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NOTES ON SOME JAPANESE ALGAE I.

By

Yukio YAMADA

With Plates II–VI.

Cladophora rhizoplea Kjell.

The present species was established by Kjellman in "Marina Chlorophyceer fran Japan (p. 31, pl. 6, figs. 8–18)" based upon some specimens growing on "*Sargassum*" which he collected in Amakusa and Gotō (both in the south of Japan). Since that time, neither Japanese nor foreign botanists have found it in any part of Japan. We have not been able, therefore, to identify any specimen with this species in spite of the fact that Kjellman's species shows very peculiar characteristics according to his description. Very fortunately I was allowed by Prof. Svedelius of Upsala to study all Kjellman's specimens kept in the herbarium there. Among them I found some six very small cushion-like specimens under the name of *Cl. rhizoplea* Kjell., three of which are attached to "*Sargassum*". All six are reddish brown in colour, reminding one of some small species of *Sphacelaria*. At a glance, however, their peculiar colour made me doubt if they belong to *Cladophora* and furthermore the host did not appear to me to be *Sargassum*. After studying them through the microscope I found that they were not *Cladophora* and *Sargassum*, but the basal portions of *Neurocarpus*, probably *N. undulata*, and so we must remove this *Cladophora* from the algal list.

Enantiocladia Okamurai spec. nov.

Dr. Okamura studied an alga of the Rhodomelaceae from the Sagami and Bōshū Provinces giving very fine illustrations and a precise description under the name of *Enantiocladia latiuscula* (Harvey) Okam.

Though the specimens of this plant are not very common in the localities given above, I also have collected some of them in Enoshima, Sagami Province. There is something wrong, however, in the above naming. Last winter, I visited the herbarium of Harvey at Trinity College, Dublin, Irish Free State, where Prof. Dixon was kind enough to allow me to study all of Harvey's specimens. Among the Japanese algae, I found two small specimens of *Rytiphloea latiuscula* Harv. which were collected by Morrow at Hakodate in 1854, they are undoubtedly the original specimens of Harvey. They are, however, quite different from what was illustrated by Dr. Okamura, representing a species of *Symphyocladia*, probably *S. gracilis* Fkbg., so I propose a new name for Dr. Okamura's plant:

Enantiocladia Okamurai spec. nov.

Syn. *Enantiocladia latiuscula* Okamura, Icon. of Jap. alg. vol. 1, p. 42, pls. 9 and 10.
(non *Rytiphloea latiuscula* Harvey)

Delisea pulchra Mont. and Delisea japonica Okam.

When Dr. Okamura described his new species, *Delisea japonica* Okam. (Icon. of Jap. alg. vol. 1, p. 139, pl. 29) he compared his Japanese specimens with *D. pulchra* Mont. and recognised the close affinity between the two species, but he laid special importance in the oblique position of cystocarps in his specimens for separating them from Montagne's species, quoting the figure given in Harvey's Phyc. Austr. pl. 16. In the herbarium of Harvey in Dublin I compared our Japanese specimens in my posession with Harvey's preserved under *D. pulchra* Mont. In some specimens among them, however, cystocarps are very often situated obliquely to the midrib of branchlets. On the other hand I have found cystocarps in some specimens from Tosa Province which have their terminal pore pointing upward and their longitudinal axis coinciding with the midrib. Other characteristics used for separating the Japanese species from the Australian, the thickness

of the frond and the slenderness of midribs are not always reliable for that purpose, so here the amalgamation of those two species is proposed:

Delisea pulchra Montagne, An. sc. nat. ser. 3, vol. 1, p. 158; Harvey, Phyc. auster. vol. 1, pl. 16.
Syn. *Delisea japonica* Okamura, Icon. of Jap. alg. vol. 1, p. 139, pl. 29.

Galaxaura distenta Harv. and Peyssonnelia involvens Okam.

