Notes on Some Japanese Algae VIII.

By

Yukio Yamada

With Plates XIX–XXXI.

Bornetella nitida Munier et Chalmas

"Obs. sur les algues appart. au groupe des Siph. vertic., Compt. rend. hebd. Acad. Sci., t. 86 (1877)"; Cramer, Ueber vertic. Siph. bes. Neomeris u. Bornetella (1890) p. 22, pl. 3, figs. 1–22; Solmes Laubach, Algengen. Cymopolia, Neomeris u. Bornetella (1893) p. 80; Weber van Bosse, Liste alg. Siboga, vol. 1 (1913) p. 89.

Japanese name: *Naga-mizutama.*

Hab.: Okinawa-zima and Isigaki-zima, Ryūkyū.

In April 1935 the writer collected two specimens of *Bornetella* in Isigaki-zima, Ryūkyū, which are to be referred to the present species. They were found on a coral block lying about 1 fathom deep. Moreover, Mr. Arasaki was so kind as to sending the writer two other specimens which belong also to the present species. He collected them in the island of Okinawa in August 1933.

Coilodesme Cystoseirae (Ruprecht) Setchell et Gardner

Plate XIX.

Alg. N. W. Amer. (1903) p. 241, Mar. alg. Pacif. coast N. Amer., Melanophyc. (1925) p. 583.

Syn. *Asperococcus Cystoseirae* Ruprecht, Tange Och. Meeres (1851) p. 370.

Syn. *Coilodesme linearis* Saunders, Alg. Harriman Exped. (1901) p. 241, pl. 48.

Not *Coilodesme Cystoseirae* Okamura, Icon. Japan. alg., vol. 4 (1918) p. 55, pl. 144, figs. 10–13.

Japanese name: *Hoso-ezobukuro.*

Hab.: Rausu (T. Tanaka), Nemuro Prov.; Akkesi, Kusiro Prov.

Recently some specimens which exactly coincide with the descriptions of this species were found in Rausu and Akkesi on the eastern coasts of

Hokkaidō. They have a much narrower frond than in the alga which has been referred to *C. Cystoseirae* SETCH. et GARD. by OKAMURA. As OKAMURA's *C. Cystoseirae* is quite different from the present species both in habit and in histological characteristics, the former will be described below as a new species.

Coilodesme japonica YAMADA spec. nov.

Plate XX.

Syn. *C. Cystoseirae* OKAMURA (non SETCHELL et GARDNER), Icon. Japan. alg., vol. 4 (1918) p. 55, pl. 144, figs. 10–13.

Frons cylindrica, ca. 8–50 cm (plerumque 8–30 cm) longa et ultra, ca. 1–5 cm (plerumque 2–3 cm) diam., saccata, deinde collabens et rugosa, apice rotundata, ad basin breviter stipitata, ca. 80–90 μ crassa; tela intima ex 1–2 stratis cellularum hyalinarum magnarum, tela corticalis ex ca. 3 stratis cellularum parvarum constructa. Zoosporangia in sectione transversa obovoidea, ca. 24–36 μ longa, 15–21 μ lata.

Japanese name: *Ezobukuro*.

Hab.: Southern and eastern coasts of Hokkaidō; Sikotan, Kuriles. (Type locality: Muroran, Iburi Prov., Hokkaidō).

Frond cylindrical, about 8–50 cm (mostly 8–30 cm) long or more, about 1–5 cm (mostly 2–3 cm) wide, saccate, afterward collapsing especially because of ruptures and becoming wrinkled, rounded at the apices, tapering abruptly at the base to a very short stipe 1–2 mm long, the wall about 80–90 μ thick, the interior tissue composed of 1–2 layers of large colourless cells, the cortical tissue composed of about 3 layers of small cortical cells. Zoosporangia obovoid in cross section of the frond, about 24–36 μ long, 15–21 μ wide.

Epiphytic on *Cystophyllum hakodatense* YENDO by means of a small discoid root the interior of which is composed of rhizoidal filaments.

The present alga is very abundantly found in the above mentioned localities growing almost always on *Cystophyllum hakodatense* YENDO, and has been referred by OKAMURA to *Coil. Cystoseirae* SETCH. et GARD. But according to the descriptions and figures of RUPRECHT, SAUNDERS, SETCHELL and GARDNER, etc. *Coil. Cystoseirae* seems to have a very slender frond and not to be identical with the alga in question. The present specimens rather resemble *Coil. californica* (RUPR.) KJELLM. especially in general aspect, but in this species the frond becomes much thicker, and also the thickness of the wall of the frond is greater than in *Coil. japonica*.

Sargassum Yendoi OKAMURA et YAMADA spec. nov.

Plates XXI–XXII, and Text-fig. 1–2.

Frons ca. 40–50 cm alta; radix discum parvum formans, ca. 5 mm diam. et ultra; caulis ancipito-complanata, 3–4 mm lata, ramos alternatos regulariter pinnatim ex marginibus emittens; folia inferiora lineari-lanceolata, fere sessilia, tenuiter membranacea, ca. 5–6 cm longa, ca. 1 mm lata, acute dentata vel duplicato-dentata vel obsoleta, ad apicem acutiuscula, ad basin leviter obliqua, evidenter costata, cryptostamatibus minutis sine ordine glandulosa; folia superiora ad marginem ramorum regulariter distiche disposita, linearia, ca. 2–10 cm longa, ca. 2–5 mm lata, breviter stipitata vel sessilia, apice acuta vel raro obtusa, basi leviter obliqua, ad marginem acute dentata, saepe obsoleta, evidenter costata, cryptostomatibus prominentibus ornata; vesiculae ovoideae vel pyriformes vel fere sphaericae, ca. 6–8 mm longae, longe stipitatae, apice muticae, glandulosae vel eglandulosae, petiolis compressis, semper ipsos superantibus ornatae; receptacula magnitudine ramificationeque varia, nunc laxe racemosa nunc dense fere cymosa, cylindrica vel leviter compressa, verrucosa.

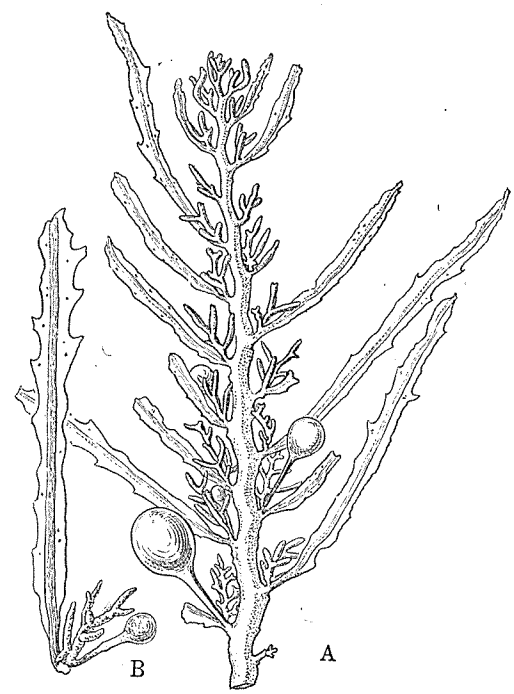


Fig. 1. *Sargassum Yendoi* OKAM. et YAMADA.
A specimen from Enosima.
A. ×1. B. ×5/3

Japanese name: *Yendō-moku.*

Hab.: Enosima and Hayama, Sagami Prov. (Herb. Biolog. Labor., Imp. Palace, Tokyo); Arasidomari near Simoda, Izu Prov. (S. SEGAWA).

