

***EPIMEDIUM JINFOSHANENSIS* (BERBERIDACEAE), A NEW SPECIES FROM CHONGQING, CHINA**

**YOU-WEI ZUO¹, SHU-XIANG WANG², XIA WANG³, HONG-PING DENG^{1*},
XING-YUN LV¹ AND CHANG-YING XIA¹**

¹Chongqing Key Laboratory of Plant Resource Conservation and Germplasm Innovation, Institute of Resources Botany, School of Life Sciences, Southwest University, 400715, Beibei, Chongqing, China

²Nature Reserve and Wildlife Protection Management Division, Chongqing Forestry Bureau, 401147, Yubei, Chongqing, China

³Chongqing Jinfoshan National Nature Reserve Management Service Center, Chongqing Forestry Bureau, 408499, Chongqing, China.

*Corresponding author's email: denghp@swu.edu.cn

Abstract

Epimedium jinfoshanensis H.P. Deng & Y.W. Zuo, sp. nov. from Nanchuan, Chongqing, China, is described, illustrated and compared with related species. *E. jinfoshanensis* appears to be related to *E. simplicifolium* and *E. acuminatum* due to the similar petals shape, but it can be easily distinguished by the leaf type and structure, inflorescence types, shape and size of sepals, petal color, structure of rhizome and phenological period.

Key words: Berberidaceae, *Epimedium jinfoshanensis*, Morphology, Jinfo mountain.

Introduction

The genus *Epimedium* L. (1753: 117), established by Linnaeus based on the type *E. alpinum* L. (1753: 117), is the largest and most morphologically diverse genus of the herbaceous Berberidaceae (Ying *et al.*, 2011). As currently circumscribed, the genus comprises more than 60 species, of which 52 taxa are endemic to China (Guo *et al.*, 2008, Ying, 2001, 2002). Furthermore, several new species of *Epimedium* from China have been published in recent years (He & Xu, 2003; Guo *et al.*, 2007; Zhang & Li, 2009; He *et al.*, 2010, Sheng & Tian, 2011; Zhang *et al.*, 2015; Zhang *et al.*, 2016; Wei *et al.*, 2017).

During field investigations in Chongqing Jinfo Mountain National Nature Reserve, we found an unusual isolated population of *Epimedium*, which differed substantially from all known species of *Epimedium*. Based on the review of the taxonomic literatures and the comparisons with herbarium materials, we comprehensively analyzed its morphological characters and confirmed it as a new species, *Epimedium jinfoshanensis* H.P. Deng & Y.W. Zuo.

Taxonomic treatment

Epimedium jinfoshanensis H.P. Deng & Y.W. Zuo *sp. nov.* (Figs. 1, 2 and 3)

Type: CHINA. Chongqing, Nanchuan district, Shanwangping town, Miaoba village, ca. 29°06'N, 107°22'E, ca. 942.3 m a.s.l., 26 March 2021, Y.W. Zuo & X.Y. LV NC2021032601 (holotype SWCTU00244497!).

Diagnosis: *Epimedium jinfoshanensis* was initially identified by us as *E. simplicifolium* (Ying 1975: 49) from Guizhou, China. After comparison with herbarium material, *E. jinfoshanensis* was found to be similar to both *E. simplicifolium* and *E. acuminatum* (Franchet 1886: 33) from Guizhou, China. A comparison of morphology of the three species is provided in (Table 1). *E. jinfoshanensis* can be distinguished from *E. simplicifolium* based on its leaf

