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REDISCOVERY OF *LEPTOCHILUS HEMIONITIDEUS* (C.PRESL) NOOT. (POLYPODIACEAE): FIRST COLLECTION IN 140 YEARS FROM THE WESTERN GHATS OF KARNATAKA

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ABSTRACT
BAGATHSINGH, C. & BENNIAMIN, A. 2025. Rediscovery of *Leptochilus hemionitideus* (C.Presl) Noot. (Polypodiaceeae): first collection in 140 years from the Western Ghats of Karnataka. *Reinwardtia* 24(1): 27–31. — This study presents the recollection of *Leptochilus hemionitideus* (C.Presl) Noot. (Polypodiaceae), a species presumed to have an extremely small population, which has not been observed since the collections made by R.H. Beddome (1883) in the Western Ghats of Karnataka. The paper provides detailed notes on its taxonomic uncertainty, a precise description, and photographs of its micromorphology to aid in its identification.

Key words: Congeners, hybridization, monomorphic, phylogeny, veins.

ABSTRAK
BAGATHSINGH, C. & BENNIAMIN, A. 2025. Penemuan kembali *Leptochilus heminitideus* (C.Presl) Noot. (Polypodiaceeae): koleksi pertama dalam 140 tahun dari Ghats bagian barat di Karnataka. *Reinwardtia* 24(1): 27–31. — Studi ini menyajikan pengkoleksian kembali *Leptochilus hemionitideus* (C.Presl) Noot. (Polypodiaceae), jenis yang diperkirakan memiliki populasi sangat kecil, yang belum pernah diamati sejak koleksi yang dibuat oleh R.H. Beddome (1883) di Ghats bagian barat, Karnataka. Tulisan ini memberikan catatan terperinci tentang ketidakpastian taksonomi, deskripsi yang tepat, dan foto-foto mikromorfologinya untuk membantu identifikasi.

Kata kunci: Filogeni, hibridisasi, kerabat dekat, monomorfik, pembuluh.

INTRODUCTION

The Western Ghats, recognized as one of the 36 global biodiversity hotspots, are endowed with exceptional ecological richness. Among its extensive range, the central Western Ghats of Karnataka stand out as a floristic richness and particularly notable for its remarkable concentration of endemic Pteridophytes. Rajagopal & Bhat (2016) documented a total of 183 species of Pteridophytes, distributed across 71 genera and 30 families, in the state of Karnataka. Among these, *Leptochilus hemionitideus* (C.Presl) Noot. is a relatively lesser -known species that has remained poorly documented across the Western Ghats for an extended period, exhibiting a highly restricted distribution. This species is a lithophytic fern belonging to the subfamily Microsoroideae within the Polypodiaceae family (PPG-I, 2016).The specific epithet was initially introduced by Nathaniel Wallich as *Polypodium hemionitideum* in his 1829 publication (Number 10, *List* no. 284, *nom.nud.*), and subsequently, the first formal description of this species was provided by Carl Boriwaj Presl (Wallich & Bentham, 1829). Unlike its congeners in Peninsular India, this species is distinguished by its monomorphic fronds and non-acrostichoidsori which are irregular, oblique, and elongate, often fusing together on tertiary veins that run parallel to the secondary veins, setting it apart from related species.

The taxonomic status of *L. hemionitideus* has been a subject of ongoing debate, with earlier studies, such as those by Fraser-Jenkins (2008) and Fraser-Jenkins *et al*. (2021), classifying it as a subspecies of *L. decurrens* Blume. Fraser-Jenkins (2008) identified two distinct subspecies within the species: one characterized by reduced fertile fronds and another by the absence of such fronds. Intriguingly, certain specimens displayed intermediate fronds, as well as typical unreduced fronds, with evidence of two taxa co-occurring on a single rhizome. Despite these observations, Zhang & Nooteboom (2013) did not accept Fraser-Jenkins's conclusions, arguing that hybridization is not a contributing factor and asserting that the spores are viable.

