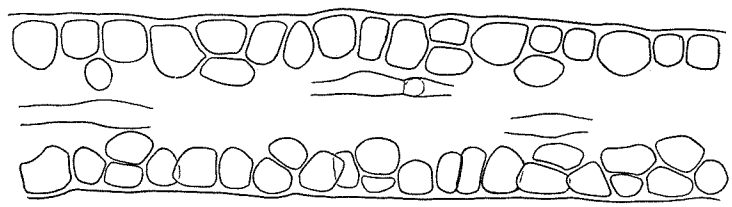


Fig. 6. *Cryptonemia Yendoi* WEBER VAN BOSSE.
Transverse section of the frond. ×530.

the frond being about 28–45μ in thickness in the Hayama specimens, while Me. WEBER VAN BOSSE measured it as about 20μ in her specimens. The cortical layer of the former specimens consists mostly of one row of cells in cross section, but often two layers of cells are found there. When seen from the surface of the frond the cells appear angulate in the Hayama specimens as in the original ones.

Cryptopleura hayamensis YAMADA spec. nov.

Plate XLIII, 2.

Frons prope basim repens?, sursum ascendens, ca. 6 cm. alta, anguste fasciata, ecostata, irregulariter di- vel trichotome divisa vel saepe prolifera; segmentis ca. 1 mm. latis, basim versus attenuatis, infra ramificationem dilatatis; stichidiis ad marginem segmentorum inferiorum productis, parvis, clavatis vel irregularibus, interdum divisis.

Japanese name: *Hosoba-no-kakuresuzi.*

Loc.: Hayama, Sagami Prov. (Biol. Labor., Imp. Palace, Tokyo).

Frond creeping? on the substratum in its lower portion, ascending in the upper portion, about 6 cm. high, narrowly band-like, irregularly di- or trichotomously divided or often proliferous; segments about 1 mm. broad, usually tapering toward their base, below the ramification becoming broader, measuring about 4 mm. in breadth; stichidia produced on the margin of the lower segments, small, clavate or becoming very irregular, sometimes divided. Frond without macroscopic vein, provided with many small rhizoidal processes, even in the upper portion of the segments.

Fauchea stipitata YAMADA et SEGAWA spec. nov.

Plate XLIV.

Frons erecta, ca. 6–7 cm. alta, caespitosa?, circumscriptione flabellata,

membranacea, evidenter stipitata; stipitibus teretibus, simplicibus vel divisis ca. 2 cm. longis, 1–2 mm. crassis, in partes membranaceas, di-polychotome divisas dilatatis; segmentis linearibus vel late linearibus, 3–5–8 mm. latis, margine minute dentatis; cystocarpiis ad marginem segmentorum productis, evidenter stipitatis, fere globulosis, inermibus.

Japanese name: *Etuki-madara.*

Loc.: Naze, Amami-Ōsima (Herb. K. OKAMURA); Hatizyō-zima, Izu Prov. (S. SEGAWA).

Frond erect, about 6–7 cm. high, caespitose?, flabellate in outline, membranaceous, provided with a stipe; stipes cylindrical, about 2 cm. long, 1–2 mm. thick, simple or branched, at their top spreading into membranaceous parts which are divided di-polychotomously; segments linear or broadly linear, about 3–5–8 mm. wide, minutely dentate at margin. Cystocarps produced on the margins of the segments, evidently stalked, nearly spherical in shape, smooth.

There is one specimen in the herbarium of the late Dr. K. OKAMURA which was left to the writer to determine. Afterwards Mr. S. SEGAWA found some other specimens in the locality mentioned above. In the first mentioned specimen two individuals stand on a common small disc-shaped base. The larger one is 6.5 cm. high, and the lower part, about 2.5 cm. from the very base, is slender and ramifies once dichotomously. From the end of this stipe the thin membranaceous leafy parts come out which are linear in outline and provided with minute spines on both margins. These segments divide dichotomously or nearly palmately. Both individuals bear cystocarps on the margins of the segments which are nearly spherical in shape and evidently stalked. The majority of these cystocarps are too ripe, so that it is rather difficult to determine their exact characteristics. But in some cystocarps some net-works are to be seen filling their cavity that is an important feature of the present genus.

Another specimen collected in the Island of Hatizyō by S. SEGAWA has broader segments as may be seen from the accompanying photograph, and the cystocarps are in better condition for study than is OKAMURA's specimen.

In comparison with the species of *Fauchea* previously described the new species seems to be quite peculiar, especially in habit, in having minute spines on the margins of the segments, and in stalked cystocarps.

Gelidium Kintaroi (OKAM.) YAMADA nom. nov.

Syn. *Gelidium clavatum* OKAMURA (non LAMOUROUX) On Pterocl. and

Gelid. of Japan (Jour. Imp. Fish. Inst. vol. 29, 1934) p. 61, pls. 28 and 32, figs. 4–6.

Japanese name: *Syakugatabuto.*

The binomial, *G. clavatum* has been already used by LAMOUROUX in Essai (1814) p. 41 basing on *Fucus clavatus* LAMX. Therefore the present alga must have a new name.

Gloioderma iyoensis OKAMURA

Text-fig. 7.

Icon. Japan. alg. vol. 7 (1934) p. 27, pl. 315, figs. 11–16; SEGAWA, Mar. alg. Susaki III (1938) p. 147.

Japanese name: *Hime-hisibukuro.*

Loc.: Hayama, Sagami Prov. (Herb. Biol. Labor., Imp. Palace, Tokyo).

When OKAMURA described the present species he, most probably, could examine only a few dried specimens which were collected by S. YAGI, and sent to him. That is why he did not mention the fact that the present species grows also on other algae, and its branches often adhere to each other, and also to other algae as pointed out afterwards by S. SEGAWA (l.c.). In addition, the writer found some lenticular thickenings in the walls of the medullary cells. In the Hayama specimens tetrasporangia are abundantly found, but cystocarps which are rather few in number are still very young.

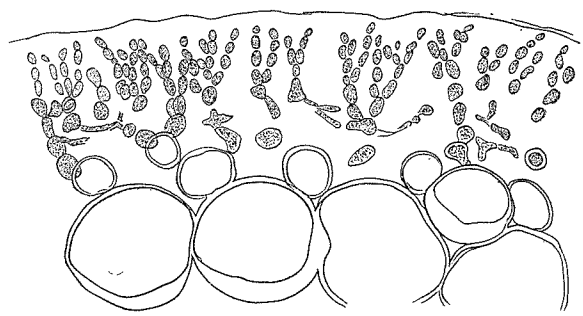


Fig. 7. *Gloioderma iyoensis* OKAMURA. Transverse section of the frond. ×250.

Gracilaria coronopifolia J. AGARDH

Plate XLV, and Text-fig. 8.

Spec. Alg. vol. 2 (1852) p. 592; Id. Epicr. (1876) p. 414.

Japanese name: *Mosa-ogonori.*

Loc.: Taitō, Garanbi, Daibanratu and Kaikō, Formosa.

Frond forming a loose entangling mass, cylindrical, cartilagenous, about 1–2 mm. thick, dichotomously branched with wide angle; branches sometimes secund, occurring more often in the upper part of the frond,

thus becoming corymbose; branchlets found mostly near the top of branches, very short, spine-like; medulla composed of large cells becoming smaller gradually outward; cortical layer thin, consisting of 1–3 layers of small coloured cells. Any kind of the reproductive organ not found.

In addition to those in Formosa the writer has met with this alga in the Marianna Islands e.g. in the Islands of Ponape. It is quite natural from the geographical point of view, the type locality of the present species being the Sandwich Islands.

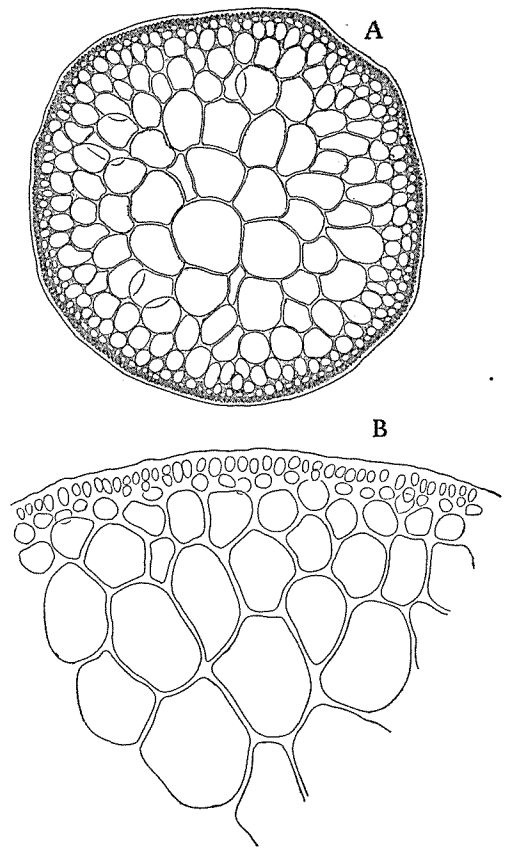


Fig. 8. *Gracilaria coronopifolia* J. Ag. Transverse sections of the frond. A. ×60. B. ×350.