Frond about 40–50 cm high; root a small disc, about 5 mm in diam. or more; stem ancipito-complanate, 3–4 mm broad, sending branches from the margins regularly in alternate manner; basal leaves sometimes distinct

sometimes not, distinct ones linear-lanceolata, nearly sessile, thinly membranaceous, about 5–6 cm long, about 1 cm broad, sharply simple- or duplicato-dentate or obsolete especially in old specimens, somewhat acute at apices, slightly oblique at the base, provided with a distinct percurrent midrib, cryptostomata minute, scattered here and there without any regularity; upper leaves arranged regularly distichously on branches, linear, about 2–10 cm long, about 2–5 mm broad, shortly stipitate or sessile, slightly oblique at base, acute or rarely obtuse at apices, at margins sharply dentate but often obsolate, midribs very clear, reaching the apex, cryptostomata prominent; vesicles ovoid or pyriform or nearly spherical, about 6–8 mm long, longly stalked, at apex smooth, provided with a few cryptostomata or not, petioles very long, always longer than the length of the vesicle itself, especially long in small vesicles, compressed evidently upward;

Fig. 2. *Sargassum Yendoi* OKAM. et YAMADA.
A specimen from Arasidomari, near Simoda. A. ×1. B. ×5/3.

receptacles widely variable in branching and size, sometimes racemose and rather loose, sometimes nearly cymose and dense, nearly cylindrical or slightly compressed, verrucous, but not spinose. Frond becoming black or deep brown in drying.

There are several specimens from three different sources as mentioned above; the first ones from Hayama, the second from Enosima, and the third from Arasidomari, near Simoda, Izu Prov. The specimens from the first two localities are very much alike, so much so that there is scarcely any doubt about their identity though there are some divergences in receptacles. Those of the specimens from Enosima are evidently racemose and rather loose, while those of the specimens from Hayama are much denser and show a tendency toward being cymose. On the other hand the specimens from Arasidomari show slightly different habit. They are not so black and coarse on drying as the above mentioned specimens. The receptacles are very much denser than those of any of the above specimens and they are arranged in nearly cymose manner. These specimens from different localities might be taken as different species, especially the Arasidomari specimens from the others. The difference between the racemose receptacles of the specimens from Enosima and the cymose ones of those from Arasidomari, however, may be linked by the Hayama specimen, which, as mentioned above, has racemose receptacles showing a tendency toward being cymose.

In receptacles of all these specimens antheridia are very commonly found, but no oogonium has been observed.

The affinity of the new species to other ones is not clear at the present time. The writer has considered some relation of this species to *S. Swartzii* J. Ag., but Prof. W. A. Setchell, to whom the writer showed the specimens at Berkeley suggested that there may be some affinity to *S. Boryi* Ag.

Callymenia sagamiana Yamada spec. nov.

Plate XXIII.

Frons irregulariter expansa, foliacea, ca. 20 cm lata, irregulariter lobata vel in segmenta incisa; segmentis saepe lobatis vel undulatis, margine spinulosis. Frons ca. 1200–1400 μ crassa; filamentis medullaribus densis, ca. 10–12 μ crassis; tela corticalia 5–8 stratosa, cellulis extra gradatim minoribus; tetrasporangiis per totam frondem sparsis.

Japanese name: *Ō-tukasanori.*

Hab.: Hayama, Sagami Prov. (Herb. Biolog. Labor., Imp. Palace, Tokyo); Simoda, Izu Prov. (S. Segawa).

Frond expanding irregularly leaf-like, about 20 cm across, adhering to the substratum with the under surface of the basal portion, irregularly lobed or deeply split into segments; segments often again split or undulate, at margin provided with fine sharp spine-like protuberances. Frond about 1200–1400 μ thick, medullary filaments dense, about 10–20 μ thick; cortical layer consisting of 5–8 layers of cells becoming gradually smaller outward; tetrasporangia scattered all over the surface of the frond, irregularly shaped and divided.

Carpopeltis Okamurai TH. ARWIDSSON

Syn. *Carpopeltis elata* OKAMURA, Icon. Japan. alg. vol. 2 (1909) p. 71, pl. 69.

Syn. *Prionitis elata* OKAMURA, Contr. knowl. mar. alg. Japan, III (Bot. Mag. Tokyo, vol. 13, 1899) p. 8, pl. I, figs. 1–2.

Japanese name: *Naga-kintoki.*

Dr. TH. ARWIDSSON in Stockholm, Sweden, called our attention to the fact that binomial *Carp. elata* had already been applied by FR. SCHMITZ to a species of Africa. He proposed a new name *C. Okamurai* in a letter.

Erythroglossum pulchrum YAMADA spec. nov.

Plate XXIV, 1.

Frons 3–4 cm alta, 0.5 mm lata in partibus latissimis, repetite fere dichotoma, in partibus inferioribus ramos breves, superioribus et breves et longiores dense pinnatim e marginibus emittens, nervis centralibus et nervis microscopicis destituta; rami breves longique iterum brevibus ramulis pinnatis ad margines instructi; ramuli ultimi lanceolati vel spathulati, apice obtusi vel acuti, ad marginem dentati.

Sori tetraspoarngiorum plerumque ad superiores partes ramulorum ultimorum producti. Cystocarpia et antheridia ignota.

Japanese name: *Kusinoha-usubeni.*

Hab.: Hayama, Sagami Prov. (Hab. Biolog. Labor., Imp. Palace, Tokyo).

Frond 3–4 cm high, about 0.5 mm wide in broadest portion, several times nearly dichotomous, in lower portions sending out short branches, in upper portions sending out short as well as long branches densely in a pinnate manner from both margins. Both short and long branches again sending out short branchlets pinnately from margins; ultimate branchlets lanceolata or spathulate, rounded or acute at apices, dentate on margins. Both central nerves and microscopic veins wanting. Sori of tetrasporangia

produced mostly in the upper portion of ultimate branchlets. Cystocarps and antheridia unknown. Colour purpre red.

Gracilaria denticulata (KUETZING) WEBER VAN BOSSE

Plate XXV, 2.

Liste alg. Siboga, vol. 4 (1928) p. 432.

Syn. *Sphaerococcus denticulatus* KUETZING, Tab. Phyc. Vol. 19 (1869) p. 19, pl. 51, figs. e–g.

Japanese name: *Toge-kabanori.*

Hab.: Okinawa-zima, Ryūkyū. (S. SAKAGUTI)

Some time ago the writer received five specimens of *Gracilaria* from Mr. S. SAKAGUTI who collected them somewhere in Okinawa, Ryūkyū. They all are provided with cystocarps which show clearly that the specimens belong to *Gracilaria,* and coincide very well with the descriptions and figures of *Sphaerococcus denticulatus* KG. in Tab. Phyc. above quoted.

