

Branchioglossum spiniferum sp. nov. (Delesseriaceae, Rhodophyta)
from north Kyushu, Japan

Tadao Yoshida* and Hideo Mikami**

*Department of Botany, Faculty of Science, Hokkaido University, Sapporo, Hokkaido, 060 Japan

**Sapporo University, Nishioka 3-7-3-1, Sapporo, Hokkaido, 062 Japan

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Branchioglossum spiniferum sp. nov. (Delesseriaceae, Rhodophyta) was described based on the materials collected from Moji, Kita-Kyushu City, Fukuoka Pref., Japan. Its distinctive characteristics include a richly branched narrow thallus with short serrulation on the margin at the lower part, and not all cells of second-order cell rows bearing third-order rows.

Key Index Words: Branchioglossum spiniferum—Delesseriaceae—Morphology—Rhodophyta—Taxonomy.

The genus *Branchioglossum* was defined by Kylin (1924) with *B. woodii* (J. Agardh) Kylin as the type species. Among the genera of *Hypoglossum*-group, *Branchioglossum* is distinguished by its monostromatic blades that branch from the margin. Two species of *Branchioglossum* were reported from Japanese coasts: *B. ciliatum* Okamura and *B. nanum* Inagaki. The morphology of *B. nanum* was described by Mikami (1973). Characteristic features of *B. ciliatum* will be treated in a paper by Mikami (1992). Recently the materials from north Kyushu, which clearly belong to the genus *Branchioglossum*, was provided to us. Careful examination revealed that they represent a new species described below.

Materials and Methods

Mature individuals growing on rocks of 2–3 m deep were collected by H. Yoshida, Marine Biological Research Institute of Japan Ltd, at Moji, Kita-Kyushu City, Fukuoka Prefecture in March, 1989. Material was preserved in 10% formalin sea water. For microscopic observation, small pieces of the thallus were mounted in glycerine on a glass

slide after being stained with 1% aqueous aniline blue. Sections were made by hand with a razor blade. Additional material deposited in the herbarium of the Faculty of Science, Hokkaido University (SAP) was also examined. Voucher specimens are housed in SAP.

Observations

Branchioglossum spiniferum Yoshida et Mikami, sp. nov. (Fig. 1–17)

Japanese name: Toge-murasaki (nov.).

Description: Plantae anguste taeniatæ, usque ad 10 cm longæ atque 600 µm latæ, rami e margine laminae parentis typice exorientes, margine serrulatis in parte inferioribus; laminae monostromaticæ, linea media excepta; non omni cellula ordinum cellularum secundariorum ordines cellularum tertiarum efficiente; procarpi secundum costam procreati; cystocarpia solitaria; plantae masculinae ignotæ; sori tetrasporangiales lineares, symmetrica circum costam.

Plant narrow, ribbon-like, circa 600 µm wide, up to 10 cm high, richly alternately branched from the margin (Fig. 1); short serrulation on the margin in the lower part of the

