Notes on Some Marine Algae from Viet-Nam—I

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Contribution No. 55

鹿児島大学水産学部紀要 第11巻 第1号 別刷
1962年9月

Reprinted from Memoirs of the Faculty of Fisheries
Kagoshima University, Vol. 11, No. 1

Kagoshima, Japan
September, 1962

2顎脚外肢・第5脚等の形成，腹部の発達と付属肢の出現等が加わる筈で，プエルルス期に至る迄の脱皮回数は11期（GURNEY, 1936），13期（野中・他，1958）よりも増加することが考えられる．又，これはプエルルス期到達迄の期間も予想より長いことを思わせる．飼育した幼生には同じ脱皮回数のものでも体長及び付属肢の発達程度に個体差があり確認した脱皮の記録以外には期数を区別できぬ場合もあった．この様な個体差は脱皮回数が進む程増加する傾向があるので変態直前の頃には個体による成長差がかなり開き，変態迄の脱皮総数はある巾を持つに至るのではないだろうか．脱皮回数が多ければ採集標本による幼生各期の判別にも限度が考えられる．結局フィロゾマ幼生の変態過程を調べる決定的な方法は幼生を飼育することによって孵化直後からプエルルス期迄の多数の標本を揃えることでありこの方法によってのみ幼生の生活史は明らかにし得るのではないだろうか．

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Notes on Some Marine Algae from Viet-Nam–I

Takesi TANAKA* and PHAM-Hoang Ho**

In 1961, the Colombo plan enabled the senior writer to spend about six months at Saigon University in Viet-Nam under the capacity of dispatched algologist, and during that term he was favoured by the chance of making some algological studies with the junior writer.

At the same time during the term, the writers were not only to investigate around Nha-Trang, Hue, Tourane, Vung-Tau, and Phu-Quoc Island, but also to examine a lot of algal specimens preserved in the Herbarium of Saigon University and the Institut Océanographique de Nha-Trang, and the identification of many new species and species new to Viet-Nam have resulted from those studies. Among these abundant specimens of marine algae from Viet-Nam, some of which are described in the following paper.

There have been a number of scientific reports made of Vietnamese marine algae. The earliest report of marine and freshwater algae from Viet-Nam was attempted by Loureiro in "Flora Cochinchinensis (1790)," in which about a dozen species of marine and freshwater algae mentioned. Recently, we have Dawson's paper (1954) on the marine algae from Nha-Trang, where about two hundred and fourteen species and seven new species of marine algae are described. Further studies about the ecology of marine algae of Nha-Trang have been carried out by the junior writer (1938 a, b).

The writers wish to express their most cordial thanks to the persons working under the Colombo plan authorities, under whose care and protection the senior writer was allowed to be dispatched to Saigon University. Thanks are also due to Dr. Nguyen-Quang-Trinh, President of Saigon University, Dr. Le-Van Thoi, Dean of the Faculty of Science, Saigon University, and also to Mr. Nguyen Dinh Hung, Chief of the Institut Océanographique de Nha-Trang, who were graciously kind enough to let us use the various research facilities.

Dictyota submaritima Tanaka et Pham-Hoang Ho, spec. nov.

Plantae frequentes, subregulariter dichotome ramosae, inter se adhaerentes ad 2 cm. altitudine, 1.5–2.5 mm. latis, 55–80μ crassis; segmenta fasciculis rhizoidearum anastomosantia; soris tetrasporangialibus zonas in superficie unaque laminae marginalibus, 1–vel 2–seris disparsis; tetrasporangia maturis 65–85μ diam., altitudine diametrum aequantibus vel sesquilicita altrientibus quam dia-

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metris; colore aureo-fusco vel fulvo, substantia membranacea. Planta typica in loco dicto Nha-be, Saigon, legit Tanaka et Pham-Hoang Ho, no. 2224, 11, Mar, 1961.

Habitat. Growing on barks or stones in the brackish water of Saigon River. Nha-be, near Saigon.

Frond small, to 2 cm. tall, 1.5–2.5 mm. broad, 55–80μ thick, crowded, membranaceous, subregularly dichotomous ramified, the blades usually becoming attached to each other by the fasciculis of rhizoids; tetrasporangial sorus only on one side surface of the marginal parts of the frond, forming one or two row; tetraspores usually subspherical, 65–85μ in diameter; colour of the frond golden brown or yellowish brown.

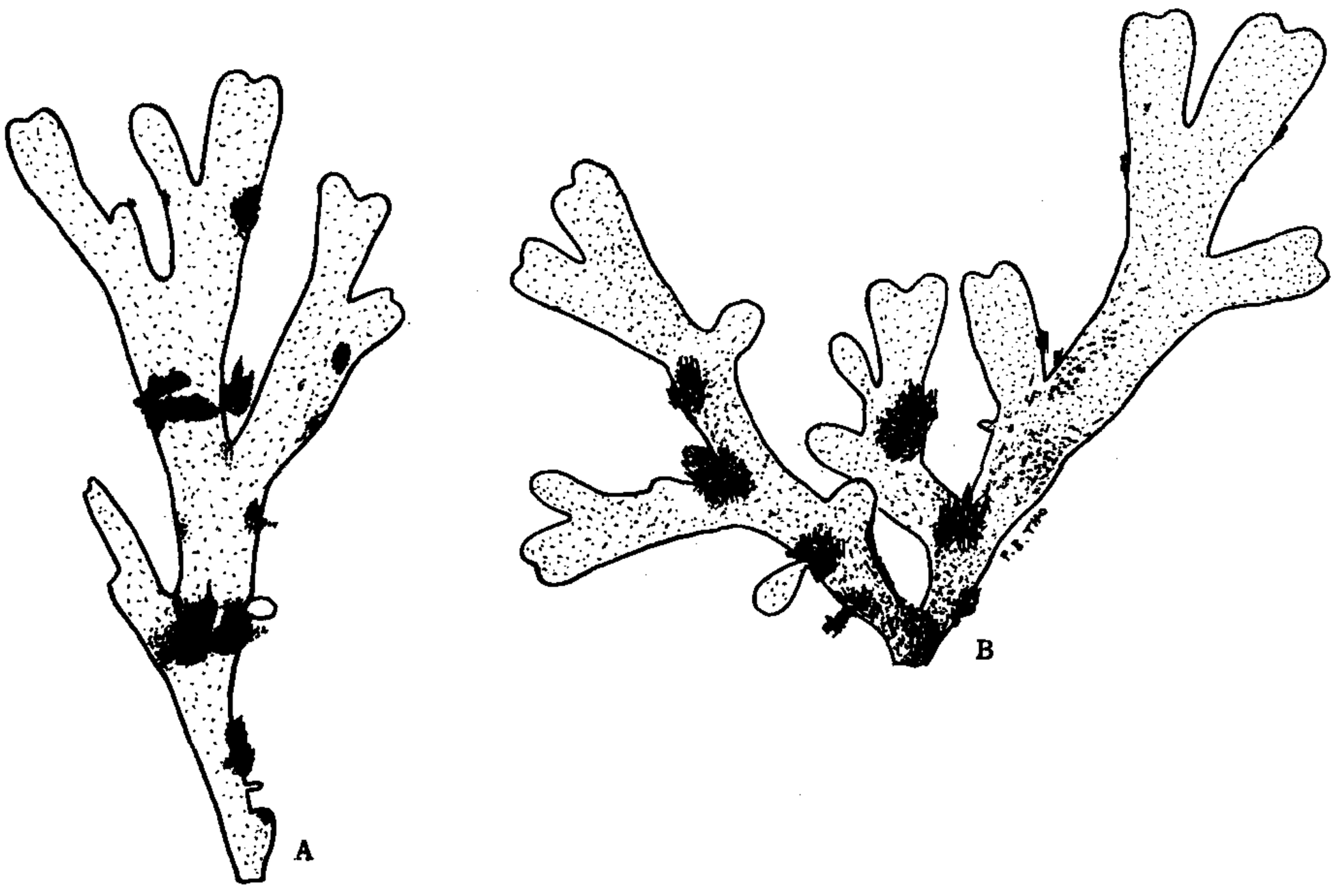
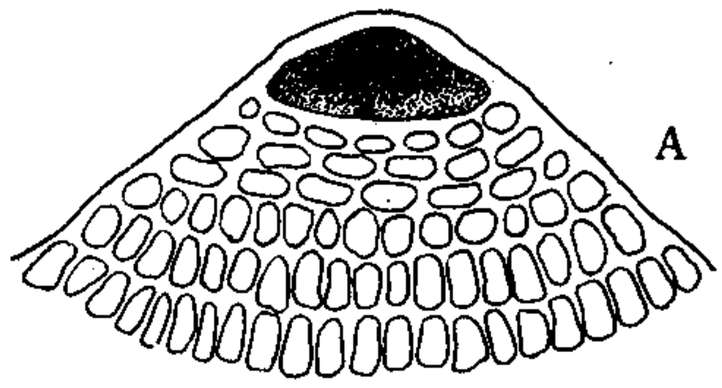
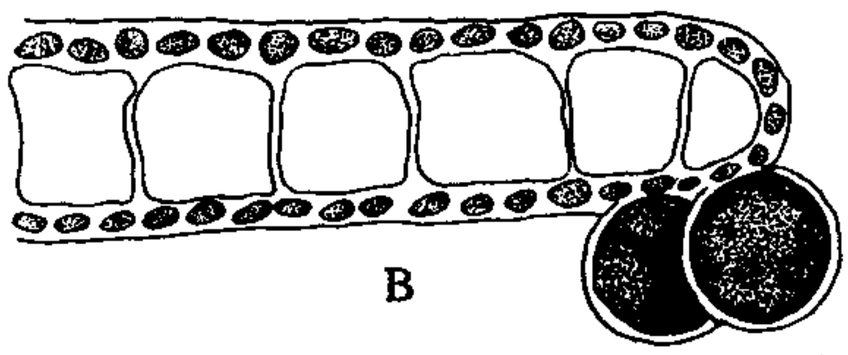


Fig. 1. *Dictyota submaritima* Tanaka et Pham-Hoang Ho.
Habit of the frond of no. 2224, A. B. ×2.5.

