



## NOTE

## The genus *Lecanorchis* Blume (Orchidaceae) in the flora of Vietnam

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**ABSTRACT:** Diversity and taxonomy of the mycoheterotrophic genus *Lecanorchis* (Orchidaceae) in Vietnam is reappraised. Four species are confirmed, including two new records, *L. moritae* Suetsugu & T.C. Hsu and *L. taiwaniana* S.S. Ying. In addition, the occurrence of *L. nigricans* Honda in Vietnam is supported by image records, but further confirmation is still needed. Data of nomenclature, ecology, phenology, distribution, voucher specimens and brief taxonomic notes are provided for all Vietnamese species.

**KEY WORDS:** Orchidaceae, *Lecanorchis*, new record, Vietnam.

### INTRODUCTION

The mycoheterotrophic orchid genus *Lecanorchis* Blume can be characterized by its numerous long, thick, horizontal roots that extend from a short rhizome, a cup-like structure (i.e., calyculus, found in many vanilloid genera) located between the base of the sepal and apex of the ovary and an elongate column with a pair of small lateral, apical wings (Hashimoto, 1990).

Species of the genus *Lecanorchis* were often overlooked during botanical surveys and observations due to their small, leafless achlorophyllous habits and unattractive flowers (usually white, brown or purple). Because of the difficulties in collecting specimens and identification, species number of *Lecanorchis* is somewhat underestimated. In fact, although only about 15 *Lecanorchis* species were recognized until the 1990s (Hashimoto, 1990; Pridgeon *et al.*, 2003), a number of *Lecanorchis* taxa have been discovered and described from various countries in Asia as more comprehensive field expeditions have been performed (Averyanov, 2005; 2011; 2013; Suddee and Pedersen, 2011; Suetsugu and Fukunaga, 2016; Suetsugu *et al.*, 2017a; 2017b; 2018a; 2018b; 2018c; 2019). Accordingly, the genus has been updated to include ca. 30 accepted species (Suetsugu *et al.*, 2019). Besides the main diversity center in Japan, the genus extends the distribution to Sikkim, Taiwan, China, Myanmar, Laos, Cambodia, Thailand, Vietnam, Malaysia and New Guinea (Pridgeon *et al.*, 2003).

According to Averyanov (2011), there are two species, *Lecanorchis vietnamica* Aver. and *L. malaccensis* Ridl., distributed in Vietnam. Recently, Averyanov *et al.* (2016) and Truong & Kitichate (2016) independently reported *L. nigricans* Honda as a new record in Vietnam. After detailed re-examination of specimens and photos preserved in SGN and PSU, however, we found that the species reported by Averyanov *et al.* (2016) and Truong & Kitichate (2016) should both belong to *L. taiwaniana* S. S. Ying, instead of *L. nigricans*. Nevertheless, recent image records imply that true *L. nigricans* might indeed occur in southern Vietnam, though detailed study is still needed toward confident identification. It is likely that the distribution and diversity of *Lecanorchis* species remains underestimated, as the plants are easily overlooked in field, owing to their short flowering seasons and dwarf habits. As anticipated, *L. moritae* Suetsugu & T.C. Hsu was newly recorded during recent botanical surveys in Vietnam. With these new findings, the number of *Lecanorchis* from Vietnam is increased to four or five.

### MATERIALS AND METHODS

Materials was collected and preserved in 70% ethanol and stored at PSU, VNM, and other examined specimens from different herbaria SGN and TAIF. All the photos were taken with a Canon 600D fitted with an EF-S 60 mm f/2.8 Macro USM lens. Terminology for the morphological description follows Beentje (2012).



## TAXONOMIC TREATMENT

*Lecanorchis* Blume, Mus. Bot. Lugd. Bat., 2, 188. 1856.

*Type species: Lecanorchis javanica* Blume.

*Lecanorchis malaccensis* Ridl., Trans. Linn. Soc. London, Bot. 3: 377. 1893. **Fig. 1**

*Type:* MALAYSIA. Pahang, *Ridley s.n.* (holotype: SING-0047368 image!).

