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Actinotrichia robusta, a new species of the Chaetangiaceae (Nemaliales, Rhodophyta)

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Actinotrichia robusta sp. nov. is proposed as a new species based upon specimens from the Ryukyu Islands, southern Japan and from the Marquesas Islands. The proposed new species is distinct from *A. fragilis*, the type and the only previously known species of the genus, because of its toughness in texture, cylindrical branches diverging at narrow angles, free assimilatory filaments irregularly arranged on the thallus surface at first, and further differing in the early deciduous nature of the free assimilatory filaments.

Generic features of *Actinotrichia*, in connection with *Galaxaura*, are discussed briefly.

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Actinotrichia is a calcified member of the red algal family Chaetangiaceae and the only species known up to the present is *A. fragilis* (FORSSKÅL) BØRGESEN (1932). *A. fragilis* is known from the Red Sea, tropical and subtropical parts of the Indian Ocean and the western to central Pacific. In southern parts of Japan, *A. fragilis* is distributed widely and has been treated only in floristic lists and morphological accounts on this species are absent (YAMADA & TANAKA 1938; SEGAWA & KAMURA 1960).

The author was fortunate to find some specimens which undoubtedly belong to *Actinotrichia* but differ conspicuously from *A. fragilis*. These noteworthy specimens were probably treated as conspecific to *A. fragilis* or as members of some *Galaxaura* species in the previous floristic treatments of southern Japan. However, closer examination of these specimens reveals that they should be separated as a distinct species from *A. fragilis*.

This paper describes these algal specimens in comparison with *A. fragilis* and briefly discusses the generic features of *Actinotrichia* in reference to *Galaxaura*.

Materials and Method

Materials used in the present study were collected by Dr. T. TANAKA and by the author from the Ryukyu Islands, southern Japan. Additional materials from the Marquesas Islands, which are deposited in the Herbarium of Dr. R. T. TSUDA, University of Guam (RT # 4310), were also used in this study. A total 43 specimens (21 gametophytic plants, 15 tetrasporophytic plants, and 7 sterile plants) were used in the present study.

A large number of specimens of *Actinotrichia fragilis* deposited in the Herbarium of the Faculty of Science, Kagoshima University (specimens from southern parts of Japan, Taiwan and the northern Philippines) and the Harbarium of Dr. R. T. TSUDA, University of Guam (specimens from Micronesia), were also used in the comparison with the new species.

Slides for internal morphological observations were prepared by decalcifying small portions with weak hydrochloric acid, staining with 1 per cent aqueous aniline blue, fixing the stain with a drop of 1 per cent

hydrochloric acid, and mounting the materials in 50 per cent glucose syrup (Karo brand).

Description

Actinotrichia robusta ITONO sp. nov.

Plantae ad 7.5 cm altae, ad substratum disco adfixae ; ramis teretibus, siccitate ad apicem interdum compressis, plus minusque regulariter dichotomis, divergentibus angulo angustos, segmentis subarticulatis, 2–9 mm longis, 0.4–0.6 mm diam., vix calce siccitate robustibus, inconspicue transverse striatis, barbatis cum filamentis assimilatoriis annulos angustos vel irregulariter dispositis ; filamentis assimilatoriis deciduis, 9–12 μm diam., cellulis duplo vel triplo longioribus quam latioribus ; filamentis medullariis 6–9 μm diam. ; cortice parenchymatoso, 3- vel 4-stromatico, 75–90 μm crasso, cellulis intimis quam aliis grandrioribus ovoideis vel subrectangularibus, cellulis intermediis hypodermaticisque minoribus quam intimis, subglobosis, cellulis epidermatis crasse circumvallatis, angularibus, 9–15 μm diam., in sectione transversali frondis lunatis, 9–15 μm altis ; tetrasporangia in cellulis filamentorum assimilatorum, ovoidea, 18–21×21–28 μm diam., cruciater divisa ; conceptaculis globosis, in thallo immersis, ostiolis ad superficiem aperantibus.

Holotypus : HI 19781 in herbario Universitatis Kagoshimensis. In loco dicto Yonaguni Is., legit T. TANAKA (15–IV–1935).