The present plants were found in the shady places of the Saigon River at Nha-be, near Saigon. The plants creep on the substratum, their branches lying one upon the other in the basal parts and thus forming an irregular mass. The fascicule of rhizoids are sent out from many parts of the segments for fixing themselves to each other (Fig. 1). The rhizoids are composed of many cells and usually not raminfied. The thalli are subregularly branched. The apical portion of the branches is generally obtuse, and not acute. The tetrasporangial sori grow only on one side surface (under side) of the mariginal parts of the upper segments, being never found on the median parts (Fig. 2, B, C), they form one or two rows of consecutive zones. The tetrasporangia are usually subspherical, about 65–85μ in diameter, with rather thick membrane.





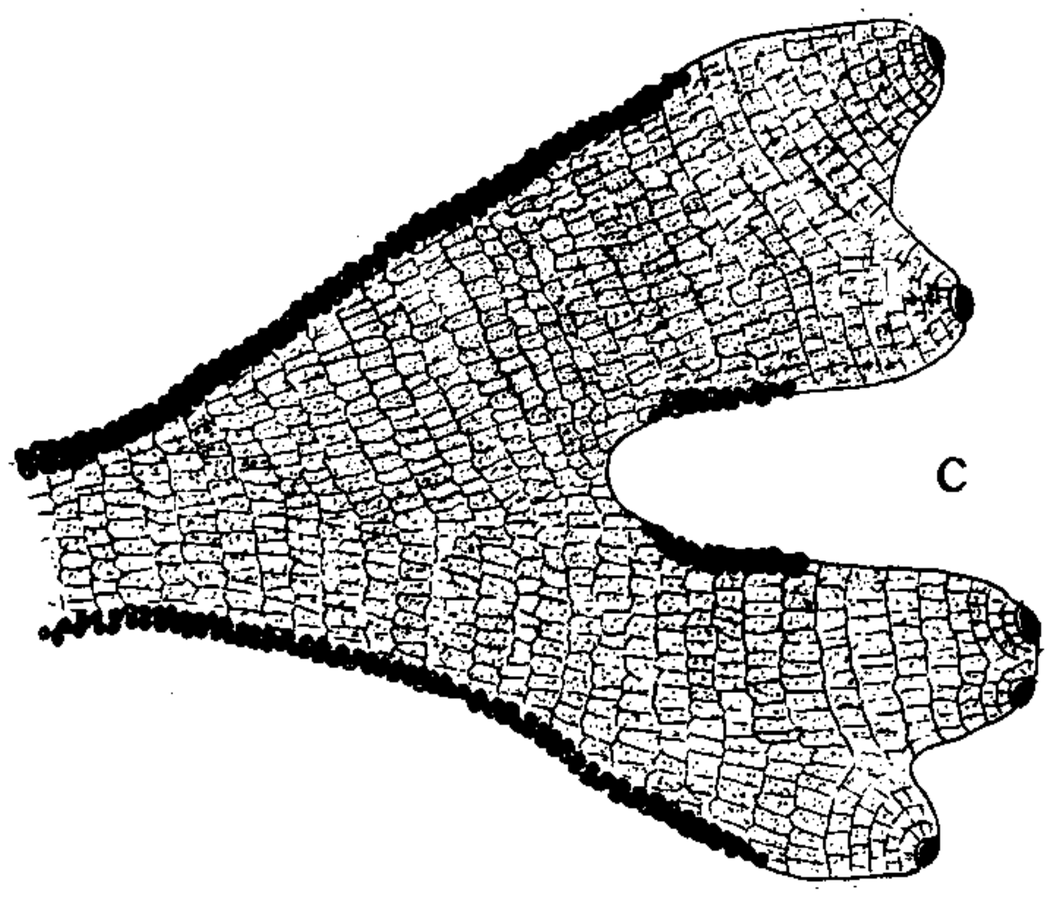


Fig. 2. *Dictyota submaritima* Tanaka et Pham-Hoang Ho.
A. Apical cell of the branchlet of the thallus. ×170.
B. Transverse section of the matured frond. ×170.
C. Part of the sporic plant. ×30.

As pointed out very precisely by Dr. Weber van Bosse (in Papers from Dr. Th. Mortensen's Pacific Expedition 1914–16, XXXIII. Algues de l'Expedition danoise aux iles Kei, p. 101, figs. 18–19, 1926), the arrangement of the tetrasporangial sori of *Dictyota adnata* Zanard. is very peculiar. The present species is very similar to *D. adnata* Zanard. in its peculiar character of the tetrasporangial sorus, but differs from it in its ramification and in the shape of the apex of the frond. So the writers separate our species from *D. adnata* Zanard. as a new species.

Gymnogongrus chnoosporoides Tanaka et Pham-Hoang Ho, spec. nov.

Fronde ad 10 cm. latitudine, subcartilaginea, plana, prope regulariter dichotome ramificata, sed raro subpalmata prope apicem; laminis 2–3 mm. latis,

480–580μ crassis, frequenter ramificatis; plerumque intervalis 0.5–2 cm. plusve anguste angulatis; marginibus integris, apicibus subobtusis vel subacutis; cystocarpiis superficialibus circiter 900μ diametro, hemisphericalibus; colore rubropurpureo, sicco brunneo. Planta typica in loco dicto Côn, Nha-Trang, legit Tanaka et Pham-Hoang Ho, no. 2881, 22 Apr, 1961.

Habitat. Growing on the concrete walls in the upper littoral zone. Côn, Nha-Trang.

Fig. 3. *Gymnogongrus chnoosporoides* Tanaka et Pham-Hoang Ho. Habit of a cystocarpic plant. $\times \frac{2}{3}$.

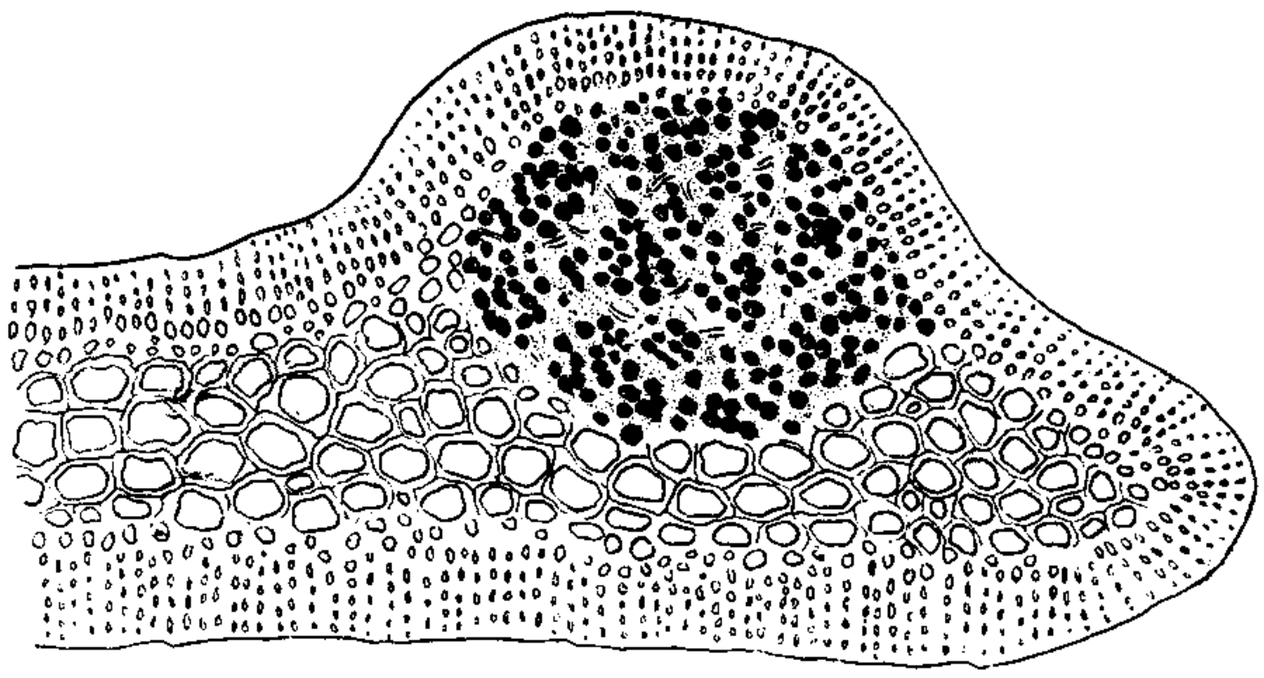


Fig. 4. *Gymnogongrus chnoosporoides* Tanaka et Pham-Hoang Ho. Vertical section through a matured cystocarp. *×200.*

Frond to 10 cm. tall, subcartilagenous, flat, usually regularly dichotomous, but often subpalmately branched in the upper part of the branches; blades 2–3

mm. broad, 480–580 μ thick, mostly at intervals of 0.5–2 cm and with narrow angles; margin entire, tips of the branchlets blunt or subacute; medullary layer consisting of round, thick-walled cells, 30–50μ in diameter, elliptical in longitudinally and with many intercellular connections, abruptly grading into a cortex of anticlinal rows of 5–6 small, elliptical cells about 4.5μ in diameter, very prominent, hemispherical; colour of the frond purplish red, but deep brown when dried.