= *Lecanorchis ridleyana* Schltr., Repert. Spec. Nov. Regni Veg. 9: 428. 1911. *Type:* SINGAPORE, Bukit-Timah, alt. 150m, January 1901, R. Schlechter-13143 (B, destroyed)

= *Lecanorchis betung-kerihunensis* Tsukaya & H. Okada, Syst. Bot. 38: 69. 2013. *Type:* INDONESIA. West Kalimantan: Betung Kerihun National Park, near Sungai (River) Rantaugong, alt. ca. 239 m, under dipterocarp forest, leg. 24 December 2011, H. Tsukaya, H. Okada, & A. Soejima HT204 (holotype: BO, dry specimen and flower preserved in 50% ethanol; isotype: TI!, dry specimen).

**Ecology and phenology.** In Vietnam, this species was found around 1400 m a.s.l., in the primary humid broad-leaved evergreen montane forests. Its flowering period is suspected to be May and June since young capsules, flowers and young buds were all observed in early June.

**Distribution.** Vietnam (Khanh Hoa, Dak Nong, Kon Tum); also in Thailand, Malaysia and Indonesia.

**Material examined from Vietnam.** Khanh Hoa Province: Cam Lam district, Hon Ba Nature Reserve, 8 Jun. 2017, *Truong Ba Vuong & Mang Van Lam BV 287* (VNM).

**Note.** Among the *Lecanorchis* species in Vietnam, *L. malaccensis* is diagnostic by the densely flowered rachis and the trilobed labellum with relatively small (< 2.5 mm long) mid-lobe. It is morphologically similar to *L. purpurea* Masam. distributed in Japan and Taiwan but could be distinguished by its longer filamentous or ribbon-like hairs on labellum (Suetsugu *et al.*, 2018a).

*Lecanorchis moritae* Suetsugu & T.C. Hsu, Phytotaxa 404(4): 139. 2019. **Fig. 2**

*Type:* JAPAN. Ryukyu Islands: Kagoshima Pref., Amami-Oshima Island, Amami City, Naze, 13 May 2018, *Morita N17-01* (holotype: TNS!).

**Ecology and phenology.** In Vietnam, this species can be found in the primary humid broad-leaved evergreen montane forests on granite around 1430 m a.s.l. Flowers were observed in June. This species grows in the same elevation of *L. taiwaniana* population. Very rare.

**Distribution.** Vietnam (Lam Dong, Khanh Hoa); also in Japan.

**Material examined from Vietnam.** Khanh Hoa province: Cam Lam district, Hon Ba Nature Reserve, 1430 m, 21 Jun. 2019, *Truong, Tu & Mang, BV 361* (VNM); Lam Dong Province: Lac Duong District, Da Chais Commune, Long Lanh Station, 1450–1650 m, 21 Sep. 2018, fruiting, *Hsu 10937* (SGN, TAIF); Dung Kno Commune, Cong Troi Station, 1700–1800 m, 10 Jun. 2019, *Hsu 11735* (SGN, TAIF); same locality and elevation, 14 Jun. 2019, *Hsu 11772* (SGN, TAIF).

**Note.** *Lecanorchis moritae* is somewhat similar to the specimens recorded as *L. javanica* from several localities (Comber, 1990; O'Byrne and Vermeulen, 2002; Suddee *et al.*, 2010; Ong, 2018). However, *L. moritae* is clearly different from *L. javanica* by the side lobes of labellum (labellum with a well-developed side lobes vs. small side lobes). It is also similar to *L. suginoana* (Tuyama) Seriz. but differs in having a transversely elliptic (slightly contracted at base) midlobe (vs. semiorbicular, not contracted at base), more triangular with almost entire margins (vs. relatively rounded, denticulate margins) and reddish apices (vs. somewhat whitish apices) and a labellum with white and purple hairs (vs. white and lemon yellow hairs) and sparse unicellular papillae scattered on the disc (vs. dense unicellular papillae) (Suetsugu *et al.*, 2019).

*Lecanorchis taiwaniana* S.S. Ying, Quart. J. Chin. Forest. 20(4): 133. 1987. **Fig. 3**

*Type:* TAIWAN. New Taipei City: Wulai District, Chia-ku-lin to Chia-ku-liao, 780 m, 2 August 1987, S.S. Ying s. n. (holotype: NTUF-F0000200!; isotype: NTUF-F00008292!); Wulai District, Pataoershan, ca. 1000 m, 15 August 2009, T.C. Hsu 2259 (epitype: TAIF-391693!, designated by Suetsugu *et al.*, 2016).

