



## *Primula weimingii* (Primulaceae), a new species from Yunnan, China

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**ABSTRACT:** *Primula weimingii* Bin Yang & Y.H.Tan, a new species of Primulaceae from Yuanyang County, Yunnan Province, China, is described and illustrated. Morphological characters and phylogenetic analyses in our previous research support *P. weimingii* as a member of the *P.* sect. *Obconicolisteri*. *Primula weimingii* is characterized by having mostly creeping scape with a propagating function that terminates in a leaf rosette, carrying an umbel of 2–4 flowers, narrowly campanulate calyx, 5–7mm long, and corolla tube slightly longer than the calyx.

**KEY WORDS:** *Obconicolisteri*, *Primula obconica*, *Primula zhengyii*, Primulaceae, Yunnan.

### INTRODUCTION

*Primula* L. is one of the largest genera in Primulaceae, consisting of more than 500 species, including 38 sections worldwide (Hu and Kelso, 1996; Richards, 2003). It is widely distributed throughout Asia and Europe in the temperate and cold regions and the tropical mountains of the northern hemisphere (Richards, 2003). There are more than 300 species in China, primarily distributed in western Sichuan, eastern Xizang, and northwestern Yunnan (Hu, 1990, 1998; Hu and Kelso, 1996; Richards, 2003).

Section *Obconicolisteri* is one of 38 sections traditionally recognized in *Primula* (Richards, 2003). A general introduction to the section and its definition based on morphological characters was discussed in our recent paper (Yang *et al.*, 2023). It comprises ca. 17 species, of which 13 are endemic to China (Hu and Kelso, 1996; Fang, 1998; Richards, 2003; Zhong *et al.*, 2019; Averyanov *et al.*, 2020; Ma *et al.*, 2021; Yang *et al.*, 2023).

One unknown *Primula* species was discovered during our recent field expedition to survey plant diversity in Yuanyang Guanyinshan Provincial Nature Reserve, Yunnan Province, China. Based on a detailed examination of the morphological characteristics of our material and closely related species (Hu and Kelso, 1996; Richard, 2003), and our recent phylogenetic analysis (Yang *et al.*, 2023), we concluded that this species collected in Yuanyang belong to a species new to science, which is at this moment described and affiliated to *Primula* sect. *Obconicolisteri*.

### MATERIALS AND METHODS

Morphological descriptions were based on living collections and dried specimens. Related species were chosen for morphological comparisons and phylogenetic results (Yang *et al.*, 2023), with the morphological features of these species culled from type specimens and descriptions in previous studies (Smith and Fletcher, 1946; Hu and Kelso, 1996; Richards, 2003). Voucher specimens have been deposited in the herbaria of the Xishuangbanna Tropical Botanical Garden (HITBC), South China Botanical Garden (IBSC), Kunming Institute of Botany (KUN), Institute of Botany (PE), Chinese Academy of Sciences.

To assess the phylogenetic position and interspecific relationship of the new species, the nuclear ribosomal internal transcribed spacer (nrITS) and chloroplast genome were used for phylogenetic analyses in our previous research, which sampled as "P\_sect\_obconica\_YB184" (Yang *et al.*, 2023). The detailed analytical methods regarding phylogenetic analyses have been described in our previous research (Yang *et al.*, 2023).

### RESULTS AND DISCUSSION

Morphologically, *Primula weimingii* shares certain similarities with *P. obconica* subsp. *obconica* and *P. zhengyii*, both of which belong to *P.* sect. *Obconicolisteri* at this moment in our previous studies (Yang *et al.*, 2023). These similarities include cup-shaped calyxes, globose capsules, elliptic leaf blades with rounded apex and cordate base.

**Table 1.** Morphological character differences amongst *Primula weimingii*, *P. zhengyii*, and *P. obconica* subsp. *obconica*.

