

## *Polystichum hubeiense* (Dryopteridaceae), a new fern species from Hubei, China

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A new fern species, *Polystichum hubeiense* Liang Zhang & Li Bing Zhang (Dryopteridaceae), is described and illustrated from limestone cliffs in western Hubei Province, China. *Polystichum hubeiense* is most similar to *P. lanceolatum* in having relatively small leaves and pinnae and similar pairs of pinnae per lamina. The new species is distinguished by having overlapping and papery pinnae that are dull adaxially and repand on the margin, while *P. lanceolatum* has contiguous and leathery pinnae that are lustrous adaxially and dentate and with hard spines on the margin.

In the summer of 2010, Liang Zhang and Zhang-Ming Zhu conducted fieldwork in Shennongjia, western Hubei, China, to search for samples of *Polystichum neoliui* (Jiang *et al.* 2000) for an ongoing project on *Polystichum*. On the first day of the fieldwork, around Muyu town they came across a species of *Polystichum* growing on limestone cliffs. The species was then collected, photographed and its photos and specimens were examined by Li-Bing Zhang. After comparative morphological and molecular investigation, we concluded that the species was unknown to science and it is described herein. No material of *P. neoliui* was found during the trip.

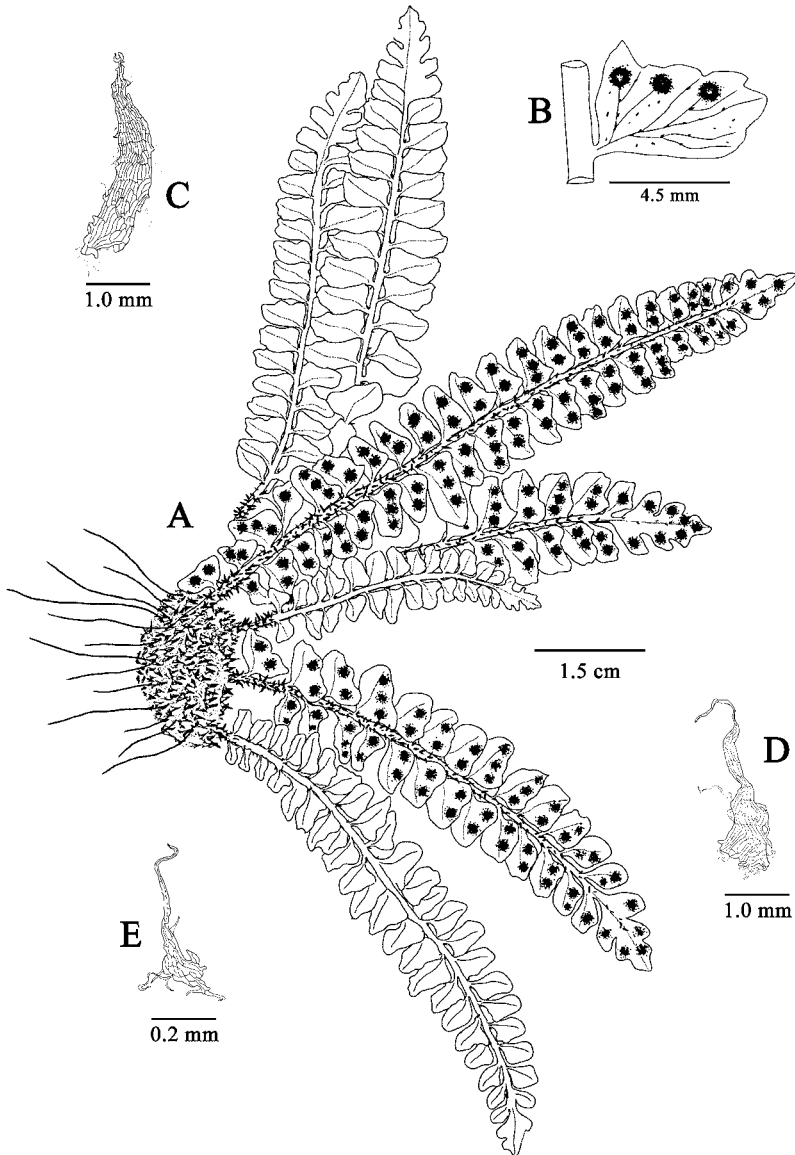
***Polystichum hubeiense* Liang Zhang & Li Bing Zhang, sp. nova** (Figs. 1 and 2).

TYPE: China. Hubei, Shennongjia prefecture, Muyu Town, Tongmu village, 31°27'14.21"N, 110°24'46.89"E, 1157 m,

limestone cliffs, 7 Sep. 2010 *Liang Zhang & Zhang-Ming Zhu 1044* (holotype CDBI; isotypes CDBI, MO).

ETYMOLOGY: The epithet is taken from the Chinese pinyin, Hubei, the name of a province in central China, and the Latin suffix '-ense', referring to the type locality and known distribution of the new species.