Further complete chloroplast genome sequencing has provided critical insights, with the genome length of 156,083 bp contributing to the phylogenetic resolution within the group (Min *et al.*,

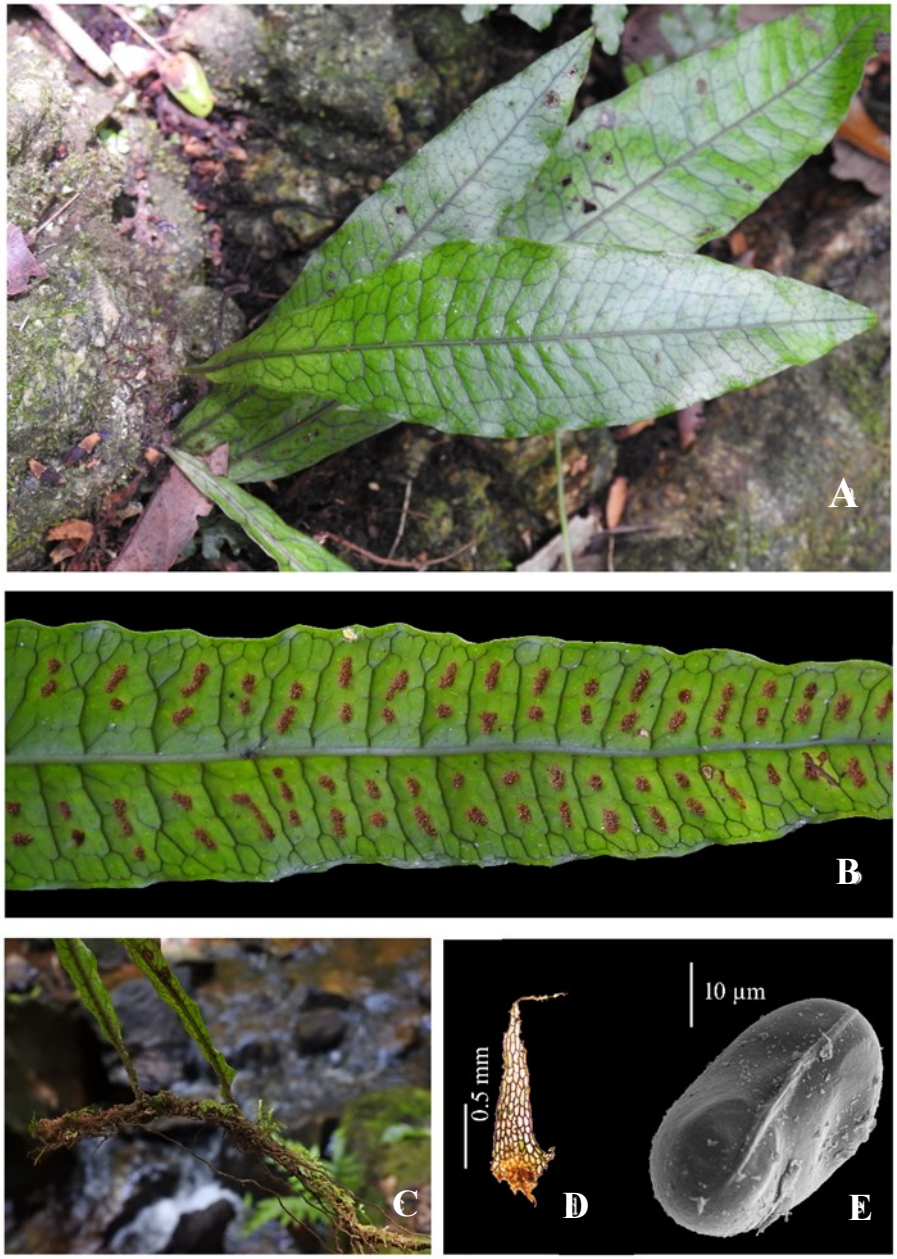

Fig. 1. *Leptochilus hemionitideus* (C.Presl) Noot. A. Habit. B. Fertile frond. C. Rhizome. D. Scale. E. SEM micrograph of spore.

2018). The phylogenetic analysis underscores the close relationship between *L. decurrens* and *L. hemionitideus*, with both forming a monophyletic group within the broader polypodiaceous ferns (Su *et al.*, 2019). This result aligns with the broader patterns observed in the Polypodiaceae family, where closely related species often exhibit significant genetic and morphological variation. Despite the molecular evidence pointing to a close evolutionary relationship, the morphological characters examined in this study indicate that *L. hemionitideus* does not exhibit the necessary traits to warrant classification as a subspecies of *L. decurrens*. The morphological divergence observed suggests that *L. hemionitideus* should be treated as a distinct species rather than a subspecies, as previously suggested by Fraser-Jenkins (2008) and Fraser-Jenkins *et al.* (2021).

