Gardens' Bulletin Singapore 76(2): 285–291. 2024
doi: 10.26492/gbs76(2).2024-11

Primulina serina, a new species of Gesneriaceae from northern Guangxi, China

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ABSTRACT. A new species of *Primulina* Hance (Gesneriaceae), *P. serina* F.Wen & W.C.Chou from northern Guangxi, China, is described and illustrated. It is morphologically similar to *P. versicolor* F.Wen, B.Pan & B.M.Wang, but can be easily distinguished by its smaller bracts. In its natural habitat, this species exists only in two subpopulations, and they occupy an area of less than 40 m^2 and, following IUCN guidelines, this new species is provisionally assessed as Critically Endangered (CR).

Keywords. Lamiales, morphology, *Primulina versicolor*, taxonomy

Introduction

Primulina Hance is a perennial herb of Gesneriaceae, distributed mainly in Guangxi, China and northern Vietnam, and is a representative plant of karst landform habitats (Wei, 2018; Xu et al., 2023; Yang et al., 2023). Since 2011, a significant number of species included in the former genus *Chirita* Buch.-Ham. ex D.Don have been incorporated into *Primulina*. Additionally, many species of former *Chirita* have been placed in other genera, such as *Microchirita* (C.B.Clarke) Yin Z.Wang, *Henckelia* Spreng., *Damrongia* Kerr ex Craib and *Liebigia* Endl. (Weber et al., 2011, 2013; Möller et al., 2016). Since then, *Primulina* has become the genus with the largest number of species in Gesneriaceae in China from an originally monotypic genus. At present, there are approximately 230 known and reported species of *Primulina* in total, with about 215 species in China and with other species in Vietnam (Wei et al., 2022; GRC, continuously updated).

In October 2020, the research team of the Gesneriaceae Conservation Center of China (GCCC) of the Guangxi Institute of Botany, Chinese Academy of Sciences, carried out a botanical survey for karst Gesneriaceae in North Guangxi, and discovered an unknown species of *Primulina*. At that time, this plant was blooming with yellow flowers, and its morphological characteristics were initially considered similar to those of *P. versicolor* F.Wen, B.Pan & B.M.Wang (Pan et al., 2016), but differed from that

species by a combination of several characters of leaves, bracts and corolla. Living plants were collected and grown in the greenhouse of GCCC for further observation. Since cultivation began in 2020, plants of the unknown species, as well as several individuals of *P. versicolor*, have been flowering every year, and have been found to be easily distinguished through differences in their morphology. Additionally, we examined specimens deposited in relevant herbaria (HITBC, IBK, KUN, PE) and digital specimens available online, particularly type specimens from E, HN, K, P and VMN. Online resources such as the Chinese Virtual Herbarium (http://cvh.ac.cn/) and Global Plants on JSTOR (https://plants.jstor.org/) were also consulted. Furthermore, we referenced relevant taxonomic publications on *Primulina* from adjacent regions (e.g., Wang et al., 1990, 1998; Wei et al., 2010; Wei, 2018; Wei et al., 2022). We confirmed that it represents an undescribed species of *Primulina*, which is described and illustrated here.

Taxonomic treatment

Primulina serina F.Wen & W.C.Chou, **sp. nov.**
The new species is most similar in leaf characteristics to *Primulina versicolor* F.Wen, B.Pan & B.M.Wang but differs by its lanceolate to narrowly ovate (vs broadly ovate or sub-rounded) bracts 3–3.5 × 1–1.2 mm (vs 50–55 × 44–50 mm). – TYPE: China, Guangxi Zhuangzu Autonomous Region, Hechi City, Luocheng County, Tianhe Town, Xinjian Village, growing in moist and shaded rock crevices or on tufa surface on the limestone cliff of hill, 24°47′N 108°42′E, 260 m, 12 October 2020, flowering, *W.C. Chou et al. CWC201012-01* (holotype IBK; isotype IBK). (Fig. 1)

