

## Studies on Some Marine Algae from Southern Japan V

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## Studies on Some Marine Algae from Southern Japan-V

Takesi TANAKA

### Abstract

The marine algal deep sea surveys were made by the writer around Mage Island, Tanegashima, and Amami Islands since 1957. In the following papers some descriptions have been made of eight species; of these eight, five are new species and other two are species new to Japanese waters, and the other one is the species already reported by Dr. Takamine and Dr. Yamada, and recently by Dr. Ohmi of Japan.

### *Monostroma alittoralis* Tanaka et K. Nozawa spec. nov.

Pl. I, A and Text-figs. 1-2.

Frons 10-15 cm. alta et 8-12 cm. lata, membranacea, brevissime stipitata, ovato-lanceolata, non raro in 2-5 lobatas laciniata, marginibus undulatissima vel integerrima, in partibus inferioribus 57-95 $\mu$ , superioribus ca. 33-48 $\mu$  crassa, ad basin crassa et aliquantum costata; cellulis vegetativis a facie visis 5-6 $\mu$  angulato-rotundis in sectione thalli transversa oblongis; fila radicalia fibrosa infra cellulas producta; colore fulvo-virido. Planta typica in loco dicto Mage Island, Tanegashima, legit Tanaka et K. Nozawa, no. 19633, 25 June 1963.

Japanese name. Shinkai-hitoegusa.

Habitat. Mage Island, Tanegashima. Dredged from 60 meter's depth at coral

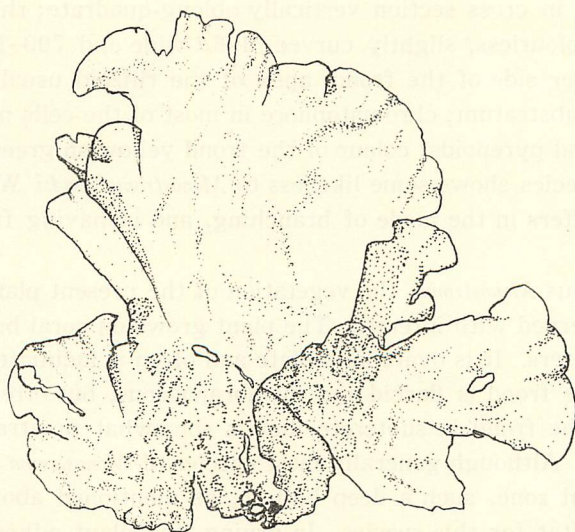


Fig. 1. *Monostroma alittoralis* Tanaka et K. Nozawa. Habit of a plant.  $\times \frac{2}{3}$ .

bottom.

Frond simple, ovate-lanceolate, often laciniate into two or five lobes, 10–15 cm. high, 8–12 cm. broad, somewhat undulate or entire on the margins, membranaceous, short cuneate stipe, margins smooth having no microscopic teeth; basal portion of the frond somewhat costate; membrane monostromatic, 57–95 $\mu$  thick as to the basal and 33–48 $\mu$  thick on the margins, covered with rather thin outer walls; cells in surface view 5–6 angled with round corners, about 32–38 $\mu$  long,

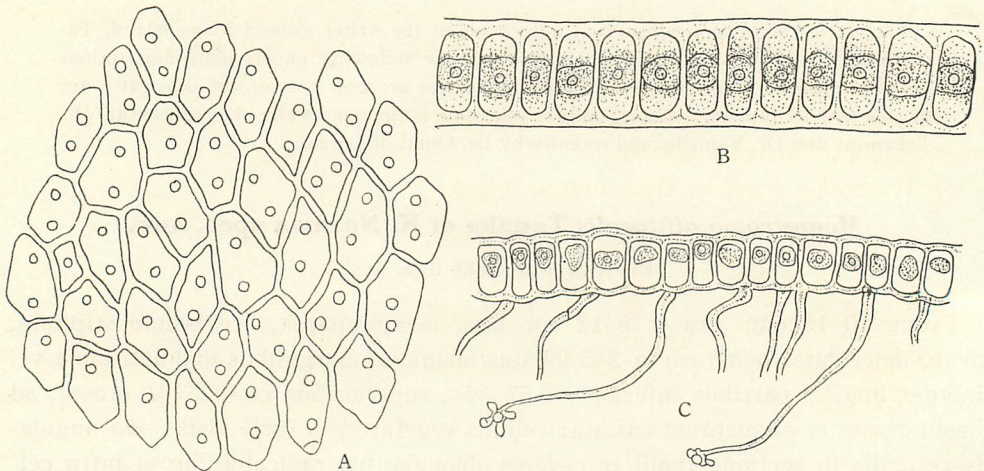


Fig. 2. *Monostroma alittoralis* Tanaka et K. Nozawa.

A. Surface view of the upper part of the frond.  $\times 270$ .

B. Longitudinal section of the frond.  $\times 150$ .

C. Longitudinal section of the basal part of the frond.  $\times 90$ .

and 22–27 $\mu$  wide, in cross section vertically oblong-quadrate; rhizoidal filaments unicellular and colourless, slightly curved, 4–6 $\mu$  wide and 700–1000 $\mu$  long, produced on the under side of the frond, apex of the rhizoid usually discoidal and attached to the substratum; chromatophore in most of the cells not filling the interior, with several pyrenoids; colour of the frond yellowish green or pure green.

The present species shows some likeness to *Monostroma sandei* Weber van Bosse, from which it differs in the mode of branching, and in having fronds of thicker dimension.

Among the genus *Monostroma*, the vegetation of the present plant is very peculiar and to be observed with interest. The plant grows on coral bottom at a depth of about sixty meters. It is ovate-lanceolate and often is laciniated into from two to five lobes. The frond is flaccid and membranaceous, but often costate in the basal portion. The frond is subterete, but is somewhat prostrate in the basal part of the plant. Although generally most species of *Monostroma* have their habitats in the littoral zone, such a deep bottom, as mentioned above, seems to be suitable as a habitat for this species. In drying, the plant adheres to paper except for the basal portion.

*Avrainvillea nigricans* Decaisne

Pl. I, B, and Text-fig. 3.

Memoire sur les Corallines (1842) p. 108; Howe, Phycological Studies, III (1907) p. 491; Boergesen, The species of *Avrainvillea* hitherto found on the shores of the Danish West Indies (1908) p. 30; The marine algae of the Danish West Indies (1913) p. 84, fig. 69; Vickers, Phycologia Barbadosensis (1908) p. 23, pl. 30-31; A. and E.S. Gepp, The *Codiaceae* of the Siboga Expedition, Monographie, LXII (1911) p. 23, figs. 78-80; Taylor, Marine algae of the Eastern Tropical and Subtropical Coasts of the Americas (1960) p. 160, pl. 19, fig. 2, pl. 25, figs. 10-12.

