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Notes on Some Japanese Algae IV.

By

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With Plates III—IX.

Avrainvillea riukuensis sp. nov.

Pl. III. and Text-fig. 1.

Frons solitaria, usque ad 17 cm alta, stipitata, stipite usque ad 5 cm longo, leviter compresso, 6 mm crasso. Flabellum oblongoreniforme, usque ad 10 cm altum, 16 cm latum, tenue et membranaceum, leviter zonatum, basi cordatum, margine lobatum vel lacertatum. Frondis filamenta cylindracea vel saepe leviter constricta, et profundis constrictionibus supradichotomialibus ornata, 11–18 μ crassa, apicem versus crassiora, saepe diametro 20 μ attingenta, ad apicem clavata.

Hab. Nawa, Riukiu.

Frond solitary, up to 17 cm high, stipitate, stipe up to 5 cm long, slightly compressed, 6 mm in diameter. Flabellum oblongoreniform with cordate base, up to about 10 cm high, about 16 cm broad, thin and membranous when dried, inconspicuously zonate, lobed or lacerated at the margin. Filaments in the interior of the flabellum cylindric or often slightly constricted, but with a deep constriction just above the dichotomy. At the end they are clavate or slightly inflated. The diameter of the filaments about 11–18 μ (rarely 25 μ) inside the flabellum, but near the surface the filaments grow gradually thicker becoming about 20 μ thick. Colour greyish brown after drying.

In outer appearance the present species stands most closely to *A. acerifolia* Börg. from the West Indies. However the filaments in this species taper toward the surface of the flabellum and become torulose near the end. *A. Gardineri* Gepp which also shows some likeness to the present species in outer appearance, has also the same characteristics of the filaments as the West Indian species described by Börgesen. As above mentioned in the diagnosis the

filaments of *A. riukiensis* become thicker near their end than inside the flabellum, and not so conspicuously torulose as in the above mentioned two species.

The present species grows on the wall of a rather deep pool in the littoral zone.

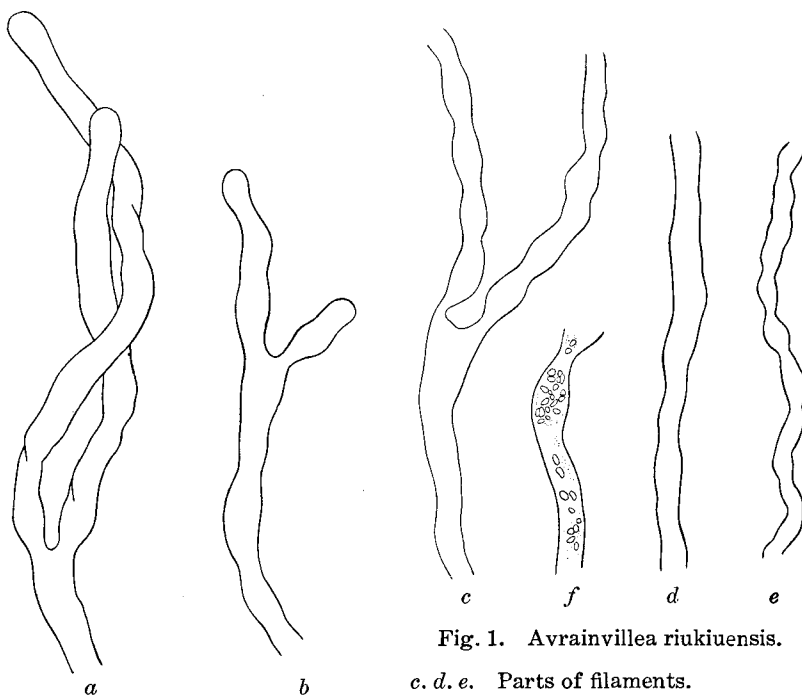


Fig. 1. *Avrainvillea riukiensis*.
a. b. Terminal parts of filaments.

Fig. 1. *Avrainvillea riukiensis*.
c. d. e. Parts of filaments.
f. A part of filament showing chromatophores.

