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## *Chamaelirium viridiflorum* (Melanthiaceae), a new species from Jiangxi, China

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### Abstract

*Chamaelirium viridiflorum* (Melanthiaceae), a new species from southern Jiangxi, China, is described and illustrated. It is similar to *C. koidzumiana* in their elliptic or ovate leaf blade and slender petiole, but differs by its zygomorphic flowers and unequal tepals. Besides *Chamaelirium viridiflorum* is also similar to *C. shiwandashanensis* in their actinomorphic flowers, but distinguished by its spatulate to obovate leaf blade, distinct petiole and 0.8–1.1 cm long tepals. This new species has an obvious feature that the color of tepals is still greenish at the end of the flowering period.

**Keywords:** China, *Chamaelirium*, Melanthiaceae, New species, Taxonomy

### Introduction

*Chamaelirium* Willdenow (1808: 18) (Melanthiaceae Batsch; APG IV, 2016) is distributed in eastern North America and also in eastern Asia including Laos, Vietnam, China, Korea, and Japan (Tanaka 2017a, Averyanov & Tanaka 2014, Utech, 2002). Tanaka (2017a, b) recently assessed *Chionographis* Maximowicz (1867: 435) which was comprised of 8 species, and the monotypic *Chamaelirium* and found them to be synonyms based on morphology (direction and symmetry of the perigone, the number, length and shape and color of the tepals, seed shape and arrangement within testa of seeds, and their chromosome number), and phenological characters. As a result, Tanaka (2017a) suggested to merge *Chionographis* into *Chamaelirium* as a section, i.e. sect. *Chionographis* (Maximowicz) Tanaka (2017a: 159), further subdivided into two subsections, i.e. subsect. *Chionographis* (Maximowicz) Tanaka (2017a: 160) and subsect. *Cathayana* Tanaka (2017a: 160), each including four species.

The circumscription of *Chamaelirium* now includes nine species: *C. luteum* (Linnaeus 1753: 1044) Gray (1848: 503) is distributed in Canada and USA (Utech 2002), *C. actinomorphyum* (Averyanov & Tanaka 2014: 13) Tanaka & Averyanov (2017a: 161) is only distributed in Laos and Vietnam (Averyanov & Tanaka 2014), *C. japonicum* (Willdenow 1802: 22) Tanaka (2017a: 163) is distributed in South Korea and Japan, and three other species are endemic to Japan (Tanaka 2003, 2013, Hara 1968): *C. hisauchianum* (Okuyama 1953: 268) Tanaka (2017a: 162); *C. cordifolia* (Tanaka 2013: 30) Tanaka (2017a: 162); and *C. koidzumianum* (Ohwi 1930: 565) Tanaka (2017a: 164). Three species are found in southern China: *C. chinensis* (Krause 1929: 807) Tanaka (2017a: 162) is widely distributed across Fujian, Jiangxi, Hunan, Guangdong, Hainan and Guangxi provinces (Chen 1980, Tanaka 2017a); *C. shiwandashanensis* (Huang & Jiang 2011: 605) Tanaka (2017a: 161) is endemic to Mt. Shiwandashan in southern Guangxi (Huang *et al.* 2011); *C. nanlingensis* (Lei *et al.* 2016: 601) Tanaka (2017a: 161) is endemic to Nanling National Nature Reserve, northern Guangdong (Wu *et al.* 2016).

During a botanical survey of Mt. Qiyunshan in 2017, we collected an unknown *Chamaelirium*, which was characterized by leaves basal, inflorescence a terminal spike and filiform tepals. Because of its actinomorphic flowers, slim petiole and 0.8 to 1.1 cm long regular tepals, it was obviously different from the four species currently classified within subsect. *Cathayana*. These plants are described and illustrated here as a new species.

