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Primulina lutescens sp. nov. (Gesneriaceae) from southern Guangxi, China

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Primulina lutescens B. Pan & H. S. Ma, a new species of Gesneriaceae from Guangxi Zhuangzu Autonomous Region, China, is illustrated and described. The new species morphologically resembles *Primulina carinata* Y. G. Wei, F. Wen & H. Z. Lü, but it differs in leaf, floral characteristics and flowering time. The conservation status of *P. lutescens* is assessed as 'Endangered' (EN) according to the IUCN red list categories and criteria.

Following generic recircumscriptions based on recent molecular phylogenetic analyses, the genus *Primulina* Hance has become the largest genus of Gesneriaceae in China, (Wang et al. 2011, Weber et al. 2011). The newly revised *Primulina* consists of more than 150 species primarily distributed from southern and southwestern China to northern Vietnam (Möller et al. 2016). Species of *Primulina* with purple or purplish-red flowers are common, but there are only few species with pale yellow flowers (Pan et al. 2016). In the course of a floristic survey of limestone areas in August 2016, we discovered a Gesneriaceae with pale yellow flowers in Liufengshan Park of Lingshan County, Guangxi, China. The plant was recognized as *Primulina* by the following characters: leaves in pairs arranged into a basal rosette, cymose inflorescence, corolla with limb 2-lipped and abaxial lip 3-parted, 2 stamens, 3 staminodes, disks ring-like, ovary linear with the apex attenuate into the single chiritoid stigma, where the upper lobe of the stigma is not developed. After consulting relevant literature (Wang et al. 1998, Li and Wang 2004, Wei et al. 2010, Xu et al. 2010, 2012, Li et al. 2014, Wen et al. 2014, Guo et al. 2015, Zhou et al. 2015, Pan et al. 2016) as well as specimens from the main Chinese herbaria (IBK, IBSC, KUN, PE), we concluded that we had found a new species of *Primulina*, which is described and illustrated below.

Primulina lutescens B. Pan & H. S. Ma sp. nov. (Fig. 1–3A–B)

A species morphologically similar to *Primulina carinata* Y. G. Wei, F. Wen & H. Z. Lü, but differing by having a

pale yellow corolla (vs purple or purplish red), a less strongly carinate corolla tube that is 15–20 mm long (vs strongly carinate, 8–11 mm long), larger leaf blades 80–110 × 50–70 mm (vs 40–50 × 30–40 mm), ovate to broadly triangular bracts that are 18–22 × 10–13 mm (vs subulate to lanceolate, 4–5 × 1.0–1.5 mm), linear-lanceolate calyx lobes that are 5.0–5.5 × 1.3–1.5 mm (vs 1.20–1.33 × 0.35–0.40 mm), and by flowering from July to August (vs August to September).

Type: China, Guangxi, Qinzhou City, Lingshan County, on the rock face of limestone hills, rare, elevation 144 m a.s.l., 22°25'N, 109°16'E, 4 Aug 2016, Bo Pan and Hu-Sheng Ma MHS2016080401 (holotype: IBK, isotypes: PE, IBK).

Etymology

The specific epithet refers to the pale yellow corolla.

Description

Perennial herb. Rhizomatous stem subterete, 10–40 mm long, ca 10 mm thick. Leaves 8–15, all basal; petiole subterete, 60–110 mm long, 4–6 mm across; leaf blade elliptic, ovate or broadly ovate, 80–110 × 50–70 mm, obtuse to round at apex, slightly oblique cuneate to round at base, with entire or rarely shallowly repand margin, puberulent on both sides; lateral veins 3–5 on each side, prominent abaxially. Cymes 2–5, 1–2-branched, 3–8-flowered; peduncle 80–300 mm long, 2–3 mm across, pubescent; pedicel 14–20 mm long, pubescent and glandular-pubescent; bracts opposite, ovate to broadly triangular, 18–22 × 10–13 mm,