Gracilaria punctata

(Okamura) Yamada comb. nov.

Syn. *Rhodymenia punctata* Okamura, Icon. Japan. alg. vol. 6 (1929) p. 13, pl. 258; Id. Nippon Kaisō Si (1936) p. 676.

Japanese name: *Itutuginu.*

Loc.: Tosa Prov. (Herb. K. Okamura); Tairi and Garanbi, Formosa.

Frond about 5–10 cm. high, complanate, at the base provided with a short compressed or nearly terete stipe, divided dichotomously; segments about 1 cm. wide, at margins undulate or crisped, either entire or provided with small protuberances, obtuse or lacerated at apices, often variegate; medulla consisting of 1–3 layers of large cells inside and of some smaller cells outside, both containing rich contents; cortical layer thin, about 4–6μ thick. Cystocarps scattered on both surfaces, rather small; tetrasporangia scattered all over the surfaces, being produced among the cortical cells, about 40×22μ; antheridia unknown in Formosa specimens. Colour dark red or sometimes slightly yellowish; substance thickly membranaceous or

cartilaginous especially in age.

The present species seems to the writer to be related most closely to *Gracilaria crispata* SETCH. et GARD. from Lower California though he has not seen the type of this species. But the former species differs from the latter by its greater dimensions and especially in thinner cortical layer. The structure of the cystocarps of the present species represents a usual type of the genus, while in this point the American species seems to be peculiar as mentioned by SETCHELL and GARDNER.

In the old tetrasporiferous specimens at hand small whitish speckles often can be seen. In these parts usually no tetrasporangia are to be found.

In describing *Rhodymenia punctata* OKAMURA could not examine any cystocarpic specimen. In Formosa the writer collected quite a number of specimens of this alga including some female specimens. The examination of the structure of the cystocarps reveals their being a member of *Gracilaria*. In the herbarium of the late Dr. K. OKAMURA the writer compared his specimens with the type of *Rhodymenia punctata* OKAM. and came to the conclusion that his Formosa specimens are exactly the same as this OKAMURA's plant, which should be transferred from *Rhodymenia* to *Gracilaria*.

Gracilaria purpurascens J. AGARDH f. **spinulosa** (OKAMURA) YAMADA comb. nov.

Syn. *Rhodymenia spinulosa* OKAMURA, Icon. Japan. alg. vol. 7 (1934) p. 33, pl. 318, figs. 1–6; Id. Nippon Kaisō Si (1936) p. 676.

Japanese name: *Toge-itutuginu.*

Loc.: Tainan, Formosa (Herb. K. OKAMURA); Tairi and Garanbi, Formosa.

Rhodymenia spinulosa was first described by OKAMURA basing on the specimens collected in Tainan, Formosa by T. AOKI, which unfortunately were destitute of cystocarps. Among the Formosa specimens at hand there are some cystocarpic ones, the examination of which shows that the present species should be placed in *Gracilaria* instead of *Rhodymenia*.

On the other hand *Gracilaria purpurascens* J. AG. is commonly distributed in the regions of Ryū-kyū and Formosa, and it varies within a very wide range especially in breadth of the frond. In the writer's opinion the alga in question represents but a wide spinous form of this species, hence the new combination is proposed.

Grateloupia Okamurai YAMADA nom. nov.

Syn. *Grateloupia lancifolia* OKAMURA (non KUETZING) Cont. know. mar.

alg. Japan, III (Bot. Mag. Tokyo, vol. 13, 1899) p. 6; Id. Icon. Japan. alg. vol. 1 (1908) p. 167, pl. 34, figs. 9–14; Id. Nippon Kaisō Si (1936) p. 542.

Syn. *Grateloupia horrida* OKAMURA (non KUETZING), Cont. phycol. Jap. (Bot. Mag. Tokyo., Vol. 7, 1893) p. 1, pl. 5, figs. 1–2.

Syn. *Gigartina lancifolia* HARVEY, Char. new alg. (Proceed. Amer. Acad. Vol. 4, 1859) p. 331, No. 30.

Japanese name: *Kyō-no-himo.*

The present alga was described first by HARVEY as a species of *Gigartina.* Later OKAMURA established a new species on the same alga calling *Grateloupia horrida* OKAM., not knowing the identity of his alga with HARVEY's. He, however, noticed that fact still later and called the plant in question *Grateloupia lancifolia* (HARV.) OKAM. In naming it thus, in both cases, OKAMURA overlooked the fact that both binomials, *Grateloupia lancifolia* and *G. horrida,* had been used already by KUETZING in Tab. Phyc. Vol. 17, p. 10 and Spec. alg. p. 731 respectively. So here the writer proposes a new name, commemorating his teacher, the late Dr. KINTARŌ OKAMURA.

Grateloupia turuturu YAMADA spec. nov.

Plate XLVI.

Syn. *Halymenia turuturu* OKAMURA in Herb.

Frons mucosa, lineari-lanceolata, saepe circumscriptione irregularis, basi breviter stipitata, sursum cuneatim vel subito dilatata, vel parvis prolificationibus ornata, vel apice in plures lacinias divisa; plerumque 30–40 cm. alta, 5–10 cm. lata sed interdum ca. 60 cm. alta 16 cm. lata; tela corticali ex 5–6 (saepe mutabilis) stratis cellularum parvarum composita: filis medullaris ca. 5–6μ crassis. Tetrasporangia cruciatim divisa, per totam superficiem frondis dispersa; cystocarpia interdum in soros parvos inconspicuesque collecta.

Japanese name: *Turuturu.*

Loc.: Muroran, Otaru and Hakodate, Hokkaidō; Enosima and Hayama, Sagami Prov.; Amatura, Bōsyū Prov.

Frond mucous, linear-lanceolate, often becoming irregular in outline (sometimes divided into two or three lobes near the base), provided with a short stipe at the base, spreading upwards cuneately or more suddenly, at the margin almost always undulate, entire or irregularly laciniate or provided with small proliferations, or divided into several laciniae near the top; usually 30–40 cm. long, 5–10 cm. wide, but large ones attaining the height of 60 cm. and the width of 15 cm; cortical layer composed of

about 5–6 layers of small cells but often variable; medullary filaments about 5–6μ thick. Tetrasporangia scattered evenly all over the surface of the frond; cystocarps showing a tendency of gathering in small groups.

Along the Japanese coast the present species is found very commonly. It varies greatly in outer appearance as well as in the thickness of the cortical layer and also in arrangement of the cystocarps. Usually in the southern specimens the cortical layer is thicker and the cystocarps are arranged in more conspicuous sori than in the northern ones.

The present species seems to be related very closely to *Gr. Cutleriae* KG. from North America and *Gr. indica* BOERG. from the East Indies, the distinction from which is not very clear as is true of most cases in the distinction between the species of this genus. But the cystocarps often forming sori in the present species seems to help in distinguishing the Japanese alga from both species mentioned above.

Halarachnion parvum YAMADA spec. nov.

Text-fig. 9.

Frons parva, ca. 1 cm. alta, breviter stipitata, simplex vel irregulariter lobata, saepe leviter concava, perforata, circumscriptione irregularis, interdum ellipsoidea interdum longe obovata, 100–160μ crassa; cystocarpiis per totam superficiem frondis laxe disseminatis; tetrasporangiis zonatim divisis, ca. 25×15μ, densius distributis.

Japanese name: *Koba-no-susukakebeni.*

Loc.: Hayama, Prov. Sagami (Herb. Biol. Labor., Imp. Palace, Tokyo).

Frond small, about 1 cm. high, shortly stipitate, simple or irregularly lobed, often shallowly concave, perforated, or irregular outline, sometimes elliptical sometimes lengthy obovate, 100–160μ thick; cystocarps scattered loosely all over the surface of the frond; tetrasporangia zonately divided, about 25×17μ, scattered rather densely.

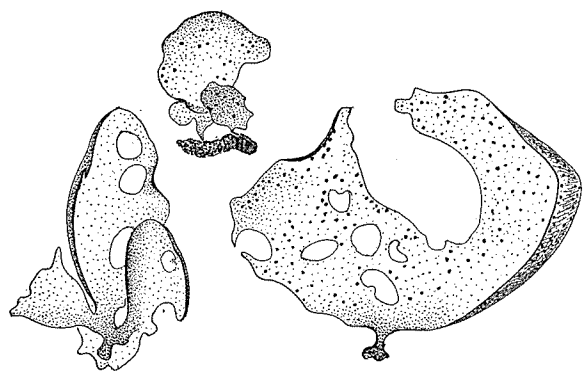


Fig. 9. *Halarachnion parvum* YAMADA.
Three specimens showing different forms of the frond.
×ca. 3.

