



A new species of *Gastrodia* (Orchidaceae: Gastrodieae, Epidendroideae) from Java

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Gastrodia Brown (1810: 330) is a mycoheterotrophic genus of Orchidaceae that consists of *ca.* 50 species (Tan *et al.* 2012, Suetsugu 2014, Huang *et al.* 2015). It is characterized by a fleshy tuber or coralloid root system, fused sepals and petals, and two mealy pollinia without caudicles. Since most *Gastrodia* species have completely fused sepals and petals, observation of the perianth is difficult, and identification of this genus is often imprecise. As a result of re-examination of floral characters, several new taxa in this genus have been reported in China, Taiwan, Japan, Madagascar and other countries during the last decade (Meng *et al.* 2007, Hsu *et al.* 2010, Hsu & Kuo 2011, Yeh *et al.* 2011, Hsu *et al.* 2012, Tan *et al.* 2012, Suetsugu 2013, 2014, Huang *et al.* 2015, Martos *et al.* 2015). Most of these new taxa belong to the section *Codonanthus* (Schlechter 1911), which has a short inflorescence (<40 cm).

In 2016, we visited Selabintana, West Java, Indonesia, and conducted a preliminary survey of the phenology of perennial herbs. There we found flowering individuals of this genus. Selabintana is located at the southern foot of Mounts Gede and Pangrango, twin volcanoes 2,958 and 3,019 m, respectively, covered with a biodiverse montane forest. A detailed examination of the specimens revealed that they belong to a new taxon. Here, we describe this new species and provide a detailed morphological account. We also include a key to the species of *Gastrodia* in Java.

Taxonomic Treatment

Gastrodia selabintanensis Tsukaya & A.Hidayat, *sp. nov.* (Fig. 1,2)

Type:—INDONESIA. Java: Selabintana, along a trail under montane forest, 6°50'40"S; 106°57'54"E, *ca.* 1,030 m, 10 March 2016, Hidayat AH5405 (holotype: BO!, a flower in spirit and a standard dried specimen; isotype: T!, a flower in spirit and a standard dried specimen).

Gastrodia selabintanensis differs from other members of *Gastrodia* sect. *Codonanthus* by having a long perianth tube (17 mm), a short, open mouth of the perianth tube (5 mm), a lip longer than the column (10–12 mm), and steldia on the column that are slightly shorter than the anther cap.

Terrestrial, mycoheterotrophic, perennial herbs. Plant erect, inflorescences unbranched. Roots filiform, mostly extending from the rhizome apex. Rhizome tuberous, fusiform or cylindrical, 3–6 cm long, 0.5 cm in diameter, purplish brown, covered with hairs. Stem glabrous, purplish brown, 15–25 cm long, 0.2–0.3 cm diameter, ± 5 sterile nodes with membranous sheaths/scale leaves of 5–7 mm long. Bracts triangle, acute, 7–9 mm long, purplish brown. Pedicels 10 mm long, ovary 6 mm long. Flowers 2–4, tubular, erect, respinate, 17 × 9 mm. Sepals and petals united, forming a five-lobed perianth tube. Sepals subsimilar, 17 mm long, connate *ca.* 3/4 of their length with petals, laterals connate *ca.* 3/4 with each other, outer surface slightly greenish brown, verrucose with pale spots, margins slightly wavy; free part of dorsal sepal triangular, retuse; free part of lateral sepals triangular, acute at apex, 5 mm long. Free part of petals ovoid with acute apex, 4 × 4 mm, white-tinged with yellow at apices. Lip joined with the perianth tube at its base, 10–12 × 4 mm, hypochile white with two white calli; epichile white, rectangular with a narrow base and a rounded, yellow apex, disc 4-ridged, margin undulate. Column straight, semi-cylindrical, 7.5 mm long, white; steldia distinct, triangular, acute, the edges parallel to the column. Anther rectangular, *ca.* 2 mm in diameter, pale yellow, pollinia 2. Fruits and seeds not seen.

Distribution and phenology:—The species is only known from the type locality, Java, Indonesia; flowering in March.

Etymology:—The new species is named after the type locality.

