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Chamaelirium jiuwanshanense (Melanthiaceae), a new dioecious species from Guangxi, China

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ABSTRACT: *Chamaelirium jiuwanshanense*, a new dioecious species of Melanthiaceae from Jiuwanshan National Nature Reserve, Guangxi, China is described and illustrated. It is similar to *C. shimentaiense*, but can be clearly distinguished from the latter mainly by its dioecious sexual system, linear-lanceolate bract-like cauline leaves, racemes with pedicelled flowers, etc. A detailed morphological description, and the information on its distribution, habitat and conservation status are provided here.

KEY WORDS: *Chamaelirium shimentaiense*, Dioecious, Flora of Guangxi, Melanthiaceae, New taxon, Taxonomy.

INTRODUCTION

Chamaelirium Willdenow (1808) was previously considered as a monotypic genus. However, recently, *Chionographis* Maximowicz (1867) has been merged into *Chamaelirium*, according to morphological and phenological analyses (Tanaka, 2017). At present, this genus contains 11 species, which are distributed in eastern Asia and eastern North America, and five species are recorded in China (Tong *et al*., 2020).

On 28 May, 2020, during a botanic survey in Jiuwanshan National Nature Reserve, Guangxi, China, the first author discovered a dioecious *Chamaelirium* species, but its male flowers nearly withered and the ovaries in female flowers already became swollen. And we successfully collected the specimens of this species with blooming flowers on 21 April, 2022. This species is special due to its dioecious sexual system and distincltly pedicelled flowers. After dissecting its flowers and consulting the relevant literature (Tanaka, 2017; Liu *et al*., 2018; Tong *et al*., 2020), we confirmed that the plant is different from any known species of *Chamaelirium*. Hence, it is described and illustrated as a new species below.

TAXONOMIC TREATMENT

Chamaelirium jiuwanshanense Ying Qin & Yan Liu, ***sp. nov.*** **九万山白丝草 Figs. 1 & 2**

Type: CHINA. Guangxi Zhuang Autonomous Region, Jiuwanshan National Nature Reserve, Yangmeiao protection station, elev. 1376 m, 21 April 2022, *Ying Qin & Gao Xie GXQY20220421001* (♂) (holotype: IBK! IBK00446152, isotypes: IBK! IBK00446153 & IBK00446154, PE! 02362083).

Chamaelirium jiuwanshanense is similar to *C. shimentaiense* Y.H.Tong, C.M.He & Y.Q.Li, but differs from the latter mainly by its dioecious (vs. hermaphroditic) sexual system, linear-lanceolate (vs. elliptic) bract-like cauline leaves, racemose (vs. spicate) inflorescences, flowers with distinct pedicels (vs. sessile or subsessile), and greenish, dark-greenish, or purplish-brown tepals (vs. purplish).

Perennial herb, dioecious, 18–41 cm tall. Rhizome 1.5–3.6 cm long, 4.1–8.8 mm in diameter, densely noded, branched or not, with many fibrous roots. Leaves crowded at apex of rhizome, rosulate, evergreen; petiole 1.0–7.2 cm long, 2.4–4.6 mm wide, slightly concave adaxially, convex abaxially, usually with wavy and narrow wings at margin; blade elliptic to oblong-elliptic or spatulate, 1.0–6.6 cm long, 0.7–3.1 cm wide, entire and usually undulate at margin, acute and usually mucronate at apex, cuneate at base, parallel-veined. Scape (including inflorescence) axillary, arising near the center of the leaf rosette, erect, simple, 16.2–39.7 cm long, with 6–12 bract-like leaves at lower part; bract-like leaves linear-lanceolate, 1.1–1.7 cm long, 2.6–5.1 mm wide, acute at apex. **Male inflorescences**, racemose, 9.4–13.5 cm long, 27–83-flowered; rachis 1.5–2.5 mm in diameter, greenish or purplish-brown, with 8–10 longitudinal ridges; bract absent. **Male flowers** obviously pedicellate, actinomorphic or nearly actinomorphic. Pedicels 3.1–8.2 mm long, 0.6–0.8 mm in diameter, greenish or purplish-brown. Tepals 3–5, rarely 6, greenish or purplish-brown, filiform, 4.3–8.5 mm long, slightly broadened and obtuse at apex. Stamens 6, inserted at base of tepals; anthers basifixed, orbicular or reniform, extremely curved toward base on both sides, yellow or yellowish-green, 0.7–1.2 mm in diameter; filaments greenish, pale yellowish-green or slightly purplish-brown, outer series 0.7–2.4 mm long, inner series a little shorter. Pistillode tiny. **Female inflorescences**, racemose, 9.0–18.4 cm long, 40–81-flowered; rachis 1.9–2.8 mm in diameter, greenish or with slightly purplish-brown, with 8–10 longitudinal ridges; bract absent. **Female flowers** obviously pedicellate, actinomorphic or nearly actinomorphic.