The first documented collection of this species in peninsular India was likely made by R. H. Beddome, with a voucher specimen preserved at the Natural History Museum in London (BM000036792). Unfortunately, the precise location details of the specimen could not be traced due to degradation of herbarium sheet. However, Beddome (1883) mentioned that this species was more commonly found in the Coorg region of Karnataka. A century later, the species was recorded

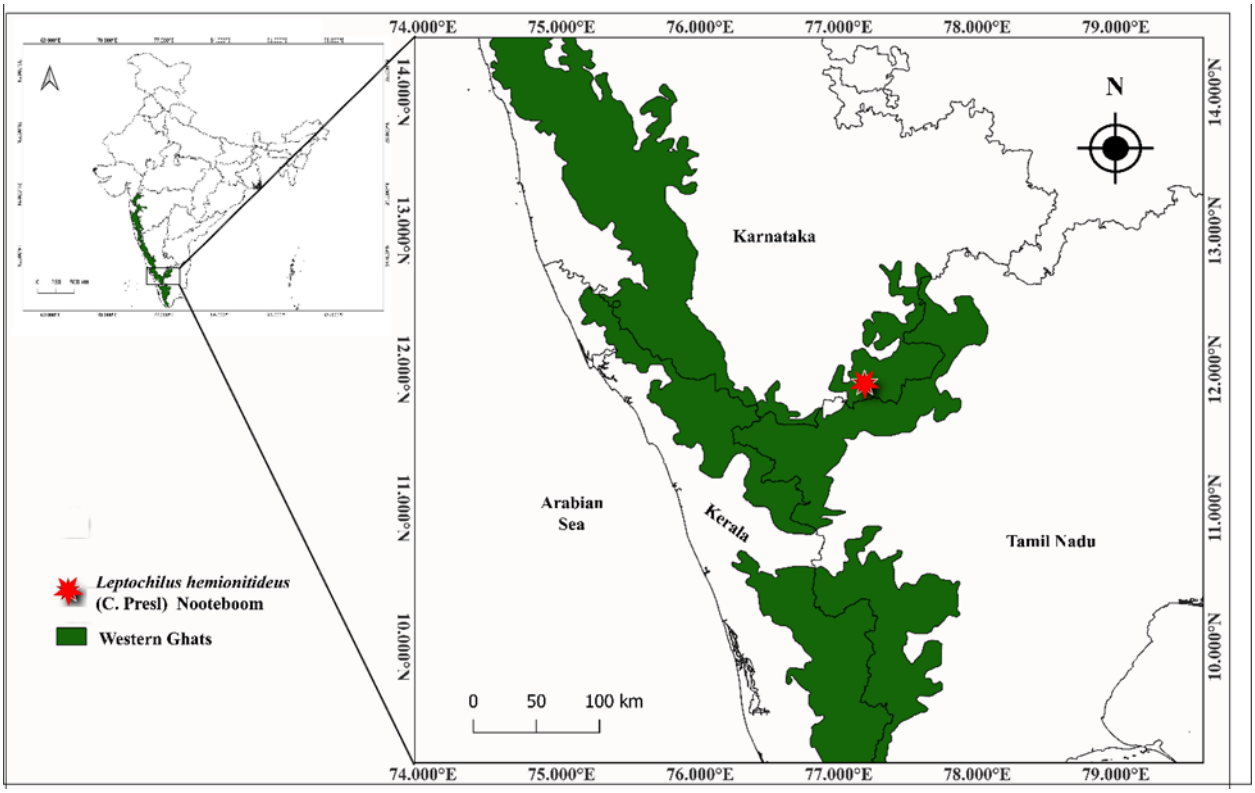

Fig. 2. Locality of *Leptochilus hemionitideus* (C.Presl) Noot. in Karnataka.

by V. S. Manickam and K. M. Matthew (RHT 33089) in Idliyar Shola, Anamalai Hills, Tamil Nadu.

Nampy & Madhusoodanan (1998) collected this species from the Ooty Botanical Garden (cultivated), subsequently incorporating it into their comprehensive study of polypodioid ferns in South India. Rajagopal & Bhat (2016) included this species in the Pteridophyte flora of Karnataka solely based on the authority of Beddome collection. No subsequent collections of this species had been made following Beddome's original documentation in Karnataka.

