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Diphyscium mucronifolium (Bryophyta, Diphysciales, Diphysciaceae): an addition to Bryophyte Flora of Assam (India)

Diphyscium mucronifolium (Bryophyta, Diphysciales, Diphysciaceae): una adición a la flora briófita de Assam (India)

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ABSTRACT

Diphyscium mucronifolium (Diphysciaceae) is presently added to the bryophytic flora of Assam, India from Chandubi. The taxon has been identified as a distributional report based on morphological investigations. The species has often been confused with *D. longifolium*. The key diagnostic feature separating it from the *D. longifolium* is the presence of entire margins in leaf cells in *D. mucronifolium*. In *D. longifolium*, leaf margins are serrate or dentate with uni- or bi-dentations. The present study implies the range extension of this taxon.

Keywords: Bryopsida; *Diphyscium mucronifolium*; moss; North-east India.

RESUMEN

Diphyscium mucronifolium (Diphysciaceae) se agrega actualmente a la flora briofítica de Assam, India, procedente de Chandubi. El taxón ha sido identificado como un informe de distribución basado en investigaciones morfológicas. La especie se ha confundido a menudo con *D. longifolium*. La característica diagnóstica clave que lo separa de *D. longifolium* es la presencia de márgenes completos en las células de las hojas de *D. mucronifolium*. En *D. longifolium*, los márgenes de las hojas son aserrados o dentados con

➤ Ref. bibliográfica: Twinkle, Ch.; Roy, H.; Lal Uniyal, P. 2024. *Diphyscium mucronifolium* (Bryophyta, Diphysciales, Diphysciaceae): an addition to Bryophyte Flora of Assam (India). *Lilloa 61* (2): 167-171. doi: https://doi.org/10.30550/j.lil/1962
➤ Recibido: 29 de junio 2024 – Aceptado: 8 de agosto 2024 – Publicado en línea: 10 de septiembre 2024.
➤ URL de la revista: http://lilloa.lillo.org.ar

uni o bidentaciones. El presente estudio implica la extensión del rango de este taxón.

Palabras clave: Bryopsida; *Diphyscium mucronifolium*; musgo; Noreste de la India.

INTRODUCTION

Diphysciaceae M.Fleisch., a monogeneric family comprises genus *Diphyscium* D. Mohr, characterized by short setae, immersed capsules, collared axillary hairs, distinctly differentiated perichaetial leaves with crenulate, dissected, laciniate or ciliate margins at apex, and arthrodontous peristomes with pleated endostomes and exostomes that are rudimentary or lacking (Magombo, 2003). Phylogenetic and molecular studies revealed Diphysciaceae is represented by three genera, viz. *Diphyscium* D.Mohr, *Theriotia* Cardot, and *Muscoflorschuetzia* Crosby. Magombo (2002), based on phylogenetic studies concluded that the morphological features used to distinguish *Diphyscium*, *Muscoflorschuetzia* and *Theriotia* are homoplastic, and thus, the only valid genus is *Diphyscium*. Later, *Muscoflorschuetzia* and *Theriotia* was synonymized under *Diphyscium* (Magombo, 2002, 2003).

Diphyscium comprises a total of 15 species globally (Karén *et al.*, 2010). In India, there are four species of *Diphyscium*, viz. *D. involutum* Mitt., *D. fasciculatum* Mitt., *D. longifolium* Griff. and *D. mucronifolium* Mitt. ex Dozy & Molk (Dandotiya *et al*., 2011). However, Dozy and Molkenboer (1855), synonymized *D. involutum* into *D. mucronifolium*., Presently, only three species are known from India (Dandotiya *et al.*, 2011). The distribution of *D. longifolium* is found in Nainital and Khasia hills; *D. fasciculatum* in the Nilgiri and Palni hills and *D. mucronifolium* in the Khasia hills, Tamil Nadu and Tirunelveli district, Agasythymalai of Western Ghats (Dandotiya *et al.*, 2011). Present study reports the occurrence of *D. mucronifolium* for the first time from Assam, India. Detailed descriptions along with the photo plate and taxonomic key encompassing all known species from India are provided.