Japanese name. Kuro-hautiwa (nov.).

Habitat. Tatugo, Amami Islands (col. 3rd August, 1963). Dredged from 45 meter's depth at rocky bottom.

Distribution. Florida; West Indies; Brazil.

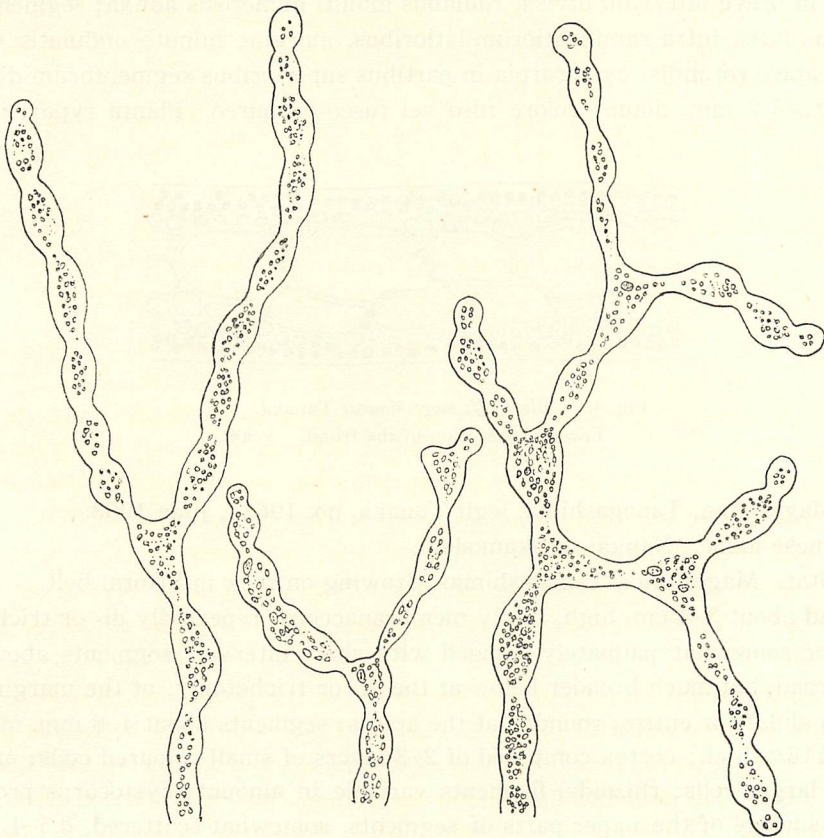


Fig. 3. *Avrainvillea nigricans* Decaisne. Parts of the filaments.  $\times 215$ .

Frond to 10 cm. tall, dark brown or tawny-green, stipitate; stipe usually flattened, simple, 2-3 cm. long and 2-3 mm. wide; flabellum cuneate to rounded, very

thin, felt-like texture, 7–8 cm. broad and 6–7 cm. high, very obscurely or not at all zonate; filaments of flabellum distinctly moniliform or tortuose, 30–48 $\mu$  in maximum diameter, those of the surface about 25 $\mu$ ; chromatophore small round-shaped plates and contains one or two pyrenoids.

The present species has been hitherto found only on the Atlantic coasts of America, and it seems to have never been reported from the Pacific. Among the genus *Avrainvillea*, this species is most characterized by its very moniliform filaments. It has been collected in the deep water at the depth of about 45 meters in Tatugo, Amami Islands.

***Callophyllis mageshimense* Tanaka spec. nov.**

Pl. II, B, and Text-figs. 4–5.

Frons 3–4 cm. alta, tenuiter membranacea, repitite di- vel trichotome vel palmatim in breve intervalli divisa, radiabus muniti numerosis adfixa; segmentis ca. 4–6 mm. latis, infra ramificationum latoribus, margine minute undulatis vel integris, apice rotundis; cystocarpia in partibus superioribus segmentorum disseminata, 0.5–1.2 mm. diam.; colore fuso vel fusco-purpureo. Planta typica in loco

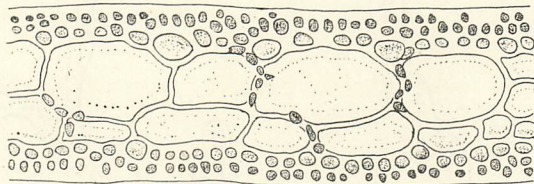


Fig. 4. *Callophyllis mageshimense* Tanaka.  
Transverse section of the frond.  $\times 300$ .

dicto Mageshima, Tanegashima, legit Tanaka, no. 19634, June 1963.

Japanese name. Nankai-tosakamodoki.

Habitat. Mageshima, Tanegashima. Growing on rock in littoral belt.

Fronde about 3–4 cm. high, thinly membranaceous, repeatedly di- or trichotomously or somewhat palmately divided with short interval; segments about 4–6 mm. broad, but much broader below at the di- or trichotomy, at the margin minutely undulate or entire; rounded at the apices; segments about 4–6 mm. late and about 115 $\mu$  thick; cortex composed of 2–3 layers of small coloured cells; medulla of 1–2 larger cells; rhizoidal filaments variable in amount; cystocarps produced on the surface of the upper parts of segments, somewhat scattered, 0.5–1.2 mm. in diam., without horn-like protuberances; colour of the frond purplish brown, in drying adhering to the paper; antheridia and tetrasporangia unknown.

