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Caption: Malabar Slender Loris *Loris lydekkerianus malabaricus* © Dileep Anthikkad.



Dryopteris lunanensis (Dryopteridaceae) - an addition to the pteridophytic diversity of India

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Abstract: The occurrence of the very rare and little-known fern, *Dryopteris lunanensis* (Christ) C.Chr., in India is reported for the first time. A detailed description and photographs of the species are provided along with notes on its distribution. A second-step lectotype has also been designated.

Keywords: Arunachal Pradesh, distribution, fern, Pteridophyta.

The genus *Dryopteris* Adans. (Dryopteridaceae) is one of the most widespread fern genera with approximately 350 species worldwide (Fraser-Jenkins 1986; POWO 2021) and has high species diversity in subtropical montane regions, though the genus extends northwards into boreal regions as well. The Sino-Himalayan and Sino-Japanese regions support the greatest numerical and morphological diversity, with secondary centres of diversity in Africa, Europe (including Macronesia), Hawai'i, and North America. *Dryopteris* in India is represented by 66 species and seven hybrids (Fraser-Jenkins 1989; Fraser-Jenkins et al. 2018), excluding the distinct Dryopteridaceous genera, *Peranema*, *Nothoperanema*, and *Dryopsis*, in contrast to a recent cladonomic oversimplification by Zhang (2012) and Zhang & Zhang (2012) artificially intended to avoid

paraphyly. Many species have been discovered recently in the eastern Indo-Himalaya that were previously only known from the main centre of distribution in southeastern Tibet and southwestern China. Of these, *Dryopteris lunanensis* (Christ) C.Chr., a distinctive species in Sect. *Hirtipedes*, was detailed from a single collection in Bhutan by Fraser-Jenkins (1989), now augmented by a second Bhutanese collection, but was not previously collected in India.

A misidentification of supposed *D. lunanensis* from India was made by S.R. Ghosh concerning a specimen from Ukhrul, Manipur (R.D. Dixit 58874, 24.2.1987, CAL), but the specimen was unequivocally reidentified by Fraser-Jenkins et al. (2018) as *D. scottii* Ching, a very different species.

The first author recently collected a specimen from Dibang Wildlife Sanctuary, Arunachal Pradesh. After critically observing its morphological characters, it was immediately identified as *D. lunanensis* by the second author from his familiarity with collections of the species in China and Bhutan. This is therefore the first authentic report of this species from India. Its taxonomy and distribution, along with photographs are provided here.

Editor: Anonymity requested.

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A second-step lectotype is also designated in the present article in accordance with its lectotypification by Fraser-Jenkins (1989) and the ICN (Turland et al. 2018).

Methods and Materials: During the field-survey in Dibang Wildlife Sanctuary of Arunachal Pradesh, a few specimens of an unusual *Dryopteris* were collected. The collected specimens were not immediately able to be identified and after preparation as herbarium-specimens were photographed and the photographs were sent to the second author, who identified them as *Dryopteris lunanensis* (Christ) C.Chr. The collection showed the typical long, sparsely scaly stipe with darkish brown scales, deeply lobed pinnae (to just over half way to the rachis on each side) with slightly narrowed bases, slightly falcate-deflexed lowest pinnae and aristate and slightly flabellate teeth at the lobe-apices (Ching 1938; Fraser-Jenkins 1989). The specimen was deposited in ARUN herbarium, Itanagar.

Dryopteris lunanensis (Christ) C.Chr., *Index Filic.*: 276. 1905.

Basionym: *Aspidium lunanense* Christ, *Bull. Herb. Boissier* 6: 966. 1898.

Type: (Lectotype (Fraser-Jenkins 1989), second-step, here designated): China, Yunnan, Lunan, A. Henry 10584, sin. date, P (P01514061 digital image!); Isolectotypes: BM (BM001066079 digital image!); K (K001080923 digital image!)

Synonyms: *Dryopteris paralunanensis* W.M.Chu ex S.G.Lu, *Guihaia* 11(3): 225. 1991.

Dryopteris semipinnata Ching, *Fl. Tsinling*. 2: 226. 1974.