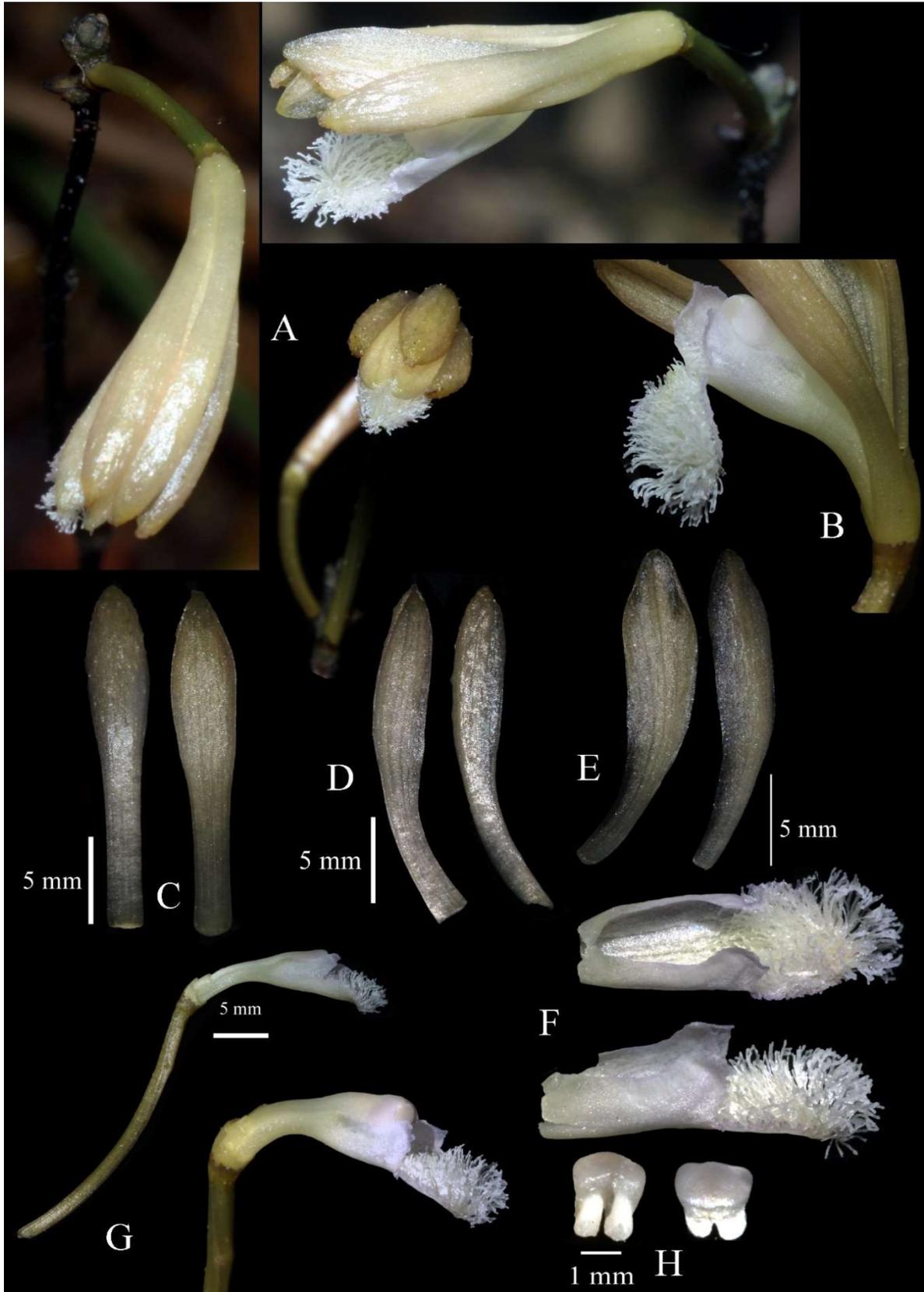
= *Lecanorchis amethystea* Y.Sawa, Fukunaga & S.Sawa, Acta Phytotax. Geobot. 57: 123. 2006. *Type:* JAPAN, Shikoku, Kochi Pref., Murotoshi, Murotomisaki-cho, Muroto cape, alt. 160m, 26 Jul 1987, Y. Sawa Sc-1702 (Holotype TI!, isotype MBK!).

**Ecology and phenology.** The species was found in the primary humid broad-leaved evergreen montane forests, at elevation around 1400–1430 m a.s.l. Very rare. Flowering time middle of July and September in Vietnam.