This small present species seems to be closely related to *Callophyllis sibogae* Weber van Bosse, but in its mode of ramification, it differs from it. There are sev-

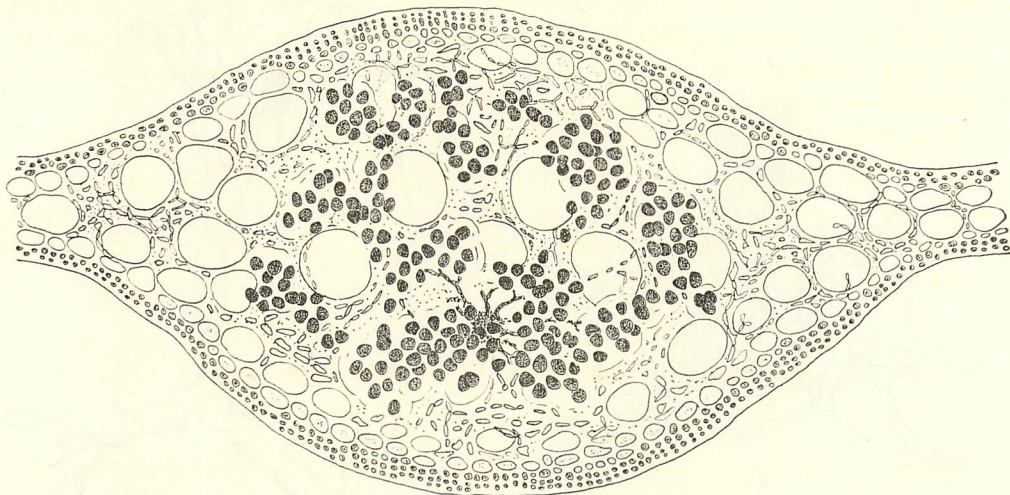


Fig. 5. *Callophyllis mageshimense* Tanaka.  
Transverse section of the cystocarp.  $\times 150$ .

eral specimens of this species in our keeping, of which three are provided with cystocarps, but they are few in number. The matured cystocarps look, on the surface of the frond, like a swollen spot comparatively flattened but no so prominently protuberant.

The plant grows on rocks in rather exposed places in the lower part of littoral zone.

***Coelarthrum lomentariae* Tanaka et K. Nozawa spec. nov.**

Pl. III, A, and Text-figs. 6-7.

Frons erecta, 3-5 cm. alta, intricata, membranacea, teretiuscula, cava, repetite dichotome vel interdum irregulariter ramosa; articulis oblongo-sphaericus vel subcylindricis, 1-2 mm. crassis; membrana intus ex cellulis majoribus, extus cellulis corticalibus minoribus composita; cellulae glandulosae, 3-5 $\mu$  diam., super cellulis minoribus stellaeformibus ornatae; tetrasporangia cruciatum divisa, subelliptica, 15-20 $\mu$  long. et 10-15 $\mu$  diam., in semi-superficie thalli dispersa; cystocarpia et antheridia ignota; colore roseo. Planta typica in loco dicto Mageshima, Tanegashima, legit Tanaka et K. Nozawa, no. 19635, 22 June 1963.

Japanese name. Katamino-fukurotunagi.

Habitat. Mageshima, Tanegashima. Dredged from 45 meter's depth on coral bottom.

Frond erect, 3-5 cm, high, articulate, membranaceous, intricate, hollow, repeatedly dichotomous or often irregularly ramified; joint oblong-spherical or subcylindrical, about 1-2 mm. in diam.; membrane consisting of two kinds of layers, inner one celled layer and cortical small 2-3 celled layer; gland cells spherical or

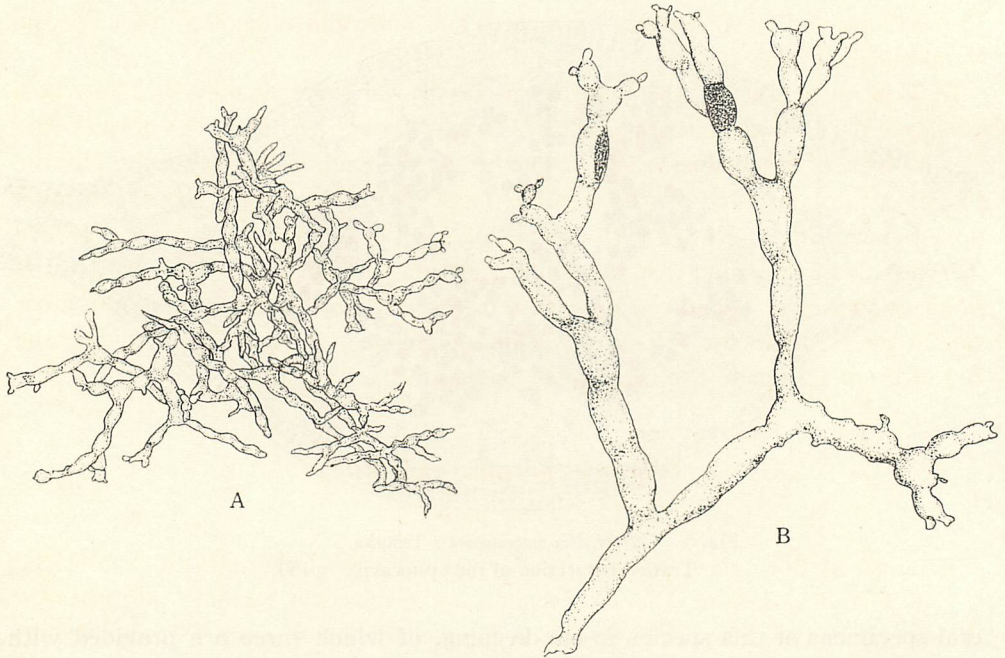


Fig. 6. *Coelarthrum lomentariae* Tanaka et K. Nozawa.

A. Habit of the plant.  $\times 1.5$ .

B. Part of a tetrasporic plant.  $\times 5$ .

ovate,  $2-3\mu$  in diam., on the stellate-like cells; nemathecium usually saddle shaped on the one side of the branchlets, tetrasporangia cruciately divided, subelliptical,

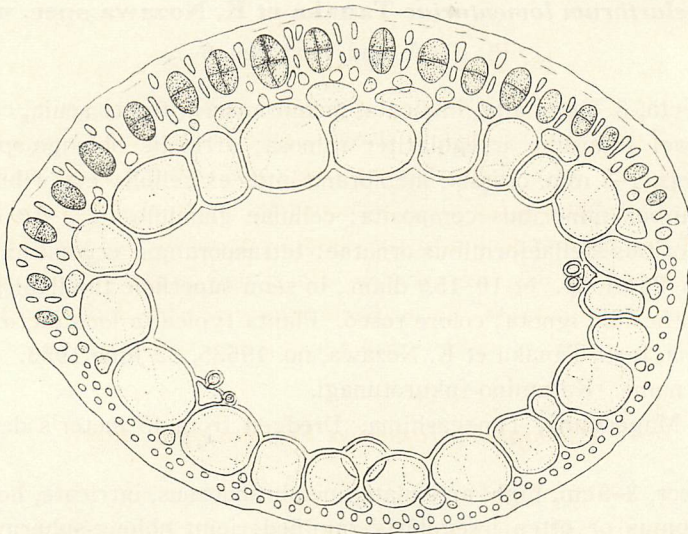


Fig. 7. *Coelarthrum lomentariae* Tanaka et K. Nozawa.