The present new species is closely related to *Gymnogongrus tenuis* J. Ag. on one hand, and to *G. flabelliformis* Harv. on the other. But, in this species, the blades are broader and more frequently ramified at the lower parts of the frond than G. *tenuis* J. Ag. Furthermore, *G. flabelliformis* Harv. always has the secondary proliferous pinnae, and that is not the case in the present species.

The plant is a peculiar yellowish brown in colour, but dark brown when dried. Generally, in outer appearance of the frond, it reminds us of *Chnoospora minima* Papenfuss.

Grateloupia phuquocensis Tanaka et Pham-Hoang Ho, spec. nov.

Frons membranacea, 2–6 cm. alta, complanata; laminis compluribus e basi communi, lineo-lanceolatis, subsimplicibus ad dichotome ramificatis vel palmatis, attenuatis, 3–5 mm. latis, 450–550μ crassis; marginibus integris; medulla paulo densa, e filamentis plerumque longitudinaliter dispositis; cystocarpiis subglobosis, ca. 180μ diam; colore rubro-purpureo vel virido-rubro. Planta typica in loco dicto Duong-Dong, Phu-Quoc, Viet-Nam, legit Tanaka no. 101, 27, Mai, 1961.

Habitat. Plants growing abundantly on the exposed rock in the upper sub-

Fig. 5. *Grateloupia phuquocensis* Tanaka et Pham-Hoang Ho.
Habit of the plants. $\times \frac{2}{3}$.

littoral zones. Duong-Dong, Phu-Quoc Island, Viet-Nam.

Frond membranaceous, 2–6 cm. high, complanate except at the base, consisting of several flat, linear-lanceolate blades from a relatively small discoid holdfast; blades usually subsimple but often dichotomous or palmately ramified in the upper parts, 3–5 mm. broad, 450–550μ thick, the margins normally entire; medullary layer rather dense, mostly of longitudinally arranged filaments about 4–5μ in diameter except along the margins next to the cortex; cortical filaments of 5–7 cells; cystocarps embedded in the blades ostiole, causing no evalation of the surface, borne most abundantly in younger branches, subglobose, about 180μ in diameter. Colour of the frond purplish red or greenish red.

The plants grow in tufts upon stones and rocks to a height of about 2–6 cm.: the breadth of the frond varies as much as from 3–5 mm. The base of the plants is somewhat subcylindrical. The plant is peculiar yellowish purple in colour. Almost all specimens at hand, even the smallest ones, are already matured with female organs.

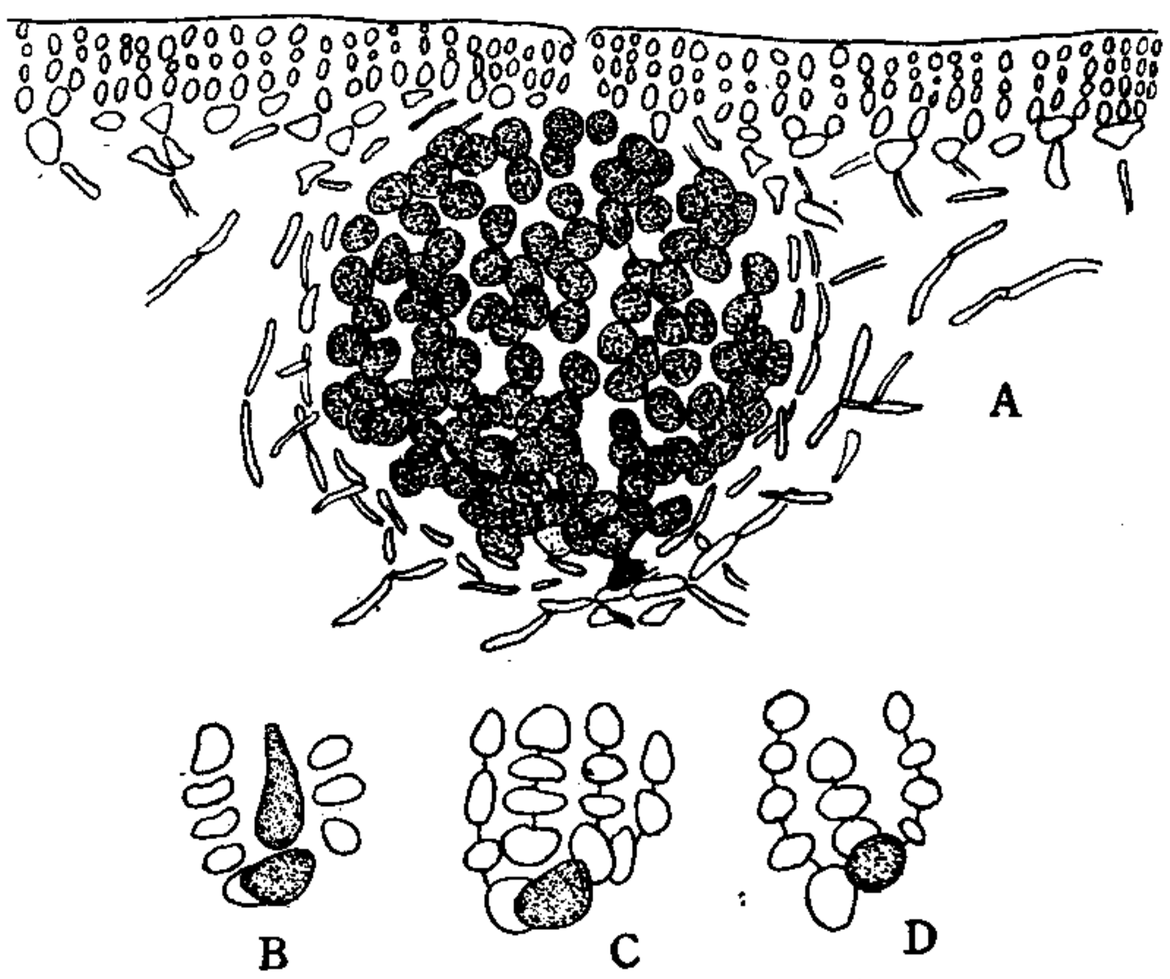


Fig. 6. *Grateloupia phuquocensis* Tanaka et Pham-Hoang Ho.
A. Cross section through a matured cystocarp. ×170.
B. Carpogonial branch system. ×170.
C–D. Auxiliary cell branch system. ×170.

This species is apparently most closely related to *Grateloupia lithophora* Boergesen of the Madras, India, with which it agrees in its general characteristics. But it differs from it in its shorter and more slender size of the frond, and also in its characteristic palmate branching in the upper parts of the frond.

Caloglossa saigonensis Tanaka et Pham-Hoang Ho, spec. nov.

Fronde repens, caespites densae formans, 0.9–1.1 mm. alta, regulariter dichotome ramosa, angustulata; segmentia costata, 470–550μ lata, 75μ crassa, e costa media et utro bique lamina monostromatica angustima composita; tetra-

sporangia subspherica, 21–32μ diam., eodem modo secus lineas parallelas regulares, a costa versus marginem, radiantes disposita, in segmentis superioribus et in phyllis propriis, quasi unico articulo constantibus, inta segmenta interjectis; cystocarpia in costa segmentia formantia, sessilia et globosa, 330–370μ diam. Planta typica in loco dicto Cau Chu Y (Cholon), Saigon, legit Tanaka et Pham-Hoang Ho, no. 2210, 24 Apr., 1961.