structure (9-basinerved, base deeply cordate with lobes arrow-shaped, subequal, partially overlap vs. 7-basinerved, base deeply or shallowly cordate with lobes rounded, subequal, not-overlapping in *E. simplicifolium*), inflorescence (usually terminal cymes with 3 flowers vs. usually terminal panicle with 15-32 flowered in *E. simplicifolium*), shape and size of sepals (outer sepals 4, ovate; inner sepal, ovate-elliptic, 1/2 to 1/3 length of petals vs. outer sepals 4, obovate; inner sepals ovate, 1/3 to 1/4 length of petals in *E. simplicifolium*), and petal color (yellow-white vs. reddish purple in *E. simplicifolium*). In structure of rhizome, *E. jinfoshanensis* is compact and irregularly nodose, while *E. simplicifolium* is stout, short, sometimes long creeping and no nodose. In addition, the phenological period also exhibits obvious differences between *E. jinfoshanensis* with *E. simplicifolium*, as *E. jinfoshanensis* is flowering mid-March to early April, fruiting April to May, while flowering April to May, fruiting May to Jun in *E. simplicifolium*. *E. jinfoshanensis* can be distinguished from *E. acuminatum* by the type and structure of leaf (simple, 9-basinerved, base deeply cordate with lobes arrow-shaped, subequal, partial overlap vs. trifoliolate, 7-basinerved, base cordate, terminal leaflet with lobes rounded, equal, non-overlapping, lateral leaflets oblique with outer lobes large and rounded, inner lobes smaller and rounded in *E. acuminatum*), inflorescence types (usually terminal cymes with 3 flowers vs. usually panicle with 10-50-flowered in *E. acuminatum*), shape of sepals (outer sepals 4, ovate; inner sepal, ovate-elliptic vs. outer sepals 4, outer pair ovate-oblong, inner pair broadly obovate; inner sepals ovate-elliptic in *E. acuminatum*), and petal color (yellow-white vs. yellow, white, rose-purple or pale violet in *E. acuminatum*). In structure of rhizome, *E. jinfoshanensis* is compact and irregularly nodose, while *E. acuminatum* is stout, short, sometimes long creeping and not nodose. Lastly, the phenological period also exhibits obvious differences between *E. jinfoshanensis* and *E. acuminatum*, as *E. jinfoshanensis* is flowering mid-March to early April, fruiting April to May, while flowering April to May, fruiting May to June in *E. acuminatum*.

