

## *Solms-laubachia zhongdianensis* (Brassicaceae), a new species from the Hengduan Mountains of Yunnan, China

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*Solms-laubachia zhongdianensis* J.P. Yue, Al-Shehbaz & H. Sun *sp. nova* (Brassicaceae) is described from the Hengduan Mountains of Yunnan, China, and illustrated in line drawings. It resembles *S. xerophyta* but differs in having papery petioles, shorter leaves, dense pubescence on fruit valves, shorter fruiting pedicels, and larger seeds. *Solms-laubachia minor* Hand.-Mazz. is reduced to synonymy with *S. pulcherrima* Muschl.

Key words: Brassicaceae, new species, *Solms-laubachia*, taxonomy

The Sino-Himalayan endemic genus *Solms-laubachia* (Brassicaceae) consists of eight species, seven of which are confined to the Hengduan Mountains (western Sichuan, eastern Tibet, and northwestern Yunnan), and *S. platycarpa* extending into Bhutan and Sikkim. The plants grow on scree slopes and in rocky crevices at altitudes of 3400–5700 m.

In the course of a revision of *Solms-laubachia*, Al-Shehbaz and Yang (2001) noticed that the holotype of *S. minor* is a problematic one. As indicated by Handel-Mazzetti (1922), the species is similar morphologically to *S. pulcherrima* but differs solely by having narrower and shorter leaves. Several authors (e.g., Lan & Cheo 1981, Lan 1987, Li 1995) believed that *S. minor* is sufficiently distinct from *S. pulcherrima* based on leaf morphology alone. However, we examined numerous populations of this complex and con-

clude that *S. pulcherrima* varies extremely in the length and width of leaves.

In September 2003, the first author carried out fieldwork in the type locality of *S. minor* and collected many specimens (Yue 0379) now deposited at KUN and MO. Based on the field observations, it is very clear that the type collection of *S. minor* is conspecific with *S. pulcherrima*, and that all previous reports of *S. minor* from Yunnan (e.g., Lan & Cheo 1981, Wu 1984, Lan 1987, Wang 1993, Li 1995, Al-Shehbaz & Yan 2001) represent a new species. Although *S. minor* has long been recognized as an independent species, the morphological limits have clearly been misinterpreted, and *S. minor* is nothing but a minor variant and should be treated as synonym of *S. pulcherrima*. The Yunnan plants assigned by the above authors to *S. minor* belong to an entirely different species first described here.