Perennial herb. ***Rhizomes*** 4–20 cm long, 1.5–2.2 cm diam. ***Leaves*** 5–10, all in a basal rosette, or clustered at apex of the rhizome after several years of growth; petiole compressed, 4–6 cm long, c. 1 cm wide at midpoint; leaf blade slightly fleshy to fleshy, dark green adaxially, pale green and sometimes with purplish red spots abaxially, orbicular, ovate, obovate, elliptic or broadly oblong (changing significantly depending on the habitat), apex acute, 8–12 cm long, 4–8 cm wide, base cuneate, margin entire but occasionally inconspicuously serrate, sparsely pubescent on both sides, lateral veins 3–5 on each side of midrib. ***Cymes*** all axillary, each plant with 2–4 cymes, 1–5-branched, 6–30-flowered or more in each cyme; peduncle 10–15 cm long, 1.5–2.5 mm diam., densely pubescent; bracts 2, opposite, lanceolate to narrowly ovate, 3–3.5 mm long, 1–1.2 mm wide at middle, apex acute, margin entire, abaxially densely pubescent, adaxially sparsely pubescent to glabrescent, sometimes glabrous; pedicel green, 1–1.5 cm long, c. 1 mm diam., densely puberulent and glandular-puberulent. ***Calyx*** of 5 lobes deeply divided to base, lobes purplish red, narrowly lanceolate to lanceolate, 3–3.5 mm long, 1–1.5 mm wide at base, with purplish red pubescence on both sides. ***Corolla*** 2.5–4 cm long, outside pale yellow to yellow, inner surface of lobes yellow, tube white with 2 bright yellow stripes, zygomorphic, tube 1.6–2.5 cm long, 1–1.5 cm diam., outside covered with purple erect glandular-puberulent hairs, inside

