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Reinstatement of the specific status of *Ligularia shifangensis* (Asteraceae, Senecioneae)

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Abstract

Ligularia shifangensis (Asteraceae, Senecioneae) has been treated as *L. liatroides* var. *shifangensis*. Observations of both herbarium specimens (including type material) and living plants demonstrate that *L. shifangensis* is a distinct species. From *L. liatroides* it can be readily distinguished by the shape of leaves and involucres, the number and pubescence of phyllaries, and a shorter pappus. The affinity of *L. shifangensis* may lie with *L. tsangchanensis*, from which it differs mainly in the shape of involucres, the length of peduncles and a shorter pappus.

Keywords: Compositae, *Ligularia liatroides*, Sichuan, taxonomy

Introduction

Ligularia shifangensis Chen & Zhang (1997: 181) (Asteraceae, Senecioneae) was described on the basis of four collections from Sichuan, China, with *M.S. Huang et al. 79-813* (CDC) designated as the holotype (Fig. 1A). In the protologue, the authors stated that this species was similar to *L. tenuipes* (Franchet 1892: 297) Diels (1901: 621) but differed by an array of characters, such as the basal leaves shortly petiolate with the petioles 2−4 cm long, the middle and distal stem leaves sessile, the capitula laxly arranged in a raceme, the involucre broadly campanulate with 10−14 phyllaries, and the ray florets 10−14.

Liu & Ho (2001) did not accept the species status of *L. shifangensis*, treating it as a variety of *L. liatroides* (Winkler 1893: 8) Handel-Mazzetti (1938a: 303), i.e. *L. liatroides* var. *shifangensis* (Chen & Zhang) Liu & Ho (2001: 560). They stated that *L. shifangensis* was different from *L. liatroides* only in the yellow-brown pubescent leaves and phyllaries. This treatment was adopted by Liu & Illarionova (2011), who claimed that *L. liatroides* var. *shifangensis* was different from the type variety, *L. liatroides* var. *liatroides*, in the white pubescent and shortly yellowish-brown pilose (vs. white pubescent) leaves and involucres.

It is most likely that Liu & Ho (2001) did not see the type material of *L. shifangensis*, basing their taxonomic decision on the original description of this species. Our observations of both herbarium specimens and living plants clearly demonstrate that *L. shifangensis* is morphologically quite different from *L. liatroides* and warrants a specific status of its own.

Material and methods

We examined specimens of *Ligularia shifangensis* and its presumed allies kept in CDBI, CDC, E, GH, HGAS, HIB, HITBC, HNWP, IBK, K, KUN, LE, NAS, P, PE, SZ, US, W and WUK. We also observed three populations of *L. shifangensis*, four of *L. liatroides*, and 20 of *L. tsangchanensis* (Franchet 1892: 299) Handel-Mazzetti (1936: 1140) in the wild. Main morphological characters were photographed and some of them were measured.

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Results and discussion

As shown in Figs. 1−3, *Ligularia shifangensis* is morphologically a distinct species. It is characterized by the stem white-yellowish or white arachnoid distally, the basal leaves petiolate or sessile, the leaf blades obovate- or ovate-oblong, the stem leaves sessile, base semiamplexicaul, the synflorescence racemose, the involucre hemispheric, the phyllaries 10−15, densely white arachnoid dorsally, the ray florets 8−15, the tubular florets numerous, and the pappus rather short (ca. 2 mm long). From *L. liatroides* (Figs. 4, 5) this species is readily distinguishable by the leaf blades obovate- or ovate-oblong (vs. lanceolate or elliptic), the involucre hemispheric (vs. narrowly campanulate), the phyllaries 10−15 (vs. 7−8), densely white arachnoid dorsally (vs. black pilose), margin entire (vs. densely white ciliate), and the pappus shorter (ca. 2 mm vs. 6−7 mm long). A detailed comparison between the two species is given in Table 1.

FIGURE 1. Specimens of *Ligularia shifangensis*. **A**. China, Sichuan, Shifang, *M.S. Huang et al. 79-813* (CDC, holotype). **B**. Same locality, *M.S. Huang et al. 79-708* (CDC, paratype).