Cladophora fuliginosa Kützing

Spec. Alg. (1849) p. 415; De Toni, Syll. Alg. vol. 1 (1889) p. 347; Collins, Green Alg. of North Amer. (1909) p. 348; Börgesen, Mar. Alg. of West Ind. vol. 1 (1913) p. 22; Howe, in Britton and Millspaugh's Bahama Flora (1920) p. 601; Taylor, Mar. Alg. of Florida (1928) p. 62, pl. 4, fig. 5.

Syn. *Blodgettia confervoides* Harvey, Ner. Bor. Amer. part 3 (1858) p. 48, pl. 45, C.

Hab. Kaikō, Formosa; Riukiu.

The present species of *Cladophora* which is noted for being infested by an endophytic fungus, *Blodgettia Borneti* Wright in its cells, has been so far reported only from the Atlantic Ocean, especially from the West Indies, but not from the Pacific. My specimens from Formosa show somewhat thicker frond than the Bermudan specimens, but the fungus is also found inside cell walls.

In the herbarium of the University of California the writer saw some specimens of this species, collected in the Hawaiian Islands, by kind permission of Prof. W. A. Setchell. And so it seems to the writer that the present *Cladophora* is distributed rather commonly in the tropical Pacific.

***Chordaria flagelliformis* f. *chordaeformis* Kjellman**

Pl. IV.

"Om Spets. Thall. II (1877) p. 28, 29, pl. 1, figs. 13-15"; Setchell and Gardner, Alg. N. W. Amer. (1903) p. 251, Mar. Alg. of Pac. Coast of North Amer., Melanophyc. (1925) p. 573.

Jap. name. Himo-nagamatsumo.

Hab. Akkeshi, Kushiro Prov.; Chinominochi, Kunashiri Island, Kuriles (Y. Okada).

Although the writer can examine neither any authentic specimens of this form nor refer to the original work in which Kjellman described the present form, our plant is most probably to be referred to *Chordaria flagelliformis* f. *chordaeformis* Kjellm. The type locality is Konyam Bay, Siberia, and Setchell and Gardner expect it to occur in American waters. Sporangia in summer.

***Leathesia sphaerocephala* sp. nov.**

Text-fig. 2.

Species ad *Cystophyllo* epiphytica. Frons sphaeriuscula, parva, ca 1-3 mm diametro metiens; filamentis assimilationibus longiusculis, e 7-13 cellulis compositis; cellulis ad basin fere cylindraceis, ca 4-5 μ crassis, 2-2.5-plo diametro longioribus, sursum sensim inflatis; cellulis terminalibus sphaericis, 18-20 μ crassis. Sporangia unilocularia sessilia, longe ellipsoidea, ca 60 μ longa, ca 20 μ crassa, ad basin filamentis assimilatoris situata.

Jap. name. Hime-nebarimo.

Hab. Saruru, Kitami Prov. (S. Segawa).

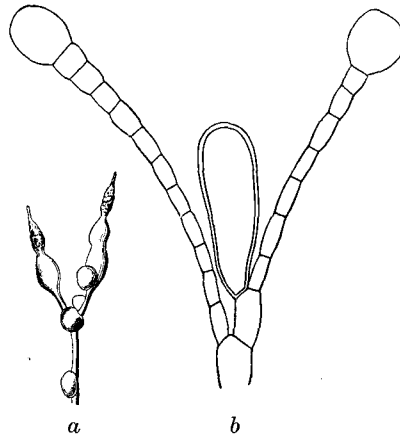


Fig. 2. *Leathesia sphaerocephala*.

- a. Four individuals on *Cystophyllum*.
 b. Assimilating filaments with a unilocular sporangium.

Frond growing epiphytically on branches and receptacles of *Cystophyllum hakodatense* Yendo, nearly spherical in shape, small, about 1–3 mm in diameter. Assimilating filaments rather long, composed of 7–13 cells, gradually becoming thicker and inflated upwards ending in a large round cell, whose diameter measures about 18–20 μ ; cells near the base cylindrical, about 4–5 μ in diameter, 2–2.5 times as long as diameter. Unilocular sporangia sessile, longly ellipsoid, about 60 μ long, about 20 μ thick, situated at the base of the assimilating filaments. There is no hair.