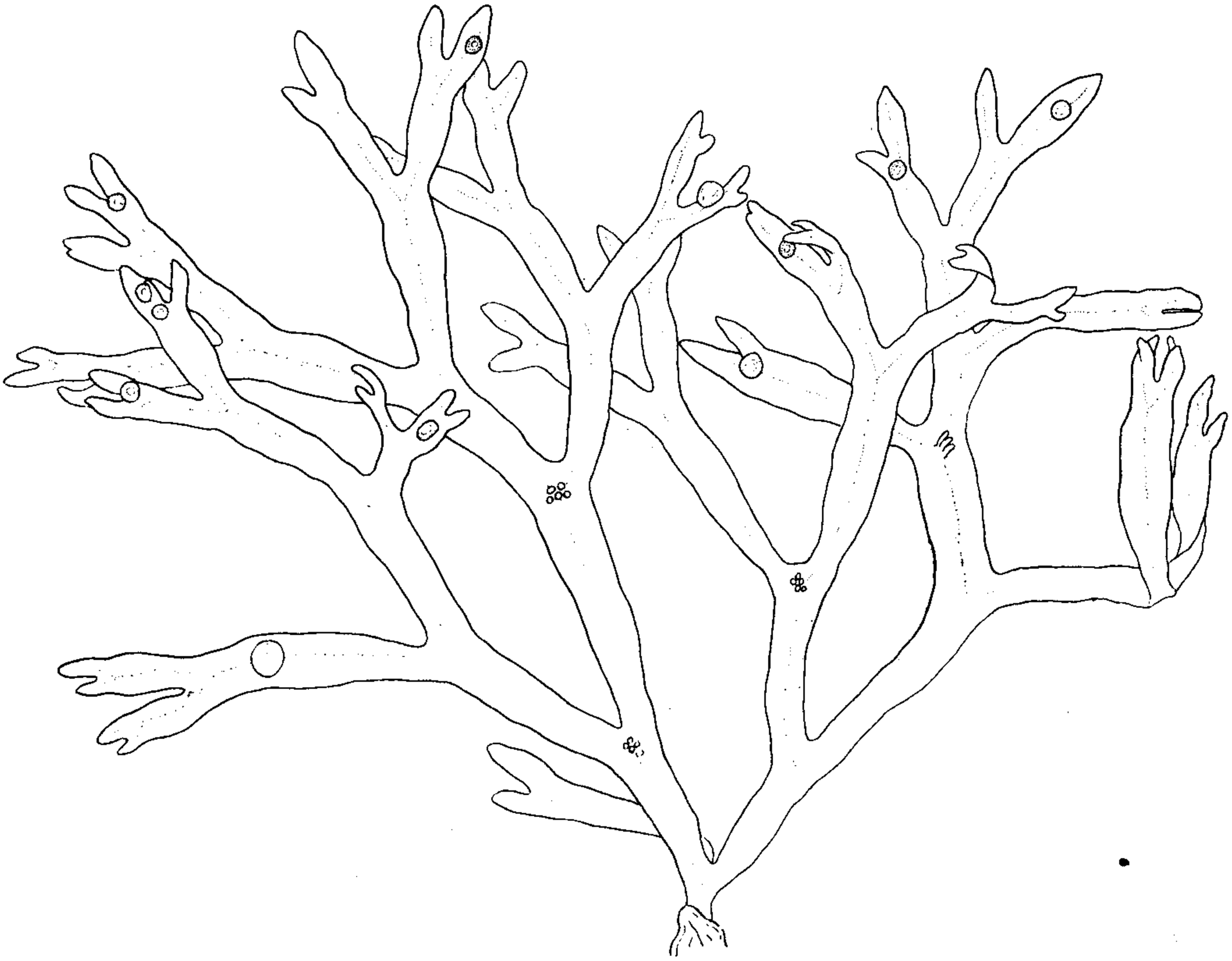


Fig. 7. *Caloglossa saigonensis* Tanaka et Pham-Hoang Ho.
Habit of a cystocarpic plant. ×20.

Habitat. Growing on the leaf of *Nipa fruticans* Wurmb. or on the fruits of *Cocos nucifera* L. associated with *Caloglossa adnata* De Toni and *C. stipitata* Post. Cholon, near Saigon.

Frond ceaspitose, regularly dichotomous, continuous, 0.9–1.1mm. tall, repent, linear-lanceolate; segments narrow, linear-lanceolate, 470–550μ broad, 75μ thick, almost even or slightly undulate at margin, very slightly attenuating towards the base, not constricted; the lateral membrance of one cell layer, the cell in decussate rows; tetrasporangia subspherical, 21–32μ in diameter; cystocarps sessile, prominent of the midribs, usually a single one near the distal end of a segment, enveloped in a thin pericarp, subglobose, 330–370μ in diameter; colour of the frond

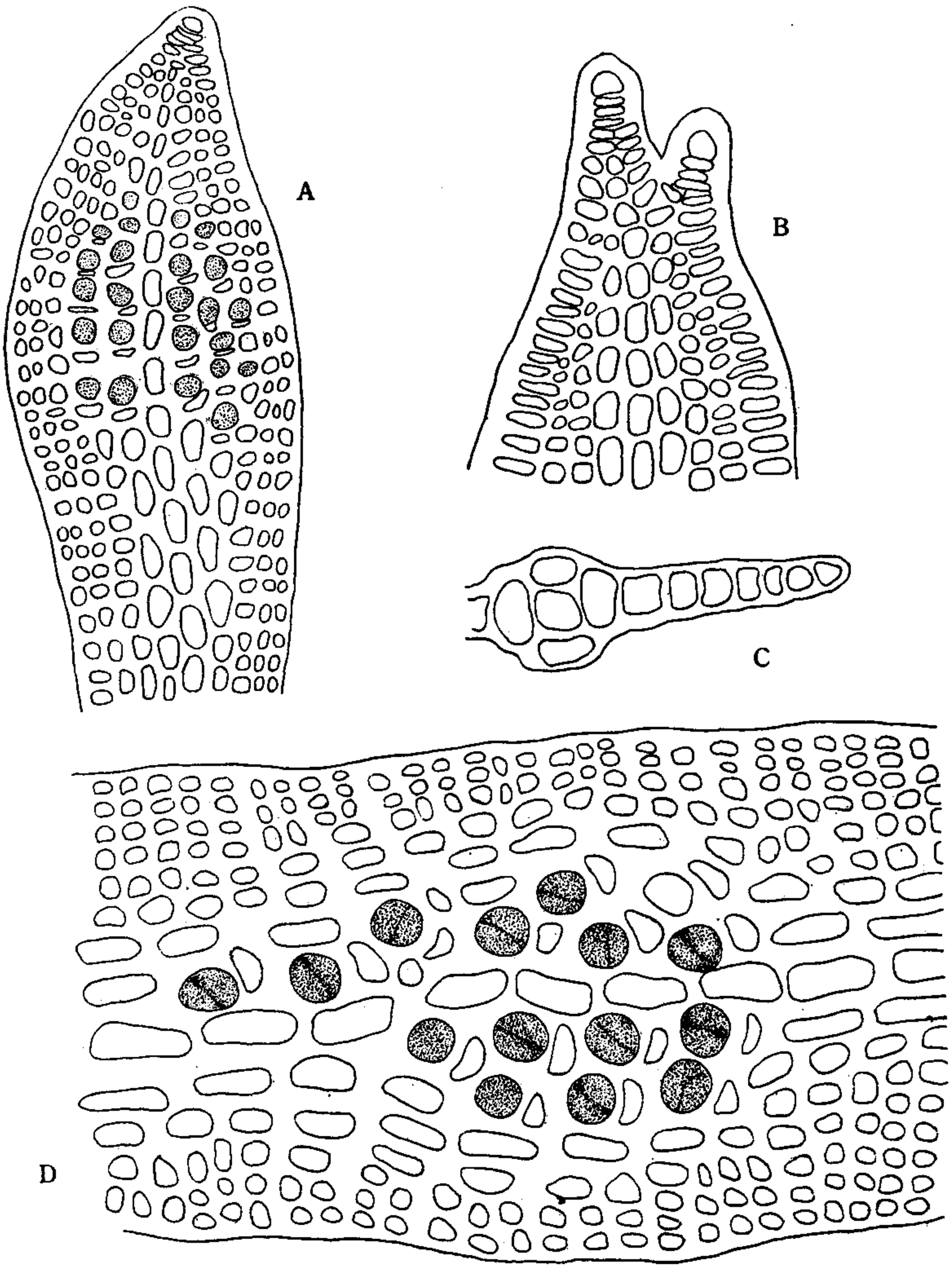


Fig. 8. *Caloglossa saigonensis* Tanaka et Pham-Hoang Ho.
A. Apex of a tetrasporic branch. ×170.
B. Apex of a branch. ×170.
C. Transverse section of the frond. ×170.
D. Part of the tetrasporic frond of the middle portion of the segment. ×170.

purplish red.

This slender small plant froms dense tufts upon the substratum to which it is fixed by means of several short rhizoids given out from the nodes. The ramification is always regularly dichotomous, as the joints are the same lengths. The blades are not much narrowed at the nodes. The secondary proliferated leaves are usually absent. The tetrasporangia formed in decussate series in sori are usually near the apex parts of the frond. But they are sometimes formed in the middle portion of the segments.

This slender new species is very nearly related to *Caloglossa bombayensis* Boergesen and *C. ogasawaraensis* Okam., but it differs from the above two species in its regular ramification. In *C. saigonensis* the formation of the tetrasporangia is very nearly related to *C. leprieurii* Mont.

Erythrocladia chaetomorphae Tanaka et Pham-Hoang Ho, spec. nov.

Thallus suborbicularis, e filamentis irregulariter radiantibus et ramosis compositus, in superficie corticis hospitis (*Chaetomorpha* spec.); ramificatio alterna aut secunda sed irregularis; cellulis oblongae-subcylindricae, 2.5–4μ latae et 3.5–5.5μ longae; chromatophora parietalia lobata; monosporangia sessilia et subspherica, ca. 3.6μ diam; colore roseo-purpureo. Planta typica in loco dicto, Ca-Na, Viet-Nam, legit Pham-Hoang Ho, no v. 106, Aug. 1960.

Habitat. Growing on *Chaetomorpha* spec. Ca-Na, Viet-Nam.

