

## *Calanthe yaoshanensis* sp. nov. (Orchidaceae) from northeastern Yunnan, China

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A new species of Orchidaceae, *Calanthe yaoshanensis* Z. X. Ren & H. Wang from northeastern Yunnan, China, is described and illustrated. It is morphologically similar to *C. brevicornu* Lindley, from which it differs by having a glabrous column and an elliptical middle lobe with three triangular lamellae. The morphological differences between *C. yaoshanensis* and related species are discussed. The habitat was investigated and its conservation status was assessed as 'Critically Endangered' (CR).

The *Calanthe* R. Br. is a widespread genus of terrestrial orchids with about 150 species, distributed in tropical, subtropical and temperate regions from Africa to Asia and the Pacific Islands, most of them concentrated in Asia (Chen 1999, Pearce and Cribb 2002). There are 51 species in China, 21 of them are endemic (Chen et al. 2009). Rising from the upper reaches of the Yangtze River, Yaoshan Mountain lies along the border between northeastern Yunnan and southern Sichuan provinces. During field work on Yaoshan Mountain by the authors from 2007 to 2009, three taxa of *Calanthe* were collected. Of these, *C. yaoshanensis* was identified as a new species as described herein.

### *Calanthe yaoshanensis* Z.-X. Ren & H. Wang sp. nov. (Fig. 1)

*Habitu C. brevicornu affinis, sed columna 8 mm longa glabra (nec 4 mm longa villosa), labello trilobato, lobo medio elliptico ventraliter lamellis 3 triangularibus (nec cristatis) facile differt.*

**Type:** China. Yunnan Province, Qiaojia County, Yaoshan Mountains, 27°12'56.5"N, 103°07'02"E, 2700–2900 m a.s.l., 26 May 2009, Z. X. Ren 039 (holotype: KUN!, isotype: KUN) (flowering).

Terrestrial. Plant 20–50 cm tall. Pseudobulb conical, 1.6 cm long, 1.5 cm in diameter. Leaves 3–4, sheathing at base when young, elliptic–lanceolate to oblong–lanceolate, 20–30 cm long, 5–10 cm wide, acuminate, not fully developed at anthesis, petiole 3–10 cm long. Inflorescence terminal, lax, with up to 13 flowers; peduncle very finely puberulent, sheathed, 19 cm long; sheaths 2–3, ovate,

acuminate, 2 cm long; rachis finely puberulent, about 5–18 cm long; floral bracts lanceolate, glabrous. Flowers greenish yellow, 3.5 cm across; pedicel and ovary 2 cm long, finely puberulent. Sepals similar, narrowly elliptic, 1.7 cm long, 0.7 cm wide, 5-veined, acuminate; lateral sepals slightly narrower than dorsal sepal; petals lanceolate, 1.6 cm long, 0.3 cm wide, 3-veined, acuminate. Lip 3-lobed, adnate to column base; lateral lobes, oblong to spatulate, apex emarginate, 0.6 cm long, 0.3 cm wide; middle lobe elliptic, apex emarginate with an apiculus, base with 0.1 cm long claw, 0.7 cm long, 1 cm wide, greenish yellow, revolute to form a tube at anthesis; three triangular lamellae on mid-lobe, 0.1–0.2 cm tall; spur puberulent, 0.1–0.3 cm long, outside and inside puberulent, attenuate toward apex. Column 0.8 cm long, stout, slightly dilated toward apex, glabrous; rostellum bifid. Anther cap beaked; pollinia narrowly obovoid, subequal in size, 0.1 cm in diameter. Capsule elliptic, 3 cm long, 1 cm in diameter. Flowers in Apr–Jun, and fruits during May–Oct.

### *Habitat and ecology*

*Calanthe yaoshanensis* is an understory herb, growing on high-mineral, humus-rich soils on mountain cliffs, and on the northeast limestone slope of Yaoshan Mountain, at an elevation of 2700–2900 m a.s.l. According to local meteorological data, the annual average temperature is 7–11°C, and its coldest monthly average temperature does not exceed 5.2°C. The annual rainfall is about 1100–1200 mm.

