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Primulina tsoongii sp. nov. (Gesneriaceae) from a limestone area in north Guangxi, China

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Primulina tsoongii sp. nov. (Gesneriaceae) is described and illustrated here. This new species resembles *P. hochiensis* and *P. hochiensis* var. *rosulata*, but is easily distinguished by its sparsely hirsute mature leaves, narrow bracts (only 0.4–0.5 in diameter) and undivided yellowish ligulate stigma with dense elongate papillae.

Primulina Hance is a recently redefined genus in Asian Gesneriaceae, with then just over 130 species (Weber et al. 2011). The limestone areas in northwestern and southern China as well as northern Vietnam are the distribution centers of this genus. Many new taxa have recently been discovered, increasing the number of species to over 145 (Liu et al. 2010, Huang et al. 2011, 2012, Tang et al. 2011, Wu et al. 2011a, b, 2012, Xu et al. 2011a, b, 2012a, Hong et al. 2012, Li et al. 2012, Wen et al. 2012a, b, c, d, 2013, Zhang et al. 2012, Chung et al. 2013, Lu et al. 2013, Ning et al. 2013, Zhao et al. 2013). All recently published taxa that have been revised after 2011 are given in Table 1.

During recent studies of shade plants, an unknown, *Primulina*-like species of Gesneriaceae was discovered and collected from Gongcheng County in northern Guangxi. It morphologically resembles *P. hochiensis*, but is clearly distinct. After thorough consultation of relevant literature (Wang et al. 1990, 1998, Li and Wang 2004, Wei et al. 2010, Xu et al. 2012b), we considered it to be a new species in *Primulina*. The characters differentiating this new species from *P. hochiensis* and *P. hochiensis* var. *rosulata* are described and illustrated below.

Primulina tsoongii H. L. Liang, Bo Zhao & Fang Wen sp. nov. (Fig. 1–2)

Differs from *P. hochiensis* and *P. hochiensis* var. *rosulata* in having sparsely hirsute mature leaves, narrow bracts (only 0.4–0.5 in diameter), and truncate (undivided), yellowish, ligulate stigma with dense elongate papillae.

Type: China. Guangxi Zhuang Autonomous Region, Gongcheng County, Lianhua Town. Endemic to Guangxi, China, on moist limestone rock faces in evergreen broad-leaved forest and bushes, located in the subtropical monsoon region, 161 m a.s.l., 11 Jul 2012, Hui-Ling Liang, Yan-Cai Shi and De-Xin Kong, 120711 (holotype: IBK!, isotype: IBK!).

Etymology

The epithet '*tsoongii*' is used to commemorate the famous Chinese botanist, Chi-Hsin Tsoong, who was the founder of the Guangxi Institute of Botany. He was the discoverer of the 'living fossil', *Cathaya argyrophylla* Chun & Kuang.

Description

Perennial, acaulescent plant with a short cylindrical axis that is ca 1.6 cm long or longer, ca 1.3 cm in diameter, glabrous. Leaves basal, ca 15; petiole compressed, pubescent or nearly glabrous, 3.0 × 0.2 to 5.5 × 0.4 cm; leaf blade ovate, oval or broadly oblanceolate, 3.5 × 2.5 to 6.0 × 4.0 cm, green to greenish purple, coriaceous, when young densely erect villous but mature leaf blades only sparsely hirsute from hairs that are 1.5–2.0 mm long; base cuneate or narrowly cuneate; margin inconspicuously crenate or repand, ciliate; apex acute or acuminate; lateral veins ca 3 on each side of midrib, extremely inconspicuous adaxially and prominent abaxially. Cymes axillary, 6–10, 6–12-flowered; peduncle purplish brown, 2.5–4.5 cm long, 0.9–1.0 mm in diameter, densely erect pubescent from ca 0.4–0.5 mm long pubescence; bracts 2, opposite, narrowly subulate to lanceolate-subulate, persistent in flowering, purple, 3.5–4.0 mm long, 0.4–0.5 mm in diameter at base, adaxially and abaxially puberulent, with entire margin and acute apex; bracteoles 2, similar to bracts but short linear, 2.5–3.5 mm long. Pedicel 8–9 mm long; subordinate pedicel 3–5 mm long, pedicel and subordinate pedicel with white erect villous hairs that are 1–2 mm long. Calyx 5-parted from base; segments nearly equal, linear, ca 4.5 mm long, outside

Table 1. *Primulina* taxa that have been revised after 2011.