In addition to the type material, our examination of the major Chinese herbaria, including CDBI, KUN, PE and SZ, resulted in the discovery of several more collections of *L. shifangensis* from Hongya, Kangding, Mianning, Xiaojin respectively, all in western Sichuan. These specimens had been variously misidentified as *L. liatroides*, *L. muliensis* Handel-Mazzetti (1938b: 117), *L. tsangchanensis*, or even, as *Y.S. Chen & Z.H. Wang 9135* (PE) from Xiaojin for instance, annotated on the determination slips to represent a hitherto undescribed species, i.e. *L. pseudomuliensis* Y.S. Chen. Our results indicate that *L. shifangensis* is a fairly common species in western Sichuan.

In general aspect *L. shifangensis* is most closely similar to *L. tsangchanensis* (Fig. 6) and both can be confused with each other. From the latter species *L. shifangensis* differs mainly in the involucre hemispheric (vs. narrowly campanulate), the peduncles longer (1.5−10 cm vs. 1−1.5 cm long) and the pappus shorter (ca. 2 mm vs. 3−6 mm long).

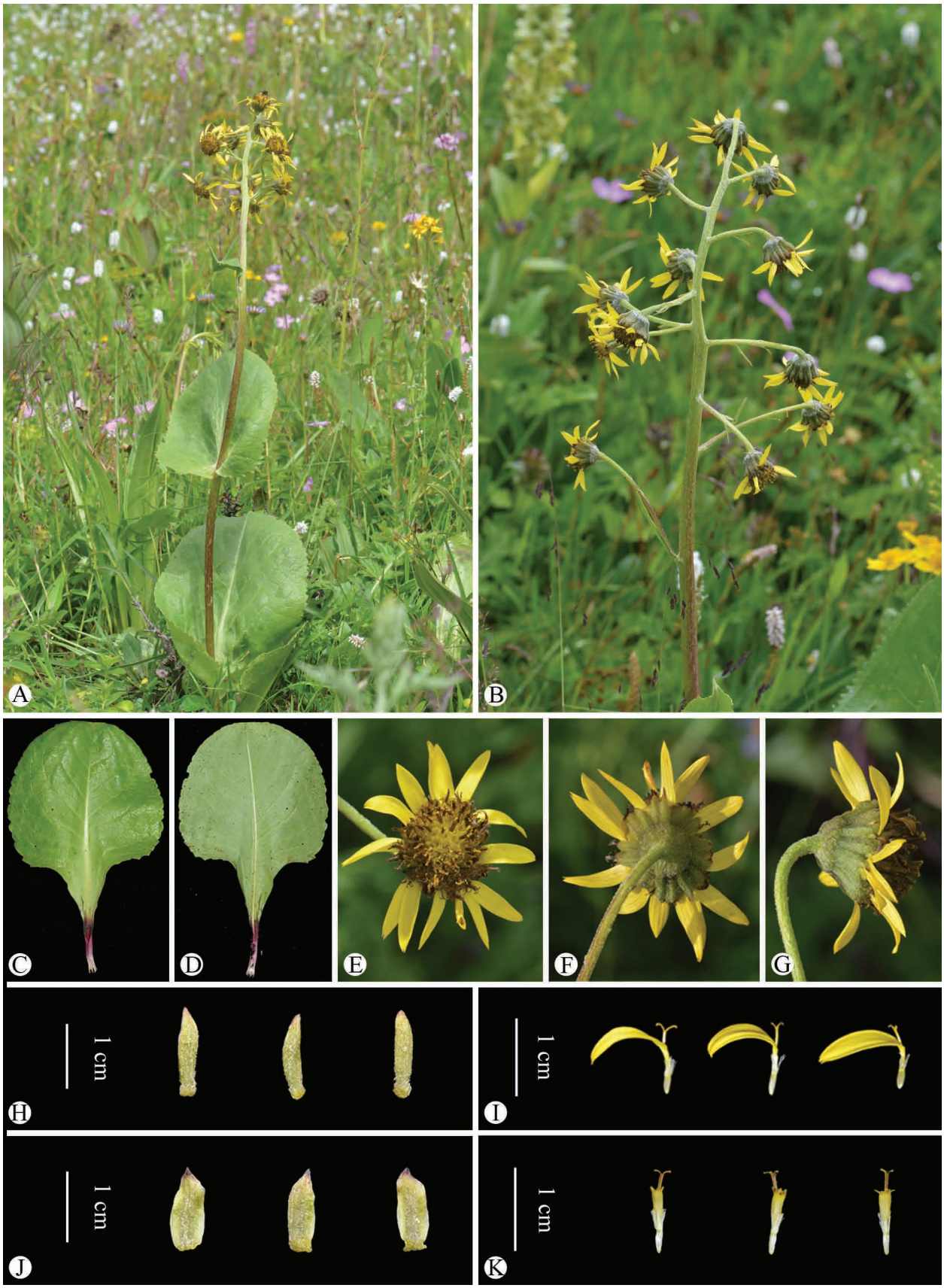

FIGURE 2. *Ligularia shifangensis* in the wild (China, Sichuan, Wenchuan). **A**. Habit. **B**. Synflorescence. **C**. Basal leaf (adaxial surface). **D**. Basal leaf (abaxial surface). **E**. Capitulum (top view). **F**. Capitulum (back view). **G**. Capitulum (side view). **H**. Outer phyllaries (abaxial surface). **I**. Inner phyllaries (abaxial surface). **J**. Ray florets. **K**. Tubular florets.

FIGURE 3. Specimens of *Ligularia shifangensis*. **A**, **B**. China, Sichuan, Wenchuan, *L. Wang & Y.P. Zeng 827* (IBSC).

TABLE 1. Comparison between *Ligularia liatroides* and *L. shifangensis*.

	Ligularia liatroides	*Ligularia shifangensis*
Stem	up to 100 cm tall, glabrous proximally, white arachnoid distally	up to 100 cm tall, glabrous proximally, white-yellowish and white arachnoid distally
Basal leaves	leaf blade lanceolate or elliptic	leaf blade obovate- or ovate-oblong
Stem leaves	2 to many, middle stem leaves 2−5, leaf blade lanceolate, 8−22 cm long, 4.5−8 cm wide, distal stem leaves 0 to many, linear	1−5, middle stem leaves 3−4, leaf blade lanceolate to linear, 6−15 cm long, 6−12 cm wide, distal stem leaves 0−2, triangulate-ovate
Peduncle	1.5−10 cm long, white arachnoid	0.5−1.5 cm long, sparsely white pubescent