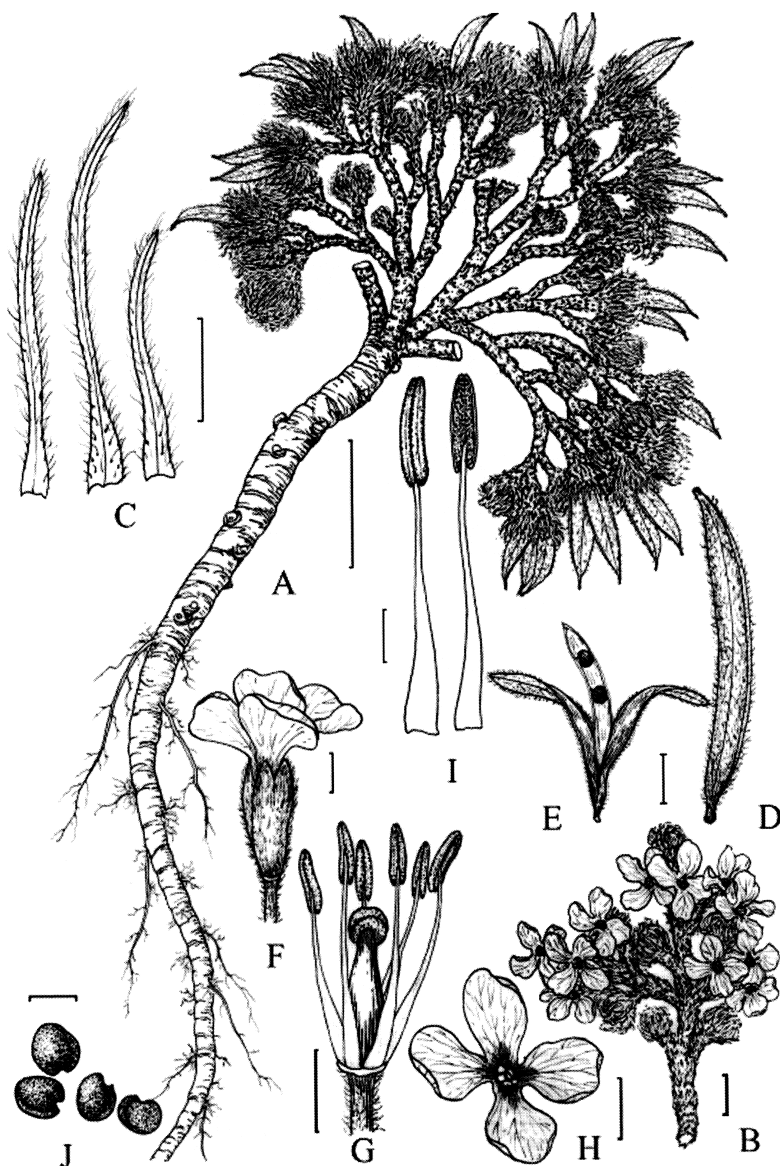


Fig. 1. *Solms-laubachia zhongdianensis* (A, C, D, E, J from holotype; others from paratype Yue 0213; drawn by Wang Hong-Bing). — A: Plant. — B: Portion of plant showing flowers. — C: Leaves. — D and E: Indehiscent and dehiscent fruits. — F: Flower. — G: Flower with perianth removed to show stamens and pistil. — H: Corolla. — I: Stamens. — J: Seeds. — Scale: A, B, D, E = 1 cm; C, H = 5 mm; F, G = 2 mm; I = 1 mm; J = 4 mm.

***Solms-laubachia zhongdianensis* J.P. Yue, Al-Shehbaz & H. Sun, *sp. nova* (Fig. 1)**

*Solms-laubachia minor* auct. non Hand.-Mazz.: Lan & Cheo (1981), Wu (1984), Lan (1987), Wang (1993), Li (1995), Al-Shehbaz & Yang (2001).

*Species S. xerophytæ similis; sed foliis abbreviatis ad 0.3–2.2 cm longis, atque crispatis centripetis; petiolis papyraceis; fructibus lanceolatis, valves dense subhirsutis, pedicellis brevibus ad 1.3–10 mm; seminibus oblongis, 2.4–4.3 mm diametris differt.*

TYPE: China. Yunnan, Shangri-La County, Mt. Shika, scree, sandy areas, 27°47'N, 99°35'E, ca. 4450 m, 27.IX. 2001 Yue 0154 (holotype KUN; isotype MO).

Perennials, 1.4–4 cm tall, with well-developed caudex covered with petioles of previous years, densely pilose with trichomes 0.9–3.5 mm long. Petioles of basal leaves (0.7–)0.8–7.8(–9) mm long, extending to 2–3.9(–4) mm wide, persistent, papery, with a distinct midvein and membranous, ciliate margins; leaf blade filiform to narrowly linear, (3.5–)4.2–21.6(–22) mm long, (0.7–)0.8–2(–3.1) mm wide at middle, long

ciliate, often grooved adaxially, crisped centripetally, base attenuate, apex subacute; cauline leaves absent. Flowers solitary. Fruiting pedicels erect to ascending, 0.13–0.7(–1.0) cm long. Sepals oblong to oblong-linear, 4.5–7.3 × 1.0–1.8 mm, free, densely pilose. Petals pinkish, mauve, pale lilac to purple, obovate, distinctly differentiated into claw and blade; claw 6–8.5 mm long, blade 7–12 × 3.5–5.6 mm, apex rounded to emarginate. Stamens 6; median filaments 5.5–6 mm long; lateral ones 4.4–4.5 mm long; anthers 1.6–2 mm long. Ovules 4–12 per locule. Fruit lanceolate, (2.8–)3.3–5.5(–8) × (0.5–)0.6–0.8 cm; valves densely subhirsute, obscurely veined; septum complete or perforate; style 2.8–3.4 mm long; stigma slightly 2-lobed. Seed uniseriate or biseriate, suborbicular, minutely reticulate, 2.4–4.3 mm in diam. Flowering May–July, fruiting middle July–October.