Frond suborbiculate, composed of freely branched, horizontally expansive, in the older portions crowded, forming an irregular spot of diameter up to 200–400μ, alternately or sencundately, but usually irregularly ramified, creeping on the surface of the host (*Chaetomorpha* spec.); filaments 2.5–4μ broad, cells 3.5–5.5μ long, cylindrical or slightly swollen in the middle and a little rounded at the end; chromatophores parietal laminate with a central pyrenoid; monosporangia mostly on the old central parts of the frond, sessile, subspherical, ca. 3.6μ in diameter; colour of the frond purplish red.

The present species was found upon *Chaetomorpha* spec. associated with *Erythrocladia subintegra* Rosenvinge. The plant has lamose filaments with apical growth and these filaments radiate from the centre in all directions covering a more or less round area, as much as 200–400μ across. The ramification is rather irregular, lateral or alternate. In the centre of the plant the filaments gradually combine to form a coherent layer. The cell contains an irregularly parietal-laminate chromatophore with one central pyrenoid. The monosporangia are nearly globular or somewhat elliptical, about 3.6μ in diameter; they have more granular contents than the vegetative cells. The formation of the sporangia takes place in the intercalary cells of the central parts of the thallus. The sporangia are cut off from the vegetative cells by means of an oblique or horizontal wall.

In general appearance, the present species closely resembles *Erythrocladia pinnata* Taylor, but the method of branch formation and the formation of monosporangia are apparently different from those of *E. pinnata* Taylor. In *E. pinnata*, the branches are often opposite in the same main axis cells, so it shows the pinnate character. But we are unable to find such habits in our plants as mentioned above. Furthermore, *E. chaetomorphae* differs from *E. irregularlis* Rosenvinge in its freely branched filaments of the frond. In *E. irregularlis* Rosenv., the filaments are always fused together in the central part of the frond.

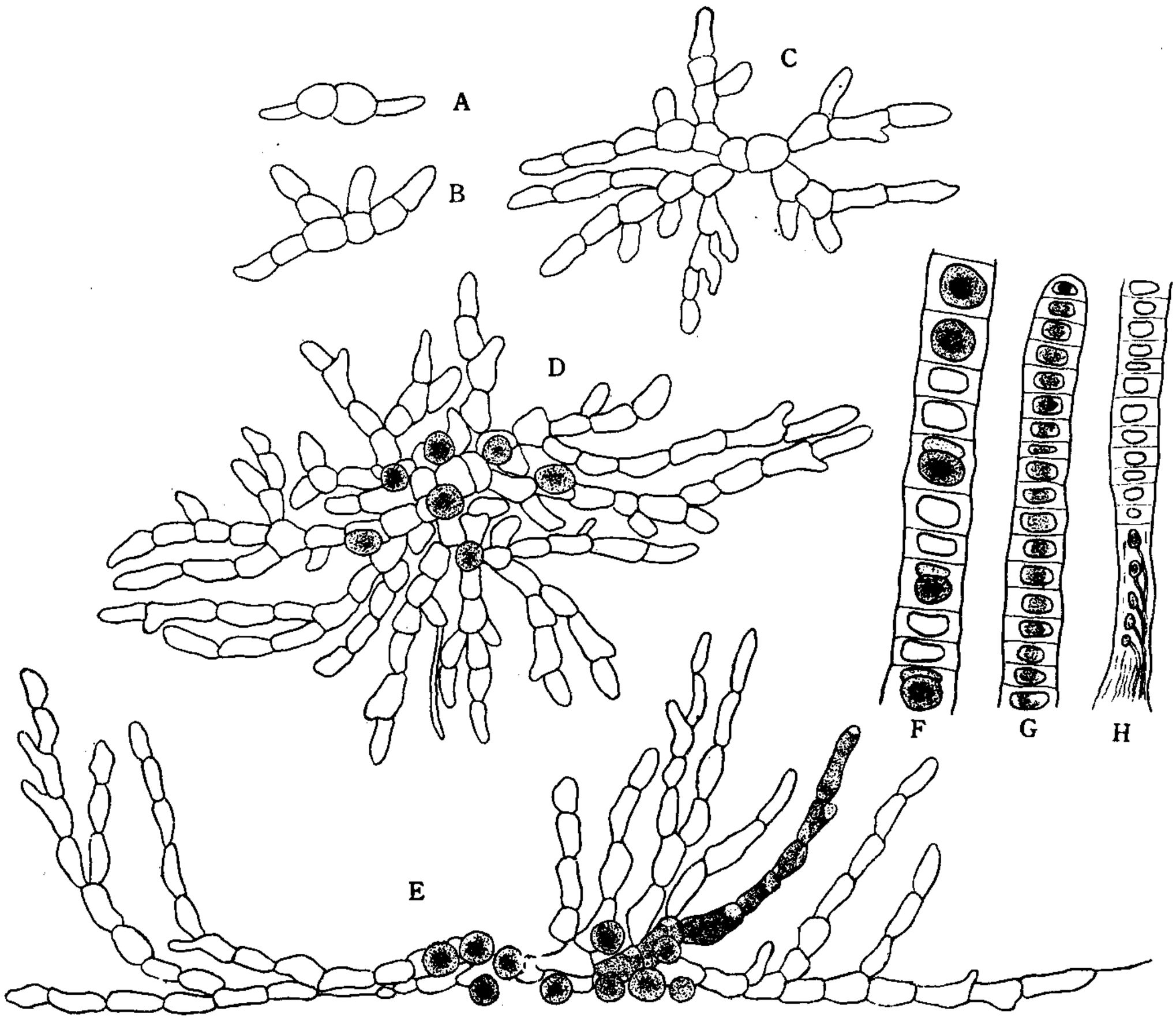


Fig. 9. A–E. *Erythrocladia chaetomorphae* Tanaka et Pham-Hoang Ho.
F–H. *Erythrotrichia parietalis* var. *majuscula* Tanaka et Pham-Hoang Ho.
A–C. Young plants. ×470.
D–E. Parts of the matured plants with monosporangia. ×470.
F. Part of a filament with monosporangia. ×170.
G–H. Parts of the filaments. ×170.

Erythrotrichia parietalis Tanaka v. **majuscula** Tanaka et Pham-Hoang Ho, var. nov.

Frons epiphytica, caespitosa, ad 3 mm. alta, filamentis erectis, uniseriatis, ca. 36μ diam.; cellulis optica quadrato-orbicularibus, 12–24 × 15–36μ; chromatophoris parietali-laminatis; monosporangia ovatis vel globosis, ca. 27–40μ diam. Planta typica in loco dicto Cana, Viet-Nam, legit Pham-Hoang Ho, no. v. 110, Apr. 1960.

Habitat. Growing on the other algae associated with *Lyngbya majuscula* Harvey. Cana, Viet-Nam.

Frond epiphytic, caespitose, usually up to 3 mm. high, lower most basal cells usually linear-elongate and slender, penetrating vertically through the substratum; filaments straight, monosiphonous, about 36μ in diameter; cells usually slightly

shorter than broad, rarely as long as broad, mostly quadrate with rounded angles, 12–24 × 15–36μ; cell wall rather thick; chromatophore parietal laminate without central pyrenoid; monosporangia spherical or ovate, 27–40μ in diameter, in upper part of the filament.

The frond is attached to the substratum by means of basal cells which give off short rhizoidal filaments. The filaments of this present new variety attain a length of 3 mm. and have a diameter about 36μ. The colour of the frond is purplish red.

Porphyra vietnamensis Tanaka et Pham-Hoang Ho, spec. nov.

Frons monstromatic, membranacea, lanceolata vel lineali-lanceolata, marginibus undulatis, dentata, ad 4–7 cm. longa, 0.5–2.5 cm. lata, 18–24μ crassa, ad basin stipitata, cordata vel rotunda; cellulis vagetativis obscure seriatis, rotudato-angulatis vel ellipticis, in sectione transversa rotundato-subrectangularibus; gelatina superficilalis 5–7μ crassa; cellulis uni-chromatophoris laminis vel substellaris; monoica; antheridiis et sporocarpiis zonas marginalis formantibus; antheridia cum 64 spermatiis 64 $\left(\frac{a}{4}\ \frac{b}{4}\ \frac{c}{4}\right)$, carposporae in sporocarpio 8 $\left(\frac{a}{2}\ \frac{b}{2}\ \frac{c}{2}\right)$; colore rubro-purpureo. Planta typica in loco dicto Vung-Tau, legit Pham-Hoang Ho, no. 2226, Jan. 1960.

Habitat. Growing on rocks in the upper littoral zones. Vung-Tau, (Cap. St. Jacqus), Viet-Nam.