Species name	Former species name	Year/ published
Primulina danxiaensis (W. B. Liao, S. S. Lin & R. J. Shen) W. B. Liao & K. F. Chung	*Chiritopsis danxiaensis* W. B. Liao, S. S. Lin & R. J. Shen	2010
Primulina jingxiensis (Yan Liu, W. B. Xu & H. S. Gao) W. B. Xu & K. F. Chung	*Chiritopsis jingxiensis* Yan Liu, W. B. Xu & H. S. Gao	2010
Primulina leprosa (Yan Liu & W. B. Xu) W. B. Xu & K. F. Chung	*Chirita leprosa* Yan Liu & W. B. Xu	2010
Primulina longzhouensis (B. Pan & W. H. Wu) W. B. Xu & K. F. Chung	*Chiritopsis longzhouensis* B. Pan & W. H. Wu	2010
Primulina tiandengensis (F. Wen & H. Tang) F. Wen & K. F. Chung	*Chirita tiandengensis* F. Wen & H. Tang	2010
Primulina guangxiensis Yan Liu & W. B. Xu		2011
Primulina hezhouensis (W. H. Wu & W. B. Xu) W. B. Xu & K. F. Chung	*Chiritopsis hezhouensis* W. H. Wu & W. B. Xu	2011
Primulina lijiangensis (B. Pan & W. B. Xu) W. B. Xu & K. F. Chung	*Chirita lijiangensis* B. Pan & W. B. Xu	2011
Primulina ningmingensis (Yan Liu & W. H. Wu) W. B. Xu & K. F. Chung	*Chirita ningmingensis* Yan Liu & W. H. Wu	2011
Primulina pseudolinearifolia W. B. Xu & K. F. Chung	*Chirita luochengensis* Yan Liu & W. B. Xu	2011
Primulina rongshuiensis (Yan Liu & Y. S. Huang) W. B. Xu & K. F. Chung	*Chirita rongshuiensis* Yan Liu & Y. S. Huang	2011
Primulina chizhouensis Xin Hong, S. B. Zhou & F. Wen		2012
Primulina fengshanensis Fang Wen & Yue Wang		2012
Primulina gongchengensis Y. S. Huang & Yan Liu		2012
Primulina guigangensis L. Wu & Q. Zhang		2012
Primulina hochiensis (C. C. Huang & X. X. Chen) Mich. Möller & A. Weber var. *rosulata* F. Wen & Y. G. Wei		2012
Primulina multifida B. Pan & K. F. Chung		2012
Primulina pseudomollifolia W. B. Xu & Yan Liu		2012
Primulina purpurea Fang Wen, Bo Zhao & Y. G. Wei		2012
Primulina sinovietnamica W. H. Wu & Q. Zhang		2012
Primulina yangshuoensis Y. G. Wei & Fang Wen		2012
Primulina xiziae Fang Wen, Yue Wang & G. J. Hua		2012
Primulina bullata S. N. Lu & Fang Wen		2013
Primulina guizhongensis Bo Zhao, B. Pan & F. Wen		2013
Primulina huaijiensis Z. L. Ning & J. Wang		2013
Primulina lutvittata Fang Wen & Y. G. Wei		2013
Primulina mabaensis K. F. Chung & W. B. Xu		2013

with erect villous hairs that are 1.5 mm long, inside glabrous, with entire margin and acute apex. Corolla pale purple; throat with two distinctly elliptic yellow spots, 1.8–2.0 mm long; orifice ca 0.5 cm in diameter, with ca 0.5 mm long glandular hairs outside, glabrous inside; tube narrowly infundibuliform, 1.0–1.1 cm long; limb distinctly 2-lipped, its adaxial lip 2-parted to the base, with lobes slightly oblique linguiform or ovate, ca 4.5 × ca 3.5 mm; abaxial lip 3-parted