MATERIALS AND METHODS

Sampling was done on 7th November 2021 from the Chandubi area of Kamrup district, Assam. The sample was collected in a zip lock bag and brought to the laboratory where it was identified based on morphological characteristics. Digital photographs of the habit were captured using a digital camera (Nikon, D-5600). The plant was dissected using a dissecting microscope (Bausch & Lomb). For photographs and measurements, a light microscope (Cilika BT-E) was used. Taxon was identified using relevant literature (Gangulee, 1969; Magombo, 2003; Karén *et al.*, 2010). The voucher specimen was submitted to the Herbarium of the Department of Botany at the University of Delhi (DUH).

TAXONOMY

Diphyscium mucronifolium Mitt. ex Dozy & Molk., Bryol. Jav. 1: 35. 1855. *Webera mucronifolia* (Mitt. ex Dozy & Molk.) Broth., Nat. Pflanzenfam. 1 (3): 664. 1904. *Webera integerrima* Broth., Leafl. Philipp. Bot. 2: 653. 1909. *Webera auriculata* (Besch.) Broth., Nat. Pflanzenfam. 1 (3): 664. 1904. *Webera involuta* (Mitt.) Broth., Nat. Pflanzenfam. 1 (3): 664. 1904.

Small to medium-sized plants, growing in small patches, 5–22 mm, olive green when young, deep green at maturity. Male plants are approximately the same as female plants; perichaetial leaves in female plant with long awn; Stem erect, usually simple, very short, rarely branched, rhizoids present at base; stem circular in transverse section, ca. 0.2–0.4 mm in diameter, with central strand (hydrome), thin-walled, parenchymatous cell, surrounded by leptome, cortex present with many layers of thick-walled parenchymatous cells, stereids present, presence of hyaline cells, cells 10–29 μm. Vegetative leaves contorted when dry, erect-spreading during moist, ligulate to oblong-lanceolate; apex apiculate or mucronate, broadly acute or obtuse; well-developed lamina from apex to base, 3–5 × 0.3–1.2 mm, cells thick-walled, bistratose above, unistratose at base; apical cells mostly round-quadrate, thick-walled, 3–15 μm; median leaf cells smooth, round–quadrate, 5–12 μm; basal cells hyaline, smooth, rectangular, 15–70 × 3–11 μm; leaf margins 2–4 cells thick, entire throughout; costae shortly excurrent to excurrent, differentiated into ventral and dorsal stereid bands and between them presence of 1–2 layers of guide cells, often hyaline at base, orange-brown. Axillary hairs 5–15 cells in length. Perichaetia at the end of branches or stems. Perichaetial leaves smooth, lanceolate, awn long excurrent; outer leaves margin entire or minutely dissected above and entire at the base, 3–7 × 0.3–1.2 mm. Sporophyte not seen.

Remarks.— The present specimen was very much similar with the specimen found in Australia, China, Philippines, and Malaysia with few variations such as apical cells (3–15 mm), basal cells length (15–70 mm), basal cells width (3–11 mm), costa short excurrent to excurrent, perichaetial leaves length (3–7 mm) and width (0.3–1.2 mm) (cf. Magombo, 2003).

Habitat.— The specimen was found in shade, on the rock surface.

Distribution.— India [Western Ghats, Tamil Nadu, Khasia hills (Dandotiya *et al*., 2011) and Assam – present study], Australia, China, Indonesia, Japan, Korea, Malaysia, New Guinea, North America, Philippines, Thailand, and Vietnam (GBIF).

Specimens examined.— INDIA. Assam, Kamrup district, Chandubi, 25°52’41.28” N, 91°23’46.62” E, 07-XI-2021, 72.2 masl, *T. Chetia 168* (DUH).