As to the specimens of F. SCHMITZ from Africa which are reported by MAZZA (Nouva Notarisia, 1907, p. 188) it is not clear, as already mentioned by Me. WEBER VAN BOSSE (l. c.), that they are the same as KUETZING's ones.

Gracilaria purpurascens J. AGARDH

Plate XXV, 1.

Till Alg. Syst., IV (1885) p. 63; DE TONI, Syll. alg., vol. 4 (1900) p. 454, vol. 6 (1924) p. 271; WEBER VAN BOSSE, Liste alg. Siboga, vol. 4 (1928) p. 437.

Syn. *Gracilaria denticulata* OKAMURA (non SCHMITZ), Mar. alg. Kōtō-sho (Bull. Biogeogr. Soc. Japan, vol. 2, 1931) p. 113.

Syn. *Rhodymenia purpurascens* HARVEY, Ceylon Alg., no. 96 (nomen nudum).

Japanese name: *Murasaki-kabanori.*

Hab.: Naha, Ryūkyū; Daibanratu, Formosa.

In Ryūkyū as well as in Formosa the present species of *Gracilaria* is distributed very commonly and the specimens agree fairly well with the description given by J. G. AGARDH as well as with HARVEY's Ceylon alga quoted above.

The late Dr. K. OKAMURA identified a specimen of *Gracilaria* collected by K. SEGAWA in the Island of Kashōtō, Formosa as *G. denticulata* SCHM. with a querry. But this specimen is most probably to be referred to *Gr. purpurascens* J. AG.

Grateloupia carnosa YAMADA et SEGAWA spec. nov.

Plates XXVI–XXVII.

Frons ex parvo disco erecta, solitaria vel caespitosa, plana, ca. 15 cm alta et ultra, 0.5–3.0 cm lata, ad basin cuneatim attenuata, bis ternisve dichotoma, margine ramis pinnatim ornata, saepe ramulis in utrisque superficiebus prolifera; ramis ad basin saepissime constrictis, dichotome divisis vel ramulis pinnatis ad marginem ornatis. Cystocarpia minuta plerumque in ramulos producta. Frons substantia carnosa, corore purpurea, saepe flabescentia.

Japanese name: *Niku-mukade.*

Hab.: Hayama (Herb. Biolog. Labor., Imp. Palace, Tokyo) and Enosima, Sagami Prov.; Susaki near Simoda, Prov. Izu (S. SEGAWA).

Frond erect on a small disc, solitary or caespitose, flat except near the base, about 15 cm high or more, 0.5–3.0 cm wide, at the base cuneately narrowed and nearly cylindrical, twice or three times dichotomously divided with wide axils, at the margin provided with many branchlets in pinnate manner and often with ramuli on both surfaces; branchlets mostly constricted at the base, dichotomously branched or provided again with pinnate ramules at the margin. Cystocarps minute, produced mostly on branchlets. Substance carnose, deeply red in colour but often yellowish.

The habit of this species is extremely vairable mainly being due to the fact that the number of branches and branchlets varies greatly according to age and the conditions under which the alga grows.

The occurrence of the present species seems to be confined rather narrowly. It has been hitherto found only on the Pacific coast of the middle portion of Honsyū.

Halymenia polydactyla BOERGESEN

Plate XXVIII.

Some Ind. Rhodophyc. etc., II (Kew Bull. no. 3, 1932) p. 122, pl. 4.

Japanese name: *Kuro-nurakusa.*

Hab.: Hayama, Sagami Prov. (Herb. Biolog. Labor., Imp. Palace, Tokyo).

Of this species there are several dried specimens, which, however, are preserved in perfect condition, and bear tetrasporangia. They coincide well with the description of BOERGESEN, and differ from *H. Agardhii* DE TONI which is considered to be related most closely to the present species, and of which the writer has examined three specimens so determined by

OKAMURA in his herbarium, by their more robust frond and darker colour as already mentioned by BOERGESEN.

Rhodochorton Howei nom. nov.

Syn. *Rhodochorten affine* YAMADA (non DREW) Notes Japan. alg., III (Journ. Fac. Sci., Hokkaido Imp. Univ., Ser. V., vol. 1, 1932) p. 114.

Japanese name:

Some years ago the late Dr. M. A. HOWE called the writer's attention to the fact that in naming the present species of *Rhodochorton* he had overlooked the binomial, *R. affine*, which had been already used by Miss DREW. The present writer proposes the new name in honour of that much regretted phycologist in New York.

Scinaia pseudo-japonica YAMADA et TANAKA spec. nov.

Plate XXIV, 2, and Text-figs. 3–4.

Frons 5–6 cm alta, cylindrica, ca. 2 mm diam., continua, quinquies-sexies dichotoma, ramis fastigiatis, ad basin brevissime stipitata; axibus conspicuis praesertim in partibus inferioribus ornata; filo axiali filamentis gracilibus, ca. 3μ crassis, et crassioribus, ca. 15μ crassis composito; epidermide utriculis hyalinis et cellulis paucis gracilibus corolatis composito; utriculis superficie 5–7-goniis, in sectione transversa vallatoideis, ca. 25μ longis, 15–18μ latis; hypodermide 1–2 stratoso, cellulis globosis vel obovoideis vel ellipsoideis, 10×7μ; antheridiis in fasciculis parvis stellulatis; cystocarpiis pyri-

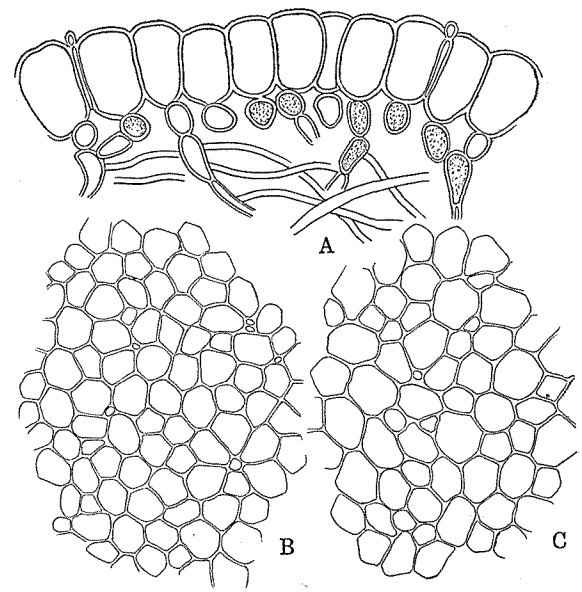


Fig. 3, A–B. *Scinaia pseudo-japonica* YAMADA et TANAKA.

A. Cross-section of frond. ×470.
B. Surface view of the utricles. ×140.
C. *S. japonica* SETCH. Surface view of the utricles. ×140.

formibus, collo breve ornatis, ca. 200–240μ longis; perdermio 2–3 stratoso, pseudoparenchymatico.