Involucre	narrowly campanulate, 5−8 mm in diam., 7−12 mm high	hemispheric, 8−13 mm in diam., 13−18 mm high
Phyllary	7−8, black pilose dorsally, outer ones 2−3 mm wide, inner ones 4−5 mm wide, margin densely white ciliate	10−15, densely white arachnoid dorsally, outer ones ca. 2 mm wide, inner ones ca. 3 mm wide, margin entire
Ray florets	5−7	8−15
Pappus	6−7 mm long, whitish	ca. 2 mm long, whitish or sometimes brown
Distribution	southwestern Qinghai, northwestern Sichuan, northeastern Xizang	western Sichuan

FIGURE 4. Holotype sheet of *Ligularia liatroides*.

Taxonomic treatment

Ligularia shifangensis Chen & Zhang (1997: 181). *Ligularia liatroides* var. *shifangensis* (Chen & Zhang) Liu & Ho (2001: 560). Figs. 1−3.

Type:—CHINA. Sichuan: Shifang, 3650 m a.s.l., 18 July 1997, *M.S. Huang et al. 79-813* (holotype CDC!, isotype PE, not seen).

FIGURE 5. *Ligularia liatroides* in the wild (China, Sichuan, Baiyu). **A**. Habit. **B**. Synflorescence.

Perennial herbs, robust. Stems solitary or 2, erect, to 100 cm tall, 6−8 cm in diam., proximally glabrous, distally white-yellowish and whitish arachnoid. Basal leaves 1−4, petiolate; petiole 2−10 cm long, winged; leaf blade obovate- or ovate-oblong, 6−15 cm long, 6−12 cm wide, pinnately veined, adaxially dark green, glabrous, abaxially pale green, slightly white and yellowish-brown pilose, base cuneate, margin crenate or denticulate, apex obtuse or rounded. Stem leaves 2−4, sessile, middle stem leaves obovate- or ovate-oblong, smaller than basal leaves, base semiamplexicaul, margin crenate or denticulate, apex obtuse or sometimes caudate, distal stem leaves ovate or triangulate-ovate. Synflorescence racemose, rarely branched at base; peduncles 1.5−10 cm long, densely white arachnoid. Capitula 6−23, nodding. Involucre hemispheric, 8−13 mm high, 10−18 mm in diam., densely white arachnoid dorsally; phyllaries 10−15, in 2 rows, oblong, outer ones 2−3 mm wide, margin membranous, apex acute, inner ones 4−5 mm wide, apex acute. Ray florets 8−15, yellow; lamina 9−15 mm long, 2−4 mm wide, lanceolate or narrowly oblong, apex shallowly 3-dentate. Tubular florets numerous, 7−8 mm long, tube ca. 2 mm long. Achenes brown, cylindric, ca. 2 mm long. Pappus whitish or sometimes brown, ca. 2 mm long, shorter than tube of tubular florets.

