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Authors: ZHANG Guiliang, CAI Lei, WANG Yizhi, ZHANG Guisheng

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Abstract

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Full Text

Paraboea nanxiensis (Gesneriaceae), a New Species from Southeastern Yunnan Province, China

Guiliang Zhang¹, Lei Cai^{2*}, Yizhi Wang³, Guisheng Zhang^{4}

¹ Hekou Yao Autonomous County Forestry and Grassland Bureau, Hekou 661300, Yunnan, China

² Yunnan Key Laboratory for Integrative Conservation of Plant Species with Extremely Small Populations/Key Laboratory for Plant Diversity and Biogeography of East Asia, Kunming Institute of Botany, Chinese Academy of Sciences, Kunming 650201, China

³ College of Biodiversity Conservation and Utilization, Southwest Forestry University, Kunming 650224, China

⁴ Hekou Branch of Management and Protection Bureau of Daweishan National Nature Reserve, Hekou 661300, Yunnan, China

Abstract

Paraboea nanxiensis Lei Cai & Gui L. Zhang, a new species of Gesneriaceae from the karst area around the Sino-Vietnamese border, is described here. The new species is morphologically similar to *P. nutans* D. Fang & D. H. Qin in the shape and indumentum characters of leaf blade, color of flower, length of the inflorescence and glabrous pistil, but it can be easily distinguished by the shape of the corolla, the color of flower interior, the shape and indumentum of calyx lobes, and capsule morphology. Detailed descriptions, color photographs, distribution and ecology, as well as its morphological relationship with similar species are also provided. In recent years, many new taxa or new record species have been found in limestone areas along the Sino-Vietnam border, making it necessary to strengthen investigation of plant diversity for better understanding the high biodiversity in this area.

Keywords: *Paraboea*, new taxon, limestone area, taxonomy, Flora of Yunnan

Introduction

The genus *Paraboea* (C. B. Clarke) Ridl. has become one of the larger genera in the Old World Gesneriaceae after revision, combination, transfer, and descriptions of many new species. Up to now it includes more than 130 species mainly distributed in the eastern Himalayas, Indo-China Peninsula, and adjacent areas. China harbors high diversity of *Paraboea* with many endemic species, and hitherto, 33 species are recorded in South and Southwest China, such as Guangdong, Guangxi, Guizhou, and Yunnan Provinces.

In the floristic surveys of limestone areas in southeastern Yunnan, China in 2016, we discovered a plant belonging to Subfamily Didymocarpoideae, Family Gesneriaceae. We confirmed it belonged to the genus *Paraboea* when we observed its flower and fruit characteristics (such as two fertile stamens, twisted capsule, and cobwebby-woolly hair on the leaf blade) in the following years. After careful examination of specimens and related literature of *Paraboea* from adjacent regions, we concluded that this plant represents a new species to science. Here, the new species, *P. nanxiensis* Lei Cai & Gui L. Zhang, is described, and its morphological characters are compared with the closely related species *P. nutans* D. Fang & D. H. Qin (Fig. 2 [Figure 2: see original paper]: A-E).

Taxonomic Treatment

Paraboea nanxiensis Lei Cai & Gui L. Zhang, sp. nov. (Fig. 1 [Figure 1: see original paper])

Type: CHINA, Yunnan Province: Hekou County, Nanxi Township, Baishahe, Laolongtian, 22°41'56" N, 103°57'19" E, alt. 536 m, on the rocks under the tropical rainforest in karst region, in flowering, 14 July 2017, G.L. Zhang et al. CL2017085 (holotype KUN!, isotypes KUN! IBK!).

Diagnosis: The new species is morphologically similar to *Paraboea nutans* in the obovate leaf blade with cobwebby-woolly and brownish woolly hair on both sides, absent or short petiole, and purplish blue flowers, but it can be easily distinguished from *P. nutans* by its calyx lobes oblong to oblanceolate and glabrous, corolla broadly shallow campanulate, tube inside white below the middle, filament glabrous, and capsule slightly twisted.

Description: Perennial herbs, stemless. Leaves basal; petiole (absent or) 2–5 mm long, rust-brown woolly; leaf blade obovate, 6.5–13.5 × 2.5–7.5 cm, leathery, adaxially dark green, cobwebby-woolly, later glabrescent, abaxially brown cobwebby-woolly to pannose, rust-brown woolly along margin and veins, lateral veins 7–12 on each side of midrib, base attenuate to broadly cuneate, margin undulate, apex rounded. Cymes 1–4, axillary, 1–2-branched, inflorescence 5–15-flowered; peduncle 4–8 cm long, brown cobwebby-woolly, later glabrescent; bracts linear lanceolate, ca. 5 × 2 mm, outside brown cobwebby-woolly; pedicel 1.4–2.4 cm long, glabrous. Calyx 5-parted to base, lobes equal, oblong to oblanceolate, 4–6 × 2–2.2 mm, glabrous, margin entire. Corolla purplish blue, broadly shallow campanulate, outside glabrous; tube short, 5–7 mm long, white below the middle inside, ca. 2 mm in diameter at base, 8–12 mm in diameter at throat; limb slightly 2-lipped; adaxial lip 2-lobed, lobes semicircular to broadly ovate, 5–7 × 6–9 mm, abaxial lip 3-lobed, lobes semicircular to broadly ovate, 6–8 × 7–10 mm. Stamens 2, included; filaments yellowish white, ca. 2 mm long, glabrous, curved in the middle, adnate to 3–4 mm above corolla tube base; anther 2, confluent at apex; staminodes 3, ca. 0.4 mm long, adnate to ca. 1 mm above corolla tube base. Disc inconspicuous. Pistil glabrous; ovary conical, 3–6 mm long, ca. 1 mm in diameter; style linear 5–8 mm long, ca. 0.5 mm in diameter; stigma 1, capitate. Capsule linear, slight twisted, 1.2–1.8 cm long, ca. 1.5 mm in diameter, with persistent style.