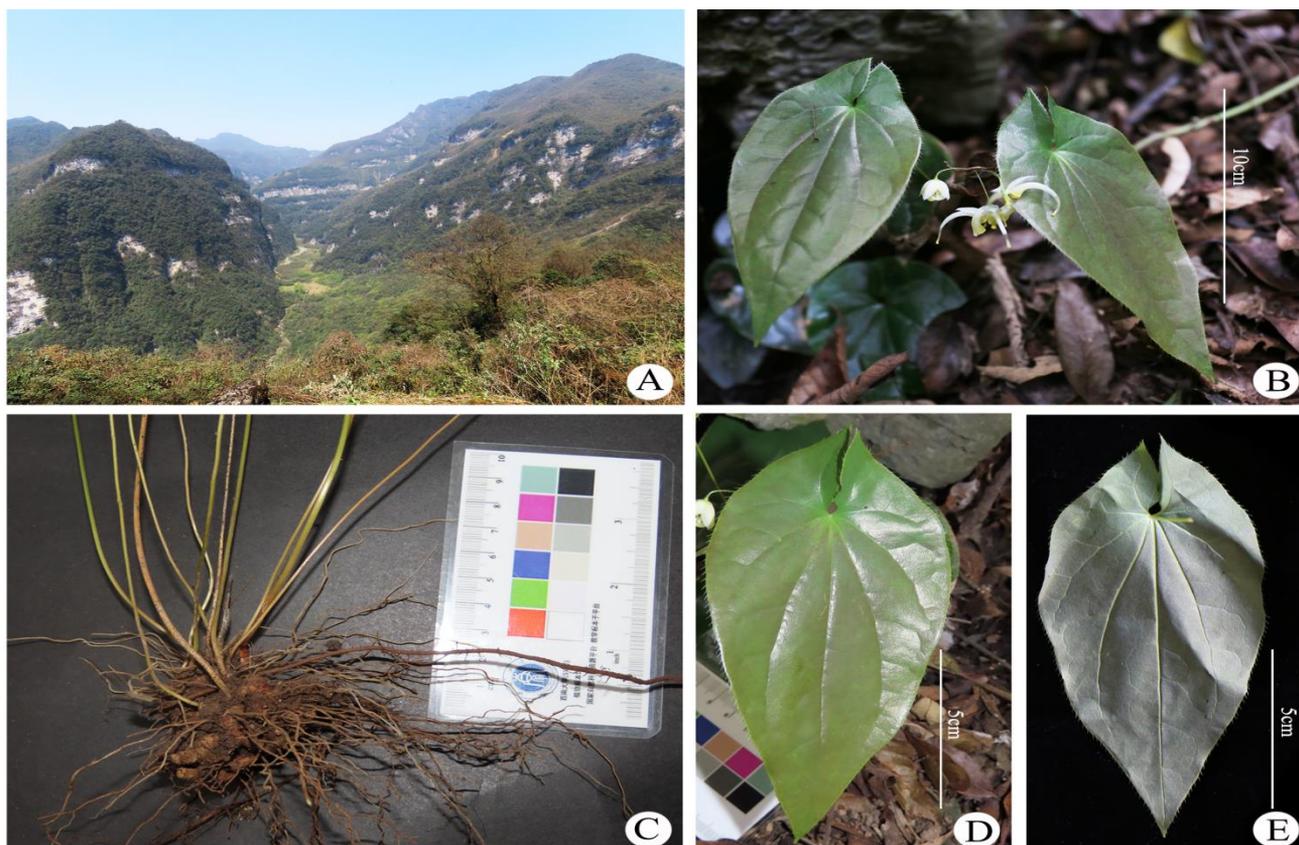


Fig. 1. *Epimedium jinfoshanensis* H.P. Deng & Y.W. Zuo, *sp. nov.* A. Habitat. B. Habit. C. Rhizome. D. Leaf (adaxial side). E. Leaf (abaxial side). (Photographs by You-Wei Zuo & Xing-Yun Lv).



Fig. 2. *Epimedium jinfoshanensis* H.P. Deng & Y.W. Zuo, *sp. nov.* A. Inflorescence (anterior view). B. Inflorescence (lateral view). C. Flower (underneath view). D. Flower (lateral view). E. Flower (top view). F. inner sepal, petal, stamen and gynoecium, lateral view. G. inner sepal. H. Stamen. (Photographs by You-Wei Zuo).