*Solms-laubachia zhongdianensis* resembles *S. xerophyta* in having filiform to narrowly linear leaves, grooved adaxially. These features also readily distinguish the two species from all congeners. *Solms-laubachia xerophyta* has thickened petioles, longer leaves and fruiting pedicels, glabrous or sparsely pilose valves, and smaller seeds. By contrast, *S. zhongdianensis* has slender petioles, shorter leaves and pedicels, densely pubescent valves, and larger seeds (Table 1).

It is surprising that this species was misidentified as *Solms-laubachia minor* by several botanists (e.g., Lan & Cheo 1981, Wu 1984, Lan 1987, Wang 1993, Li 1995, Al-Shehbaz & Yang 2001) for a long time. According to Handel-Mazzetti (1922), *S. minor* is similar to *S. pulcherrima* in having thickened petioles, while *S. zhongdianensis* has distinctly papery ones. Had these authors observed this significant difference, they would have treated the Yunnan material as a new species instead of placing it under *S. minor*.

Actually *S. minor* is a taxonomic synonym of *S. pulcherrima*. Therefore, all specimens misidentified by the previous authors as *S. minor* should be recognized as *S. zhongdianensis*, a specific epithet named after the locality from which most specimens were collected.

**DISTRIBUTION:** Shangri-la County (formerly Zhongdian County), Wei-si County, and Lijiang County in northwestern Yunnan, at altitudes of 3200–4500 m, on scree slope, and in sandy areas.

**ADDITIONAL SPECIMENS EXAMINED** (paratypes). — **China.** Yunnan: Zhongdian, Xianren Dong, *Yü 12160* (KUN); Xhungtien, Juatze, *Yü 13635* (A, BM, E, KUN); Zhongdian Xian, *Yang Jingshen 83043* (KUN); Shigao Shan, *Feng 23339* (KUN, PE); Shika Shan, 27°47'N; 99°35'E; 4200 M, 30.V.2002 *Yue 0213* (KUN, MO); Wei-si Xian, Yeh-chih, *Wang 68411* (A, PE); Lichiang Xian, *Wang 71304* (A, PE).

**REPRESENTATIVE SPECIMENS EXAMINED** of *Solms-laubachia xerophyta*. — **China.** Sichuan: Gonggalin, *Yü 13043* (A, KUN, PE); Mount Konka, Risonqueмба, Konkaling, *Rock 16419* (NY, US, HUH); Xianuoduoji, Yading, 4530 m, 28.IX.2002 *Yue 0250* (KUN, MO); Muli Xian, *Qinghai-Xizang Team 13871, 13980* (KUN, PE); Yunnan: ZhongDian, Nilonggi, *Qian Zigang & Sun Hang 977* (KUN); Dongwang Xian, *Yang Jingshen 6757* (KUN); Daxue Shan, 4340 m, 4.VI.2002 *Yue 0225, 30.IX.2002 Yue 0251* (KUN, MO).

### *Solms-laubachia pulcherrima* Muschl.

Notes Roy. Bot. Garden Edinb. 5: 206. 1912. — **TYPE:** China. NW Yunnan: E flank of Lichiang Range, 27°20'N, 12 000 ft, V.1906 *G. Forrest 2164* (holotype B!; isotypes BM!, E!, P!).

*Parrya ciliaris* Bureau & Franch., J. Bot. (Morot) 5: 20. 1891. — *Solms-laubachia ciliaris* (Bureau & Franch.) Botsch., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 17: 169. 1955. — **TYPE:** China. Tibet: route de Batang, 12.V.1890 *M. Bonvalot & H. d'Orléans s.n.* (holotype P!).

*Solms-laubachia minor* Hand.-Mazz., Anz. Akad. Wiss. Wien, Math. Naturwiss. Kl. 59: 246. 1922, *syn. nov.* — **TYPE:** China. Sichuan: Mt. Holoscha, 27°48'N, between Yenyuen and Kwapi, 4325 m, 18.V.1914 *H. F. Handel-Mazzetti 2318* (holotype WU!; isotypes E!, P!, W!).

**Table 1.** Diagnostic characters distinguishing *Solms-laubachia zhongdianensis* from *S. xerophyta*. 20 specimens of both species were measured.

