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***Primulina papillosa* (Gesneriaceae), a new species from limestone areas of Guangxi, China**

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Abstract

Primulina papillosa Z.B. Xin, W.C. Chou & F. Wen, a new species from limestone areas of Guangxi, China, is described and illustrated. It resembles *P. linearifolia* (W.T. Wang) Yin Z. Wang and *P. pseudolinearifolia* W.B. Xu & K.F. Chung, but can be easily distinguished by some combined characters, especially its leaf blades densely papillose-hispid. We found only one population at the type locality with no more than 200 individuals so that this new species is provisionally assessed as Critically Endangered (CR) using IUCN criteria.

Keywords

Cliff-dwelling, flora of Guangxi, limestone flora, new taxon, taxonomy

Introduction

By the end of 2020, the genus *Primulina* Hance (1883) comprises 201 species and 27 varieties (IPNI 2021; Tropicos 2021). It is mainly distributed throughout southern and southwestern China and northern Vietnam (Wang et al. 2011; Weber et al. 2011). China is a center of diversity for *Primulina* as at least 183 species and 27 varieties occur there at present, especially limestone areas (e.g. Wen et al. 2019, 2021; Ge et al. 2020; Liu et al. 2020; Xin et al. 2020a, 2020b, 2020c). An acceleration of species discovery had been seen over the last five years, with an average of over ten new species per year (Wen et al. 2019, 2021). As this trend persists, more new species from China will most likely be discovered, even though a thorough investigation is unlikely in the short term (Möller 2019).

An amateur Gesneriaceae enthusiast from Guangxi found this unknown plant in the wild on 9 April 2020. One of authors, W.C. Chou, went to the type locality and collected the specimens for this unknown species. At the same time, some living plants were introduced and cultivated in the gardens of the Gesneriad Conservation Center of China (GCCC) and National Gesneriaceae Germplasm Bank for further study. A detailed comparison of specimens and living plant materials with the type specimens and protologues of known *Primulina* species revealed that these specimens neither fit the existing protologues nor conform to the type specimens of these species. Nevertheless, its leaf shape and rhizome are most similar to those of *P. linearifolia* (W.T. Wang) Yin Z. Wang (Wang and Pan

1982; Wang et al. 2011) and *P. pseudolinearifolia* W.B. Xu & K.F. Chung (Xu et al. 2011, 2012), it can be easily distinguished from the latter two by the combination of several morphological characters (Table 1), especially its leaf blades densely papillose-hispid. Thus, we confirmed that it represents a new species of *Primulina*, and described it here.

Taxonomic Treatment

Primulina papillosa Z.B. Xin, W.C. Chou & F. Wen, sp. nov.

urn:lsid:ipni.org:names:*****

Fig. 1 and Fig. 2E-F

Diagnosis. The new species resembles *Primulina linearifolia* (Fig. 2A-B) and *P. pseudolinearifolia* (Fig. 2C-D), but can be easily distinguished from the latter two by its leaf blades densely papillose-hispid. It differs from *P. linearifolia* by its 1–2-flowered per cyme (vs. 4–7-flowered); pedicel 20–35 mm long (vs. 5–12 mm); calyx lobes 7.5–9 mm long (vs. 3.2–4 mm); disc ca. 1.2 mm in height, margin entire (vs. ca. 0.5 mm, margin repand); capsule 5–6.5 cm long (vs. 2.2–3.6 cm). It also differs from *P. pseudolinearifolia* by its 1–2-flowered per cyme (vs. 4–12-flowered); pedicel 20–35 mm long (vs. 7–15 mm); central staminodes ca. 0.5 mm long (vs. ca. 3 mm); disc ca. 1.2 mm in height, margin entire (vs. ca. 2.5 mm, margin repand).

Type. CHINA. Guangxi: Nanning City, Longan County, Dingdang Town, 23°07'N, 107°57'E, 9 April 2020, *W.C. Chou 20200409-01* (Holotype, IBK!; Isotypes, IBK!)

Description.