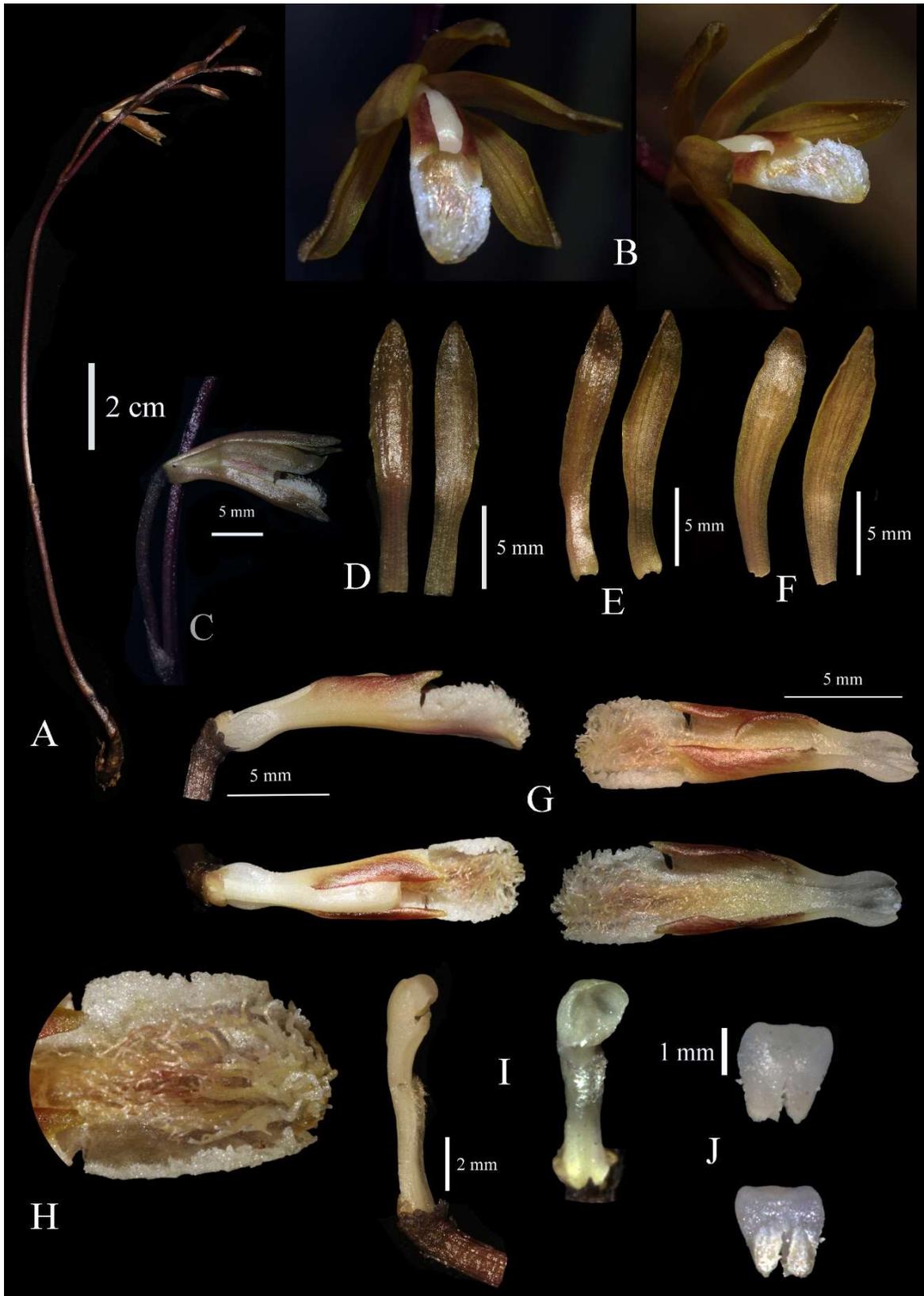
**Distribution.** Vietnam (Khanh Hoa); also in Laos (Suetsugu *et al.*, 2018d), Japan and Taiwan.

**Material examined from Vietnam.** Khanh Hoa Province: Hon Ba Nature Reserve, 21 Jul. 2014, *Truong & Mang, BV 103* (PSU); Khanh Son District, Son Trung Municipality, O Kha (Suoi Che) Mt., 10 Sep. 2013, *Tich, Gioi & Truong, Tich 11-9-13* (SGN).