Japanese name: *Hime-husanori.*

Hab.: Taitō, Formosa.

Frond 5–6 cm high, cylindrical, about 2 mm in diameter, not constricted, 5–6 times dichotomously branched with wide axils in the lower part, but with narrower axils upwards—thus the branches fastigiate in the upper portion of the frond—near the base forming a very short (about 2–3 mm long) stipe giving off several main shoots, axis visible, especially evident in the lower part of the frond, colour dirty red.

Axial strand composed of numerous slender (about 3μ thick) filaments and a few large (about 15μ thick) ones. Epidermis composed of colourless utricles and a few small coloured cells, utricles 5–7-gonal in surface view, pallisade-like in section, about 25μ long, about 15–18μ broad. Hypodermis of 1–2 layers of globular or obovoidal or ellipsoidal coloured cells with a size of about 7×10μ. Antheridia in small stellate clusters. Cystocarps pyriform with short neck, about 200–240μ wide, periderm pseudoparenchymatous, composed of 2–3 layers.

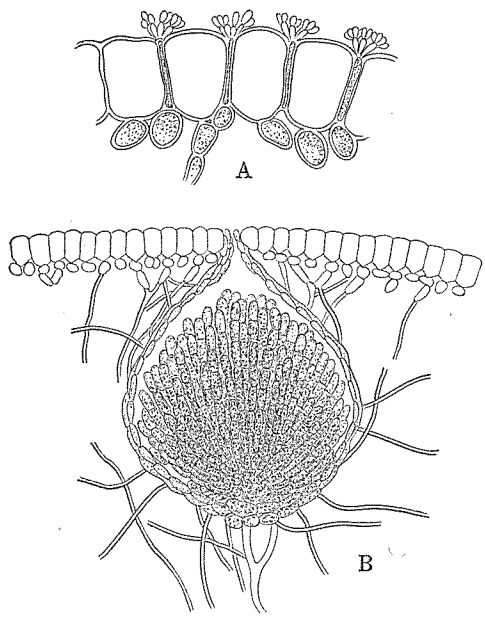


Fig. 4. *Scinaia pseudo-japonica* YAMADA et TANAKA.

A. Cross-section of the frond showing antheridial clusters. ×470.

B. The cystocarp. ×165.

The new species appears to be related most closely to *S. japonica* SETCHELL, but can be distinguished from it by both the outer appearance and the inner characters. The frond of the present species is smaller than that of *S. japonica* and the colour is also different, being somewhat dirty, while that is usually not the case in *S. japonica*. As to the anatomical characters both the utricles and the hypodermal cells of *S. pseudo-japonica* are smaller than those of *S. japonica*. The accompanying figures of the utricles of

both species seen from the surface, which are deliniated on the same scale will show this difference very clearly. Furthermore another difference can be seen in the shape of the cystocarps. In Formosa species the base of the cystocarps is not flat as it is the case in *S. japonica*. The writer has examined several specimens of *S. japonica*, which were collected in Enosima near the type locality and preserved in spirit. In those specimens the mature cystocarps show almost always a flattened base, while in *S. pseudo-japonica* the base is not flattened as is shown in the accompanying figure.

Sebdenia Okamurai YAMADA spec. nov.

Plate XXIX.

Frons membranacea, 10–20 cm alta, primo decumbens? dein erecta, per superficiem basis frondis adfixa, sessilis vel breviter stipitata, di- vel trichotome vel dichotomo-pinnatim ramosa, ca. 1.0 cm (—1.5 cm) lata, ad marginem saepe ramos ad basin cuneatim constrictos emittens, ramis ad apicem saepe emarginatis. Tetrasporangia nunc zonata nunc cruciata, sed saepissime irregulariter divisa. Cystocarpia minuta, ad superiorem partem frondis disseminata.

Japanese name: *Okamuragusa.*

Hab.: Hayama, Sagami Prov. (Herb. Biolog. Labor., Imp. Palace, Tokyo).

Frond membranaceous, 10–20 cm high, at first decumbent?, afterward erect, attaching to the substratum with the undersurface of the base, sessile or shortly stipitate, ramifying dichotomously or dichotomo-pinnately, often sending off branchlets being constricted at the base from the margins, at the extremities of branches not entire, often notched, about 1.5 cm wide in broadest portion, usually about 1 cm wide.

Tetrasporangia divided very irregularly, sometimes zonate, sometimes cruciate, but often showing very irregular divisions linking zonate and cruciate. Cystocarps minute, produced in the upper segments, showing inclination of being gathered. Colour dark red or blackish.

Sarcodia cuneifolia YAMADA spec. nov.

Plates XXX–XXXI.

Frons 15–20 cm alta et ultra, ex parvi disco exsurgens, sessilis vel breviter stipitata, sursum mox late vel cuneatim expansa, dichotome vel palmatim vel irregulariter divisa; segmentis plerumque 2–3 cm latis sed

mutabilissimis, ad spicem rotundatis linguiformibusque sed saepissime vulneratis, margine integris, ipse saepe triangularibus vel robos triangularem breviter stipitatem fere pinnatim vel irregulariter emittentibus. Tetrasporangia zonatim divisa, 50–70 $\mu \times$ 25–30 μ, per segmentis sparsa. Cystocarpia ad utresque superficies marginemque evoluta.

Japanese name: *Hiroha-atubanori.*

Hab.: Hayama, Sagami Prov. (Herb. Biolog. Labor., Imp. Palace, Tokyo).

Frond 15–20 cm high or more, at base a small disc, without stipe or sometimes provided with a short stipe scarcely 1 cm long, soon expanding widely or cuneately upwards, divided dichotomously or palmately or very irregularly; segments usually 2–3 cm broad, but extremely variable in breadth, rounded and tougue-shaped at apices but often injured, at margins smooth excepting cystocarpic portions, sending out several nearly triangular lobes in an irregular or nearly pinnate manner; triangular lobes often provided with a short stalk at base. Tetrasporangia zonately divided, about 50–70 $\mu \times$ 25–30 μ, scattered all over the surface. Cystocarps produced on both surfaces as well as on the margins of the segments.

The new species is to be distinguished from all the described species, especially from the Japanese species of *Sarcodia, S. Montagneana* according to OKAMURA and YENDO, by having broad triangular segments which are very clearly cuneate and often stipitate at the base. But Japanese specimens of *S. Montagneana* show also a tendency to send out proliferations which are cuneate at the base, and according to the descriptions both *S. Montagneana* J. AG. from New Zealand and *S. ceylanica* HARV. have also the same characteristic. But in *S. cuneifolia* this tendency is so apparent that it compels one to consider this alga as a distinct species.

PLATE XIX

PLATE 19

Coilodesme Cystoseirae (RUPRECHT) SETCH. et GARD.
A specimen from Rausu, Hokkaidō. × ca. ¾.

