



## *Gastrodia longiflora* (Orchidaceae: Epidendroideae: Gastrodieae), a new mycoheterotrophic species from Ishigaki Island, Ryukyu Islands, Japan

KENJI SUETSUGU

Department of Biology, Graduate School of Science, Kobe University, 1-1 Rokkodai, Nada-ku, Kobe, Hyogo, 657-8501, Japan

✉ [kenji.suetsugu@gmail.com](mailto:kenji.suetsugu@gmail.com); <https://orcid.org/0000-0002-7943-4164>

*Gastrodia* Brown (1810: 330; Gastrodieae, Epidendroideae) is a mycoheterotrophic orchid genus distributed in temperate and tropical regions of Asia, Oceania, Madagascar, and Africa (Cribb *et al.* 2010, Hsu & Kuo 2010, Suetsugu *et al.* 2018). It is characterized by fleshy tubers, absence of normal leaves, united sepals and petals and two mealy pollinia without caudicles (Cribb *et al.* 2010, Hsu & Kuo 2010, Hsu *et al.* 2012, Suetsugu *et al.* 2018).

Several recent studies have re-examined the diversity of *Gastrodia* in many Asian countries. Consequently, the genus comprises more than 100 species, making it the most species-rich mycoheterotrophic genus (Suetsugu *et al.* 2018a,b, Suetsugu 2019). However, species diversity of *Gastrodia* likely remains underestimated due to its brief flowering season and dwarf habit. As anticipated, an unknown *Gastrodia* species was discovered during a recent botanical survey on Ishigaki Island, Japan. A remarkably long, narrow perianth tube shows a close affinity to *G. nipponica* (Honda, 1932: 168) Tuyama (1939: 4). Accordingly, this plant is described here as a new species and a detailed morphological account is provided.

### Taxonomic treatment

*Gastrodia longiflora* Suetsugu, *sp. nov.* (Figs 1,2)

Type:—JAPAN. Ryukyu Islands: Okinawa Pref., Ishigaki City, Hirae, 8 March 2021, Kazui KS826-Ga5 (holotype: KYO!, spirit collection).

*Gastrodia longiflora* is similar to *G. nipponica* but differs by its perianth tube that is relatively narrower for its length and hemiellipsoid anther cap.

Terrestrial, mycoheterotrophic herbs. Roots slender, often produced from the junction between rhizome and inflorescence after the flowering season. Rhizome tuberous, fusiform or cylindrical, 3–8 cm long, 0.4–0.9 cm in diameter, yellowish brown, covered with numerous scales and unicellular hairs similar to roots. Stem leafless, erect, pale brown, 3.00–8.00 cm long, 0.25–0.40 cm in diameter, 3–4 nodes, with tubular sheaths. Bracts ovate, ca. 0.5 × 0.5 cm. Pedicel and ovary 1.0–1.5 cm long. Flowers 1–5, tubular, horizontal, slightly arched, resupinate, 3.2–3.5 cm long, 1.0–1.2 cm in diameter. Sepals and petals united, forming a five-lobed perianth tube. Sepals subsimilar, 3.2–3.5 mm long, connate to ca. 5/6 of their length with petals, lateral sepals connate ca. 3/4–4/5 of their length, outer surface pale brown with numerous white warty spots, margin entire or slightly undulate; free portion of dorsal sepal ovate-triangular, obtuse at apex, 4.8–5.2 × 4.6–5.0 mm; free portions of lateral sepals triangular, spreading, obtuse at apex, 6.7–7.0 × 6.4–6.9 mm. Free portions of petals ovate or elliptic, 3.4–3.7 × 2.1–2.4 mm. Lip adnate to column foot, 9.8–10.6 mm long; hypochile with 2 well-developed globose calli; epichile pale yellowish white, ovate-orbicular, base contracted, disc with 4–6-ridges, the central two ridges extending to the ligulate reddish apex. Column straight, semi-cylindrical, 9.6–10.3 × 3.8 mm at the widest part and 2.8 mm wide at base, white tinged with reddish brown at base; column foot well developed; lateral wings (stelidia) distinct, narrow, the edges parallel to column, dilated toward a little below the middle of column, apex acute; rostellum well developed; stigma located at base. Anther hemiellipsoid, 1.6 × 1.1 mm, pollinia 2. Capsule cylindrical, 3.7–4.2 cm long, pedicel elongating to 42 cm long in fruit. Seeds fusiform, 2.3–2.6 mm long.

[The measurements above were based on several specimens from the type locality and may not be entirely representative of the diversity present in the species when more specimens are found in the future.]

**Additional specimens examined:**—JAPAN. Ryukyu Islands: Okinawa Pref., Ishigaki City, Hirae, 29 Feb 2020, Kazui KS687 (KYO); Ishigaki City, Hirae, 14 Feb 2021, Kazui KS825-Ga4 (KYO).