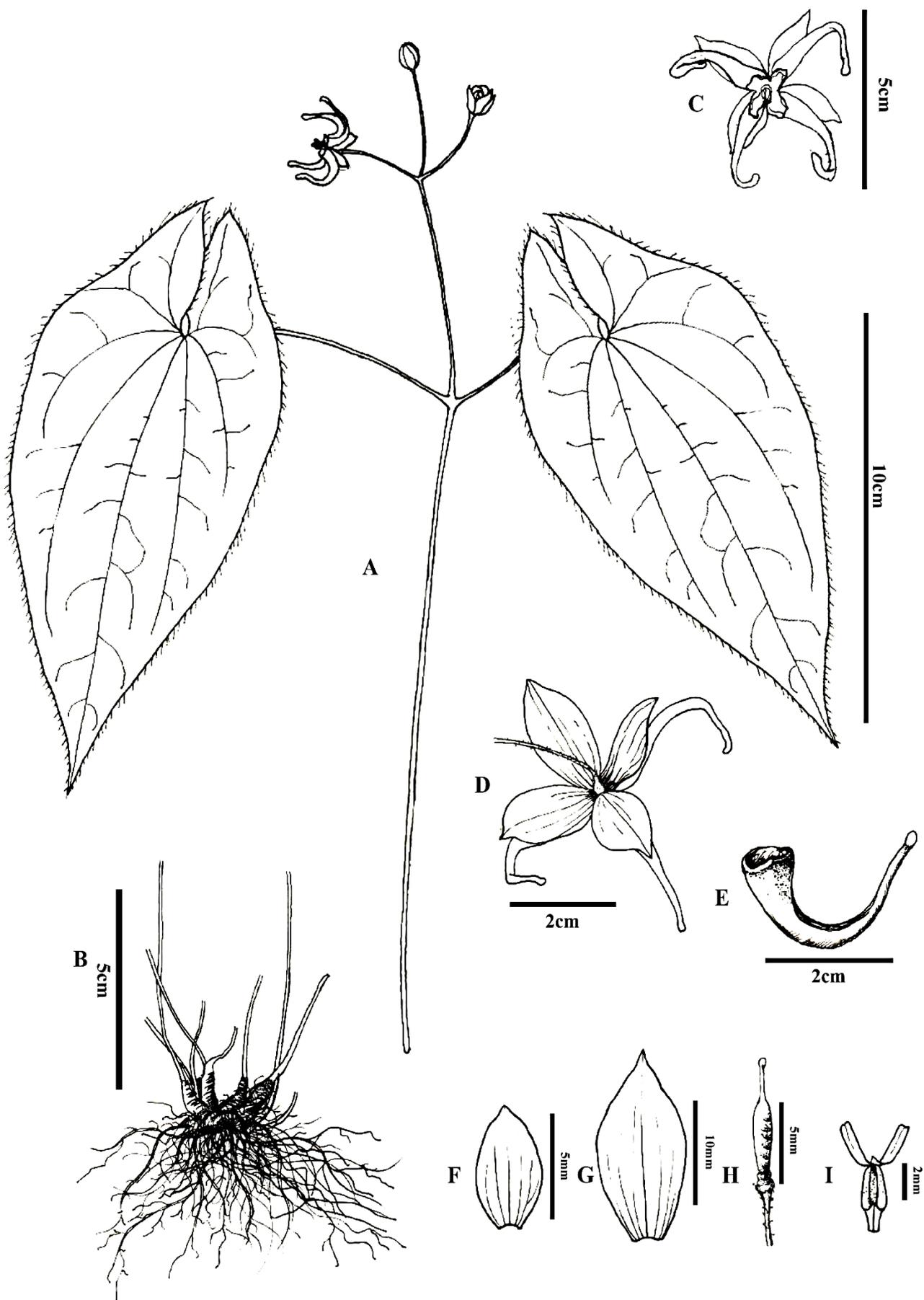
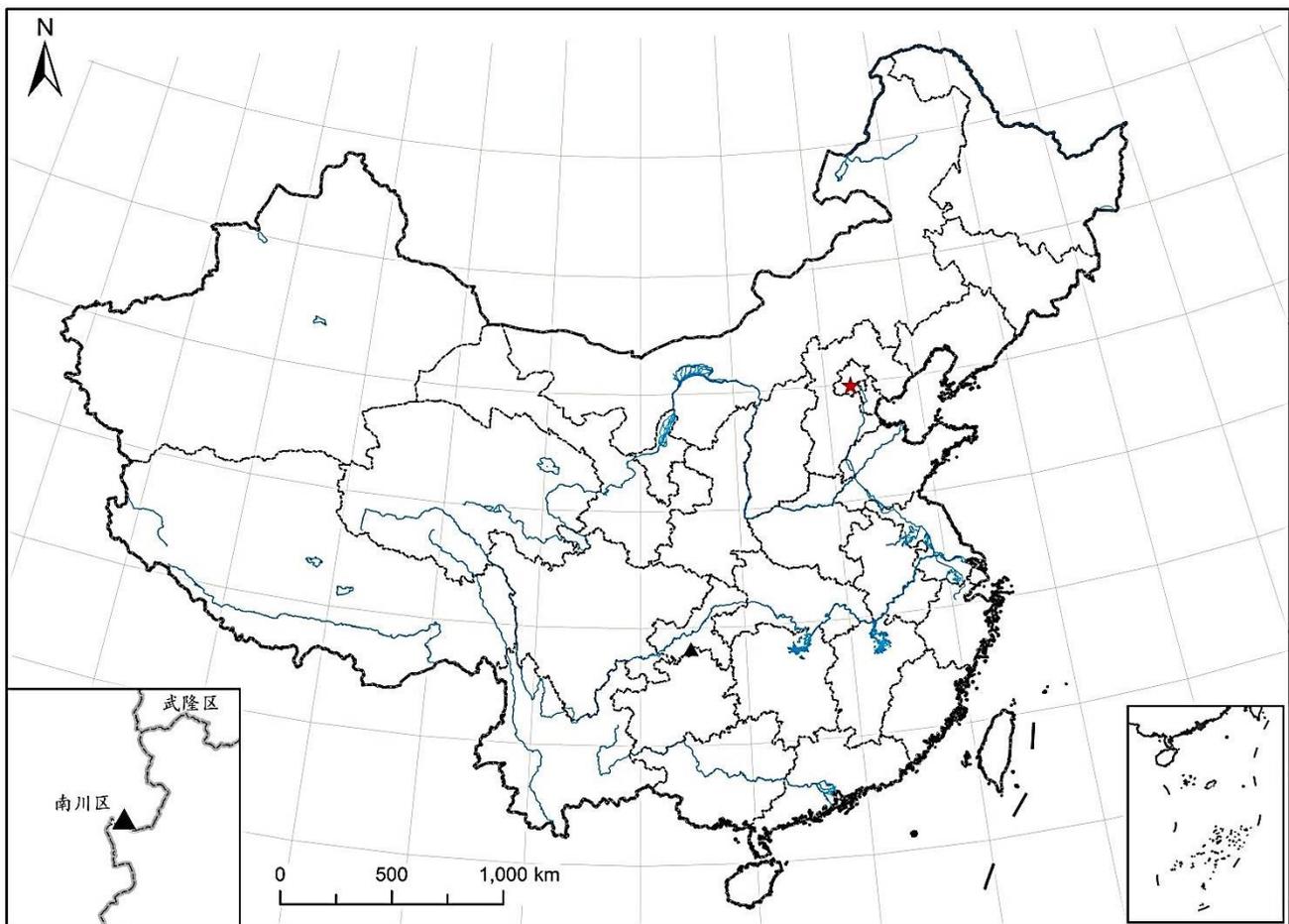