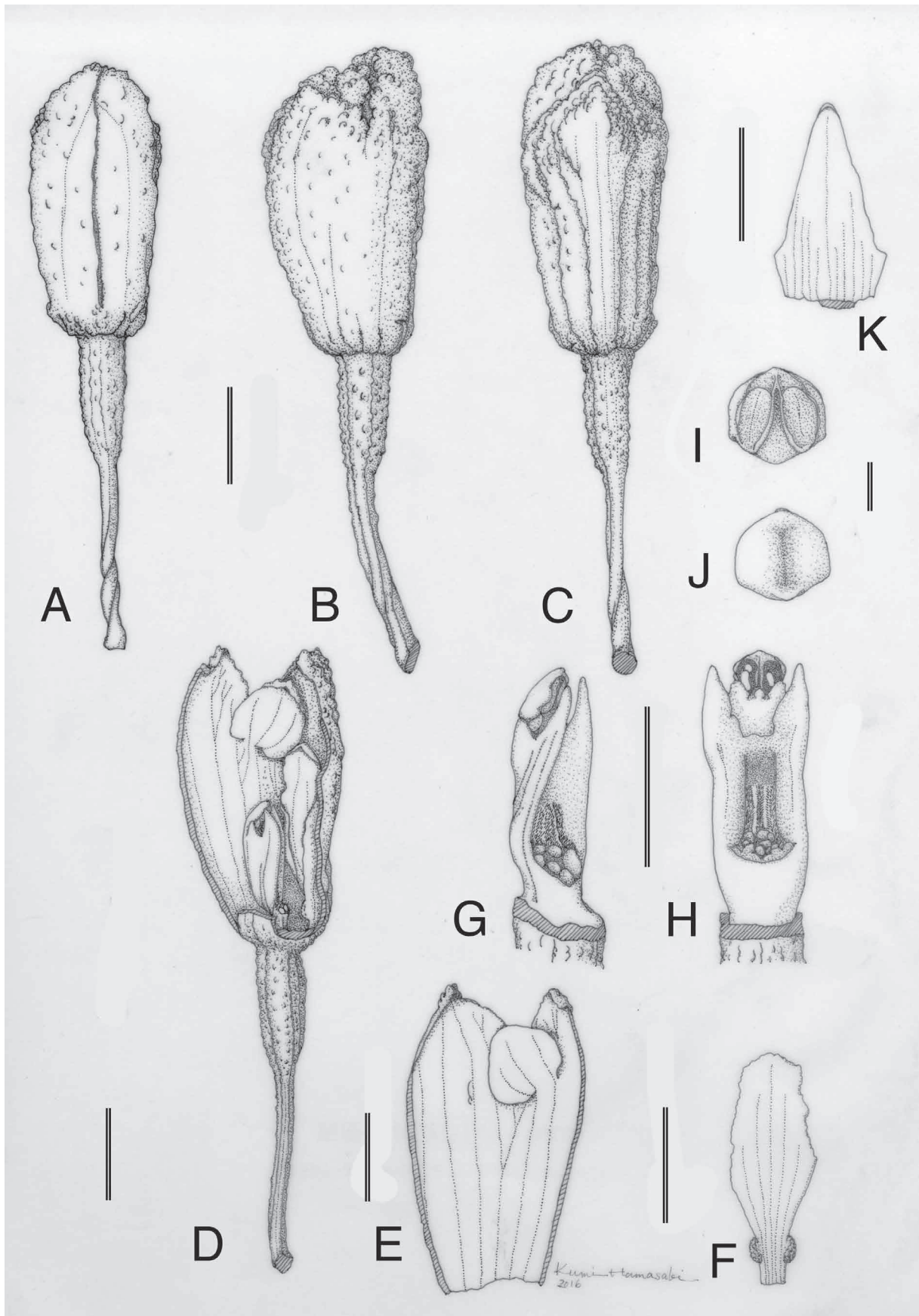


FIGURE 1. *Gastrodia selabintanensis*. A., ventral view. B. Lateral view. C. Dorsal view. D. Inside view. E. Sepals and petals, inside view. F. Lip. G. Lateral view of the column. H. Ventral view of the column. I. Anther cap, backside. J. Anther cap, from outside. K. Bract. Scale bar: A–H, K = 5 mm; I, J = 1 mm. From *Hidayat AH5405* (BO; TI). Drawn by K. Hamasaki.