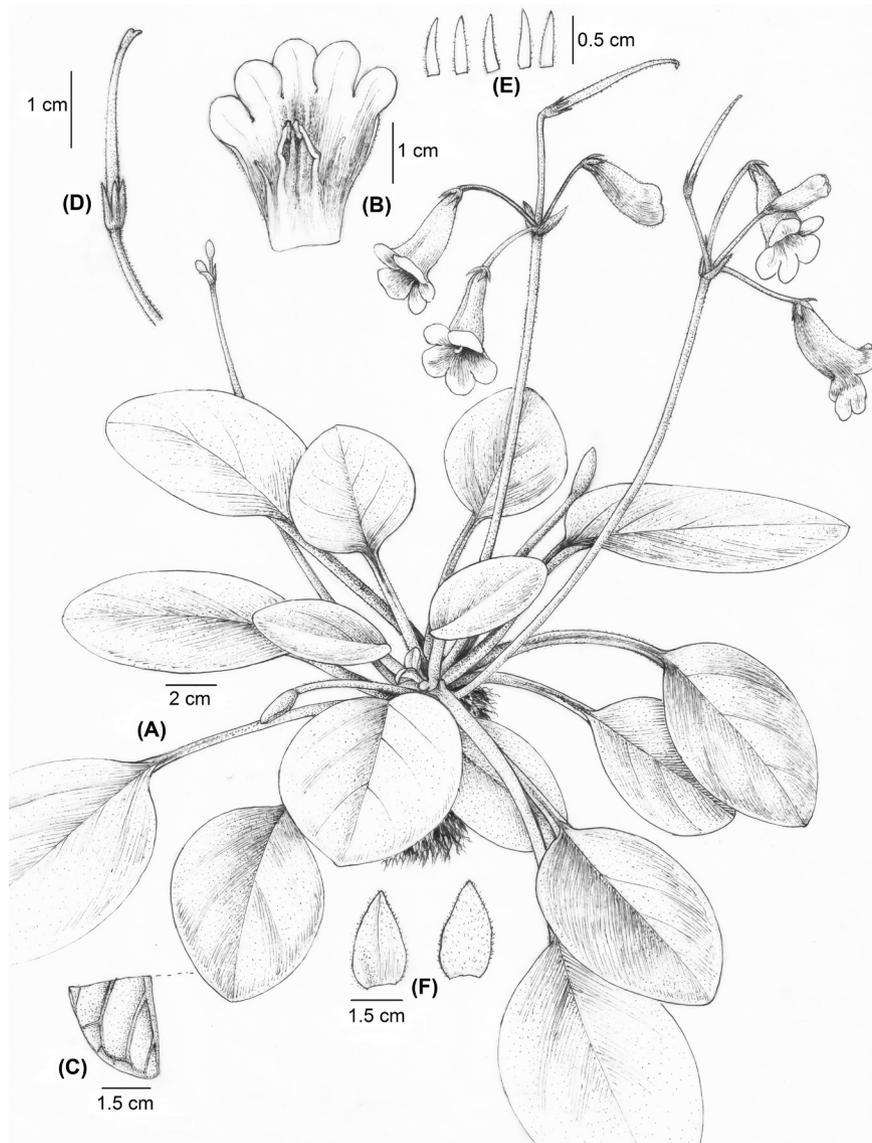


Figure 1. *Primulina lutescens* sp. nov. (A) habit, (B) corolla opened with stamens and staminodes, (C) enlarged abaxial lateral veins, (D) calyx and pistil, (E) calyx anatomy, (F) bracts. Drawn from holotype by W. H. Lin.

pubescent outside, puberulent inside, with entire to sparsely dentate margin. Calyx 5-parted nearly to the base; lobes linear-lanceolate, $5.0\text{--}5.5 \times 1.3\text{--}1.5$ mm, acuminate at apex, pubescent outside, puberulent inside, with entire margins. Corolla pale yellow with purple stripes inside, 19–26 mm long, externally pubescent, internally sparsely puberulent; corolla tube funnel-shaped–tubular, 15–20 mm long, ca 4 mm in diameter at the base, ca 8–10 mm in diameter at the mouth, ventrally carinate, with two yellow-ridged honey guides on corolla floor; limb distinctly 2-lipped, with three purplish vertical lines on each corolla lip; adaxial lip 2-parted to the middle with lobes broadly ovate, ca $5 \times 3\text{--}4$ mm; abaxial lip 3-parted to over the middle with lobes broadly