Transverse section of a tetrasporic plant.  $\times 105$ .

15–20 $\mu$  long and 10–15 $\mu$  wide; cystocarps and anthridia unknown; colour of the frond purplish rose.

In general character, the present species shows some likeness to *Coelarthrum boergesenii* W. v. B. and also *C. albertisii* (Piccone) Boergesen. But, the present species is to be distinguished easily from the above mentioned two species, by the shape of the joints and by the peculiar habit of the sporangial sorus. As mentioned above, the joints are very oblong-spherical or cylindrical. It is only around the halfside of the frond that the nemathecia are formed: this is the characteristic of this species. Gland cell grows out of the stellate cell placed upon the inner side of the frond facing the cavity. These gland cells are spherical or ovate, and 2–3 of them are usually found on each stellate cell.

### *Dictyurus purpurascens* Bory

Text-fig. 8.

Bélangier et Bory, *Cryptogamie du Voyage aux Indes-Orientales en 1825* (1836) t. 1, p. 170; Falkenberg, *Die Rhodomelaceen des Golfes von Neapel* (1901) p. 675; Weber van Bosse, *Liste des Algues du Siboga, III* (1923) p. 381; Taylor, *Plants of Bikini and other Northern Marshall Islands* (1950) p. 143, pl. 78, fig. 1; Dawson, *Some marine and algae of the Southern Marshall Islands* (1956) p. 57, *An annotated list of marine algae from Eniwetok Atoll, Marshall Islands* (1957) p. 123.

Japanese name. Beni-amigoromo (nov.).

Habitat. Tatugo, Amami Islands (col. 5th August, 1963). Dredged from 40 meter's depth on coral bottom.

Distribution. Marshall Islands: Bikini: Indian Ocean: Malay Archipelago. Frond 2 cm. high, 2.5–3.5 mm. wide, bushy, the main axes sparingly branched at the base, simple above, main axes consisting of four pericentral cells surrounded by a thick cortical layer; axes bearing lateral branches and branchlets in regular rows, which from their tips support a connected system developed from smaller branchlets, producing the characteristic reticular structure.

The plant has been collected at the depth of about 40 meters. The present interesting species was described first by Bory, and later a minute diagnosis and illustration on the structure of the frond was given by Falkenberg in 1901. In our materials, the plant is rather small and it seems to be in a younger stage.

### *Placophora japonica* Tanaka spec. nov.

Text-figs. 9–10.

Frons imbricata, repens, membranacea, plana flabellatim expansa, 0.5 cm. lata, 1–1.5 cm. longa, lobisque confermibus subdivisa et singulis oblongis variis lobatis, lobis cuneato-reniformibus, ca. 35–48 $\mu$  crassa; duobus vel tribus stratis compo-



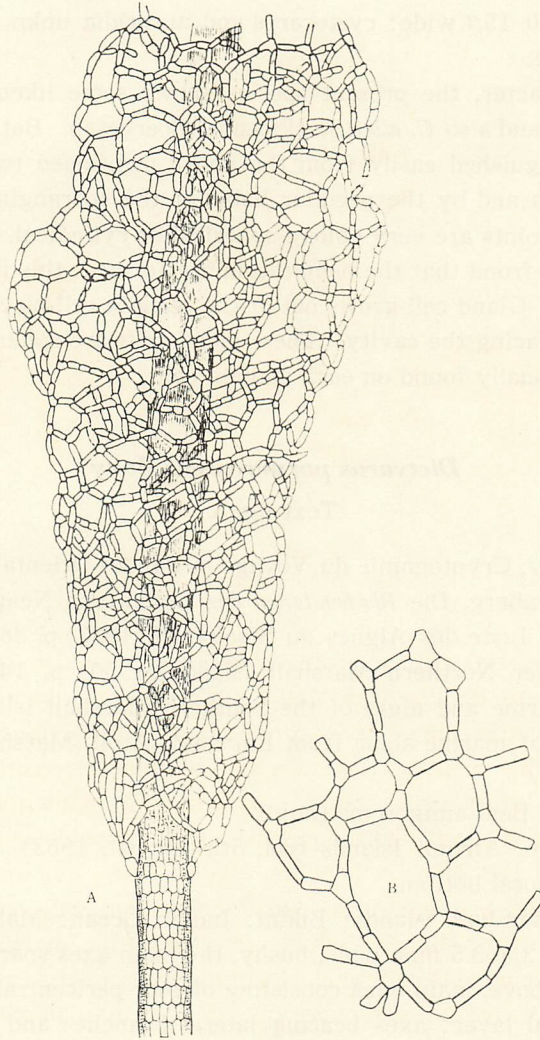


Fig. 8. *Dictyurus purpurascens* Bory.

- A. Habit of the lower part of the plant.  $\times 10$ .  
 B. Net-like structure of the surface portion of the frond.  $\times 75$ .

sita, cellulis in zonas concentricas conjunctis, rectangula oblongis, 20–25 $\mu$  latis et 55 $\mu$  longis; stichidia filiformia in curva tetrasporangias unica serie longitudinali dispositas, 1–3.5 mm. longa et 55–90 $\mu$  diam., tetrasporangia triangule divisas, subsphaerica, 55–75 $\mu$  in diam.; colore brunneo vel rufo; cystocarpia et antheridia ignota. Planta typica in loco dicto Odomari, Sata, Kagoshima, legit Tanaka no. 19636, 14 Dec., 1960.

Japanese name. Kabairo-haiusuba.

Habitat. Odomari, Sata, Kagoshima. Dredged from 22 meter's depth on coral bottom.

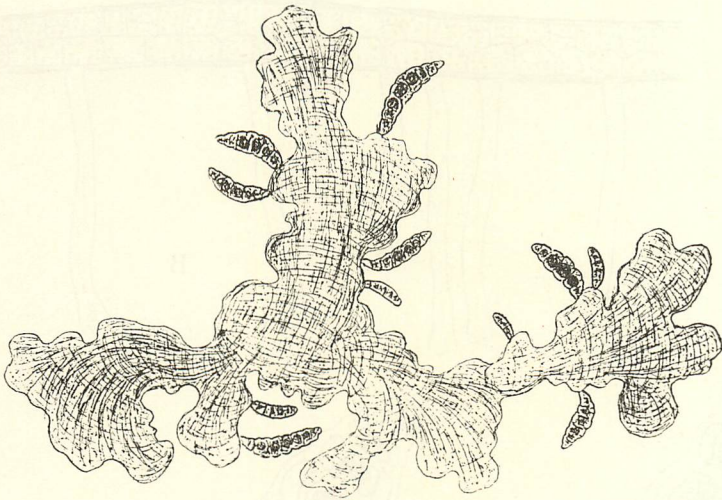


Fig. 9. *Placophora japonica* Tanaka.  
Habit of the tetrasporic plant.  $\times 6$ .