Fig. 3. *Epimedium jinfoshanensis*. A. Flowering stem with cauline leaves. B. Rhizome. C. Flower (underneath view). D. Flower (top view). E. Petal. F. Outer sepal. G. inner sepal. H. capsule. I. stamen. (Drawn from the type plant by Xiao-Shuang Zhang).

Table 1. Comparison of morphological characters of *Epimedium jinfoshanensis*, *E. simplicifolium* and *E. acuminatum*.

Characters	<i>E. jinfoshanensis</i>	<i>E. simplicifolium</i>	<i>E. acuminatum</i>
Rhizome	Compact, irregularly nodose	Stout, short, sometimes long creeping, not nodose	Stout, short, sometimes long creeping, not nodose
Flowering stem	With 2 opposite leaves	With 2 opposite leaves	With 2 trifoliolate opposite leaves, sometimes 3-whorled
Leaf type	Simple	Simple	Trifoliolate
Abaxial leaflet surface	Densely sericeous	Densely sericeous	Dense or sparse shortly appressed fairly stout bristles, sometimes nearly glabrous
Vein	9-basinerved	7-basinerved	7-basinerved
Leaf blade base shape	Base deeply cordate with lobes arrow-shaped, subequal, partial overlap	Base deeply or shallowly cordate with lobes rounded, subequal, non-overlapping	Base cordate, terminal leaflet with rounded lobes, equal, non-overlapping, lateral leaflets oblique with outer lobes large and rounded, inner lobes smaller and rounded
Inflorescence	Usually terminal cymes with 3 flowers	Usually terminal panicle with 15-32 flowered	Usually panicle with 10-50-flowered
Sepals	Outer sepals 4, ovate; inner sepal, ovate-elliptic, 1/2 to 1/3 length of petals	Outer sepals 4, obovate; inner sepals ovate, 1/3 to 1/4 length of petals	Outer sepals 4, outer pair ovate-oblong, inner pair broadly obovate; inner sepals ovate-elliptic, 1/2 to 1/3 length of petals
Petal color	Yellow-white	Reddish purple	Yellow, white, rose-purple or pale violet
Phenological period	fl. Mid-Mar. to early Apr., fr. Apr. to May.	fl. Apr. to May., fr. May. to Jun.	fl. Apr. to May., fr. May. to Jul.

