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Cover: Life and death in one night - wolf hunting the hare. Mixed media—gouache, acrylics, pen & colour pencils. © Dupati Poojitha.

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SHORT COMMUNICATION

Phycolepidozia indica (Marchantiophyta: Jungermanniales) an endemic leafless liverwort from Kerala part of Western Ghats, India

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Abstract: The genus *Phycolepidozia* R.M.Schust. of the family Cephaloziellaceae is globally known by only two species, viz. *P. exigua* R.M.Schust., a neotropical species and *P. indica* Gradst., J.-P. Frahm & U. Schwarz, a southern Indian endemic species. The leafless liverwort *P. indica*, so far known by its type collection from Karnataka only, is being presently recorded from the Kerala part of the Western Ghats. In the present paper an illustrative account of the species is being provided.

Keywords: Cephaloziellaceae, Karnataka, leafless stems, leafy liverwort, new record, Phycolepidoziaceae, taxonomy, threatened, Wayanad.

Phycolepidozia R.M.Schust. is a fascinating leafy liverwort with many unique features. Unlike most liverworts, it lacks leafy lobes and underleaves on its stems and branches giving it a somewhat algal appearance. However, it's reproductive structures, both the male and female gametoecia are adorned with leaves. The genus *Phycolepidozia* belonging to the family Cephaloziellaceae was described by R.M. Schuster (1966) with a single species, *P. exigua* R.M.Schust. based on its type collection from Dominica (Caribbean Island). Later it was also collected from Venezuela (GBIF 2024). It is known to occur on tree trunks in humid rainforest in the tropical American region. This species was assessed as Critically Endangered (CR) due to its rare occurrence (Bryophyte Specialist Group 2000; Hallingbäck & Hodgetts 2000; Schäfer-Verwimp 2010). A second species was added to this genus after 37 years from India by Gradstein et al. (2014), as *P. indica* Gradst., J.-P. Frahm & U.Schwarz from the forests of the Western Ghats of Karnataka state in Peninsular India.

During our recent survey in the Wayanad District of Kerala state (Figure 1), we came across an unusual interesting plant specimen, and even mistook it for an alga due to its leafless stem. However, on closer observation, we could confirm it as *P. indica*.

Materials and Methods

The bryophyte collection was made during December 2023 near the Tentgram, a popular tourist destination,

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Competing interests: The authors declare no competing interests.

