Primulina albicalyx (Gesneriaceae), a new species from a karst area in Guangxi, China

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Primulina albicalyx (Gesneriaceae), a new species from a karst area in Guangxi, China

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Abstract: Primulina albicalyx, a new species of Gesneriaceae from Guangxi Zhuang Autonomous Region, SW China, is described and illustrated. This new species is similar to P. leprosa by its yellow flowers, white calyx lobes and large bracts, but can be easily distinguished from the latter by some qualitative and quantitative characters in the leaf blade, peduncle and corolla. The conservation status of P. albicalyx can be considered as Critically Endangered (CR) according to the IUCN Red List categories and criteria.

Key words: China, Gesneriaceae, Guangxi, karst, limestone, new species, Primulina, Primulina albicalyx, Primulina leprosa, taxonomy

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Introduction

The previously monotypic genus Primulina Hance (1883) has recently been redefined based on molecular data (Wang & al. 2011; Weber & al. 2011). The new Primulina has a predominant distribution in S and SW China, as well as N Vietnam. It displays a high degree of edaphic habitat specialization, i.e. the majority of species occur in karst limestone areas (Wang & al. 1990, 1998; Li & Wang 2004; Wei & al. 2010). This genus has rapidly drawn great attention from many botanists, and more than 50 new species have been described from China after its redefinition. The discovery of many new taxa of this group in a only few years suggests that Primulina diversity is not well understood, and further floristic surveys of Gesneriaceae in China are needed (Möller & al. 2016).

Flower colour in Primulina shows great variation and has been used as an important character for the description of new species, such as P. alutacea F. Wen & al. and P. versicolor F. Wen & al. and (Pan & al. 2016). However, most Primulina species have been described as having a purple-blue corolla, and yellow flowers are relatively rare. At the beginning of the redefinition of Primulina, there were only four species with yellow flowers: P. cordifolia (D. Fang & W. T. Wang) Y. Z. Wang (Wang 1982, under Chiritopsis; Wang & al. 2011), P. lutea (Yan Liu & Y. G. Wei) Mich. Möller & A. Weber (Liu & Wei 2004, under Chirita; Weber & al. 2011), P. pteropoda (W. T. Wang) Yan 1 South China Botanical Garden, Chinese Academy of Sciences, Xingke Road, Tianhe District, Guangzhou, 510650, China.
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3 Guangxi Institute of Botany, Guangxi Zhuang Autonomous Region and Chinese Academy of Sciences, Yanshan Road, Yanshan District, Guilin, 541006, China; *e-mail: panbo@gxib.cn (author for correspondence).
Liu (Wang 1985, under Chirita; Wang & al. 2011) and P. xiumingensis (X. L. Liu & X. H. Guo) Mich. Möller & A. Weber (Liu & Guo 1989, under Chiritopsis; Weber & al. 2011). Soon after, another two species, both with yellow flowers, were transferred to the new Primulina, i.e. P. daxiaiensis (W. B. Liao & al.) W. B. Liao & K. F. Chung (Shen & al. 2010, under Chiritopsis; Xu & al. 2012) and P. leprosa (Yan Liu & W. B. Xu) W. B. Xu & K. F. Chung (Xu & al. 2010, under Chirita; Xu & al. 2012). In recent years, five additional species, all with yellow flowers, have been newly described, i.e. P. alutacea and P. versicolor (Pan & al. 2016), P. jiangyongensis X. L. Yu & Ming Li (Li & al. 2014), P. lepingensis Z. L. Ning & M. Kang (Ning & al. 2014) and P. moif F. Wen & Y. G. Wei (Zhou & al. 2015). Up to now, there are 11 species with yellow flowers known in Primulina. In this paper, we describe a 12th species with yellow flowers.

At the end of June 2015, during field explorations in Du’an County, W Guangxi, China, one of the present authors (Pan) found some plants of a Primulina species at the end of their flowering period. Several remaining flowers showed yellow colour, which drew this author’s attention. Several living individuals were collected and brought to the Guilin Botanical Garden (GBG) and were cultivated there, and also herbarium specimens were collected. Further field work was done in April 2016, and several living individuals were brought to the South China Botanical Garden (SCBG) and were cultivated there. Detailed morphological observations were done both in GBG and SCBG. The results show this species is similar to P. leprosa, an endemic species occurring near Du’an County, by its yellow flowers, white calyx lobes and large bracts. Nevertheless, the two entities differ in several important characters, which are discussed below. To confirm the identity of the plants from Du’an County, we conducted a comprehensive study of the literature and herbarium specimens. The results make us consider these plants to represent a new species, which is described and illustrated here.