Herbs perennial. **Rhizome** subterete, 10–15 cm long, 1.5–2 cm in diameter, commonly branched at the apex of the rhizome, or no branched. **Leaves** 15–25, congested at the apex of the rhizome, subsessile; **leaf blade** fleshy, linear-lanceolate, 5–15 × 0.9–1.8 cm, densely papillose-hispid on both surfaces, apex obtuse to round, base attenuate, margin entire, lateral veins 2–4 on each side of the midrib, conspicuous on the abaxial surface, inconspicuous on the adaxial surface. **Cymes** 2–5, axillary, 1–2-flowered; peduncle 4–8 cm long, ca. 2 mm in diameter, glandular-pubescent and sparsely pilose; **bracts** 2, opposite, linear-lanceolate, 6–8 × 1–1.5 mm, apex acute, margin entire, pubescent on both surfaces, pedicel 2–3.5 cm long, ca. 2 mm in diameter, glandular-pubescent. **Calyx** 5-parted from the base, segments equal, lanceolate, 7.5–9 × ca. 2 mm, abaxially glandular-pubescent, adaxially sparsely glandular-pubescent to glabrous, apex acute, margin entire. **Corolla** purple, throat with two yellow stripes inside, 3.5–4.5 cm long, outside puberulent with both glandular and eglandular hairs, inside glabrous, tube 2.5–3 cm long, orifice 1–1.5 cm in diameter; limb distinctly 2-lipped, adaxial lip 2-parted to the base, lobes ovate, 6–7 × 8–9 mm, abaxial lip 3-parted to near the middle, lobes ovate, 8–9 × 9–10 mm. **Stamens** 2, adnate ca. 1.2 cm above the corolla base; filaments 1.3–1.5 cm long, sparsely geniculate near middle; anthers reniform, 3.5–4 mm long, bearded; **staminodes** 3, lateral ones linear, glabrous, ca. 9 mm long, apex capitate, sparsely pubescent, adnate to ca. 1 cm above the corolla tube base, the central one ca. 0.5 mm long, apex capitate, adnate to 3.5 mm above the corolla tube base. **Disc** annular, ca. 1.2 mm in height, margin entire, glabrous. **Pistil** 2.5–3 cm long, **ovary** 1.4–1.6 cm long, ca. 2 mm in diameter, densely glandular-pubescent; **style** 0.9–1.2 cm long, 1.5 cm wide, glandular-pubescent; **stigma** obtrapeziform, ca. 2 mm long, apex shallowly 2-lobed. **Capsule** linear, 5–6.5 cm long, 2–3 mm in diameter,

puberulent with both glandular and eglandular hairs.

Phenology. Flowering occurs from September to November, fruiting from October to December.

Etymology. The specific epithet '*papillosa*' is derived from its leaf blades densely papillose-hispid on both surfaces.

Vernacular name. The Chinese name '刺疣报春苣苔' (Cì Yóu Bào Chūn Jù Tái) is newly coined for this species because of its special leaf blades surface full of densely papillose-hispid hairs.

Distribution and habitat. *Primulina papillosa* is only known from the type locality, Dingdang Town, Longan County, Nanning City, Guangxi, China. It only grows in a crevice of the cliff near the top of limestone hills in a subtropical evergreen seasonal rain forest.

Conservation status. *Primulina papillosa* is only found from the type population with less than 200 individuals. The beautiful flowers, fleshy rhizome and spiny leaves have led to its over-harvesting by local people who have sold it as an ornamental plant. Furthermore, the natural habitat is mostly disturbed due to local farmers imposing intense pressure on the remaining patches of primary forest. Thus, following the IUCN Red List Categories and Criteria (IUCN 2019), it is temporarily assessed as Critically Endangered [CR B1+B2ab (iii, v)].

Additional specimens examined. *Primulina linearifolia* CHINA: Guangxi, Nanning City, suburb, 1959, *Inst. Med. Nanning* 66735 (Holotype: GXMI!); Guangxi, Nanning City, Longan County, Natong, 8 April 1971, *X.X. Chen & H.M. Yang* 73117 (Paratype: GXMI!)

Primulina pseudolinearifolia, CHINA: Guangxi, Luocheng County, Huaiqun Town, 25°11'N, 108° 24' E, 350 m, 19 April 2009, *W.B. Xu & Yan Liu* 09383 (Holotype: IBK!).

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Table 1. Detailed comparison of *Primulina papillosa* and its two relatives.

Characters	<i>P. papillosa</i>	<i>P. linearifolia</i>	<i>P. pseudolinearifolia</i>
Leaf blades	densely papillose-hispid	densely appressed pubescent	densely appressed pubescent
Cymes	1–2-flowered	4–7-flowered	4–12-flowered
Pedicel	20–35 mm long	5–12 mm long	7–15 mm long
Calyx lobes	7.5–9 × ca. 2 mm	3.2–4 × 0.6–1.1 mm,	5–6 × ca. 1 mm
Central staminodes	ca. 0.5 mm long	none	ca. 3 mm long
Disc	ca. 1.2 mm in height, margin entire	ca. 0.5 mm in height, margin repand	ca. 2.5 mm in height, margin repand
Flowering time	September to November	April	April to May
Capsule	5–6.5 cm long	2.2–3.6 cm long	3–4.5 cm long