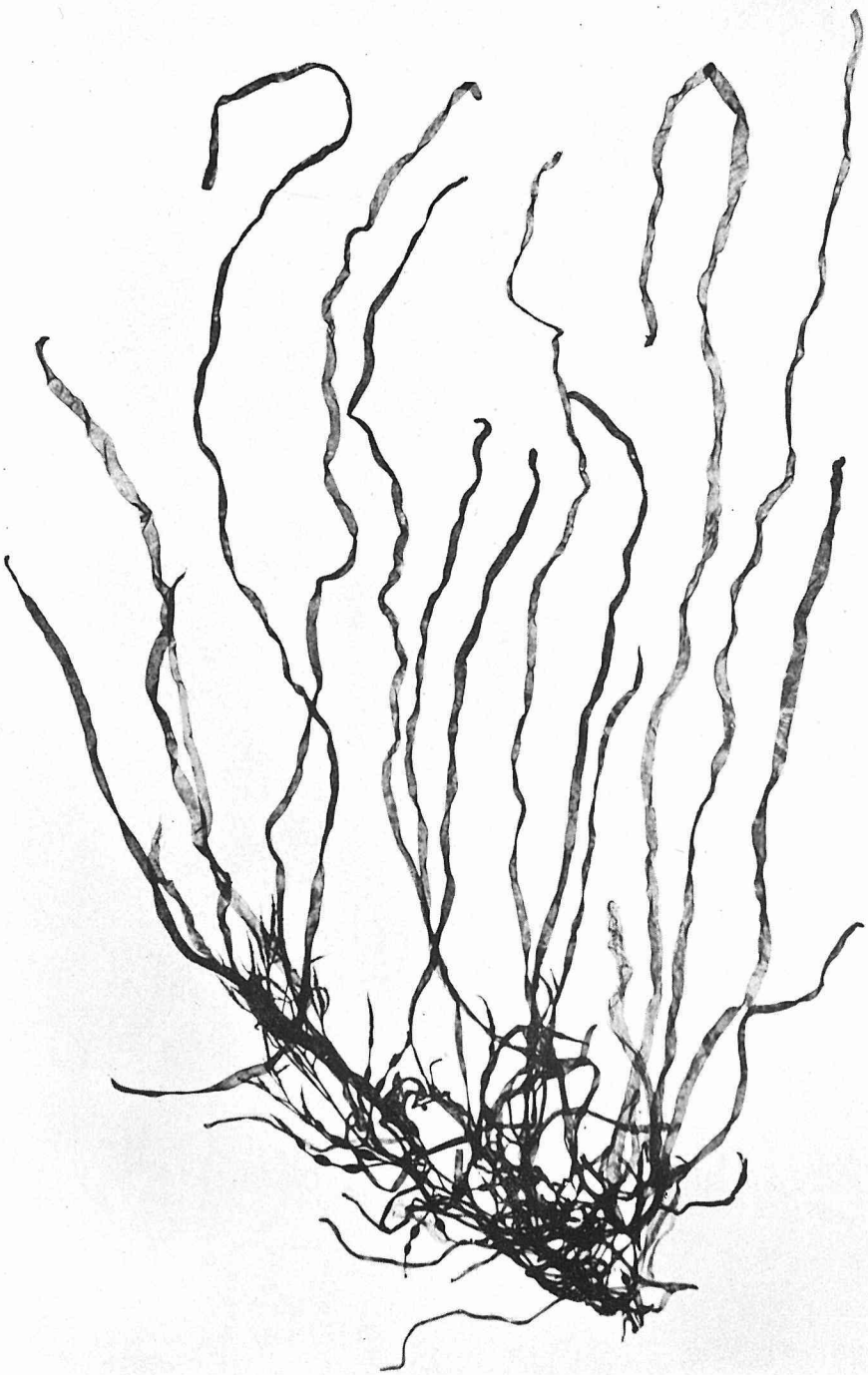


PLATE XX

PLATE 20

Coilodesme japonica YAMADA spec. nov.
A specimen from Muroran, Hokkaidō. × ca. 3/8.

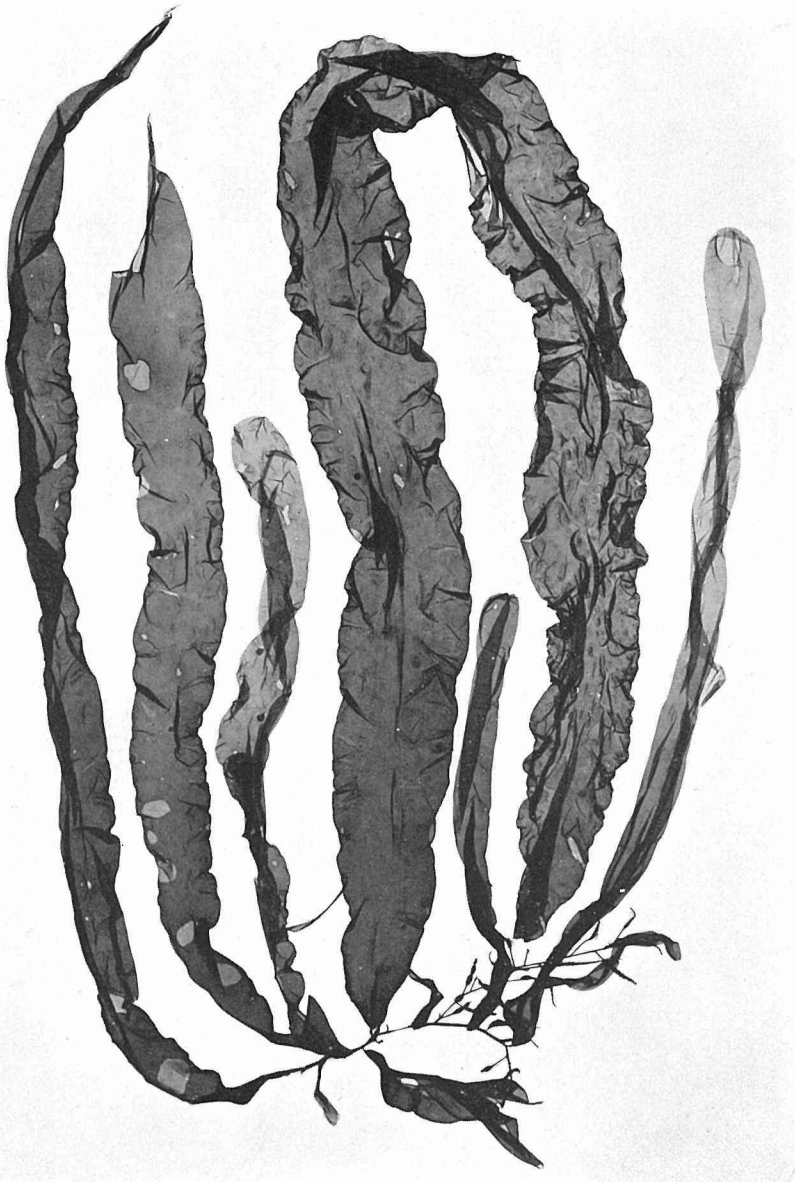


PLATE XXI

PLATE 21

Sargassum Yendoi OKAMURA et YAMADA spec. nov.
A specimen from Enosima. × ca. 4/7.