oblong, $7\text{--}9 \times 5\text{--}7$ mm. Stamens 2, adnate at ca 7 mm above the corolla tube base; filaments linear, white, 8–9 mm long, twisted at the middle, puberulent; anthers elliptic to reniform, connate at adaxial surface, dorsi-fixed, ca 2 mm long, glabrous; staminodes 3, the lateral ones ca 2 mm long, capitate at apex, adnate at ca 7 mm above the corolla tube base, the middle one ca 0.5 mm long, adnate to ca 3 mm above the corolla tube base. Disks ring-like, ca 1.2 mm in height, with repand margin. Pistil 21–23 mm long, densely puberulent, ovary 15–17 mm long, ca 2 mm across; style densely puberulent; 60–80 mm long, stigma obtrapeziform, 2-lobed. Capsule linear, sparsely pubescent, 38–51 mm long, ca 2 mm across.



Figure 2. *Primulina lutescens* sp. nov. (A) cymes, (B) corolla opened with stamens and staminodes, (C) pistil and disc, (D) side face view of corolla and calyx, (E) face view of corolla, (F) cymes and bracts. Photo by Hu-Sheng Ma.

Phenology

Flowering occurs from July to August, and fruiting from August to September.

Distribution and habitat

To date, *Primulina lutescens* has only been found at the type locality (Fig. 4). There, it grows on the shaded surface of limestone rocks, at altitudes of 40–200 m a.s.l. The main companion species are *Radermachera sinica* (Hance) Hemsl., *Alangium chinense* (Lour.) Harms, *Ficus tinctoria* Forst subsp. *gibbosa* (Bl.) Corner., *Acampe rigida* (Buch.-Ham. ex J. E. Smith) P. F. Hunt, *Bidens pilosa* L. var. *radiata* Sch.-Bip., *Drynaria roosii* Nakaike, and *Pyrrosia tonkinensis* (Giesenh.) Ching.

Conservation status

At present, on two sites in Liufengshan Park are known and the total population of *Primulina lutescens* comprises no more than 1000 individuals. Furthermore, the suitable habitat of this new species is under threat because the local authorities want to develop the tourist industry. There is a risk that all ‘weeds’ in this beauty spot will be cleared and replaced by cultivated plants. It might seem good to uninformed administrators, but it obviously means that some endemic species will disappear and become extinct. Therefore, we propose that *P. lutescens* should be considered as ‘Endangered’ (EN): B2a, according to the IUCN red list categories and criteria (IUCN 2016).

Primulina lutescens was found in a limestone karst region in the Liufengshan Park. There are no limestone landforms

