

# 中国广西虾脊兰属一新种——弄岗虾脊兰

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**摘要:** 报道了分布于我国广西西南部的兰科(Orchidaceae)虾脊兰属(*Calanthe* R. Br.)一新种——弄岗虾脊兰(*C. longgangensis* Y. S. Huang & Yan Liu)。该新种与泽泻虾脊兰(*C. alismifolia* Lindl.)相似,但根状茎明显,侧面萼片向上反卷,花瓣重叠,唇瓣侧裂片倒披针形、顶端斜截形,中裂片顶端微2裂、基部具数列白色的胼胝体,花粉块棒状而与后者相区别。

**关键词:** 兰科; 弄岗虾脊兰; 新种; 石灰岩植物区系; 中国

doi: 10.11926/j.issn.1005-3395.2015.03.009

## *Calanthe longgangensis*, A New Species of *Calanthe* (Orchidaceae) from Guangxi, China

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**Abstract:** *Calanthe longgangensis* Y. S. Huang & Yan Liu, a new species from southwestern Guangxi, China is described and illustrated. Based on morphological characters, it is similar to *C. alismifolia* Lindl., but differs in its rhizome conspicuous, lateral sepals upward reflexed, petals overlapping, lateral lobes of lip oblanceolate, apex obliquely truncate, mid-lob apex shallowly 2-lobed, disk with multiseriate white, wartlike calli at base, pollinia clavate.

**Key words:** Orchidaceae; *Calanthe longgangensis*; New species; Limestone flora; China

The genus *Calanthe* R. Br. distributed in tropical, subtropical and temperate regions from Africa to Asia and the Pacific Islands, a few species also distributed in tropical America. *Calanthe* R. Br. comprises about 150 species, of which 51 species distributed in China, including 21 endemic species<sup>[1]</sup>. The south China is the main distribution area of China, and 20 species have been discovered in Guangxi<sup>[2]</sup>.

During our fieldwork in the southwest of Guangxi, China, a particular species of *Calanthe* was found flowering in karst forest at an elevation of 300 m in Longgang National Nature Reserve. The flowers of this species have overlapping, white petals, but the base of lip is purplish violet, this two characteristics are obviously differ from most of other species. After consulting national floras and other relevant literature<sup>[3-10]</sup>,

Received: 2014-04-29

Accepted: 2015-01-04

This work was supported by the National Natural Science Foundation of China (41161011); the National Science and Technology Support Plan (2008BAC39B02-07); Fundamental Research Fund of Guangxi Institute of Botany (GZY13014); the Traditional Chinese Medicine Project ([2011]76), and Traditional Chinese Medicine Industry Research Special Project (201207002).

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as well as numerous herbarium specimens, we found this particular species differed from all known ones. So we made the conclusion that this population is an undescribed species, and the valid name *Calanthe longgangensis* Y. S. Huang & Yan Liu was used, which is described below.

***Calanthe longgangensis* Y. S. Huang & Yan Liu sp. nov.** Fig. 1, Fig. 2: C, D

**Type:** China, Guangxi, Chongzuo City, Longzhou County, Longgang National Nature Reserve, in karst forest, rare, alt. 300 m a. s. l., 29 Jul. 2012, Yan Liu et Yu-song Huang Y2158 (holotype: IBK, isotype: PE,

