**Petrocodon chishuiensis** (Gesneriaceae), a new species endemic to Guizhou, China

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**ABSTRACT** A new species, *Petrocodon chishuiensis* Z.B. Xin, F. Wen & S.B. Zhou, from NW Guizhou, China, is described and illustrated here. It shares a rare characteristic with *P. hunanensis* X.L. Yu & Ming Li, *P. tongziensis* R.B. Zhang & F. Wen and *P. longitubus* Cong R. Li & Yang Luo: all have four fertile stamens, a character state distinguishing this clade from the rest of *Petrocodon*. *P. chishuiensis* closely resembles *P. hunanensis* and *P. tongziensis*, but differs in vegetative and generative characters. We found only one population with no more than 60 mature individuals at the type locality. This species is provisionally assessed as Critically Endangered (CR B2ab(iii)) using IUCN criteria.

**KEY WORDS** China, Cliff-dwelling, Danxia landform, flora of Guizhou, Gesneriaceae, *Petrocodon*, taxonomy.

**INTRODUCTION**

The genus *Petrocodon* Hance (Tribe Trichosporeae: Didymocarpoideae: Gesneriaceae) was established by Hance (1883). It is endemic to China, and known as a monotypic genus for over a century. It comprised only one species (*P. dealbatus* Hance) and one variety (*P. dealbatus* Hance var. denticulatus (W.T. Wang) W.T. Wang (Wang and Pan, 1990)) for a long time until 2007. Two new species, *P. ferrugineus* Y.G. Wei (Wei, 2007) and *P. multiflorus* F. Wen & Y.S. Jiang (Jiang et al., 2011) were described at the beginning of the 21st century. Based on molecular data and a morphological evaluation, five genera, mostly small-sized and monotypic, i.e. *Calcareoboea* C.Y. Wu ex H.W. Li (Li, 1982), *Dolicholoma* D. Fang & W.T. Wang (Wang, 1983), *Lagarosolen* W.T. Wang (Wang, 1984), *Paralagarosolen* Y.G. Wei (Wei, 2004), *Tengia* Chun (Chun, 1946), and a few species of *Didymocarpus* Wallich (Wallich, 1819), were revised and merged into *Petrocodon* (Wang et al., 2011; Weber et al., 2011). And with new taxa published after 2011, the genus has been expanded and is comprised of 41 species and one variety (IPNI, 2019; Möller, 2019; Wen et al., 2019). Five species were published last year, namely *P. tongziensis* R.B. Zhang & F. Wen (Zhang et al., 2019a), *P. longitubus* Cong R. Li & Yang Luo (Li et al., 2019), *P. chonggingensis* F. Wen, B. Pan & L.Y. Su (Su et al., 2019b), *P. jiangxiensis* F. Wen, L.F. Fu & L.Y. Su (Su et al., 2019a) and *P. rubiginosus* Y.G. Wei & R.L. Zhang (Zhang et al., 2019b).

In October 2010, the authors collected specimens of an unknown species of Gesneriaceae during a botanical expedition in NW Guizhou Province, near Sichuan Province and Chongqing City, China. The newly collected specimen resembled the recently described *Petrocodon hunanensis* X.L. Yu & Ming Li (Yu et al., 2015) (Fig. 3) and *P. tongziensis* (Fig. 4) in flower shape, stamen number and capsule characters, but differs in other characters. Thus, we considered that it represents a new species of *Petrocodon*.

**TAXONOMIC TREATMENT**

**Petrocodon chishuiensis** Z.B. Xin, F. Wen & S.B. Zhou, sp. nov.

**Diagnosis.** Petrocodon chishuiensis is morphologically similar to *P. hunanensis* (Fig. 3), but differs by its acaulescence (vs. stem 5–20 cm long); leaf blades thin chartaceous, oblong or oblanceolate, 5–7 cm long (vs. thickly chartaceous, ovate, 2–3.2 cm long); petiole 3–8 cm long, densely white lanate (vs. 0.5–2.5 cm long, densely reddish-purple pubescent); bracts oblong, 7–12 mm long (vs. lanceolate, 1–3 mm long); calyx lobes linear, 9–10 × ca. 1 mm (vs. triangular-lanceolate, 3–5 × ca. 1 mm); staminae absent or extremely indistinctive (vs. ca. 1 mm long); ovary 18–20 mm long, no stipitate (vs. ca. 10 mm long, distinctly stipitate) and capsule glabrous (vs. densely short puberulence). *P. chishuiensis* also resembles...
Fig. 1. *Petrocodon chishuiensis* sp. nov.: A: habit; B: cut open corolla with four stamens; C: upper stamens; D: lower stamens; E: pistil with bracteoles and opened calyx; F: stigma and part of style; G: mature dehisced capsule. From *F.W.-Ges 20101001*(IBK). Drawn by Yun-Xi Zhu.
Table 1. Morphological comparison between *Petrocodon chishuiensis* and its close relatives, *P. hunanensis* and *P. tongziensis*.