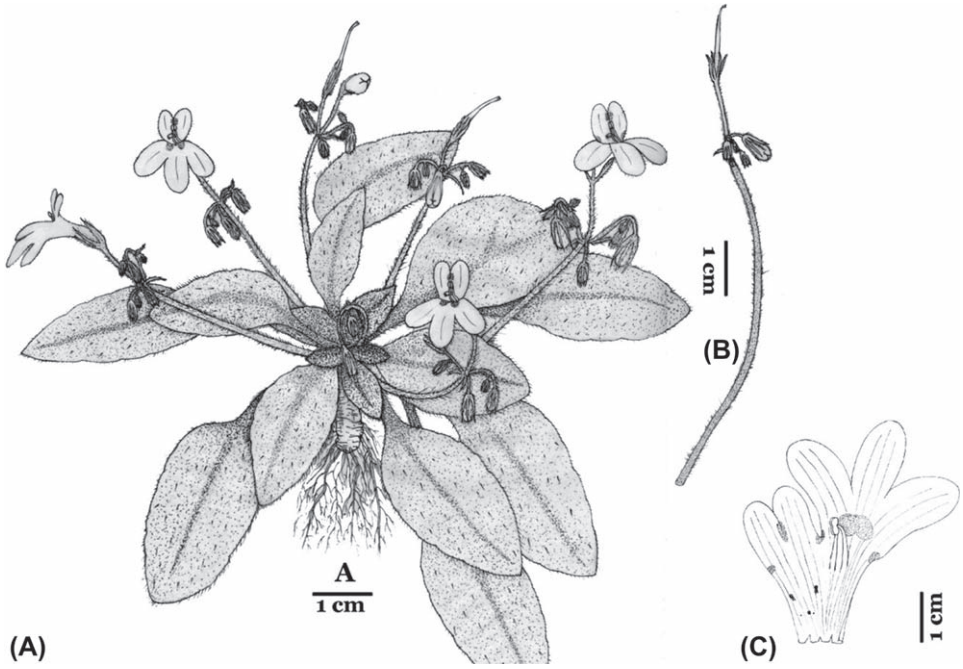

Figure 1. *Primulina tsoongii* sp. nov. (A) habit, (B) cyme, buds and pistil, (C) opened corolla exposing stamens and staminodes. From the holotype, Hui-Ling Liang, Yan-Cai Shi and De-Xin Kong, 120711 (IBK).