Although the writer can not examine any specimen of *Leathesia umbellata* Meneg. reported by Yendo from Japan,* the present species seems to come very nearly to that species. Judging from the figures and descriptions given by Kützing, Hauck, Kuckuck etc. the assimilating filaments and the unilocular sporangia in *L. umbellata* seem to be sufficiently different from those in our specimens to separate the latter from the former specifically.

***Callithamnion callophyllidicola* sp. nov.**

Pl. V, Pl. VI. Fig. b. and Text-fig. 3.

Frons erecta, 2–8 mm longa, ecorticata, articulata, leve flexuosa, subdichotomo-pinnatim alternatimque dense ramosa, in frondibus

* K. YENDO, Notes on Alg. new to Japan, V (1916) p. 250.

Callohyllidis crispatae Okam. et *C. japonicae* Okam. epiphytica. Rami ramulique distichi; ramuli ad apicem attenuati, in parte superiore frondis corymbose dispositi.

Cellulae ad basin frondis usque ad $160\ \mu$ crassae, 1.5–2-plo diametro longiores, in ramulis ca $30\text{--}60\ \mu$ crassae, 1.5–3-plo diametro longiores, levissime constrictae. Cellulae ultimae ramulorum obtusae vel acutiusculae, apice saepe pilo tenuissimo ornatae.

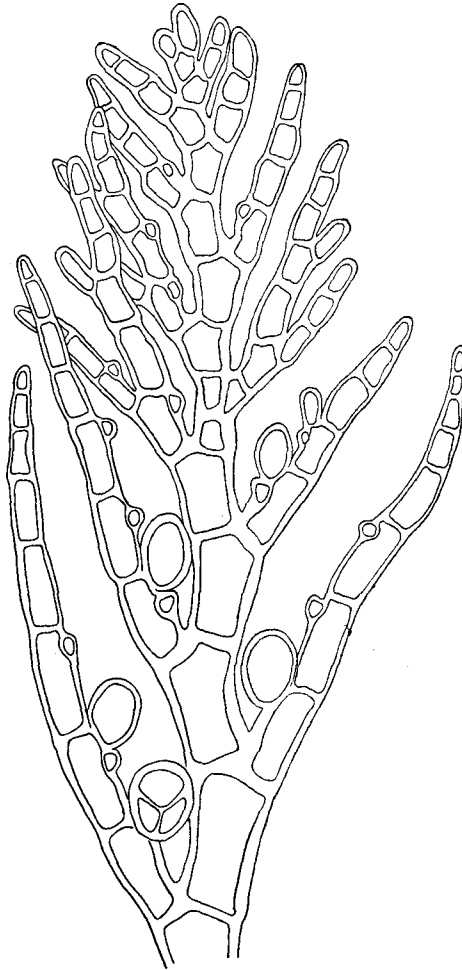


Fig. 3. a. *Callithamnion callophyllidicola*.

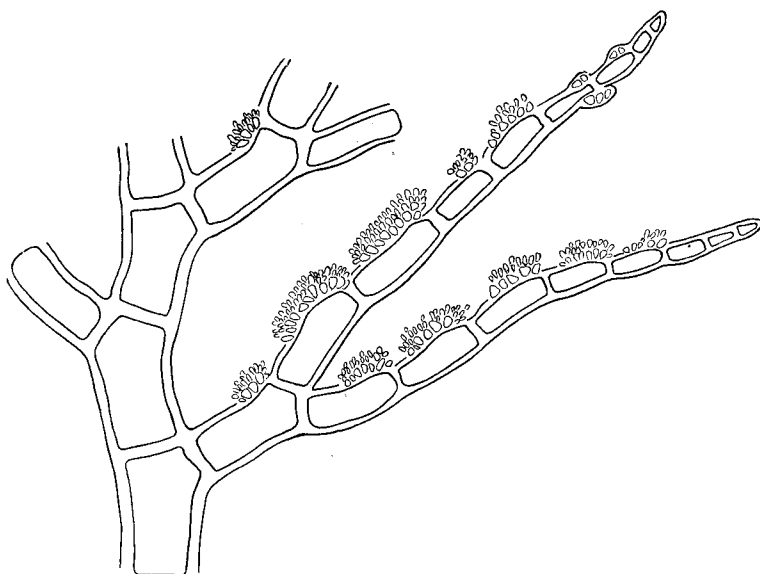


Fig. 3. *b.* *Callithamnion callophyllidicola.*

Species dioica. Tetrasporangia ovata, $70 \times 60 \mu$, sessilia, in superiore latere rami ramulique sparsa. Antheridia in superiore latere ramulorum saepe curvatorum seriata. Cystocarpia in cellulis rachidis vel ramorum producta.

