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Petrocosmea dejiangensis (Gesneriaceae), a new species from Guizhou, China

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Abstract

Southwestern China is the centre of diversity of *Petrocosmea* (Gesneriaceae). Here, a new species, named *Petrocosmea dejiangensis*, from north-eastern Guizhou, China, is described. The new species is most similar to *P. martini*, but it is distinguished from the latter by two dark blue-purple stripes inside the corolla tube along its entire length, the anthers shorter than the filaments, and the stigma apex rounded. Three populations comprising approximately 120 mature individuals were found at and near the type locality. This new taxon was assessed as "Data Deficient" (DD), according to IUCN standards.

Keywords: Didymocarpoideae, flora of China, *Petrocosmea martini*

Introduction

Petrocosmea Oliver (1887: pl. 1716) is a small genus within the family Gesneriaceae, subfamily Didymocarpoideae (Weber *et al.* 2013). The genus, which currently comprises 64 taxa (GRC 2021, IPNI 2021, Wen *et al.* 2021), is distributed from the eastern Himalayas to central China and Indo-China (POWO 2021). Plants in this genus are perennial, rhizomatous, stemless herbs with basal leaves and usually lax axillary inflorescences; the zygomorphic corolla can be blue to purple or white and usually show spots inside; flowers have two stamens and usually three staminodes; there is no disc; the ovary is unilocular with two placentas; the capsule is straight and dehiscing loculicidally into two valves (Gou *et al.* 2010, Qiu *et al.* 2012, 2020, Wang *et al.* 1998, 2013, Zhang *et al.* 2013, Han *et al.* 2017, 2018, 2019, Jiang *et al.* 2020, Tang *et al.* 2021).

In May 2016, during field work in Nangan town, Dejiang County, Guizhou Province, we discovered flowering plants of the genus *Petrocosmea* with relatively small leaves and dark blue-purple stripes in the throat. In May 2020, we conducted more field work in Nangan town and found a second population. This time, some living plants were collected and grown at the Guizhou Botanical Garden. In May 2021, these plants flowered in the greenhouse of the Guizhou Botanical Garden. In August 2021, we returned to Nangan town to collect fruits and found a third population. The plants in all three populations were similar to *Petrocosmea martini* (Léveillé 1903: 166) Léveillé (1911: 329) with regard to the indumentum of the following organs: petiole, leaf blade, filaments, and ovary. Nonetheless, after thorough comparison, we concluded that these plants belonged to a new species.

Materials & methods

Approximately 40 flowers were closely observed, 5 were measured in the field, and 5 more that grew in a greenhouse were observed and measured. All morphological characteristics were observed under a dissecting microscope (Olympus

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SZ61; Tokyo, Japan), and descriptions were made following the terminology used by Wang *et al.* (1998). Relevant literature was consulted, including Li (1983), Wang (1984, 1985), Wei & Wen (2009), Zhao & Shui (2010), Shaw (2011), Wen (2019), Li *et al.* (2020), and Huang & Xin (2021). Images of type specimens available in virtual herbaria and databases, namely RBGE (https://data.rbge.org.uk/search/herbarium/), Kew Herbarium Catalogue (http://apps.kew.org/herbcat/navigator.do), MNHN (https://www.mnhn.fr/en), PE (https://pe.ibcas.ac.cn/index.html), and iPlant (http://www.iplant.cn/), were also examined. Holotype specimen of the new taxon was collected by Sheng-Hu Tang in the greenhouse of the Guizhou Botanical Garden. Flowering plants of *P. martini* were collected by Sheng-Hu Tang and Sa Li from the type locality.

Taxonomic treatment

Petrocosmea dejiangensis Sheng H.Tang & Jian Xu, *sp. nov.*, Figure 1

Type:—CHINA. Guizhou Province, Dejiang County, Nangan Town, at approximately 610 m elev., 28°22′12″N, 107°53′24″E [the voucher from plants cultivated at the Guizhou Botanical Garden, and collected in the locality presented on 12 May 2020], 3 May 2021, *Sheng-Hu Tang 2021002* (holotype GZAC!).