	Pedicels	Leaf length (cm)	Fruiting pedicels length (cm)	Valves	Seed diameter (mm)
<i>S. zhongdianensis</i>	papery	(0.35–)0.4–2.2	0.13–0.7(–1.0)	densely subhirsute	2.4–4.3
<i>S. xerophyta</i>	thickened	(1.3–)1.9–7.4(–9.0)	1.4–2.5(–3.0)	glabrous or sparsely pilose	(1.2–)1.5–3.0(–3.2)

*Pegaeophyton sinense* (Hemsl.) Hayek & Hand.-Mazz. var. *stenophyllum* O. E. Schulz, Notizbl. Bot. Gart. Berlin-Dahlem 9: 477. 1926. — TYPE: China. Yunnan: Yangtze watershed, Prefectural District of Likiang, E slope of Likiang snow range, 5300 m, 11.XIII.1922 J. F. Rock 5719 (holotype B!; isotypes E!, GH!, P!, US!).

*Solms-laubachia pulcherrima* f. *angustifolia* O. E. Schulz, Notizbl. Bot. Gart. Berlin-Dahlem 9: 477. 1926. — TYPE: China. Yunnan: Yangtze watershed, W slope of Likiang snow range, 13 000 ft, 30.V.–6.VI.1922 J. F. Rock 4277 (holotype B!; isotypes E!, GH!, P!, US!, W!).

*Solms-laubachia pulcherrima* f. *atrichophylla* Hand.-Mazz., Anz. Akad. Wiss. Wien, Math. Naturwiss. Kl. 62: 24. 1926. — TYPE: China. Sichuan: Mt. Gonschiga, Muli monastery, Yungning toward Dschungdien, 4500 m, H. F. Handel-Mazzetti 7503 (holotype WU!; isotype W!).

*Solms-laubachia pulcherrima* is characterized by its leathery leaves, pink to light- or turquoise-blue flowers and subcorky petioles. It is highly variable in leaf shape, size, and indumentum (Al-Shehbaz & Yang 2001), and the above synonyms represent some of the many morphological variants of the species. As mentioned above, *Solms-laubachia minor* was described by Handel-Mazzetti (1922) as a relative of *S. pulcherrima*. Leaf shape and size in *S. pulcherrima* are highly variable among or within populations. For example, leaf size of one population from Lijian County (Yue, 0245, KUN, MO) was 0.5–3.7 cm × 1.5–7 mm. Furthermore, leaf size in fruiting period is certainly larger than that in flowering period. From the original description of *S. minor*, we now know that it was based on materials in flowering stage, while most of those of *S. pulcherrima* compared with it were based on fruiting material. Therefore, the use of leaf size to separate *S. minor* from *S. pulcherrima*, as was done by Handel-Mazzetti (1922), is unreliable.

The latest taxonomic treatment of *Solms-laubachia* recognized nine species (Al-Shehbaz & Yang 2001). As a result of intensive field survey, *S. gamosepala* is now considered as conspecific of *S. eurycarpa* (Yue et al. 2004). With the new species and new specific synonym treated here, *Solms-laubachia* has eight species. The cytological results reported for *S. minor* (Yue et al. 2003) should accordingly belong to *S. zhongdianensis*.

REPRESENTATIVE SPECIMENS EXAMINED of *Solms-laubachia pulcherrima*. — China. Sichuan: Yinyuan Xian, 4360 m,

24.IX.2003 Yue 0379 (KUN, MO); Danba, Huang, Luo & Jiang 1445 (KUN); Dege, Yang jingsheng 91-415 (KUN); Muli, Mt. Mitzuga, Rock 18296 (E, GH, HUH, NY, US); Derong, 4200–4400 m, 19.VII.2004 D. E. Boufford et al. 30895 (KUN, HUH); Xizang: Riwoqe, 4570–4850 m, 10.VIII.2004 D. E. Boufford et al. 31975 (KUN, HUH); Yunnan: Haba Shan, *Zhongdian Expedition 1808* (KUN); N flank of Haba Shan, Feng 1132 (A); Lijiang, Yü 15536 (KUN); Yulong Shan, *Qinghai-Xizang Team 320* (KUN, PE); Chienchuan-Mekong divide, *Forrest 21525* (E, K, US); E flank of Lichiang range, *Forrest 23058* (E, K, P, US); Lijiang, Wu-Toudi, He-Bai Shan, 4210 m, 26.IX.2001 Yue 0153 (KUN, MO); Lijiang, Gaheba, 3670 m, 11.IX.2002 Yue 0245 (KUN, MO).

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