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Three new species of *Polystichum* (Dryopteridaceae) from China

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Аннотация. Three new species of *Polystichum* (Dryopteridaceae), *P. paramartini* R. H. Jiang et X. C. Zhang, *P. sublanceolatum* R. H. Jiang et X. C. Zhang, and *P. venosum* R. H. Jiang et X. C. Zhang, are described and illustrated. They are all from the limestone mountains in South and Southwest China. The first two species are found in limestone caves while the third one occurs on limestone mountain slopes. Detailed descriptions, line drawings, ecological preferences, conservation status are provided.

Три новых вида *Polystichum* (Dryopteridaceae) из Китая

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Summary. Сообщается о трех новых для науки видах *Polystichum* (Dryopteridaceae) – *P. paramartini* R. H. Jiang et X. C. Zhang, *P. sublanceolatum* R. H. Jiang et X. C. Zhang и *P. venosum* R. H. Jiang et X. C. Zhang, найденных в карстовых горных районах на юго-западе Китая. Первые два вида встречаются в известняковых пещерах, а последний – в известняковых горах. Приводятся подробные морфологические описания, изображения, экологическая приуроченность, охранный статус, а также даны сравнительные характеристики с близкородственными видами.

Introduction

South and Southwest China (Yunnan, Guizhou, and Guangxi Provinces) has the most extensive and continuous karst formations at the same latitude worldwide. Because of the complex ecological environment and special geographical conditions, it harbors many endemics and plants of ancient origin.

The karst region of South and Southwest China is one of the biodiversity hotspots in China and harbors many unique and endangered plants. Limestone mountains are rich in *Polystichum* Roth species, and new species were continuously discovered in the past decades (Zhou et al., 1996; Kung et al., 2001; Zhang, He, 2009; Jiang, 2013; Zhang, Barrington, 2013). In the present paper, three new species of

Polystichum were described and illustrated from the karst mountains of South and Southwest China.

Morphological studies

Herbarium specimens of *Polystichum* preserved in CDBI, IBK, IBSC, K, KUN, P, and PE were observed. Herbarium acronyms follow Index Herbariorum (Thiers 2022). IUCN Red List categories and criteria (IUCN, 2022) were followed for conservation assessment.

Taxonomic treatment

Polystichum paramartini R. H. Jiang et X. C. Zhang, **sp. nov.** Qian Zhong Er Jue (Fig. 1).

Diagnosis. *Polystichum paramartini* is similar to *P. martini* Christ and *P. cuneatiforme* W. M. Chu et Z. R. He in shape and size of pinnae. It differs from *P. martini* by its fronds being 2-pinnate-pinnatifid, laminae sub-coriaceous, margin of scale erose, and margin of indusium erose; it differs from *P. cuneatiforme* by elliptic-lanceolate to oblong-lanceolate fronds, laminae sub-coriaceous, narrowed toward base; lamina scales vermiform, margin erose; margin of indusium erose.

Holotype: “China, Guizhou Province, Ziyun County, Houchang Town, Kezuo Village, in karst cave, 975 m. 16 VI 2012. S. Huang 2019” (IBK).

Description. Plant perennial, evergreen. Rhizome erect, 0.8–1.4 cm in diam., covered with scales; scales brown, broad ovate-lanceolate, ca. 6 × 1.5 mm, membranous, margin erose, apex caudate. Fronds cespitose; stipes 4–15 cm long, 1.2–1.5 mm in diam. at base, stramineous, adaxially canaliculate; scales at base of stipe broad ovate-lanceolate, membranaceous, 4.5–6 × 1.0–1.5 mm, margin erose, apex caudate; distal stipe scales sparse, similar to basal stipe scales but smaller. Lamina elliptic-lanceolate to oblong-lanceolate, narrowed toward base, 2-pinnate-pinnatifid, 5–14 cm long, 2–4 cm wide at middle, 1.4–3.2 cm wide at base, apex acuminate, sub-coriaceous, adaxially glabrous, abaxially scaly, scales brown, vermiculiform, margin erose; rachis stramineous, adaxially canaliculate, covered with scales, scales ovate-lanceolate, membranaceous, margin erose, apex acuminate. Pinnae 7–16 pairs, short stalked, alternate, oblique ovate, apex acute, attached at 55–70° to rachis, acroscopic base nearly parallel to rachis, basiscopic base cuneate. Pinnules and lobes 6–15 pairs, adjacent to one another or imbricate, basal pinnules largest, obovate, base cuneate, apex obtuse with 2–6 lobes; lobes acute, 1–4

mm long, adaxially glabrous, abaxially sparsely scaly; microscales brown, ovate-lanceolate, membranous, margin erose; fronds sub-coriaceous; veins pinnate, indistinct. Sori terminal on veins, close to margin of pinna; indusia peltate, membranaceous, brown, margin erose.