Frond imbricate, repent, membranaceous, dark-brown or reddish brown, expanding to flabellate, 0.5 cm. wide and 1–1.5 cm. long, and lobulate, lobelet cuneate-reniformis, consisting of two or three layers of cells, 35–48 $\mu$  thick, throughout the whole thallus, a surface layer consisting of nearly rectangular cells and a layer of slightly larger cells below, provided with many unicellular rhizoids; rhizoidal filaments straight and colourless, about 20 $\mu$  wide and 250 $\mu$  long, more or less discoidal at the apex; cells of the blades oblong and rectangular, 20–25 $\mu$  broad and 55 $\mu$  long, arranged in a regular concentric zone; stichidia 1–3.5 mm. long and 55–90 $\mu$  broad, slightly curved, growing on the marginal portion of the frond as exogenetic adventive branchlets, presenting a single row of tetraspores; tetrasporangia tetrahydral, subsphaerical, 55–75 $\mu$  in diameter; cystocarps and antheridia unknown.

This interesting present alga seems to belong to the *Placophora* group in the Family *Rhodomelaceae*. Among this group the present plant seems to belong to genus *Placophora*: and of the genus it seems to be allied to *Placophora binderi* J. Ag. from South Africa.

But it differs from *P. binderi* J. Ag. in the mode and shape of stichidia. The stichidia are formed on the marginal portion of the frond, and the characteristic of its formation consists in its growing solitary and not aggregated.

***Amansia scalpellata* Tanaka spec. nov.**

Pl. II, A, and Text-figs. 11–13.

Frons ca. 8 cm. alta, plana, membranacea, integris, laminis stipitatis; stipites

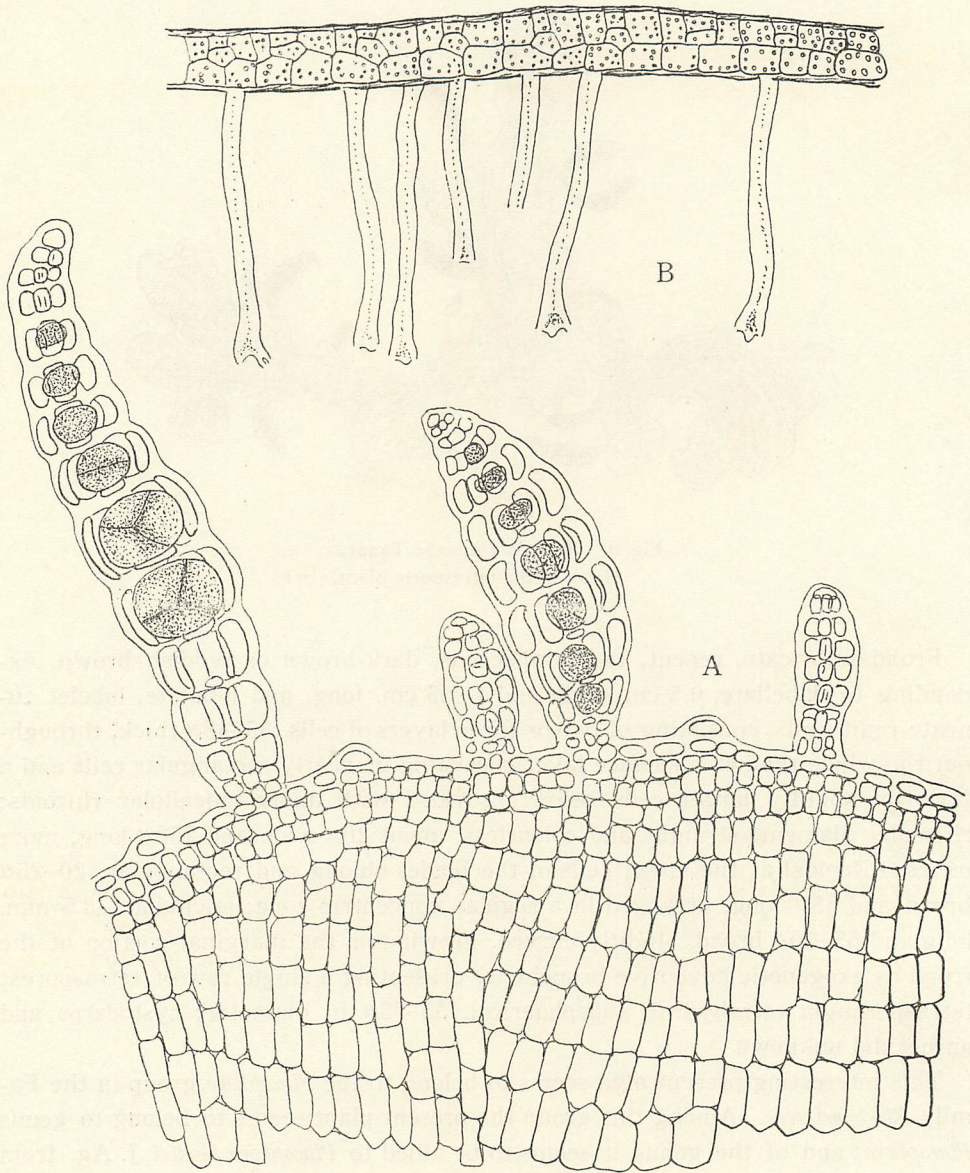


Fig. 10. *Placophora japonica* Tanaka.

A. Marginal portion of the frond with stichidia.  $\times 240$ .

B. Transverse section of the basal portion.  $\times 240$ .

cylindraceo-teretis, 3 cm. longo, 2 mm. diam., parenchymatics, ad basin plus minus discalis, ad apicem divisis; lamis primariis sparse alterneque ramosis; 1.5 cm. latis et 6 cm. longis, 60-75% crassis, oblongo-angulatis, alterno-pinnulatis, venis absentibus, ad apicem truncatis et incurvatis; colore porphyreo-fusco. Planta typica in loco dicto Mage Island, Tanegashima, legit M. Kubo, no. 19637, 13 June

1963.

Japanese name. Suzinasi-hiodosi.