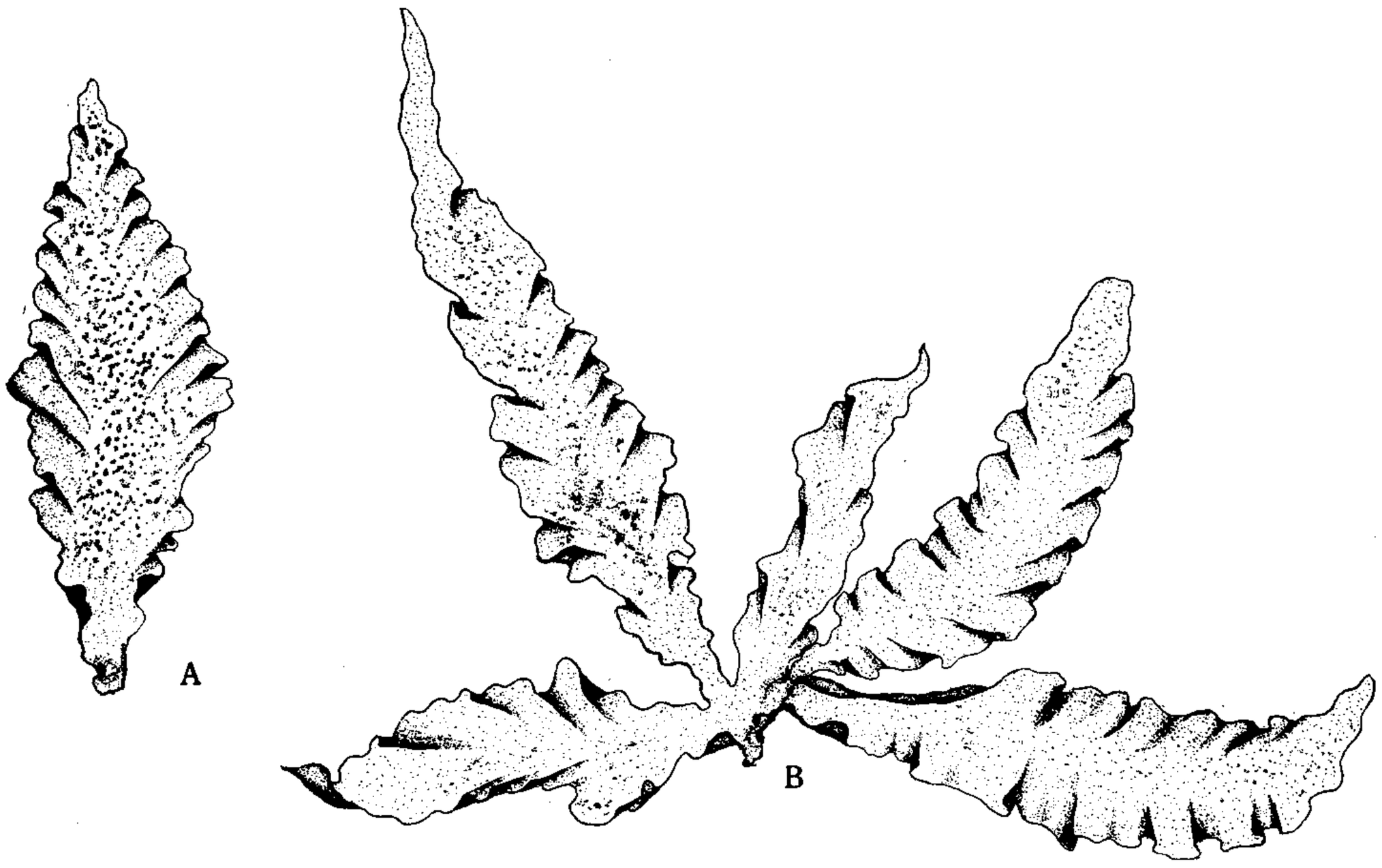


Fig. 10. *Porphyra vietnamensis* Tanaka et Pham-Hoang Ho.
A. Habit of a plant. × 2.
B. Branched blades of a single plant. × 2.

Frond monostromatic, membranaceous, lanceolate or linear-lanceolate, more or less lacerate blades arising from a common base, with undulate margins, shortly stipitate with cordate or ovate-base, 4–7 cm. long, 0.5–2.5 cm. broad, 18–24μ thick; vegetative cells in surface view usually more or less elliptic, ca. 5–6μ in diameter, irregularly arranged, lower cells projecting rhizoidal filaments rather large, ca. 10–15μ in diameter, angular-capitate or oblong-capitate; microscopic spinulate processes well developed; surface jelly 5–7μ thick; vegetative cells containing laminate or substellate chromatophores and a central pyrenoid within it; monoecious; sporocarpic and antheridial patches found on the marginal region of the same thallus; each antheridium containing 64 antherozoids, arranged in four tiers of four each in surface view, according to the formula of division, corresponding to $64\left(\frac{a}{4}\ \frac{b}{4}\ \frac{c}{4}\right)$; sporocarp containing 8 carpospores each after having divided according to the formula, $8\left(\frac{a}{2}\ \frac{b}{2}\ \frac{c}{2}\right)$; colour of the frond light purplish red.

This present species occurs on rocks in the upper littoral zone. The shape

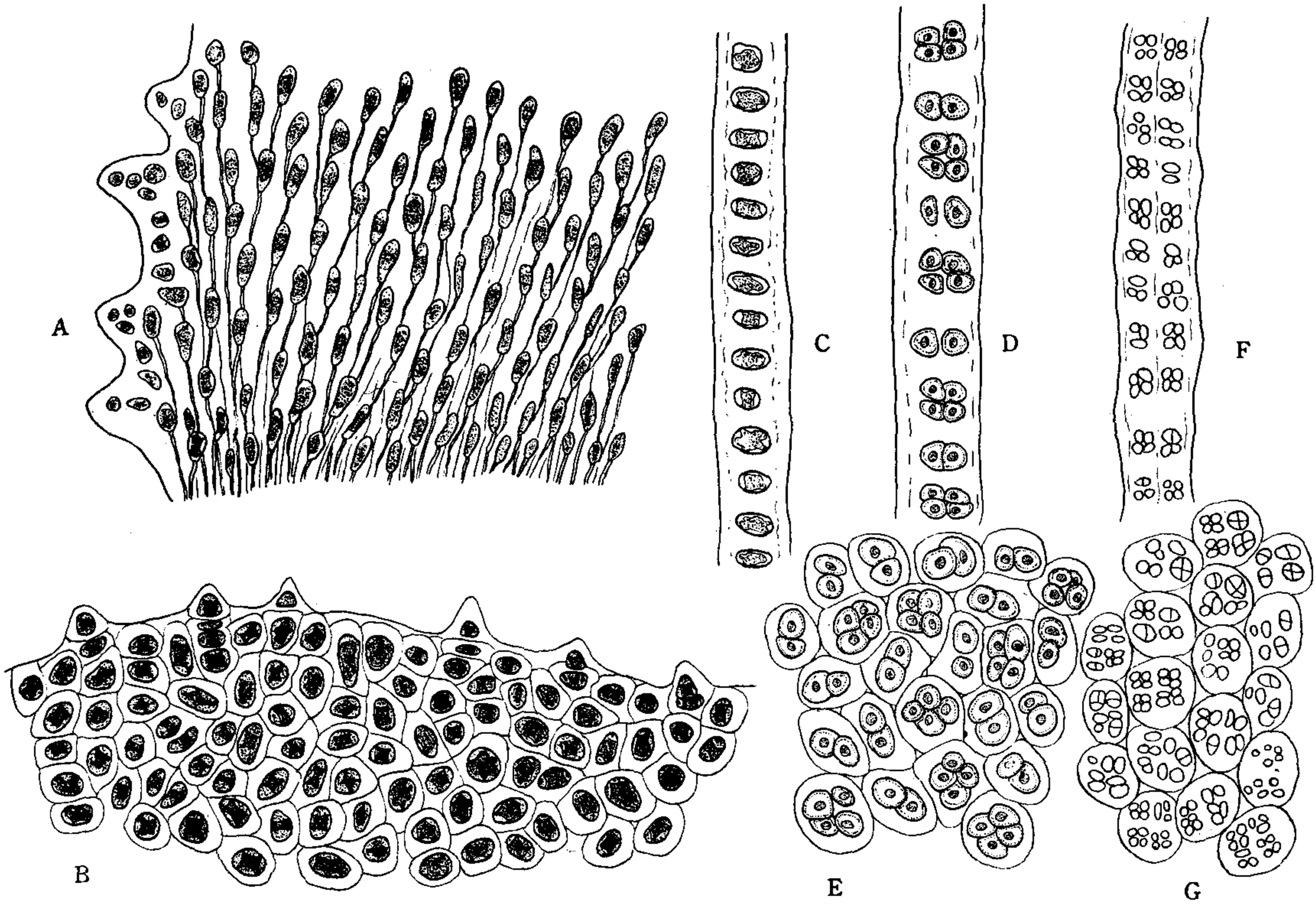


Fig. 11. *Porphyra vietnamensis* Tanaka et Pham-Hoang Ho.
A. Lower most cells of the frond, showing the rhizoidal filaments. ×300. B. Marginal portion of the frond, showing microscopic spinulate processes. ×300. C. Cross section of the frond, ×300. D. Cross section of a cystocarpic frond. ×300. E. Surface view of the cystocarpic frond. ×300. F. Cross section of an antheridial frond. ×300. G. Surface view of the antheridial frond. ×300.

and size of the frond are variable. The specimens at hand, contain two forms. The one is oblong lanceolate. The other has lacerate blades arising from a common basal. The frond is always monoecious. At first antheridia are only found at the tip and the marginal portions. Inside this margin, the sporocarpic area can be readily recognized by their deep red colour.

There are six monostromatic species with microscopic spinulate processes which are known previously, namely, *Porphyra areolata*, *P. dentata*, *P. crispata*, *P. okamurai*, *P. suborbiculata*, *P. denticulata*. The present new species is closely related to *Porphyra denticulata* Levring, but differs from it in the divisional mode of antheridia, and in having the thinner frond.

