

Primulina argentea (Gesneriaceae), a new species endemic to a karst cave in N Guangdong, S China

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Primulina argentea (Gesneriaceae), a new species endemic to a karst cave in N Guangdong, S China

Abstract

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Primulina argentea Xin Hong, F. Wen & S. B. Zhou, sp. nov. (Gesneriaceae) is described and illustrated from N Guangdong Province, S China. It is morphologically close to *P. fengshanensis* F. Wen & Yue Wang and *P. orthandra* (W. T. Wang) Mich. Möller & A. Weber, but is differentiated from its congeners by several characters of the shape, texture and indumentum of the leaf blade and bracts, length of pedicels, size of calyx lobes, colour of corolla, indumentum of staminodes, etc. A description of *P. argentea* together with illustrations, distribution map, habitat description and a diagnostic comparative table with *P. fengshanensis* and *P. orthandra* are presented.

Additional key words: limestone flora, taxonomy, *Primulina fengshanensis*, *Primulina orthandra*

Introduction

Primulina Hance consists of more than 150 species and has become the biggest genus in the Chinese Gesneriaceae, thanks to the recent discovery of many new species with narrowly restricted distributions and the new combinations that followed the inclusion of the genus *Chirita* Buch.-Ham. ex D. Don (Wei & al. 2010; Weber & al. 2011; Chung & al. 2013; Liang & al. 2013; Lu & al. 2013; Ning & al. 2013; Wen & al. 2013; Xu & al. 2013; Zhao & al. 2013).

During the collection of seeds for the seed bank of the Gesneriad Conservation Center of China, a *Primulina*-like species was discovered and collected from the

type locality of *P. orthandra* (W. T. Wang) Mich. Möller & A. Weber (basonym: *Chirita orthandra* W. T. Wang; Wang 1985) in Liannan Yao Autonomous County in N Guangdong Province in S China. The two species share the habitat in a medium-sized limestone cave, but can be easily distinguished by several characters (Table 1 and Fig. 3 & 5). After carefully consulting the relevant literature (e.g. Wang 1985; Wang & al. 1990; Wang & al. 1998; Li & Wang 2004; Wei & al. 2010; Hong & al. 2012; Wen & al. 2012a, b) and after examining many specimens from Chinese and Vietnamese herbaria (e.g. BJFC, CDBI, CTC, HN, IBK, IBSC, KUN, PE, VNMN) as well as MO, we concluded that the unidentified plant was a new species.

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Results and Discussion

Primulina argentea Xin Hong, F. Wen & S. B. Zhou, **sp. nov.** – Fig. 2 & 3.

Holotype: China, Guangdong Province: Lianzhou city, Liannan Yao Autonomous county, Damaishan town, c. 200 m, in the entrance of a limestone cave, 19 Sep 2012 (fl.), *F. Wen 20120930-1* (IBK!; isotype: ANU!).

Diagnosis — *Primulina argentea* Xin Hong, F. Wen & S. B. Zhou is similar to *P. fengshanensis* F. Wen & Yue Wang in vegetative appearance, but differs in having leaves opposite, leaf blade thick, chartaceous, densely appressed sericeous-villous on both surfaces, apex attenuate or with a curved beak; cymes 1- or 2-branched; bracts 2, densely appressed sericeous-villous on both surfaces; bracteoles oblong-lanceolate, c. 2 mm long; pedicels 1.3–1.5 cm long; calyx 9–11 × 1–1.5 mm; corolla brownish purple; staminodes densely glandular pubescent; pistil 2–2.5 cm long; and stigma 2.5–3 mm long (Table 1).

