Paraboea nanxiensis (Gesneriaceae), a new species from southeastern Yunnan Province, China postprint

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Abstract

Paraboea nanxiensis Lei Cai & Gui L. Zhang, a new species of Gesneriaceae from karst area around the Sino-Vietnamese border, is described here. The new species is morphologi-cally 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 distin-guished by the shape of the corolla, the color of flower interior, the shape and indumentum of ca-lyx lobes, and capsule morphology. The 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, it is necessary to strengthen the investigation of plant diversity for better under-standing the high biodiversity in this area.

Full Text

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

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Abstract

Paraboea nanxiensis Lei Cai & Gui L. Zhang, a new species of Gesneriaceae from the karst area around the Sino-Vietnamese border, is described and illustrated. The new species is morphologically similar to *P. nutans* D. Fang & D. H. Qin in leaf blade shape and indumentum, flower color, inflorescence length, and glabrous pistil, but can be easily distinguished by its corolla shape, interior flower color, calyx lobe morphology and indumentum, and capsule morphology. Detailed descriptions, color photographs, distribution and ecological information, and morphological relationships with similar species are provided. In recent years, many new taxa and newly recorded species have been discovered in the limestone areas along the Sino-Vietnamese border, underscoring the need for strengthened investigation of plant diversity to better understand the high biodiversity of this region.

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

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Introduction

The genus *Paraboea* (C. B. Clarke) Ridl. has become one of the larger genera in the Old World Gesneriaceae following recent revisions, combinations, transfers, and descriptions of many new species. Currently, it includes more than 130 species distributed primarily in the eastern Himalayas, Indo-China Peninsula, and adjacent areas. China harbors high diversity of *Paraboea* with many endemic species, and 33 species have been recorded from southern and southwestern China, including Guangdong, Guangxi, Guizhou, and Yunnan provinces.

During floristic surveys in the limestone areas of southeastern Yunnan in 2016, we discovered a plant belonging to subfamily Didymocarpoideae of Gesneriaceae. Based on its flower and fruit characteristics—two fertile stamens, twisted capsule, and cobwebby-woolly hairs on the leaf blade—we confirmed its placement in the genus *Paraboea* in subsequent years. After careful examination of specimens and relevant literature on *Paraboea* from adjacent regions, we concluded that this plant represents a new species to science. Here, we describe *P. nanxiensis* Lei Cai & Gui L. Zhang and compare its morphological characters with the closely related *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 rocks under tropical rainforest in karst region, 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 having obovate leaf blades with cobwebby-woolly and brownish woolly hairs on both surfaces, absent or short petioles, and purplish-blue flowers. However, it can be easily distinguished by its oblong to oblanceolate, glabrous calyx lobes; broadly shallow campanulate corolla with tube inside white below the middle; glabrous filaments; and slightly twisted capsule.

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 middle, adnate to 3–4 mm above corolla tube base; anthers 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, slightly 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* occurs in two separate populations in Hekou County and Maguan County, southeastern Yunnan Province, near the China-Vietnam border. It grows on moist rock surfaces under tropical rainforest in limestone areas, associated 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 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 50 individuals were found at two separate locations during field investigations. Based on survey results and available

data, *Paraboea nanxiensis* is provisionally assessed as Critically Endangered (CR) B2a according to IUCN Red List categories and criteria (IUCN, 2019). We will continue to monitor the dynamics of this species with an extremely small population.

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 moist rock surfaces, 20 November 2017, L. Cai et al. CL2017092 (KUN!).

Notes: *Paraboea nanxiensis* morphologically resembles *P. nutans* in obovate leaf blades with cobwebby-woolly and brownish woolly hairs, absent or short petioles, and purplish-blue flowers. However, *P. nanxiensis* can be clearly distinguished by several characters: calyx lobes 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. obviously 2-lipped); tube inside white below the middle (vs. two yellow patches on underside of tube near base); filaments glabrous (vs. glandular puberulent); and capsule slightly twisted (vs. not twisted). Additionally, the new species occurs at 530–610 m altitude in southeastern Yunnan, while its congener occurs at 900–1,150 m in Guangxi.

The new species also resembles *P. trisepala* W. H. Chen & Y. M. Shui from Guangxi in leaf blade shape and indumentum, but differs obviously in having three calyx lobes and straight capsules in the latter (Chen et al., 2008) (Fig. 2: F). Two other basal-leaved *Paraboea* species occur in the same region: *P. hekouensis* Y. M. Shui & W. H. Chen and *P. manhaoensis* Y. M. Shui & W. H. Chen, but both are very different from the new species. *Paraboea hekouensis* has white flowers and golden-brown simple long trichomes on lower leaf surfaces, 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 lies in the Sino-Vietnamese limestone region, a global biodiversity hotspot where many Gesneriaceae species (including *Paraboea*) have been discovered in recent years. We will continue to focus attention on Gesneriaceae 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, 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, staminode, and pistil with calyx. (F: Provided by Dr. Fang Wen)

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References

AVERYANOV LV, XU WB, NGUYEN KS, et al., 2020. *Paraboea villosa* (Gesneriaceae), a new species from Northern Vietnam [J]. *Taiwania*, 65(1): 33 36.