PLATE XXII

PLATE 22

Sargassum Yendoi OKAMURA et YAMADA spec. nov.
A specimen from Arasidomari, near Simoda, Izu Prov. × ca. 4/11.

PLATE XXIII

PLATE 23

Callymenia sagamiana YAMADA spec. nov. × ca. ⅔.

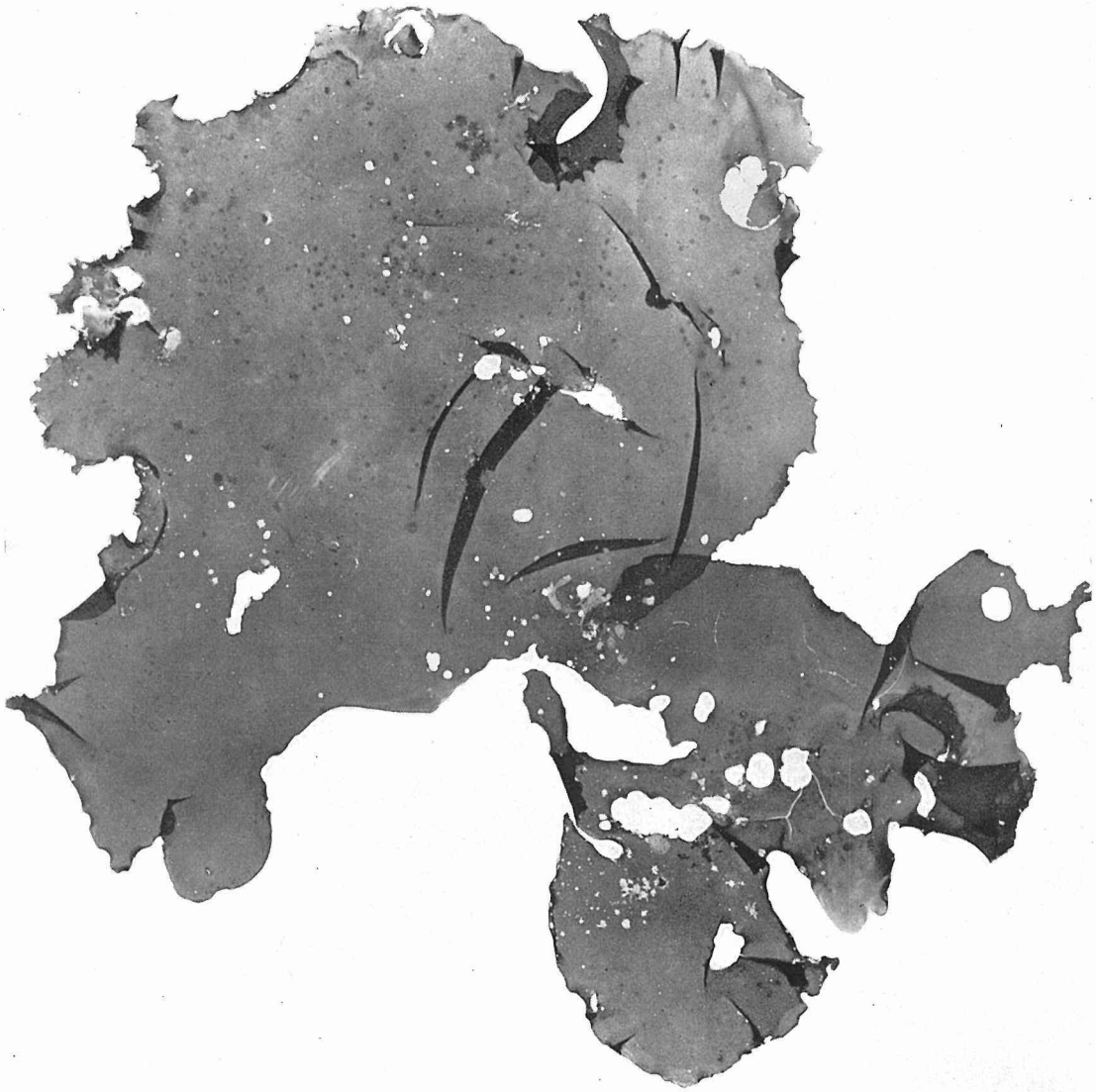
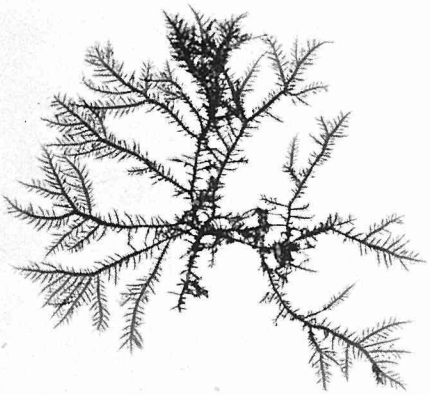


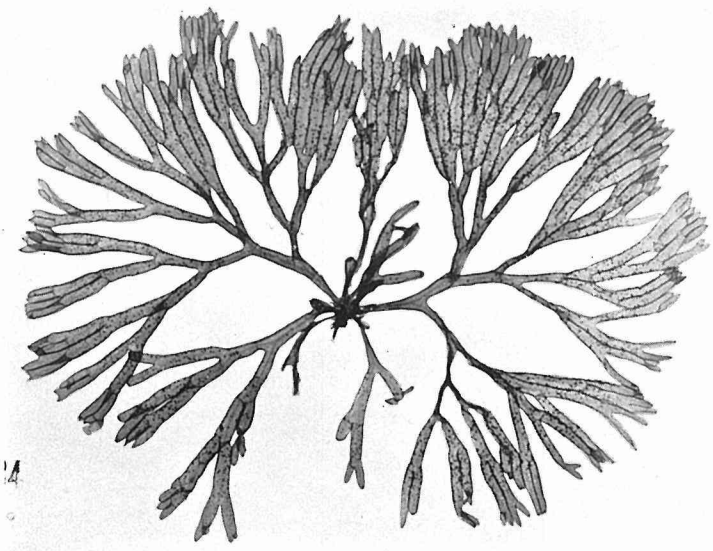
PLATE XXIV

PLATE 24

1. *Erythroglossum pulchrum* YAMADA spec. nov. × ca. 1.
2. *Scinaia pseudo-japonica* YAMADA et TANAKA spec. nov. × ca. 1.