MATERIALS AND METHODS

During a Pteridophyte exploration (2018–2021) in the Biligiri Rangaswamy Temple (BRT) Tiger Reserve, the first author successfully recollected this species in the Western Ghats of Karnataka, marking its first collection in 140 years. The identification was confirmed through consultation of relevant literature (Beddome, 1883; Manickam & Irudayaraj, 1992; Nampy & Madhusoodanan, 1998; Fraser-Jenkins, 2008; Rajagopal & Bhat, 2016; Benniamin & Sundari, 2020; Fraser-Jenkins *et al.,* 2021) and comparison with voucher specimens deposited in the various herbaria. Spores were collected, air-dried, mounted on aluminum stubs, coated with platinum in a sputter coater, and analyzed for morphological characteristics using a Scanning Electron Microscope (SEM Zeiss Sigma 360 VP). Field photographs were captured using a Nikon Coolpix P900 DSLR Camera, while microphotographs were taken with an Olympus SZ61 stereo microscope. The collected specimen was processed, and a voucher specimen was prepared following standard herbarium protocols (Jain & Rao, 1977), subsequently deposited in the herbarium of the Botanical Survey of India, Western Regional Centre, Pune (BSI).

TAXONOMIC TREATMENT

Leptochilus hemionitideus (C.Presl) Noot., Blumea.42: 285. 1997. *Selliguea hemionitidea* C.Presl, Tent. Pterid.216, t. 9, Fig. 17, 1836. *Leptochilus decurrens* Blume subsp. *hemionitideus* (C.Presl) Fraser-Jenk., Taxon. Revis. Indian Subcontinental Pteridophytes 63. 2008; Benniamin & Sundari, Pteridophytes of Western Ghats-A Pictorial guide: 51. 2020. *Colysis hemionitidea* (C.Presl) C.Presl, Abh. Königl.Böhm.Ges.Wiss., ser. 56: 507. 1851; Manickam & Irudayaraj, Pterid. Fl. West. Ghats, S. India: 1992. *Pleopeltis hemionitidea* Wall., Bedd., Handb. Ferns Brit. India.

359. t. 202.1883. Type — NEPAL. *s.loc*., 1837, Wallich N., 284 (P) image! (P00626865).

Description. *Rhizome* creeping, 2–3 mm in diameter, dorso-ventrally flattened, furnished with wiry scaly fibrous roots; *scales* pseudopeltate, apically dense, otherwise more or less sparse, narrowly ovate or triangular, 2–5 × 0.5–1 mm, clathrate, margin denticulate. *Fronds* monomorphic, thin-herbaceous; stipeswinged, scaly; lamina simple, narrowly ovate to obovate, 30–50 × 4–9 cm, base cuneate, winged nearly all down the stipe, margins entire, apex acute or acuminate, abaxial surface without acicular hairs; veins distinct, prominent; more or less straight, dichotomously branched near the margin, veinlet free or forked once, areoles between two adjacent veins. *Sori* separate, orbicular or elongate, in 1 discontinuous line between each pair of veins, absent at basioscopic end; sporangia stalked, annulus 12–14 celled, 64 spores per sporangia; spores monolete, bilateral, ellipsoid, irregular, exine smooth (Fig.1).

Ecology. Lithophytes grows on rocks in partially shaded place along streams in evergreen forests.

Indian distribution. Karnataka, Kerala, Megahalaya, Sikkim, Tamil Nadu, Uttarkhand.

Global distribution. Bangladesh, China, Japan, Laos, Myanmar, Nepal, Philippines, Taiwan, Thailand, Tibet, Vietnam.

Specimens examined. *R.H.Beddome s.n*., (BM image!) (BM000036792), India, *s.loc., s.die.*; *S.S.Bir*, *s.n*. (CUPB image!) Darjeeling, 1,524 m; *V.S. Manickam and K.M. Matthew* 33089 (RHT image!) Tamil Nadu: Coimbatore district, Valparai taluk, Aanamali hills, Idliyar shola, 1,000 m, 13 June 1985; *C.R. Fraser-Jenkins* 3983 (H image!), Meghalaya: South edge of Khasi hills, behind Mowsami Cave, 21 December 1998.

Specimen collected. *C. Bagathsingh* 77 (BSI, 205922), India, Karnataka, BRT Tiger reserve, Kombaekallpodu, 11.8981°N, 77.1863°E, 1,430 m, 28 November 2018 (Fig. 2).

Taxonomic notes. This species closely resembles *Microsorum zippelii* (Blume) Ching and is frequently misidentified as such. However, it can be readily distinguished by its green, transparent lamina, which features irregular, oblique, elongate sori that often fuse together. In contrast, the lamina of *M. zippelii* is relatively subcoriaceous and less transparent, characterized by circular sori arranged in two rows between the main veins.

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