Text-fig. 1. Pl. VI, Fig. 7

Galaxaura distenta Harv. was described very briefly by Harvey (Char. of new alg. chiefly from Jap. etc.) and it has puzzled us for a long time. In Dublin there is only one specimen under the present specific name, so undoubtedly it represents the type. It was collected

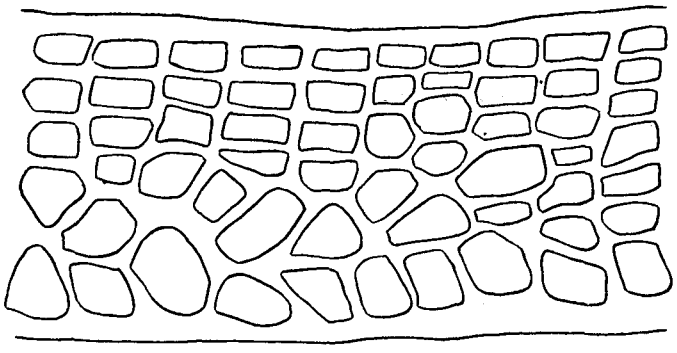

Fig. 1. Transverse section through the frond of the type specimen of *Galaxaura distenta* Harv.
×about 500.

by C. Wright in the "Eastern archipelago, Ousima". Having examined the structure of the frond of this specimen, I found that this is not *Galaxaura* at all, but a species of *Peyssonnelia*, and also that this is the same thing as the Japanese plant which will be mentioned below.

On the other hand Dr. Okamura referred his only specimen from Formosa to *Peyssonnelia involvens* Zanard. and gave illustration of it (Icon. of Jap. alg. vol. 2, p. 27, pl. 57) adding that because he had only one specimen and he had not been able to examine any authentic specimen of Zanardini's species to compare with it, his determination was provisional. In the same herbarium in Dublin there are three specimens collected "ad littora Yamensia" and determined by Montagne as *Peyssonnelia involvens* Zanard. They grow on the stem of some sea-phanerogame? in company with *Chondrococcus* showing a striking resemblance to Zanardini's figure (Plant. mar. rubr. p. 269, pl. 9, fig. 2) and representing quite a different plant from our Japanese specimens. So it is clear that *Galaxaura distenta* Harv. is the same thing as *Peyssonnelia involvens* Okam. (non Zanard.) and it has nothing to do with Zanardini's species. Consequently we must make the following combination:

Peyssonnelia distenta (Harv.) comb. nov.
Syn. *Galaxaura distenta* Harvey
Syn. *Peyssonnelia involvens* Okam. (non Zanardini)

Callophyllis palmata spec. nov.

Pl. III, Fig. 2.

Frons 25 cm. alta, circa 280–300 μ crassa, membranacea, coccinea vel leviter fuscessens, 3–4 plo palmata vel dichotoma, stipite brevi ornata; stipite tereti, 0.5–1.0 cm. longo; segmentis circa 3 cm. latis sed infra ramificationem multo latioribus, in latitudinem deorsum cuneatim decressentibus, apice rotundatis, margine minute undulatis, parvis tuberibus instructis; cystocarpiis rotundatis, diam. circa 1 mm. latis, leviter elevatis, per totam superficiem frondis praeter ad basin sparsis; tetrasporangiis et antheridiis ignotis.

Hab. Ōhara, Kazusa Prov.; Enoshima, Sagami Prov.

Frond up to 25 cm. high, about 280–300 μ thick, membranaceous, scarlet in colour or slightly dark, 3–4 times palmately or dichotomously

divided; provided with a short stipe; stipe cylindrical, 0.5–1.0 cm. long; segments about 3 cm. wide, but much wider below the ramification and the width decreasing cuneately toward the base; margins finely undulate, provided with small protuberances; cystocarps rounded, about 1 mm. in diameter, slightly elevated, scattered over the surface of the frond, except near the very base. Tetrasporangia and antheridia unknown.

The present new species is a very distinct one, the frond attaining a considerable size and showing vividly scarlet colour. *Callophyllis crispata* Okam. bears some resemblance to this species but is easily distinguished by its special spine-like protuberances on cystocarps and their marginal position. Some specimens of *C. pinnata* Setch. et Sw. from the West coast of North America show some likeness to the present species, but its thick frond and large cystocarps separate our Japanese species from it very easily.