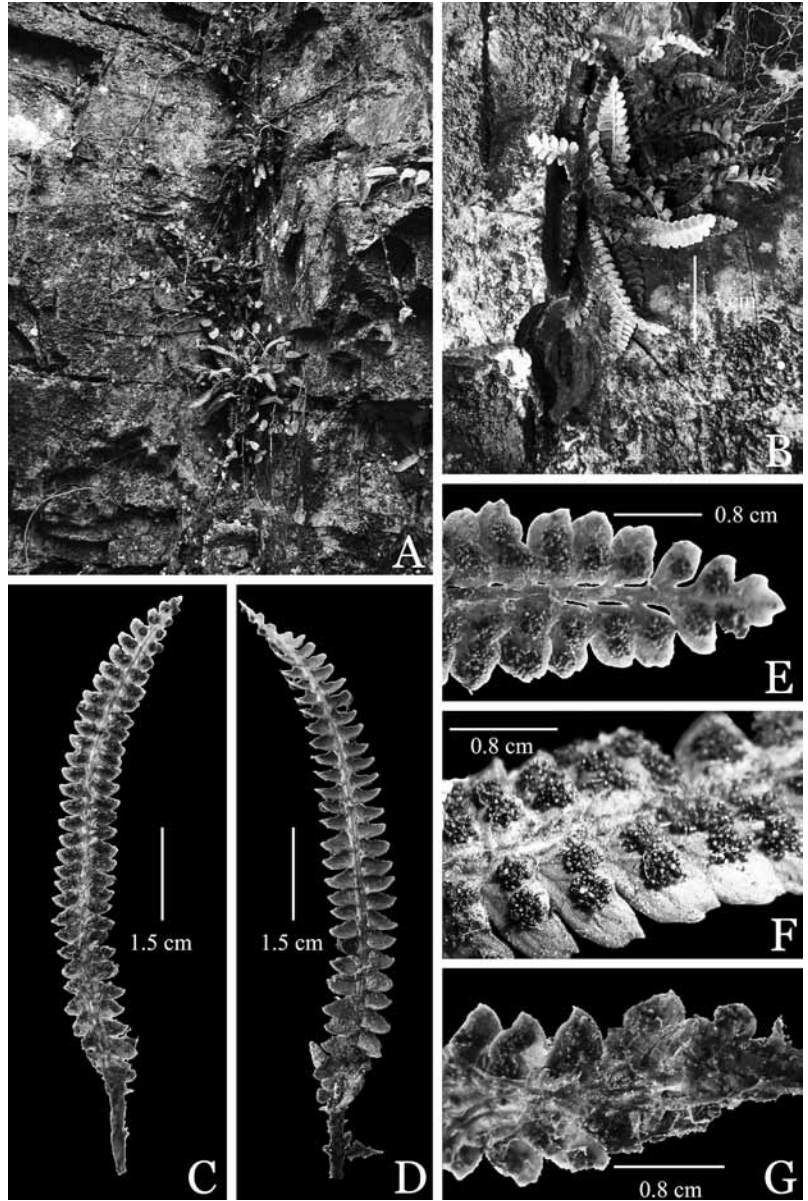
Plants perennial, caespitose, evergreen, (2–)5–9(–11) cm tall; rhizome short, 0.5–1 cm, ca. 6 mm diam., ascending, scaly; scales deltoid-ovate or broadly lanceolate, concolorous, apex acuminate, basal margins ciliate, chartaceous, 1.15–2.65 × 0.50–1.19 mm, cells narrowly linear, brown; roots dull brown when dry, up to 10 cm long, ca. 0.5 mm diam., nearly glabrous or covered with short lanate hairs. Leaves 8 to 18 per rhizome, appressed to substrate or slightly ascending. Petiole green, (0.41–)1.11–2.04 cm long, 0.51–0.95 mm diam. at mid-portion, adaxially canaliculate, densely scaly; petiole scales similar to rhizome scales, 1.16–2.64 × 0.47–



**Fig. 1.** *Polystichum hubeiense* (drawn by Liang Zhang from the holotype). — **A:** Habit. — **B:** Portion of rachis showing pinna. — **C:** Petiole scale. — **D:** Rachis scale. — **E:** Microscale.