## Description of the new species

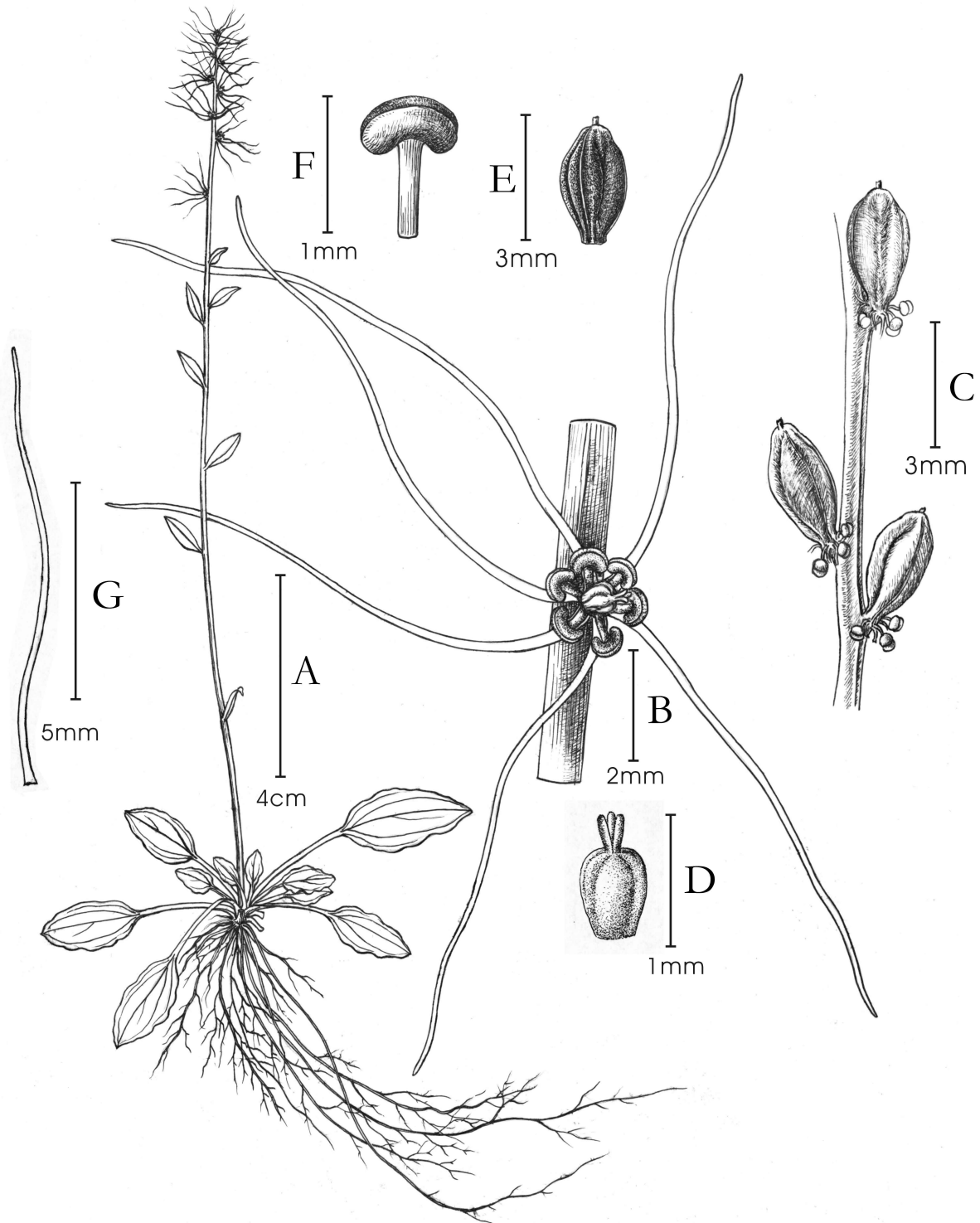
*Chamaelirium viridiflorum* L. Wang, Z.C. Liu & W.B. Liao, *sp. nov.* (Figs. 1–3)

*Chamaelirium viridiflorum* is most similar to *C. shiwandashanensis*, but differs by its distinctly petiolate leaves; greenish inflorescence rachis; and longer tepals (0.8–1.1 cm).

**Type:**—CHINA. Jiangxi Province: Chongyi county, Qiyunshan, 25°54'09"N, 114°01'02"E, Elev. 1465 m, in the valley of a dense forest, 9 June 2017, Z.C. Liu *et al.*, LXP-13-23537 (holotype SYS!, isotype SYS!).



FIGURE 1. *Chamaelirium viridiflorum* L. Wang, Z.C. Liu & W.B. Liao (holotype).



**FIGURE 2.** *Chamaelirium viridiflorum* L. Wang, Z.C. Liu & W.B. Liao. **A**, Flowering plant; **B**, Flower; **C**, Infructescences; **D**, Styles and ovary; **E**, Capsule; **F**, Stamens; **G**, Tepal.