CAI L, LIU DT, ZHANG P, et al., 2019. Two new species of *Henckelia* (Gesneriaceae) from Southeastern Yunnan, China [J]. *PhytoKeys*, 130: 151–160.

CAI L, ZHANG GL, ZHANG GS, et al., 2017. *Loxostigma hekouensis* (Gesneriaceae), a new species from Yunnan Province, China [J]. *Ann Bot Fenn*, 54: 429–433.

CHEN L, CHEN WH, GUO SW, et al., 2019. *Petrocodon tenuitubus* (Gesneriaceae), a new species from Southeast Yunnan, China [J]. *Guihaia*, 39(5): 574–580.

CHEN WH, MÖLLER M, SHUI YM, et al., 2008. A new species of *Paraboea* (Gesneriaceae) from a karst cave in Guangxi, China, and observations on variations in flower and inflorescence architecture [J]. *Bot J Linn Soc*, 158: 681–688.

CHEN WH, MÖLLER M, SHUI YM, et al., 2014. Three new species of *Petrocodon* (Gesneriaceae), endemic to the limestone areas of Southwest China, and preliminary insights into the diversification patterns of the genus [J]. *Syst Bot*, 39(1): 316–330.

CHEN WH, MÖLLER M, ZHANG MD, et al., 2012. *Paraboea hekouensis* and *P. manhaoensis*, two new species of Gesneriaceae from China [J]. *Ann Bot Fenn*, 49: 179–187.

GUO J, LU ZC, LIU J, et al., 2016. *Paraboea crassifila*, a new species of *Paraboea* (Gesneriaceae) from Danxia landform in Guangxi, China [J]. *Taiwania*, 61(1): 8–12.

HE DM, FENG YF, PAN FZ, et al., 2018. *Paraboea wenshanensis*, a new species of Gesneriaceae from Yunnan, China [J]. *PhytoKeys*, 95: 83–91.

IUCN, 2019. *Guidelines for Using the IUCN Red List Categories and Criteria. Version 14*. Prepared by the Standards and Petitions Subcommittee of the IUCN Species Survival Commission. http://cmsdocs.s3.amazonaws.com/RedListGuidelines.pdf

LI ZY, WANG YZ, 2005. *Plants of Gesneriaceae in China* [M]. Zhengzhou: Henan Science & Technology Publishing House: 1-721.

LU ZC, LIU ED, HAN MQ, et al., 2019. Discovery of *Paraboea minutiflora* (Gesneriaceae) from southeastern Yunnan, China with supplementary description [J]. *Guihaia*. DOI: 10.11931/guihaia.gxzw201909027.

MIDDLETON DJ, 2018. Two new species of *Paraboea* (Gesneriaceae) from Vietnam [J]. *Edinb J Bot*, 75(3): 421-425.

PUGLISI C, MIDDLETON DJ, TRIBOUN P, et al., 2011. New insights into the relationships between *Paraboea*, *Trisepalum*, and *Phylloboea* (Gesneriaceae) and their taxonomic consequences [J]. *Taxon*, 60(6): 1693-1702.

PUGLISI C, SUDDEE S, TRIBOUN P, et al., 2015. A new species of *Paraboea* (Gesneriaceae) from Thailand [J]. *Gard Bull Singapore*, 67(1): 101-106.

PUGLISI C, YAO TL, MILNE M, et al., 2016. Generic recircumscription in the Loxocarpinae (Gesneriaceae), as inferred by phylogenetic and morphological data [J]. *Taxon*, 65(2): 277-286.

TRIBOUN P, MIDDLETON DJ, 2012. Twenty new species of *Paraboea* (Gesneriaceae) from Thailand [J]. *Gard Bull Singapore*, 64: 333-370.

TRIBOUN P, MIDDLETON DJ, 2015. Three new species of *Paraboea* (Gesneriaceae) from Thailand [J]. *Thai For Bull (Bot)*, 43: 18-23.

WANG WT, PAN KY, LI ZY, 1990. Gesneriaceae [M]// WANG WT. *Flora Reipublicae Popularis Sinicae*. Beijing: Science Press, 69: 460-471.

WANG WT, PAN KY, LI ZY, 1998. Gesneriaceae [M]// WU ZY, RAVEN PH. *Flora of China*. Beijing: Science Press; St. Louis: Missouri Botanical Garden Press, 18: 362-367.

WEN F, LI S, XIN ZB, et al., 2019. The updated plant list of Gesneriaceae in China under the new Chinese naming rules [J]. *Guangxi Sci*, 26(1): 37-63.

WEN F, WEI YG, 2016. *Paraboea yunfuensis*: a new calcicolous species of Gesneriaceae from Yunfu, Guangdong Province, China [J]. *Telopea*, 19: 125-129.

XU WB, GUO J, PAN B, et al., 2017a. Three new species of *Paraboea* (Gesneriaceae) from limestone karsts of China based on morphological and molecular evidence [J]. *Bot Stud*, 58(1): 1-14.

XU WB, GUO J, PAN B, et al., 2017b. Diversity and distribution of Gesneriaceae in China [J]. *Guihaia*, 37(10): 1219-1226.

XU ZR, BURTT BL, SKOG LE, et al., 2008. A revision of *Paraboea* (Gesneriaceae) [J]. *Edinb J Bot*, 65: 161-347.

Note: Figure translations are in progress. See original paper for figures.