

## Studies on Some Marine Algae from Southern Japan, I

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For some years the present writer has been studying the marine algal flora of Yakusima, Tanegasima and their vicinity. The result of this study seems likely to the writer to be interesting and contribute to some extent to the marine flora of the southern parts of Japan. Among the specimens of marine algae from these Islands, collected by the writer since 1947, there are some interesting ones, of which are described in the following pages.

Here the writer to express his best thanks to Prof. YUKIO YAMADA in the Botanical Institute, Faculty of Science, University of Hokkaido, for his kind guidance during the course of the present study. Thanks are also due to Mr. SEINAI YAMAMOTO, Master of Kagoshima College of Fisheries, for his kind advices and encouragement throughout the present work.

The expense of the present study was defrayed partly by the subsidy from the Department of Education's Scientific Research Fund, for which the writer expresses here his sincere thanks.

1) *Trichogloea Papenfussii* spec. nov. Plate II, and Text-fig. 1.

Frons lubrica, gelatinoso-mucosa, filiforme vel cylindracea, ca. 15 cm lata, radice parva disciforme adfixa, paniculatum ramosa, ramulis ultimis apice obtusis, calce leviter tantum in axi centrali obducta; axis centralis in ramulis ex filamentis diam. 15-22  $\mu$  crassis, in inferioribus partibus frondis ex filamentis magnis crassioribus, diam. 55-85  $\mu$  crassis et tenuioribus, ca. 15  $\mu$  crassis intermixtis, composita; stratum periphricum ex filamentis, ca. 450-950  $\mu$  longis compositum; cellulis ultimis interdum pilis coronatis; species dioica vel androdioica; antheridiis ad quomodo superioribus partem filamentorum periphericarum in capitulum convenientibus, sphericis vel ovatis, diam. 1.5-3  $\mu$  metientibus; ramis carpogonii ex gere 8 cellulis compositis, ca. 4-6  $\mu$  latis, fere rectis, ad filamentorum periphricum terminalibus; corole albo fusco vel fuliginoso.

Japanese name. *Yogore-akebonomoduku*.

Hab. Magesima, Tanegasima. Growing on rock in lower littoral belts.

Fronde lubricous, gelatinous-mucous, filiform or cylindrical, ca. 15 cm high, fastened to the substratum by means of a small disc-shaped base, paniculately branched, with obtuse ultimate branchlets, only central axis thinly encrusted; central axis composed of long cylindrical cells with diam. of 15-22  $\mu$  in branchlets, in the lower portion of the frond of thick (55-85  $\mu$ ) filaments and thinner about 15  $\mu$  thick ones; assimilatory filaments about 450-950  $\mu$  long, 3-4

times dichotomous, cells longly cylindrical, about  $3-4\ \mu$  thick below, becoming shorter and rounded upwards, near the end of filaments oval or elliptical, larger ones about  $9\ \mu$  thick; ultimate cells bearing sometimes hairs or often short young hairs; plants dioecious or andro-dioecious; antheridia borne on upper part of peripheral filaments, forming a small head, spherical or somewhat ovate, about  $1.5-3\ \mu$  in diameter; carpogonial branches composed of about 8 cells, about  $4-6\ \mu$  wide; nearly straight, terminal on young peripheral filaments.