The structure of the frond, the cysto-

carps produced inward, and zonately divided rather large tetrasporangia indicate clearly the membership of the present alga in *Halarachnion*. Among all described species of this genus the new species represents the smallest one.

Some five specimens preserved in formalin solution, and two dried ones, all of them were collected at the place about 10 m. deep have been examined.

Helminthocladia macrocephala YAMADA spec. nov.

Plate XLVII, and Text-fig. 10.

Frons 12–20 cm. alta, basi discoidea, quoquoversum ramosa, circumscriptione piramidalis; axi principali fere percurrenti, ad basin leviter compresso, sursum teretiusculo; ramis ramulos eadem modo emittentibus, sursum gradatim tenuioribus, apice obtusis; filamentis axis centralis ca. 12μ crassis; filamentis peripheriicis di- vel trichotome ramosis, cellulis cylindraceis, ca. 7μ crassis, ca. 3–5-plo diam. longioribus, sed prope apicem vel longe ellipticis vel leviter clavatis, plerumque 40×15μ (saepius ad 58×17μ). Species dioica vel monoica; ramis carpogonii ex 3 cellulis compositis, ca. 14μ latis, levissime curvatis vel fere rectis, ad filamentum peripheriicum lateralibus; antheridiis ad apicem filamentorum peripheriicorum in capitulum convenientibus, sphaericis vel ovatis, diam. 4–5μ metientibus.

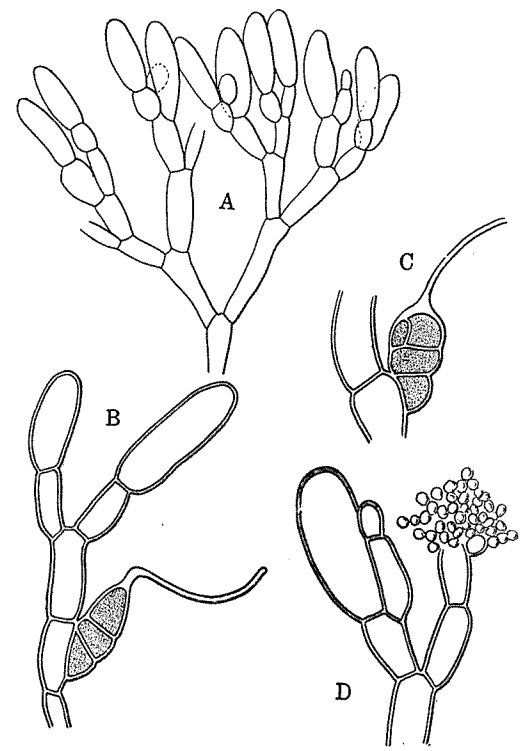


Fig. 10. *Helminthocladia macrocephala* YAMADA.
A. Peripheral filament. ×250.
B. Carpoginial branch. ×500.
C. Divided carpogonium. ×500.
D. Antheridia ×500.

Japanese name: *Simabenimozuku.*

Loc.: Naha, Ryū-kyū

archipelago (S. SEGAWA).

Frond 12–20 cm. high, attached to the substratum by means of a small disc-shaped base, sending off many branches to every direction, pyramidal in outline; principal axis almost percurrent, slightly compressed near the base, nearly cylindrical upwards; branches issuing again branchlets in every direction becoming gradually slenderer, obtuse at apices. Filaments of central axis about 12μ thick; peripheral filaments di- or trichotomously branched; cells cylindrical, about 7μ thick, about 3–5 times as long as broad, but near the top becoming shorter and inflated; ultimate cells conspicuously large, oblong or longly elliptical or somewhat clavate, usually $40\times15\mu$ (sometimes attaining $58\times17\mu$). Species dioecious or monoecious; carpogonial branches composed of 3 cells, about 14μ wide, slightly curved or nearly straight, lateral on peripheral filaments; antheridia borne on the top of peripheral filaments, forming a small head, spherical or somewhat ovate, about 4–5μ in diam.

The present species seems to be related closely to *H. australis* HARV. from Australia and Japan, but can be easily distinguished by its large ultimate cells of the peripheral filaments.

As diagnosed above *H. macrocephala* YAM. is dioecious or monoecious. Six specimens in all were examined which Mr. SEGAWA collected at Naha and kindly put at the writer's disposal. Among them three are female and two are male, while one specimen proved to be monoecious, and yet in other characteristics all the specimens are not distinguishable from each other. In the Helminthocladiaceae, however, such case as this is not without example, viz. in *Liagora farinosa* LAMX. BOERGESEN found a monoecious species while it is dioecious according to HOWE. The cystocarps could not be found, but it was observed that the fertilized carpogonia are divided first by means of a longitudinal wall.

Hypoglossum sagamianum YAMADA spec. nov.

Plate XLI, 1.

Frons parva, 2–4 cm. alta, erecta, saepe stipitata, ad costas parce ramosa; segmentis saepe geminatis, lineari-lanceolatis, 1.5–4 mm. latis, margine integris vel leviter undulatis, apice acutis, versus apicem basimque attenuatis; costis conspicuis, ex 3 seriebus parallelis cellularum elongatarum compositis (e superficiem visis); soris tetrasporangiorum longe ellipsoideis vel irregularibus, ad segmenta parva productis; antheridiis et cystocarpiis ignotis.

Japanese name: *Suzi-benihanori.*

Loc.: Hayama, Sagami Prov. (Herb. Biol. Labor., Imp. Palace, Tokyo).

Frond small, 2–4 cm. high, erect, often stem-like near the base, attached to the substratum by means of a small irregularly shaped disc, sending a few branches from the mid-rib; segments often geminate, linear-lanceolate, 1.5–4 mm. wide, entire or somewhat undulate at margin, acute at apices, attenuated toward both ends; mid-ribs conspicuous, composed of three parallel rows of elongated cells as viewed from the flat surface, soon covered with cortical cells downwards. Sori of tetrasporangia lengthy elliptical or irregular in outline, produced on small branchlets, often occupying near the whole surface of branchlets. Antheridia and cystocarps unknown.

The new species seems to be related most nearly to *H. Woodwardii* Kg. But it can be distinguished from it by the tetrasporangial sori. In *H. sagamianum* they are produced on the small leaflets of the last order and are lengthy elliptical in outline, occupying almost the whole part of the leaflets, as mentioned above in the diagnosis.

Liagora boninensis Yamada spec. nov.

Plate XLVIII.

Frons erecta, ca. 15 cm. alta, valde incrustata, cylindracea, levis, sicco compressa asperque plerunque in partibus inferioribus, densissime ramosa; ramis principalibus dichotomis, ca. 1–1.5 mm. latis (sicco) compressis, multos ramulos irregulariter alternatos emittentibus; ramulis alternatis iterum ramellos dense emittentibus; ramellis ultimis brevibus, patentibus leviter rugosis, saepe bifidis, ad apicem acutis. Axis centralis ex filamentis tenuibus, ca. 17μ crassis pariete crasso foventibus, compositus. Fila strati peripherici ca. 200–300μ longa, quater vel quinquies dichotome vel sursum saepe trichotome ramosa; cellulis filorum in parte inferiori cylindraceis ca. 8–10μ crassis, 5–10-plo longioribus, sursum brevioribus et inflatis; cellulis ultimis vel penultimis ellipsoideis vel obovoideis, ca. 5–7μ crassis. Species dioica; ramis carpogonii ex 4 vel 3 cellulis compositis, parvis, ca. 14μ crassis, curvatis, ad dissepimenta valde constrictis; cystocarpiis ignotis; antheridiis ad apicem filamentorum strati peripherici corymbosis.

Japanese name: *Bonin-konahada.*

Loc.: Haha-zima, Bonin Isl. (S. Segawa).

Frond about 15 cm. high, strongly calcified, cylindrical and smooth throughout the whole length when fresh, becoming flattened and rough in the lower parts when dried, very densely branched; main branches about 1–1.5 mm. wide in dried state, dichotomous, sending many branchlets irregularly alternately, and branchlets again many proliferating short

patent ramuli; ultimate ramuli faintly rugose, mostly bifid and acute at apices. Medullary filaments thin, about 17μ thick, with thick cell-wall; peripheral filaments 200–300μ long, 4–5 times dichotomous, in upper parts often trichotomous; cells in lower parts cylindrical, about 8–10μ thick, 5–10 times as long as broad, those in upper portion much shorter, inflated; ultimate or penultimate ones ellipsoid or obovoid, about 5–7μ thick.