Habitat. Mage Island, Tanegashima, Collected in deep sea at a depth of about 30 meters by fishing net.

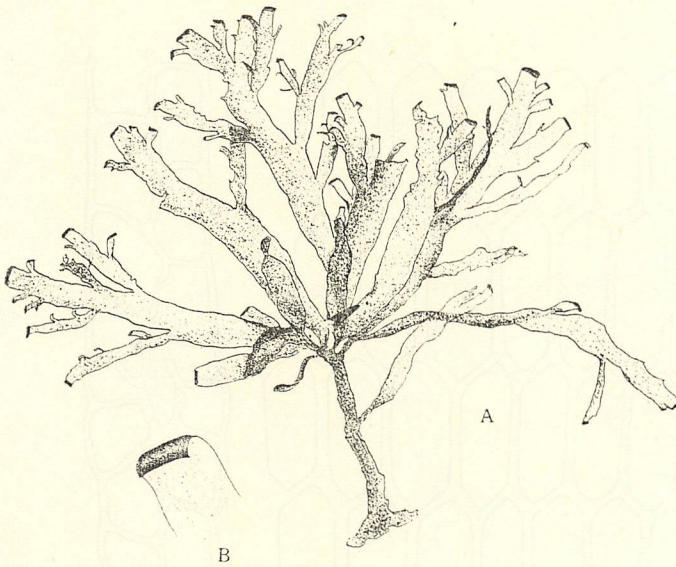


Fig. 11. *Amansia scalpellata* Tanaka.

A. Habit of a plant.  $\times$  Slightly reduced.

B. Tip portion of the branch.  $\times 2$ .

Fronde about 8 cm. high, 1.5 cm. broad, flat, membranaceous, purplish brown, provided with a long stipe; stipe very long, cylindrical, 3 cm. long and 2 mm. in diam., composed of parenchymatic tissue, often ramified in upper portion; blades

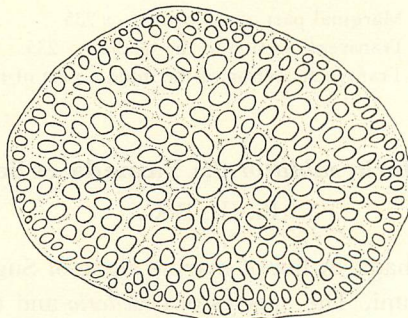


Fig. 12. *Amansia scalpellata* Tanaka.

Transverse section of the stipe.  $\times 37$ .

sparingly and alternately branched, oar-shaped, 1.5 cm. wide and 6 cm. long, 60–75 $\mu$  thick, branches and branchlets oblong-angulate, alternate-pinnulate, truncate

and incurved at the apex, midribs inconspicuous; reproductive organ unknown.

Generally, the present species is allied to *Amansia japonica* (Holmes) Okam., but this differs from the latter in its ramification and in the shape of the branches, and in its having no midribs in the blades.

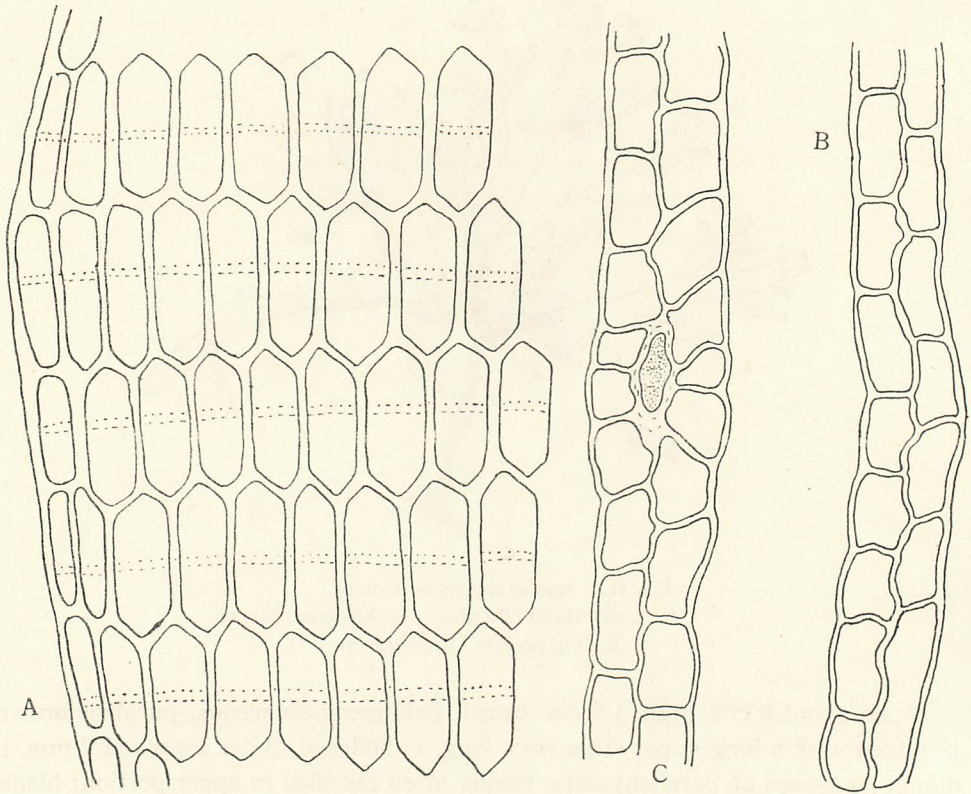


Fig. 13. *Amansia scalpellate* Tanala.

A. Marginal part of the blade.  $\times 235$ .

B. Transverse section of the blade.  $\times 235$ .

C. Transverse section of the middle part of the blade.  $\times 235$ .

### *Gracilaria sublittoralis* Yamada et Segawa

Pl. III, B-C.

in Takamine and Yamada, A list of marine algae of Sugashima, Ise Bay (1950) p. 263 (in Japanese); Ohmi, The species of *Gracilaria* and *Gracilariopsis* from Japan and Adjacent waters (1958) p. 44, pl. 9, c-d, text-fig. 22.

Japanese name. Shinkai-kabanori.

Habitat. Izu Island, Ise Bay, Ehime, Kagoshima Bay, Mage Island, Tanegashima. Growing on rocks in sublittoral zone.

The present species was first collected by Takamine at Sugashima, Ise Bay and

reported in 1950 as *Gracilaria sublittoralis* Yamada et Segawa, with no diagnosis of illustrations given. Recently, minute description of this species was given by Ohmi in his report: The Species of *Gracilaria* and *Gracilariopsis* from Japan and Adjacent Waters (1958).