1.15 mm, brown, concolorous, apex caudate, margins nearly entire and with a few irregular outgrowths. Lamina lanceolate, 1-pinnate, contracted toward base from below middle of lamina, (2.87–)6.16–8.55 × 0.67–0.99 cm, apex acute or rounded; rachis sulcate adaxially, 0.46–0.77 mm diam. at mid-portion, without proliferous bulbils, green (same color as pinnae) when fresh, turning brown when dry; basal rachis densely scaly, scales 1.04–2.41 × 0.39–1.06 mm, narrowly ovate to lanceolate, differing in size, membranaceous, light brown, margins occasion-

ally ciliate, apex caudate, distal rachis scales sparser and narrower. Pinnae in (8–)12–29 pairs, oblong, (2.75–)3.79–4.84 × (1.87–)3.33–3.79 mm, basalmost pairs nearly 1/2 to 2/3 as long as middle ones, papery, shortly petiolate, petiolules ca. 1.3 mm, alternate, apex acute or slightly rounded, acroscopic margins repand, distal acroscopic margins shallowly undulate, undulations 1–3, ca. 0.2 mm tall in middle and non-mucronate, basicopic margins truncate and entire, at angles of 90° to 120° with rachis, acroscopic base auriculate, auricles deltate, 0.86–1.56



**Fig. 2.** *Polystichum hubeiense*. — **A:** Habitat of the population. — **B:** Plant habit. — **C:** Abaxial lamina. — **D:** Adaxial lamina. — **E:** Abaxial view of upper portion of lamina. — **F:** Abaxial view of middle portion of lamina. — **G:** Abaxial view of basal portion of lamina.

$\times 0.9$ – $1.83$  mm; adaxial surface green when fresh, dull green when dry, almost glabrous, abaxial surface sparsely covered with microscales; microscales narrowly lanceolate with dilated base, brown,  $0.51$ – $1.02$  mm long,  $0.13$ – $0.19$  mm wide at base; venation pinnate, visible abaxially and slightly obscure adaxially, midrib slightly raised abaxially; lateral veins free, single or forked, each lateral vein further forked; whole lamina fertile. Sori terminal on veinlets, 2 to 3 per fertile pinna, often only located on acroscopic side, overlap-

ping, larger when mature,  $0.69$ – $1.72$  mm diam., close to pinna margins (centers of sori  $0.61$ – $0.79$  mm from pinna margins,  $0.72$ – $0.83$  mm from midrib); indusia round, peltate,  $0.61$ – $1.47$  mm in diam., membranous, brown, margins irregularly lacerated, fallen off early.

**DISTRIBUTION AND HABITAT:** *Polystichum hubeiense* is known only from the type locality in the Shennongjia prefecture, western Hubei. Shennongjia is a part of Daba Shan, which is famous for the occurrence of the golden monkey, *Rhino-*

*pithecius roxellana* (Cercopitheciidae). This region is known for the largest natural vegetation in central China. *Polystichum hubeiense* was growing on limestone cliffs surrounded by acidic soils in a small bamboo forest, moist and steep, at the elevation of 1157 m a.s.l. The plants were observed 0.5–2.3 m above the ground. Around the bamboo forest there was secondary vegetation.

Plants growing in the vicinity of *P. hubeiense* included, *Lemmaphyllum microphyllum* (Polypodiaceae), and a *Ficus* sp. (Moraceae). Other plants growing within 10 m included *Anemone hupehensis* (Ranunculaceae), *Corchoropsis crenata* (Tiliaceae), *Laportea* sp. (Urticaceae), *Phtheirospermum japonicum* (Scrophulariaceae), *Phyllostachys* sp. (Poaceae), *Sedum lineare* (Crassulaceae), and *Spatholirion longifolium* (Commelinaceae), *Coniogramme wilsonii* (Pteridaceae), *Dryopteris varia* (Dryopteridaceae), *Pteris cretica*, and *P. vittata* (Pteridaceae).

TAXONOMIC NOTES: As with many other species of *Polystichum* recently described (e.g., Zhang & He 2010, 2012, Zhang et al. 2010, He & Zhang 2011), it was almost impossible to relate *Polystichum hubeiense* to any other species described. We, therefore, conducted a molecular analysis based on DNA sequences of the *trnL-F* intergenic spacer. It showed that *P. hubeiense* is most closely related with *P. lanceolatum*, a species that occurs in Guizhou, Hubei, Hunan, Jiangxi, and Sichuan in China (Zhang & Barrington 2013). Indeed, the two species share similar small leaves and pinnae. Also, the two species have similar pairs of pinnae per lamina. They co-occur in Shennongjia, western Hubei, although they were not observed to grow together. However, the two species are easily distinguishable from each other. *Polystichum hubeiense* has oblong pinnae that are overlapping, papery, dull adaxially, and repand on the margin, while *P. lanceolatum* has deltate to oblong pinnae that are contiguous, leathery, lustrous adaxially, and dentate and with hard

spines on the margin. *Polystichum hubeiense* has same leaf texture as *P. liui* from Chongqing, Guizhou and Hunan (Zhang & Barrington 2013), but the latter has pinnae that are contiguous and dentate and with hard spines on the margin. An additional species, *P. neoliui*, has been described from Shennongjia area (Jiang et al. 2000). *Polystichum neoliui*, however, is a heterotypic synonym of *P. lanceolatum* (Zhang & Barrington 2013).

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