**Note.** *Lecanorchis taiwaniana* had long been confused with *L. nigricans*, but recent nomenclatural, morphological and genetic studies (Suetsugu *et al.* 2016, 2018c) have well-demonstrated their systematic position as two independent species. In morphology, *L. taiwaniana* can be clearly distinguished from *L. nigricans* by having longer peduncles, rachis, and internodes, slightly narrower sepals and petals, indistinctly 3-lobed labellum, pale brown, ascending capsules, and a column fused more than half with the labellum (Suetsugu *et al.*, 2016; 2018c). Voucher specimens of the earlier records of *L. nigricans* in Vietnam (Averyanov *et al.*, 2016; Truong and Kitichate, 2016) were both misidentified and are actually corresponded to *L. taiwaniana*.



**Fig. 1.** *Lecanorchis malaccensis* Ridl., from *Truong & Mang BV 287*. **A.** Flower at different views, **B.** Epichile, **C.** Dorsal sepals, **D.** Lateral sepals, **E.** Petals, **F.** Labellum at different view, **G.** Column, **H.** Anther cap. Photos by Truong Ba Vuong.



**Fig. 2.** *Lecanorchis moritae* Suetsugu & T.C.Hsu, from *Truong et al.* BV 361. **A.** Flowering plant, **B.** Flower, frontal and side views, **C.** Flower side view, **D.** Dorsal sepal, **E.** Lateral sepals, **F.** Petals, **G.** Labellum at different views, **H.** Epichile, **I.** Column **J.** Anther cap. Photos by Truong Ba Vuong.