Description: Plant up to 60 cm tall. Rhizome short, thick, erect, scaly at the apex. Fronds bipinnatifid, arching, stipe nearly as long as the lamina, 20–30 cm, brown at base, stramineous upwards, dorsally grooved, densely scaly at base with scales 8–15 × 0.5–1 mm, blackish-brown, basifixed, narrowly lanceolate, base broad, margin ciliate, apex attenuated, sparsely scaly, with shorter, narrower scales, upwards and on the rachis; rachis stramineous, ± sparsely scaly; lamina deltate-lanceolate, subcoriaceous or slightly crispaceous, 25–30 × 10–15 cm; pinnae pinnatifid, lobed up to 2/3 towards costa or more, lanceolate, alternate, sessile to sub-sessile, apex acute to acuminate, 12–15 × 2–2.5 cm, characteristically narrowed at their bases; costae stramineous, sparsely scaly with small fibrils or hair-like scales, dorsally grooved; pinna-lobes with entire margins and rounded, acutely dentate apices, the teeth abruptly narrowed to their apices and slightly flabellate; veins simple, free. Sori indusiate, round, median, in two

rows, one on each side of the midvein; indusia reniform, c. 0.5 mm in diameter.

Habitat: A terrestrial species, occurring at approximately 1,900 m altitude, in forest on slopes by streams.

Distribution: India (Arunachal Pradesh); Bhutan, China (Yunnan, Kweichow, Szechuan, Hunan, Kansu), Tibet, Japan. Its long-known presence in Bhutan was mistakenly omitted by Wu et al. (2013) in the Flora of China.

Specimen examined: India, Arunachal Pradesh, Dibang Valley District, Dibang Wildlife Sanctuary, slope above streams in forest, c. 1900 m, C. Chanda 42060, 23.xi.2018, ARUN.

Conservation status: CR (Critically Endangered and known only from a single collection in India). Despite extensive collection by pteridologists in Arunachal Pradesh and elsewhere in northeastern India this distinctive and easily recognisable species has only been found as a single small group of a few individual plants in one locality.

Note: This species is rare and restricted in distribution throughout all parts of its range and is to be considered as globally threatened. It has only been collected twice before in the Indian subcontinent, both from west-central Bhutan (Punakha Dzongkhag, Tinlegang to Gon Chungnang, c. 1,700 m, H. Kanai, G. Murata, H. Ohashi, O. Tanaka & T. Yamazaki 14832, 5.v.1967 (BM, TI, KYO) and Wangdue Phodrang Dzongkhag, Pho Chu, north-east of Kewa Nang, evergreen Quercus forest on steep E-facing rock slope, undisturbed, 2,350 m, S. Miehe & D.B. Gurung 00-459-12, 10.xii.2000 (UC), det. CRFJ) (Fraser-Jenkins 1989 and in prep., re Bhutan). The present collection from India was made from an isolated group of only three individuals in a small area.

Nomenclatural Notes: Christ (1898) described *Aspidium lunanense* Christ on the basis of a specimen collected from Lunan (the “stone forest”), in Yunnan Province, China, A. Henry 10584. Christ mentioned in the first part of his paper that it concerned the collections of Augustine Henry from the Meng-tse (or Mong Tseu., now Mengzi) semi-autonomous area in southeastern Yunnan Province, situated south of Kunming and east of central Myanmar, north of Vietnam.

Referring to website data-bases, we found three specimens in BM, K and P (1 in each) and Fraser-Jenkins (1989) had also found a second specimen in P with the same details as provided in the protologue of *A. lunanense*. The specimens in K and P are well preserved and exhibit all the characters required for identification, while the specimen housed in BM

