

RESEARCH NOTE

Mycobiology 40(4) : 252-254 (2012)
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<http://dx.doi.org/10.5941/MYCO.2012.40.4.252>
pISSN 1229-8093
eISSN 2092-9323

The Lichen Genus *Polychidium* New to South Korea

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(Received September 21, 2012. Revised October 10, 2012. Accepted October 22, 2012)

The lichen species *Polychidium muscicola* was found in South Korea for the first time and this is the first record of the genus *Polychidium* from the Korean peninsula. This species is characterized by a dichotomously branched minute thallus with clustered cells of *Nostoc* as the photobiont. A detailed description and illustrations of this species are provided.

KEYWORDS : Fruticose, Massalongiaceae, *Nostoc*, *Polychidium*, South Korea

According to the recent lichen checklist published by Hur *et al.* [1], nine fruticose lichen genera have been reported from South Korea, *Bryoria* Brodo & D. Hawksw., *Cladina* (Nyl.) Nyl., *Cladonia* P. Browne, *Oropogon* Th. Fr., *Pilophorus* Th. Fr., *Ramalina* Ach., *Stereocaulon* Hoffm., *Sulcaria* Bystrek and *Usnea* Dill. ex Adans. The current study revealed a new, rare fruticose cyanobacterial lichen genus *Polychidium* (Ach.) Gray for the South Korean lichen flora.

The genus *Polychidium* includes 15 species worldwide [2]. However, the number of species recorded has varied among studies [3-5], and no recent revisionary work of the genus has been conducted. Recently, four species belonging to the genus *Polychidium* [6, 7] together with *Leptochidium* M. Choisy and *Massalongia* Körb. were transferred to a new family, Massalongiaceae Wedin, P. M. Jørgensen & E. Wiklund based on the parsimony and Bayesian analysis of the mitochondrial small subunit (mtSSU) and nuclear large ribosomal subunit (nuLSU) rDNA sequence [8].

The genus *Polychidium* includes the following characteristic features. Thallus very small and non-stratified, dichotomously, evenly or isotomically branched, fruticose, shrub like, attached to substrate by a basal holdfast. Upper surface or thallus is greyish to brownish or brownish black in color and round in cross-section, very slender, shiny, gelatinous, brittle and solid, corticate. Cortex well developed, cellular, one to several layers thick, surrounding a medullary hyphae. Within the cortex, cyanobacteria (*Nostoc* or *Scytonema*) form the core of the branch. Isidia, soredia and pseudocyphellae absent. Ascomata apothecia,

biatorine, mostly lateral, disc pale to dark brown and sunken, very common on some species and rare on others. Thalline exciple absent, true exciple present, paraphyses unbranched, septate. Spores 1 or 2 celled, colorless, ellipsoid to spindle shaped, fusiform, thin or thick walled, eight per ascus. Conidiomata pycnidia, bacilliform conidia. No lichen substances on thin layer chromatography (TLC). Cosmopolitan genus, but generally at higher elevations in tropical regions [9-12].

In the East Asian region, *Polychidium* species have been recorded from four countries, China (*P. dendriscum*) [7], Japan (*P. muscicola*) [13], Taiwan (*P. stipitatum*) [14], and Papua New Guinea (*P. dendriscum*, *P. muscicola* and *P. stipitatum*) [15]. According to Jørgensen [16], *P. muscicola* is considered as a red listed species since it to be endangered in particular habitat. This is the first record of the genus *Polychidium* from South Korea. This genus representing species *P. muscicola* was found on a moss together with a thallus of *Myelochroa irrugans*. Here, the thallus is described in full and figures and taxonomic details pertaining to *P. muscicola* are presented.

This study was based on the voucher specimen deposited in the herbarium of the Lichen and Allied Bio-resource Center at the Korean Lichen Research Institute (KoLRI), Suncheon National University, South Korea. The external morphology of the thallus was observed under a dissecting microscope (Nikon SMZ645; Nikon, Tokyo, Japan) and photographs were taken using a Hi-SCOPE HC-100A camera. A compound microscope (Zeiss Scope. A1; Carl Zeiss, Oberkochen, Deutschland, Germany) was used to study the anatomy of the thalli and photographs

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were taken using an AxioCam ERc 5s camera (Carl Zeiss) fitted to the light microscope. All measurements were made from materials mounted in water and stained with lactophenol cotton blue. Spot test reactions were carried out on the thallus and TLC was performed in solvent system C (toluene : acetic acid = 85 : 15) as described by Orange *et al.* [17].

***Polychidium muscicola* (Sw.) Gray, Nat. Arr. Brit. Pl. (Lond.) 1: 402 (1821).**

Collema muscicola (Sw.) Ach., Lich. Univ.: 1-696 (1810).