<table>
<thead>
<tr>
<th>Characters</th>
<th><em>P. chishuiensis</em></th>
<th><em>P. hunanensis</em></th>
<th><em>P. tongziensis</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Terrestrial stem</td>
<td>acaulescent</td>
<td>5–20 cm long</td>
<td>acaulescent</td>
</tr>
<tr>
<td>Leaf blades</td>
<td>thin chartaceous,</td>
<td>thickly chartaceous,</td>
<td>chartaceous,</td>
</tr>
<tr>
<td></td>
<td>oblong or oblanceolate,</td>
<td>ovate,</td>
<td>elliptic to oval-elliptic,</td>
</tr>
<tr>
<td></td>
<td>5–7 cm long</td>
<td>2–3.2 cm long</td>
<td>2.5–4.5 cm long,</td>
</tr>
<tr>
<td>Petiole</td>
<td>3–8 cm long, white lanate</td>
<td>0.5–2.5 cm long,</td>
<td>white pubescent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>reddish-purple pubescent</td>
<td></td>
</tr>
<tr>
<td>Bracts</td>
<td>2, oblong, white lanate</td>
<td>2, lanceolate,</td>
<td>3, oval-lanceolate,</td>
</tr>
<tr>
<td></td>
<td>7–12 mm long</td>
<td>1–3 mm long</td>
<td>1–2 mm long</td>
</tr>
<tr>
<td>Calyx lobes</td>
<td>linear, 9–10 × ca. 1 mm</td>
<td>triangular-lanceolate,</td>
<td>linear-lanceolate, 3–5 × ca. 0.5 mm</td>
</tr>
<tr>
<td>Staminode</td>
<td>absent/extremely indistinctive</td>
<td>ca. 1 mm long</td>
<td>absent/extremely indistinctive</td>
</tr>
<tr>
<td>Ovary</td>
<td>1.8–2 cm long, no stipitate</td>
<td>ca. 1 cm long,</td>
<td>ca. 0.8 cm long,</td>
</tr>
<tr>
<td>Fruit</td>
<td>5–6.5 cm long</td>
<td>2.5–4 cm long</td>
<td>1.5–2.5 cm long</td>
</tr>
<tr>
<td>Capsule</td>
<td>glabrous</td>
<td>densely short puberulence</td>
<td>densely short puberulence</td>
</tr>
</tbody>
</table>

Fig. 2. *Petrocodon chishuiensis* sp. nov.: A: habitat; B: plants in flower and leaf blade adaxial surface; C: leaf blade abaxial surface; D: Frontal view of flower, showing the two rows of conspicuous orange-yellow glandular hairs on lower lip and corolla throat; E: lateral view of flower; F: flower viewed from below; G: pistil, showing the stigma, style and ovary; H: mature, dehisced capsule splitting into 4 valves. (Photos: Fang Wen).
P. tongziensis (Fig. 4) but differs by its leaf blades oblong or oblanceolate, 5–7 cm long (vs. elliptic to oval-elliptic, 2.5–4.5 cm long); bracts 2, oblong, 7–12 mm long (vs. bracts 3, oval-lanceolate, 1–2 mm long); calyx lobes linear, 9–10 × ca. 1 mm (vs. linear-lanceolate, 3–5 × ca. 0.5 mm); corolla white with pinkish shading, with 2 conspicuous rows of orange-yellow glandular hairs on abaxial lip (vs. pale violet with a lavender shading, a darker purple blotch on abaxial lip); ovary linear, 18–20 × 0.8–1.3 mm (vs. cylindrical, ca. 8 × ca. 2 mm); fruit 5–6.5 cm long (vs. 1.5–2.5 cm long) and capsule glabrous (vs. densely short puberulence).