Plants up to 7.5 cm tall, attached by a discoid holdfast ; branches terete, apex sometimes compressed when dried, more or less regularly dichotomous diverging at narrow angles, segments subarticulate, 2–9 mm long and 0.4–0.6 mm diam., less calcified and robust when dried, inconspicuously striated, barbate with assimilatory filaments in narrow rings or in irregular

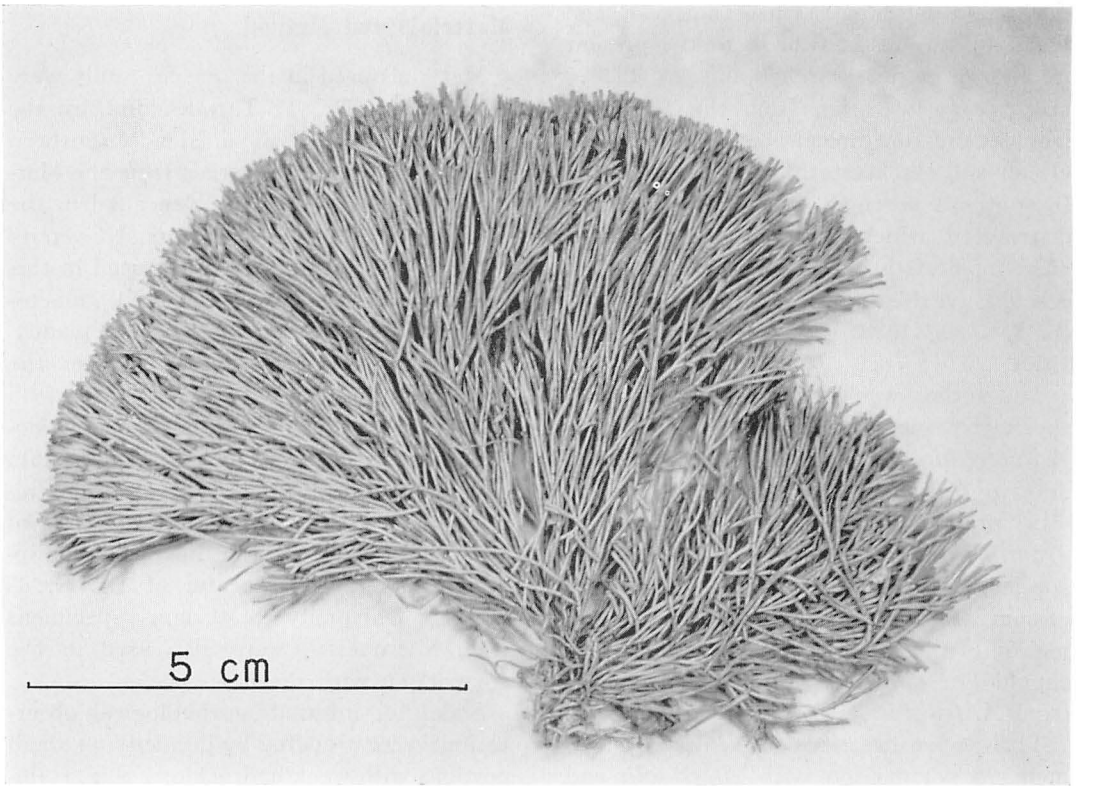
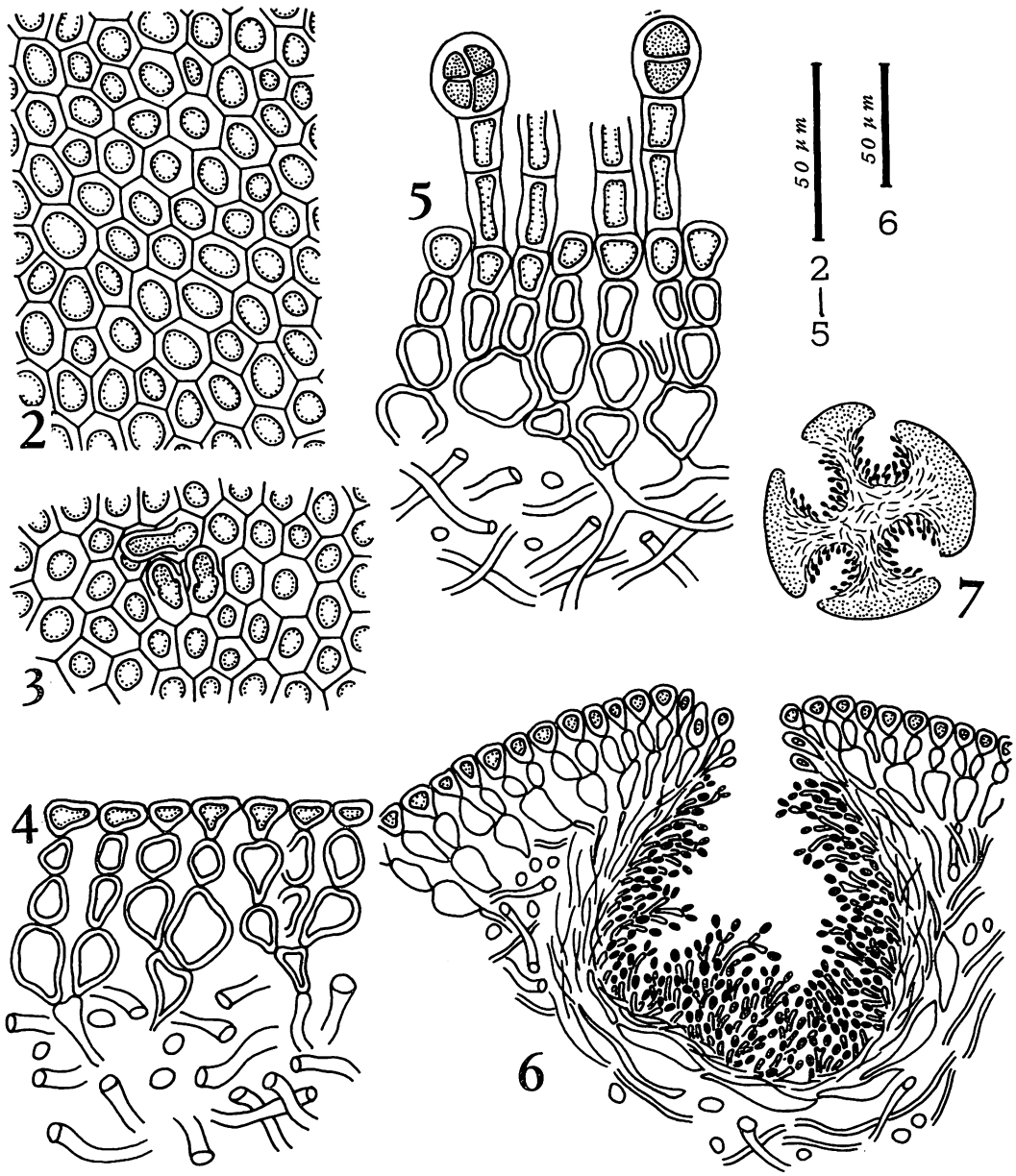