Distribution and ecology. *Polystichum paramartini* is known from a single location in a karst cave in Ziyun County, Guizhou Province, China. The population has about 210 individuals.

Conservation status: Based on its small population size and narrow distribution, *P. paramartini* should be classified as CR (critically endangered) following the IUCN guidelines (IUCN, 2022).

Polystichum sublancoelatum R. H. Jiang et X. C. Zhang, **sp. nov.** Jin Liang Ye Er Jue (Fig. 2).

Diagnosis. *Polystichum sublancoelatum* R. H. Jiang et X. C. Zhang is similar to *Polystichum lanceolatum* (Baker) Diels but differs by its broad lanceolate lamina narrowed toward base, apex pinnatifid to pinnatifid; pinnae imbricate, oblong, apex truncate, with 3–5 teeth, adaxially glabrous, abaxially sparse scaly, scales lanceolate, brown; sori close to pinna margin, about 5 sori on each fertile pinna.

Holotype: “China, Guangxi Province, Quanzhou County, Shuicheng Village, in limestone area, 250 m. 11 IX 2013. R. H. Jiang et al. JRH7851” (IBK).

Description. Plant evergreen. Rhizome erect, 3–8 mm in diam. including stipe base, apex of rhizome and bases of stipe scaly; scales reddish brown, ovate-lanceolate, to 5 mm long, membranous, sparsely toothed, acuminate. Fronds cespitose; stipe stramineous, 5–15 mm long, 0.3–0.5 mm in diam., sparsely scaly, scales varying in size, brown, ovate-lanceolate to narrowly lanceolate, papery, margin sparsely dentate. Lamina 1-pinnate, broad lanceolate, 3–6 × 1–1.5 cm at middle, narrowed toward base, apex pinnatifid to pinnatifid, short acuminate; rachis stramineous, without proliferous bulbils, abaxially sparsely scaly; scales reddish brown, lanceolate, membranous, sparsely toothed. Pinnae 15–25 pairs, alternate or nearly opposite, attached at right angles to rachis or slightly ascending, imbricate, short stalked, nearly oblong, apex truncate, with 3–5 teeth, base asymmetrical, acroscopic slightly auriculate, auricles parallel to rachis, margin with 2 or 3 teeth, basiscopic cuneate, entire; Lamina papery; veins visible on both surfaces, pinnate, lateral veins reaching tips of teeth. Sori terminal, on veinlets close to margin of pinna, about

5 sori on each fertile pinna; indusia dark brown, entire.

Distribution and ecology. *Polystichum sublanceolatum* was found in a karst cave in Shuicheng village, Quanzhou, Guangxi, China.

Conservation Assessments: Only one population with ca. 80 individuals is known. Fortunately, this cave is far from the nearest residential area and not easily accessible, and therefore less susceptible to human interference.