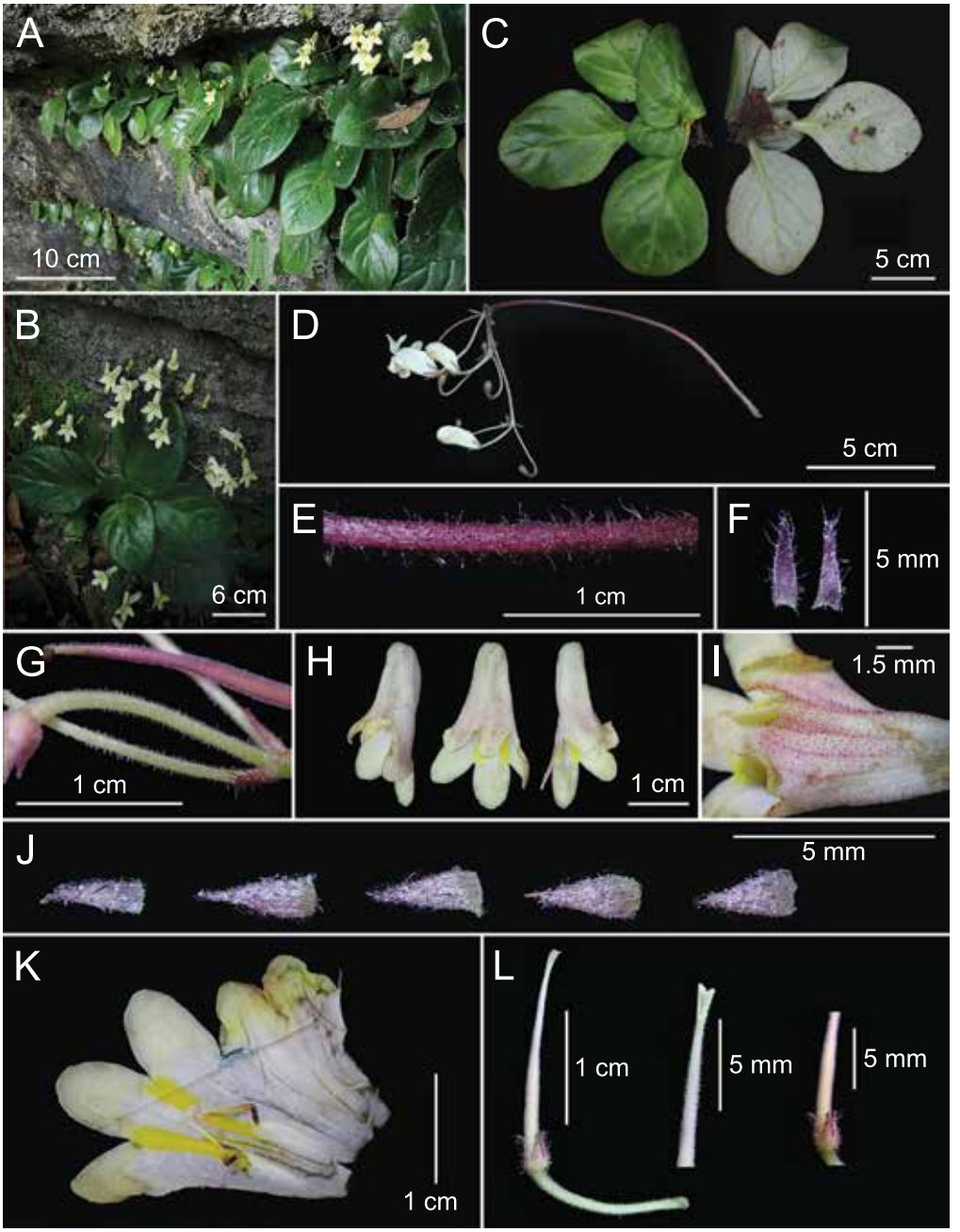

Fig. 1. *Primulina serina* F.Wen & W.C.Chou. **A.** Habitat. **B.** Habit. **C.** Abaxial (right) and adaxial (left) surface of leaves. **D.** Flowering cyme. **E.** Indumentum on peduncle. **F.** Adaxial view of bracts. **G.** Pedicels. **H.** Corolla front (middle) and side views (left and right). **I.** Purple erect glandular hairs on corolla. **J.** Calyx lobes, dissected showing the abaxial surfaces. **K.** Opened corolla, showing stamens (anthers and filaments) and staminodes. **L.** Pistil (left), style and stigma (middle), and ovary plus calyx (right). (Photos: W.C. Chou, F. Wen & D.C. Meng)

nearly glabrous; limb 2-lipped, adaxial lip distinctly shorter than abaxial lip, 2-lobed, lobes semicircular to oblong, margin entire, apex obtuse, 5–8 mm long, 6–10 mm wide at base, densely glandular-puberulent on both surfaces; abaxial lip 3-lobed, lobes oblong, margin entire, apex obtuse, 8–12 mm long, 6–10.5 mm wide at base, densely glandular-puberulent on both surfaces. ***Stamens*** 2, adnate to 1–1.2 cm above corolla base; anthers white, reniform, slightly constricted at the middle, sparsely puberulent, 1.5–2 mm long, cohering face-to-face; filaments linear, brown from base up to upper third, then gradually transitioning to a pale yellow-white towards the top, 8–10 mm long, sparsely glandular-puberulent, geniculate at 1/3 from base; staminodes 3, two lateral ones white, linear, adnate at 3–5 mm above corolla base, 3.5–4.5 mm long, glandular puberulent, central one transparent, punctate, adnate near corolla base, 0.5–0.9 mm long, glabrous. ***Disc*** circular, whitish-yellow to pale waxy-yellow, c. 1.2 mm high, glabrous, margin slightly repand to entire. ***Pistil*** c. 2 cm long, densely pubescent and glandular-puberulent except stigma; style white, linear, 5–8 mm long, 0.5–0.8 mm diam.; ovary white with a hint of pale pink blush, slightly wider diam. than style, linear, 11–15 mm long, 10–15 mm diam.; stigma chiritoid, lower lobe obdeltoid or narrowly trapezoidal, bifid, green, c. 2 mm long and c. 1.5 mm wide at top, sparsely papillate. ***Capsule*** linear, c. 3 cm long, c. 2 mm diam., glabrous.

Distribution and habitat. This new species, known only from two populations, is found on two limestone hills approximately 3 km apart. It occupies north-facing limestone cliffs exclusively, thriving in dimly lit, moist crevices of rocks or on tufa. In its native habitat, *Primulina serina* is a dominant plant due to the large leaves that cover most of the rock surfaces where populations are growing. Its large leaf size gives it a competitive advantage over other herbaceous companion plants, and the few species that coexist with it include *Pteris vittata* L., *Rubia cordifolia* L., and *Begonia porteri* Lévl. & Vant.

Phenology. The new species typically flowers from mid to late August through to late October, with occasional extension into November. Its natural fruiting period usually starts about two months after the flowering season, roughly from mid to late October to January of the following year.

Etymology. Primulina serina is named after the canary (*Serinus canaria*) owing to its exquisite yellow flowers. The specific epithet "*serina*" is derived from the Latin word "*citrinus*", meaning "lemon yellow", reflecting the canary's bright yellow plumage.

Vernacular name. 金翅报春苣苔 (*Jīn Chì Bào Chūn Jù Tái*).

Provisional IUCN conservation assessment. Since 2020, we have revisited the type locality of this species and the surrounding limestone hills multiple times. Through detailed field surveys, we now know that this species exists only in two populations, located in the lower half of these limestone hills. The combined Area of Occupancy (AOO) of these two populations is less than 40 m^2. The base of the limestone hills

where these populations are found are approximately 120 m wide, and the straight-line distance between the populations is around 3 km, making the Extent of Occurrence (EOO) about 360,000 m^2 (0.36 km^2). Additionally, this new species faces several threats: firstly, due to its bright yellow flowers, which are popular among plant enthusiasts and hobbyists, it is already being sold on online shopping platforms (e.g., Taobao), increasing the risk of human harvesting and habitat destruction; secondly, the area where this species is found does not fall under any national or provincial conservation areas and is not protected by local laws and regulations; thirdly, in the second half of 2022, Guangxi experienced a severe drought that lasted seven months, during which we observed about one-third of the mature plants died. Currently, the combined number of mature and healthy individuals within the two known populations does not exceed 300 individuals. Therefore, based on these observations and the guidelines of the IUCN Standards and Petitions Committee (2024), the conservation status of this species is provisionally assessed as Critically Endangered (CR B1a,b(i,iii,v); B2a,b(ii,iii,v)).