Characters	<i>Primula weimingii</i>	<i>P. zhengyii</i>	<i>P. obconica</i> subsp. <i>obconica</i>
Leaf blade	elliptic to ovate-elliptic, 2.5–5.6 × 2.1–4.2 cm	ovate-elliptic to elliptic, 3.5–9.0 × 2.5–6.0 cm	ovate-rotund to elliptic or oblong, 1.5–17 × 1–11 cm
Scape	mostly creeping, with propagating function that terminates in a leaf rosette, 8.5–22 cm	erect without propagating function, 6.5–15 cm	erect without propagating function, 2.5–25 cm
Inflorescences	2–4 flowers	3–12 flowers	2–13 flowers
Pedicels	2.5–10 mm	8–15 mm	5–25 mm
Bracts	5–8 mm	2–5 mm	5–10 mm
Calyx	5–7 mm, narrowly campanulate	3–4 mm, campanulate	5–10 mm, cup-shaped to broadly campanulate
Calyx lobes	triangular, apex acute	triangular, apex acute	broadly triangular, apex hydathode-apiculate
Corolla	pink, annulate, limb 1.2–2.0 cm in diameter	pink, annulate, limb 1.1–1.2 cm in diameter	pink to lavender-rose, rarely white, annulate, limb 1.5–2.5 cm in diameter
Corolla tube	8–9 mm, slightly longer than the calyx	5–8 mm, 1.5–2 times as long as the calyx	7–12 mm, 1.5–2 times as long as the calyx
Style & Stamens	pin flowers: stamens ca. 4.5 mm above base of corolla tube, almost in the middle of corolla tube, style ca. 9 mm; thrum flowers: stamens inserted ca. 1.5 mm near throat of corolla tube, ca. 7.5 mm above base of corolla tube, style 3.5–4 mm	pin flowers: stamens ca. 2.5 mm above base of corolla tube, almost in the middle of corolla tube, style 5–6 mm; thrum flowers: stamens inserted near throat of corolla tube, 5–6 mm above base of corolla tube, style 3–4 mm	pin flowers: stamens near base of corolla tube, style 6–7 mm; thrum flowers: stamens inserted ca. 3 mm near throat of corolla tube, ca. 8 mm above base of corolla tube; style 2–2.5 mm

The new species is forming a sister relationship to the clade with species of *Primula chapaensis*, both based on the phylogenetic analyses of Bayesian inference from the nrITS sequences (BI<sub>pp</sub> = 0.99, BS = 80%) and chloroplast genome (BI<sub>pp</sub> = 1, BS = 100%) (Yang *et al.*, 2023). The sister relationship clade with *P. zhengyii*, *P. zhui*, three species of sect. *Obconicolisteri* and *P. sugongii* form the strongly supported monophyletic clade I (BI<sub>pp</sub> = 1, BS = 94%) in the phylogenetic analyses of Bayesian inference from the nrITS sequences (Yang *et al.*, 2023). Therefore, based on comprehensive morphological and molecular evidence, we assign this species to *Primula* sect. *Obconicolisteri*.