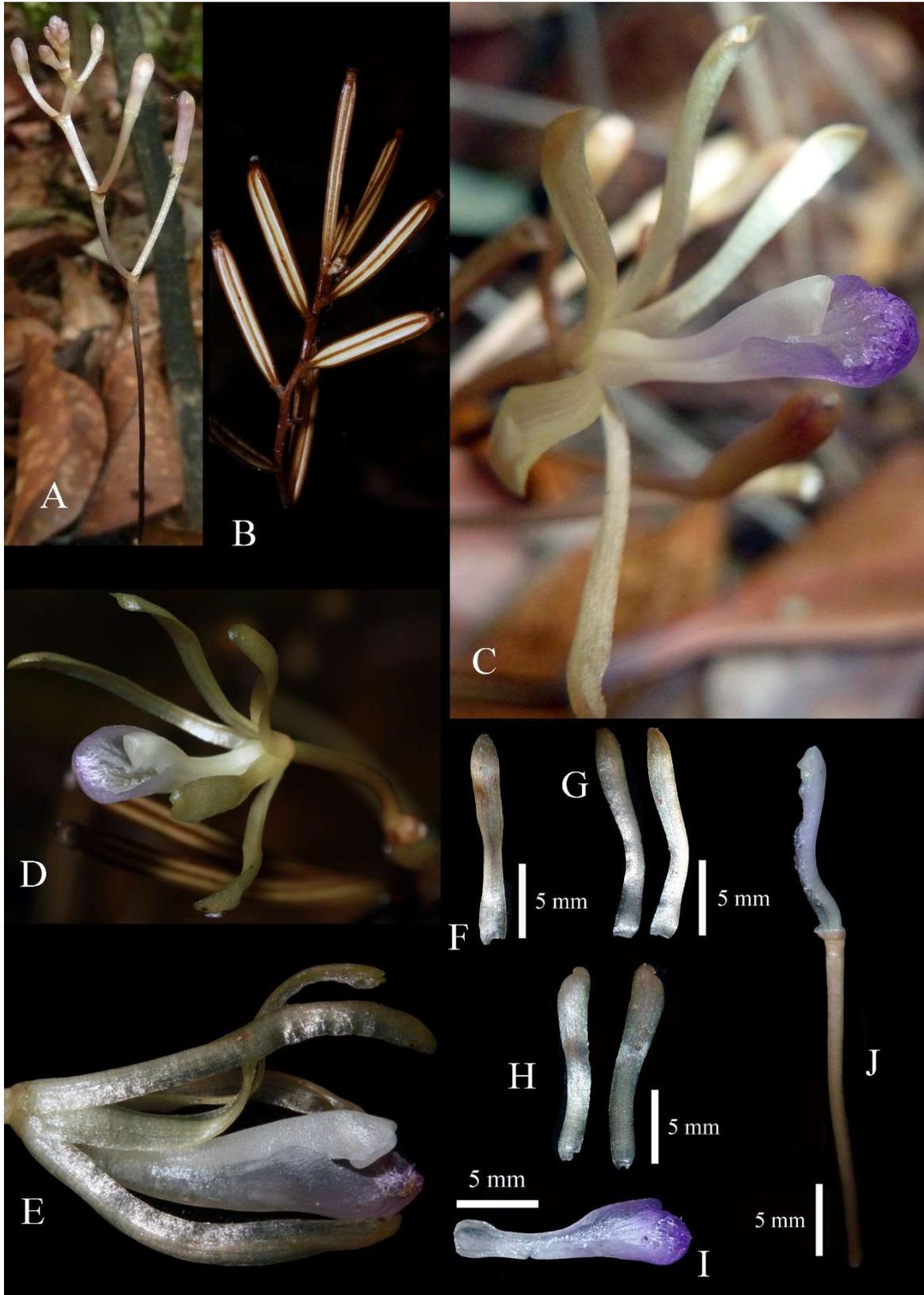
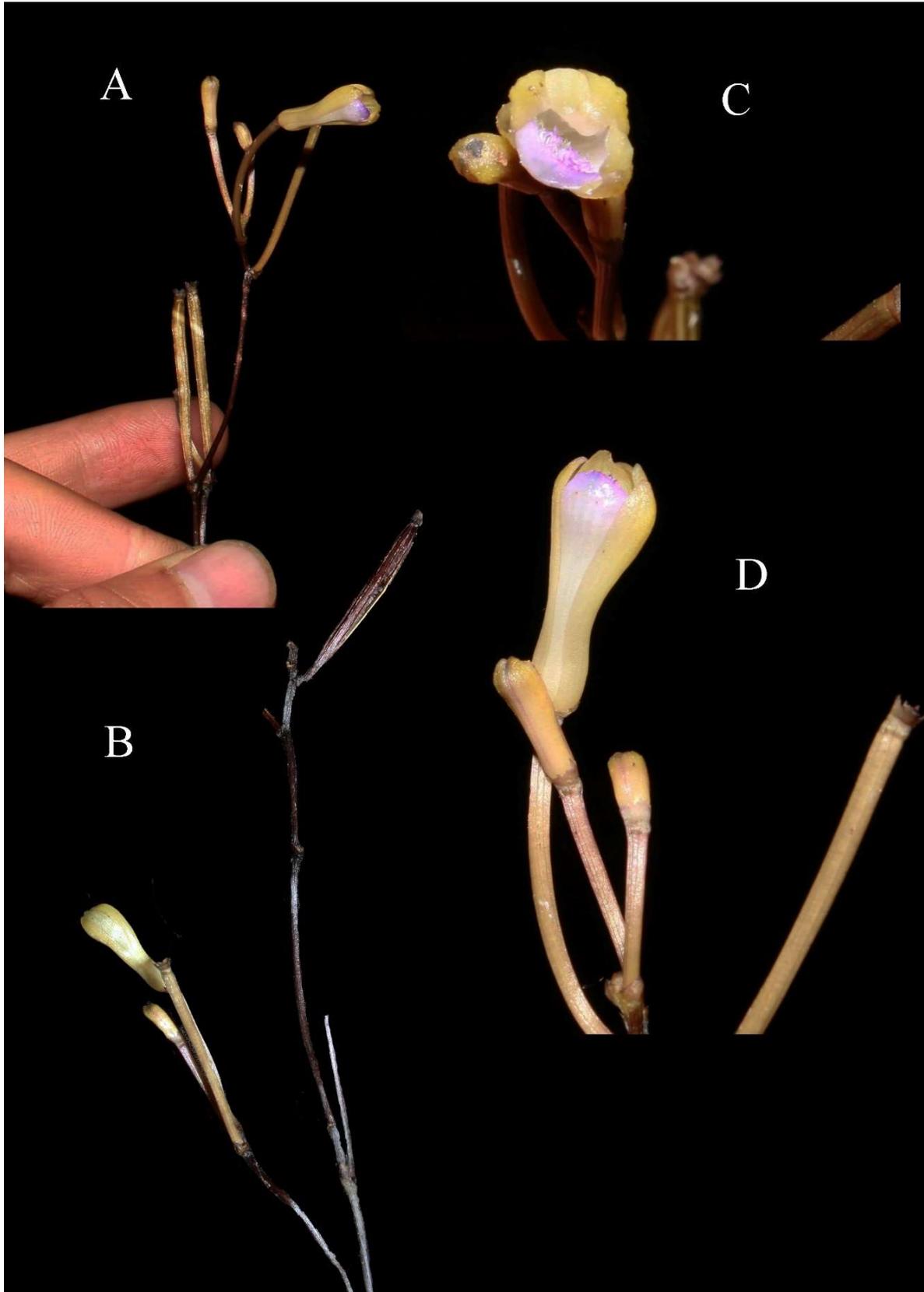