Phenology: Flowering from July to August; fruiting from September to December.

Distribution & Ecology: *Paraboea nanxiensis* is found from Hekou County and Maguan County with two separate populations in southeastern Yunnan Province, near the border between China and Vietnam. It grows on the surface of moist rocks under tropical rainforest in limestone area with other lithophytic plants (e.g. *Adiantum* L., *Begonia* L., and *Elatostema* J.R. Forster & G. Forster).

Etymology: The specific epithet “nanxiensis” is derived from the name of the type locality, Nanxi Township, Hekou County, Yunnan Province, China. The Chinese name is “nán xī zhū máo jù tái” (南溪蛛毛苣苔).

Conservation status: Approximately only 50 individuals were found in two separate locations during field investigation. Based on the result of field surveys

and available data, *Paraboea nanxiensis* is provisionally assessed as Critically Endangered (CR) B2a according to IUCN Red List categories and criteria (IUCN, 2019), and we will continue to pay attention to the dynamics of this plant species with extremely small populations.

Additional specimens examined: China, Yunnan Province, Maguan County, Gulinqing Community, Juziyuan, Zhankengdaokou, 22°43' 41.92" N, 103°54' 09.91" E, alt. 610 m, on the surface of moist rocks, 20 November 2017, L. Cai et al. CL2017092 (KUN!).

Notes: *Paraboea nanxiensis* morphologically resembles *P. nutans* in the obovate leaf blade with cobwebby-woolly and brownish woolly hair, absent or short petiole, and purplish blue flowers. However, *P. nanxiensis* can be clearly distinguished from *P. nutans* by several vegetative characters: the calyx lobes are oblong to oblanceolate and glabrous (vs. oblong or lanceolate-oblong, outside sparsely brownish woolly); corolla broadly shallow campanulate (vs. helmet-shaped); limb slightly 2-lipped (vs. limb obviously 2-lipped); tube inside white below the middle (vs. two yellow patches underside of tube near base); filament glabrous (vs. glandular puberulent); and capsule slightly twisted (vs. not twisted). Additionally, the new species grows at altitudes of 530–610 meters in southeastern Yunnan, while its congener grows at 900–1,150 meters in Guangxi.

It also resembles *P. trisepala* W. H. Chen & Y. M. Shui from Guangxi in leaf blade shape and indumentum characteristics, but is obviously different in having three calyx lobes and a straight capsule in the latter (Chen et al., 2008) (Fig. 2: F). Two other basal-leaved *Paraboea* species (*P. hekouensis* Y. M. Shui & W. H. Chen and *P. manhaoensis* Y. M. Shui & W. H. Chen) occur in the same geographic region, but they differ markedly from the new species. *P. hekouensis* has white flowers and golden-brown simple long trichomes on the lower leaf surface, petioles, peduncles, and pedicels, while *P. manhaoensis* has tiny white flowers and golden subsessile glands on lower leaf surface veins, petioles, peduncles, and filaments (Chen et al., 2012) (Fig. 2: G, H).

The type locality is in the Sino-Vietnamese limestone region, which is one of the world's biodiversity hotspots. Many Gesneriaceae species (including the genus *Paraboea*) have been discovered in this area in recent years (Chen et al., 2012, 2014; Cai et al., 2017, 2019; Xu et al., 2017a; Middleton, 2018; Chen et al., 2019; Lu et al., 2019; Averyanov et al., 2020). Therefore, we will continue to pay close attention to Gesneriaceae species diversity in this area and adjacent regions.

Figure Captions

Fig. 1 *Paraboea nanxiensis* Lei Cai & Gui L. Zhang. A. Habitat; B. Plants with flowers; C. Abaxial leaf surfaces; D. Front view of inflorescence; E. Top view of inflorescences; F. Front view of a flower; G. Opened corolla showing stamens and staminode, and pistil with calyx; H. Stamens; I. Young fruit.

Fig. 2 *Paraboea nutans* (A-E), *P. trisepala* (F), *P. hekouensis* (G) and *P.*

manhaoensis (H). A. Plants with flowers; B, C, F. Top view of inflorescences; D, G, H. Front view of inflorescence; E. Opened corolla showing stamens and staminode, and pistil with calyx. (F: Provided by Dr. Fang Wen)

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