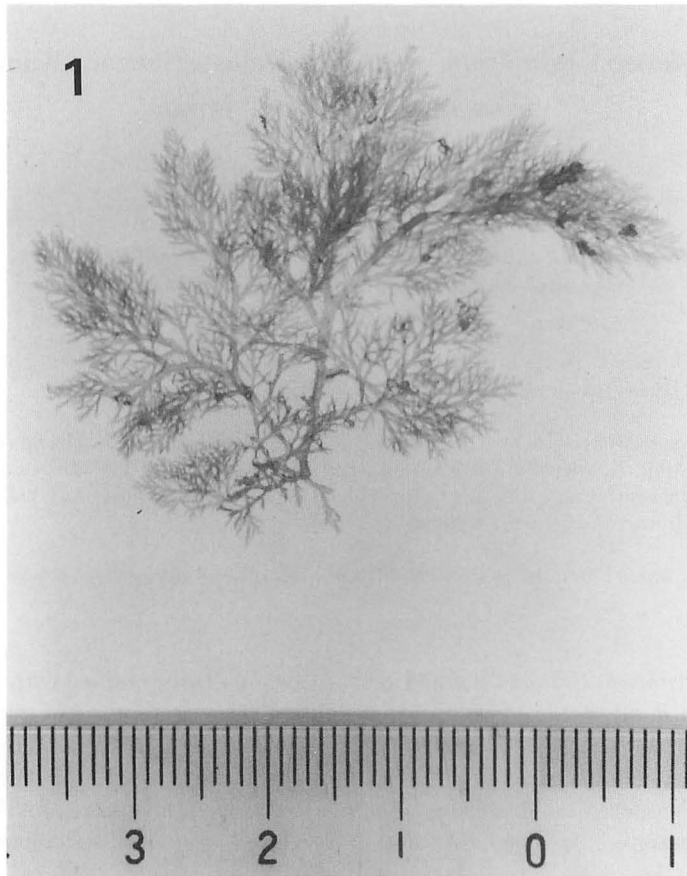


Fig. 1. *Branchioglossum spiniferum* Yoshida et Mikami, sp. nov. Holotype, SAP 053651, Moji, Kita-Kyushu City, Fukuoka Pref.

thallus; not all cells of second-order cell rows bear third-order rows; blades monostromatic except midrib region; procarp formed on the midrib; cystocarps few in number, usually near branching, the cystocarp diameter nearly the same as the width