When I collected my specimens in Enoshima, they appeared to me to belong to the above mentioned species described by Dr. Okamura, but after some very nice specimens with cystocarps had been found in the herbarium of Prof. Yendo, I am obliged to consider them as a new species. My specimens from Enoshima were found all cast ashore, probably they grow in the sublitoral region.

Acrosorium flabellatum spec. nov.

Pl. IV, Fig. 3.

Frons 15 cm. alta flabellata, breve stipitata, in speciminibus adultis, mox palmatim divisa; stipite circa 1–1.5 cm. longo; segmentis 1–1.5 cm. latis, 70 μ crassis, lineis tenuibus longitudinalibus instructis, repetite palmatis vel saepe alternato-pinnatis, ramificatione in parte superiore irregularibus; ramulis ad extremitatem saepe curvatis; ramulis ultimis brevibus spinosis secundiis ornatis; venis tenuissimis ipse ad ramulos ultimos instructis; cystocarpiis et tetrasporangiis ignotis.

Hab. Ōhara, Kazusa Prov.; Enoshima, Sagami Prov.

Frond up to 15 cm. high, shortly stipitate in the well grown specimens, soon dividing palmately; stipe about 1–1.5 cm. long; segments about 1–1.5 cm. wide, 70 μ thick, provided with fine longitudinal lines, dividing palmately again, but somewhat alternate-pinnately upwards, thus forming a flabellate outline and branching irregularly in the upper part of segments, branchlets near the end often curved bearing short spine-like branchlets disposed secundly; microscopic fine veins are clear even in small branchlets; cystocarps and tetrasporangia unknown.

Acrosorium flabellatum grows on stones in the sublitoral zone instead of the frond of other algae as is often the case in *A. uncinatum* Kylin, to which the present species is closely related. But *A. flabellatum* is different from the other by having a stronger frond, which divides palmately forming a flabellate outline and by being provided with some fine longitudinal lines on the lower part of the frond, though they are not very conspicuous macroscopically. Dr. Okamura gives some good illustrations under *Nitophyllum uncinatum* J. Ag. (Icon. of Jap. alg. vol. 1, p. 121, pl. 26) and remarks that the Japanese specimens which he referred to *N. uncinatum* J. Ag. are exceedingly variable in habit. So I am afraid that some specimens belonging to the present species may be mixed there with true *A. uncinatum* Kylin.

Pseudophycodrys pacifica spec. nov.

Pl. II, Fig. 1.

Although to my great regret I did not have the opportunity to visit Leningrad during my stay abroad in 1928–1930 where the herbarium of Ruprecht is preserved, I have seen a specimen of *Delesseria* distributed from the "Herb. Acad. Petrop." among Harvey's specimens in Dublin. It was collected at "St. Paul, Mare Camtshaticum" and is accompanied by a label on which one reads the name of *Delesseria crassifolia* Rupr. most probably in Ruprecht's handwriting, so it seems to me that we have here a cotype specimen of Ruprecht. Looking at that specimen I was very much surprised to find that our specimens from the northern

parts of Japan referred by us to the present species and figured by Dr. Okamura in his Icones (vol. 4, pl. 168) under the name of *D. crassifolia* Rupr. are quite different in habit from Ruprecht's specimen having a much more robust frond.

On the other hand Kylin established a new genus *Ruprechtiella* (Studien über die Delesseriaceen, p. 53) based upon this Ruprecht's species and arranged it in his analytical key of the genera of the Delesseriaceae he studied. According to him, *Ruprechtiella* Kylin is placed in the *Ruprechtiella*-group which is to be found in the *Nitophylleae*, its main nerves showing no rhizoidal cells and its leaves being monostromatic.

Coming back to our Japanese specimens, they are also quite different in structure from the description of *Ruprechtiella* given by the namer of the genus. So, judging from the differences in habit as well as in structure of the frond as above mentioned, it seems to me to be most probable that the Japanese specimens which have passed among us as *D. crassifolia* Rupr. are quite different genetically from Ruprecht's species, viz. *Ruprechtiella crassifolia* Kylin. As has been found by Dr. Okamura, in the Japanese specimens there are rhizoidal cells in the midrib, and leaves are not monostromatic except at the margin. From the characteristics of our specimens, they are to be placed under the genus *Pseudophycodrys* representing a new species for which a new name *P. pacifica* is proposed.