Notes. To date, a total of 27 species of *Primulina* (including the new species described here) have been reported to have yellow or predominantly yellow flowers, ranging from light to deep shades of yellow, and accounting for approximately 11.7% of the known species in this genus. Among them, seven species are *Chiritopsis*-like, characterised by their small, pale-yellow flowers. The corolla length of these species is often less than 1 cm, and their colour is not bright, as found in, for example, one of the representative species *Primulina repanda* (W.T.Wang) Yin Z.Wang. Another group in *Primulina* is the *Chirita*-like species with yellow, larger flowers, with the corolla usually significantly exceeding 2 cm long. Their flowers are bright and vibrant, offering high ornamental value and breeding potential. There are about 16 species in this category, accounting for approximately 59.3% of all yellow-flowered *Primulina* species. Representative species in this group include *P. lutea* (Yan Liu & Y.G.Wei) Mich.Möller & A.Weber, *P. leprosa* (Yan Liu & W.B.Xu) W.B.Xu & K.F.Chung, and *P. hoangmongii* K.S.Nguyen, Aver. & C.W.Lin, which was recently published from Vietnam (Nguyen et al., 2024). The third group consists of yellow-flowered *Primulina* species with corolla sizes intermediate between the *Chiritopsis*-like (small-flowered) and *Chirita*-like (large-flowered) types. This group has only four species, accounting for about 1.5% of all yellow-flowered *Primulina* species. In summary, yellow-flowered *Primulina* species are not very numerous. Among the 27 species mentioned above, *Primulina serina* is morphologically similar to *P. versicolor*, but they can be easily distinguished from each other by a number of characters as outlined in Table 1.

ACKNOWLEDGEMENTS. We want to thank Michael LoFurno, Adjunct Professor, Temple University, Philadelphia, USA, for his editorial assistance. This study was financially supported by the Key Sci. & Tech. Research and Development Project of Guangxi (Guike ZY21195050), the capacity-building project of SBR of CAS (KFJ-BRP-017-68), the Foundation of Guangxi Key Laboratory of Plant Conservation and Restoration Ecology in Karst Terrain (22-035-26) and the Basic Research Fund of Guangxi Academy of Sciences (CQZ-C-1901).

Table 1. Morphological comparison of *Primulina serina* F.Wen & W.C.Chou and *P. versicolor* F.Wen, B.Pan & B.M.Wang.

Characters	***Primulina serina***	***Primulina versicolor***
Leaf blade shape	Ovate, obovate, elliptic, or broadly oblong, base cuneate, apex acute	Broadly oval or nearly cordate, base broadly cuneate to cordate, apex obtuse to subacute
Bract shape	Lanceolate to narrowly ovate	Broadly oval or sub-rounded
Bract size	3–3.5 × 1–1.2 mm	50–55 × 44–50 mm
Bract indumentum	Abaxially densely pubescent, adaxially sparsely pubescent to glabrescent, sometimes glabrous	Abaxially densely appressed pubescent, adaxially nearly glabrous
Calyx lobe shape	Narrowly lanceolate to lanceolate	Lanceolate
Calyx lobe size	3–3.5 × 1–1.5 mm	c. 8.5 × 2 mm
Calyx lobe indumentum	Both sides purplish red pubescent	Outside densely glandular-pubescent, inside nearly glabrous
Corolla colour	Outside pale yellow to yellow, inner surface of lobes yellow, tube white with 2 brightly yellow stripes	Canary yellow, throat dark yellow with two brownish purple stripes, the border between adaxial and abaxial lip brown, in the middle of two adaxial lip lobes with a dark brown crescent-shaped and swollen patch
Corolla indumentum	Outside densely purple erect glandular-puberulent	Outer side of the upper half of corolla erectly glandular-pubescent, outer side of the bottom half of corolla sparsely pubescent
Corolla size	2.5–4 cm long, tube 1–1.5 cm diam.	3.5–4.2 cm long, tube c. 2.8 cm diam.
Filament colour	Brown from the base up to upper third, then gradually transitioning to a pale yellow-white towards the top	White
Filament indumentum	Sparsely glandular-puberulent	Glabrous but the upper half of filament sparsely glandular-puberulent
Filament length	8–10 mm long	c. 12.5 mm long

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