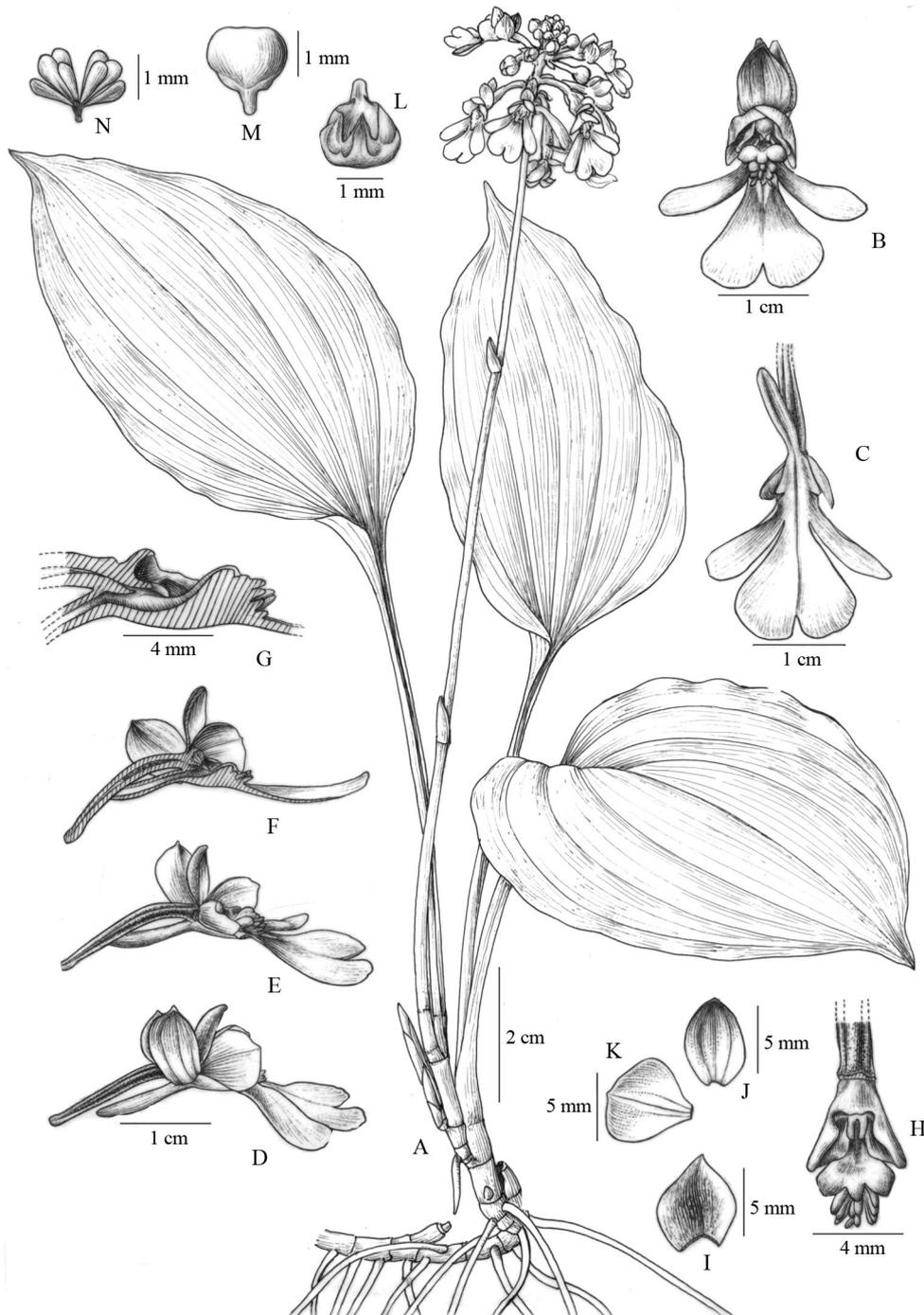


Fig. 1 *Calanthe longgangensis* Y. S. Huang & Yan Liu. A: Habit; B: Flower (front view); C: Flower (seen from below); D-E: Flower (lateral view); F: Flower (longitudinal section); G: Column (longitudinal section); H: Column and wartlike calli of disk; I: Bract; J: Sepal; K: Petal; L: Anther cap (ventral view); M: Anther cap (seen from above); N: Pollinia. [Drawn by Y. X. ZHU (PE)]

IBK).

Plants 35–45 cm tall. Rhizome conspicuous. Pseudobulbs cylindric, 2–4 cm long, 3–5 mm in diam. Leaves 2–3, well developed and spreading at anthesis, evergreen, blade elliptic or oblong, 10–25 cm long, 4–9 cm wide, apex acuminate, margin entire, abaxially densely pubescent, petiole-like base 9–15 cm. Scapes 1 or 2, arising from leaf axils, erect, 18–40 cm long, densely pubescent, with 2 tubular sheaths. Rachis 3–7 cm long, with 10–15 flowers. Floral bracts persistent, green, ovate-lanceolate, 5–8 mm long, ca. 3 mm wide, apex acute, recurved, abaxially densely pubescent. Pedicel and ovary ca. 2 cm long, densely pubescent.

Sepals similar, elliptic, white or light green, lateral sepals upward reflexed, ca. 8 mm long, ca. 6 mm wide, apex acute, 3-veined, abaxially densely pubescent, adaxially glabrous. Petals white, subrhombic, overlapping, ca. 6 mm long and wide, base clawed, glabrous. Lip adnate to entire length of column wings, deeply 3-lobed, lateral lobes oblanceolate, apex obliquely truncate, ca. 1 cm long, ca. 3 mm wide, mid-lobe flabellate, white, base of lip purplish violet, ca. 1.7 cm long, ca. 1.2 cm wide, apex shallowly 2-lobed, apex margin incised, disk with multiseriate white, wartlike calli at base. Spur straight, cylindric, ca. 8 mm long, glabrous or sparsely pubescent. Column ca. 5 mm,



Fig. 2 *Calanthe alismifolia* Lindl. (A, B) and *C. longgangensis* Y. S. Huang & Yan Liu (C, D). A, C: Habit; B, D: Flowers.

glabrous, rostellum 2-lobed. Anther cap white, beaked. Pollinia clavate, ca. 1.5 mm long.