This plant seems to be distributed widely in Ise Bay, Izu Islands, and also Ehime Pref., in rather deep sea. Furthermore, it seems to be common in the southwestern sea of Japan. Our numerous materials agree fairly well with the description of this species illustrated by Ohmi except for those of the ramification of younger plants. The branching of the segments of the young plant is always dichotomous and rather palmate at the upper portion. As shown in Pl. III, B-C, the ramification is made in a regular manner in the young stage, but it becomes gradually larger and variable in shape and size. In our materials cystocarpic and tetrasporic plants are abundantly observed.

— 摘 要 —

日本南海産海藻類の研究 (その五)

田 中 剛

1957年頃から実施している深海性の海藻類の調査のうち、今回は奄美大島、種子島、大隅半島近海のものの中から、興味あると思われる8種について報告した。

シンカイヒトエグサ：馬毛島近海の水深60米から採集された大型のヒトエグサの一新種で、マレー島産の *Monostroma sandei* W.v.B. にやや似ているが、体分岐の様子、体厚、附着部の様子等で差異がある。

クロハウチワ：やや黒色を帯びたハウチワ属の一種で、大西洋アメリカ沿岸の亜熱帯にごく普通の種であるが、太平洋からは報告されていない。本種は体糸が数珠状になるのが特徴の一つである。

ナンカイトサカモドキ：トサカモドキ属植物中、割に小形の一新種で、*Callophyllis sibogae* W.v.B. にやや近似と思われるが、枝分れ方や囊果の様子が異なっている。

カタミノフクロツナギ：外形はフシツナギを思わせるが、フクロツナギ属植物の一新種である。*Coelarthrum boergesenii* W.v.B. および *C. albertsii* Boergesen の両種に近似のものである。本種では節間部が長くやや円柱状をなす点と四分胞子嚢が体の一側部にのみ生じ、鞍状を呈する点とが著しい特徴である。

ベニアミゴロモ：紅藻類、イギス目、ダジア科の *Dictyurus* 属植物の一員で、甚だ珍稀で興味深い種とされている。*Dictyurus* 植物は2種が知られているが、大西洋産のものは *Dictyurus occidentalis* J.Ag. である。今回の採集品は小形の幼体で生殖器官は見当らない。

カバイロハイウスバ：紅藻類フジマツモ科の *Placophora* 属の一新種で、体は匍匐性であ

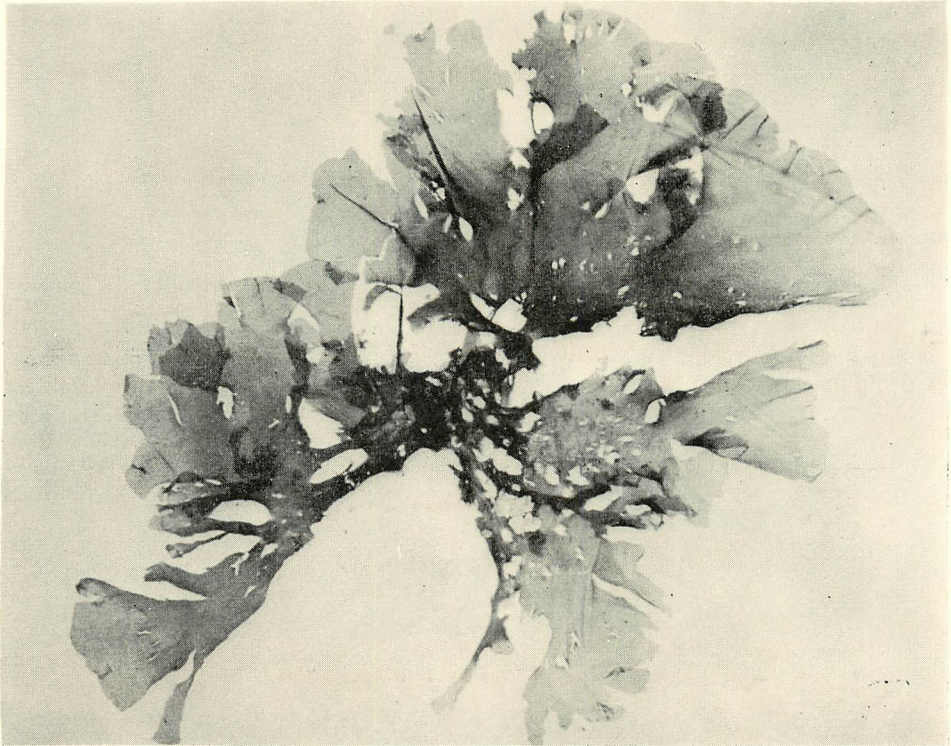
る。 *Placophora* 属は唯一種 *P. binderi* J. Ag. が南アフリカから知られているだけである。本種は *P. binderi* とステキジアの位置および性状において差異がある。体はやや黒褐色を呈している。

スジナシヒオドシ：ヒオドシグサ属植物の一新種で、ヒオドシグサ (*Amansia japonica* Okam.) にやや似た点もあるが、本植物は長茎部を有する点、葉および小葉の外形が特異な点、中助を有していない点等で異なっている。

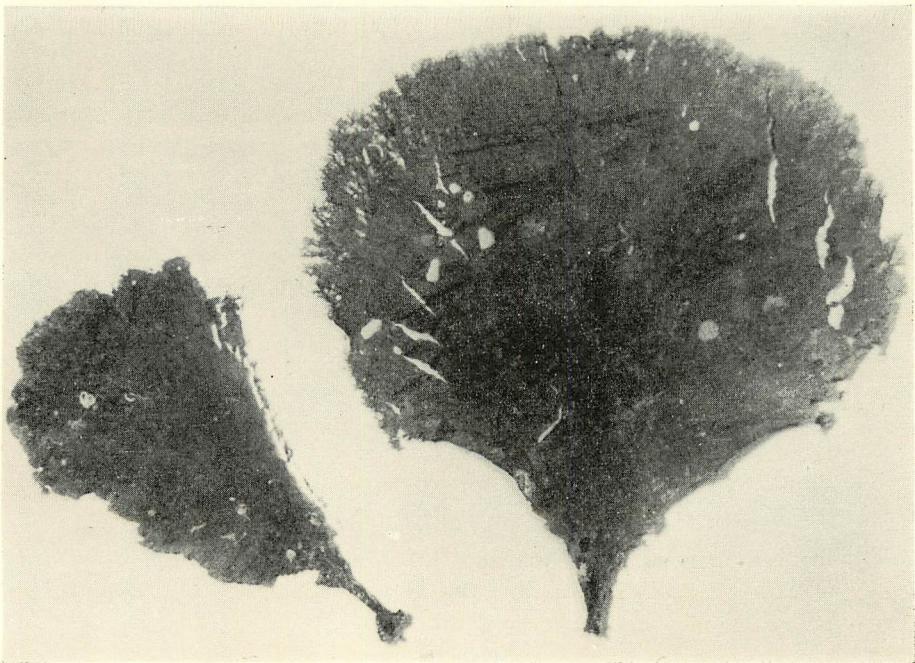
シンカイカバノリ：本種はすでに伊豆、伊勢湾等から報告発表された深海性のカバノリの一種であるが、今回南九州の深海各所にも多量採集せられた。本植物の体形は成体では種々に変化する様であるが、幼体では割に規則正しい分岐を示すのでこの点本種の特徴と思われる。