Jap. name. Kinitogusa.

Hab. Enoshima, Sagami Prov.

Frond erect, 2–8 mm high, not corticate throughout the whole length, slightly flexuous, densely ramified; ramification alternate, subdichotomo-pinnate. Branches and branchlets distichous, branchlets gradually tapering to the apex, arranged corymbosely in the upper parts of the frond.

Cells near the base of the frond up to 160μ thick, 1.5–2 times as long as diameter, very slightly constricted at dissepiments. Apical cells of branchlets obtuse or somewhat acute, often provided with a very thin hair. Species dioecious. Tetrasporangia ovate, 70μ long, 60μ wide, sessile, on the upper side of cells of branchlets, not seriate though often two are produced on the neighbouring cells. Antheridia seriate, occupying the upper side of cells of branchlets in the upper parts of the frond, branches carrying them being often curved. Gland cells present, especially common in the tetrasporic

individuals. Cystocarps situated on cells forming the axis of the frond or branches, but not of branchlets.

This is a small and very beautiful species of *Callithamnion* growing on the frond of *Callophyllis crispata* Okam. and *C. japonica* Okam. fastening itself to the host by means of thin rhizoidal filaments which come out of the cells near the base of the frond. In spring three kinds of reproductive organs are to be found on the different individuals.

***Callophyllis adhaerens* sp. nov.**

Pl. VI. Fig. a.

Frons 4–6 cm longa, plana, membranacea, 2–3 mm lata, ca 180 μ crassa, laxe intricata; ramis ramulisque dichotomo-pinnatis, patentibus, postea irregularibus, marginibus levibus, postea sparse dentatis; cystocarpiis hemisphaericis, diametro ca 500 μ , cornubus parvis armatis, ad marginibus frondis ex una pagina prominentibus. Color sicco fusco-ruber, substantia rigidiuscula, sicco chartae non arcte adhaerens.

Jap. name. Hime-tosakamodoki.

Hab. Enoshima, Sagami Prov.; Wagu, Shima Prov. (K. Inagaki).

Fronde 4–6 cm long, membranous, 2–3 mm wide, about 180 μ thick, loosely entangled, branches adhering to each other or to other things; branches dichotomo-pinnate, with wide axils, becoming irregular afterward; margins smooth, in age provided with small protuberances; cystocarps along the margins of the frond, hemispherically prominent on one surface, about 500 μ in diameter, provided with small protuberances.

There are two sets of specimens before us, both having been collected in the springtime. But only one specimen from Wagu has some cystocarps which show clearly the generic characteristics of *Callophyllis*, while all other specimens are sterile. Therefore the above description of cystocarps is unfortunately very imperfect. But the dwarfness of the frond and branches adhering to each other are so peculiar that there is no allied species on our coast.

***Carpoblepharis Schmitziana* Okamura var. *erecta* var. nov.**

Pl. VI. Fig. c.

Frons erecta, crassior quam in typo.

Jap. name. Tachi-chirimomiji.

Hab. Enoshima, Sagami Prov.

The present variety grows very densely on the frond of *Chondrus elatus* Holmes, and is always erect while the species has been found creeping mostly on *Grateloupia elliptica* Holmes in Japan. The frond of the variety is much thicker than in the species. Antheridia, cystocarps and tetraspores are produced on the different individuals in spring.

Galaxaura obtusata (Solander) Lamouroux

Pl. VII.