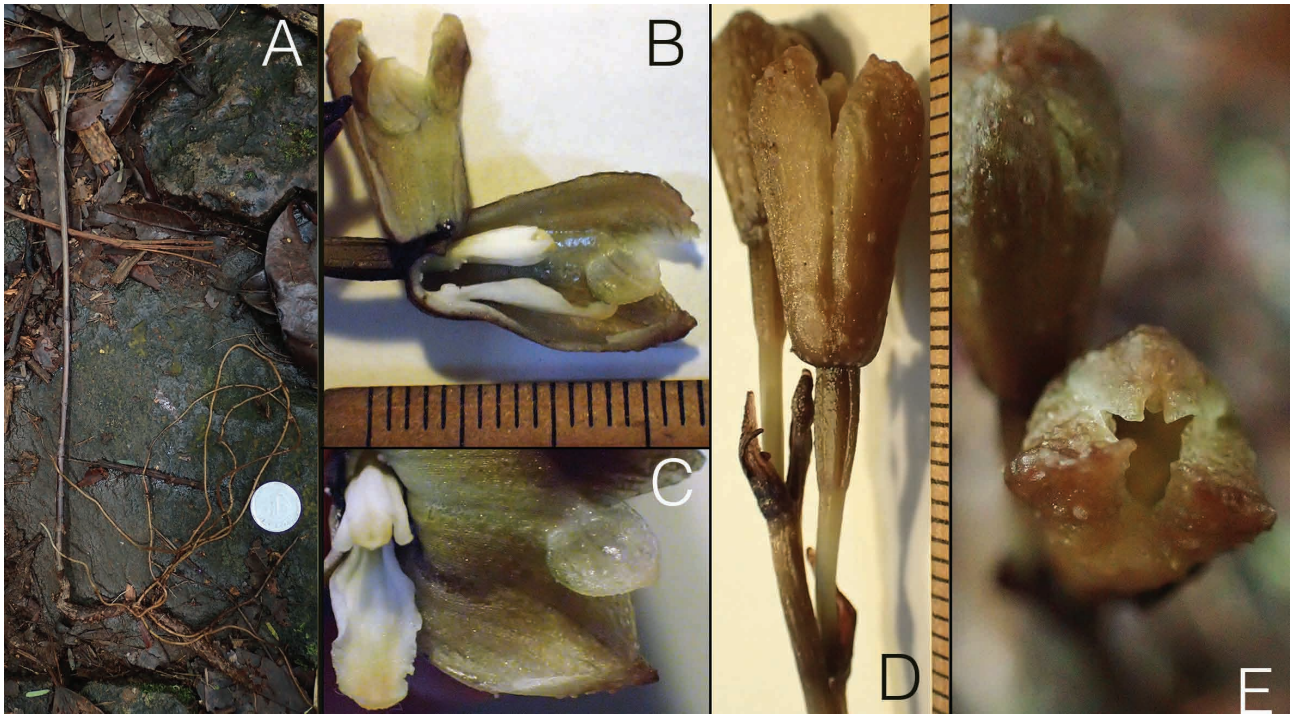


FIGURE 2. *Gastrodia selabintanensis* at the type locality. A. Gross morphology. B. Lateral inside view of the perianth tube after splitting the sepals. C. Front inside view of the column, lip, sepals, and petal after splitting the sepals. D. A flower from the joint of two lateral sepals. E. Opening of the perianth tube. Scale: A, the diameter of coin is 2 cm. B–D, one grid line = 1 mm. A–E: from Hidayat AH5405 (BO & TI); photographs by H. Tsukaya at the type locality of Selabintana, West Java, Indonesia.

Note:—This species has a short inflorescence stem (<40 cm) at flowering, indicating that it belongs to section *Codonanthus* (Schlechter 1911). The most conspicuous feature of this new species is its 17 mm perianth tube, with a slender 15–25 cm inflorescence. Among members of section *Codonanthus*, only *G. crispa* Smith (1921: 248), *G. longitubularis* Meng, Song & Luo (2008: 23), *G. fontinalis* Lin (1987: 129), *G. takeshimensis* Suetsugu (2013: 375) and *G. flexistyloides* Suetsugu (2014: 270) share the same characters. Among these five species, none shares the white, long lip character (11–12 mm long) with this new species. Morphologically, *G. takeshimensis* is most similar to *G. selabintanensis*. *Gastrodia takeshimensis* is a completely cleistogamous species (Suetsugu 2013); *G. selabintanensis* opens its flower slightly, suggesting that *G. selabintanensis* displays an evolutionary intermediate between outcrossing and cleistogamy. Further analysis will reveal whether this is the case or not.

Key to the species of *Gastrodia* in Java (modified from Comber 1990).

1. Height 50 cm or more at flowering; corolla tube split open along lateral sepal margins almost to the base (*Gastrodia* sect. *Gastrodia*) *G. javanica*
1. Height 40 cm or less; corolla tube split open along lateral sepal margins to no more than 3/4 of their length 2
2. Inflorescence 1- or 2-flowered only; stelidia on the column projecting well beyond the anther cap *G. callosa*
2. Inflorescence with more than 2 flowers; stelidia only as long as or shorter than the anther cap. 3
3. Flower length 10.0 mm or less; petals more or less spherical, 2 mm long *G. verrucosa*
3. Flower length 13 mm or more; petals 3.5 mm or more long 4
4. Flowers ± 13 mm long; lip margins straight *G. abscondita*
4. Flowers ± 16 mm long; lip margins wavy 5
5. Lip 6–8 mm long, shorter than column *G. crispa*
5. Lip 10–12 mm long, longer than column *G. selabintanensis*

Discussion

Previously, members of *Gastrodia* section *Codonanthus* (Schlechter 1911) with a short inflorescence (<40 cm) at flowering had not been fully examined because of their small stature and the dark, inconspicuous color of the flowers. However, descriptions of new taxa in this genus have rapidly accumulated in the last decade. Discoveries from East Asian countries have been particularly extensive. Our report of a new species from Java suggests that additional undescribed species are

likely to be found in tropical Asia, too. Because correct identification requires close observation of floral organs hidden in the perianth tube, re-examination of herbarium specimens is necessary to reveal the “true” flora for *Gastrodia*. Future detailed botanical surveys should reveal many new species and provide critical data for conservation.

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