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A

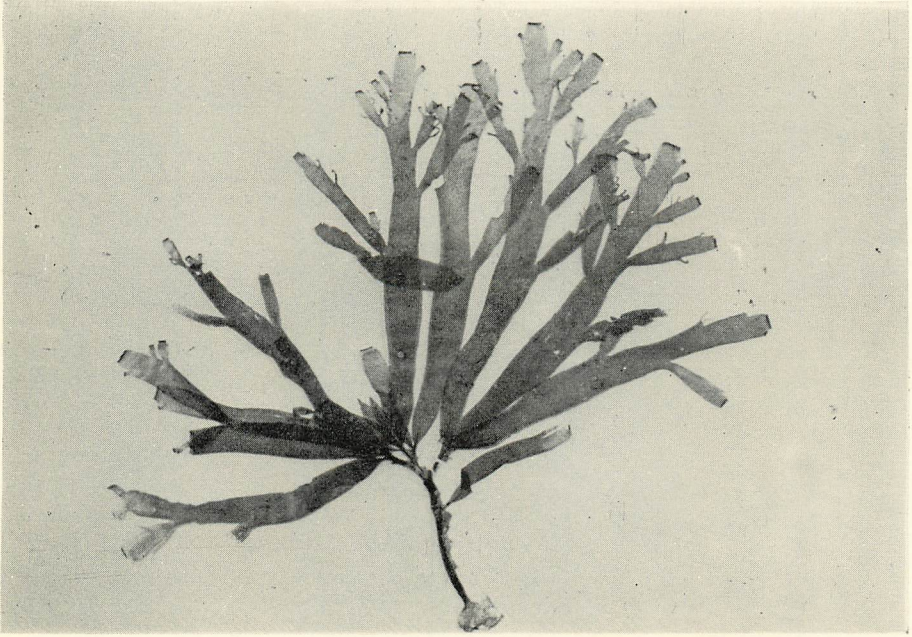


B

Plate I

- A. *Monostroma alittoralis* Tanaka et K. Nozawa.  $\times \frac{1}{2}$ .  
B. *Avrainvillea nigricans* Decaisne..  $\times 1$ .





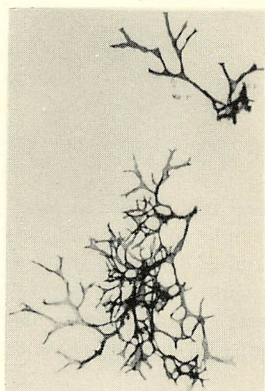
A



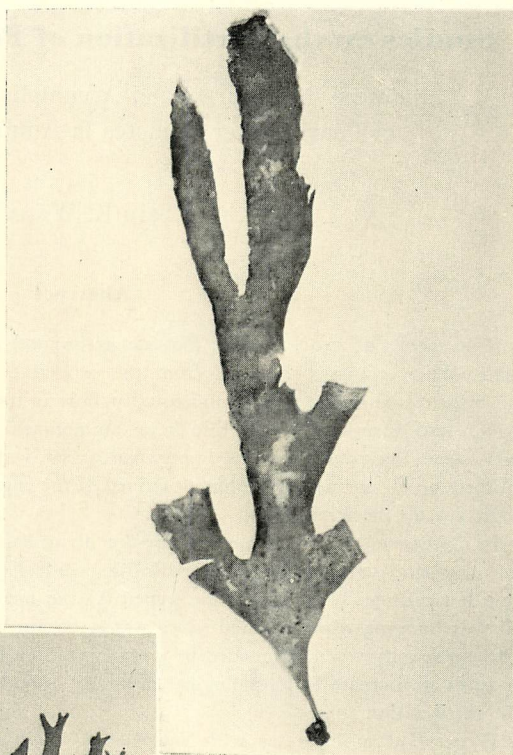
B

## Plate II

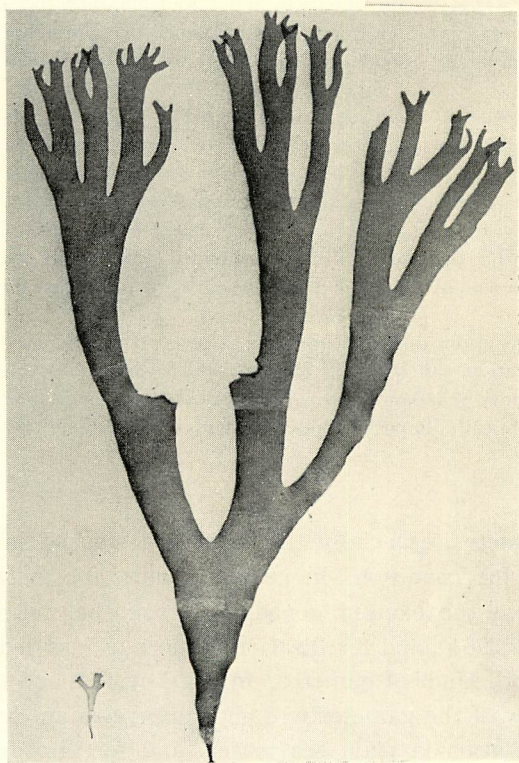
A. *Amania scalpellata* Tanaka.  $\times 1$ .B. *Callophyllis mageshimense* Tanaka.  $\times 1$ .



A



C



B

## Plate III

A. *Coelarthrum lomentariae* Tanaka et K. Nozawa. Slightly reduced. B-C. *Gracilaria sublittoralis* Yamada et Segawa. B. Younger plants, showing regular ramifications.  $\times \frac{1}{2}$ . C. Older plant.  $\frac{1}{3}$ .