of the blade; male plant not known; tetrasporangial sori linear in shape, disposed symmetrically along the midrib.

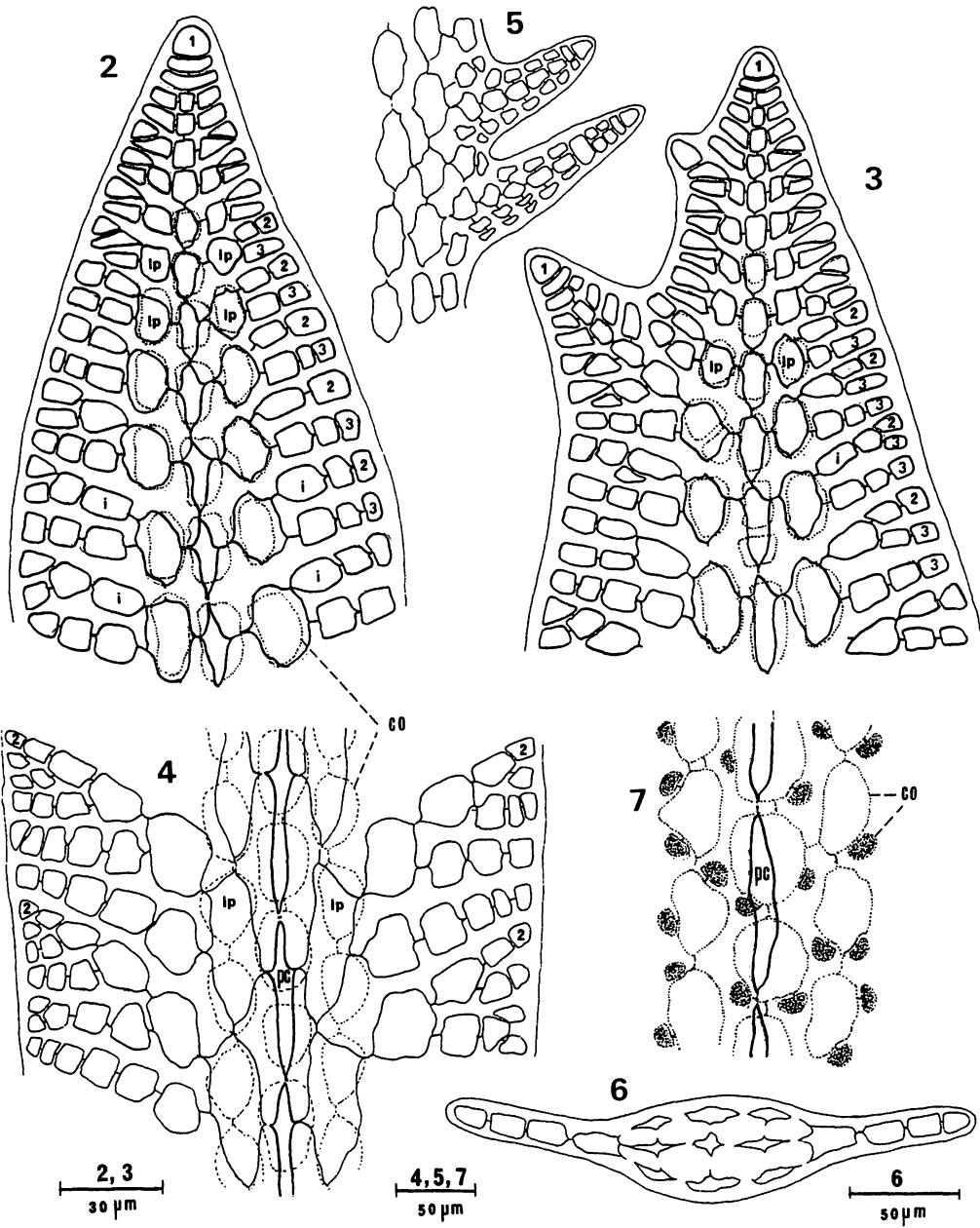
Holotypus: Tetrasporic. Moji, Kita-Kyushu City, North Kyushu, Japan. 33°56'N, 130°57'E. March 20, 1989. Leg. H. Yoshida. SAP 053651 (Fig. 1). Isotypi in TNS, UC, MICH. Additional specimen examined: Dairen, China. March 16, 1935. Leg. M. Noda. SAP 053652.