Description — *Herbs* perennial. *Rhizome* subterete, 6–9 cm long, 1–1.3 cm in diam.; *internodes* inconspicuous. *Leaves* 6–10(–21), opposite, clustered at apex of rhizome; *petiole* 3–6(–13) × 2–3 cm, densely pilosulous; *leaf blade* elliptic to obovate-lanceolate, 8–14(–19) × 2–6 cm, thick, chartaceous, both surfaces densely appressed sericeous-villous, hairs on both surfaces and on other parts of plant simple, multicellular, base cuneate-attenuate, margin entire, apex attenuate or with a curved beak; *lateral veins* 3–5 on each side, abaxially slightly prominent, adaxially unapparent. *Inflorescence* cymose, each plant bearing 7–10 flowers borne in 3–8 cymes; *peduncle* 10–14 cm long, c. 0.3 mm in diam., sparsely appressed pubescent with both glandular and eglandular hairs, hairs simple, multicellular; *cymes* 1- or 2-branched, branches (1 or) 2–6-flowered; *bracts* 2, opposite, oblong, 3.5–3.7 × c. 1 cm, both surfaces densely appressed sericeous-villous, base obtuse, margin entire, apex acuminate; *bracteoles* 2, opposite, oblong-lanceolate, c. 0.2 × 0.1 cm, with same indumentum as on bracts, margin entire, apex acute; *pedicels* 1.3–1.5 cm long, sparsely glandular pubescent. *Calyx* 5-parted to base; *lobes* narrowly lanceolate, 0.9–1.1 × 0.1–0.15 cm, glandular pubescent on both surfaces, hairs simple, multicellular, margin entire, apex acute. *Corolla* brownish purple, 4–5 cm long, out-



Fig. 1. Known distributions of *Primulina argentea* (A) and *P. fengshanensis* (B).

side shortly glandular pubescent, inside sparsely shortly pubescent; *tube* cylindrical, 2.5–3 cm long, 0.4–0.5 cm in diam. at base, c. 0.8 cm in diam. in throat; *limb* distinctly 2-lipped; *upper lip* 2-lobed to base, lobes with dark purple lines inside, narrowly ovate, c. 0.7 × 0.6 cm, apex obtuse; *lower lip* 3-lobed to or slightly below middle, lobes ovate-oblong, 0.9–1.2 × 0.7–0.8 cm, apex obtuse; *throat* with a yellow spot between lobes of upper lip and 2 dark purple narrowly elliptic zones between lobes of lower lip. *Stamens* 2, adnate to corolla tube 1.1–1.2 cm above base; *anthers* fused throughout adaxial surface, c. 0.3 cm long, glabrous; *filaments* purple, geniculate near middle, 1–1.1 cm long, glabrous; *staminodes* 3; *lateral staminodes* arising c. 1.3 cm above corolla base, purple, 0.6–0.8 cm long, densely extremely small glandular pubescent, hairs simple, multicellular, apex curved, turgid; *middle staminode* arising c. 1.2 cm above corolla base, c. 0.4 mm long, glabrous, apex capitate. *Disk* annular, c. 0.1 cm high, margin entire. *Pistil* 2–2.5 cm long; *ovary* linear, 1–1.1 cm long, 0.8–0.9 mm in diam., densely shortly glandular pubescent, hairs simple, multicellular; *style* 1.4–1.5 cm long; *stigma* 2.5–3 mm long, bipartite to half its length, lobes subulate, 1–1.5 mm long, apex acute or acuminate. *Capsule* linear, straight, 4–6 cm long or longer, 3–5 mm in diam., pubescent when young, with style persistent. *Seed* long ellipsoid; *testa* favulariate.

Phenology — Flowering from September to October.

Distribution — S China. Narrowly endemic and known only from the type locality: Damaishan town, Liannan Yao Autonomous County, c. 13 km SW of Lianzhou City in N Guangdong Province (Fig. 1).