Species dioicous. Carpogonial branches lateral, 4- or 3-celled, small, about 14μ wide, crooked, with cells strongly constricted at dissepiments. Cystocarps unknown. Antheridia produced at the top of peripheral filaments.

This new species undoubtedly belongs to the section *Validae* of the writer, having lateral carpogonial branches, monilliform peripheral filaments and antheridia borne on the top of the peripheral filaments. It shows some resemblance to a Canarian species *L. gymnarthron* BOERG. as well as *L. decussata* MONT. in the form of the peripheral filaments and the carpogonial branches, these species being placed together in the *Decussata*-group. But it is distinguishable by the difference of ramification from both species mentioned above viz. from MONTAGNE's species by the dichotomous ramuli, and from BOERGESEN's species especially by the short ultimate ramuli.

Lophocladia japonica YAMADA spec. nov.

Text-figs. 11–12.

Frons ca. 4–8 cm alta, ad basin leviter corticata, tenuis, irregulariter dichotome ramosa, ad basin ca. 300μ crassa, rhizoidibus ad aliam algam vel inter se affixa; articulis 1–2 plo diam. longioribus, prope basin frondis ad dissepimenta leviter incrassatis; trichoblastis simplicis vel semel iterumque pseudo-dichotome ramosis, saepe curvatis, apice acutis vel obtusiusculis, ca. 85–90μ crassis, ca. 350μ longis ad inferiorem partem, ca. 20–26μ crassis ad superiorem partem frondis; stichidiis tetrasporangiorum ramos primos trichoblastorum formantibus, ca. 100μ crassis, ca. 1 mm. longis.

Japanese name: *Yoremi-gusa.*

Loc.: Hayama, Sagami Prov. (Herb. Biol. Labor., Imp. Palace, Tokyo).

Frond about 4–8 cm. high, slightly corticated near the base, thin, irregularly dichotomously branched, about 300μ thick at the base, adhering to other algae or to each other; articulations 1–2 times as long as diameter, slightly thickened at the dissepiments near the base of the frond; trichoblasts simple or 2–3 times pseudo-dichotomously branched, often curved, acute or obtuse at apices, about 85–90μ thick, about 350μ in the

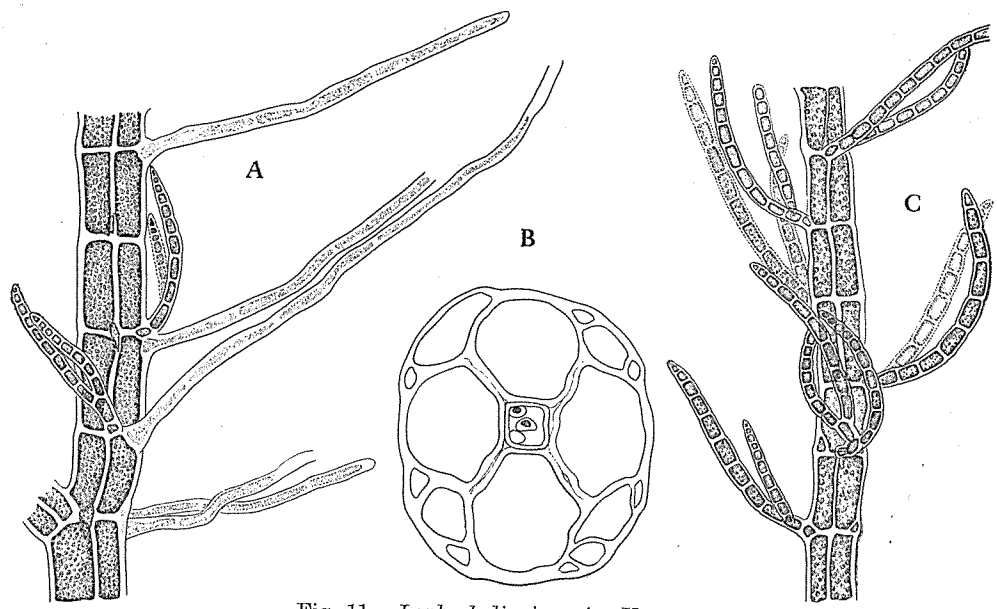


Fig. 11. *Lophocladia japonica* YAMADA.
A. An upper portion of a main branch with thin rhizoids. ×50. B. Transverse section of main axis near the base, showing small cells inside the cavity of the central cell. ×65. C. A middle portion of a main branch. ×50.

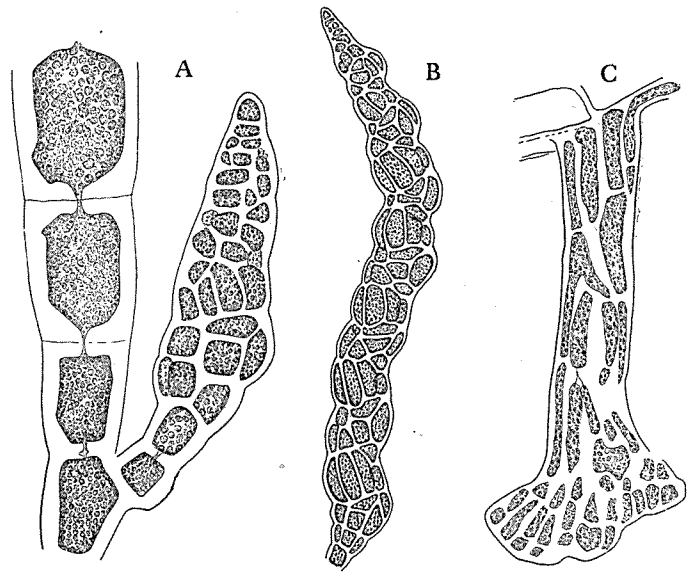


Fig. 12. *Lophocladia japonica* YAMADA.
A. Young stichidium. ×230. B. Nearly mature stichidium. ×75.
C. A corticated rhizoid ending in a disc. ×50.

lower, about 20–26μ in breadth in the upper parts of the frond; stichidia about 100μ thick, 1 mm. long, representing the first branch of trichoblasts.

In the present species the rhizoids are in abundance, occurring almost everywhere in the frond being found even near the top of the branches. They issue always from the pericentral cell, and many of them are a single row of long slender cells, ending in a thick-walled top. Among them, however, there are some thick ones ending in a conspicuous disc. At first they are composed of a single row of rather thick cells but later on they become covered with elongated cortical cells. Both kinds of rhizoids are simple, being never ramified. The frond shows four pericental cells, and in the lower parts some pericental cells give off small elongated cells downwards along the frond, thus showing the beginning of the cortication. This process is jet not sufficient in the present species. The writer has not met with any parts of the frond which were completely covered with a cortical layer.

In the cross-sections through the frond near the base some small cells were found inside the cavity of the central cell (Text-fig. 11).

Myriogramme ? ciliata YAMADA spec. nov.

Plate XLII, 2.

Frons decumbens?, in substratum expansa, rhizoidibus ad basim marginemque frondis emittentibus adfixa, ca. 65μ crassa, ex uno strato (raro duobus stratis) cellularum composita; nervis microscopicis macroscopicisque destitutis, irregulariter valde lobatis; segmentis iterum leviter lobatis vel sinuatis, ad marginem integris, leviter undulatis, saepe rhizoidibus brevibus ornatis; soris tetrasporangiorum circumscriptione ellipticis vel orbicularis, irregulariter dispositis; cystocarpiis et antheridiis ignotis.

Japanese name: *Nedasi-suziginu.*

Loc.: Hayama, Sagami Prov. (Herb. Biol. Labor., Imp. Palace, Tokyo).

Frond decumbent?, expanding on the substratum, attaching to it by means of rhizoids issued from the margin and near the base of the frond, about 65μ thick, composed of only one layer throughout the whole frond except very rare cases in which two layers of cells are seen, with neither macroscopic nor microscopic vein, irregularly deeply lobed; segments again shallowly lobed or sinuate, at margin entire, weekly undulate, often provided with short rhizoids even in upper parts of lobes. Tetrasporangial sori ellipsoid or orbicular in outline, scattered irregularly and not densely all over the surface except the upper parts of lobes. Both cystocarps and

antheridia unknown.

To his great regret the writer has not been able to examine any cystocarpic specimen. Therefore a query is put after the generic name.

Nemastoma foliacea YAMADA spec. nov.

Text-fig. 13.

Frons erecta, parva, ca. 2 cm. alta, ad basin fere sessilis, tenuiter membranacea, ca. 300μ crassa, lubrica, fere orbicularis vel leviter reniformis, margine integra vel nonnihil irregulariter lobata vel undulata; filamentis medullae ca. 6–7μ crassis; cellulis corticis ellipsoideis vel ovoideis, ca. 5–6μ longis; cystocarpiis minutissimis per totam frondem disseminatis.