1

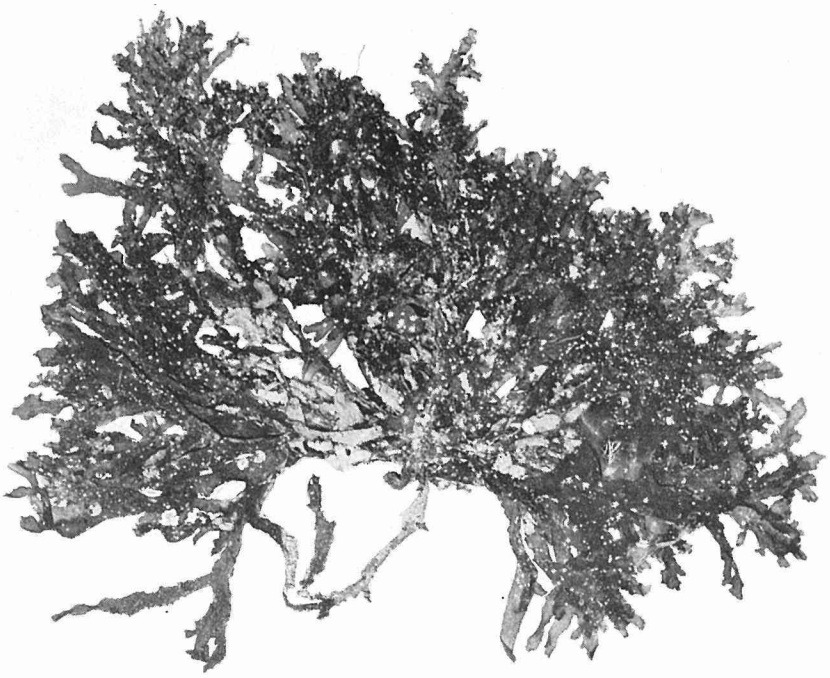


2

PLATE XXV

PLATE 25

1. *Gracilaria purpurascens* J. Ag.
   A specimen from Daibanratu, Formosa. ×1.
2. *Gracilaria denticulata* (Kg.) Weber van Bosse. ×1.



1

2

PLATE XXVI

PLATE 26

Grateloupia carnosa YAMADA et SEGAWA spec. nov.
A cystocarpic specimen from Susaki, near Simoda, Izu Prov. ×1.

PLATE XXVII

PLATE 27

Grateloupia carnosa YAMADA et SEGAWA spec. nov.
A sterile specimen from Susaki, near Simoda, Izu Prov. ×1.

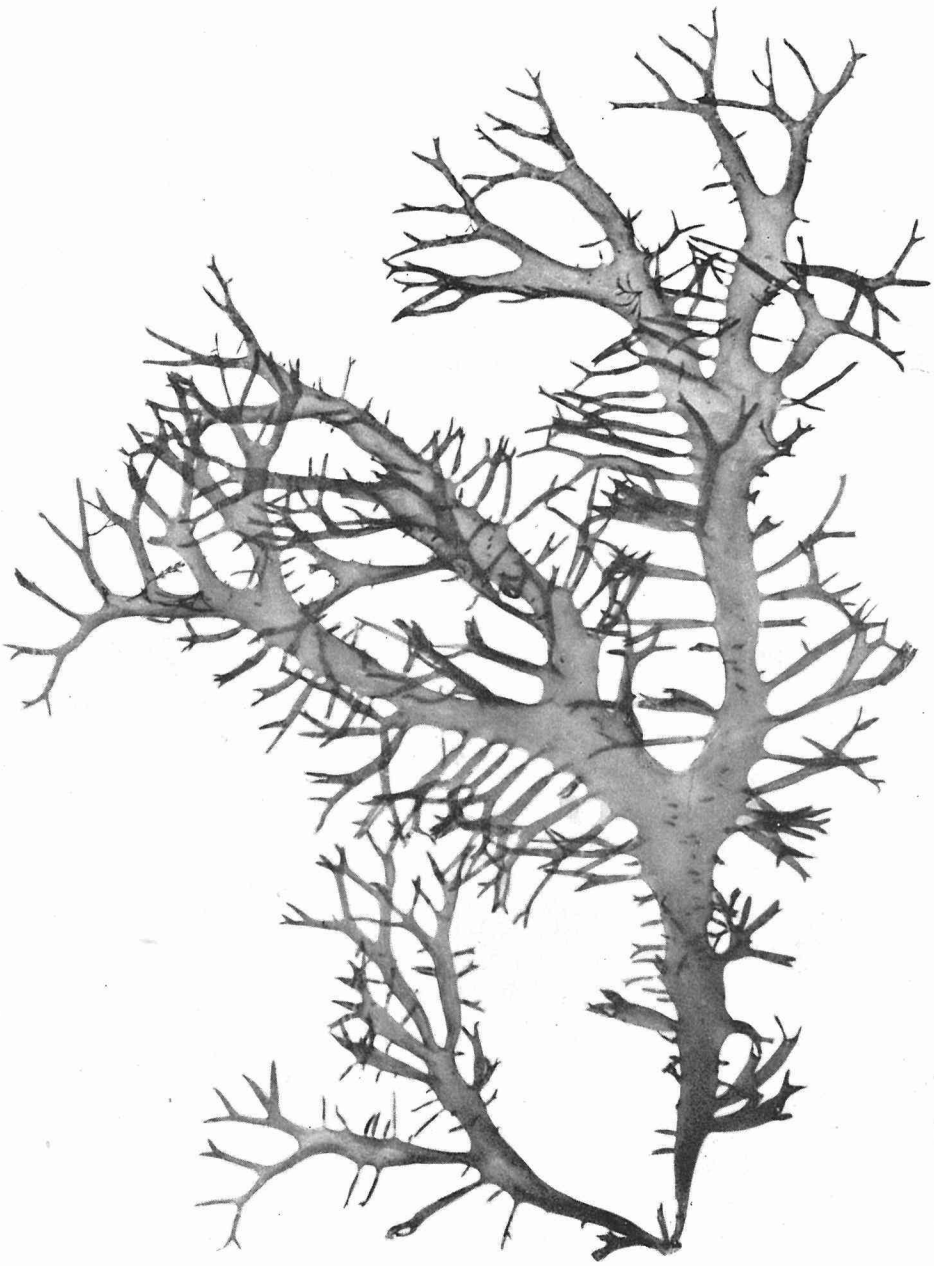


PLATE XXVIII

PLATE 28

Halymenia polydactyla BOERGESEN. Slightly reduced.