The slope is covered by deciduous broad-leaf forest, with *Quercus spinosa* David ex Franch., and *Corylus yunnanensis* (Franch.) A. Camus being the main arbor species. *Magnolia*

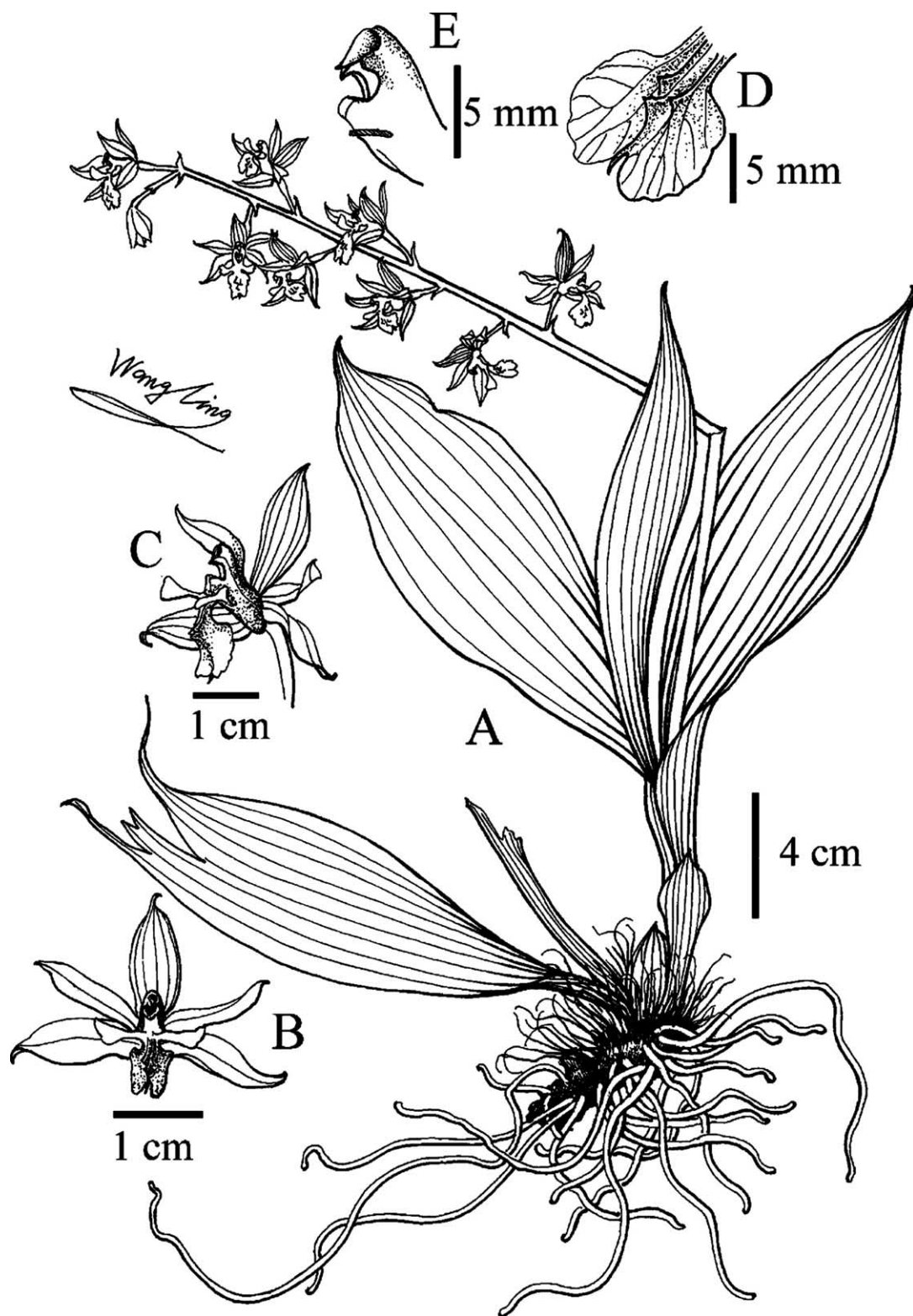


Figure 1. *Calanthe yaoshanensis* sp. nov. (A) plant, (B) front view of flower, (C) lateral view of flower, (D) front view of middle lobe of lip, (E) rostellum (drawn by Ling Wang from Z.-X. Ren 039).