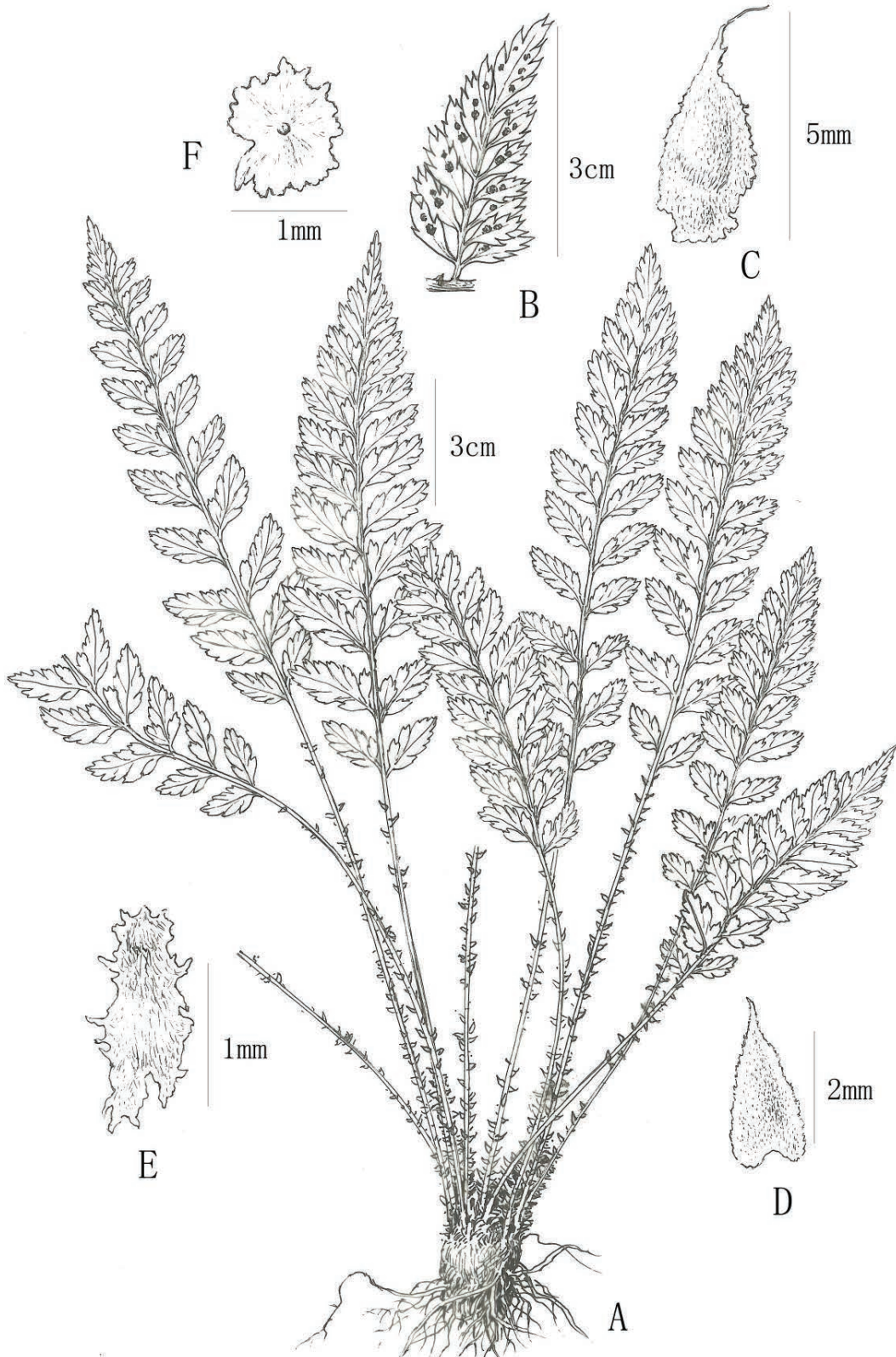


Fig. 1. *Polystichum paramartini* R. H. Jiang et X. C. Zhang, sp. nov.