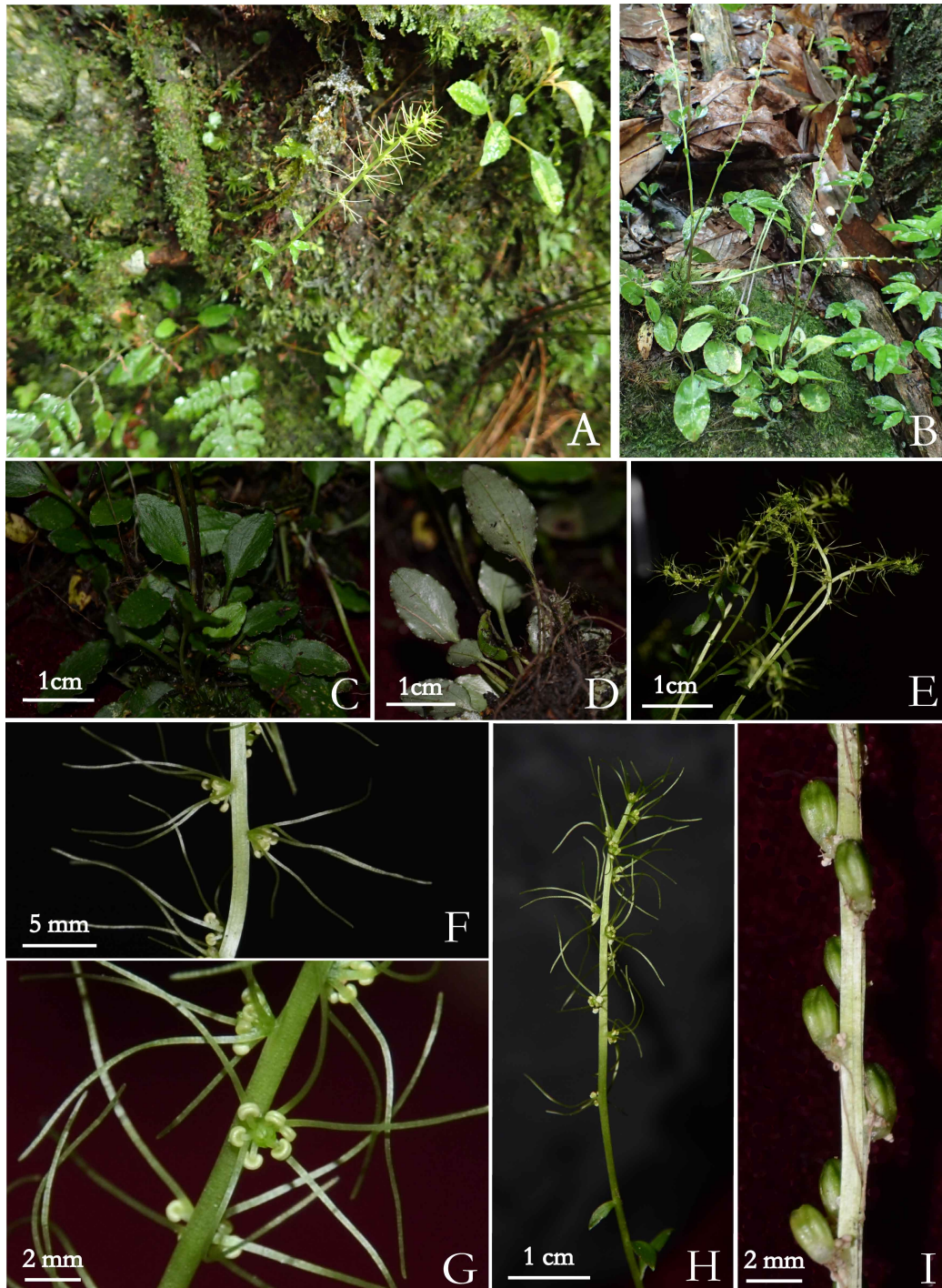
**Description:**—Perennial hermaphroditic, rosulate, herb. Rhizome short, with many fibrous roots. Leaves basal, petiolate, leaf blade round to oblong-elliptic, evergreen, 1.0–3.1 × 0.8–1.4 cm, glabrous, margin entire or minutely undulate, apex acute or rounded, base rounded to cuneate, parallel-veined. Scape axillary arising from the stem apex, erect, 15–22 cm long, with 7–9 small elliptic to elliptic-lanceolate, bract-like leaves. Spike 5–10.5 cm, inflorescence rachis greenish, many flowered, usually elongate after anthesis, without bracts. Flowers actinomorphic, tepals 6, rarely 5, greenish, white at fruit period, filiform 0.8–1.1 cm long, regular. Stamens 6, inserted at base of tepals, 0.8–0.9 mm

long, regular; anthers basifixed, oblong-elliptic, extrorse. Styles 3, linear, 0.3 mm long. Capsule sub-obovoid, 2–2.2 × ca 1.1 mm, 3-loculed, triangulate in transverse.