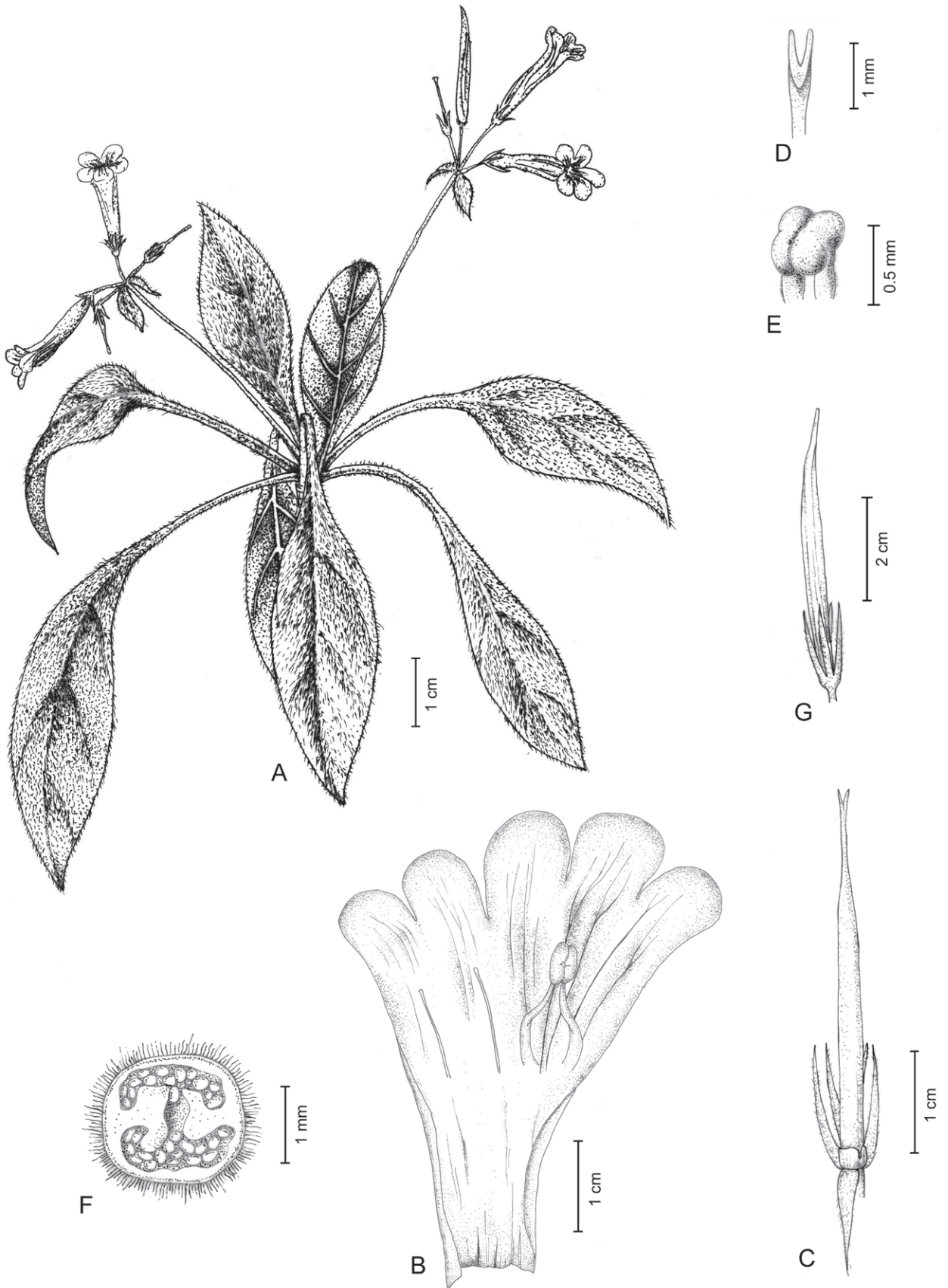


Fig. 2. *Primulina argentea* – A: habit, in flower; B: cut-open corolla showing stamens and staminodes; C: calyx, pistil and disk; D: stigma; E: anthers; F: cross-section of ovary; G: capsule. – All drawn from the holotype by Xiao-Mei Xiao.



Fig. 3. *Primulina argentea* – A & B: habitat at type locality; C: plants of *P. argentea* (1) and *P. orthandra* (2) growing side by side; D: habit; E: leaves, showing dense, appressed, sericeous-villous indumentum; F: cyme; G: frontal view of flower; H: lateral view of flower; I: calyx lobes; J: opened corolla; K: young capsule; L: mature capsule. – Photographs by Fang Wen, type locality of *P. argentea*, 19 Sep 2012.