Cornicularia muscicola (Sw.) DC., in Lamarck & de Candolle, Fl. Franç., Ed. 3 (Paris) 2: 331 (1805).

Garovaglia muscicola (Sw.) Trevis., Caratt. Tre Nuov. Gen. Collem.: 2 (1853).

Homodium muscicola (Sw.) Nyl. (1896).

Leptogium muscicola (Sw.) Fr. (1835).

Lichen muscicola Sw., Nova Acta Acad. Upsal. 4: 248 (1784).

Parmelia muscicola (Sw.) Ach., Method. Lich.: 244 (1803).

Patellaria muscicola (Sw.) Wallr. (1831).

Thallus richly and dichotomously branched, greyish to brown, small, loosely inter-woven cushion like mass, 1~10 mm across. Branches cylindrical, (0.04) 0.05~0.12 (0.19) mm wide, becoming thinner and shorter towards the apices. Apices of branches reddish brown and somewhat ellipsoid. Cortex 1~2 cells thick, cortical cells in a cross section polygonal to irregular $7\sim9 \times 5.5\sim6.5 \mu\text{m}$. Surface view rectangular to irregular $5\sim8 \times 3.5\sim4.5 \mu\text{m}$, colorless to brown. Photobiont *Nostoc*, not in obvious chains, but

clustered, cells blue green, rounded to elliptical, $6\sim8.5 \times 4\sim7 \mu\text{m}$ (Fig. 1). Apothecia and pycnidia not seen.

Chemistry: No lichen substances detected by TLC.

Remarks: *P. muscicola* is characterized by the presence of *Nostoc* as the photobiont in the medulla because other *Polychidium* species including *P. cortotum*, *P. dendriscum* and *P. stipitatum* have *Scytonema* as the photobiont [7]. According to Brodo *et al.* [11], *P. muscicola* closely resembles *Cetraria aculeata*, *Pseudephebe pubescens* and *P. minuscula*, but the latter species have green algae as the photobiont. Further, *Leptogium tenuissimum*, a tiny, branched, almost terete and rosette lichen, also resembles *P. muscicola*, but its thallus is wrinkled and its spores are muriform.

Specimen examined: Mt. Jiri, Sannae-myeon, Namwon-si, Jeollabuk-do, Korea, on bark, $35^{\circ}18' 48.9'' \text{ N}$, $127^{\circ}35' 13.5'' \text{ E}$, alt. 1,120 m, 18 Jun 2006, J. S. Hur, 060356-2.

Ecology and distribution: *P. muscicola* was found on an unknown moss species together with the lichen thallus *Myelochroa irrugans* on the bark of a tree. *P. muscicola* is widespread in the Northern Hemisphere, being found in Austria [18], British Columbia [10], Canada [10], Denmark [19], Finland [20], Germany [21], Great Britain [4], Ireland [4, 22], Japan [13], Kenya [9, 23], Mongolia [24], Montenegro [25], Morocco [26], USA [11], Norway [27], Poland [28], Portugal [29], Spain [30] and Sweden [27]. The species has also been recovered from Papua New Guinea in the Southern Hemisphere [15].

Acknowledgements

This work was supported by a grant from the Korean Forest Service Program (KNA 2012) through the Korea National Arboretum and the Korean National Research Resource Center Programme.

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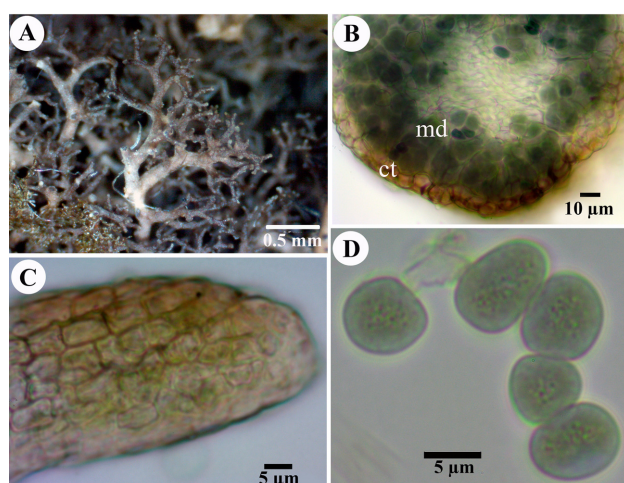


Fig. 1. A, Habit of the thallus (J. S. Hur, 060356-2) under the dissecting microscope; B, Cross section of the thallus with cortex (ct) and the medulla (md); C, Surface view of the branch apices showing rectangular cortex cells; D, Clustered cells of the photobiont *Nostoc* sp.

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