## TAXONOMIC TREATMENT

*Primula weimingii* Bin Yang & Y.H.Tan, *sp. nov.*

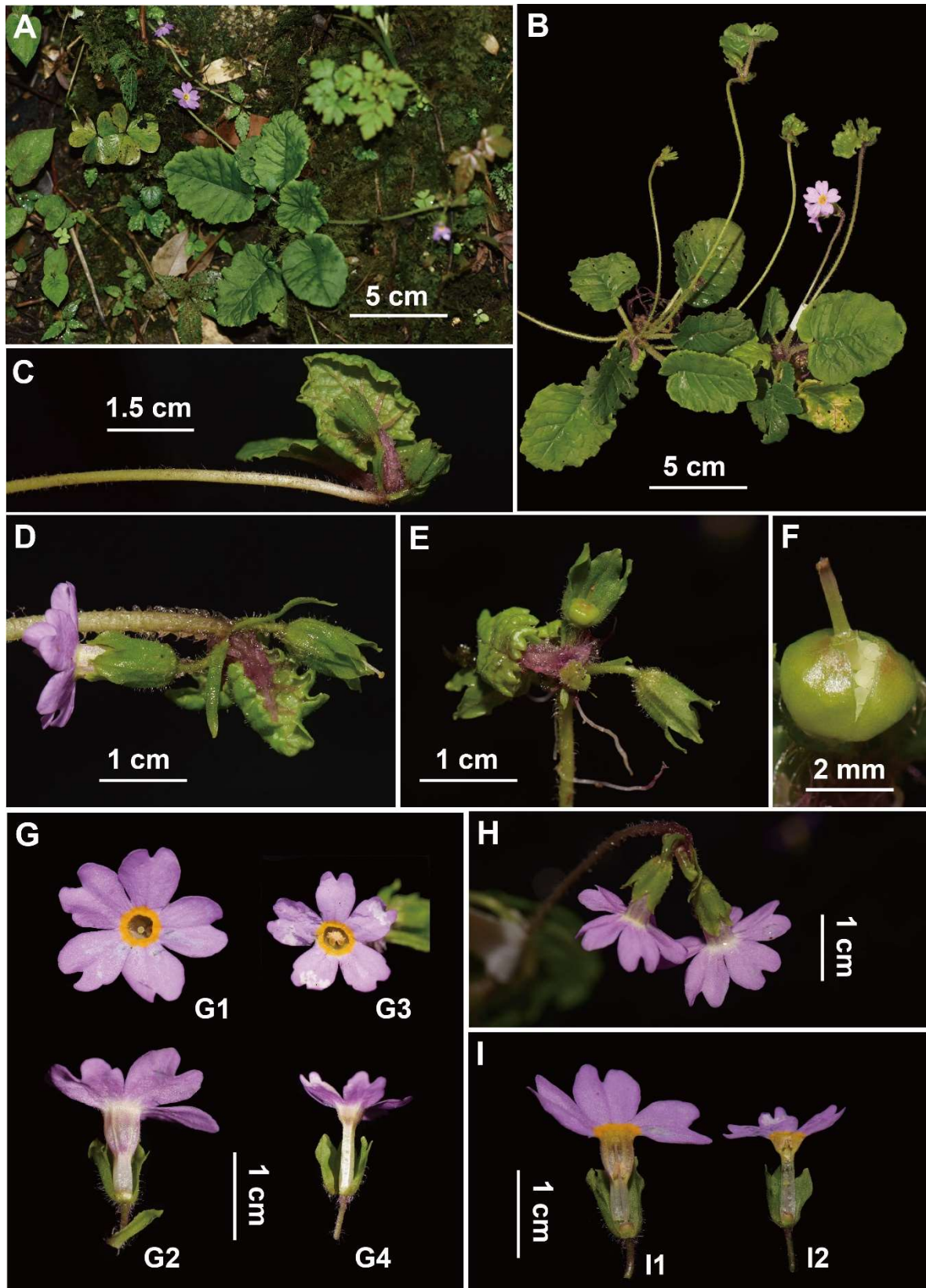
维明报春 Figs. 1, S1 & 2(A1, A2)

**Type:** CHINA. Yunnan Province, Yuanyang County, Xiaoxinjie Township, Jinzihetou, Yuanyang Guanyinshan Provincial Nature Reserve, 22° 59' 13.23"N, 102° 59' 21.24"E, terrestrial perennial herbs under mid-montane humid evergreen broadleaved forests, eleven. 2510 m, 22 April 2022, S.S.Zhou, L.Wang, D.L.Quan, M.Li, X.Luo, N.Han, W.Yang GYS00450 (holotype: HITBC[0091830]; isotypes: HITBC[0091831], IBSC, KUN, PE).

**Diagnosis:** *Primula weimingii* is similar to *P. zhenyii* in having elliptic to ovate-elliptic leaf blades and stamens inserted almost in the middle of the corolla tube of pin flowers, near the throat of the corolla tube of thrum flowers, but can be easily distinguished by its mostly creeping scape with propagating function that terminates in a leaf rosette, carrying an umbel of 2–4 flowers, calyx

narrowly campanulate, 5–7 mm (vs. 3–4 mm) long, and larger corolla size (1.2–2.0 cm vs. 1.1–1.2 cm) (Table 1).