Petrocosmea dejiangensis has a highly fused upper lip. This important character is shared by 21 species of *Petrocosmea*. The new species is most similar to *P. martini* (Fig. 2) in the indumentum of the petiole, leaf blade, filaments, and ovary, but differs from it in having inconspicuous bracts (*vs.* conspicuous), two dark blue-purple stripes inside along the entire corolla tube (*vs.* two purple spots inside the tube under the filaments), throat blue-purple (*vs.* white), anthers shorter than filaments (*vs*. anthers subequal to filaments in length), and stigma apex rounded (*vs.* flat).

Perennial herbs, stemless. Rhizome short, 3–4 mm long. Leaves all basal, 10 to 20; the inner leaves with petioles 0.5–1.5 cm long or absent, the outer leaves with petioles 3.5–6 cm long, petioles sparsely or densely descending pilose; leaf blades subcordate or suborbicular, 9.2–12.5 × 9–12.2 mm, apex obtuse or rounded, base cordate, and margin crenate, papery when dry, both adaxial and abaxial blade surfaces densely pilose, ca. 0.5 mm long, lateral veins adaxially and abaxially inconspicuous, 2–3 on either side of the midrib. Cymes 1–9, one flower per cyme; peduncles 4.5–5.8 cm long, sparsely ascending pilose, and densely appressed pilose; bracts absent, rarely two, nearly opposite, inconspicuous, 0.3–0.5 mm long, sparsely pilose; pedicels 1.5–2.5 cm long, sparsely ascending pilose and densely appressed pilose. Calyx zygomorphic, densely erect pilose outside, glabrous inside; adaxial calyx lip 5.2–5.4 mm in length, 3-lobed nearly to the base, lobes 3.9–4.1 × 1.1–1.2 mm, lanceolate, apex acuminate; abaxial calyx lip 2-lobed to the base, lobes 5–5.7 × 1.3–1.5 mm, lanceolate, apex acuminate. Corolla blue-purple, 12.9–14.3 mm long, puberulent outside, glabrous inside; tube 4.1–4.4 mm long, broadly tubular, two dark blue-purple stripes extending inside along the entire corolla tube length; throat blue-purple, with two dark blue stripes; adaxial corolla lip 2.2–2.6 mm long, much shorter than abaxial corolla lip, indistinctly 2-lobed, apex emarginate, margin recurved; abaxial corolla lip 9–10 × 11.7–12.8 mm, 3-lobed to the middle, lateral lobes obovate or ovate, 4.2–5.5 × 4.1–4.3 mm, the middle one obovate or ovate, 4.5–5 × 4.1–4.5 mm. Stamens two, included, adnate to the corolla tube near the base; filaments 3.5–4 mm long, densely glandular puberulent, curved near the middle; anthers ovate, ca. 2 × 1.7 mm, dorsifixed, coherent at apex; parallel thecae, not confluent at apex, poricidal near the apex, sometimes dehiscing longitudinally from apex to above the middle. Staminodes three, included, adnate to the adaxial side of the corolla tube near the base, ca. 0.8 mm long, glabrous. Pistil 7.5–8.3 mm long; ovary densely appressed pilose, narrowly ovoid, 2–2.5 mm long, ca. 1.0 mm in diameter; style 5.5–5.8 mm long, 0.3 mm in diameter, glabrous; stigma nearly globose, ca. 0.35 mm in diameter, apex rounded. Capsules unknown.

Phenology:—Flowering occurs from April to May. Fruiting in the wild is unknown but likely occurs from September to October; only young fruits were observed.

Etymology:—The new taxon is named after the type locality, Dejiang County, China.

Vernacular name:—The Chinese name is "Dé Jiāng Shí Hú Dié" (德江石蝴蝶).