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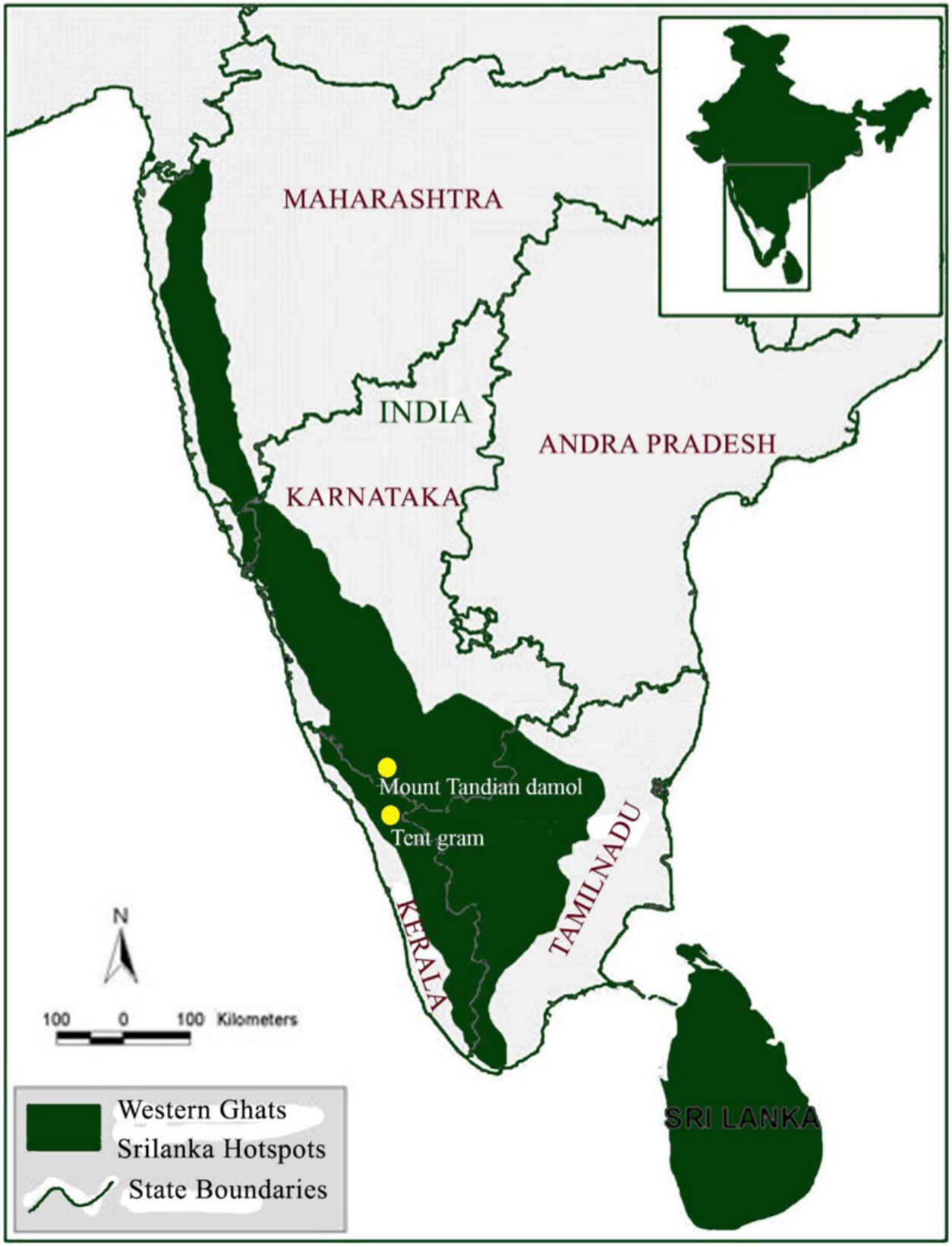

Figure 1. Location map of collection site of *Phycolepidozia indica* Gradst., J.-P.Frahm & U.Schwarz in the Western Ghats.