Material and methods

Living material of the new species from both the wild and the greenhouses of GBG and SCBG, as well as herbarium specimens collected from the wild, were observed. All morphological characters were measured using a dissecting microscope and were described using the terminology presented by Wang & al. (1998). Literature studies included all relevant monographs, i.e. Wang & al. (1990, 1998), Li & Wang (2004) and Wei & al. (2010), and also some recently published literature, such as Liu & Wei (2004), Shen & al. (2010), Xu & al. (2010, 2012), Li & al. (2014), Ning & al. (2014) and Pan & al. (2016). Study of specimens was conducted at IBSC, IBK, and via online databases, such as the Chinese Virtual Herbarium (http://www.cvh.ac.cn/) and JSTOR Global Plants (http://plants.jstor.org/).

Results and Discussion

Primulina albicalyx B. Pan & Li H. Yang, sp. nov. – Fig. 1 & 2.

Holotype: China, Guangxi Zhuang Autonomous Region, Du’an County, Dongmiao Town, on moist rocky surface of limestone, 22 Jun 2015, B. Pan & X. H. Hu. P1028 (IBK!).

Diagnosis — The new species is similar to Primulina leprosa, but mainly differs by its ovate to broadly ovate leaf blade with flat adaxial surface (vs elliptic to broadly elliptic with bullate adaxial surface in P. leprosa), nearly tubular corolla tube (vs funel-form in P. leprosa), different corolla colour pattern: tube yellowish, with several brownish yellow striations on the entrance and a brownish yellow swelling between the two upper lip lobes (vs tube white, with brown lines on upper lip and without brownish yellow swelling in P. leprosa).

Description — Herbs perennial. Rhizome subterete, 1–3 cm long, 8–15 mm in diam. Leaves 6–10, all basal, opposite; petiole 2.1–4.2 cm long, 4–6 mm wide, apressed pubescent on both surfaces; leaf blade ovate to broadly ovate, 4.5–8.6 cm long, 3.5–6.8 cm wide, slightly fleshy when fresh, thickly papery when dried, abaxially glabrescent and only puberulent along veins, adaxially flat and densely appressed pubescent, base cuneate to broadly cuneate, margin inconspicuously crenate, apex obtuse to subacute; lateral veins 3 on each side, abaxially conspicuous, adaxially inconspicuous. Cymes 2–5, axillary, 6–14-flowered; peduncle 6.8–12 cm long, 2.5–3.5 mm in diam., densely apressed pubescent; bracts 2, opposite, green, ovate to narrowly ovate, 1.8–2.5 cm long, 9–14 mm wide, abaxially densely apressed pubescent, adaxially sparsely pubescent, margin entire, apex acute. Pedicel 7–10 mm long, densely pubescent. Calyx 5-lobed to near base; lobes white, lanceolate, 4–6 mm long, 1.5–2 mm wide, abaxially densely glabrous pubescent, adaxially sparsely pubescent, margin entire. Corolla yellowish with several brownish yellow striations on entrance, 3.5–4.5 cm long, outside densely glabrous pubescent, inside sparsely glandular pubescent; corolla tube nearly tubular, 2.2–2.8 cm long, 6–8 mm in diam. at base, 10–12 mm in diam. at mouth; corolla limb distinctly 2-lobed; upper lip 2-lobed, lobes broadly ovate, 5–7 mm long, 7–9 mm wide, apex rounded, with a brownish yellow swelling between lobes; lower lip 3-lobed, lobes obovate, 7–9 mm long, 5–6 mm wide, apex rounded. Stamens 2, adnate to corolla tube 15–18 mm above tube base; filaments yellowish, linear, 9–12 mm long, obviously geniculate near middle, sparsely glandular pubescent; anthers fused by entire adaxial surfaces, 2–2.5 mm long, 1.2–1.5 mm wide, glabrous; staminodes 2, 5–7 mm long, adnate to corolla tube 12–15 mm above tube base. Disc circular, c. 1.2 mm high, with repand margin. Pistil 2.2–2.8 cm long; ovary cylindric, 16–20 mm long, ovary tubular base. Disc circular, c. 1.2 mm high, with repand margin. Pistil 2.2–2.8 cm long; ovary cylindric, 16–20 mm long, ovary tubular base. Disc circular, c. 1.2 mm high, with repand margin. Pistil 2.2–2.8 cm long; ovary cylindric, 16–20 mm long, ovary tubular base.
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long, c. 1.5 mm in diam., densely glandular pubescent; style 6–8 mm long, densely glandular pubescent; stigma 1, c. 2 mm long, c. 1.5 mm wide, upper lobe absent, lower lobe obtrapeziform, apex 2-lobed. Capsule linear, 3.1–3.6 cm long.