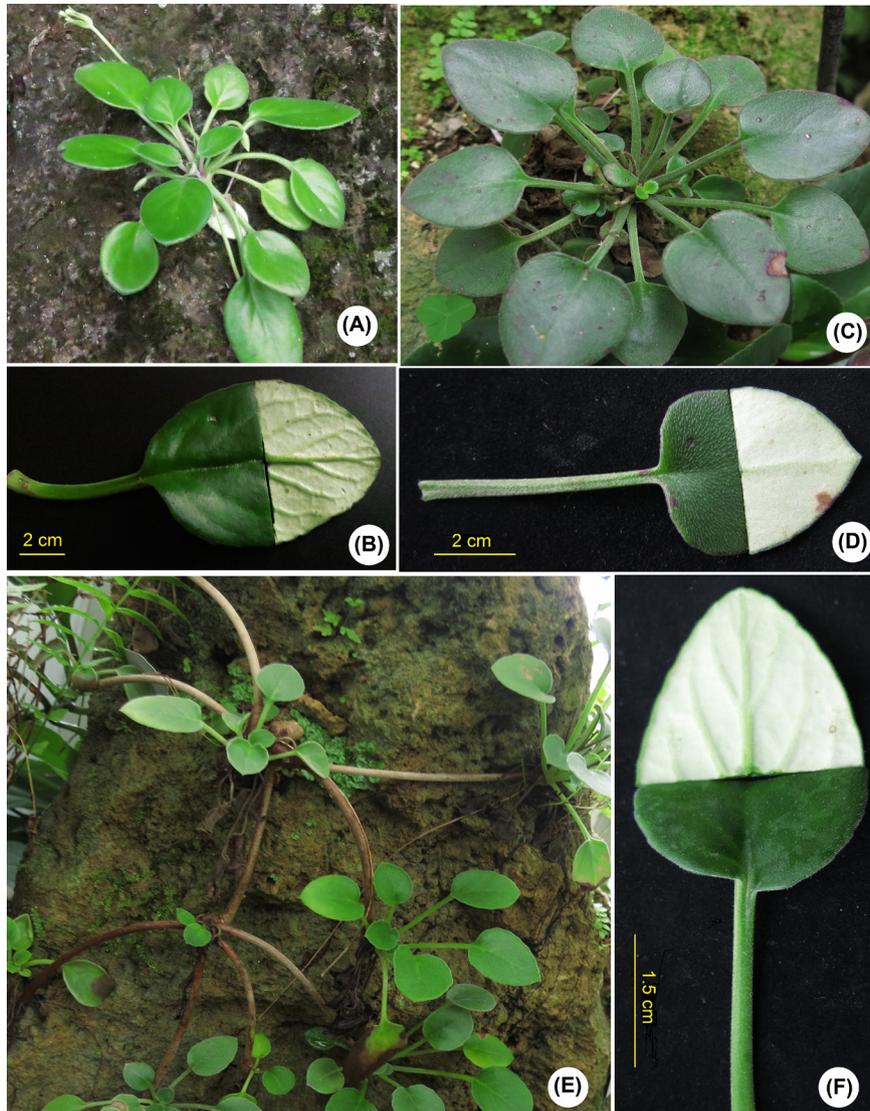


Figure 3. *Primulina lutescens* sp. nov. (A) habit, (B) adaxial and abaxial leaf. *P. carinata*: (C) habit, (D) adaxial and abaxial leaf. *Primulina parvifolia*: (E) habit, (F) adaxial and abaxial. Photo by Hu-Sheng Ma.

around the park, and the species is restricted to this karst island. Thus, the species may have evolved in situ from a geographically isolated population. After careful investigations in surrounding areas and neighboring counties, we found no further populations or related species.

Similar species

Primulina lutescens is morphologically similar to *P. carinata* Y. G. Wei, F. Wen & H. Z. Lü (Fig. 3C–D) in floral and vegetative

characteristics, but the two species show several diagnostic differences as detailed in Table 1. It is also similar to *P. parvifolia* (W. T. Wang) Yin Z. Wang & J. M. Li in habit (Fig. 3E–F). In addition to *P. lutescens*, *P. carinata* and *P. parvifolia*, there are also several other species with a carinate corolla such as *P. dryas*, *P. polycephala*, *P. langshanica* and *P. roseo-alba*. However, *P. lutescens* can easily be distinguished from all these by its pale yellow corolla. The carinate corolla tube may be derived from the infundibular type more widespread in *Primulina* and may



Figure 4 Distribution of *P. lutescens* sp. nov., *P. carinata* and *P. parvifolia* in China. Drawn by Hu-Sheng Ma.

Table 1. Morphological comparison of *Primulina lutescens* sp. nov. and *P. carinata*.

Characters	<i>P. lutescens</i>	<i>P. carinata</i>
Leaf blade (mm)	80–110 × 50–70	40–50 × 30–40
Petiole length (mm)	60–110	18.5–58.5
Pedicel length (mm)	14–20	10–12
Bract shape	ovate to broadly triangular	subulate to lanceolate
Bract size (mm)	18–22 × 10–13	4–5 × 1.0–1.5
Calyx lobes (mm)	linear-lanceolate, 5.0–5.5 × 1.3–1.5	narrowly lanceolate, 1.2–1.3 × 0.35–0.40
Corolla	pale yellow, with purple stripes inside and two yellow-ridged honey guides on corolla floor	purple or purplish red, with purplish brown stripes inside and outside
Tube (mm)	funnel-form-tubular, ventrally carinate, 15–20	narrowly funnel-form, clearly carinate, 8–11

be linked to a specialization to specific pollinators. However, to test this hypothesis detailed fieldwork is necessary.

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