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 synchronous 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; SEPPLET 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 korotkevitchiae 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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Materials were kept frozen during transport to Japan at $-20^\circ$C, and later they were stored in a freezer ($-20^\circ$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 ($7.5H \times 6D \times 6W$ 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 $20\pm2^\circ$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 (synoocious). 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 rhizodal tubers  2 Germinating rhizodal tuber  3 Shoot apex with synocious 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 inflorescence. However, further studies on morphological variation of this aquatic moss are needed, to make a final determination.

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