Plants from Moji (Fig. 1) are 3-4 cm high, possessing narrow fronds arising from a small

basal disc, compressed at the lower part, and flattened at the upper part, ribbon-like, frequently alternately branched from the margin in one plane. Branches 0.3-0.6 mm wide, with midrib, terminating into acute apices. The plants grew on rocks about 2-3 m deep. A specimen from Dairen, China attains 10 cm high.

Blades are monostromatic except the region of midrib which shows 3 layers of cells (Fig. 4, 6). In the lower part of the thallus, cortical cells cut off smaller cells (Fig. 7). Branches originate from the terminal cells of the second-order cell rows. No lateral veins are observed in the alae. Margins of the blades are provided with short serrulation in the middle and lower portion of the thallus.

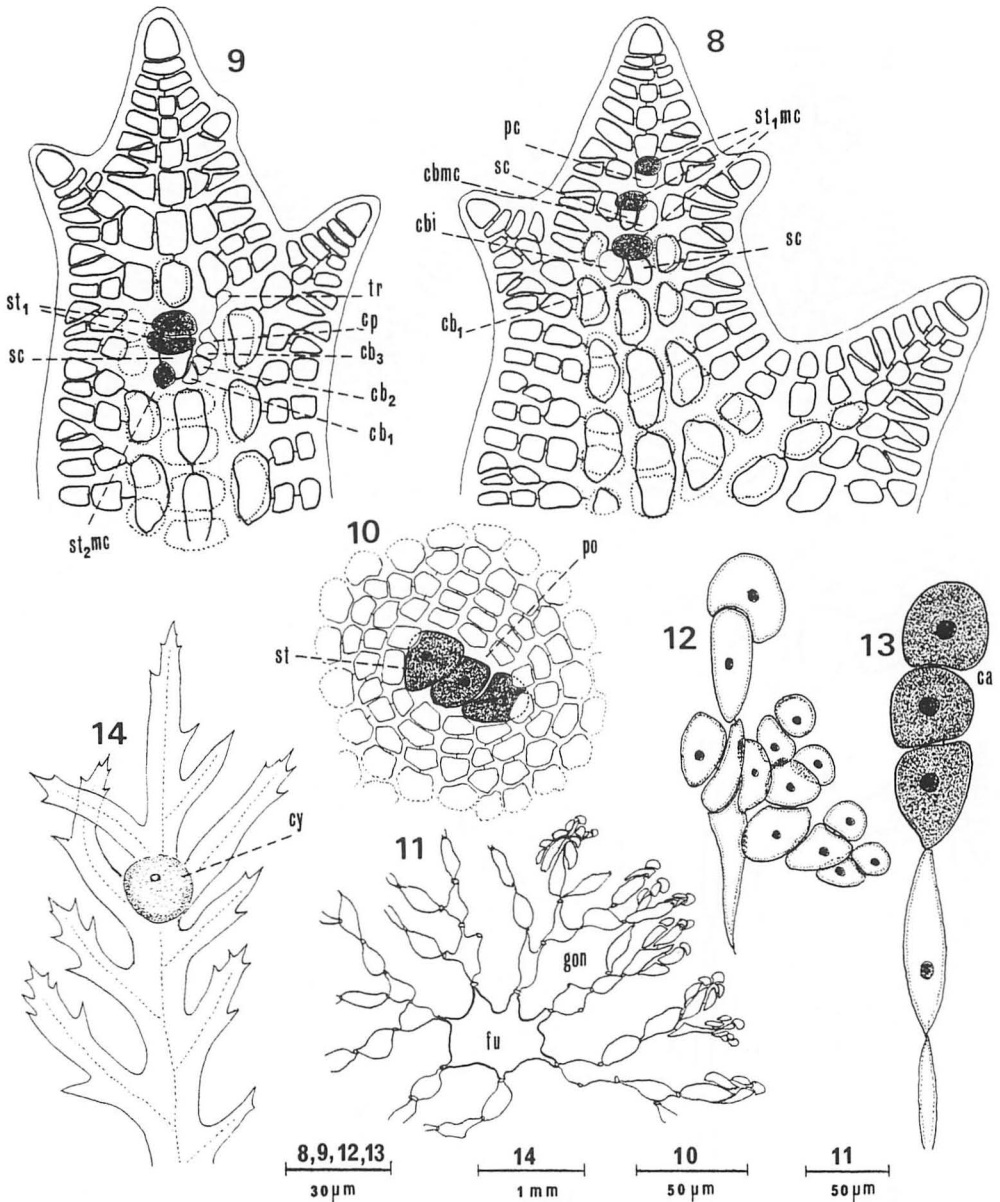
Growth of the thallus takes place by the