With regard to the name of *Ruprechtiella* Kylin, because the late Prof. Yendo had used the same name for a genus of Phaeophyceae, Prof. Kylin proposed a new name *Yendonia* for embracing Ruprecht's species.

Acrosorium Yendoi spec. nov.

Pl. V, Fig. 4.

Syn. *Nitophyllum monanthos* Yendo (non J. Agardh) exc. syn., Notes on alg. new to Jap. VIII, p. 69. in Tokyo Bot. Mag. vol. 32;

Yamada, Mar. alg. Mutsu Bay and adjac. waters. II, p. 250, in Science Rep. of Tohoku Imp. Univ. 4. Series, Biology, vol. 3.

A small creeping species of Delesseriaceae has been referred, though with some doubt, by the late Prof. Yendo to *Nitophyllum monanthos* J. Ag. He gave a rather precise description of our Japanese form and compared it with the authentic specimens. When I got some specimens of it from Mutsu Bay, I followed his determination. But last year, when I was staying at Lund, I examined the type specimen of *N. monanthos* J. Ag. by kind permission of Prof. Muerbeck and Prof. Kylin, and also reexamined my own specimens and came to the conclusion that ours are quite different from the original specimen of J. Agardh not only specifically, but also genetically, being such that they ought to be referred to the genus *Acrosorium*. So I named our plant after our Japanese phycologist, Prof. K. Yendo.

Heteronema japonica spec. nov.

Text-fig. 2. & Pl. V. Fig. 5.

Frons circa 12 cm. et ultra alta, 1.0–1.5 cm. lata, radicibus stoloniferis tenuibus adfixa, ex marginibus repetite bi-tri-pinnata, costata, sed in partibus superioribus frondis inconspicue costata, in partibus inferioribus frondis nervis alternis inconspicuis ornata, microscopice enervosa, ad marginem undulata et irregulariter dentibus brevibus armata; tetrasporangiis per superiorem partem frondis in soris parbis sparsis; cystocarpiis et antheridiis ignotis.

Hab. Ōhara, Kazusa Prov.

Frond 12 cm. high or more 1.0–1.5 cm. wide, attached to the substratum by means of slender stolon-like roots, repeatedly bi-tri-pinnately branched from the margins; margins undulate and irregularly beset with fine teeth; midribs inconspicuous in the upper part of branches, in the lower part there are some inconspicuous, alternate veins, though not many in number; microscopic veinlets absent; tetrasporangia

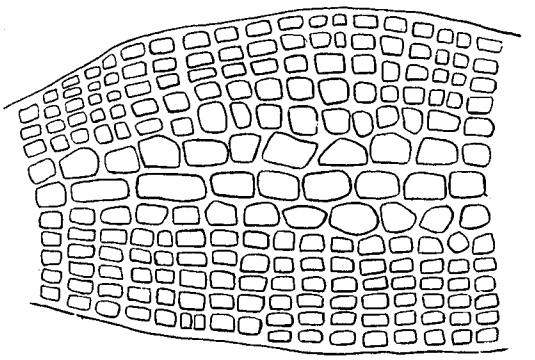

Fig. 2. *Heteronema japonica*

Transverse section of the frond. ×about 100.

scattered in small sori over the upper parts of the frond; cystocarps and antheridia unknown.

In July, 1925, I found several specimens of the present species in the locality given above, all having been cast ashore. I have never seen it growing near that place; it may grow in the deep water.

According to Kylin (Studien über Delesseriaceen) there are no veins in *Heteronema* while in *Halicnide* opposite ones are conspicuous on the segments. In the present species, however, the lower parts of well grown specimens are provided with some alternate veins, though they are neither very conspicuous nor many in number.

Hypoglossum nipponicum spec. nov.

Pl. VI, Fig. 6.