*wilsonii* (Finet et Gagnep.) Rehd., *Rhododendron argyrophyllum* Franch., and *Rhododendron siderophyllum* Franch. are the most prevalent shrubs. Other orchids, such as *Cypripedium fargesii* Franch., *Cypripedium tibeticum* King ex Rolfe, and *Cremastra*

*appendiculata* (D. Don) Makino are usually found in the same habitat as *Calanthe yaoshanensis* during the flowering season. *Calanthe yaoshanensis* usually grows in small clusters of 2–15 individuals.

Table 1. Comparison of the floral morphology of *Calanthe yaoshanensis* sp. nov. and related species.

Character	<i>C. yaoshanensis</i>	<i>C. brevicornu</i>	<i>C. fugongensis</i>	<i>C. griffithii</i>	<i>C. hancockii</i>
Colour	greenish yellow	yellowish green, with pinkish red striations	greenish yellow	flowers greenish brown to yellowish green with brownish lip	yellowish brown
Sepals (mm)	similar, narrowly elliptic, 17 × 7	similar, oblong, 12–23 × 4–6	dorsal sepal narrowly elliptic, 20 × 10, lateral sepals lanceolate, 20 × 8	similar, oblong, 20 × 10	similar, oblong-lanceolate, 25–35 × 6–10
Petals (mm)	lanceolate, 16 × 3	oblong-lanceolate, 11–20 × 4–5	oblanceolate, 15–16 × 6	suboblanceolate, 17 × 6	subelliptic, 23 × 6
Lateral lobe of lip (mm)	oblong to spatulate, 6 × 3	falcate-oblong, 15.0 × 12.5	narrowly oblong-hamate, oblique, 8 × 5	oblong, 8 × 4	falcate-oblong, 8 × 4
Mid-lobe of lip (mm)	elliptic, 7 × 10	nearly reniform or orbicular, disk pinkish red, 6 × 8	spatulate, 10 × 10	subcordate or flabellate-elliptic, 9 × 12	narrowly obovate-oblong, 10 × 5
Lamellae	3; triangular	3; tall cristate	3; rectangular	1; subtriangular	3; undulate
Spur (mm)	1–3	2	4.5–6.0	6	2–3
Column (mm)	8, glabrous	4, ventrally villous	10, glabrous, with triangular wings	8, glabrous	5, sparsely puberulent

### Distribution and conservation status

*Calanthe yaoshanensis* is a local endemic species, only collected at the type locality on the northeastern slope of Yaoshan Mountain, northeastern Yunnan, China.

Up to now, only one population with about 200 individuals has been found in an area of 1 km<sup>2</sup>. In 2008 and 2009, we collected 90 and 84 capsules during fruiting season. According to IUCN red list criteria (IUCN 2001), this species should be included in the category ‘Critically Endangered’ (CR) (B2a, C2a).

### Similar species

The new species *Calanthe yaoshanensis* is very similar to *C. brevicornu* in morphological characters, such as 3-lobed lip with 3 lamellae on the mid-lobe and a spur less than 3 mm long. However, it differs from *C. brevicornu* by an elliptic middle lobe with three subtriangular lamellae centrally and a glabrous column. *Calanthe brevicornu* is characterized by having yellowish green flowers with pinkish red striations, reniform or orbicular mid-lobe, pinkish red disk with 3 tall cristate lamellae and ventrally villous column. Additionally, *C. griffithii*, *C. hancockii* and *C. fugongensis* may also be allies of *C. yaoshanensis* (Chen 1999, Chen et al. 2009). The features of the lip, especially the lamellae on the mid-lobe, are very useful to distinguish them. *Calanthe fugongensis* possesses hamate lateral lobes and an elliptic middle lobe with three rectangular lamellae (Jin and Li 2007). *Calanthe griffithii* is easily distinguished by a broad mid-lobe with a single central subtriangular lamella (Chen 1999, Pearce and Cribb 2002), whereas *C. hancockii* is characterized by an obovate-oblong mid-lobe with three undulate lamellae, the central one almost reaching the mid-lobe apex (Chen et al. 2009). A detailed comparison of the floral morphology of *C. yaoshanensis* and related species is provided in Table 1.

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