Figs. 2-7. *Branchioglossum spiniferum* Yoshida et Mikami. 2-4. Blade apex showing apical segmentation. 1, apical cell of first-order cell row; 2, initial of second-order cell row; 3, initial of tertiary row; 4, initial of fourth row; co, cortical cell; i, intercalary cell; lp, lateral pericentral cell; pc, primary cell. 5. Marginal serrulation (cortical cells not shown). 6. Cross section of frond. 7. Division of cortical cells.

activity of a transversely dividing apical cell, which gives rise to a first-order cell row (Fig. 2). No intercalary cell division is observed in the first-order cell row. Initials of second-order cell rows reach thallus margin; inter-

calary cell divisions occur rarely in the secondary cell rows (Fig. 2, 3). Accordingly, not all cells of the secondary cell rows give rise to third-order cell rows. Almost all initials of the third-order cell rows attain the margin,

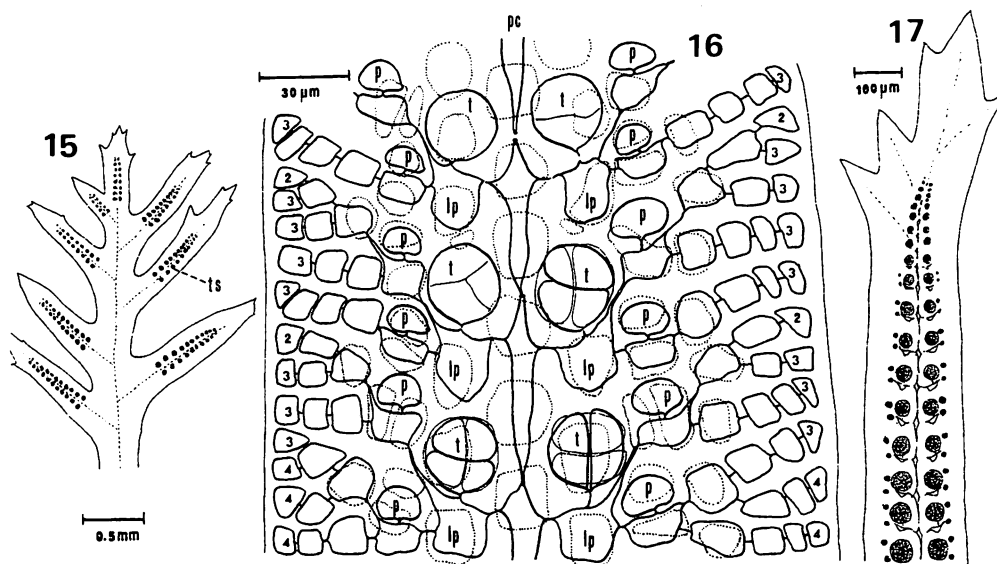


Figs. 8–14. *Branchioglossum spiniferum* Yoshida et Mikami. 8–9. Development of procarp. cbi, initial cell of carpogonial branch; cb_{1-3} , first, second and third cells of carpogonial branch; cbmc, mother cell of carpogonial branch; cp, carpogonium; pc, pericentral cell; sc, supporting cell; st_1 , first group of sterile cell; $st_{1,mc}$, $st_{2,mc}$, mother cells of first and second groups of sterile cells; tr, trichogyne. 10. Surface view of young cystocarp. po, ostiole; st, sterile cell. 11. Fusion cell (fu) and gonimoblast (gon). 12. Young gonimoblast. 13. Mature carposporaniga (ca). 14. Blade with cystocarp (cy).

but just below the branching, some initials of the third-order cell rows do not reach the margin (Fig. 3). Branching is initiated by the activity of certain initials of second order cell rows. Spinal processes are formed from the

margin originating from marginal cells in the middle to lower parts of the thallus giving the serrulate appearance (Fig. 5).

A few procarpia are formed acropetally in the midrib of distal part of branches (Fig. 8).



Figs. 15-17. *Branchioglossum spiniferum* Yoshida et Mikami. 15. Blade with tetrasporangial sorus (ts). 16. Tetrasporangial development. lp, lateral pericentral cell; p, tetrasporangial primordia; pc, primary cell; t, tetrasporangium. 17. Diagrammatic arrangement of tetrasporangia.

They are composed of a 4-celled carpogonial branch and two groups of sterile cells (Fig. 9). Cystocarps develop at the branching of the thallus, occupying nearly the width of the branch (Fig. 14). Filamentous tissue is formed from inner cells of the pericarp. A fusion cell develops and gives rise to gonimoblast filaments with 3-4 elongated segments (Fig. 11) that bear carposporangia in chains (Fig. 12, 13). Male plants were not collected.

Tetrasporangial sori occupy symmetrical positions along the midrib of the distal part of the branch (Fig. 15, 17). Tetrasporangia are arranged in one layer in the tissue. Primordia of tetrasporangia arise from the primary cells of second order cell rows including lateral pericentral cells and third order cells, and not from the cortical cells (Fig. 16). Mature tetrasporangia often divide cruciately, sometimes tetrahedrally, measuring 70-80 µm in diameter.

Discussion

This species can be clearly distinguished from all other species described in the genus

by its narrow ribbon like thallus monopodially branching up to fourth order, and its minute denticulation on the margins at the lower parts of a thallus.

In the genus *Branchioglossum*, *B. pseudoprostratum* Ballantine et Wynne (1987) and *B. crispatum* (Harvey) Kylin (1924) were reported to share a characteristic feature in that not all cells of a second-order cell row bear third-order cell rows, which was first recognized in the closely related genus *Hypoglossum* by Womersley and Shepley (1982). *B. spiniferum* is the third species with this feature.

Branchioglossum spiniferum superficially resembles *Tsengiella spinulosa* Zhang et Xia (1987) from the Chinese coast in size and habit, and in having spinous processes on the margin, but *Tsengiella* has a polystromatic blade.

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吉田忠生*・三上日出夫**：紅藻コノハノリ科の1新種トゲムラサキ *Branchioglossum spiniferum* について

北九州市門司で採集された標本に基づき、トゲムラサキ（新称）*Branchioglossum spiniferum* を記載した。この種は細いリボン状の体で、単基的に数回分枝し、体下部の縁辺に小鋸歯を持っている。北海道大学理学部所蔵の標本からこの種は中国大連でも採集されていたことが分かった。（*060 札幌市北区北10条西8丁目 北海道大学理学部植物学教室，**062 札幌市西岡3-7-3-1 札幌大学）