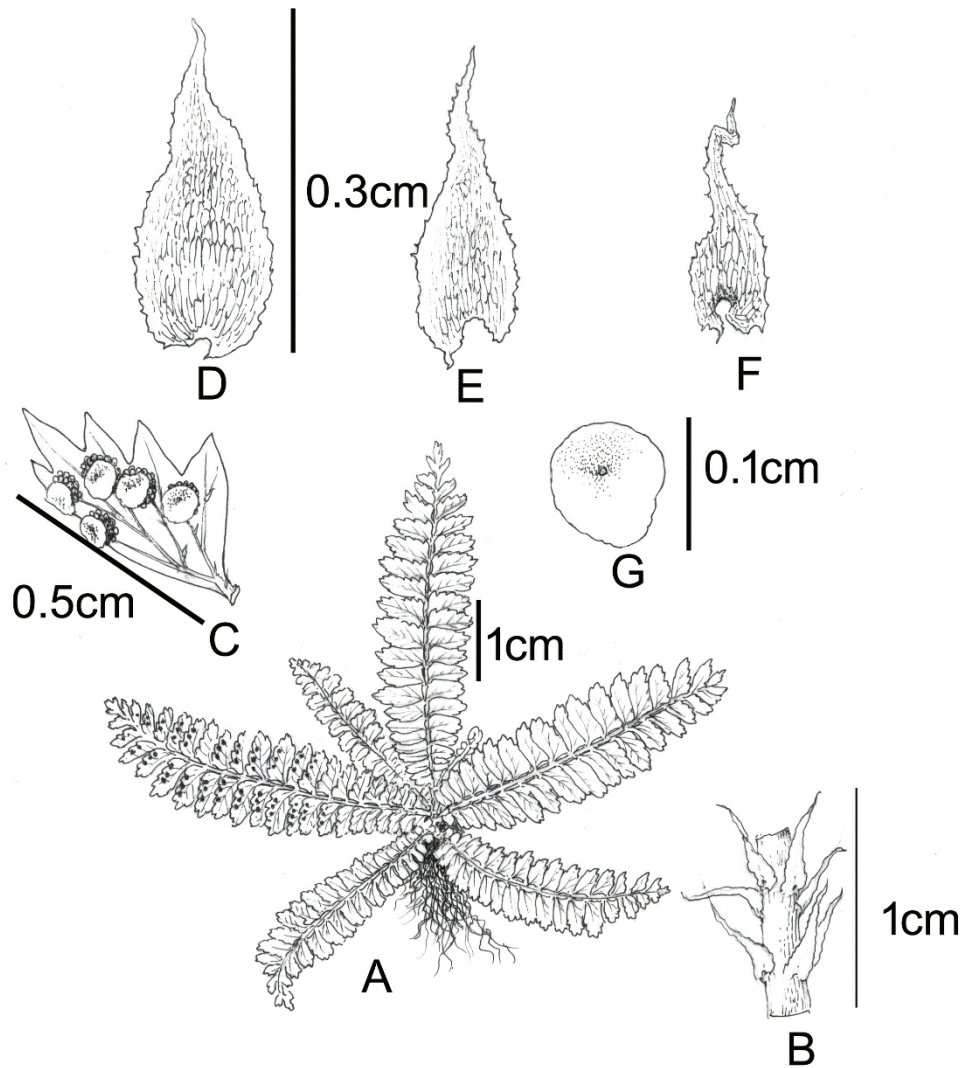


Fig. 2. *Polystichum sublanceolatum* R. H. Jiang et X. C. Zhang, sp. nov.

Polystichum venosum R. H. Jiang et X. C. Zhang, sp. nov. Xian Mai Er Jue (Fig. 3).

Diagnosis. *Polystichum venosum* R. H. Jiang et X. C. Zhang is similar to *P. peishanii* L. B. Zhang et H. He and *P. guangxiense* W. M. Chu et H. G. Zhou but differs by its lanceolate, entire rhizome scales, pinnae 35–60 pairs; indusium entire.

Holotype: “China, Guangxi Province, Huangjiang County, Chuanshan Town, Mingli Village, 25°6′47″N, 107°57′33″E, on limestone mountain, 700 m. 19 IV 2012. R. H. Jiang et al. 11340” (IBK, iso – IBK).

Description. Plant perennial, evergreen, 35–60 cm tall. Rhizome erect, densely scaly; scales lanceolate, membranaceous, dark brown, 4–6 mm long, 1 mm broad, margin entire, apex acuminate. Fronds cespitose; stipes 9–16 cm long, 1–3 mm in diam., stramineous, adaxially canaliculate; densely scaly; scales on base of stipe narrow lanceolate,

membranaceous, dark brown, 4 mm long, 0.5 mm broad, margin entire, apex caudate. Lamina linear-lanceolate, 18–35 cm long, 3.2–4.5 cm broad, base slightly contracted, apex acuminate, 1-pinnate; rachis stramineous, covered with scales, scales narrow lanceolate to sublinear, membranaceous, dark brown, 3 mm long, 0.1 mm broad, margin entire, apex fibriform. Pinnae 35–60 pairs, coriaceous, dull green, alternate and subopposite, imbricate, sub-explanate, attached at 80–105° to rachis, short petiolate, rhomboidal to trapeziform, 1.5–2.4 cm long, 0.7–0.9 cm wide at middle, base asymmetric, acroscopic base auriculate, margin dentate, basisopic base truncate and forming a 45–80° angle with rachis, margin dentate, apex obtuse, adaxially lustrous and glabrous, abaxial surface scaly, scales linear, filiform; veins pinnate, abaxially raised, distinct, adaxially indistinct; sori terminal on

veins of distal pinnae, close to pinna margin; indusia peltate, 0.7–1.6 mm in diam., membranaceous, margin entire.

Distribution and ecology. *Polystichum venosum* is only known from Mingli village in Mulun National Nature Reserve, Guangxi, China; on limestone mountains.

Conservation status: Two populations of *Polystichum venosum* were found in the core area of Mulun National Nature Reserve, with about 220 individuals. According to the IUCN criteria (IUCN, 2022), *P. venosum* is considered as an endangered (EN) species.