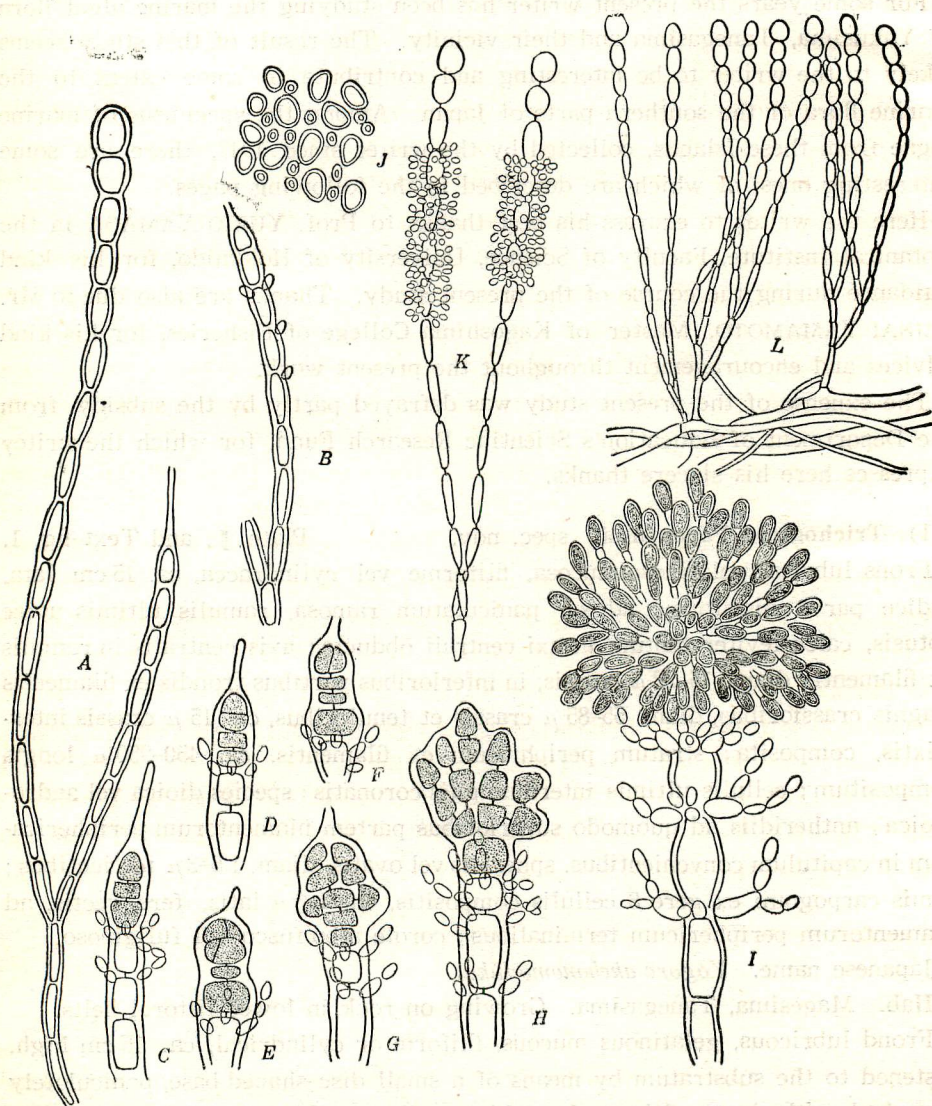


Fig. 1. *Trichogloea Papenfussii* TANAKA. A, B. Early stages in the development of carpogonial branch. x 270. C—H. Early stages in the development of the gonimoblast. x 320. I. Mature cystocarp. x 300. J. Cross section of central axis. x 130. K. Antheridia. x 200. L. Assimilatory filaments. x 100.

In outer appearance and anatomical structure, the present species is nearly related to *T. Requiinii* (MONT.) KUETZING. But in detail there are several constant differences between the present species and *T. Requiinii*. The base of the plant consists of small soft disc. The frond is mostly simple, filiform or cylindrical. The ramification occurs irregularly and alternately branched with some proliferations. These proliferations of this species are rather fewer than those of *T. Requiinii*. The plant has a rather peculiar colouring; it is either dirty brownish white or darkish brown.

Structurally the thallus of this new species agrees with that of *T. Requiinii* and *T. lubrica* J. Ag. The thallus is composed of a central tissue of entwined, branched, colourless, filaments, from which issue numerous assimilating filaments radiately. The peripheral portions of the assimilative filaments, are composed of cells which are moniliform near the surface, but become progressively longer and narrower the center of the thallus.

As diagnosed above, the present species is dioecious or andro-dioecious; that is, on male fronds only antheridia are formed on "female fronds" the carpogonia are formed together with some antheridia. According to PAPENFUSS, *T. Requiinii* is ordinarily dioecious, but occasional plants are monoecious. The antheridia are formed on the subdistal cells of the assimilative filaments. Usually on this case the three terminal cells remains sterile.