**Description:** Perennial acaulescent herb, lithophytic. Leaves 18–25, spiral on a basal rosette; petiole 3–8 cm long, densely white lanate; leaf blades oblong or oblanceolate, 5–7 cm long, 1.5–2.5 cm wide at the widest point, base narrowly cuneate or cuneate, margin serrate, adaxial and abaxial surfaces densely whitish villous; lateral veins 5–6 on each side of midrib, conspicuous on both surfaces, apparently raised on abaxial surface. Cymes 2–8, lax, axillary, 1–3-flowered; peduncles 4–9 cm long, whitish lanate; bracts 2, opposite, oblong, 7–12 mm long, ca. 3 mm wide, apex with an obtuse tip, margin entire, outside whitish pubescent, inside sparsely pubescent; bracteoles 2, opposite, lanceolate, 6–7 mm long, ca. 1.5 mm wide, margin entire, outside whitish pubescent, inside with sparse pubescent; pedicels ca. 1 cm, whitish pubescent. Calyx 5-sect from base; lobes equal,
linear, 0.9–1 cm long, ca. 1 mm wide, outside densely pubescent, margin entire. Corolla tubular, white with pinkish shading, zygomorphic, 2.4–3 cm long; corolla tube 1.6–1.9 cm × 1.5–4 mm; limb 2-lipped, adaxial lip short, 2-lobed to the middle, lobes oblong or broadly triangular, ca. 0.5 cm long, abaxial lip 3-lobed, ovate, central one longer than lateral ones, ca. 1 cm long, lateral ones ca. 0.8 cm long, with 2 conspicuous rows of orange-yellow glandular hairs on abaxial lip and corolla throat. Stamens 4, two longer ones adnate to corolla tube ca. 1.4 cm from the base, filaments ca. 0.9 cm long, two shorter ones adnate to corolla tube ca. 1.3 cm from the base, filaments ca. 0.8 cm long, all filaments linear, slightly arched from middle to base, pink, densely with glandular-puberulent hairs especially at the base; anthers dorsi-fixed, reniform to elliptic, ca. 1.8 mm long, ca. 0.8 mm wide, coherent in pairs, thecae confluent at middle, glabrous, dehiscing longitudinally; staminode absent or extremely indistinctive. Disc annular, ca. 1 mm high, margin entire. Pistil densely glandular-pubescent; ovary linear, 1.8–2 cm long, 0.8–1.3 mm wide, 1-loculed, placentas 2, parietal. Style ca. 8 mm long, ca. 0.8 mm wide, with glandular hairs, stigmas 2, ovate, ca. 1.5 mm long, ca. 0.8 mm wide, puberulent. Fruit 5–6.5 cm long, capsule linear-cylindrical, 4-valved, glabrous. Seeds appendaged.

Etymology: The specific epithet is derived from the type locality, Chishui City, Guizhou Province, China.

Phenology: Flowering from late September to November, fruiting from October to December.

Distribution and habitat: The new species is only known from its type locality, Chishui City, Guizhou Province, China. This species grows at damp and shaded bottom of cliff in a valley of Danxia landform, at an altitude of 730–752 m, 28°21′N, 105°44′E.

Conservation status: Petrocodon chishuiensis is known from a single population in Chishui City, Guizhou Province. It is clearly scarce, being known from one very small area of occupancy, estimated at 20 m² on a rock surface in a valley of Danxia landform. Obviously, this area of occupancy of P. chishuiensis we found so far is significantly lower than the smallest AOO unit of IUCN is 4 km² (2 × 2 km² grid) for Critically Endangered B2. According to the detailed information from our careful...
field investigation on the surroundings of the type area for more than ten times in recent years, the population size of this new species is fewer than 60 plants at the sole site. Potential direct threats to the plants come from the high visitor density in this famous scenic spot. The information on abundance, highly restricted range, and direct threats indicate that this species is facing an extremely high risk of extinction, and is assessed provisionally as Critically Endangered (CR B2ab(iii)) (IUCN, 2019) before more populations being discovered.

Notes: Petrocodon chishuiensis shares the character of four fertile stamens with P. longitubus, P. hunanensis (Fig. 3) and P. tongziensis (Fig. 4), it resembled P. hunanensis and P. tongziensis in flower shape, stamen number and capsule characters, but differs in other characters. Morphological comparison of P. chishuiensis and its two relatives are summarized in Table 1.

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LITERATURE CITED


