



Gastrodia daweishanensis (Orchidaceae), a new species from Yunnan, China

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ABSTRACT: *Gastrodia daweishanensis* Ying Qin & Yan Liu (Orchidaceae), a new species from Yunnan, China is described. The new species is similar to *G. putaoensis* X. H. Jin, but differs from the latter by its yellow flowers, perianth tube ventrally distinctly swollen near the base forming a pouch-shaped outgrowth and inner surface of the front half densely pubescent. The detailed information of the new species, including morphological descriptions, illustrations, phenology, etymology and conservation assessment are provided.

KEY WORDS: *Gastrodia putaoensis*, Gastrodieae, holomycotrophic orchids, morphology, yellow flower.

INTRODUCTION

The genus *Gastrodia* Brown (1810) contains about 100 species and is distributed from tropical Africa through Madagascar, the Mascarene Islands, Sri Lanka, northeastern India, the eastern Himalayas, southern China and southeastern Asia to Japan, eastern Siberia and eastern Australia, the southwestern Pacific islands (Chen *et al.*, 2009; POWO, 2024). The species of this genus are holomycotrophic, with cylindrical, tuberous or slightly coralloid rhizomes; sepals and petals are united forming a perianth tube; lip adnate to apex of column foot, or adnate to perianth tube, usually with two calli at base; stigma often at base of column; pollinia 2, granular-farinaceous (Chen *et al.*, 2009). In Mainland, China, there are about 26 species and 1 variety, mainly distributed in Guangxi, Yunnan and Guangdong, etc. (Chen *et al.*, 2009; Yang *et al.*, 2013; Zhou *et al.*, 2016; Lu *et al.*, 2017; Ma *et al.*, 2019; Tong and Wu, 2019; Qin *et al.*, 2020a,b; Li *et al.*, 2021; Liu *et al.*, 2021; Shi *et al.*, 2021; Yang *et al.*, 2022; Chen *et al.*, 2023; Kong *et al.*, 2024).

On 15 May, 2024, the first author received a photograph of *Gastrodia sp.* from the third author. The plant in the photograph was very special, and after a thorough study, we concluded that it was probably an undescribed species, because of its yellow perianth tube, with raised veins and ventrally distinctly swollen near the base, red apex of lip. Therefore, in late May 2024, the first author conducted a survey in Yunnan specially to collect flowering materials of the species. Flowers were carefully dissected and relevant literature were referred (Li and Liu, 2007; Meng *et al.*, 2007; Zhang and Ji, 2010; Tan *et al.*, 2012; Hu *et al.*, 2014; Huang *et al.*, 2015; Pelsner *et al.*, 2016; Jin and Kyaw, 2017; Lu *et al.*, 2017; Li *et al.*, 2018; Suetsugu *et al.*, 2018; Lin, 2019; Suetsugu, 2021; Liu *et*

al., 2021; Bandara *et al.*, 2020, 2023; Gopallawa *et al.*, 2023). This species was found to share similarities with *Gastrodia putaoensis* X. H. Jin (2017) in shape, structure and colors of lip, veins of perianth tube, shape of column, and caducous floral bracts. However, the new species differs significantly from the latter in floral colors, shape of perianth tube, inner surface of perianth tube, etc. This new species is described and illustrated below.

TAXONOMIC TREATMENT

Gastrodia daweishanensis Ying Qin & Yan Liu, *sp. nov.*

大围山天麻 Fig. 1

Type: CHINA. Yunnan Province, Honghe Hani and Yi Autonomous Prefecture, Pingbian County, Daweishan National Park, elev. ca. 1691 m, 20 May 2024, Ying Qin, GXQY20240520001 (holotype: IBK! IBK00461961, isotypes: IBK! IBK00461962, IBK00461963 & IBK00461964)

The new species is similar to *G. putaoensis* X. H. Jin. Shared characters mainly include similar shape of lip, white disc of lip, ligulate apex of lip densely covered with yellow and red papillae, perianth tube with raised veins on outer surface, similar shape of column and caducous floral bracts. However, it differs from the latter mainly by its yellow (vs. greyish white) flowers, perianth tube ventrally distinctly (vs. indistinctly) swollen near the base forming a pouch-shaped outgrowth (vs. without pouch-shaped outgrowth), inner surface of perianth tube densely pubescent (vs. glabrous) distally. A detailed comparison between *G. daweishanensis* and *G. putaoensis* is showed in Table 1.

Holomycotrophic herbs, 10.5–25.5 cm tall. Rhizome cylindrical, dark-brown, 1.5–4.2 cm long, 4.2–7.1 mm in diameter, covered with many lanceolate scales and root-



Fig. 1. *Gastrodia daweshanensis*. **A.** Habit. **B.** Inflorescence. **C.** Flower, front view. **D.** Flower, top view. **E.** Flower, ventral view. **F.** Flower, side view. **G.** Opened perianth tube. **H.** Flower with half of perianth tube removed. **I.** Anther cap and pollinaria. **J.** Columns, top view and ventral view. **K.** Ovary, column, lip, side view, noting red papillae on the tip of lip. **L.** Lips, top view. **M.** Rhizome. Photos by Ying Qin from living plants of the holotype population.

