KAVAKA 60(4): 55-57 (2024) DOI: 10.36460/Kavaka/60/4/2024/55-57

Romjularia Timdal (Ascomycota Lecideaceae): A Monotypic Lichen Genus New to India

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(Submitted on November 21, 2024; Accepted on December 11, 2024)

ABSTRACT

The lichen genus *Romjularia* Timdal has been recorded for first time in India, represented by *R. lurida* (Ach.) Timdal, based on 3 specimens annotated as *Toninia cinereovirens* (Schaer.) A. Massal., at herbarium LWG (CSIR-National Botanical Research Institute, Lucknow, India). A detailed description, illustrations, distribution and ecological notes, and comparison with closely allied genera are presented.

Keywords: Biodiversity, Taxonomy, Squamulose lichens, Western Himalaya.

INTRODUCTION

The genus *Romjularia* was established by Timadal (2007) for *R. lurida* which has been switched back and forward between several genera, *viz*., *Lecidea* Ach., *Mycobilimbia* Rehm and *Psora* Hoffm. Schneider (1980) segregated all the squamulose species of *Lecidea* earlier placed under section *Psora* (Hoffm.) Th. Fr. into 10 genera. Among them 5 genera were monotypic [*Astroplaca* Bagl., *Chrysopsora* (Vainio) M. Choisy, *Eremastrella* Vogel, *Lepidoma* (Ach.) Grey (syn. *Lecidoma* G. Schneider & Hertel), *Xanthopsora* G. Schneider & W. Weber] and 2 included 2 species each [*Psorinia* G. Schneider and *Psorula* G. Schneider]. The genera *Hypocenomyce* M. Choisy, *Trapeliopsis* Hertel & G. Schneider and *Psora* Hoffm. emend. G. Schneider were the largest genera with 3, 5 and 17 species. Schneider (1980) further included *Lecidea lurida* in *Psora* (as *P. lurida* (Ach.) DC.). Timdal (1984) delimitated and updated nomenclature of *Psora* species and excluded *P. lurida* from *Psora* and again placed it under the genus *Lecidea* based on the type of upper cortex, the absence of calcium oxalate in the hypothecium, the absence of anthraquinones in the hymenium, the type of pycnidium, and shape of conidia. Hafellner and Türk (2001) placed it in *Mycobilimbia*. However, according to the generic concept developed by Ekman (2004), the genus *Mycobilimbia* consists of only crustose to granular species. Therefore, Timdal (2007) established the genus *Romjularia* for the species differing from *Mycobilimbia* sensu Ekman in having a squamulose thallus, simple ascospores and *Porpidia*-type ascus. The genus is monotypic including a single species *R. lurida* which typically inhabits calcium rich rocks and soil in open habitats (Timdal, 2007). Fryday *et al.* (2014) opined that *R. lurida* appears to have a common ancestor with *Lecidea berengeriana* (A. Massal.) Linds. and molecular data is required to trace the genetic and phylogenetic lineage with allied taxa.

During our ongoing revision on the Indian squamulose lichens, 3 specimens annotated as *Toninia cinereovirens* (Schaer.) A. Massal. at herbarium LWG (CSIR-National Botanical Research Institute, Lucknow, India) were critically re-examined which actually belong to *Romjularia lurida,* representing a new generic record to India. The species is presented with detailed description, illustrations, distribution and ecological notes, and comparisons with allied genera.

MATERIALS AND METHODS

The present study is based on re-examination of specimens annotated as *Toninia cinereovirens* at herbarium LWG (CSIR-National Botanical Research Institute, Lucknow, India). The Stereozoom microscopes (Leica S8APO and Leica EZ4) and light microscopes (Leica DM2500 and OPTIKA B-510BF) both equipped with camera and image analysis software were used for the macro- and micromorphological studies. Measurements were taken from thin hand cut vertical sections of apothecia mounted in water.

Spot tests were performed using routine reagents; potassium hydroxide (KOH), calcium hypochlorite, paraphenylenediamine (PD), nitric acid (N), K/I pretreatment with 10% KOH and then Lugol's Iodine. The lichen substances were investigated by thin-layer chromatography (TLC) following Orange *et al.* (2001) in solvent system A. The specimens were identified following Timdal (1984, 2007).