Hist. Polyp. fl ex. (1816) p. 262; K utzling, Spec. Alg. (1849) p. 529; Id., Tab. Phyc. vol. 8, (1858) t. 35; J. Agardh, Epicr. (1876) p. 525; De Toni, Syll. Alg. vol. 4 (1897) p. 110; Kjellman, Floride-Sl agtet Galaxaura (1900) p. 88; Howe, in Britton and Millspaugh's Bahama Flora (1920) p. 559; Weber van Bosse, Liste des Alg. du Siboga vol. 2 (1921) p. 88.

Jap. name. Fukure-garagara.

Hab. Wagu, Shima Prov.; Riukiu.

In the specimens at hand the frond is 7–13 cm high, the segments being 2–3 mm wide and usually 2–4 times as long as the width. In cross section the frond shows the central cavity in which the medullary filaments run very loosely, and the cortex consists of two layers of cells. The outermost cells which contain pigment are irregularly pentagonal or hexagonal in surface view and lense-like in cross section. The inner layer consists of larger cells which are quadrate or round in cross section some of which send out medullary filaments.

In identifying our specimens with *G. obtusata* Lamx. comparison has been made with specimens from Porto Rico distributed from the New York Botanic Garden under the present name.

The present species seems to be distributed rather widely in the warmer parts of our waters, though it has never previously been reported from Japan.

Laurencia hamata sp. nov.

Pl. VIII.

Frons mollis, intricata, 15 cm alta et ultra, cylindrica, ad basin frondis ca 1 mm crassa, irregulariter dense ramosa, axi centrale non

percursa; ramis ramulisque ad basin leviter constrictis; ramis saepe cuneatis in parte superiore; ramulis clavatis, ad apicem truncatis; tetrasporangiis in ramulis ultimis conformibus situatis; cellulis superioribus in partibus superioribus ramulorum levissime projectentibus, in sectione transversa non simili modo ut cellulis valli-formibus dispositis; parietibus cellularum medullarum parte crassiori non ornatis; cystocarpiis et antheridiis ignotis.

Jap. name. Kagi-sozo.

Hab. Nō, Echigo Prov.; Himi, Etchū Prov. (K. Ōshima); Izumo Prov.; Iyo Prov.

Frond soft, 15 cm high or more, cylindrical, about 1 mm thick near the base, irregularly much branched showing no percurrent axis. Branches as well as branchlets slightly constricted at the base, branches often curved like a hook in the upper part and by means of it branches entangling with other algae or with other branches of the same individual. Branchlets clavate and truncate at the apex. Stichidial branchlets like sterile ones. Epidermal cells of branchlets very slightly projecting in the surface view showing no pallisade-like arrangement in the cross section. There are no lenticular thickenings inside the frond. Cystocarps and antheridia unknown.

The present species of *Laurencia* is a rather distinct one among the Japanese species, its branches often being curved like a small hook. As above mentioned the superficial cells do not show the pallisade-like arrangement and there are no lenticular thickenings in the walls of the medullary cells. Thus the present species is to be placed in the section *Cartilagineae*.

Among the species of this section *L. hamata* is related most nearly to *L. subopposita* Setchell, but is easily distinguishable from it by the ramification.

Weberella micans Hauptfleisch

Pl. IX.

In Engler and Plantle's Nat. Pflanzenfam. Rhodophyc. (1897) p. 401; De Toni, Syll. Alg. vol. 4 (1900) p. 537; Weber van Bosse, Liste des Alg. du Siboga, vol. 4 (1928) p. 463.