Japanese name: *Hime-usuginu.*

Loc.: Hayama, Sagami Prov. (Herb. Biol. Labor., Imp. Palace, Tokyo).

Frond erect, small, about 2 cm. high, nearly sessile at the base, thinly membranaceous, about 300μ thick, lubricous, nearly orbicular or somewhat reniform in outline, at margin entire or somewhat irregularly lobed or undulate. Medullary filaments about 6–7μ thick; cortical layer consisting of cell rows perpendicular to the surface of the frond, 4–6 times dichotomously branched; cells ellipsoid or ovate, about 5–6μ long. Cystocarps very minute, scattered all over the surface of the frond. Tetrasporangia unknown. Colour blackish red.

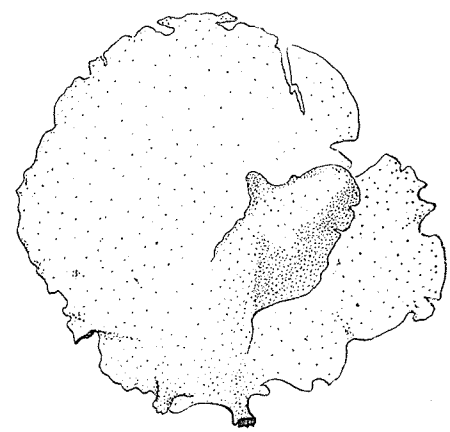


Fig. 13. *Nemastoma foliacea* YAMADA. × ca. 2¼.

Neomonospora Yagii (OKAMURA) YAMADA comb. nov.

Syn. *Monospora Yagii* OKAMURA, Icon. Japan. alg. vol. 7 (1934) p. 21, pl. 314, figs. 7–18.

Japanese name: *Ito-kinuge.*

Rhodymenia parva YAMADA spec. nov.

Plate XLIII, 1, and Text-figs. 14–15.

Frons parva, 1.2 cm. alta, stipitata; stipite cylindraceo, erecto vel leviter repento, sursum in segmentum latum dilatato; segmentis tenuibus ca. 100–160μ crassis, bis vel ternis di- vel raro trichotome divisis, margine

integris, apice rotundatis vel leviter angustatis, ca. 1.5–2.0 mm. latis; tetrasporangiis cruciatim divisis, soros orbiculatos vel ellipticos vel interdum irregulares in partibus superioribus segmentorum formantibus; cystocarpiis ad vel prope marginem vel ad superficiem segmentorum productis, fere hemisphericis, sessilibus. Frons ex duobus vel uno stratis cellularum magnarum non coloratarum interiorum et uno vel duobus stratis cellularum parvarum coloratarum perifericarum constructa.

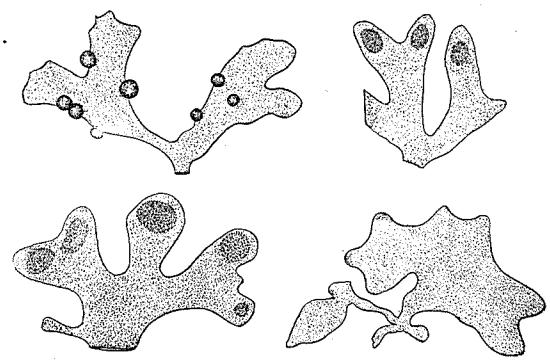


Fig. 14. *Rhodymenia parva* YAMADA.
Two tetrasporic, one carposporic, and one young sterile specimens. ×2⅔.

Japanese name: *Hime-darusu.*

Loc. Hayama, Sagami Prov. (Biol. Labor., Imp. Palace, Tokyo).

Frond small, about 1.2 cm. high, stipitate; stipe cylindrical, erect or somewhat creeping, expanding into broad segments upwards; segments thin, about 100–160μ thick, twice or three times di- or rarely trichotomously divided, entire at margin, rounded or somewhat narrowed toward apices, about 1.5–2.0 mm. broad. Tetrasporangia cruciately divided, forming circular or elliptical or sometimes irregularly outlined, well defined sori in the upper parts of segments; cystocarps at or near the margin or on the surface of segments, nearly hemispherical, sessile. Frond internally consisting of mostly two layers or rarely one layer of large, not coloured

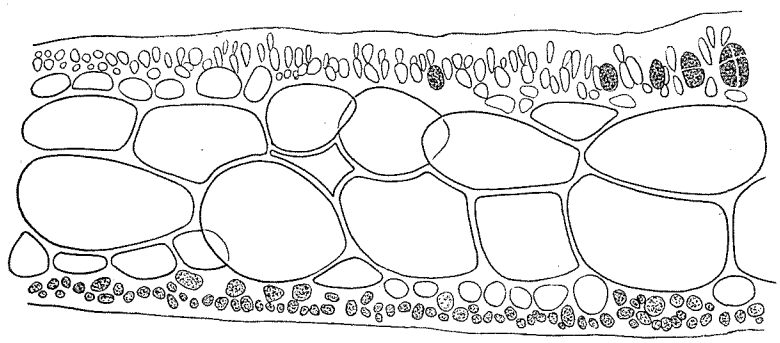


Fig. 15. *Rhodymenia parva* YAMADA.
Transverse section of a tetrasporic specimen. ×250.

cells inside and one or two layers of small coloured cells outside.

Symphyocladia latiuscula (HARVEY) YAMADA comb. nov.

Syn. *Rytiphloea latiuscula* HARVEY, in GRAY's list of Japan. plants (1857) p. 331, no. 4.

Syn. *Dictyomenia gracilis* MARTENS, Preus. Exped. Ost-Asien (1866) p. 119, pl. 7, fig. 4.

Syn. *Symphyocladia gracilis* FALKENBERG, Rhodomelac. (1901) p. 282; OKAMURA, Icon. Japan. alg., Vol. 2 (1912) p. 169, pl. 97.

Syn. *Rytiphloea angusta* OKAMURA, Cont. know, mar. alg. Jap. (Bot. Mag. Tokyo, vol. 10, 1896) p. 26, pl. 3, figs. 8–13.

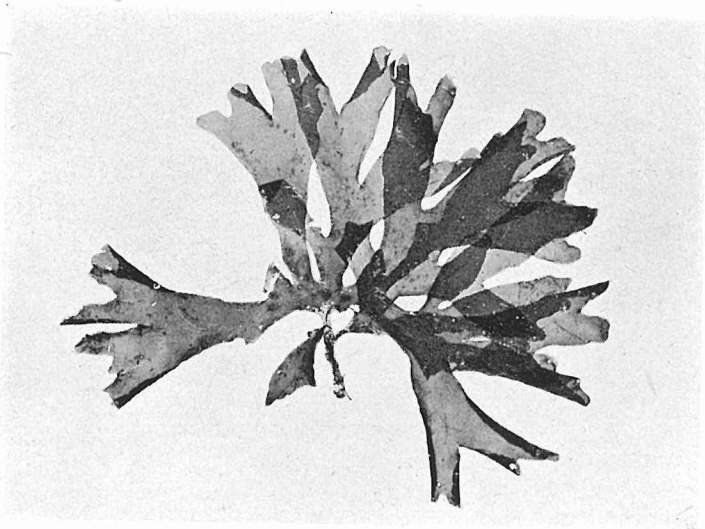
Japanese name: *Isomurasaki.*

As the present writer has already mentioned (Notes on Japan. alg. I, p. 28) the type of HARVEY's *Rytiphloea latiuscula* which was collected at Hakodate, Japan is nothing but what is now called *Symphyocladia gracilis* FKBG. Therefore the name of this alga should be changed to *Symphyocladia latiuscula.*

PLATES XL–XLVIII

PLATE 40

Callophyllis hayamensis YAMADA spec. nov. ×1.