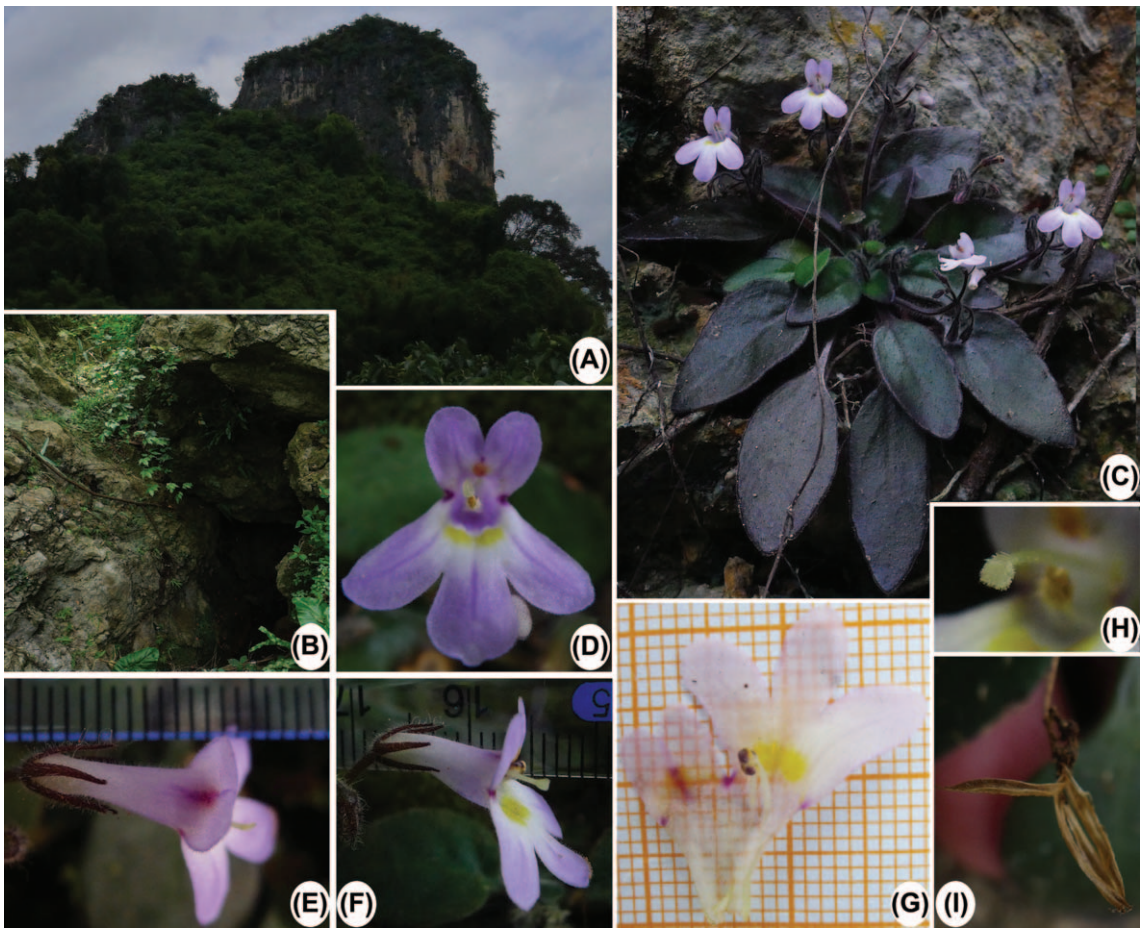

Figure 2. *Primulina tsoongii* sp. nov. (A) type locality, (B) habitat, (C) habit, (D) frontal view of corolla, (E) top view of corolla, (F) lateral view of corolla, (G) opened corolla, (H) stigma, (I) capsule.