Fig. 1. ***Chamaelirium jiuwanshanense.*** **A:** Habitat. **B:** Male plant habit. **C:** Female plant habit. Photos by Ying Qin.

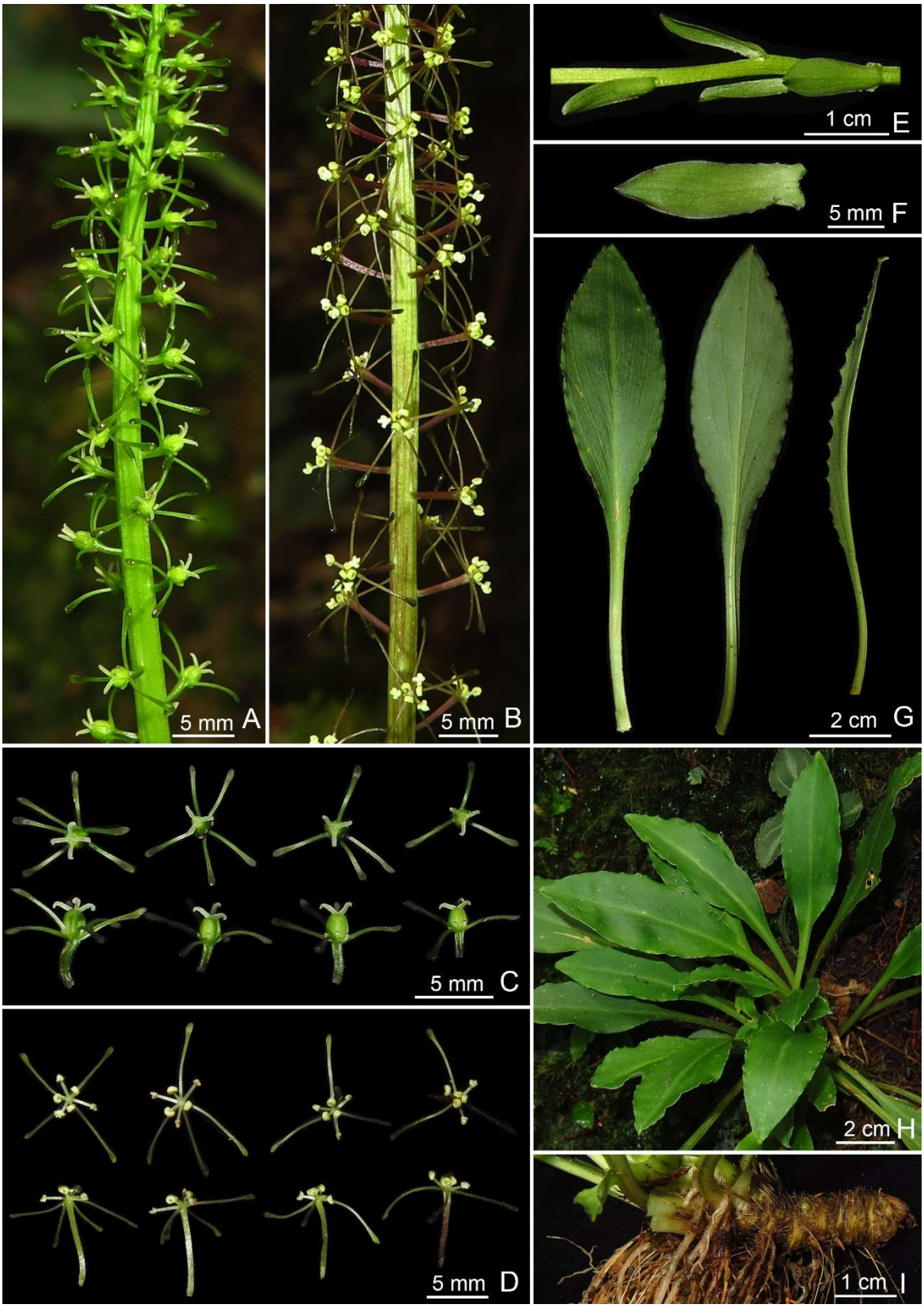

Fig. 2. ***Chamaelirium jiuwanshanense***. **A:** Female inflorescence. **B:** Male inflorescence. **C:** Female flowers, face view and side view. **D:** Male flowers, face view and side view. **E:** Bract-like leaves at lower part of scape. **F:** Linear-lanceolate bract-like leaf, adaxial view. **G:** Leaves, adaxial view, abaxial view and side view. **H:** Plant without flowers. **I:** Densely noded rhizome. Photos by Ying Qin.