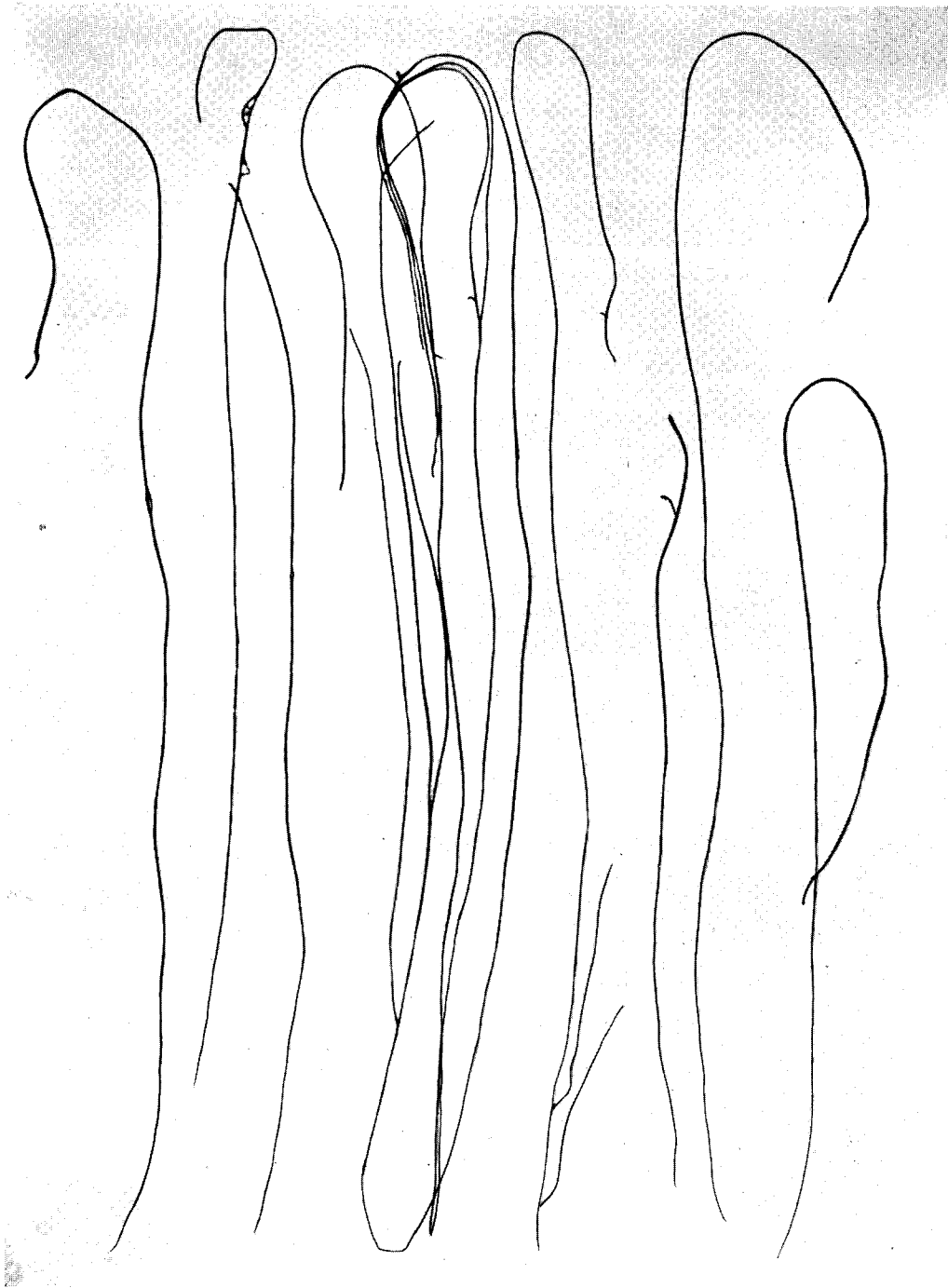
Hab. Riusensui, Formosa.

The present species has been reported only from the Malay Archipelago. The writer has met with it only once in the above mentioned locality. All our specimens, however, show neither cystocarps nor tetrasporangia.

Their frond is provided with short hapter-like protuberances here and there on the under surface by means of which the frond fastens itself to the substratum, or sometimes being provided with it, lobes of one individual attach to each other.



Avrainvillea riukuensis Yamada.
Slightly reduced.