Distribution and habitat:—Three populations with nearly 120 mature individuals were found at Nangan town, Dejiang County, Guizhou Province, China. The plants grew on moist shady rocks in valleys at an elevation of ca. 600–700 m. The main companion species were *Platycarya strobilacea* Siebold & Zuccarini (1843: 741–742), *Lindera communis* Hemsley (1891: 387), and *Carpinus* sp. Linnaeus (1753: 998) *sp.*

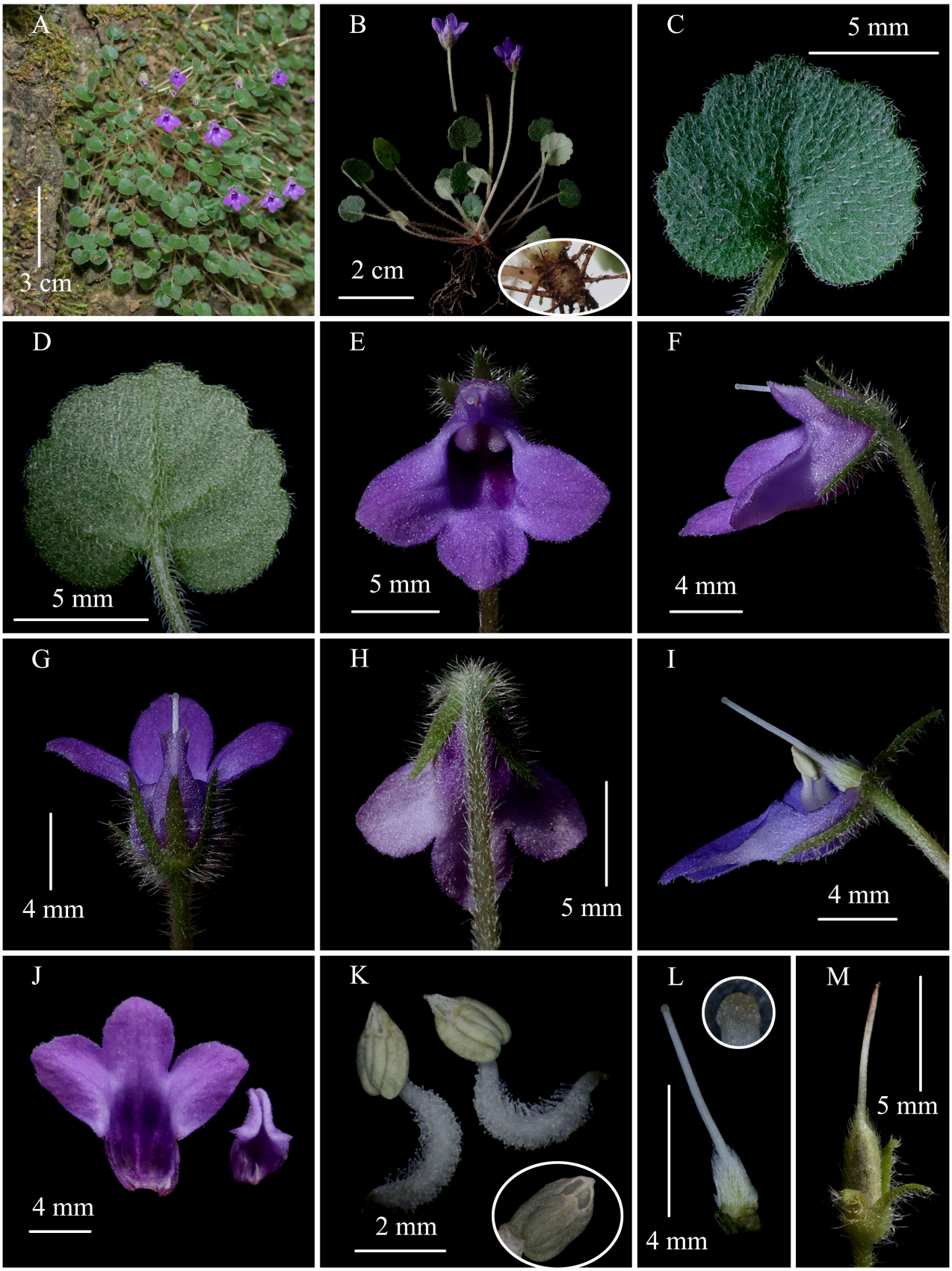

FIGURE 1. *Petrocosmea dejiangensis* Sheng H.Tang & Jian Xu, *sp. nov*. **A** habitat **B** flowering plant, rhizome, and fibrous roots (inset) **C** adaxial surface of leaf blade **D** abaxial surface of leaf blade **E** flower in front view **F** flower in side view **G** flower in top view **H** flower in back view **I** opened corolla showing stamen and pistil inside the corolla **J** opened corolla with stamens and pistil removed, showing stripes inside the corolla **K** stamens and anther (inset) **L** pistil and stigma (inset) **M** young fruit and calyx lobes. (Photographs by Sheng-Hu Tang and Jian Xu).