Fig. 1. *Actinotrichia robusta* ITONO. Habit of the holotype specimen (HI 19781).

arrangement; assimilatory filaments deciduous, 9–12 μm diam., cells 2–3 times as long as broad; medullary filaments 6–9 μm diam.; cortical tissue strongly parenchymatous, 3- to 4-stromatic, 75–90 μm thick, cells of the innermost layer the largest, ovoid or sub-



Figs. 2–7. *Actinotrichia robusta* ITONO

Fig. 2. Surface view of the epidermis showing angular epidermal cells and circular cell lumens. Fig. 3. Surface view of epidermis showing three initials of assimilatory filaments. Fig. 4. Cross section of the axis. Fig. 5. Cross section of the axis showing tetrasporangia on the assimilatory filaments. Fig. 6. Cross section of the axis showing spermatangia within conceptacle. Fig. 7. Cross section of the axis showing schematic illustration of the cystocarpic conceptacles.

rectangular, cells of the intermediate layers smaller than the innermost cells, more or less subglobose, the epidermis composed of thick walled cells, angular in surface view, 9–15 μm diam., in sectional view semilunate 9–15 μm thick; tetrasporangia produced on the cells of assimilatory filaments, ovoid measuring 18–21×21–28 μm diam., cruciately divided; conceptacles globose, immersed, provided with ostioles on the thallus surface.

Holotype: HI 19781, deposited in the Herbarium of Kagoshima University. Collected by T. TANAKA on April 15, 1935.

Type locality: Yonaguni Island, southern Japan.

Distribution: Yonaguni Island, Iriomote Island, Yoron Island, Okierabu Island, Tokunoshima Island, Kakeroma Island, Ukejima Island and Amamioshima Island, Ryukyu Islands, southern Japan; Taiohae Bay, Marquesas Islands.

Japanese name: Shimasodegarami (nom. nov.)