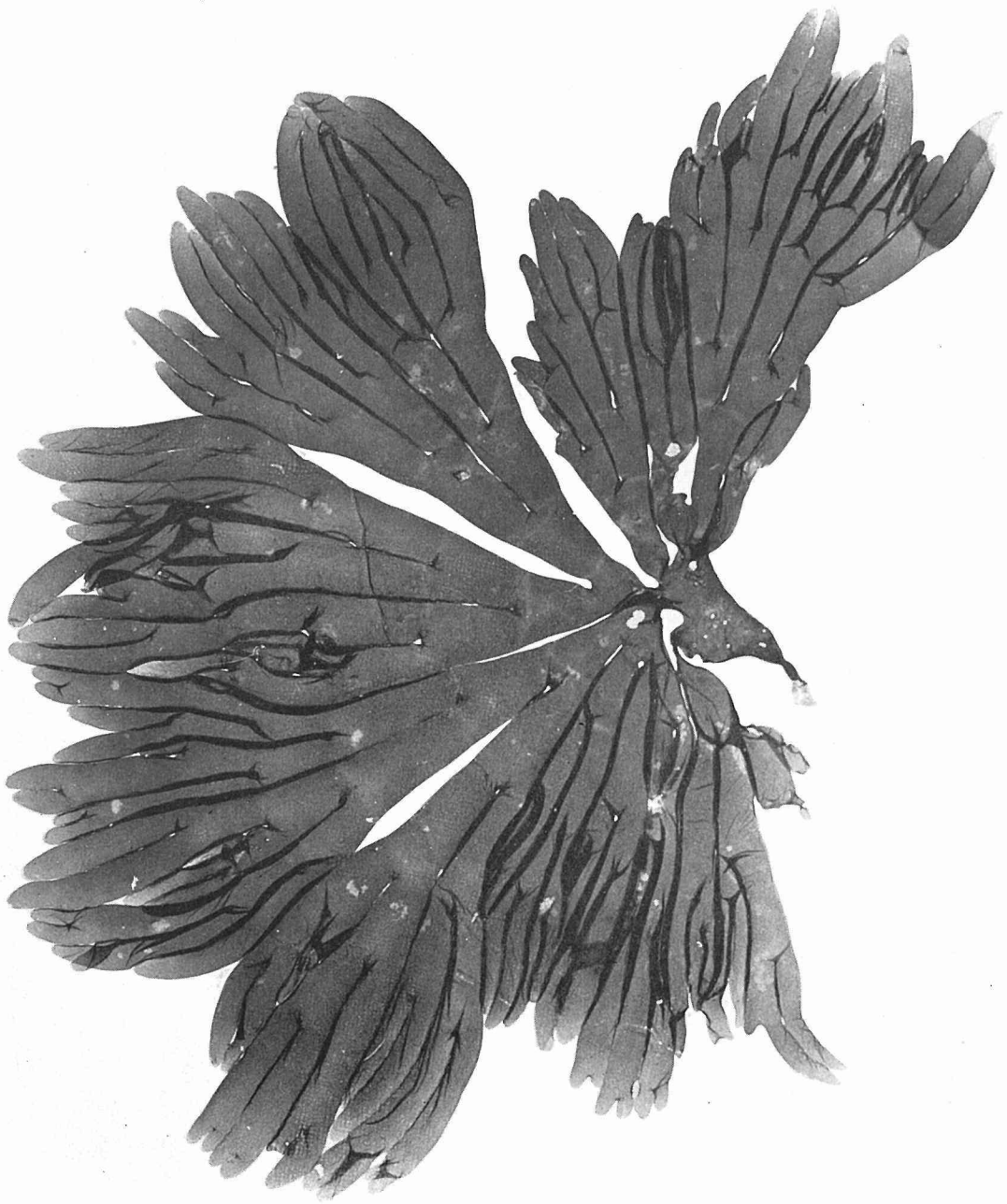


PLATE XXIX

PLATE 29

Sebdenia Okamurai YAMADA spec. nov.
A cystocarpic specimen. × ca. 1.

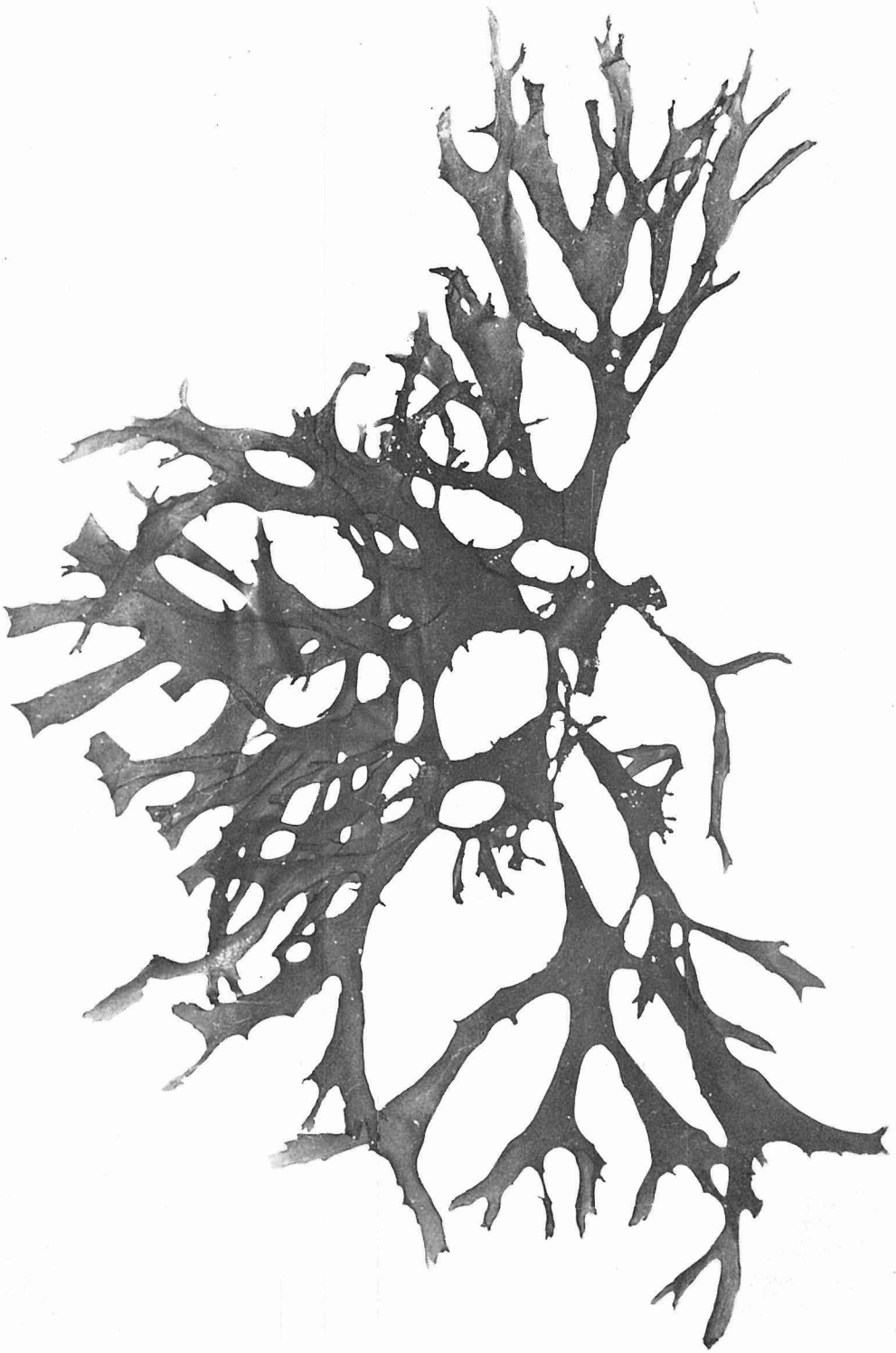


PLATE XXX

PLATE 30

Sarcodia cuneifolia YAMADA spec. nov.
A cystocarpic specimen. × ca. 6/7.

PLATE XXXI

PLATE 31

Sarcodia cuneifolia YAMADA spec. nov.
A tetrasporic specimen. × ca. 5/7.