Fig. 3. *Lecanorchis taiwaniana* S.S.Ying, from *Truong & Mang BV 103* (A, C & F–J) and *Tich et al. 11-9-13* (B, D & E). A. Inflorescence, B. Fruits, C. Flower, side view, D. Flower, frontal view, E. Flower, side view, F. Dorsal sepal, G. Lateral sepals, H. Petals, I. Labellum, J. Column. Photos by Luu Hong Truong (B, D & E) and Truong Ba Vuong (A, C & F–J).



**Fig. 4.** *Lecanorchis cf. nigricans* Honda. **A.** Inflorescence, **B.** Infructescence, **C.** Flower, frontal view, **D.** Flower, view from below. Photos by Truong Quang Cuong.

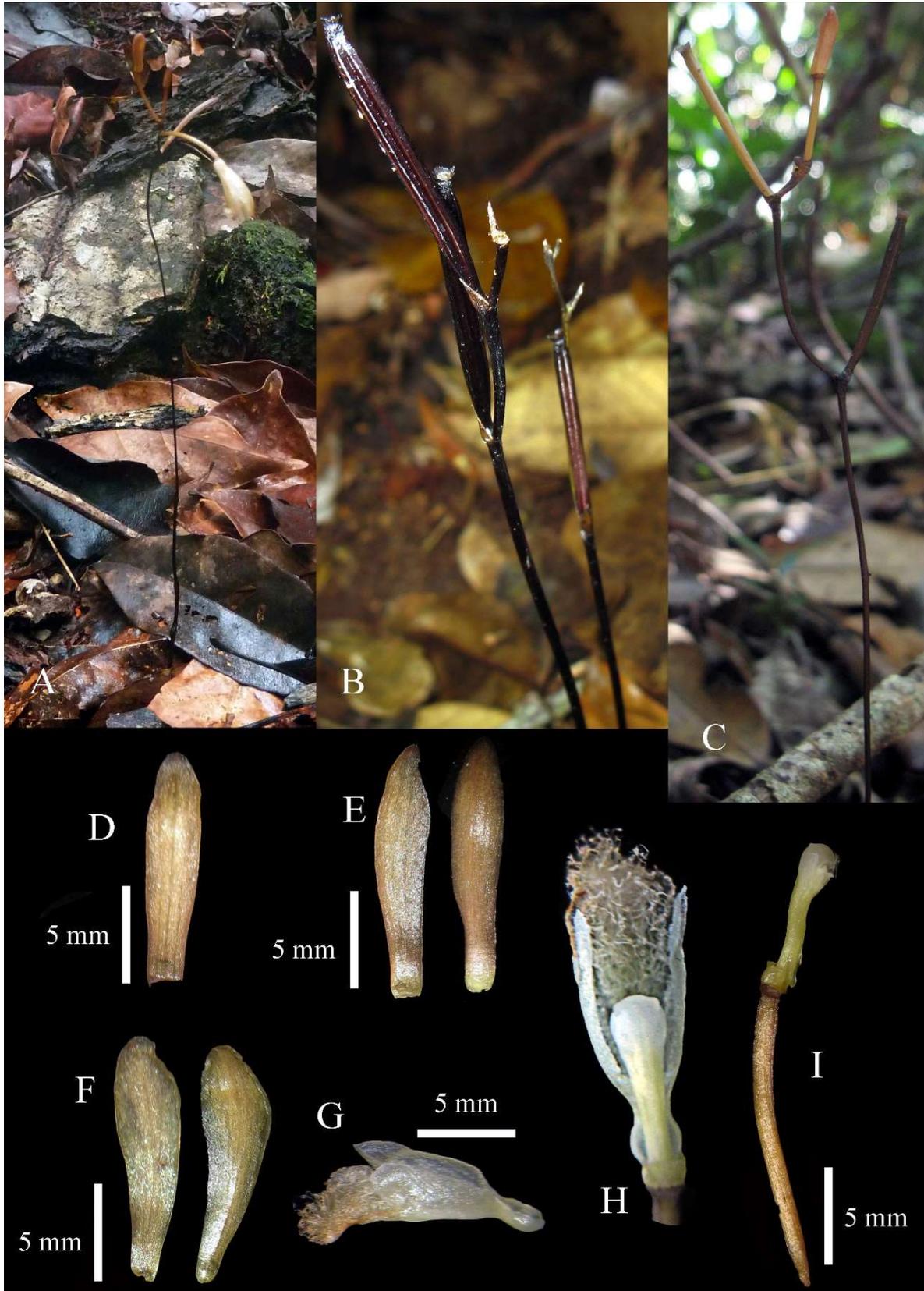


Fig. 5. *Lecanorchis vietnamica* Aver., from *Truong & Mang BV 103*. A. Inflorescence, B. Fruits, C. Flower and fruit, D. Dorsal sepal, E. Lateral sepals, F. Petals, G. Labellum, side view, H. Labellum, frontal view, I. Column. Photos by Truong Ba Vuong.



*Lecanorchis nigricans* Honda, Bot. Mag. (Tokyo) 45: 470. 1931.

**Type:** JAPAN. Wakayama Pref.: Nishimuro County, Iwata, Oka, date unknown 1931, *K. Kashiyama s.n.* (holotype TII!; Isotype TII!).

**Distribution.** Unconfirmed in Vietnam (Lam Dong Province); currently only certainly recorded in Japan and Taiwan (Suetsugu *et al.*, 2018c).

**Note.** As noted under *Lecanorchis taiwaniana*, the specimens previously recorded in Vietnam as “*L. nigricans*” actually belong to *L. taiwaniana*. Therefore, the occurrence of *L. nigricans* in Vietnam becomes questionable since currently we could not find any specimen that could be clearly identified as *L. nigricans*. On the other hand, we noticed that the photographs taken at Dung Jar Gieng region, Lac Duong District, Lam Dong Province by Truong