Ceramium howei Weber van Bosse

Liste des Algues du Siboga, III (1923) p. 323, fig. 16.

Frond small, 2–4 mm. long, creeping on the substratum, main filaments irregularly ramified, about 150μ in diameter, branches and branchlets issued from the main filaments with just right angles, and often secundate; nodes entire or very slightly contracted in the upper divisions, each node usually shorter than broad, about 70μ long and 150μ broad; outermost cortical cells almost all over the internodes, somewhat elongated and arranged in longitudinal chains, more longer and less close towards the below of the septum; tetrasporangia ellipsoidal,

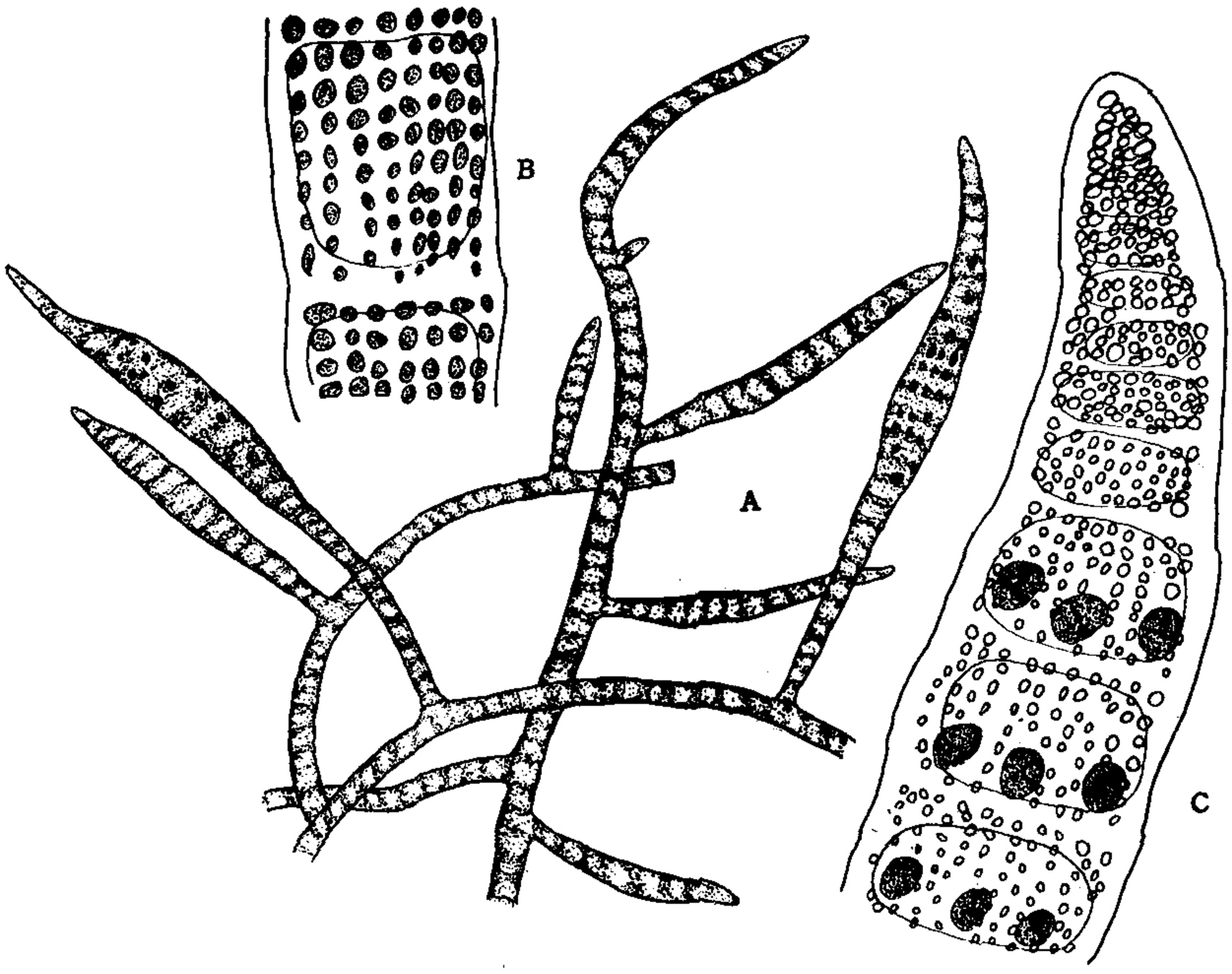


Fig. 12. *Ceramium howei* Weber van Bosse.
A. Habit of a tetrasporic plant. ×35.
B. Portion of a branch, showing the cortication. ×300.
C. Tip of a branch with tetrasporangia. ×300.

ca. 30–35 × 35–45μ in diameter, in the nodes of the branchlets, usually in a single row, immersed in the cortical cells.

Habitat. The plants growing on the other algae associated with *Centroceras clavulatum* Mont. Duong-Dong, Phu-Quoc Island (col. Tanaka no. 185, 26 May, 1961).

This vietnamese plants which the senior writer has refered to *Ceramium howei* seem to accord well with the description and figures of Weber van Bosse (1. c.). In the specimens at hand the branches and the branchlets of the frond seem to the writer to be longer and more slender than those of Weber's plants.

Hypnea pannosa J. Agardh

"Alg. Lieb., p. 14", Spec. Alg., II (1852) p. 453, Epicr. (1867) p. 565; Harvey, Nereis Boreali-Americana (1853) p. 125; Kuetzing, Tab. Phyc., Bd. 18 (1868) tab. 27, i-k; Grunow, Algen der Fidschi-Tonga und Samoa Inseln (1874) p. 39; De Toni, Syll. Alg., IV (1900) p. 482; Okamura, On alg. Ogasawarajima (Bot. Mag. Tokyo, vol. II, 1897) p. 12, Icon. Japan. Alg., vol. 1, no. 1 (1901) p. 47, pl. 10, figs. 18–20, On mar. alg. Kotosho (1931) p. 114; Weber van Bosse, Mar. Alg. Sealark Expedition (Trans. Linn. Soc., vol. 8, pt. 3, 1913) p. 118, Liste des alg. Siboga, IV (1928) p. 455, fig. 193; Taylor, Mar. Alg. Florida (1928) p. 156, Pacific mar. alg. Allan Hancock Expeditions Galapagos Islands (1945) p. 227, pl. 71, fig. 2; Boergesen, Mar. alg. Ceylon (1936) p. 84, Contrib. south Ind. mar. alg. Flora, II (1937) p. 326, Mar. alg. from Iranian Gulf (1939) p. 112, Some mar. alg. from Mauritius (1943) p. 61; Tanaka, Genus *Hypnea* from Japan (1941) p. 247, fig. 20; Dawson, Mar. alg. Gulf of California (1944) p. 291.

Habitat. Growing on the rocks associated with *Hypnea nidulans* Setch. Duong

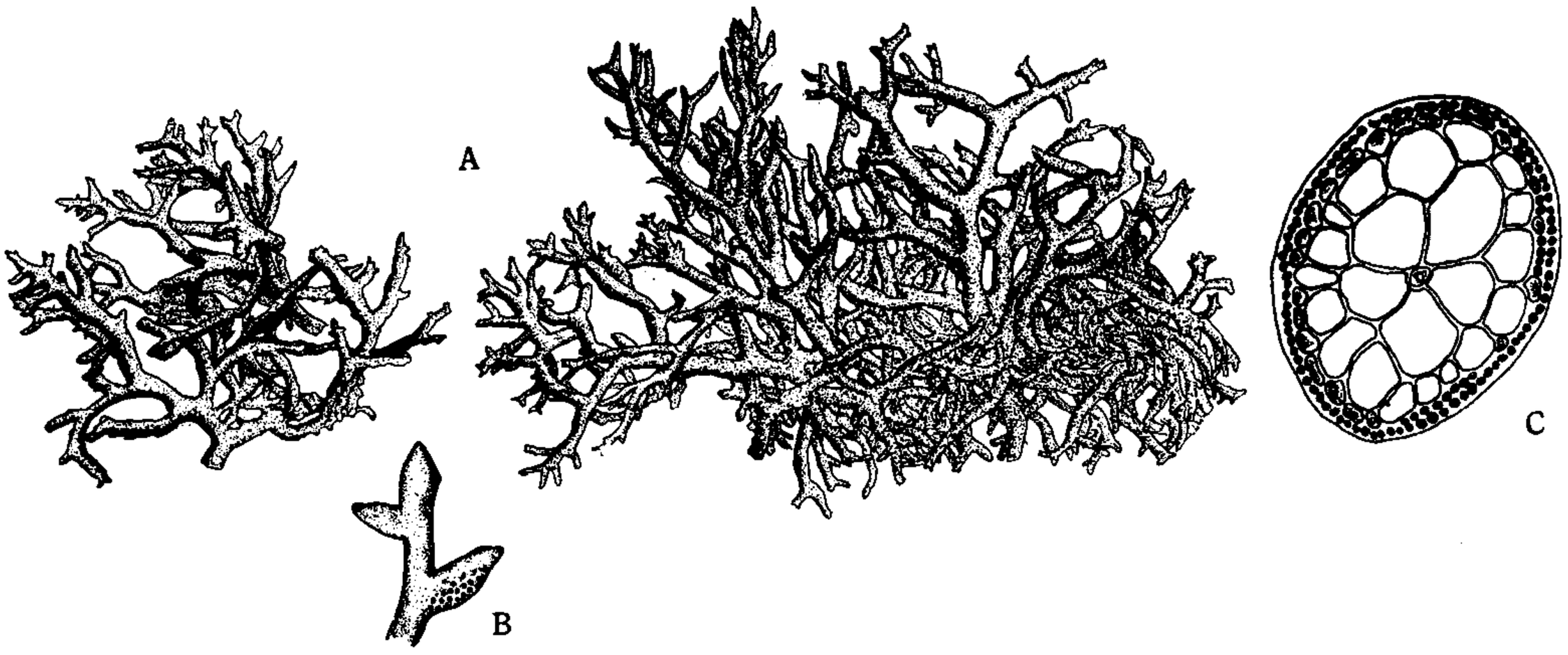


Fig. 13. *Hypnea pannosa* J. Ag.
A–B. Habit of the plants. × 1. 5.
B. Part of a branch with tetrasporangia. × 3.
C. Transverse section of the frond. × 130.