Distribution and habitat:—*Ligularia shifangensis* is distributed in western Sichuan (Hongya, Kangding, Mianning, Pengzhou, Shifang, Wenchuan, Xiaojin), China (Fig. 7). It grows in alpine meadows or in alpine scrub at elevations between 2800−4100 m above sea level.

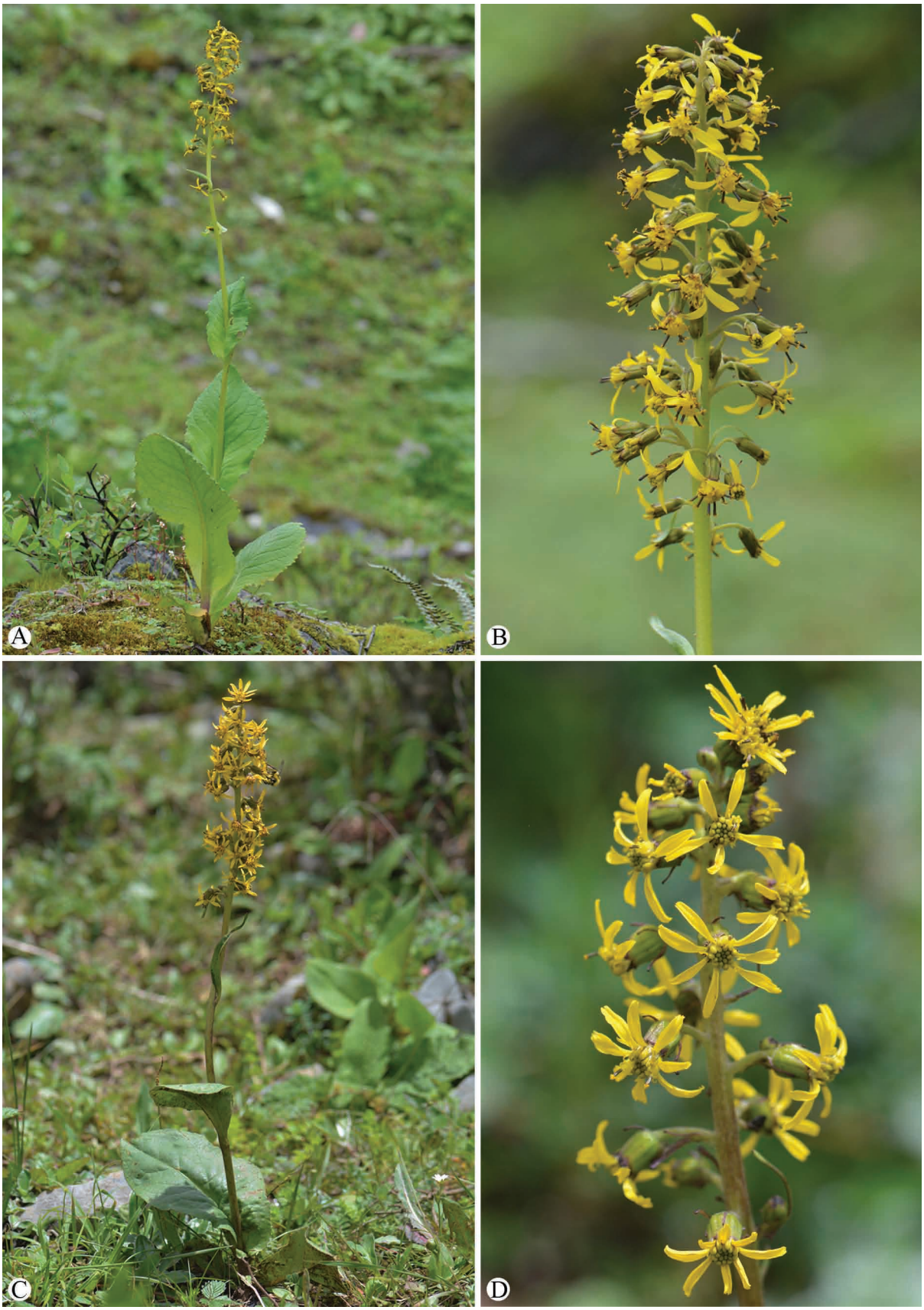

FIGURE 6. *Ligularia tsangchanensis* in the wild, showing the habit (**A**, **C**) and synflorescence (**B**, **D**). **A**, **B**. China, Sichuan, Gongshan. **C**, **D**. China, Sichuan, Yanyuan.

