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CULTURE OF RHIZOIDAL TUBERS ON AN AQUATIC MOSS IN THE LAKES NEAR THE SYOWA STATION AREA, ANTARCTICA*

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Abstract: The rhizoidal tubers of a moss collected from the bottom of the lakes in the Syowa Station area, Continental Antarctica, were cultured Protonemata and leafy plants were developed from the tubers stored in a freezer for about two years Antheridia and archegonia were formed in the same inflorescence at the tip of the plants The morphological characters and the synoicous sexual condition of the plants agree closely with those of *Leptobryum pyriforme* (Hedw) Wils

1. Introduction

In recent years, the moss flora in the Syowa Station area, Continental Antarctica, has been studied by several workers (KANDA, 1981, 1986; SEPPELT and KANDA, 1986, *et al*) However, there are mosses still left in question One of them is an aquatic moss from the bottom of lakes.

NAKANISHI (1977) first reported the occurrence of the aquatic moss at a depth of 2–5 m in 17 lakes in the Skarvsnes region, 30 km south of Syowa Station. He called this aquatic moss *Bryum* sp , and suggested the relation to *Bryum korotkevicziae* Sav et Smirn. or its variety *hollerbachii* Sav. et Smirn. He mentioned characteristic globose gemmae (rhizoidal tubers of IMURA and IWATSUKI 1990) on the rhizoids of this moss. In the study of OCHI (1979), this species was also called *Bryum* sp , because the specimen was sterile and no sexual organs were found on it. IMURA and KANDA (1986) studied the same aquatic moss and suggested that the species did not belong to the genus *Bryum*, because of the characters of rhizoidal tubers. KANDA and IWATSUKI (1989) considered that the species might belong to the genus *Dicranella*

2. Materials and Methods

Materials used for this study were collected on the ice-surface of a lake at Skarvsnes, Continental Antarctica. They are considered to have grown on the lake beds before they moved upward through the ice cover (WILSON, 1965).

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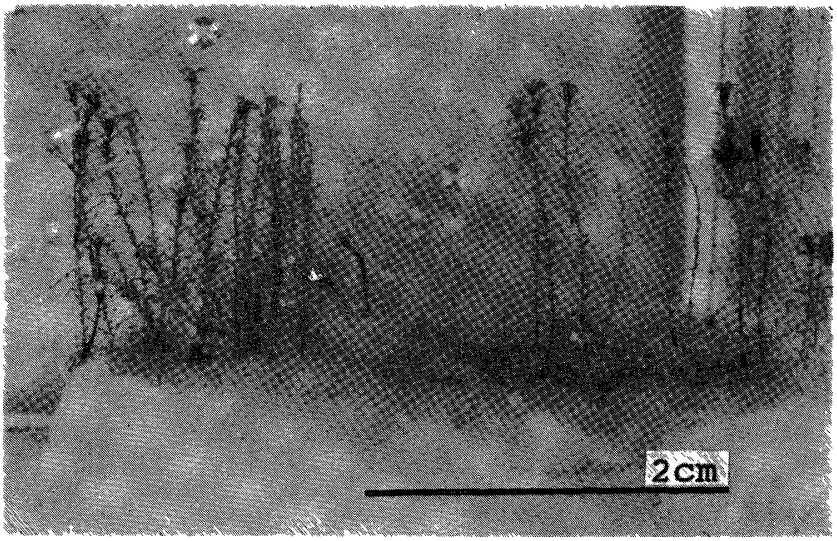


Fig 1 Cultured plants on ceramic wool sheets in a plastic box

Materials were kept frozen during transport to Japan at −20°C, and later they were stored in a freezer (−20°C) for about two years before the experiment.