The carpogonial branches are formed in the younger parts of the thallus, consisting of about eight cells. Initiate sterile filaments are already formed in this species previous to fertilization. After fertilization, the carpogonium cell divides transversely into two unlike cells. The proximal cell remains sterile, forming a stalk cell. The distal cell formed by the first division of the carpogonial cell has very dense cytoplasm. It soon divides again, transversely, and the each of cells thus formed divides, one or more times, in planes perpendicular to the first divided plane, forming thus an almost spherical mass of several cells arranged in two tiers. According to PAPENFUSS, the first division of the primary gonimoblast cell of *T. Requiinii* is finished by an oblique wall. This feature of *T. Requiinii* is clearly different from that of *T. subnuda* and *T. Papenfussii* TANAKA.

2) **Trichogloea Requiinii** (MONTAGNE) KUETZING

Spec. Alg. (1849) p. 544, Tab. Phyc., t. VII (1857) p. 37, pl. 92, f. II; DE TONI, Syll. Alg., Vol. IV (1897) p. 76.

Syn. *T. lubrica* (non J. AGARDOH) OKAMURA, Icones of Japanese Algae, Vol. IV (1923) p. 183, pl. 197, figs. 1-8, On the Algae from the Island Hatidyo (1930) p. 93, Nippon Kaisoshi (in Japanese, 1936) p. 411; SEGAWA, On the Marine Algae on Susaki, Prov. Izu and its Vicinity (1935) p. 71.

Japanese name. *Akebonomoduku*.

Hab. Kusi, Satuma Prov.; Hatidyo; Nomozaki, Hizen Prov.; Niijima,

Izu Prov.

Distrib. Red Sea ; Malay Archipelago ; Hawaiian Islands ; Japan.

Dr. PAPENFUSS (1946) has given a good account of the structure and reproduction of the thallus of *T. Requierii* (MONT.) KUETZING from the materials from Hawaiian Islands, and has suggested that the Japanese plants which Dr. OKAMURA has referred to *T. lubrica* seem to have much coincide with *T. Requierii*.

By the favour of Dr. PAPENFUSS, the writer was allowed to examine the the duplicate of the original material of HARVEY (Friendly Island Algae, No. 46, *Trichogloea lubrica*) (Pl. II.) and the specimen of *T. Requierii* from Hawaii in California University Herbarium.

Though the comparative examination of above mentioned specimens, it was identified that, in outer appearance and anatomical structure of the frond, the Japanese plants show greater agreement with *T. Requierii* than *T. lubrica*. The name of our Japanese alga therefore should be *T. Requierii* (MONTAGNE) KUETZING insted of *T. lubrica* J. AG. as suggested by PAPENFUSS. The certain stages in the development of the reproductive organs of our Japanese plants of *T. Requierii*, unfortunately, have not been ascertained yet.

3) *Exophyllum Wentii* WEBER VAN BOSSE Pl. II. and Text-figs. 2-3.

Notice sur quelq. genres nouv. d'alg. de l'Arch. Malaisien (Ann. du Jardin Bot. de Buitenzorg. 1910) p. 28, Liste des Algues du Siboga, II (1923) tab. VI, figs. 5-8, IV (1928) p. 478 ; DE TONI, Sylloge Algarum, VI (1924) p. 304.

Japanese name. *Atuba-komorinori*. (n. n.)

Hab. Magesima, Tanegasima. Growing on rocks in rather lower sheltered places.

Distrib. Borneo ; Sulu Islands ; Savu Island.

Frond coriaceous, dorsi-ventrally prostrate, ca. 1-2 mm. thick, umbraculiferous, with some spinules at margins, attaching to the substratum by means of short stipe under surface of the frond, often being provided with it lobes of one individual attach to each other ; upper surface of the frond often convex, laevigate but often covered with rather densely with tubercle or papillae when old ; cortical layer composed 3-8 rows of cells, the outermost 1-2 cells small, becoming gradually larger inward ; medullary cells large, about 150-180 $\mu$  in diam. ; stichidia short, lanceolate, more or less curved in the middle part, developed on surface parts of the frond, usually double row of tetraspores in ventral view ; tetrasporangia usually elliptical,

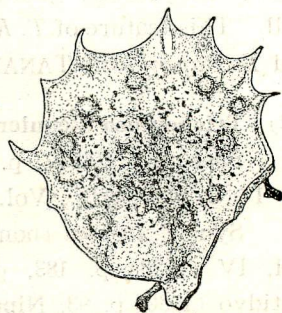


Fig. 2. *Exophyllum Wentii* WEBER VAN BOSSE. Part of the frond with stichidia. x 1.

ca.  $195\ \mu$  in diam, tetrahydrally divided; antheridia and cystocarps unknown; colour deep red or purplish red.