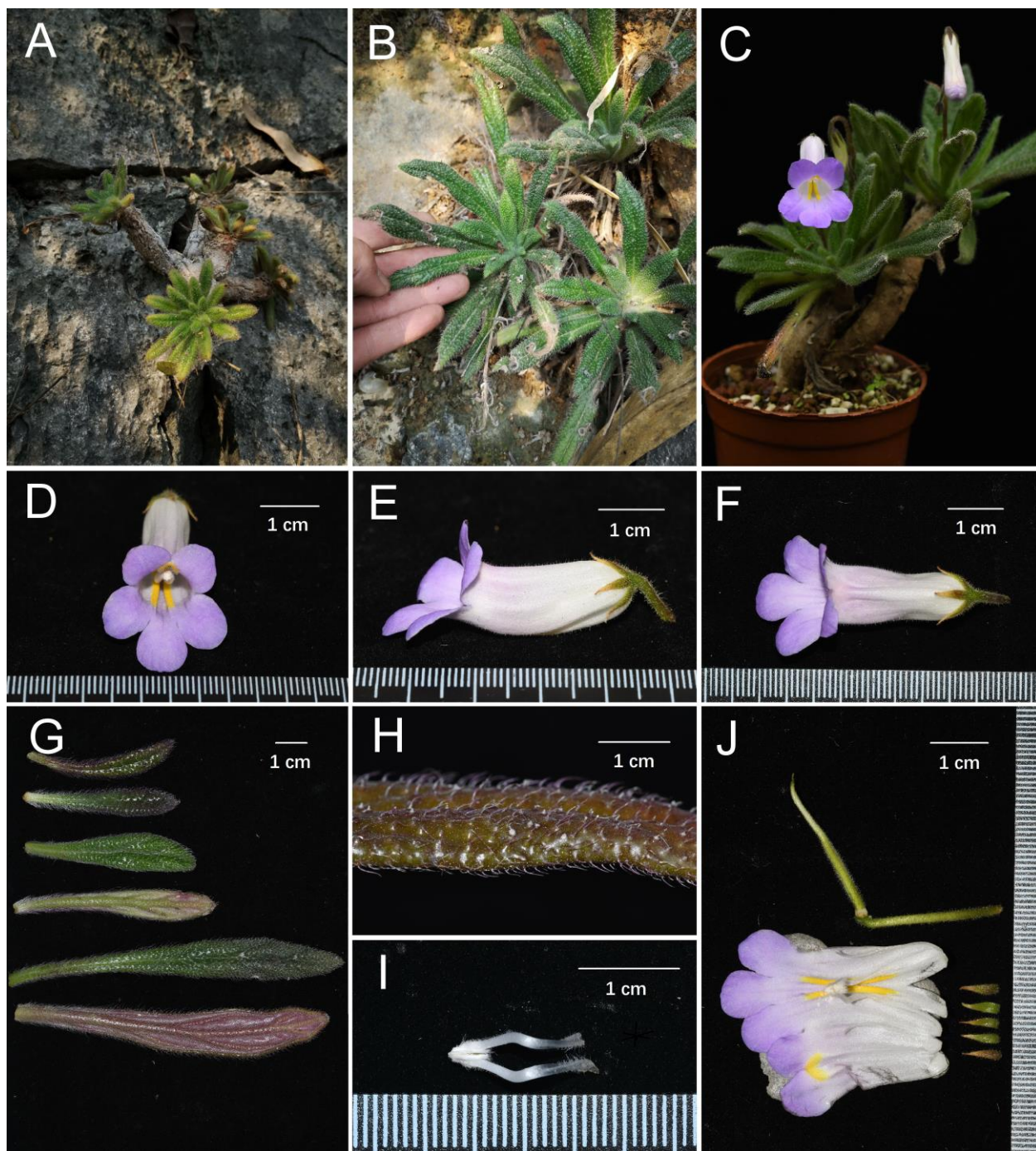


Figure 1. *Primulina papillosa* A-B habitat C habit D front view of the corolla E lateral view of the corolla F top view of the corolla G adaxial and abaxial surface of leaf blades H papillose-hispid hairs on leaf blade surface I stamens J pistil, calyx and opened corolla with stamens and staminodes (A-B: photos by W.C. Chou, C-J: photos by F. Wen; arranged by Z.B. Xin).



Figure 2. Comparison of three species of *Primulina* **A-B** *P. linearifolia* **C-D** *P. pseudolinearifolia* **E-F** *P. papillosa* (photos by F. Wen; arranged by Z.B. Xin).