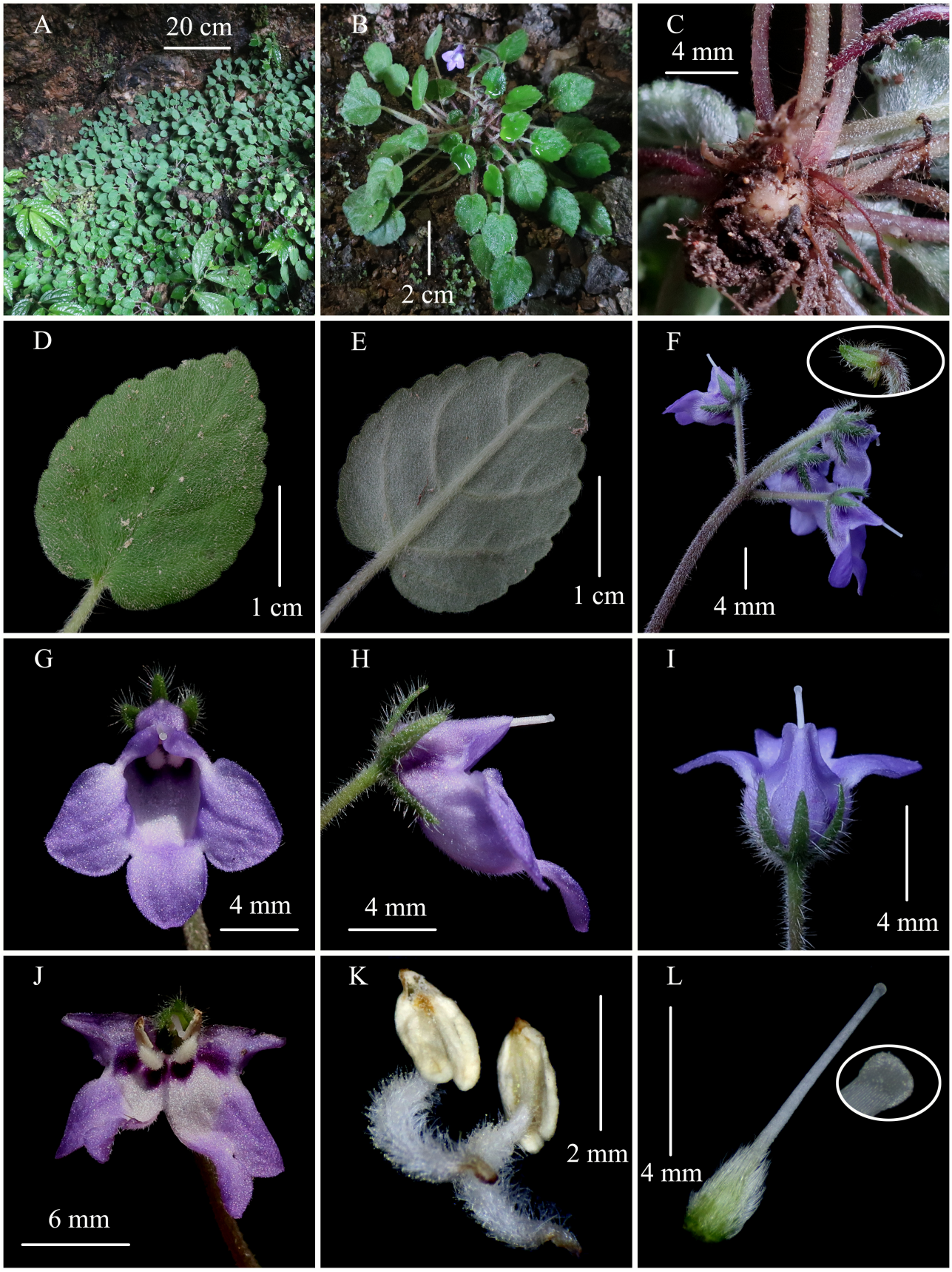

FIGURE 2. *Petrocosmea martini* (H.Lév.) H.Lév. **A** habitat **B** flowering plant **C** petioles, rhizome, and fibrous roots **D** adaxial surface of leaf blade **E** abaxial surface of leaf blade **F** cyme and bract (inset) **G** flower in front view **H** flower in side view **I** flower in top view **J** opened corolla, showing stamens and spots **K** stamens **L** pistil and stigma (inset). (Photographs by Sheng-Hu Tang).

Conservation status:—Each time we visited the area, we discovered a new population. Three populations with approximately 120 mature individuals were found at and near the type locality. It is highly possible that more populations are present in the area. Until further investigation, the species should be designated as "Data Deficient" (DD) according to the IUCN standards (IUCN 2019).

Morphological affinities:—Although *Petrocosmea dejiangensis* and *P. martini* are similar in the shape of corolla, they differ in the morphology of bracts, color marks in the corolla, stamens, and the stigma. We have found three populations of *P. dejiangensis* at and near the type locality. The relatively smaller plant and leaf blades, the presence of two dark blue-purple stripes inside along the entire length of the corolla tube, anthers shorter than filaments, and stigma apex rounded were stable characters both in the wild and in the greenhouse. The detailed morphological comparison is shown in Table 1, as well as an identification key to the morphological alliance of *P. dejiangensis*.

TABLE 1. Detailed comparison between *Petrocosmea dejiangensis* and *P. martini.*

Character/species	*P. dejiangensis*	*P. martini*
Bract	absent, rarely two, nearly opposite, inconspicuous, 0.3–0.5 mm long	two, opposite, conspicuous, ca. 3 mm
Stripes or spots inside the tube	two dark blue-purple stripes inside the entire corolla tube	two purple spots inside the tube under the filaments
Throat colour	blue-purple, with two dark blue stripes	white, stripes absent
Length comparison between anthers and filaments	anthers shorter than filaments	anthers subequal to filaments in length
Stigma apex	rounded	flat

Additional specimens examined (paratype):—CHINA. Guizhou Province: Dejiang County, Nangan Town, approximately 610 m, 29 August 2021 (young fruit), *Jian Xu*, *Xuanze He & Shuo Yang DJ20210829001* (GZAC!, CSH, IBK).