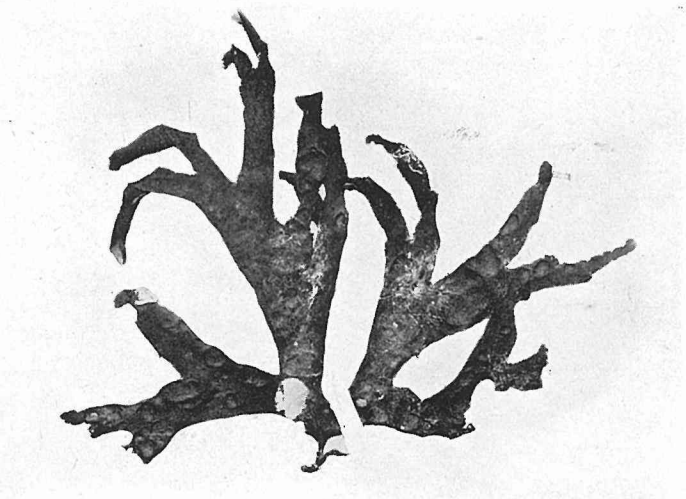
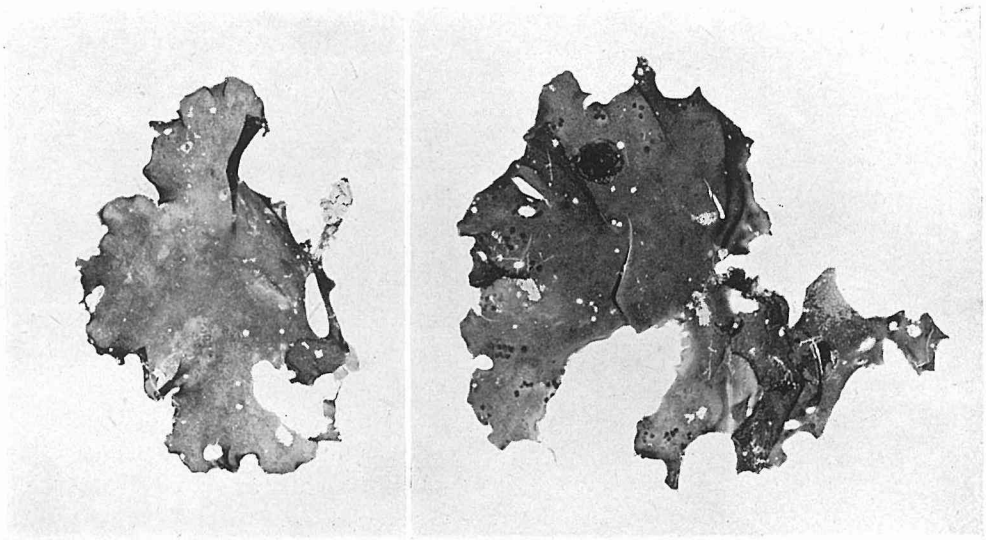


PLATE 41

1. *Hypoglossum sagamianum* YAMADA spec. nov.
   Five original specimens. × 1.
2. *Callymenia oligonema* YAMADA spec. nov.
   Two original specimens. × 1.



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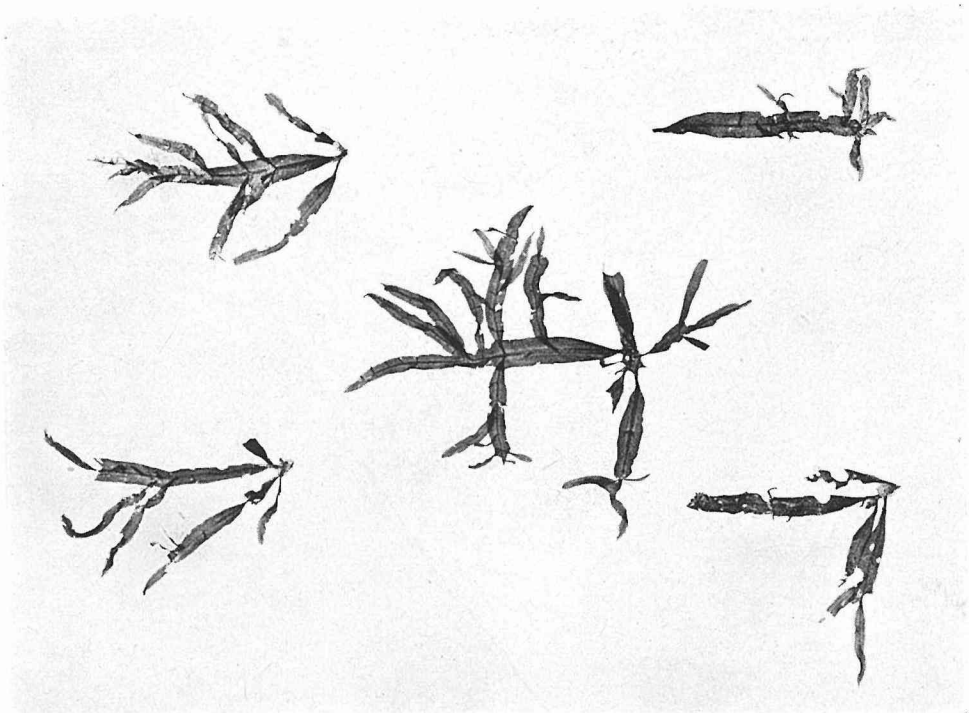
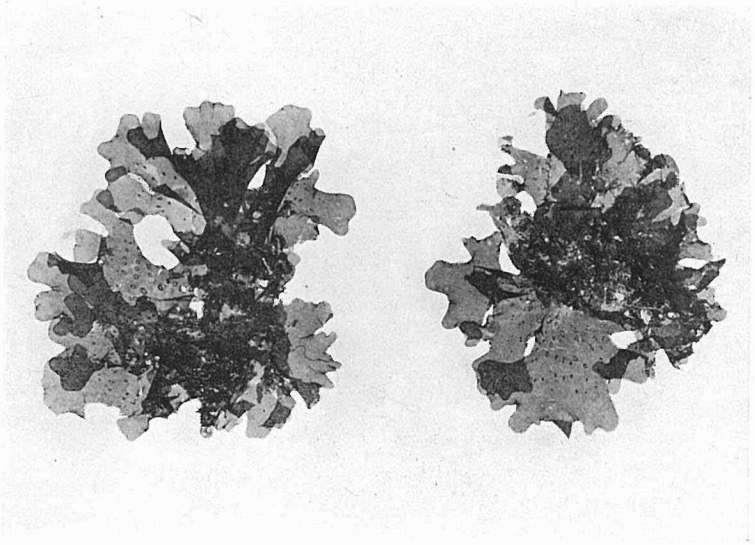


1

PLATE 42

1. *Cryptonemia Yendoi* WEBER VAN BOSSE. ×1.
2. *Myriogramme ? ciliata* YAMADA spec. nov.
   Two original specimens. ×1.



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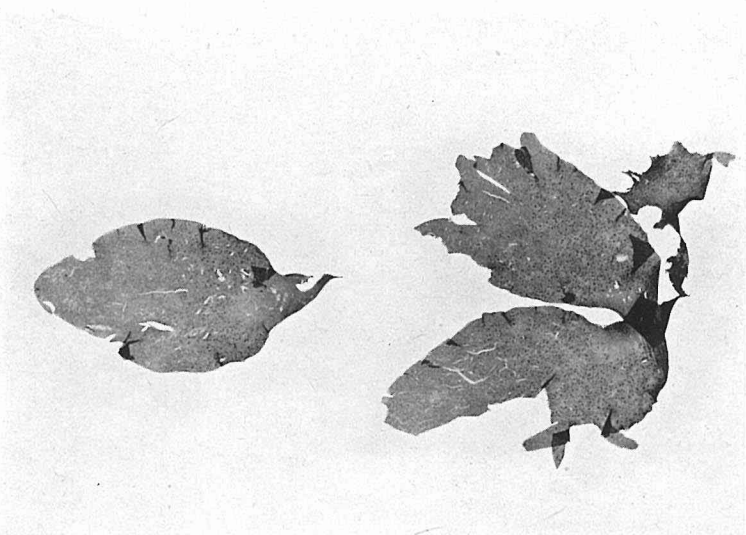
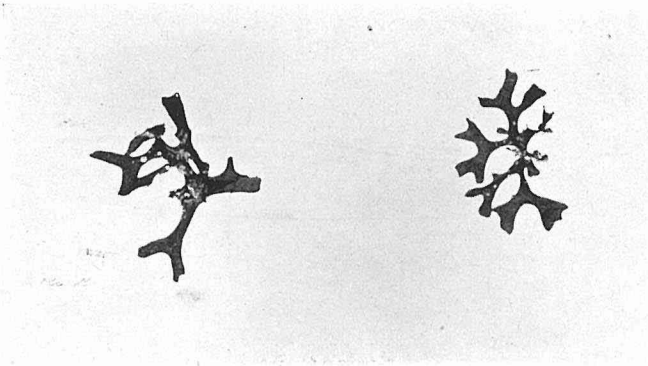


1

PLATE 43

1. *Rhodymenia parva* YAMADA spec. nov. ×1.
2. *Cryptopleura hayamensis* YAMADA spec. nov. ×1.