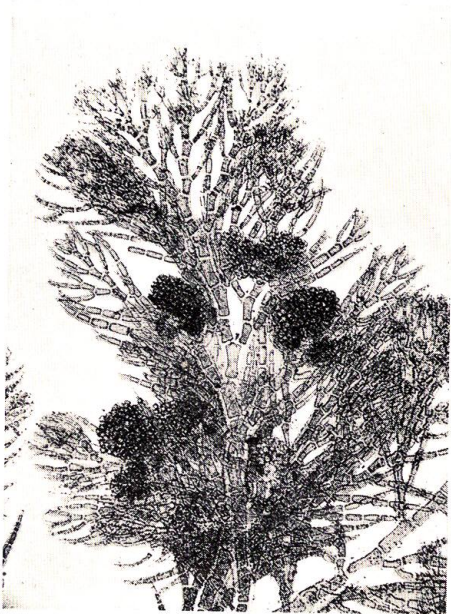
Chordaria flagelliformis f. *chordaeformis* Kjellm.
Slightly reduced.



Callithamnion callophyllidicola Yamada. $\times 1$.



a. *Callophyllis adhaerens* Yamada. $\times 1$.



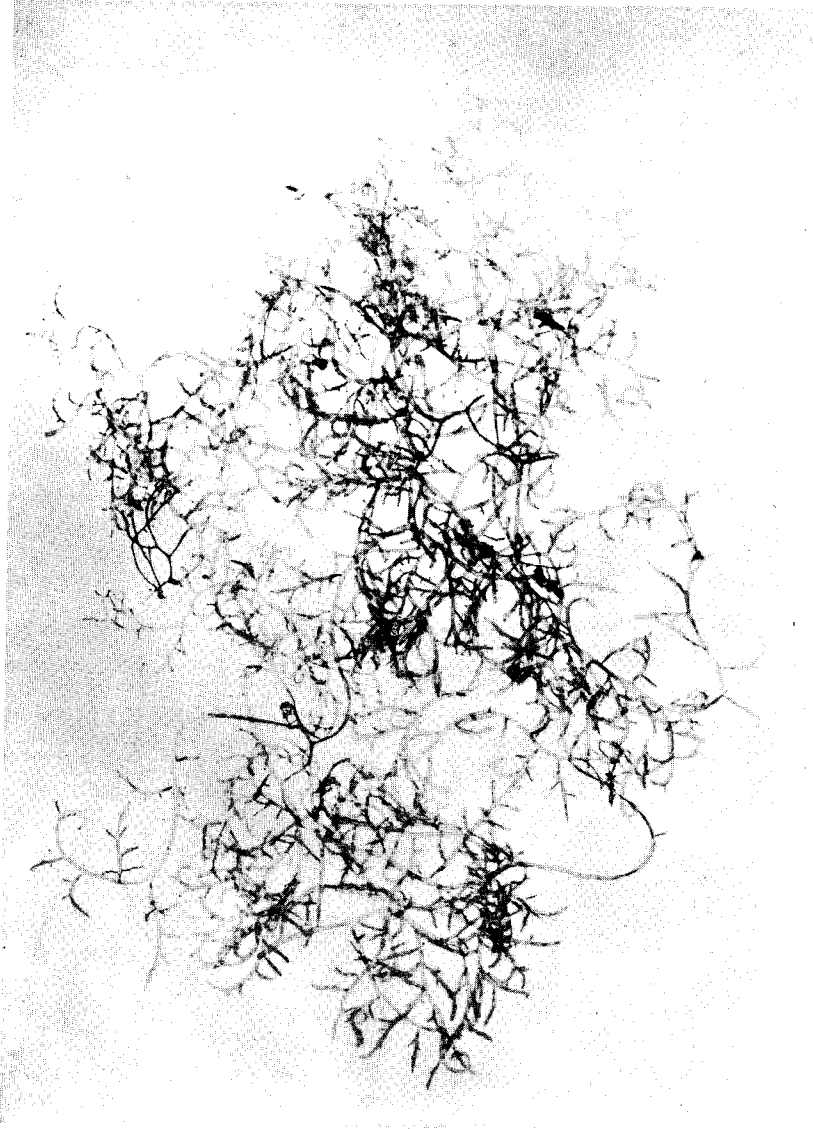
b. *Callithamnion callophyllidicola* Yam.



c. *Carpoblepharis Schmitziana*
var. *erecta* Yam. $\times 1$.



Galaxaura obtusata Lamx. $\times 1$.



Laurencia hamata Yam. $\times 1$.



Weberella micans Hauptfleisch. $\times 1$.