Postprint of Notes on Chinese Orchid Research

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Abstract

Medog County, Tibet, is situated in the Eastern Himalayas and the Indo-Myanmar border region, serving as the core area of the Yarlung Tsangpo Grand Canyon National Nature Reserve and representing one of the Himalayan biodiversity hotspots. Based on scientific expeditions to Medog, we report two new orchid species records for China: Ceratostylis radiata and Bulbophyllum psychoon, with descriptions and photographic documentation provided. Ceratostylis radiata is distinguished by its pure white flowers, radial symmetry, trilobed labellum, and stem length of 2–2.5 cm, clearly differentiating it from other congeneric species. Bulbophyllum psychoon resembles Bulbophyllum levinei but is distinguished by its ovate petals with acute apices. Voucher specimens are respectively deposited in the herbarium of the Tibet Autonomous Region Institute of Plateau Biology (XZ) and the Institute of Botany, Chinese Academy of Sciences (PE). Both newly recorded species were originally distributed in India, Myanmar, Vietnam, and adjacent regions; their discovery in Tibet indicates certain floristic affinities between Medog and their native distribution areas, while also corroborating that Medog belongs to the subtropical zone. Moreover, the elevational range of both species extends beyond that of their original distribution, and their flowering period is relatively delayed. The discovery of these new record species provides more comprehensive data for elucidating plant species composition in this region and enriching the flora of Tibet, China.

Full Text

Additional Notes on Orchidaceae from China

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Abstract

Medog County in Tibet is located at the junction of the Eastern Himalaya and Indo-Burma region, representing one of the core areas of the Yarlungzangbo Grand Canyon National Nature Reserve and a biodiversity hotspot in the Himalayas. Through scientific expeditions to Medog, we report two newly recorded orchid species in China: *Ceratostylis radiata* and *Bulbophyllum psychoon*, providing detailed descriptions and photographic documentation. *Ceratostylis radiata* is distinguished from other species in the genus by its pure white, radially symmetrical flowers with a three-lobed lip and notably short stems of 2–2.5 cm. *Bulbophyllum psychoon* resembles *Bulbophyllum levinei* but differs in having ovate petals with acute apices. Voucher specimens are deposited in the herbaria of the Tibet Plateau Institute of Biology (XZ) and the Institute of Botany, Chinese Academy of Sciences (PE). Both species were previously known from India, Myanmar, and Vietnam. Their discovery in Tibet reveals floristic connections between Medog and these regions, confirms the subtropical nature of Medog, and indicates that their distribution extends beyond the previously known altitudinal range with relatively delayed flowering periods. These new records provide valuable data for documenting plant diversity and enriching the flora of Tibet, China.

Keywords: new record, Orchidaceae, *Ceratostylis radiata*, *Bulbophyllum psychoon*, Tibet, China

Southeastern Tibet is a global biodiversity hotspot situated at the junction of the Eastern Himalaya and Indo-Burma region (Myers et al, 2000; Mittermeier et al, 2005). Medog County lies in the southeastern Tibet Autonomous Region along the lower reaches of the Yarlungzangbo River. The Indian Ocean and South Asian monsoon create a subtropical warm-humid climate that brings moisture through the Yarlungzangbo valley. The region encompasses diverse ecosystems ranging from alluvial grasslands and subtropical broadleaf forests to alpine meadows above the treeline, spanning an altitudinal range of 150–6,000 m above sea level. Recent years have witnessed the discovery of numerous new species in Medog (e.g., for Orchidaceae; Lai & Jin, 2012; Huang et al, 2013; Wang et al, 2017), indicating that biodiversity surveys in this region remain incomplete. During our botanical survey in Medog County in November 2017, we documented two orchid species new to the flora of China: *Ceratostylis radiata* J.J.Sm. and *Bulbophyllum psychoon* Rchb.f., which we report herein.

1. *Ceratostylis radiata* J.J. Sm., Fl. Buitenz. 6: 295. Fig. 225, 1905; Schechter, Beilb. Bot. Jahrb. 104. 45(3): 21. 1911; J.J. Sm., Fed. Repert. 32: 213. 1933; Baker & Bakhuizen, Fl. Java 310. 1968; Seidenf., Bot. Tidsskr. 65(1-2): 132. 1969; Op. Bot. 89: 115. 1986; *Ceratostylis linearifolia* Ridl., Fl. Malay Pen. 4: 110. 1924; Holttum, Orchids of Malaya, Fl. Malaya 495. 1957.