The present species has been reported only from the Malay Archipelago by WEBER VAN BOSSE. The writer has met with it twice at the above mentioned locality. The plant is provided with short stem-like protuberance here

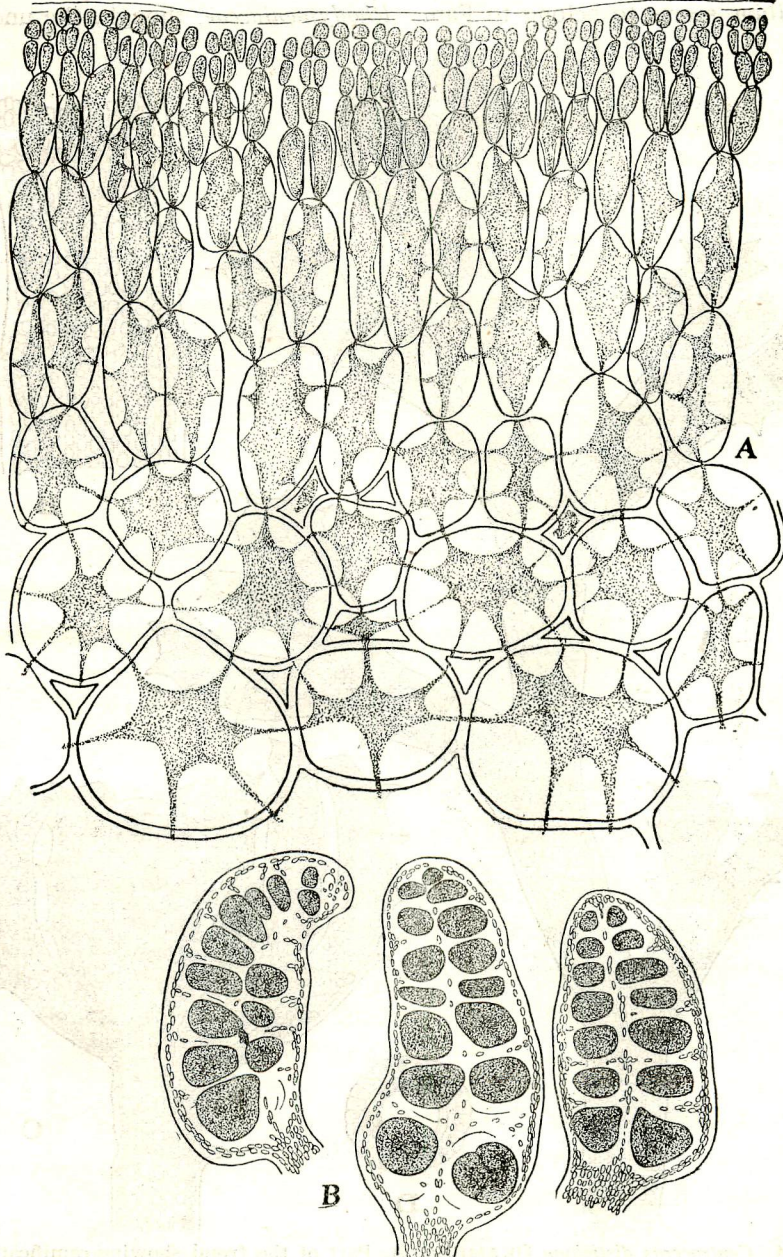


Fig. 3. *Exophyllum Wentii* WEBER VAN BOSSE. A. Transverse section of the frond. x 220. B. *Stichidia*. x 25.