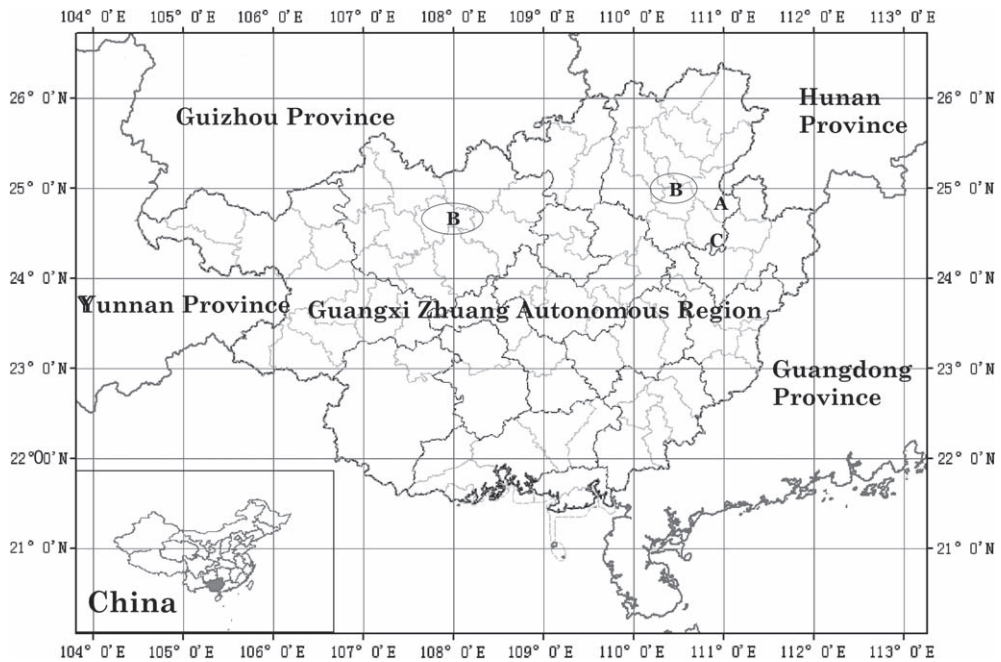

Figure 3. Known distribution of *Primulina tsoongii* sp. nov. (A), two known localities of *P. hochiensis* (B) and *P. hochiensis* var. *rosulata* (C).

Table 2. Morphological comparison of *Primulina tsoongii* sp. nov., *P. hochiensis* and *P. hochiensis* var. *rosulata*.

Character	*P. tsoongii*	*P. hochiensis*	*P. hochiensis* var. *rosulata*
Stolons	lacking	numerous	lacking
Leaf blade	ovate, oval or broadly oblanceolate, when young densely erect villous, when mature with sparse hirsute pubescence	ovate, ovate-elliptic or nearly rounded, base nearly rounded or broadly cuneate, apex nearly rounded to obtuse	elliptical to slightly ovate, base cuneate, apex acute
Leaf blade margin	indistinctly crenate or repand	6–8 crenate on each side or rarely subentire	entire
Bracts (mm)	3.5 × 0.4 to 4.0 × 0.5	3.0–4.0 × ca 1.2	4–5 × ca 1
Filaments	slightly geniculate near base, glabrous	geniculate close to the base, glabrous	straight, glandular pilose
Anthers	glabrous	abaxially white villous	glabrous
Stigma	yellowish, ligulate, undivided, apex truncate, with dense elongate papillae	purple, ligulate, emarginate at apex, glabrous	translucent to white, obtrapeziform, apex 2-lobed to the middle, glabrous
Flowering time	Late June to early July	October	August

to the middle, with lateral lobes obliquely ovate, 5.0 × 4.5 to 6.0 × 5.5 mm and the central lobe 4.5 × 5.0 to 5.0 × 5.5 mm. Stamens 2, adnate to ca 0.8 cm above the corolla base; anthers dark brown, reniform, ca 2.5 × 1.2 mm, glabrous; filaments slightly geniculate near base, ca 4.5 mm long, glabrous; staminodes 3, lateral ones short linear, glabrous, 0.5 mm long, adnate to 2 mm above the corolla base, the central one linear, 0.2–0.3 mm long, adnate to 0.5 mm above the corolla base; disc annular, its margin entire or sometimes slightly erose, 0.4–0.5 mm high. Pistil 9.2–9.7 mm long; ovary linear, ca 4.0 mm long and ca 1.5 mm in diameter, densely puberulent with glandular and eglandular hairs; style 1 cm long, ca 0.5 mm in diameter, its middle-lower part glandular-puberulent, the part close to stigma