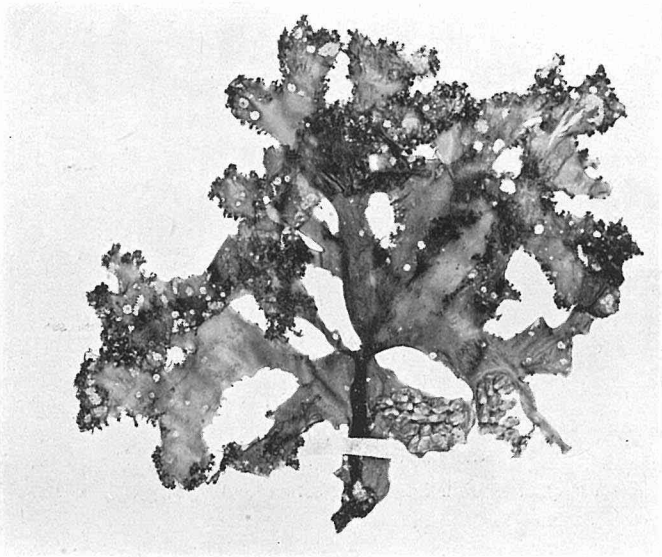
1

2

PLATE 44

Fauchea stipitata YAMADA et SEGAWA spec. nov.

1. A specimen from the Island of Hatizyō collected by S. SEGAWA. ×1.
2. A specimen from Amami-ōsima in the Herbarium of the late Dr. K. OKAMURA. ×1.



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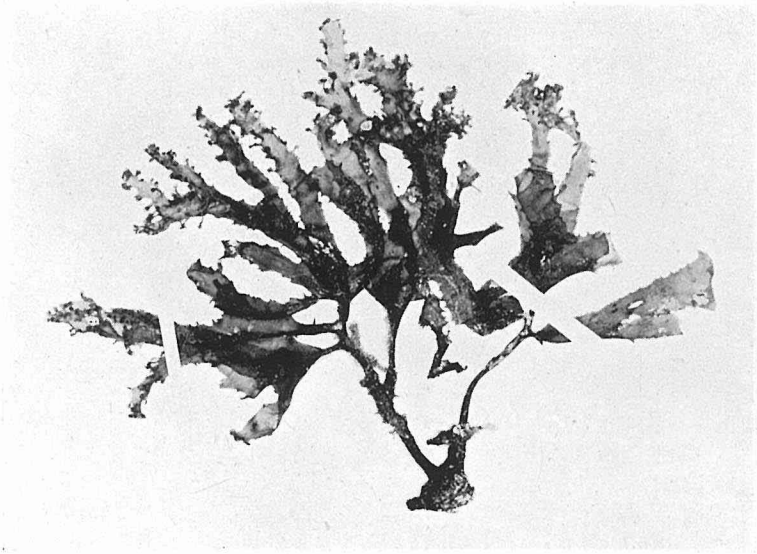


2

PLATE 45

Gracilaria coronopifolia J. AG.

A specimen from Garanbi, Formosa. Slightly reduced.

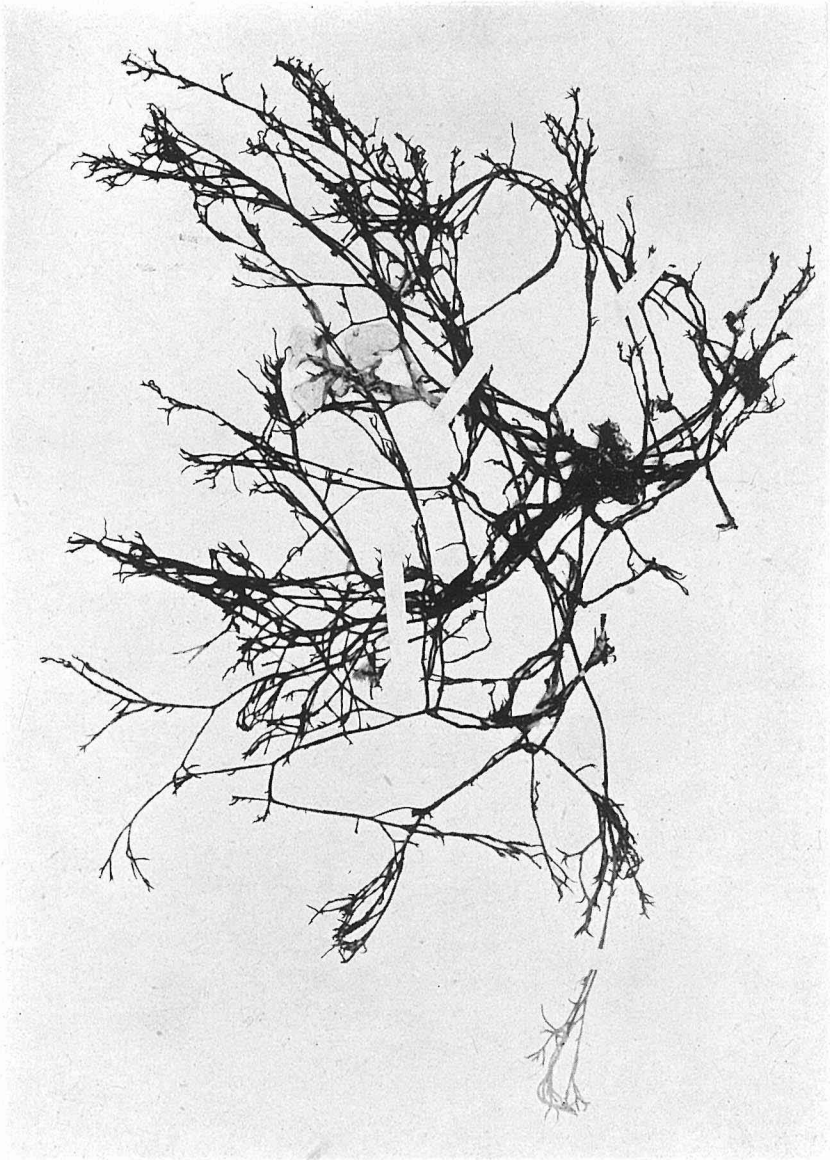


PLATE 46

Grateloupia turuturu YAMADA spec. nov.
Two cystocarpic specimens from Muroran, Hokkaidō. ×16/29.

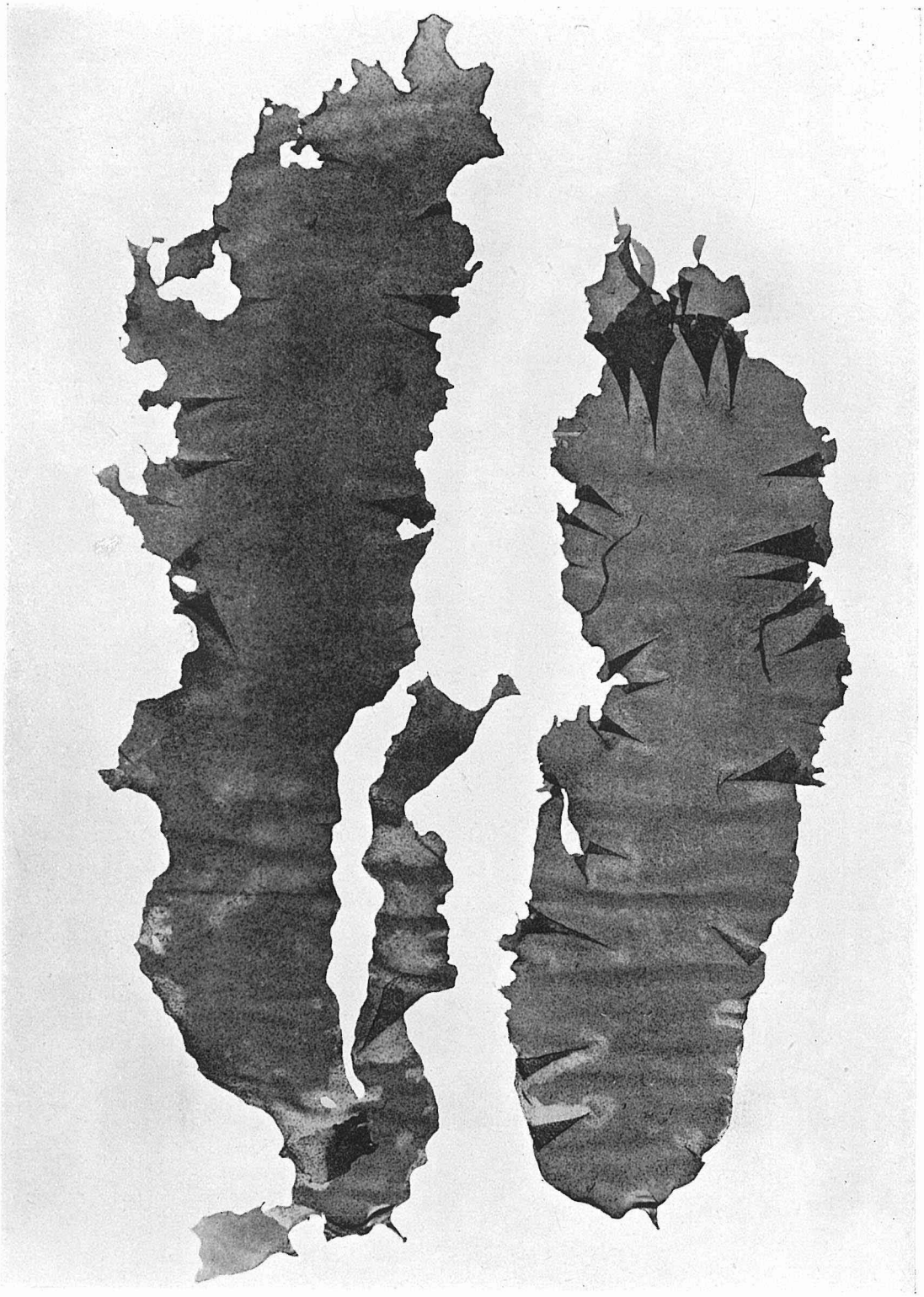


PLATE 47

Helminthocladia macrocephala YAMADA spec. nov.
The type-specimen. ×1.