**Etymology:**—The specific epithet refers to the flowers of this new species that are green throughout the flowering period, differing from those of all other known species.

**Phenology:**—Flowering April to June and fruiting June to August.

**Distribution and ecology:**—*Chamaelirium viridiflorum* is currently known only from Mt. Qiyunshan, southern Jiangxi, China. It occurs in moist bryophyte-dominated habitats or along stream banks on rocks in subtropical evergreen broad-leaved forest at elevation from 1200 m to 1550 m. The community has not been disturbed by human activities, where the dominant tree species is *Machilus pauhoi* Kanehira (1930: 8), *Cyclobalanopsis gracilis* (Rehder & Wilson 1916: 228) Cheng & Hong (1963: 11), *Stewartia crassifolia* (Yan 1981: 468) Li & Ming (1996: 57), *Rhododendron fortunei* Lindley (1859: 868), *R. latoucheae* Franchet (1899: 210), and *R. ovatum* (Lindley 1846: 149) Planch. ex Maximowicz (1871: 230).

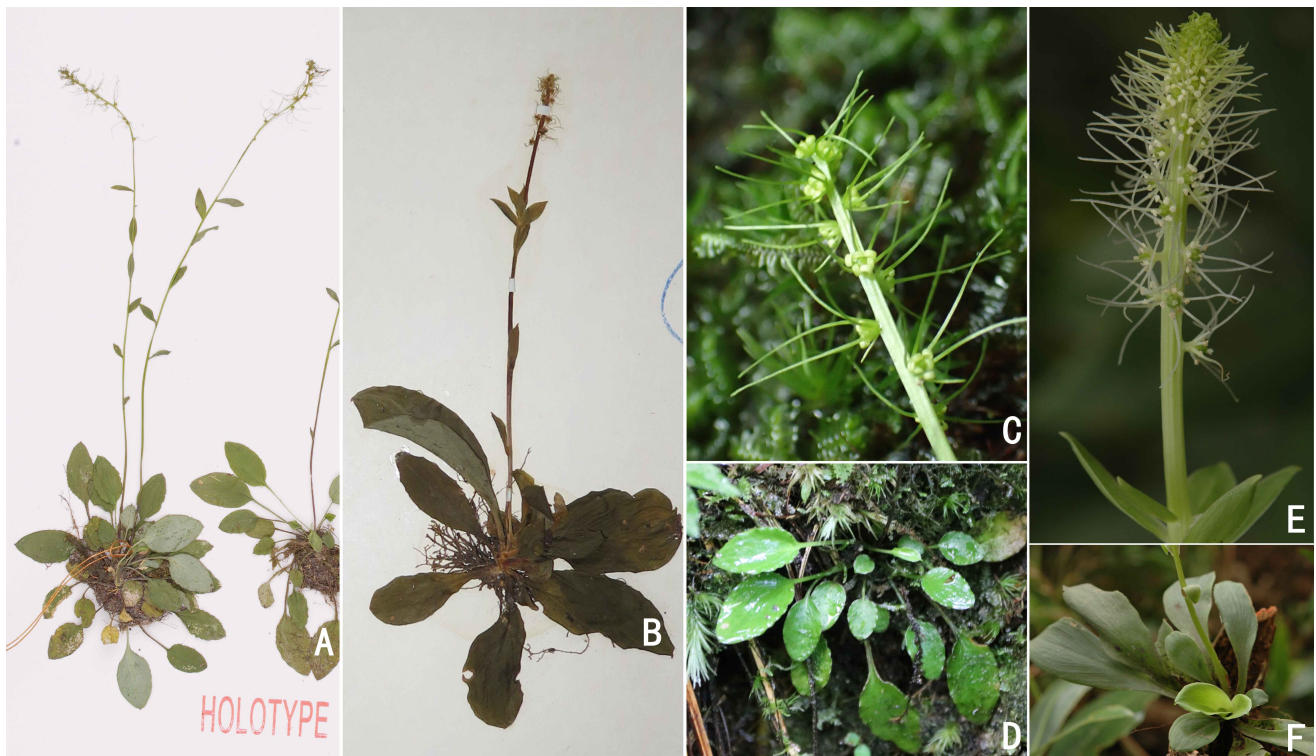


**FIGURE 3.** *Chamaelirium viridiflorum* L. Wang, Z.C. Liu & W.B. Liao. A & B, Habit; C & D, Blade; E & H, Spike; F, Flower, lateral view; G, Pistil and stamen; I, Capsule.