Table 1. Morphological comparisons of ***Chamaelirium jiuwanshanense*** and ***C. shimentaiense***.

Characters	***C. jiuwanshanense***	***C. shimentaiense***
Sexual system	dioecious	hermaphroditic
Petiole	1.0–5.7 cm long	0.5–2.0 cm long
Bract-like leaf	linear-lanceolate	elliptic
Inflorescence	racemose	spicate
Pedicel	obvious, 3.1–8.2 mm long (♂) and 1.1–3.1 mm long (♀)	absent
Tepal	greenish or purplish-brown (♂); greenish or dark-greenish (♀)	purplish
Anther	orbicular or reniform, extremely curved toward base on both sides, yellow or yellowish-green	reniform, not extremely curved, white
Style	3, rarely 4	3

Pedicels 1.1–3.1 mm long, 0.4–0.8 mm in diameter, greenish or dark-greenish. Tepals 3–5, rarely 6, greenish or dark-greenish, filiform, 3.2–5.0 mm long, slightly broadened and obtuse at apex. Staminodes 6, 0.4–0.7 mm long, greenish, with undeveloped anthers. Ovary ellipsoid, obtusely trigonal, rarely quadrangular, 1.1–1.7 mm long, 0.9–1.5 mm wide, 3-loculed and rarely 4-loculed, 2 ovules per locule. Styles 3, rarely 4, linear, 0.9–1.7 mm long, recurved. Capsule not seen.

***Phenology*:** Flowering in April and May, fruiting unknown.

***Etymology*:** The epithet is derived from the type locality Jiuwanshan National Nature Reserve, Guangxi, China.

***Taxonomic notes*:** *Chamaelirium jiuwanshanense* is similar to *C. shimentaiense*. Shared characters include elliptic to oblong-elliptic blades and filiform tepals with a slightly broadened and obtuse apex. But the new species can be easily distinguished from the latter by several characters (Table 1).

***Distribution and habitat*:** *Chamaelirium jiuwanshanense* was discovered in a subtropical evergreen and deciduous broad-leaved mixed forest of Jiuwanshan National Nature Reserve, Guangxi, China. The main companion species are *Rhododendron* sp., *Machilus chienkweiensis* S. Lee, *Diospyros lotus* Linnaeus, *Acer davidii* Franchet, *Hydrangea paniculata* Siebold, *Cornus hongkongensis* Hemsley, *Diplopanax stachyanthus* Handel-Mazzetti, *Cinnamomum* sp., *Asplenium normale* D. Don, *Phyllagathis cavaleriei* (H. Léveillé & Vaniot) Guillaumin, *Aeschynanthus buxifolius* Hemsley, *Goodyera velutina* Maximowicz ex Regel, *Chimonobambusa angustifolia* C.D.Chu & C.S.Chao, etc.

Conservation status: According to Guidelines for using the IUCN Red List Categories and Criteria (IUCN Standards and Petitions Committee, 2022), *C. jiuwanshanense* is assessed as data deficient (DD). At present, after three botanic surveys, only one population of the species has been discovered with 67 individuals. However, Jiuwanshan National Nature Reserve covers a large area of ca. 252.13 km² (49.02% in Rongshui County, 31.30% in Luocheng County and 19.68% in Huanjiang County). Thus, the previously conducted botanic surveys are not enough to evaluate the conservation status of this species.

***Additional specimens examined (paratypes)*:** CHINA. Guangxi Zhuang Autonomous Region, Jiuwanshan National Nature Reserve, Yangmeiao protection station, elev. 1376 m, 28 May 2020, *Ying Qin & Xi-Tao Li JWSQY187*(♂) (IBK!); ibid., 28 May 2020, *Ying Qin & Xi-Tao Li JWSQY197*(♂) (IBK!); ibid., 28 May 2020, *Ying Qin & Xi-Tao Li JWSQY240*(♀) (IBK!); ibid., 21 April 2022, *Ying Qin & Gao Xie GXQY20220421002* (♀) (IBK!, PE!).

Key to *Chamaelirium* taxa in China

1 Inflorescences racemose, pedicel distinct ..... ***C. jiuwanshanense***
– Inflorescences spicate, pedicel absent **2**
2 Apex of tepals broadened and obtuse **3**
– Apex of tepals acute or obtuse but not broadened **4**
3 Tepals equal, initially purplish ..... ***C. shimentaiense***
– Tepals unequal, white to pale yellow ..... ***C. chinensis***
4 Tepals 3, rarely 4, filaments unequal .....***C. nanlingensis***
– Tepals 6, filaments equal **5**
5 Tepals green, leaf petiole 0.6–3.8 cm long ..... ***C. viridiflorum***
– Tepals white, leaf more or less petiolate ..... ***C. shiwandashanensis***

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