and there on the under-surface, by means of which the frond fastens itself to the substratum. The stichidia of this species develop on the upper surface of the frond as exogenetic adventive branchlets, presenting usually a double row of tetraspores in ventral view. All our specimens, however, show neither cystocarps nor antheridia. Judging from the structure of the frond, genus *Exophyllum* seems to belong to Fam. *Rhodymeniaceae*, though, the uncertain

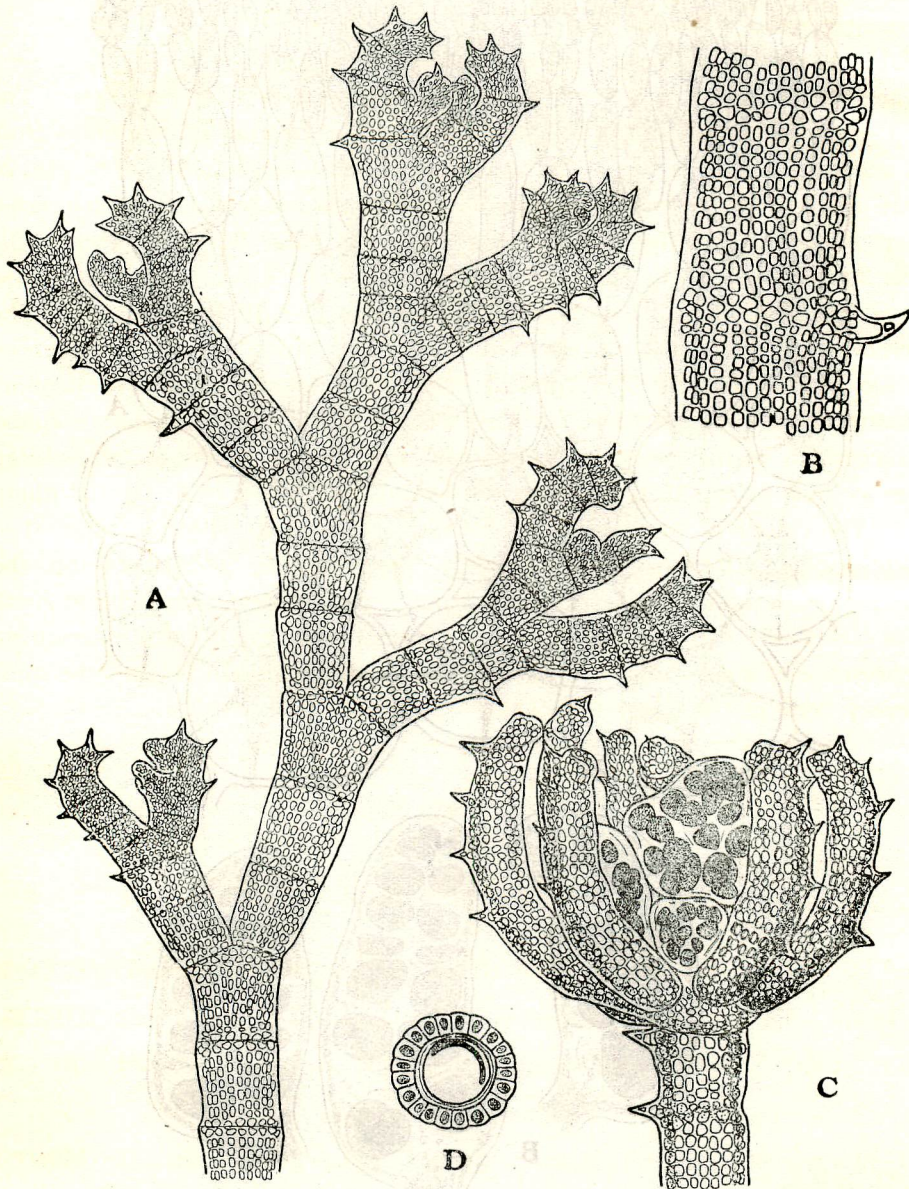


Fig. 4. *Centroceras distichum* OKAMURA. A. Part of the frond showing ramification. x 60. B. Part of the frond with spine. x 100. C. Cystocarp. x 75. D. Transverse section of the frond. x 80.

structure of cystocarps prevents us from determining the systematic position of the present genus. This species is to be a new addition to the algal flora of Japan.