Fig. 4. Distribution of *Epimedium jinfoshanensis* (▲).

Description: Herbs, perennial, 40-60 cm tall; stems erect, terete, fistulose, smooth, 3-6 mm diam. Rhizome compact, irregularly nodose, 5-8 mm in diam. Leaves simple, basal and cauline; petiole of stem leaf 7-9 cm, glabrous; leaf blade adaxially dark green, ovate or broadly elliptic-ovate, 17-19 × 8-10 cm, papery, abaxially densely sericeous, 9-basinerved, reticulate, veins conspicuously raised, adaxially glabrous, base deeply cordate with lobes arrow-shaped, subequal, partial overlap, margin closely spinulose-subserulate, apex acute. Flowering stem with 2 opposite leaves.

Inflorescences usually terminal cymes with 3 flowers, 12-22 × 8-10 cm; rachis glabrous. Pedicel 4-6 cm, puberulent. Flowers yellow-white. Sepals 8 in 2 whorls; outer sepals ovate, reddish, caducous, ca. 2 × 1.5 cm, apex obtuse; inner sepals ovate-elliptic, white, ca. 8 × 5 mm, membranous, 1/2 to 1/3 length of petals, apex acute. Petals curved upward, yellow-white, horn-shaped, much longer than inner sepals, ca. 3 cm. Stamens 4, pale yellow, ca. 7 mm; filaments shorter than anthers; anthers valved. Pistil obliquely terete; style ca. 3 mm. Capsules obliquely terete, glabrous; style rostriform.

Phenology: Flowering and fruiting: Flowering mid-March to early April; fruiting April to May.

Distribution and Habitat: *Epimedium jinfoshanensis* is currently known only from its type locality, i.e., Jinfo Mountain National Nature Reserve in Nanchuan, Chongqing, China. It grows on wet slopes under the mixed forests or on the edge of mixed forests at elevations of ca. 942.3 m a.s.l (Fig. 4).

Etymology: The epithet *jinfoshanensis* was derived from the name of the mountain, *Jinfoshan*, where *E. jinfoshanensis* was collected.

Additional specimens examined

Epimedium jinfoshanensis (**Paratype**): CHINA. Chongqing: Nanchuan, 26 March 2021, Y.W. Zuo, X.Y. Lv NC2021032602 (SWCTU).

E. simplicifolium: CHINA. Guizhou: Wuchuan, 9 May 1928, B.Q. Zhong 0000594 (IBSC). CHINA. Guizhou: Wuchuan, 9 May 1928, B.Q. Zhong 01432137 (PE). CHINA. Guizhou: Wuchuan, 9 May 1928, B.Q. Zhong 01432138 (PE). CHINA. Guizhou: Suiyang, 10 April 1996, S.Z. He, B. Gu 01432159 (PE). CHINA. Guizhou: Wuchuan: Zunyi, 19 May 2009, M. Shang ZY0000450 (ZY).

E. acuminatum: CHINA. Yunnan, 5 June 1908, F. Ducloux 00770 (QIN). May 1908, J. Cavalerie 00270388 (E). Yunnan, 19 May 1908, J. Cavalerie 00762 (K). Guizhou: Zunyi, 2 April 2003, Z.Y. Liu IMC0053320 (IMC). Chongqing: Wulong, 29 April 2008, Z.Y. Liu IMC0053432 (IMC). Nanchuan, 31 March 2008, Z.Y. Liu IMC0053321 (IMC).

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Innovation and Application Development Special Key Project Research and Application of Typical Damaged Ecosystem Restoration Technology in Nature Reserve (cstc2019jscx-tjsbX0005).

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