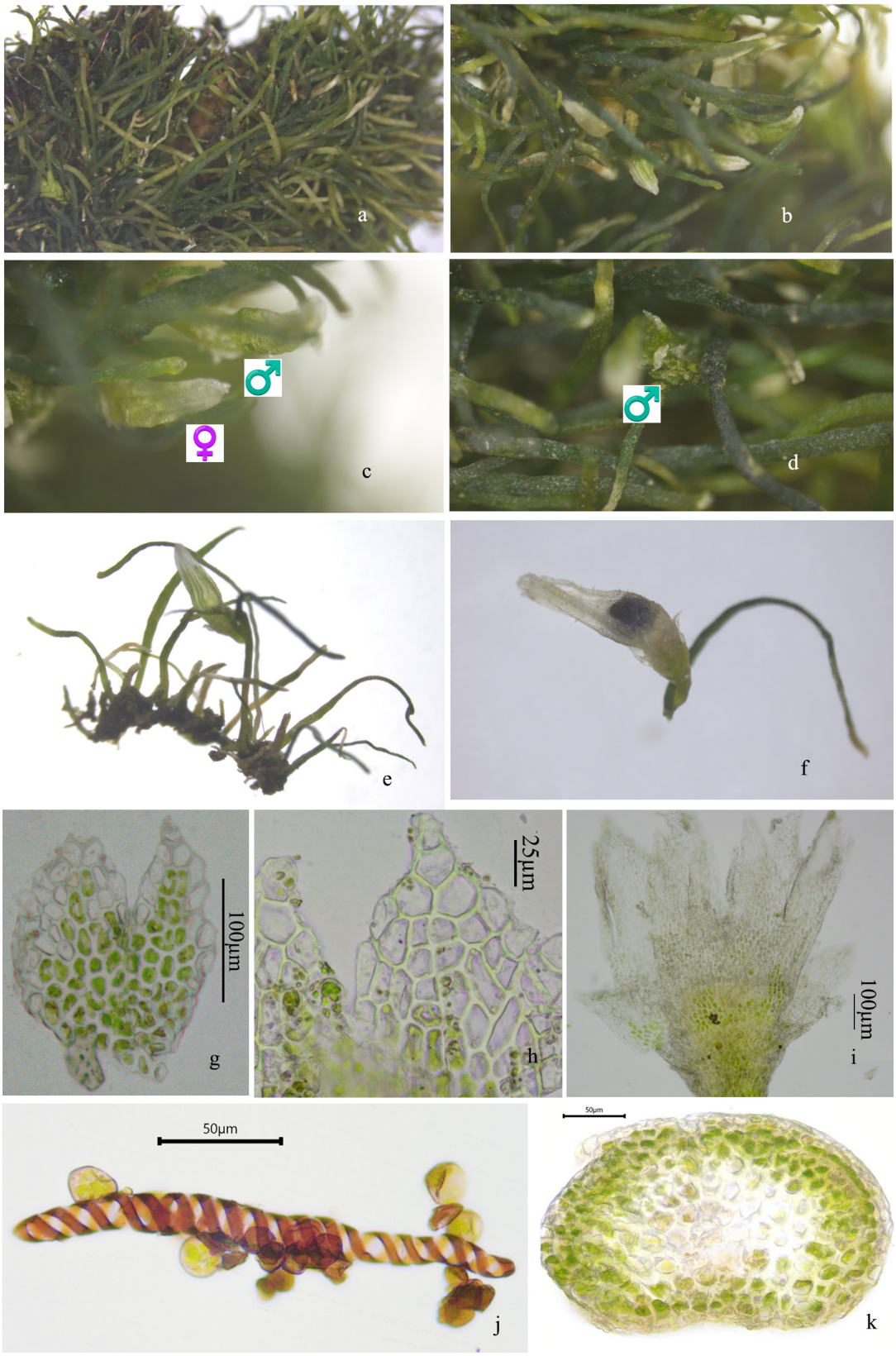

Image 1. ***Phycolepidozia indica*** **Gradst., J.-P.Frahm & U.Schwarz. a—habit showing leafless branches | b—female branch | c—branch showing female and male structure | d—male branch with small bracts | e–f—enlarged view of female branch with sporogonium enclosed within perianth | g—male branch with bract | h—bract cells | i—connate bract and bracteoles | j—spores and elater | k—cross section of stem. © Manju & Krishnendhu.**

amidst thick forest in the Wayanad district of Kerala. The leafless liverwort was found growing on a large, rocky patch. The morphological features were studied under a Leica SApo stereo microscope, and internal features using an Olympus CX21liLED compound microscope. The photomicrographs were recorded using Magcam DC5 5.1MP camera and Magnus Analytics MagVision software (version x64.4.8.15674.2-01991008). The voucher specimens are housed in the Calicut University Herbarium (CALI).

Taxonomic Treatment

Phycolepidozia indica Gradst., J.-P. Frahm & U. Schwarz, Taxon 63(3): 499. 2014. – Type: INDIA, Western Ghats, Karnataka State, Coorg District, trail to the summit of mount Tandiandamol, 25.9 km south-west of Madikeri, 1,610 m, on a shaded rock in remnant forest along the trail, 12.2208 ^{0}N, 75.6095 ^{0}E, 11 November 2012, U.Schwarz, J.-P.Frahm & F.Schumm s.n. (PC). (Image 1).