Tibet Horn Orchid (新拟) [Figure 1: see original paper]

Ceratostylis Blume (1825) comprises approximately 100 species distributed from tropical Asia (India, Indonesia) to New Guinea and the Pacific Islands (Pearce & Cribb, 2002). Four species are currently recognized in China: *C. hainanensis*, *C. himalaica*, *C. siamensis*, and *C. subulata* (Chen et al, 2009; Li et al., 2015).

Morphological Description: Epiphytic herbs with short, clustered stems approximately 2–2.5 cm long and 5 mm thick, covered by two membranous sheaths. The sheaths are tubular, measuring 4–5 × 1–1.5 cm with acuminate apices. Roots emerge from the stem base, about 1 mm thick and 10 cm long. Leaves are linear-lanceolate and elongated, 15–25 × 1.4–2.2 cm, with acute and slightly asymmetrical apices. The mid-vein is slightly concave above and convex below, with the basal portion approximately 5 cm on both sides sinuate upward to form a tube. The petiole is about 1 cm long, connecting to the stem via joints that resemble stem extensions. Inflorescences are racemes growing from leaf axils, terminal with clustered scapes, though only 1–2 racemes develop simultaneously, each bearing a single flower. The scape bears 3–4 sheaths at the base that are triangular-ovate, 1.5–1.7 × 1 cm, with acuminate apices. The peduncle measures 1–1.2 cm long with a tubular sheath at the base approximately 4 × 4.5 mm, apex acuminate. Flowers are white and star-shaped. The pedicel and ovary are 9–10 mm long and densely hirsute. Floral bracts are triangular, 2–2.5 × 3–3.5 mm, with acuminate apices. Sepals are similar, lanceolate, hairy abaxially (more densely at the base), 12–13 × 4 mm, with acute apices and five veins; lateral sepals are slightly shorter, with a mentum approximately 3 mm deep and 4 mm in diameter, apex bilobed. Petals measure 12–13 × 3 mm, linear-lanceolate, narrowly acuminate toward the apex, shorter than lateral sepals, with three veins. The lip is approximately 15 mm long, three-lobed; side lobes are triangular, about 3 × 1.2 mm, obtuse with finely hairy margins; the mid-lobe is lanceolate and curved downward, with an acute apex. The disc bears two ridges on the middle of the side lobes, and the lip base narrows into a claw approximately 5 mm long, bent and concealed in the mentum. The column is about 1.2 mm long, with a column foot approximately 3 mm long; stelidia are oblong, about 2 mm long with rounded apices; the anther cap is oblong; pollinia number eight. Capsules are ellipsoid, approximately 1.2 × 0.8 cm.

Specimen Information: China, Tibet: Medog County, Linzhi City. Epiphytic in semi-evergreen forest beside the Yarlungzangbo River, altitude 1,077 m, November 2017. Flowering occurs from November to December. Collected by Jin Xiaohua, Li Jianwu, Wang Xilong, Wang Chengwang 19116 (XZ!, PE!).

Distribution: China (Tibet), Vietnam, Myanmar, India, Thailand, Malaysia, Java, Sumatra.

Diagnostic Key for *Ceratostylis* in China: 1a. Leaves subterete, stem more than 20 cm, flowers yellow ·····. *C. subulata*
1b. Leaves linear to narrowly oblong; stem less than 10 cm, completely enclosed by sheaths.
2a. Stem branching ····· *C. himalaica*
2b. Stem unbranched
3a. Leaves longer, 15–25 cm long, flowers white ·····. *C. radiata*
3b. Leaves shorter, 2.5–6.0 cm long, flowers white with purple-red or purplish stripes.
4a. Stem ca. 1 cm, flower white with purplish stripes near base ····· . *C. hainanensis*
4b. Stem ca. 0.2 cm, flower white with purple-red spotted ····· *C. siamensis*

Taxonomic Notes: *Ceratostylis radiata* was first published in *Die Orchideen* from Java in 1905. The type specimen from the Kew Herbarium catalogue was collected from Langkawi, Malaysia. Subsequent records include Vietnam, Myanmar, India, and Thailand (Seidenfaden, 1986; Kuezweil & Lwin, 2012; Odyuo et al, 2013; Averyanov et al, 2016). This species is readily identified in the field by its short stem (2–2.5 cm), pure white flowers, three-lobed lip, and star-shaped flowers lacking colored spots.

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2. *Bulbophyllum psychoon* Rchb.f., Gard. Chron., n.s. 10: 170–171. 1878.