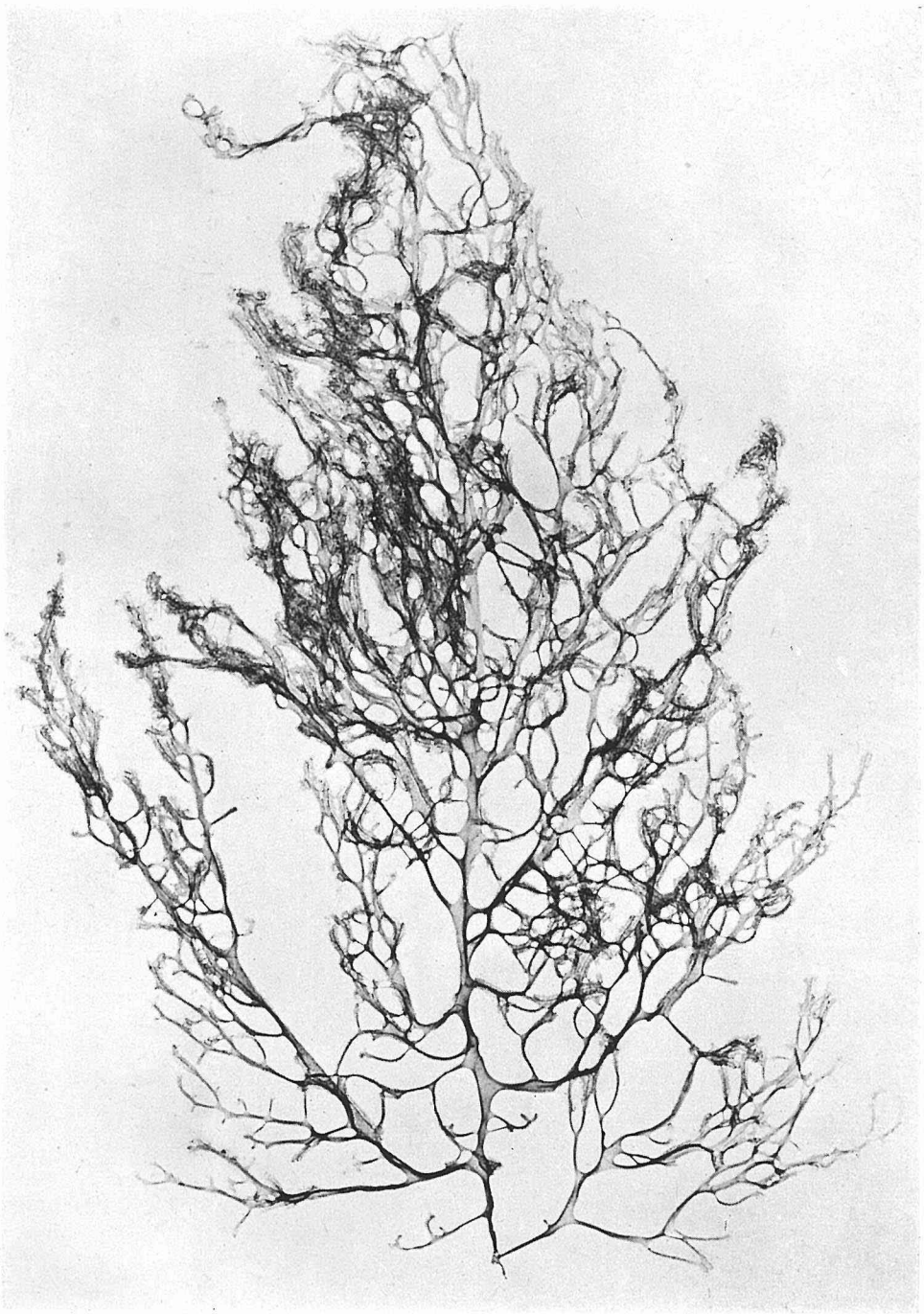
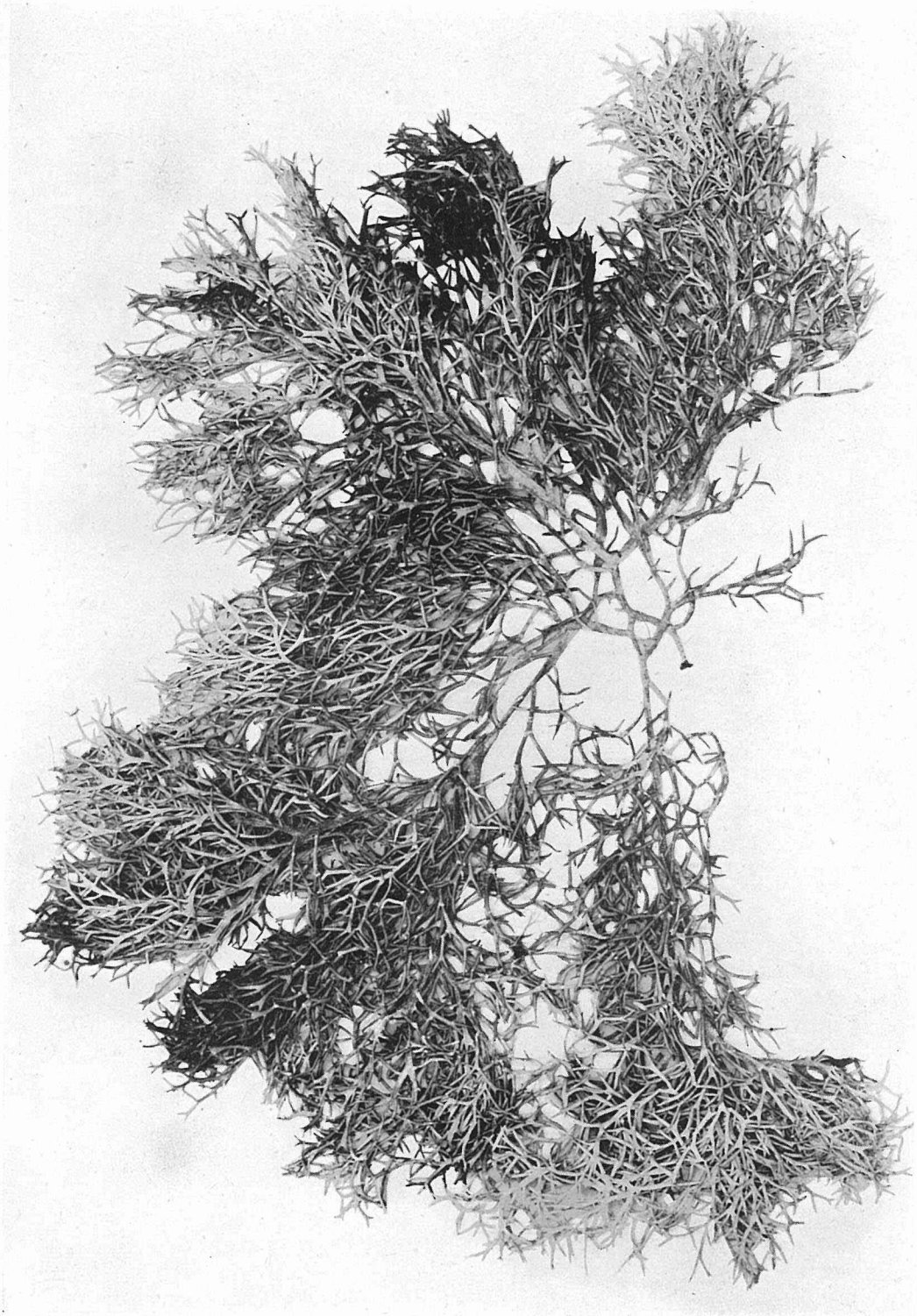


PLATE 48

Liagora boninensis YAMADA spec. nov. ×1.