Phenology — The new species flowers from May to June and fruits from June to July.

Distribution and ecology — At present, Primulina albicalyx is known only from the type locality in Du’an County, W Guangxi Zhuang Autonomous Region, SW China (Fig. 3). Plants grow on moist and shady limestone rocks under northern tropical limestone seasonal rain forest.

Conservation status — Based on our careful field explorations on three occasions over the past several years,
The new species is known from only one population and occupies an area of less than 100 m². This population is located at a roadside, and is therefore easily subjected to destruction by human activities. According to our observations, there were about 200 mature individuals in 2015. However, the population size had been reduced to no more than 100 mature individuals in 2016. Based on the current information, Primulina albicalyx can be considered as Critically Endangered (CR) B1ab(iii,v)+2ab(iii,v); C2a(ii), following the IUCN categories and criteria (IUCN 2016).

**Etymology** — The specific epithet “albicalyx” refers to the white calyx lobes.

**Vernacular name** — Chinese: 白萼报春苣苔 (bái è bào chūn jù tái). The first two characters mean “white calyx”, the last four are the Chinese name for Primulina.

**Remarks** — Primulina albicalyx is morphologically similar to P. leprosa by its yellow flowers, white calyx lobes and large bracts, and mainly differs from the latter by the characters described in the diagnosis as well as in Table 1. Moreover, there is no overlap in the geographical distributions of these two species (Fig. 3). It is worth noting that yellow flowers in Primulina species have evolved independently, according to the phylogenetic tree in Kang & al. (2014), which suggests that P. albicalyx is perhaps not closely related to P. leprosa in phylogeny. The phylogenetic affinities of the new taxon need further work.

**Additional specimen seen (paratype)** — China: Guangdong; Guangzhou City, cultivated in South China Botanical Garden, 29 May 2017, L. H. Yang, YLH384 (IBSC!).
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Table 1. Morphological comparison of Primulina albicalyx and P. leprosa.

<table>
<thead>
<tr>
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<th>Primulina albicalyx</th>
<th>Primulina leprosa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaf blade shape</td>
<td>ovate to broadly ovate, adaxial surface flat</td>
<td>elliptic to broadly elliptic, adaxial surface bullate</td>
</tr>
<tr>
<td>Peduncle length</td>
<td>6.8–12 cm</td>
<td>4.5–7 cm</td>
</tr>
<tr>
<td>Corolla colour</td>
<td>tube yellowish, with several brownish yellow striations on entrance and a brownish yellow swelling between 2 upper lip lobes</td>
<td>tube white, with brown lines on upper lip, without brownish yellow swelling</td>
</tr>
<tr>
<td>Corolla tube shape</td>
<td>nearly tubular</td>
<td>funnelform</td>
</tr>
<tr>
<td>Corolla tube dimensions</td>
<td>6–8 mm in diam. at base, 10–12 mm in diam. at mouth</td>
<td>c. 3.5 mm in diam. at base, c. 12 mm in diam. at mouth</td>
</tr>
<tr>
<td>Corolla lower lip lobes length</td>
<td>7–9 mm</td>
<td>11–14 mm</td>
</tr>
<tr>
<td>Number of staminodes</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Flowering time</td>
<td>May to June</td>
<td>October to November</td>
</tr>
</tbody>
</table>

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