THE SPECIES

Romjularia lurida (Ach.) Timdal, Lichen Flora of the Greater Sonoran Desert Region, **3**:288 (2007).

Basionym: *Lecidea lurida* Ach. - Meth. Lich.: 77, 1803. Synonyms: *Mycobilimbia lurida* (Ach.) Hafellner & Türk; *Psora lurida* (Ach.) DC.; *Psora lurida* f. *dispersa* A. Massal.; *Psora petri* (Tuck.) Fink **Figure 1**

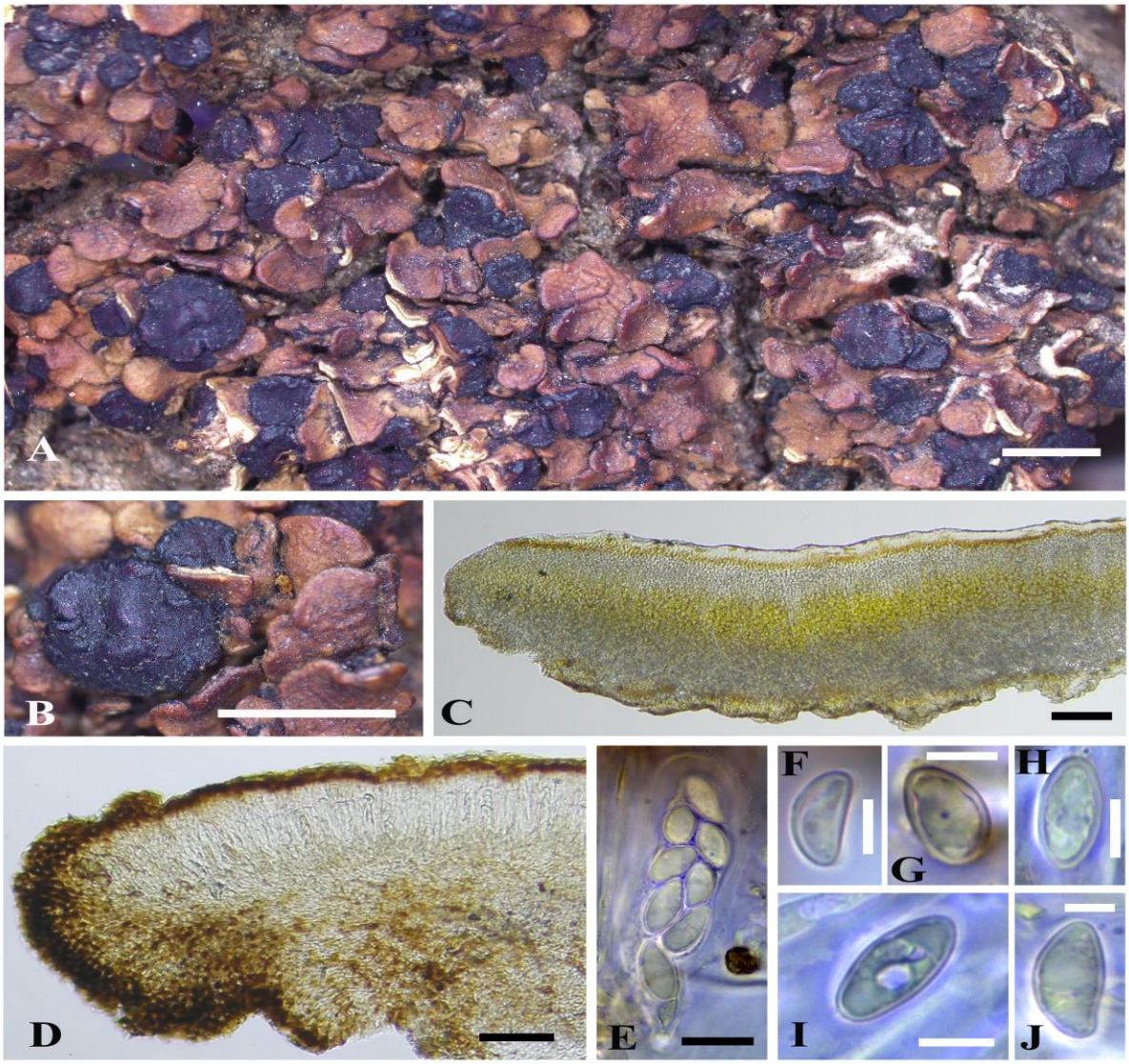

Figure 1: ***Romjularia lurida*****. A,** Thallus with squamules and apothecia; **B,** Magnified view of apothecia arising from squamule margins; **C,** Vertical section showing different thallus zones; **D,** Section through an apothecium; **E,** Ascus with ascospores; **F–J,** Ascospores. Scale bars: **A** = 1 mm; **B** = 2 mm; **C** & **D** = 100 µm; **E** = 10 µm; **F**, **G**, **H**, **I** & **J** = 5 µm.