4) *Centroceras distichum* OKAMURA

Text-fig. 4.

Icones of Japanese Algae, Vol. VII (1934) p. 40, pl. 321, figs. 7-10, Nippon Kaisoshi (in Japanese, 1936) p. 743.

Japanese name. *Gonomegusa*.

Hab. Wagu, Sima Prov.; Anbo, Yakusima.

The present species was found upon *Corallina* spec. in sublittoral belts. The plant creeps upon the substratum by means of short bundles of root-fibers from the undersurface of rachis. The thallus is terete and reaches a length of about 0.6 cm. The branches are usually distichously alternate, arising from every fourth articulation intervening usually two ones. Each segment of the upper branches has only one spine at the upper end. Lower branches' spine of segment is hardly noticeable, though rare ones are usually persistent. The internodes are about  $120\mu$  broad, about as long as broad except in the upper portion of the frond. The cortical cells are longly quadrate, rectangular, ordinate in longitudinal rows, but hardly transversely. The cystocarp is found in the summit of the ramuli. The mature cystocarps are globose and sessile; those cystocarps are surrounded by an involucre of a few (6-8) curved filaments. The colour of the plant is a brownish red with a yellowish tinge.

*Centroceras distichum* was originally described by OKAMURA on the imperfect materials from Wagu, Sima Prov. The present materials at hand agree quite well with the description and figures given by OKAMURA excepting the presence of spine cells. On the plants at hand, we can always find the spine of every node at the upper branches.

和 文 摘 要

田 中 剛： 日本南海産海藻類の研究. 其一

屋久島、種子島及びその近海の花藻類の研究については従来本格的調査は行はれていない。数年前より筆者は同海区の花藻類の研究調査を進めているが、中には新種、新邦産種、分布上、生態学上、分類学上興味する植物も相当見受けられるので遂次発表する事にした。

1) ヨゴレアケボノモヅク (新種) 本植物は *Trichogloea Requierii* (MONT.) KUETZING に稍近似の種であるが、体の外観、内部構造、生殖器官の構造及びその発生過程等に於て差異を数点発見する事が出来るので新種と見做される。種子島、馬毛島に産する。

2) アケボノモヅク 本邦産の *Trichogloea* は岡村博士によつて 1923 年 *T. lubrica* J. Ag. に当てられていたが、米国カリフォルニア大学の PAPPENFUSS 氏 (1946 年) は日本産のものは *T. lubrica* ではなくして *T. Requierii* (MONT.) KUETZING であらうと述べている。筆者は PAPPENFUSS 氏より *T. lubrica* の原標本及びハワイ産の *T. Requierii* の標本を借用して本邦産種と比較研究した結果、やはり PAPPENFUSS 氏の提案通り *T. Requierii* (MONT.) KUETZING に当てる方が妥当と思われた。

3) アツバコウモリノリ (新稱) 本植物は WEBER 女史により 1910 年マレー半島より採集記載されたもので、珍奇なる外観と構造を有し、新属 *Exophyllum* として発表している。但し *Exophyllum* 属の分類学上の位地に就いては、体の構造より見て紅藻類ダルス目、ダルス科に属する様に思われるが、その有性生殖器官及びその発生過程が未詳のために決定されてはいない。本種は国内では種子島、馬毛島に於て始めて発見された。