Frons laxe intricata, pulvinata, diam. circa 9 cm. magna, semper ad nervos centralem ramosa; nervis centralibus ecorticatis, ex tres ordinibus cellularum elongatarum compositis; segmentis angustis, fere 1 mm. latis, longe lanceolatis, margine integris, in partem inferiorem frondis rhizoidibus ornatis; soris tetrasporangiarum ellipsoideis in segmentis superioribus frondis dispositis; cystocarpiis et antherdiis ignotis.

Hab. Shibagaki, Noto Prov.

Frond making a loosely entangled cushion-like body, in size about 9 cm. diam. branches always from the midrib; midribs not corticated, consisting of three rows of elongated cells; segments narrow nearly 1 mm. wide, long lanceolate, entire at the margins, in the lower part of the frond some rhizoids coming out and attaching to other segments, thus making the entire body cushion-like. Tetrasporangial sori occur in the upper segments in an ellipsoidal or round form. Cystocarps and antheridia unknown. Plant soft and adheres closely to the paper.

I found this species only once floating near the shore in the above locality in August, 1924. Probably they grow on rocks in the sublitoral region. They are much larger than the other two Japanese species of *Hypoglossum*: *H. barbatum* Okam. and *H. geminatum* Okam.

Fig. 1. *Pseudophycodrys pacifica.*
The type specimen. ×2/3.

Fig. 2. *Callophyllis palmata.*
The type specimen. ×7/12.

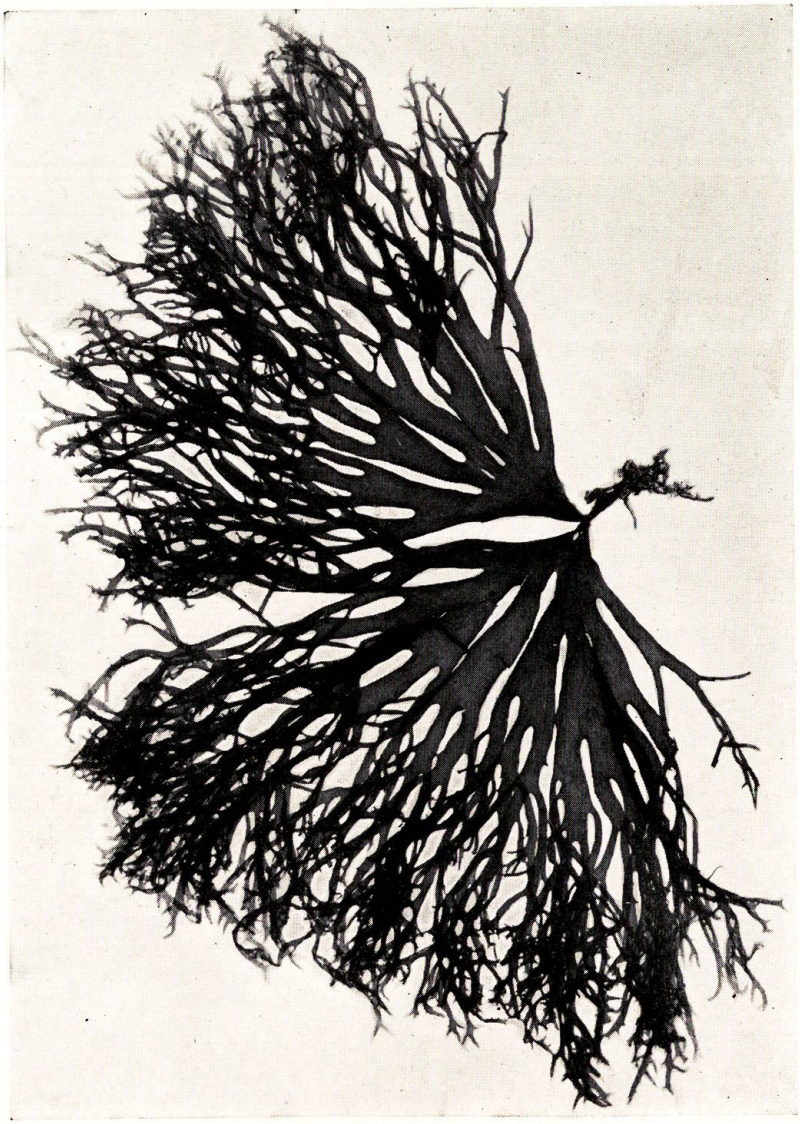

Fig. 3. *Acrosorium flabellatum.*
The type specimen. ×3/5.

