

First Record of *Umbilicaria cylindrica* (Umbilicariaceae) from Nandi Kund, Uttarakhand, Western Himalaya, India

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ABSTRACT

This paper reports *Umbilicaria cylindrica* (Umbilicariaceae) as a new distributional record for Uttarakhand, India. The species was collected from Nandi Kund, a high-altitude sacred lake in the Madhyamaheshwar Valley, located within Kedarnath Wildlife Sanctuary,

at an altitude of 4800 m a.s.l. The discovery extends the known Indian distribution of *U. cylindrica*, previously reported from Sikkim and West Bengal, highlighting the high potential for documenting unrecorded lichen taxa in high-altitude Himalayan ecosystems.

Keywords *Umbilicaria cylindrica*, Ascomycota, Lichenized fungi, Nandi kund, Uttarakhand.

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INTRODUCTION

The Indian Himalayas are renowned for their rich and diverse plant life and are recognized as a major biodiversity hotspot, supporting a wide range of plant groups, including lichens (Gupta *et al.* 2016). Uttarakhand is positioned in the Western Himalayan part of India, spanning latitudes 28°43'-31°28' N and longitudes 77°34'-81°03' E. The Western Himalaya is identified as one of India's eight lichenogeographic regions and is recognized as a major hotspot for lichen diversity. This region extends across three states, namely Jammu & Kashmir, Himachal Pradesh, and Uttarakhand (Sinha 2021). Uttarakhand is recognized for its high richness and abundance of lichen species (Gahtori *et al.* 2022). According to a recent comprehensive checklist of lichens from India, Uttarakhand harbors more than 1034 lichen species, making it the state with the highest recorded lichen diversity, followed by Himachal Pradesh with 716 species

and Jammu & Kashmir with 457 species (Sinha *et al.* 2024).

In our ongoing investigations of lichen diversity in the Madhyamaheshwar Valley, Uttarakhand, we have documented a total of 60 species across diverse habitats, establishing a comprehensive baseline for future ecological and taxonomic studies (Prabhakar *et al.* 2024). In the present study, we report *Umbilicaria cylindrica* (Umbilicariaceae) as a new record from Nandi Kund, within the valley, thereby extending the known distribution of this species in Uttarakhand and underscoring the potential for discovering previously unrecorded lichen taxa in high-altitude Himalayan ecosystems.

MATERIALS AND METHODS

The species was collected from Nandi Kund, a

high-altitude sacred lake in the Madhyamaheshwar Valley, located within Kedarnath Wildlife Sanctuary. The valley spans 262 km², with the Nandi Kund area covering 4.43 km², including the lake (0.06 km²). The collection site lies between 30°35'39"–30°36'44" N and 79°18'15"–79°20'54" E (Fig. 1). The specimen was collected from rocks and soil. Morphological and anatomical examinations were conducted using a stereo zoom microscope (OLYMPUS SZ40 110AL2X WD28) and a compound light microscope (OLYMPUS CX21 ILED FSI). Identification followed Nayaka (2014) and standard taxonomic literature (Awasthi 2007). The chemical spot tests were executed according to the methods described by Orange *et al.* (2001). The specimen was verified at the Lichenology Laboratory, CSIR–NBRI, Lucknow, and deposited in the herbaria of H.N.B. Garhwal University (GUH) and CSIR–NBRI, Lucknow (LWG).

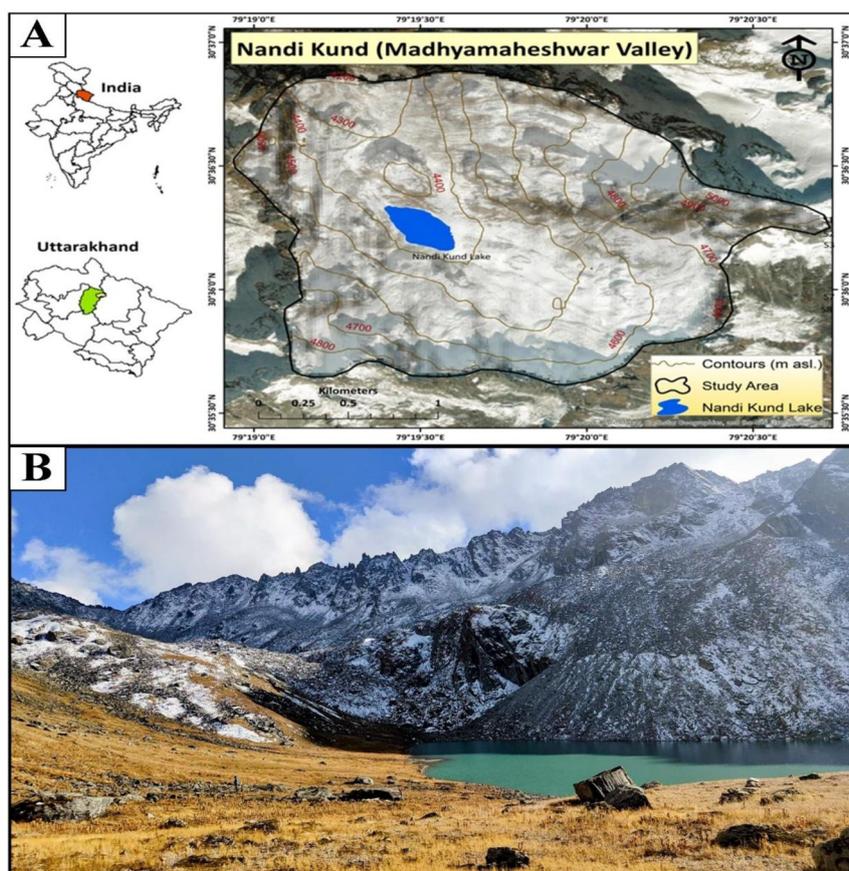


Fig. 1. A - Geographical map of the study area, B - Landscape view of the study area.