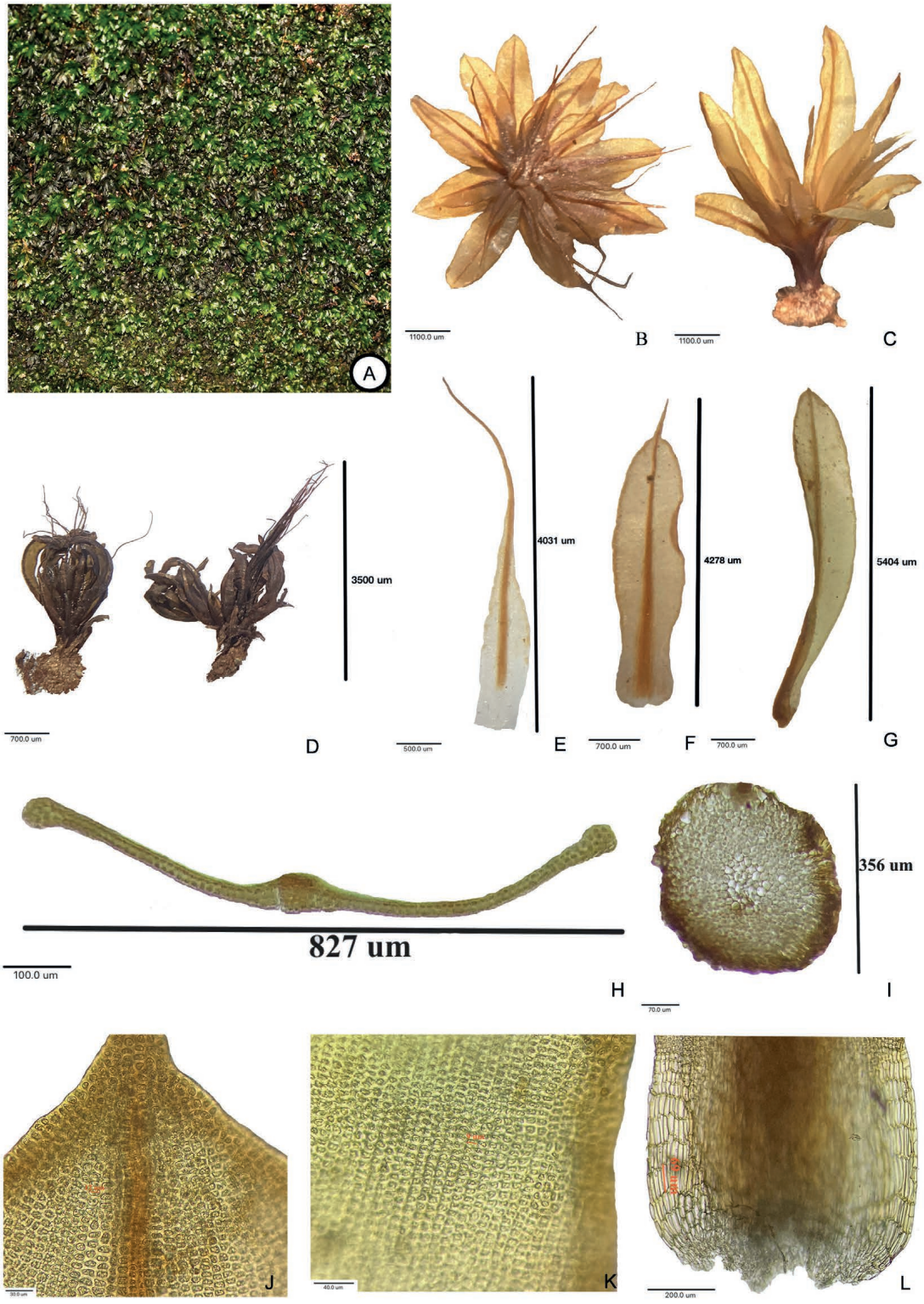

Fig. 1. *Diphyscium mucronifolium*. A) Habit. B) Female plant. C) Male plant. D) Dry plant. E) Perichaetial leaf. F-G) Upper and lower vegetative leaves. H) V.S of leaf. I) T.S of stem. J) Apical leaf cells. K) Median leaf cells. L) Basal leaf cells. *Chetia 168* (DUH).

Fig. 1. *Diphyscium mucronifolium*. A) Hábito. B) Planta femenina. C) Planta masculina. D) Planta seca. E) Hoja periquetial. F-G) Hojas vegetativas superiores e inferiores. H) V.S de hoja. I) T.S de tallo. J) Células foliares apicales. K) Células foliares medianas. L) Células basales de las hojas. *Chetia 168* (DUH).

Key to the species of *Diphyscium* in India

1 Plants dioicous; vegetative leaves ligulate to oblong-lanceolate 2
1' Plants autoicous; vegetative leaves linear ..... *D. fasciculatum*
2 Leaf margins serrate or dentate above, entire below ..... *D. longifolium*
2' Leaf margins throughout entire ..... *D. mucronifolium*

ACKNOWLEDGEMENTS

The authors acknowledge the Head of the Department of Botany, Cotton University for her support and encouragement. The first author extends his gratitude to Mr Anshul Dhyani for his invaluable assistance and insightful suggestions throughout the preparation of this manuscript. The authors are thankful to the Institute of Eminence, University of Delhi (IOE/2023-24/12/FRP) for the partial financial support.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest.

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