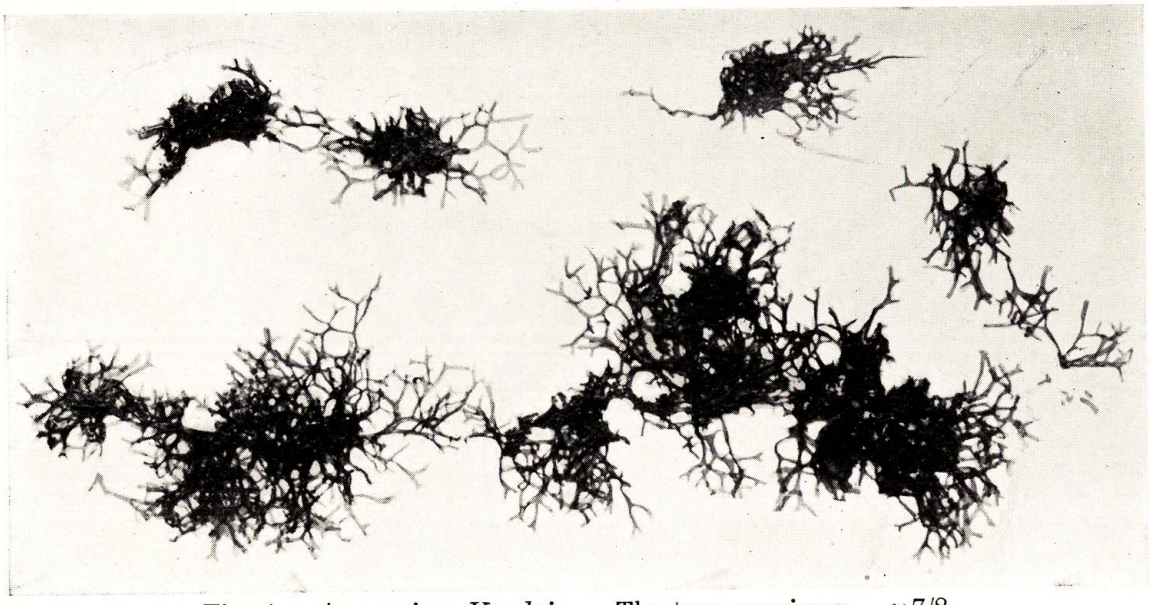

Fig. 4. *Acrosorium Yendoi.* The type specimen. ×7/8.

Fig. 5. *Heteronema japonica.*
The type specimen. ×3/4.

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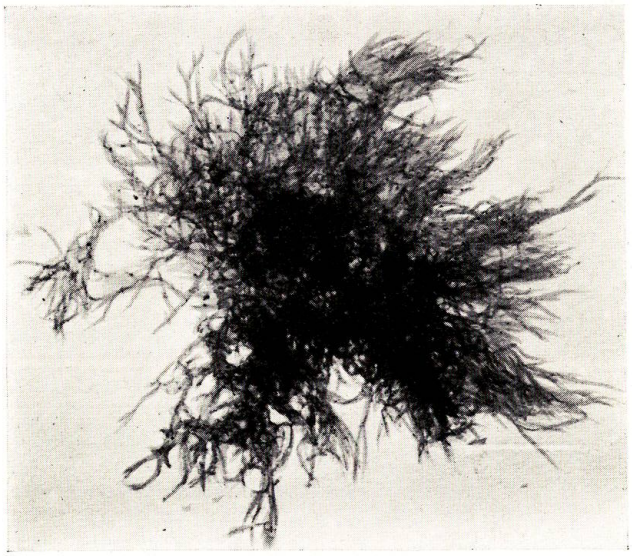

Fig. 6. *Hypoglossum nipponicum.*
The type specimen. ×8/9.

Fig. 7. *Peyssonnelia distenta.*
Two specimens from Formosa. ×1.