**Habitat, distribution and phenology:** *Calanthe longgangensis* grows in the valley of karst forest, near the stream, at an elevation about 300 m, the associated species contain *Ficus hispida*, *Saurauia tristyla*, *Polygonum chinense*, *Trevesia palmate*, *Gynostemma pentaphyllum*, *Chasallia curviflora*, *Peliosanthes macrostegia* and so on. At present, *C. longgangensis* is only found in Longgang National Nature Reserve of southwestern Guangxi Province, China, flowering occurs from July to October. *C. alismifolia* usually grows in evergreen broad-leaved forests, at an elevation 700–2100 m, sometimes it also grows in hillside of limestone areas of low altitude, distributing in Guangxi, Guizhou, Hubei, Hunan, Sichuan, Taiwan, SE Xizang, SE and W Yunnan, Zhejiang and so on. Besides, it also distributes in Bhutan, NE India, Japan and Vietnam. Flowering occurs from June to July.

**Conservation status:** *Calanthe longgangensis* is only known from the type locality, and the total number of plants is less than 200. We therefore consider *C. longgangensis* to be endangered (EN) according to the IUCN categories and criteria<sup>[11]</sup>.

**Similar species:** *Calanthe longgangensis* Y. S. Huang & Yan Liu is similar to *C. alismifolia* Lindl. (Fig. 2: A, B), but differs in its rhizome, lateral sepals, petals, lip and pollinia. A morphological comparison of both species is shown in Table 1.

**Additional specimens examined (paratypes):** China. Guangxi, Chongzuo City, Longzhou County, Longgang National Nature Reserve, grows in karst forest, 270 m, 13 Jul. 2010, Wei-Bin Xu and Wang-

Hui Wu 10573 (IBK).

**Notes:** *Calanthe alismifolia* is a widespread species, the type specimen collected in sikkim, with the prominent characteristics of spreading lateral sepals, separate petals and yellow calli on the disk. But the species showed in Fig. 29 (b, c) of L. V. Averyanov's research paper<sup>[12]</sup> and in the books: *Genera Orchidacearum, Volume 4: Epidendroideae (Part 1)*<sup>[13]</sup> and *The Genus Calanthe*<sup>[14]</sup> are very similar to *C. longgangensis*, which were considered as *C. alismifolia*. Maybe they are the same species with *C. longgangensis*, thus L. V. Averyanov and all the authors of the books may believe that the characteristics of upward reflexed lateral sepals, overlapping petals and white calli on the disk are within the range of variation of *C. alismifolia*. But according to our field observation up to 4 years about the species of *C. longgangensis*, it has stabilized characteristics of upward reflexed lateral sepals, overlapping petals and white calli on the disk, etc.

Besides, we sampled an individual from the presently known population of the new species in the field. The experimental procedures and primary sequence treatment were referred to those outlined in previous studies<sup>[15]</sup> including DNA extraction, conditions for PCR and sequencing. The primers used for amplification and sequencing included: ITS4 (5'-TCCTCCGCTTATTGATATGC-3') and ITS5 (5'-GGAAGTAAAAGTCGTAACAAGG-3') for the internal transcribed spacer (ITS)<sup>[16]</sup>. Finally, the aligned matrix included 29 accessions of 29 species. Phylogenetic trees were reconstructed using maximum parsimony (MP)<sup>[17]</sup> and maximum likelihood (ML).

Table 1 Morphological comparison of *Calanthe longgangensis* and *C. alismifolia*

Characters	<i>Calanthe longgangensis</i>	<i>C. alismifolia</i>
Rhizome	Conspicuous	Inconspicuous
Lateral sepals	Upward reflexed	Spread, not reflexed
Petals	Overlapping	Non-overlapping
Lip	Lateral lobes oblanceolate, apex obliquely truncate, mid-lobe apex shallowly 2-lobed, disk with multiseriate white, wartlike calli	Lateral lobes linear or narrowly oblong, apex rounded, mid-lobe apex divided by a deep sinus into 2 lobules, disk with several yellow, wartlike calli
Pollinia	Clavate, ca. 1.5 mm long	Ovoid, ca. 2 mm long

The parsimony analyses were conducted under the option of heuristic search with 100 random stepwise additions and tree-bisection-reconnection (TBR) branch swapping with PAUP\* version 4.0b10<sup>[18]</sup> with all most-parsimonious trees saved at each replicate (MulTree on). Support for each branch was assessed using bootstrap analysis with 100 bootstrap replicates, each with 10 stepwise additions. All other parameters were settled as default. Homoplasy levels were assessed by consistency index (CI), retention index (RI) and rescaled consistency index (RC). Although SYM+G nucleotide substitution model was selected by the program Modeltest using the Akaike information criterion (AIC), it is not implemented in RAxML. Thus, for the ML analysis, we constructed the phylogeny using alternative GTR+ $\Gamma$  as alternative and performed 500 replicates for the bootstrap analysis

in RAxML 7.0.3<sup>[19]</sup>.