**Table 1.** Morphological comparison of *Gastrodia daweishanensis* and *G. putaensis*.

Characters	<i>G. daweishanensis</i>	<i>G. putaensis</i>
Perianth tube	yellow; 1.4–1.8 cm long, ventrally distinctly swollen near the base forming a pouch-shaped outgrowth; inner surface of the front half densely pubescent; outer surface with 13 or 12 raised veins	greyish white with sepal lobes slightly purple-tinged; 1.3 cm long, ventrally indistinctly swollen near the base and without pouch-shaped outgrowth; inner surface glabrous; outer surface with 7–8 raised veins
Free portions of sepals	free portion of dorsal sepal 3.8–5.6 × 4.8–6.5 mm; free portions of lateral sepals 5.5–7.3 × 4.7–8.0 mm	3 × 3 mm
Free portions of petals	3.1–4.6 × 2.5–3.2 mm	2 × 2 mm
Flowering period	May	June

hair-like hairs. Roots 3–5, slender, originating from apex of rhizome. Inflorescence erect, racemose; peduncle 8.2–21.6 cm long, 1.1–2.6 mm in diameter, pale yellow to pale yellow-brown, or pale brown, 4–6 noded, with tubular, membranous, brown sheaths; rachis 1.1–4.2 cm long, 0.8–2.1 mm in diameter, pale yellow to pale yellow-brown, with 2–6 well-spaced flowers. Floral bracts ovate, membranous, yellow-brown to brown, 4.6–7.9 mm long, caducous. Ovary pale yellow-green, 1.7–2.4 mm in diameter, including pedicel to 6.3–9.1 mm long. Sepals and petals united and forming a 5-lobed perianth tube. Perianth tube campanulate, ventrally distinctly swollen near the base forming a pouch-shaped outgrowth, 1.4–1.8 cm long, 0.8–1.2 cm in diameter, yellow, outer surface with 13 or 12 raised veins, inner surface densely pubescent distally. Sepals connate 3/5–2/3 their lengths with petals, lateral ones connate 5/7–5/6 with each other; free portion of dorsal sepal ovate-rectangular, apex retuse or obtuse, 3.8–5.6 mm long, 4.8–6.5 mm wide; free portions of lateral sepals triangular-ovate, 5.5–7.3 mm long, 4.7–8.0 mm wide, apex obtuse or rounded; free portions of petals ovate-rectangular or triangular-ovate, 3.1–4.6 mm long, 2.5–3.2 mm wide, base not contracted, apex rounded. Lip triangular-ovate to ovate, or narrowly triangular, 5.1–6.2 mm long, 2.6–3.8 mm wide, entire, base shortly clawed, apex ligulate; claw 1.0–1.3 mm wide, with two yellow-green, pale yellow-green or pale yellow, subglobose or elliptic calli; calli 0.3–0.6 mm in diameter; disk white, with 4–6 longitudinal ridges, the central two ridges highest near the ligulate apex and extending toward the ligulate apex; the ligulate apex densely covered with yellow papillae at middle and base, densely covered with red papillae towards the front. Column white, 4.9–5.5 mm long, 1.9–2.3 mm wide, winged along both sides, with two small and erect teeth at apex; foot short, ca. 0.8 mm long; rostellum small; stigma located at base. Anther cap hemispheric, ca. 1.1 mm in diameter; pollinia 2, ovate, each bipartite, granular-farinaceous, friable, 0.6–0.8 mm long. Capsules unknown.

Distribution, habitat and ecology: *Gastrodia daweishanensis* is discovered in the Daweishan National Park, Pingbian County, Honghe Hani and Yi Autonomous Prefecture, Yunnan Province, China. The type locality lies in the montane rainforests at an elevation of ca. 1691 m, where it grows along *Castanopsis*

echidnocarpa Miq., *Quercus augustinii* Skan, *Lithocarpus variolosus* (Franch.) Chun, *Helicia grandis* Hemsl., *Heptapleurum macrophyllum* Dunn, *Elatostema sp.*, *Camellia sp.*, *Ternstroemia sp.*, *Daphniphyllum sp.*, *Alpinia strobiliformis* T. L. Wu & S. J. Chen, *Amomum tsaoko* Crevost & Lem., *Allantodia sp.*, *Selaginella wallichii* (Hook. & Grev.) Spring, *Coelogyne leucantha* W. W. Sm., *Odontochilus elwesii* C. B. Clarke ex Hook. f., etc.

Phenology: Flowering in May, capsules not seen.

Etymology: The epithet “*daweishanensis*” refers to Daweishan National Park, Pingbian County, Honghe Hani and Yi Autonomous Prefecture, Yunnan Province, China, where the new species was found.

Conservation status: At present, only one population with 40 mature individuals of the new species is known. Based on IUCN (2022), *Gastrodia daweishanensis* should be assessed as Critically Endangered [CR D].

Key to *Gastrodia* taxa in Yunnan, China

- 1 Outer surface of perianth tube distinctly verrucose *G. confusa*
- Outer surface of perianth tube smooth or inconspicuously verrucose apically 2
- 2 Pedicel and ovary sparsely papillose *G. tuberculata*
- Pedicel and ovary glabrous 3
- 3 Perianth tube enclosed *G. longistyla*
- Perianth tube not enclosed 4
- 4 Lip with two lamellar calli on claw 5
- Lip with two subglobose or globose calli on claw 6
- 5 Flowers white; apex of lip rounded, sometime irregular erose; disc with a longitudinal yellow belt *G. angusta*
- Flowers orange, pale yellow, blue-green, yellow-white; apex of lip irregularly fimbriate; disc without a longitudinal yellow belt *G. elata*
- 6 Flowers yellow; veins of perianth tube prominently raised on outer surface; perianth tube ventrally distinctly swollen near the base forming a pouch-shaped outgrowth; apex of lip red *G. daweishanensis*
- Flowers white; veins of perianth tube not raised; perianth tube without pouch-shaped outgrowth; apex of lip not red 7
- 7 Claw of lip long, adnate to perianth tube *G. menghaiensis*
- Claw of lip short, adnate to column foot 8
- 8 Perianth tube straight, widely opening at apex *G. dyeriana*
- Perianth tube curved, not opening widely *G. albidoides*

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