Plant monoecious, pale green to dark green, green to blackish when dried, caespitose, bristles like mats on rocks, shoots leafless, arising from rhizomes, 2.30–5.29 mm long, 0.12–0.17 mm thick. Stem straight to remotely angled, irregularly branched, branches 0.51–2.63 mm long, 0.11–0.15 mm thick with pointed tip, devoid of leaves, but with alternatingly protruding few-celled hyaline projections on lateral sides representing vestigial leaves; in surface view the dorsal epidermal cells oblong, thick walled, green; ventral epidermal cells short, rectangular and pale green. Stem cross section shows 18–21 cells across, 280–300 × 170–180 µm in diameter; the outer cortical cells green, chlorophyllous, thick walled, small sized, 8–15 × 5–13 µm, arranged in 4–5 layers of cells; the inner medullary cells hyaline, non chlorophyllous, thin walled, larger, 18–23 × 13–19 µm, arranged in 4–5 layers of cells; branches greenish, arising from ventral sides in straight angles, erect, small hyaline projections on either side of stem representing the leaf position. Rhizoids hyaline and smooth, arising from the rhizomes, also present on shoot tip. Gametoecia leafy, colourless, arising from short branches. Androecia terminal or intercalary in position, mostly adjacent to the perianth, comprising 6–7 leaf-like bifid appendages or bracts, 0.9–1.2 mm, cells chlorophyllous, 19–30 × 11–15 µm. Gynoecia terminal on short branches, bracts and bracteoles connate, female bract in 2–3 series, innermost bract 0.3–0.4 mm long; perianth 0.8–1.2 × 0.30–0.37 mm, 6-keeled with green base and hyaline tip, orange to brown cover on its tip, cells hyaline, 46–81 × 11–24 µm. Cells of perianth and male and female bracts contain 5–8 globular oil bodies. Seta very thin, 3 mm long; capsule cylindrical; spores immature, spherical, 17–19 µm in diameter, brownish yellow; elaters 213–239 × 15–18 µm, brownish, with strong bi-spiral bands.

Habitat: The species was collected near to semi evergreen forest from a shady large rocky patch where water drips regularly.

Distribution: India, southern Western Ghats, Karnataka (Coorg District), and Kerala (Wayanad district – present study), endemic.

Specimen examined: India: Kerala, Wayanad District, Thollayiram kandi, Tentgram (1,180 m), 02.12.2023, 11.4903 ^{0}N, 76.0995 ^{0}E, coll. K.P. Rajesh, #202511 (CALI).

Discussion

Schuster (1966) considered *Phycolepidozia* under a separate family Phycolepidoziaceae R.M.Schust. when he first described *P. exigua.* However, based on the molecular analysis Gradstein et al. (2014) concluded that the genus is closely related to Cephaloziellaceae and included it under Cephaloziellaceae. The Wayanad region is known with a rich Bryoflora comprising more than 170 species, including endemics such as *Trichostomum wayanadense* Nair et al., *Amphidium gangulii* Nair et al., *Pinnatella enrothiana* Manju et al., *Acidodontium indicum* Vineesha et al., etc (Nair et al. 2005; Manju et al. 2023; Vineesha et al. 2023). The present finding of a curious genus, *Phycolepidozia,* also signifies the quality of the habitats in the Wayanad region in supporting a rich biodiversity. However, due to the small size of the plant, the chance to ignore or miss many species is high. The continued intensive surveys in the habitats of the Western Ghats are proved worthy in documenting many more taxa. The present location of the species, Wayanad, is about 82 km (aerial distance) from the earlier known localities in Karnataka State. Like *P. exigua*, the present species is also very rare as it is known only from two locations with very small extent of occurrence and area of occupancy and hence may be threatened.

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