**Conservation status:**—*Chamaelirium viridiflorum* was documented from only two localities, about 2 km apart from one another. Searches in similar habitats have not been exhaustive, but given the preliminary data this species is rare and the habitat should be protected. Considering IUCN (2017) standards we conclude a data deficient (DD) category.

**Additional specimens examined (paratypes):**—CHINA. Jiangxi Province: Chongyi county, Qiyunshan, 1505 m, in the valley of a dense forest, 11 June 2017, Z.C. Liu *et al.*, LXP-13-23500 (SYS!).

**Taxonomic relationships:**—The specimens of *C. viridiflorum* collected from the Luoxiao mountains are easily distinguished from the rather widespread *C. chinensis* by the flowers that are actinomorphic, tepals 6, filiform, and regular (vs. flowers zygomorphic, tepals upper 3 or 4; lower 2 or 3, sometimes absent). *Chamaelirium viridiflorum* is also similar to *C. nanlingensis* in their leaf blade shape (round to elliptic), actinomorphic flowers and regular tepals, but differs by the number of tepals 6 (vs. 3, rarely 4), the stamens in one whorls (vs. nearly 2 whorls), the length of filaments equal (vs. unequal). It is also morphologically similar to *C. koidzumiana* in sharing slender petiole and filiform tepals, but differs by the flowers that are actinomorphic (vs. zygomorphic), tepals regular (vs. unregular). *Chamaelirium viridiflorum* is most similar to *C. shiwandashanensis* concerning the greenish inflorescence rachis, actinomorphic flowers and regular tepals, but differs by leaf blade base round to cuneate (vs. rapidly narrowed and longly decurrent), petiole 0.6–3.8 cm long (vs. more or less sessile or lamina nearly cuneate to the base), and tepals 0.8–1.1 cm long (vs. 0.6–0.8 cm long). These differences are also shown in Fig. 4.



**FIGURE 4.** *Chamaelirium viridiflorum*. A, Specimen from holotype; C, Flower; D, Leaf blade. *C. shiwandashanensis*. B, Specimen from isotype; E, Flower; F, Leaf blade.

### Identification key to *Chamaelirium* Willd.

1. Flowers pedicellate. Ovules 6–12 per locule. Seed winged (with testa) around ..... *C. luteum*
1. Flowers sessile. Ovules 2 per locule. Seed winged (with testa) at ends ..... 2
2. Flowers actinomorphic, tepals regular ..... 3
2. Flowers zygomorphic, tepals unregular ..... 6
3. Tepals 3, rarely 4, filaments unequal ..... *C. nanlingensis*
3. Tepals 6, filaments equal ..... 4
4. Tepals spatulate-linear, filaments slightly shorter than tepals, about 2.5–3.5 mm long ..... *C. actinomorphum*
4. Tepals filiform, filaments distinctly shorter than tepals, about 0.6–1.0 mm long ..... 5
5. Tepals white, about 0.6–0.8 cm long, leaf blade more or less sessile ..... *C. shiwandashanensis*
5. Tepals green, about 0.8–1.1 cm long, leaf blade petiole 0.6–3.8 cm long ..... *C. viridiflorum*
6. Tepals filiform ..... *C. koidzumianum*

6.	Tepals narrowly obclavate (spatulate).....	7
7.	Leaf blade cordate .....	<i>C. cordifolium</i>
7.	Leaf blade elliptic, lanceolate or oblanceolate .....	8
8.	Anthers unilocular .....	<i>C. chinensis</i>
8.	Anthers bilocular .....	9
9.	Tepals 6, the lower 2 half or slightly less than half as long as the upper .....	<i>C. hisauchianum</i>
9.	Tepals 6, the lower 2 vestigial or lacking .....	<i>C. japonicum</i>

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