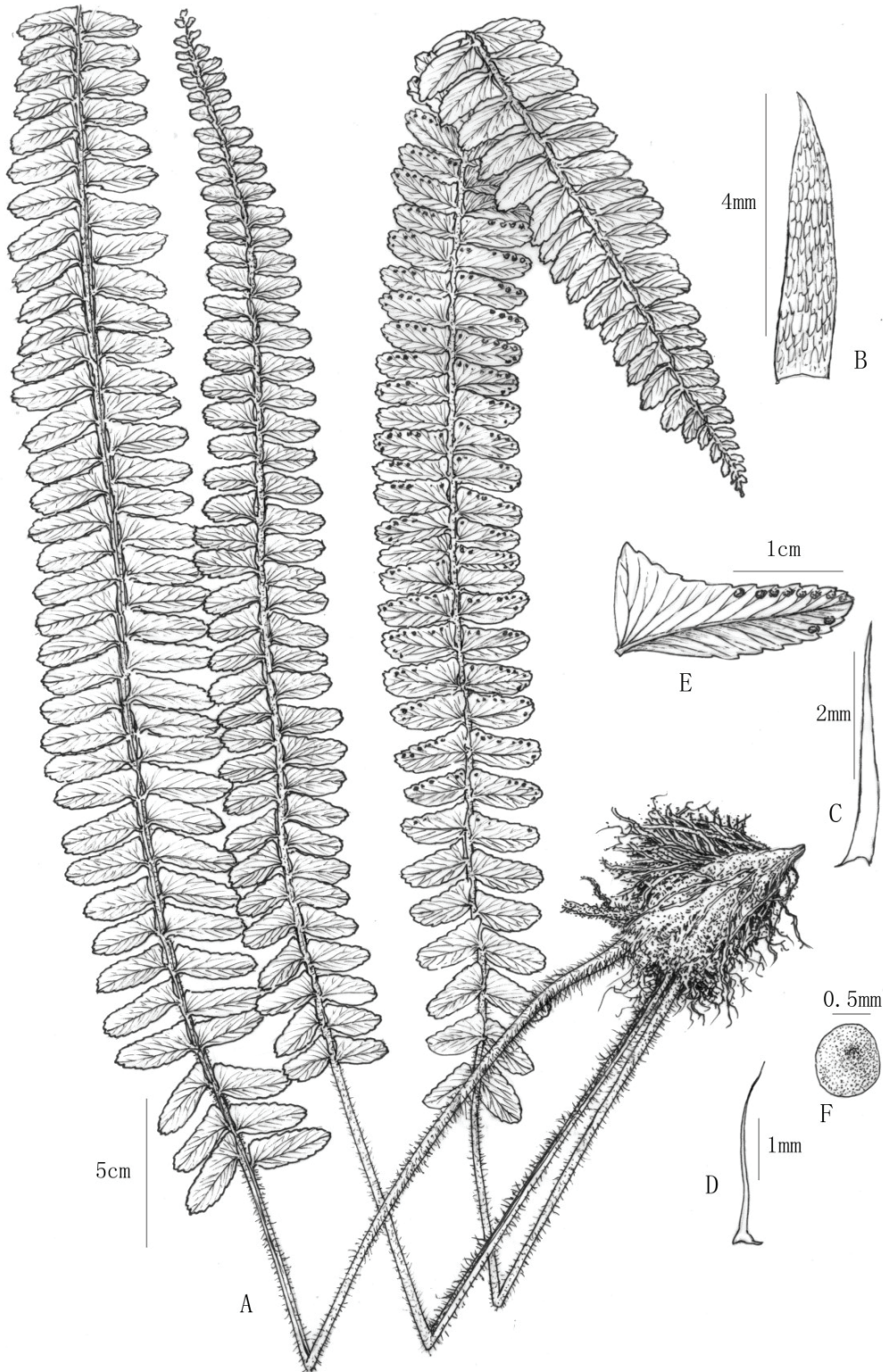


Fig. 3. *Polystichum venosum* R. H. Jiang et X. C. Zhang, sp. nov.

Paratypes: “China, Guangxi: Huangjiang County, Chuanshan Town, Mingli Village, 25°6′46″N, 107°57′34″E, in limestone area, 700 m. 19 IV 2012. R. H. Jiang et al. 11336” (IBK); “China, Guangxi: Huangjiang County, Chuanshan Town, Mingli Village, 25°6′47″N, 107°57′32″E, in limestone area, 690 m. 19 IV 2012. R. H. Jiang et al. 11281” (IBK).

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