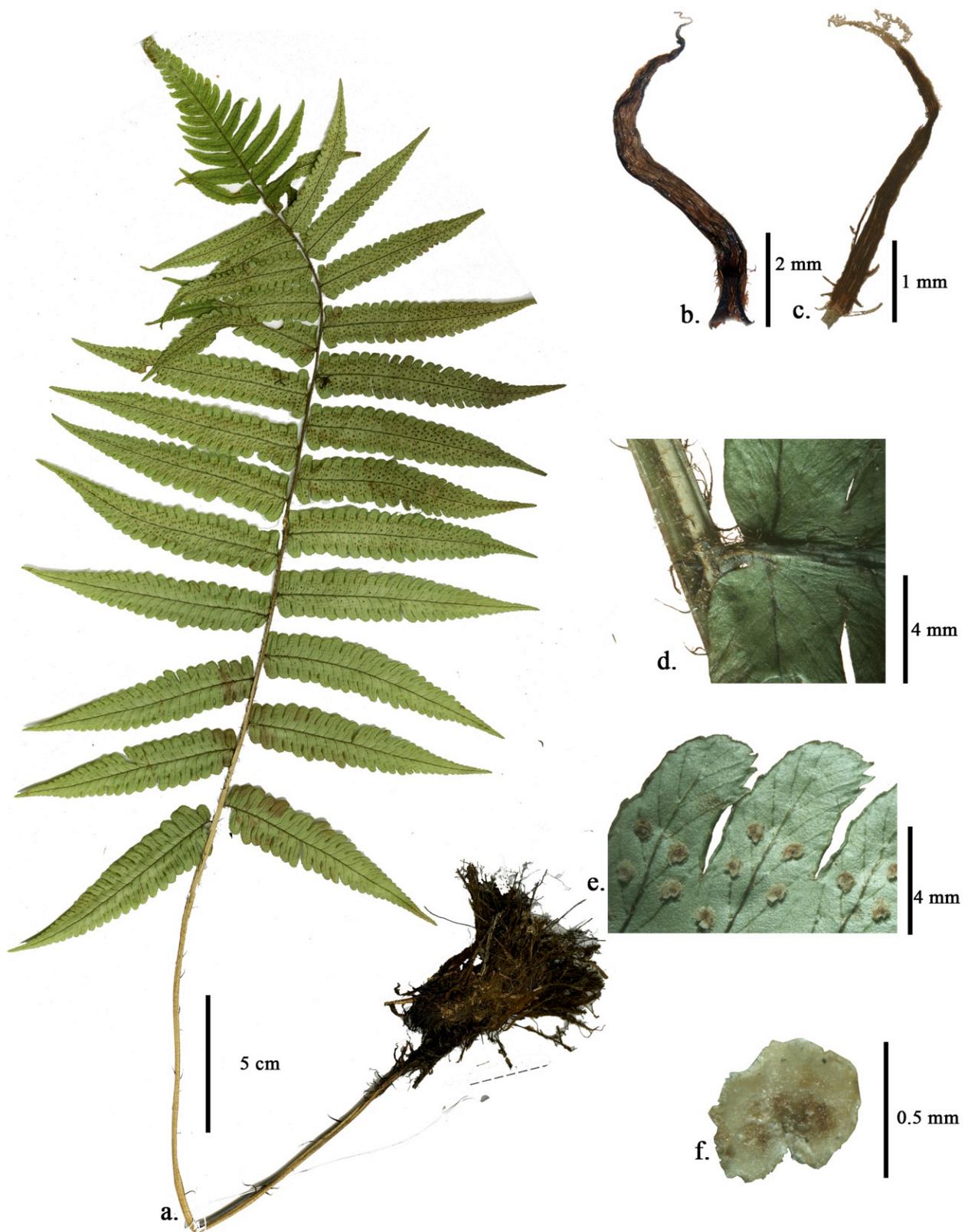


Image 1. Habit and different parts of *Dryopteris lunanensis* (Christ) C.Chr. (photographs prepared from C. Chanda 42060, ARUN): a—Habit of the plant | b—Rhizome scale | c—Rachial scale | d—Barching point showing rachial scales | e—Venation and sori arrangement | f—Indusium. © Chhandam Chanda.

has original circumscription copied and written by Christensen, but is only a single pinna taken by him from the Paris material and forming part of Christensen's comprehensive type-fragment herbarium. The sheet at P, barcoded as P01514061 (digital image!), bears original data by Henry and "Aspidium lunanense n. sp. [species nova]" in Christ's handwriting. We designate this sheet as a second-step lectotype.

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