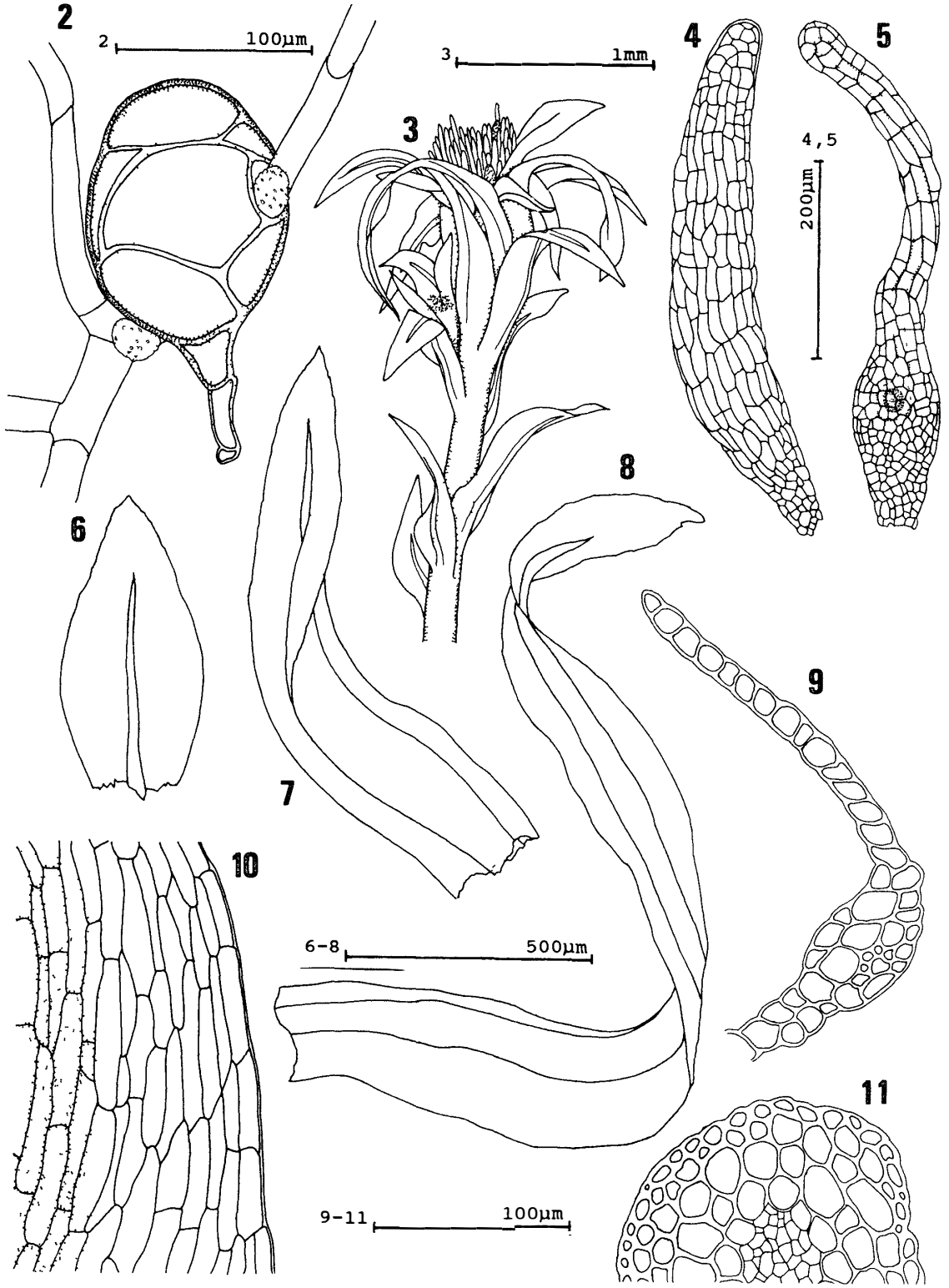
Rhizoidal tubers were separated from rhizoids and sterilized for 5 minutes in 20 ml of 1% NaClO solution with one drop of the surface active agent, and washed several times with autoclaved water. They were sown on 1 cm thick ceramic wool sheets in plastic boxes (7 5H×6D×6W cm) with 30 ml of Knop III liquid medium (NEHIRA, 1964), adjusted to pH 6 (Fig 1) The experiment was carried out on 21 September 1990 at a temperature of 20±2°C under a light intensity of 2000–2500 lux obtained from white fluorescent tubes with 12 hours diurnal light-dark cycle.

3. Results and Discussion

Rhizoidal tubers germinated within 5 days after sowing on the medium At germination, protonemata extended from germination pores of some cells of the rhizoidal tubers (Fig 2). After about 20 days, the protonemata developed vigorously on the medium.

After about 30 days from the beginning of cultivation, buds were formed on the protonemata After about 90 days, the buds had grown up to about 1 cm high plants, and inflorescences were formed at the apex of stems (Figs. 1 and 3) In the inflorescence, 5–17 antheridia (Fig. 4) were observed with many paraphyses. In this period, no archegonia were found. After about 120 days, 1–7 archegonia (Fig. 5) were found in the same inflorescence (synoicous) After that, inflorescences were commonly found on the apices of many stems The following is the description of plants developed from protonemata

Stems with small, slightly thick-walled cortical cells on cross sections (Fig. 11). Lower leaves elliptical, about 0 5 mm long (Fig 6), laxly scattered on stems, upper leaves clustered, linear, 1–2 mm long (Figs 7 and 8), margin weakly crenated near the leaf apex, not bordered (Fig 10), with smooth laminal cells (Fig 9), costae of upper leaves stout and wide.



Figs 2–11 Cultured plants from rhizoidal tubers 2 Germinating rhizoidal tuber 3 Shoot apex with synoicous inflorescence 4 Antheridium 5 Archegonium 6 Lower leaf 7, 8 Upper leaves 9 Portion of cross section of a leaf 10 Marginal leaf cells of the middle part of an upper leaf 11 Portion of cross section of a stem

Numerous smooth rhizoids developed from the base and leaf axils of the stems. Many rhizoidal tubers were produced on rhizoids and protonemata. These tubers are very similar in shape to those found on plants from the bottom of Antarctic lakes.

We think the species might belong to *Leptobryum pyriforme* (Hedw.) Wils., based on the characters of rhizoidal tubers and plants developed from the cultured tubers, and its synoicous infl orescence. However, further studies on morphological variation of this aquatic moss are needed, to make a final determination.

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