Ecology — Locally abundant in rock crevices on moist shady cliffs at the entrance of a limestone cave at an altitude of 200 m. The annual average temperature of Liannan is 19.5 °C; the average annual precipitation is 1570 mm.

Conservation status — At present, *Primulina argentea* is known only from one site. It is estimated that the number of mature individuals of this new species does not exceed 2000. All the individuals depend on the particular cave



Fig. 4. *Primulina fengshanensis* – A: habitat; B: habit; C: leaves; D: cyme; E: frontal view of flower; F: lateral view of flower; G: dehiscent capsules. – Photographs by Fang Wen, type locality of *P. fengshanensis* (see Remarks), 1 Oct 2010.

habitat to survive. If the cave is disturbed or destroyed, the population of this new species might rapidly decline or even disappear. Therefore, we propose that *Primulina argentea* should be considered Critically Endangered: CR B1ab(iii)+2ab(iii) according to the IUCN Red List categories and criteria (IUCN 2012).

Etymology — The specific epithet refers to the dense silvery hairs on both leaf blade surfaces (Latin, *argenteus*, silvery).

Vernacular name — Chinese: 银叶报春苣苔 (yin ye bao chun ju tai). The first two characters mean “silver leaf”, the last four are the Chinese name for *Primulina*.

Remarks — *Primulina argentea* is morphologically close to *P. fengshanensis* (Wen & al. 2012b), which is endemic to Guangxi Zhuang Autonomous Region, adjacent to and W of Guangdong Province (Fig. 1), where it is at present known only from the type locality, which happens to be another limestone cave (Fengshan County, Hungkun



Fig. 5. *Primulina orthandra* – A: habitat; B: habit; C: cyme; D: frontal view of flower; E: lateral view of flower. – Photographs by Fang Wen; A: type locality of both *P. orthandra* and *P. argentea*, 19 Sep 2012; B–E: nursery of Gesneriad Conservation Center of China, Guilin, 7 Apr 2013.

Tong, 570–580 m; Fig. 4A). These two species together with *P. orthandra*, which is sympatric with *P. argentea*, can easily be distinguished by the characteristics compared in Table 1 and Fig. 3–5.

Additional specimens seen (paratypes) — CHINA: GUANGDONG PROVINCE: Lianzhou city, Liannan Yao Autonomous county, Damaishan town, c. 200 m, 2 Apr 2014, ZSB029 (ANU!, IBK!, KUN!).

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Table 1. Diagnostic character differences among *Primulina argentea* and its morphologically close congeners, *P. fengshanensis* and *P. orthandra*.

Characters	<i>Primulina argentea</i>	<i>Primulina fengshanensis</i>	<i>Primulina orthandra</i>
Leaves arrangement	opposite	in whorls of 3	opposite
Leaf blade texture	thick, chartaceous	fleshy	herbaceous
Leaf blade indumentum	densely appressed sericeous-villous on both surfaces	densely appressed pubescent on both surfaces	densely puberulent on both surfaces
Leaf blade apex	attenuate or with a curved beak	obtuse or rounded	acute to rounded
Cymes	1- or 2-branched	2–5-branched	1- or 2-branched
Bracts number	2	4	2
Bracts indumentum	densely appressed sericeous-villous on both surfaces	densely appressed pubescent abaxially	puberulent
Bracteoles shape	oblong-lanceolate	linear	ovate
Bracteoles length [mm]	2	4–5	c. 3
Pedicels length [cm]	1.3–1.5	1.5–3	0.4–1.3
Calyx dimensions [mm]	9–11 × 1–1.5	2.5–3.2 × 0.35–0.52	3–3.5 × c. 1.2
Corolla colour	brownish purple	purple	purple-blue
Staminodes number	3	3	2
Staminodes indumentum	densely glandular pubescent	glabrous	glabrous
Pistil length [cm]	2–2.5	1.5–1.9	c. 2.1
Stigma length [mm]	2.5–3	1.2–1.5	c. 2