Description: Thallus squamulose, attached by the whole lower surface. Squamules pale brown to dark brown, pale greenish when wet, 1–4 mm long, elongated, rounded at tips, flat to slightly concave to convex, lacking vegetative propagules. Upper surface smooth, epruinose, sometimes wrinkled or cracked. Lower surface pale to dark brown. Epinecral layer mostly composed of anticlinally oriented hyphae, 15–30 µm thick. Upper cortex 45–65 µm thick, outermost layer of cells with brown pigment. Algal layer continuous, 30–100 µm thick. Photobiont chlorococcoid, algal cells 8–12.5 µm in diam.

Medulla white, I–, K–, composed of interwoven hyphae, lacking crystals.

Apothecia marginal, dense, sessile to weakly constricted at base, 0.8–2 mm in diam., plane, ± marginate when young, later becoming slightly convex and immarginate; disc epruinose, dak brown, shiny. Proper exciple annular, pale brown to dark brown, composed of thick-walled, strongly conglutinated, radiating hyphae. Epihymenium brown K–, N–, 12.5–25 µm high. Hymenium hyaline, I+ blue, 85–120 µm high. Paraphyses conglutinate, branched, with swollen apical cells. Hypothecium hyaline to pale-brown, reduced, 30–50 µm high. Asci 8-spored, elongate-clavate, K/I+ deep blue, *Porpidia*-type, 45–75 × 10–17.5 µm. Ascospores simple, hyaline, ellipsoid, 10–15 × 5–8 µm, lacking perispore. Pycnidia not seen.

Chemistry: Cortex and medulla K–, C–, KC–, P–. No lichen compounds in TLC.

Distribution and ecology: The species is known to occur on calcareous soils in crevices associated with limestone, sometimes directly on rock in open habitats (Timdal, 2007). Earlier, the distribution of species is known from temperate parts of Europe, North Africa, Middle East, some scattered localities of North America (Timdal, 2007), Britain and Ireland (Aptroot & Timdal, 2009). In India, the species has been found growing on rocks and soil over rocks in moist places of temperate north-west Himalayan region.

Notes: The species is characterized by a pale brown to dark brown squamulose thallus with dark brown marginal apothecia. *Romjularia lurida* is similar to *Psora globifera* (Ach.) A. Massal., but differs in having apothecial margin darker than the disc, upper cortex with no algal remains, absence of calcium oxalate in the hypothecium, I+ blue hymenium, absence of anthraquinones in the hymenium, pale brown to dark brown hypothecium, sessile pycnidia and narrowly ellipsoid conidia (Timdal, 1984, 2007). Due to its brownish squamulose thallus and brown apothecia, *R. lurida* resembles *Solenopsora holophaea* (Mont.) Samp., which differs by 1-septate spores, generally plane and loosely organized darker squamules, with more elevated apothecia having a well-developed thalline exciple and occurring on non-calcareous substrates (Aptroot and Timdal, 2009). Another squamulose species *Psorula rufonigra* (Tuck.) Gotth. Schneid., has sessile pycnidia but can be distinguished by its smaller, dark-edged squamules, uniformly black apothecia, and a lichenicolous habit (Timdal, 2007).

Specimens examined: India, Jammu & Kashmir, Ganderbal district, Baltal, on rocks, elev. 2700 m, 29 August 1982, Ajay Singh & D.K. Upreti (LWG-24846, 42363); *ibid*., on soil over rock, elev. 2800 m, 01 September 1982, Ajay Singh & D.K. Upreti (LWG-008825).

ACKNOWLEDGEMENTS

The authors are thankful to the Director, CSIR-National Botanical Research Institute, Lucknow and Head (UGC-SAP DRS-II), Department of Botany, University of Jammu, Jammu for providing all kinds of facilities during the study.

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