Discussion

Weber-van BOSSE (1921) and SVEDELIUS (1952) distinguished the genus *Actinotrichia* from *Galaxaura*, as well as from other red algal genera, by the presence of persistent assimilatory filaments on the thallus surfaces and by the absence of dimorphism between tetrasporophyte and gametophyte. In *Actinotrichia*, SVEDELIUS (1952), futhermore, cited the importance of the presence of both fertile and sterile branches at the periphery of the spermatangial cavity, and of the cystocarps resembling closely those of *Scinaia*. Most features of *Actinotrichia* mentioned by SVEDELIUS (1952) are generally seen in the new species (Figs. 2–7) and leave no doubt that it belongs to *Actinotrichia*.

Actinotrichia robusta differs from *A. fragilis* in the following characteristics. The branches of *A. robusta* are branched dichotomously at narrow angles (Fig. 1). The branching manner of this species suggests that it closely resembles the slender form of certain species of section Oblongatae (CHOU 1945) of *Galaxaura*. In *A. fragilis*, the branches above the dichotomy diverge at wide angles. In surface view of the epidermal layer, cell lumens are circular in *A. robusta* (Fig. 2), while in *A. fragilis* they are angular except for the cells bearing the assimilatory filaments which have the circular cell lumen. This suggests that in *A. robusta* there is no differentiation of the shape of the cell lumen among the epidermal cells with or without the assimilatory filament, and all of the epidermal cells are capable of producing assimilatory filaments which arrange irregularly on the thallus surface. The axes of *A. robusta* are more or less tough in texture due to the slight amount of calcium accumulation; on the other hand, *A. fragilis* is consistently fragile and hard in texture caused by the heavy calcium accumulation.

The most distinctive feature of *A. robusta* is that the assimilatory filaments are, at the younger parts of branches, produced in rings or entirely absent, and subsequently they are produced irregularly on all sides of the axes. The axes, therefore, possess irregularly arranged filaments, i.e., in some parts are quite devoid of them. These assimilatory filaments, as seen in *A. robusta*, are early deciduous and they disappear entirely in the older parts of the axes, or even in more or less younger parts. OKAMURA (1916) already mentioned that in *A. fragilis* (as *A. rigida*) the assimilatory filaments are lost in the lower parts of the older branches leaving annular marks on the axes. In *A. robusta*, the axes lack clear annular marks on the axes after the loss of the assimilatory filaments since these filaments are not produced in rings. Thus, *A. robusta* is markedly different from *A. fragilis*.

In separating *Actinotrichia* from *Galaxaura*, many phycologists (DECAISNE 1842; SVEDELIUS 1952; KYLIN 1956) used the presence of persistent assimilatory filaments in rings as one of the most distinctive characteristics of the genus *Actinotrichia*.

Based on this study, the deciduous nature of the assimilatory filaments in *A. robusta* suggests that the presence of the persistent assimilatory filaments in rings is not sufficient as the criterion for the genus *Actinotrichia*. The only vegetative characteristic of *Actinotrichia* as distinguished from *Galaxaura*, is the complete absence of the dimorphism between tetrasporophytic and gametophytic plants.

Presently, *A. robusta* is known only from the Ryukyu Islands, southern parts of Japan and from the Marquesas Islands (ca. 139°W, 8°5′S). These two localities are distantly isolated, and, thus, *A. robusta* shows a disconnected distribution. *A. robusta* was not recognized in other collections from Taiwan, northern Philippines and Micronesia. A distributional review of *A. fragilis* was made by CORDERO (1975), and he reported Tahiti as the easternmost limit in the Pacific for this genus. The occurrence of the new species from the Marquesas Islands extends the range of the genus to the east at approximately 139°W.

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糸野　洋：紅藻の一新種シマソデガラミ *Actinotrichia robusta*

琉球列島より採集した紅藻の一種は *Galaxaura oblongata* に外部形態が非常に類似している植物である。この植物の四分胞子体・配偶体には体構造の相違が見られないことから *Galaxaura* 属の植物とは異なり，*Actinotrichia* 属に所属させるべきことが判明した。しかし *Actinotrichia* 属の唯一の種 *A. fragilis* とは同化糸の性質，表皮細胞の形状，藻体の石灰沈着量等が明らかに異なっていることから，当該藻に *Actinotrichia robusta* ITONO (シマソデガラミ　新称) の名称を与え新種記載を行った。

また，*Galaxaura* 属の特徴と比較を行い，*Actinotrichia* 属のいくつかの特徴について簡単に論じた。

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