Key to *Petrocosmea dejiangensis* and its alliance

1 Corolla light green or white....2
– Corolla blue or purple....3
2 Corolla light green, leaf blade 3–7 mm long....*P. viridis* Han & Yan Liu in Han *et al.* (2017: e01566)
– Corolla white, leaf blade 25–40 mm long....*P. cryptica* Shaw (2011: 177–179)
3 Leaf blades margins deeply lobed....*P. weiyigangii* Wen (2019: 175–183)
– Leaf blades margins not deeply lobed....4
4 Leaf blades narrowly oblanceolate....*P. xingyiensis* Wei & Wen (2009: 261–262)
– Leaf blades subcordate, suborbicular, ovate, elliptic, or obovate....5
5 Leaf blades base peltate....*P. huanjiangensis* Yan Liu & W.B.Xu in Xu *et al.* (2011: 385–387)
– Leaf blades base not peltate....6
6 Leaf blades base cuneate, broadly cuneate or rounded....7
– Leaf blades base cordate....12
7 Filaments straight....8
– Filaments curved near the middle....9
8 Leaf blades base cuneate....*P. chiwui* M.Q.Han, H.Jiang & Yan Liu in Jiang *et al.* (2020: e02847)
– Leaf blades base rounded....*P. rotundifolia* M.Q.Han, H.Jiang & Yan Liu in Jiang *et al.* (2020: e02847)
9 Adaxial leaf blades surfaces densely brownish yellow appressed puberulent....*P. sericea* C.Y.Wu ex Li (1983: 18–27)
– Adaxial leaf blades surfaces densely or sparsely erect pilose, with or without pustulate hairs at the base....10
10 Filaments villous....*P. shilinensis* Y.M.Shui & H.T.Zhao var. *changhuensis* T.F.Lü & Y.Z.Wang in Li *et al.* (2019: 145–158)
– Filaments glandular-pubescent....11
11 Filaments purple, lateral lobes of abaxial corolla lip wide-ovate....*P. purpureoglandulosa* Y.Dong & Y.Z.Wang in Li *et al.* (2019: 145–158)
– Filaments white, lateral lobes of abaxial corolla lip triangular....*P. minor* Hemsley in Hooker (1899: pl. 2600)
12 Filaments glabrous, sparsely pilose, or densely pilose....13
– Filaments densely glandular puberulent or glandular pilose....16
13 Filaments glabrous or sparsely pilose....*P. leiandra* (Wang 1984: 9–35) Z.J.Qiu in Qiu & Liu (2015: 116)
– Filaments densely pilose....14
14 Leaf blades 50–150 mm long....*P. funingensis* Qiang Zhang & B.Pan in Zhang *et al.* (2013: 5–8)
– Leaf blades 10–35 mm long....15
15 Anthers narrowly ovoid....*P. shilinensis* Y.M.Shui & H.T.Zhao in Zhao *et al.* (2010: 328–330)

– Anthers widely triangular ..... *P. qiruniae* M.Q.Han, Li Bing Zhang & Yan Liu in Han *et al.* (2019: 1–5)
16 Apex of abaxial corolla lip lobes reflexed ..... *P. duyunensis* Sheng H.Tang in Tang *et al.* (2021: 1–8)
– Apex of abaxial corolla lip lobes not reflexed 17
17 Petioles densely villous and golden-brown glandular puberulent ..... *P. adenophora* Huang & Xin (2021: e02944)
– Petioles sparsely or densely pilose and lacking glandular hairs 18
18 Anthers longer than filaments ..... *P. iodioides* Hemsley in Hooker (1899: pl. 2599)
– Anthers shorter than filaments, or subequal to filaments in length 19
19 Style bending downward at base ..... *P. longituba* M.Q.Han & Yan Liu in Li *et al.* (2019: 145–158)
– Style straight 20
20 Leaf blades margin entire ..... *P. qionglaiensis* C.Q.Li & Y.Z.Wang in Li *et al.* (2019: 145–158)
– Leaf blades margin crenate, or crenulate to denticulate 21
21 Stigma apex rounded, two dark blue-purple stripes inside the entire corolla tube ..... ***P. dejiangensis* Sheng H.Tang & Jian Xu**
– Stigma apex flat, two purple spots inside the tube under stamens ..... *P. martini* (Léveillé 1903: 166) Léveillé (1911: 329)

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