The final aligned matrix had 633 bps in length with 114 informative sites as well as 44 additional variable but uninformative sites. Both MP and ML analyses yielded concordant majority-rule consensus trees with the ML consensus tree better resolved (Fig. 3). In the MP majority-rule consensus tree (CI=0.83, RI=0.92 and RC=0.76) and the maximum likelihood tree, the new species *C. longgangensis* is obviously not the closest relative to *C. alismifolia*, the most morphologically similar species, but is sister to the clade including *C. alismifolia* and the other seven species with strong support value (BSML=91%, BSMP=91%).

We have observed that the assumed new species is strikingly different from the *C. alismifolia* for its special floral structure and traits, for example,

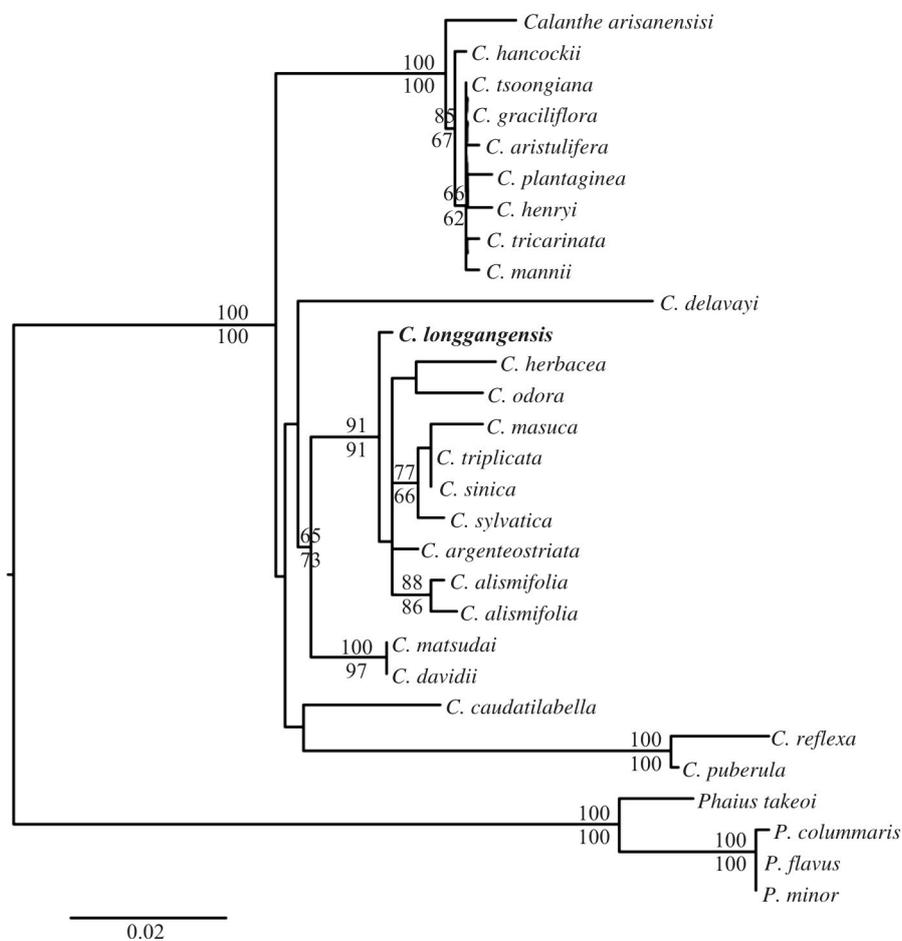


Fig. 3 A maximum likelihood (ML) phylogenetic tree of *Calanthe longgangensis* and associated species based on the nuclear ribosomal ITS sequence. The bootstrap values of ML and MP analyses more than 50% are indicated above and below branches, respectively. The new species is highlighted in bold.

rhizome conspicuous, lateral sepals upward reflexed, petals overlapping, lateral lobes of lip oblanceolate and so on, suggesting that they could be separated from each other. This is strongly supported by our further molecular analysis. So the new species is distinguished from other closely-related species, including the most morphologically similar *C. alismifolia*, and thus should be an independent new species.

**Acknowledgements** We thank Mr. Yun-xi ZHU (PE) for preparing the illustration, the leaders and staff of Longgang National Nature Reserve for help and support. We also thank Dr. Qiang ZHANG for his comments on the manuscript, and Prof. Hong JIANG for providing relevant references.

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