Gedang Stone Bean Orchid (新拟) [Figure 2: see original paper]

Bulbophyllum Thouars (1822) is the largest genus in Orchidaceae (Chase et al, 2015). Approximately 150 species are recorded from China (Zhou et al, 2016). We identified this species as *Bulbophyllum psychoon*, belonging to section *Desmosanthes*. Three species from this section occur in China: *B. levinei*, *B. eublepharum*, and *B. insulsoides* (Chen et al, 1999).

Morphological Description: Epiphytic herbs with creeping rhizomes. Roots emerge from rhizome nodes at the base of pseudobulbs. Pseudobulbs are subcylindric or bottle-shaped, 5–10 × 2–4 mm, bearing a terminal leaf. The leaf blade is narrowly oblong or obovate-lanceolate, 3–4 × 0.5–0.7 cm, thinly leathery, with a base contracted into a petiole 3–4 mm long. The margin is slightly undulate, apex subacute. The scape arises from the pseudobulb base, erect, 6–8 cm, longer than the leaves, glabrous. The inflorescence is erect, shortened, umbel-like, typically bearing 2–6 flowers; peduncle approximately 4 mm,

sparsely bearing 2 or 3 tubular sheaths; floral bracts erect, narrowly lanceolate, 2–3.5 mm, apex acuminate. Pedicel and ovary are longer than floral bracts. Flowers are white tinged with purple. The dorsal sepal is ovate-lanceolate, concave, 3–4 × 1.5–2 mm, abruptly contracted and thickened above the middle, margin denticulate, apex acute; lateral sepals are obliquely ovate-lanceolate, 3–5 × 1.5–2 mm, thickened above the middle, base adnate to column foot forming a mentum, margins entire, apex cuspidate. Petals are connivent with sepals, ovate, approximately 2–2.5 × 1.5–2 mm, margins denticulate, apex obtuse. The lip is recurved, lanceolate in outline, 2–2.5 mm, nearly fleshy, grooved in the basal half, base attached to the end of column foot, immobile, margin entire, apex subacute; column approximately 1.2 mm, column foot curved, approximately 1.5 mm, with free part about 0.5 mm; stelidia filiform, approximately 0.5 mm; anther cap subglobose, apex narrowed and beaked, with a densely finely papillate ridge centrally.

Specimen Information: China, Tibet: Medog County, Linzhi City. Epiphytic in broadleaf-coniferous forest beside the road, altitude 1,769 m, November 2017. Flowering occurs from November to December. Collected by Jin Xiaohua, Li Jianwu, Wang Xilong, Wang Chengwang 19192 (XZ!, PE!).

Distribution: China (Tibet), Vietnam, Laos, India.

Diagnostic Key for *B. psychoon* and Related Species in Section *Desmosanthes*: 1a. Inflorescence umbellate

2a. Petals ovate-lanceolate, apex long acuminate ·····. *B. levinei*

2b. Petals ovate, apex obtuse ·····*B. psychoon*

1b. Inflorescence racemose

3a. Lip 3.5–4 mm ·····. *B. eublepharum*

3b. Lip 2–2.8 mm ·····. *B. insulsoides*

Taxonomic Notes: *Bulbophyllum psychoon* Rchb.f. was first described and published in *The Gardeners' Chronicle* by Reichenbach & Heinrich Gustav in 1878. Subsequent records include Vietnam and Laos (Averyanov, 2007, 2013). *Bulbophyllum psychoon* is similar to *B. levinei* but readily distinguished by its white flowers tinged with purple, shortened umbel-like inflorescences bearing 2–6 flowers, ovate petals with obtuse apices, and flowering period from November to December.

The discovery of *Ceratostylis radiata* and *Bulbophyllum psychoon* in Medog County, Tibet, confirms the region' s floristic affinities with tropical monsoon forests. Over-collection and habitat destruction pose the most significant threats to orchid species in this area. We recommend that local authorities prohibit illegal collection, strengthen scientific management of nature reserves, and strictly

limit human access to the core and buffer zones of the Yarlungzangbo Grand Canyon National Nature Reserve to protect its fragile ecosystems. Protected areas are cornerstones of in-situ conservation, and protection of these rare and endangered orchids could be enhanced through management plans incorporating in-situ or ex-situ conservation and artificial cultivation. The discovery of these new record species highlights the high biodiversity conservation value of southeastern Tibet and underscores the need for more comprehensive botanical surveys, research, and environmental protection in this region. This report represents only a small portion of our ongoing work; continued field investigations and specimen identification will undoubtedly yield further discoveries.

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