Dong, Phu-Quoc Island, Viet-Nam. (Col, Tanaka, no. 120, 29 May, 1961).

Frond densely intricate-caespitose, subcartilagenous or somewhat membranaceous, 2–4 cm. high, about 700–800μ thick, subcylindrical, consisting of small compact tufts on rocks, irregularly densely ramified, upper branchlets patent, acute or obtuse, usually obliquely truncate at the apex, no constriction at the base, medullary cells of the inner layer, excepting central cell, gradually smaller towards periphery, usually consisting of rather thin membrane; lenticular thickenings in the wall of the medullary tissue usually absent; cortex consisting of one or two layers of small cells, and about 20–38μ in thickness; tetrasporangia ellipsoidal, 6–8μ long and 15–20μ thick, on one side (afterwards gradually around) of somewhat swollen portion of upper branchlets, tetraspore irregularly zonate; male and female organs unknown; colour of the frond reddish purple, but little darker when dried.

Hypnea pannosa J. Ag. often grows together with *Hypnea nidulans* Setch. and is distributed widely in the warmer parts of the Pacific. The type locality of this species is on the Pacific coast of Mexico. The senior writer has been able to compare the Vietnamese materials with authentic J. Agardh's and Dawson's specimens from the Mexico and the Gulf of California, and Vietnamese materials appear to be very similar to those mentioned specimens.

Hypnea cervicornis J. Agardh

Spec. Alg., II (1952) p. 451, Epicr. (1876); Harvery, Nereis Boreali-Americana, II (1853) p. 125; De Toni, Syll. Alg., IV (1900) p. 480; Okamura, Icon. Japan. Alg., vol. 4 (1916) p. 35, pl. 159, figs. 6–9, pl. 160, figs. 1–5; Collins and Hervery, The alg. of Bermuda (1917) p. 112; Boergesen, Mar. alg. Danish West Indies (1920) p. 383, Mar. alg. Canary Islands (1929) p. 84; Weber van Bosse, Liste alg. Siboga, IV (1928) p. 454; Taylor, Mar. alg. Florida (1928) p. 156, pl. 22, fig. 11, Caribbean mar. alg. Allan Hancock Expedition 1939 (1942) p. 104, Pacific mar. alg. Allan Hancock Expeditions Galapagos Islands (1945) p. 228, Mar. alg. Eastern tropical and subtropical coasts Americas (1960) p. 466, pl. 73, fig. 2; Tanaka, Genus *Hypnea* from Japan (1941) p. 240, fig. 13; Dawson, Mar. plants in the vicinity Nha-Trang, Viet-Nam (1954) p. 437, fig. 46, d.

Syn. *Hypnea spinella* Kuetzing, Tab. phyc., Bd. 18 (1868) t. 26.

Frond loosely intricate-caespitose, forming tangled and extensive, 5–10 cm. high, and about 500μ thick, membranaceous, main axis to 3–15 cm. long, subcylindrical, lower branches decumbent, those above widely divaricate, subdichotomous, in the upper portions alternate and somewhat cervicorn, ultimate divisions tapering to the tips and usually not hamate; medullary cells of the inner layer gradually smaller towards periphery, consisting of rather thick membrane, cortex consisting of one or two layers of small cells; lenticular thickenings in the wall of the medullary cells very rare; tetrasporangia usually ellipsoidal, 5–8 $\times$ 10–25μ, around the middle or basal swollen portion of the branchlets; cystocarps

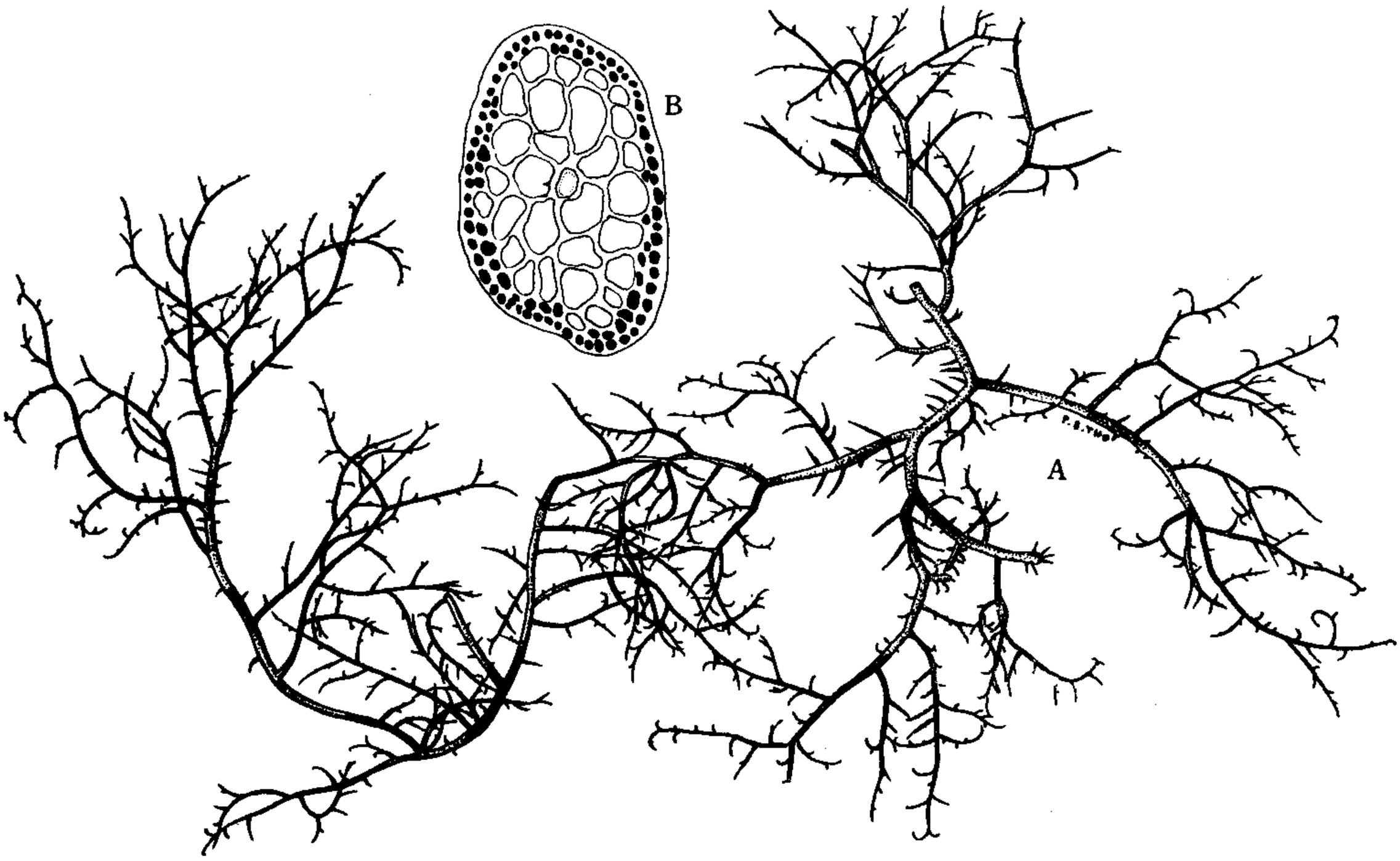


Fig. 14. *Hypnea cervicornis* J. Ag.
A. Habit of the plant. ×1.5.
B. Transverse section of the frond. ×125.

and antheridia unknown; colour of the frond purplish red or pale red.

The materials of *Hypnea* from Vung-Tau, Viet-Nam were able to be referenciated to *Hypnea cervicornis* J. Ag. In 1954, Dr Dawson has already reported this species from Nha-Trang, Viet-Nam, but our materials are little different from the specimens from Nha-Trang in their mode of ramification.

Senior writer was able to compare his specimens with J. Agardh's specimen no. 33876 from Brazil. In the general appearance of the frond, our plants quite agree with the Brazilian specimen. Furthermore, our material seems to agree quite well with the description of Taylor from Galapagos Islands (loc. cit.), but it differs from the Galapagos plant by the absence of the tendrils of the branchlets. In this plant, usually there are no perfect hooked branch tips, according to the senior writer's examination. The present species has much resemblace to *H. nidifica* J. Ag. from which, however, it differs in its ramification of the upper parts of the branches.

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