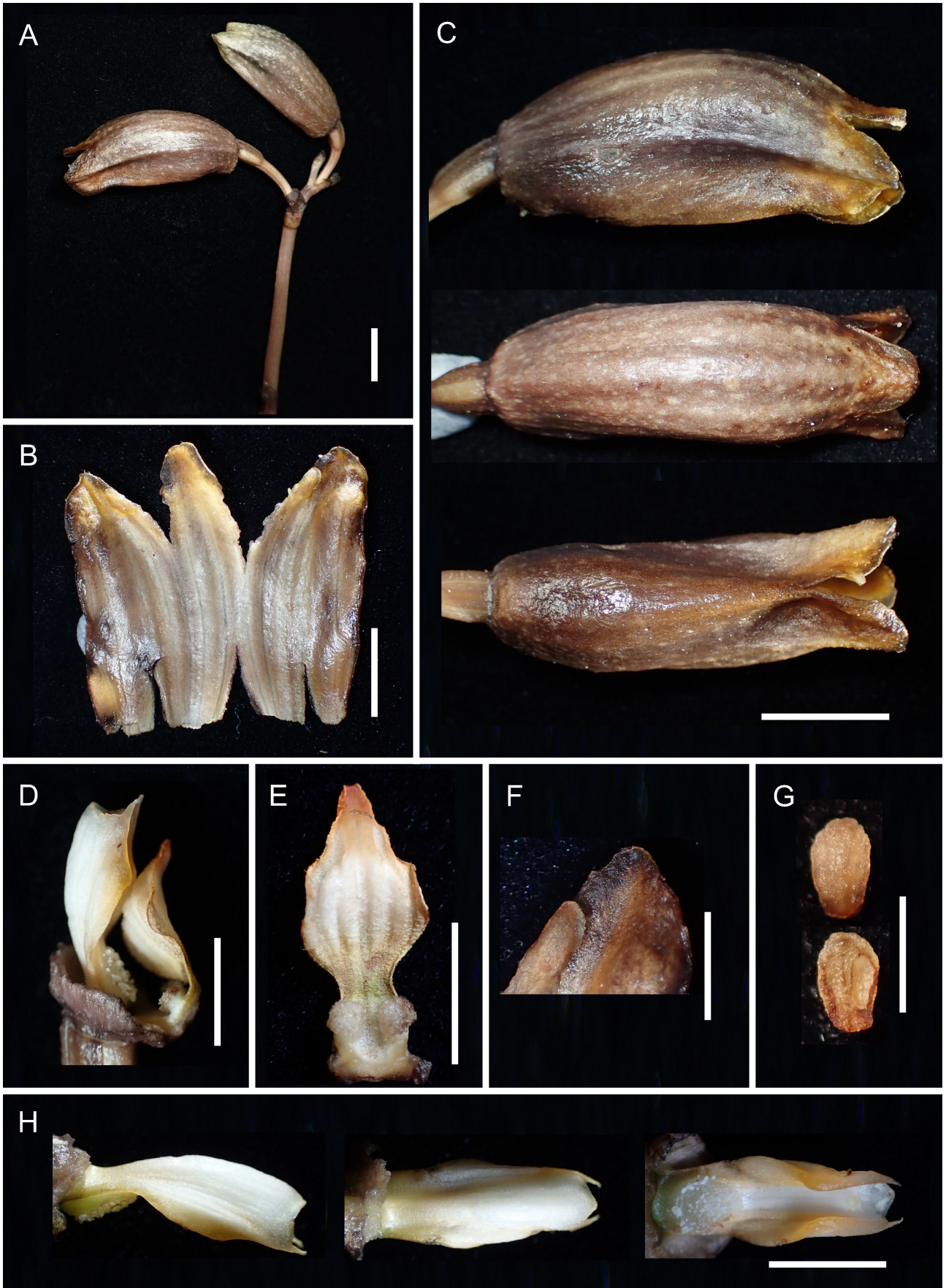


**FIGURE 1.** *Gastrodia longiflora* from the type locality. A. Flowering plants, view from above. B. Flowering plants, side view. C. Flowers, side view. D. Flower, front view. Photographed by Hiroshi Kazui.

**Distribution and phenology:**—Restricted to the type locality, where dozens of flowering individuals occur in a dense forest dominated by *Castanopsis sieboldii* (Makino, 1909: 141) Hatusima (1971: 223). Flowering was observed from mid-February to mid-March, and fruiting from late-March to early-April.

**Notes:**—The elongate perianth tube shows is similar to those of the *G. nipponica* species complex (Hsu & Kuo 2010, Suetsugu 2013, 2014, 2017). However, *G. longiflora* can be distinguished from *G. nipponica* by its longer perianth tube that is narrower for its length (3.2–3.5 cm and 1.0–1.2 cm in diameter vs. 1.8–2.4 cm and 1.1–1.3 cm in diameter), greater connation of sepals and petals (sepals connate with petals to ca. 5/6 of their length and lateral sepals connate with each other to ca. 3/4–4/5 of their length vs. sepals connate with petals to ca. 3/4 their length and lateral sepals connate with each other to ca. 2/3 their length), smaller and elongate petals (3.4–3.7 × 2.1–2.4 mm vs. 4.0 × 3.5 mm.) and shape of anther cap (hemiellipsoid vs. hemispheric; Hsu & Kuo 2010, Suetsugu 2017, Suetsugu *et al.* 2018a). In addition, *G. longiflora* is also similar to *G. okinawensis* Suetsugu (2017: 254), given that both species possess more elongate perianth tube and united sepals and petals than *G. nipponica*. However, *G. longiflora* can be easily distinguished by its smaller stature during flowering (3–8 cm vs. 10–17 cm), longer flower (3.2–3.5 cm long and 1.0–1.2 cm in diameter vs. 1.8–2.1 cm long and 0.6–0.8 cm in diameter.), lip morphology (hypochile with 2 well-developed globose calli and epichile with 4–6 ridges vs. hypochile without callus and epichile with 2 ridges) and rostellum condition (well-developed vs. degenerate; Hsu & Kuo 2010, Suetsugu 2017, Suetsugu *et al.* 2018a).





**FIGURE 2.** *Gastrodia longiflora* (from the holotype). A. Habit. B. Flattened perianth tube. C. Flower (side view, dorsal view and ventral view). D. Column and lip. E. Lip. F. Free portions of lateral sepal and petal. G. Anther cap. H. Column (side view, dorsal view and ventral view). Size bars: A–C, 1 cm; D–F, H, 5 mm; G, 2 mm.

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