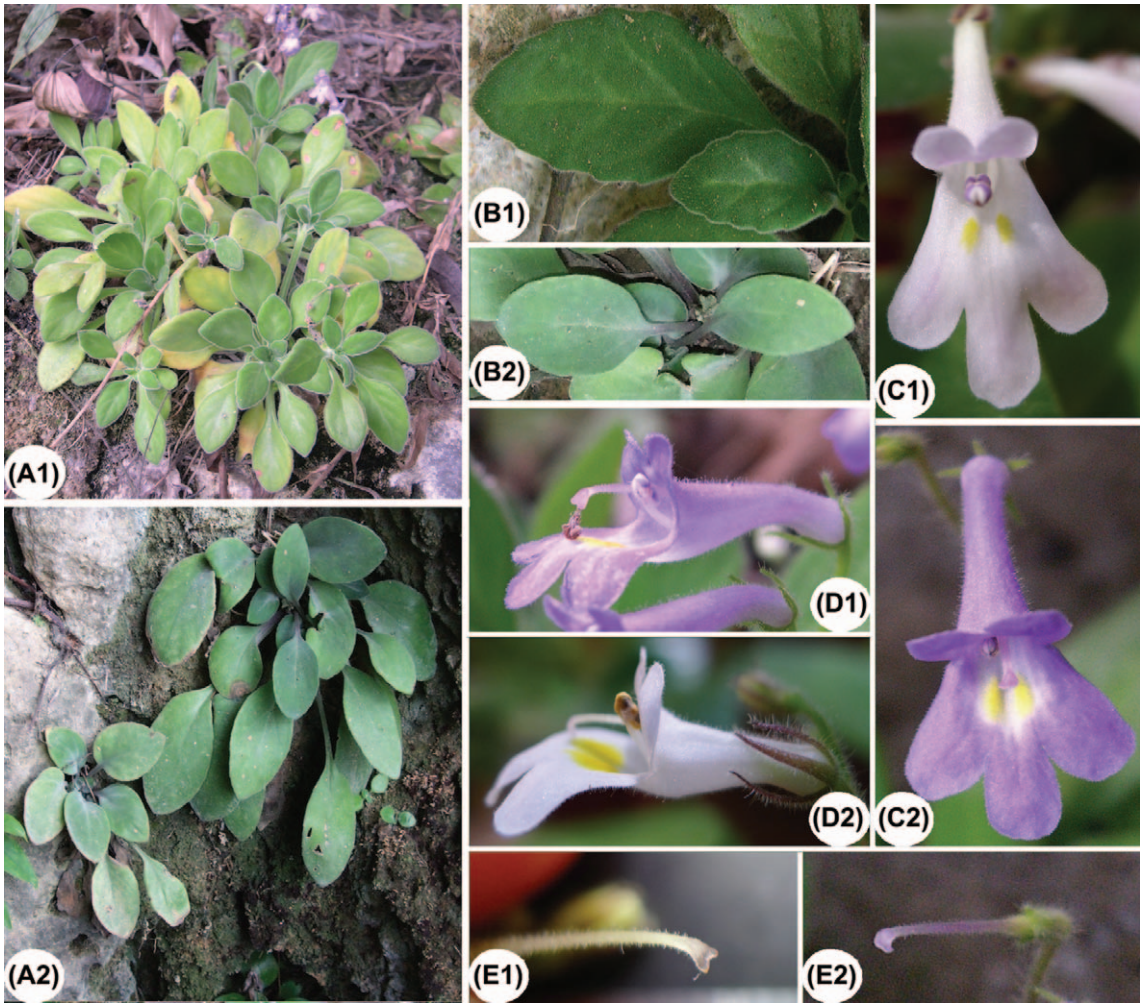

Figure 4. (1) *Primulina hochiensis*, (2) *P. hochiensis* var. *rosulata.* (A) habitat, (B) top view of leaves, (C) frontal view of flower, (D) lateral view of flower, (E) style and stigma.

glabrous. Stigma undivided, ligulate, yellowish, with truncate apex, 0.8 mm long and 0.5 mm in diameter, with dense elongate papillae. Capsule linear, ca 0.8–1.0 cm long, pubescent. Seed not seen.

Phenology

Flowering is in July and the fruiting period occurs in September and October.

Distribution, ecology and conservation status

Primulina tsoongii is known only from the type locality near Lianhua town, Gongcheng County, Guilin, Guangxi (Fig. 3). It grows only in shaded moist rock crevices and cave entrances of limestone hills under subtropical evergreen broadleaved forests, at an elevation of about 160 m a.s.l. The annual average temperature of Pingle County is 19.7°C and average annual precipitation is 1437.7 mm. At present, a total of two sites in one locality are known, with a total of more than 3500 individuals. We propose that *P. tsoongii* should be considered as 'Vulnerable' (VU D2) according to IUCN red list criteria (IUCN 2001).

Similar species

A morphological comparison between *Primulina tsoongii* and the most closely related taxa *P. hochiensis* and *P. hochiensis* var. *rosulata* is provided in Table 2 and Fig. 1, 2, 4.

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