**Description:** Perennial herb, 5–15 cm, efarinose. **Leaves** forming a spreading rosette, petiole 2.0–7.5 cm long, with densely stained white pilose, leaf blade elliptic to ovate-elliptic, 2.5–5.6 × 2.1–4.2 cm, rounded to obtuse at the apex, cordate at the base, sinuate or repand at the margins, thinly papery when dry, adaxially sparsely puberulent to subglabrous, abaxially sparsely puberulent, short pilose along the nerves; lateral nerves 4–6 pairs, raised and prominent abaxially, terminated in a leaf rosette. **Scape** arises from the basal of the leaf rosette during anthesis, extending within the leaf rosette, mostly creeping along the ground and rooting at the nodes with bracts to propagate, and serving a similar vegetative function as a stolon, 8.5–22 cm long, longer than the leaves, covered by stained white pilose, carrying an umbel of 2–4 flowers, procumbent along the surface of the ground and rooting at the nodes. **Bracts** 5–8 × 1–1.5 mm, linear, covered by pilose abaxially. **Pedicels** 2.5–10 mm, surrounded by sparsely pink or stained white pilose and puberulous. **Flowers** distylous. **Calyx** 5–7 mm, narrowly campanulate, outer surface sparsely with stained white pilose and puberulous, inner surface puberulent, split to one-third, lobes triangular, 2–2.5 × 1.5–2 mm, apex acute. **Corolla** pink, with yellow eyes, annulate, puberulous to puberulent at throat, limb 1.2–2.0 cm in diam., lobes obovate, apex emarginate, corolla tube 8–9 mm, slightly longer than the calyx, sparsely puberulous; **pin flowers:** stamens ca. 4.5 mm above base of corolla tube, almost in the middle of corolla tube, style ca. 9 mm, nearly as long as corolla tube; **thrum flowers:** stamens inserted ca. 1.5 mm near throat of corolla tube, ca. 7.5 mm above base of corolla tube, style 3.5–4 mm.



**Fig. 1.** *Primula weimingii* Bin Yang & Y.H.Tan. **A.** Habitat; **B.** Habit; **C.** Stolon with infructescence; **D.** Inflorescence; **E.** Infructescence; **F.** Immature capsule; **G.** Flowers (Pin flowers: **G1.** front view, **G2.** lateral view; Thrum flowers: **G3.** front view, **G4.** lateral view); **H.** Inflorescence; **I.** Dissected flowers, showing stamens and styles (**I1.** pin flowers, **I2.** thrum flower). (Photos: **A** by Li Wang, **B-I** by Bin Yang)



**Ovary** globose. **Immature Capsule** subglobose, included in the calyx, c. 3 mm in diameter, mature capsule not seen.

**Phenology:** Flowering in April, fruiting unknown.

**Etymology:** The species epithet *weimingii* honors Prof. Weiming Zhu (朱维明-Wei Ming Chu, 1930-2023) from Yunnan University, who worked on plant taxonomy and made significant contributions to China's flora of lycophytes and ferns.

**Distribution and habitat:** *Primula weimingii* is endemic to the east of Yunnan, southwest China, only known from its type locality, it grows in very damp soil covered with moss in the understory of mid-montane humid evergreen broadleaved forests or forests mixed with bamboo at altitudes of 2400-2600 m.

**Preliminary conservation status:** This species is only known from its type locality, which is in the nature reserve, and the habitats are well preserved. Therefore, it is assigned a preliminary Least Concern (LC) status according to the IUCN Red List Categories (IUCN Standards and Petitions Committee, 2022). However, since very few details exist about its natural distribution, a detailed investigation of the same habitats may identify more populations and individuals of this species.

**Notes:** The new species most resembles *Primula zhengyii* and *P. obconica* subsp. *obconica* on habit, however, *P. weimingii* can be clearly distinguished from the latter two species by its scape mostly creeping along the ground and rooting at the nodes with bracts to propagate, and serving a similar vegetative function as a stolon. In contrast, the latter two species have erect scapes without propagating function. The new species have several other characteristics of flowers that differ from *P. obconica* subsp. *obconica*. The corolla tube of *P. weimingii* is slightly longer than the calyx, calyx narrowly campanulate, and the calyx lobes triangular with acute apex, whereas the corolla tube of *P. obconica* subsp. *obconica* is 1.5–2 times as long as the calyx, cup-shaped to broadly campanulate calyx, and calyx lobes broadly triangular with hydathode-apiculate apex. A detailed morphological comparison among these three species is given in Table 1 and Fig. S2.

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