Phenology:—*Ligularia shifangensis* is a relatively earlier-flowered species in the genus, flowering in middle June to July and fruiting in late July to August.

Note:—We have been unable to trace the isotype of *Ligularia shifangensis* in PE, although it was stated to have been deposited there in the protologue.

Additional specimens examined:—CHINA. Sichuan: Hongya, *W.K. Bao et al. 3276* (CDBI); Kangding, *Q.E. Yang et al. 971* (IBSC), *C. Zhang 20071096* (PE), *X.S. Zhang & Y.X. Ren 5524* (PE, SZ); Mianning, *S.K. Wu 2131* (KUN, PE); Shifang, *M.S. Huang et al. 79-707* (CDC), *79-708* (CDC); Wenchuan, *L. Wang & Y.P. Zeng 827* (IBSC); Xiaojin, *Y.S. Chen & Z.H. Wang 9135* (PE), *X.J. He & Q.S. Zhao 189344* (SZ), *Y. Hong & L. Wang 425* (IBSC), *H.N. Tan et al. 17063* (PE).

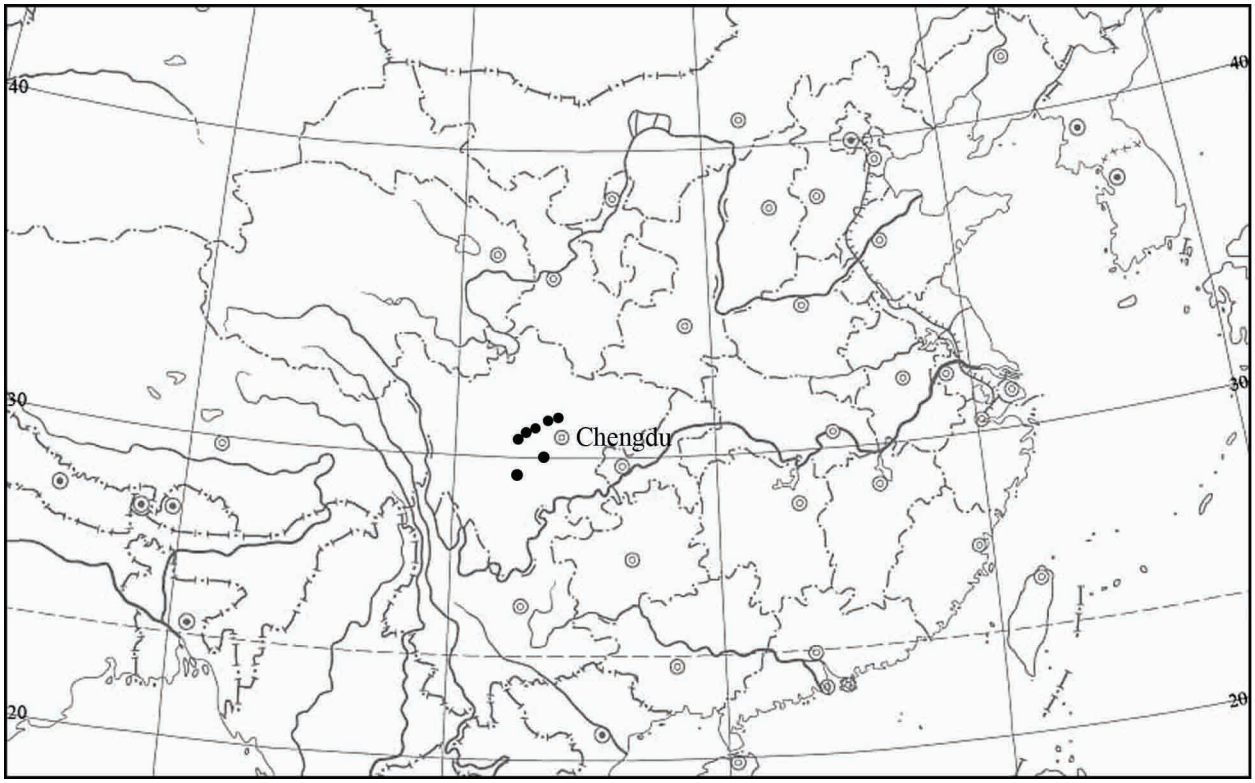

FIGURE 7. Distribution of *Ligularia shifangensis* (●).

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