RESULTS

New record

Umbilicaria cylindrica (L.) Delise ex Duby (Fig. 2).

Taxonomic description

Thallus - Umbilicate, composed of single or multiple lobes, robust, firm, broadly rounded to irregular, occasionally perforate at the margin; size ranges from

1-4 cm, sometimes up to 10 cm in diameter.

Upper surface - Pale to mid-gray, smooth, brownish beneath pruina, edges lined with dark cilia.

Medulla - White.

Lower surface - Cream to pinkish, sometimes darkening near the center; texture smooth to finely roughened; sparsely covered with pale, branched rhizinomorphs.

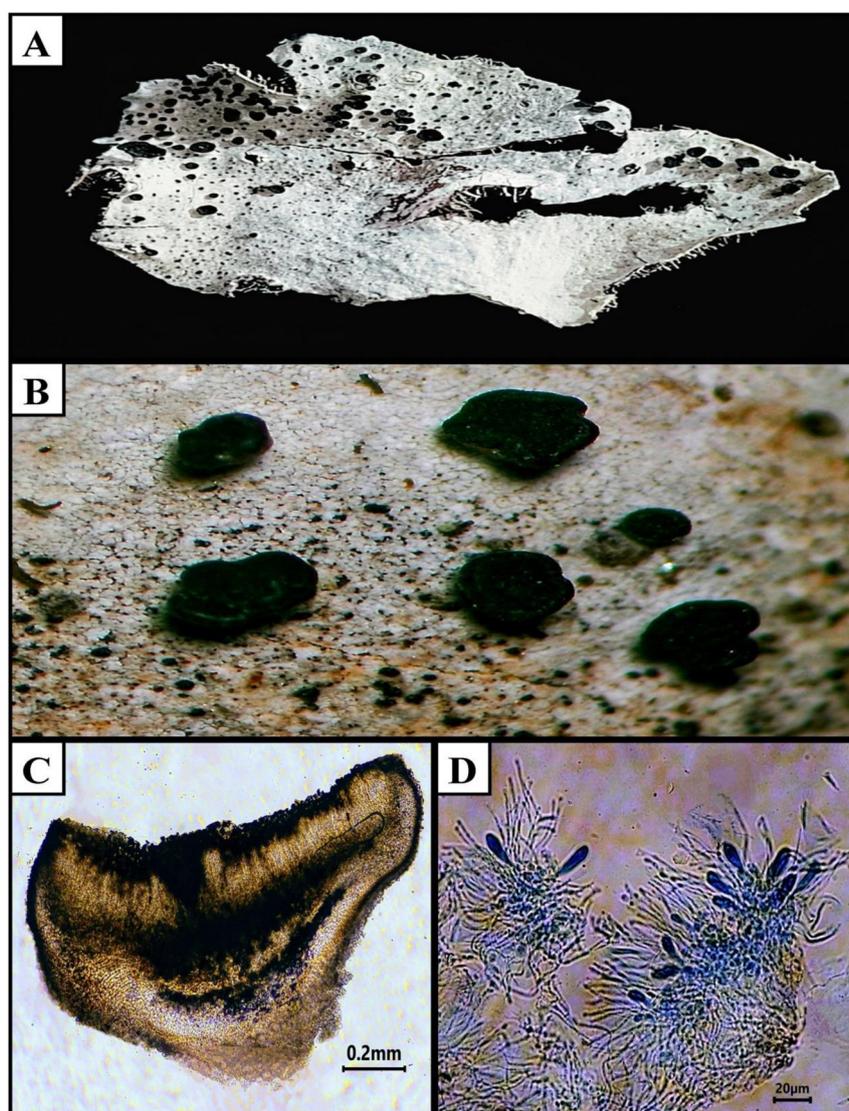


Fig. 2. - *Umbilicaria cylindrica*; **A** - Thallus with apothecia, **B** - Magnified view showing the disc-shaped apothecia, **C** - Apothecial section showing hymenium and exciple, **D** - Asci stained with lactophenol cotton blue.

Apothecia - Frequent, black, stalked, spiral-disc type, 1-3(-4) mm wide.

Asci - Club-shaped, containing eight spores.

Ascospores - Colorless, non-septate, ellipsoid, measuring $7-15 \times 4-7 \mu\text{m}$.

Chemistry - (Medulla): K⁺ red or K⁻, C⁻, KC⁻, P⁺ orange or P⁻.

TLC - Norstictic acid present.

Specimen examined - India, Uttarakhand, Rudrapur district, near Nandi Kund region (Madhyamaheshwar Valley), 30°36'27"N, 79°19'59"E, 4800 m a.s.l., growing on rock and soil, 15 October 2024, Nitin Kant Prabhakar, (LWG-69625).

World distribution - Europe, Asia, and North America (Llano 1950, Blackman *et al.* 1974, Hestmark 2004, Kantvilas and Louwhoff 2007).

Indian distribution - Sikkim and west Bengal (Sinha and Singh 2005, Sinha *et al.* 2024).

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