4) ゴノメグサ 本種は山田知治氏が和具にて採集せる一、二の標本によつて岡村博士が 1934 年新種として発表されたのである。

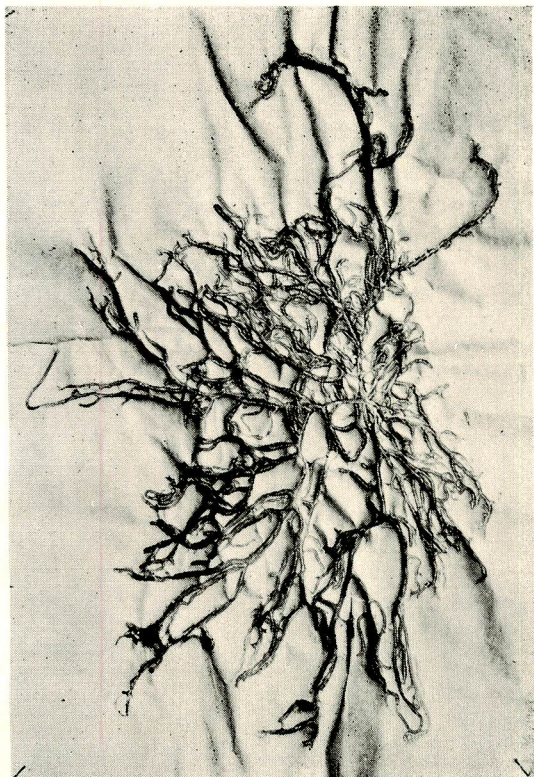
筆者は 1949 年 8 月本種と思われる植物を屋久島、安房海岸にて多量に採集する事が出来た。但し岡村博士の記載によれば本種には小枝の各関節に刺を有しないとされているが、屋久島のもは必ず刺を有している。これは岡村博士の鑑定された標本が不完全なため、上の性質を見落されたものと思われ、両者が別種とは見做されない様である。嚢果を有する体が多数見受けられ、四分胞子は見当らない。

### 要 語

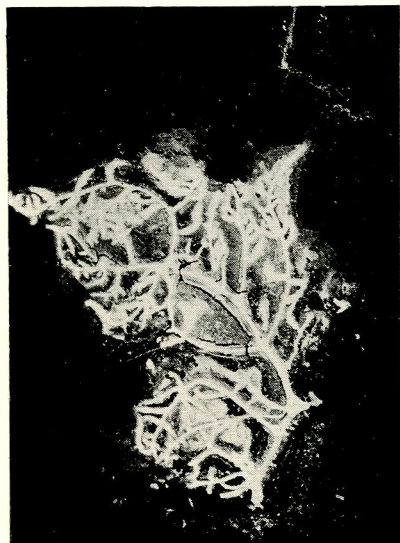
#### 一 其 次 將 以 博 業 述 述 諸 種 本 目

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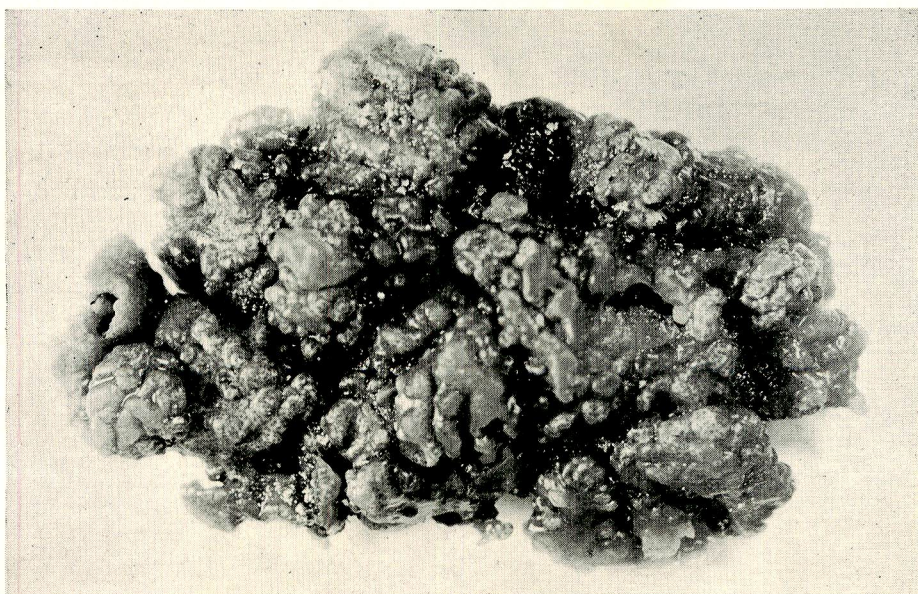




*Trichogloea Papenfussii* Tanaka. x ca.  $\frac{1}{3}$



Original specimen of *Trichogloea lubrica* (Harv.) J. Ag. (Friendly Islands Algae, No. 46. Herb. Univ. California.) x ca. 1.



*Exophyllum Wentii* Weber van Bosse. x ca. 1.