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References

- Chung K. F., Huang H. Y., Peng C. I. & Xu W. B. 2013: *Primulina mabaensis* (*Gesneriaceae*), a new species from a limestone cave of northern Guangdong, China. – *Phytotaxa* **92**: 40–48.
- Hong X., Zhou S. B. & Wen F. 2012: *Primulina chizhouensis* sp. nov. (*Gesneriaceae*), a new species from a limestone cave in Anhui, China. – *Phytotaxa* **50**: 13–18.
- IUCN 2012: IUCN Red List categories and criteria. Version 3.1, ed. 2. – Gland & Cambridge: IUCN.
- Li Z. Y. & Wang Y. Z. 2004: Plants of *Gesneriaceae* in China. – Zhengzhou: Henan Science Technology Publishing House.
- Liang H. L., Kong D. X., Shi Y. C., Zhao B. & Wen F. 2013: *Primulina tsoongii* sp. nov. (*Gesneriaceae*) from a limestone area in north Guangxi, China. – *Nordic J. Bot.* **32**: 75–79.
- Lu S. N., Fu L. F., Liang G. Y. & Wen F. 2013: *Primulina bullata*, a new species of *Primulina* (*Gesneriaceae*) from Guangxi. – *Guihaia* **33**: 42–45.
- Ning Z. L., Li G. F., Wang J., Smith J. F., Rasolonjatovo H. & Kang M. 2013: *Primulina huaijiensis* (*Gesneriaceae*), a new species from Guangdong, China. – *Ann. Bot. Fenn.* **50**: 119–122.
- Wang W. T. 1985: A revision of the genus *Chirita* in China (II). – *Bull. Bot. Res.*, Harbin **5(3)**: 37–86.
- Wang W. T., Pan K. Y. & Li Z. Y. 1990: *Gesneriaceae*. – In: Wang W. T., Pan K. Y. & Li Z. Y. (ed.), *Flora Reipublicae Popularis Sinicae* **69**. – Beijing: Science Press.
- Wang W. T., Pan K. Y., Li Z. Y., Weitzman A. L. & Skog L. E. 1998: *Gesneriaceae*. – In: Wu Z. H. & Raven P. H. (ed.), *Flora of China* **18**. – Beijing: Science Press; St Louis: Missouri Botanical Garden Press.
- Weber A., Middleton D. J., Forrest A., Kiew R., Lim C. L., Rafidah A. R., Sontag S., Triboun P., Wei Y. G., Yao T. L. & Möller M. 2011: Molecular systematics and remodelling of *Chirita* and associated genera (*Gesneriaceae*). – *Taxon* **60**: 767–790.
- Wei Y. G., Wen F., Möller M., Monro A., Zhang Q., Gao Q., Mou H. F., Zhong S. H. & Cui C. 2010: *Gesneriaceae* of South China. – Nanning: Guangxi Sciences and Technology Publishing House.
- Wen F., Qin G. L., Wei Y. G., Liang G. Y. & Gao B. 2012a: *Primulina hochiensis* var. *rosulata* (*Gesneriaceae*) – a new variety at an entrance of a limestone cave from Guangxi, China. – *Phytotaxa* **54**: 37–42.
- Wen F., Xi S. L., Wang Y., Xiang M. S. & Fu L. F. 2012b: *Primulina fengshanensis* (*Gesneriaceae*), a new species from Guangxi, China. – *Ann. Bot. Fenn.* **49**: 103–106.
- Wen F., Zhao B., Liang G. Y. & Wei Y. G. 2013: *Primulina lutvittata* (*Gesneriaceae*), a new species from a limestone cave in Guangdong, China. – *Ann. Bot. Fenn.* **50**: 87–90.
- Xu W. B., Liu Y., Kono Y., Chang H., Peng C. I. & Chung K. F. 2013: *Primulina cardaminifolia* (*Gesneriaceae*), a rare new species from limestone areas in Guangxi, China. – *Bot. Stud. (Taipei)* **54(19)**: 1–9.
- Zhao B., Hong X., Huang S. L. & Wen F. 2013: *Primulina crassirhizoma* sp. nov. (*Gesneriaceae*) from a limestone area along the boundary of Sino-Vietnam. – *Bangladesh J. Pl. Taxon.* **20**: 129–134.