Q.C. (Fig. 4) show some morphological characters of *L. nigricans* (i.e. dark brownish rachis, slightly wider and more spatulate sepals and dark brownish capsules) and is possibly corresponded to *L. nigricans* var. *patipetala* Y. Sawa or *L. nigricans* var. *yakusimensis* T. Hashim. based on its chasmogamous flower (see Suetsugu *et al.*, 2018c). However, considering that no voucher specimen was preserved, and these images are still not detailed enough for clear identification, we tentatively retain *L. nigricans* as a doubtfully recorded species in Vietnam awaiting further investigation.

*Lecanorchis vietnamica* Aver., Rheedia 15: 92. 2005.

#### Fig. 5

**Type:** VIETNAM. Thua Thien-Hue Province, A Luoi District, A Roang Municipality, Tra Lenh Forestry station, around point 16°04'38"N, 107°29'10"E, at elevation 700–800 m, on tops of ridge, 20 April 2005, *L. Averyanov, P.K. Loc, N.T. Vinh et al.* HAL 724 (holotype HN).

= *Lecanorchis flavicans* Fukuy var. *acutiloba* T.Hashim., Ann. Tsukuba Bot. Gard. 8: 8. 1989. JAPAN. Kagoshima: Yakushima, Mt. Motchomu, 24 July 1979, *Y. Hanei s.n.* (holotype: TNS)

**Ecology and phenology.** In Vietnam, this species can be found from the elevation of 1400 to 1500 m a.s.l, in the primary humid broad-leaved evergreen montane forests. Flowering period from middle to the end of June. Growing sympatrically with *L. malaccensis*.

**Distribution.** Vietnam (Hon Ba Nature Reserve, Khanh Hoa Province; Hue Province); also in Cambodia (Suetsugu *et al.*, 2018b), Japan and Taiwan.

**Material examined from Vietnam.** Khanh Hoa Province, Hon Ba Nature Reserve, 23 Jun. 2014, *Truong & Mang, BV 104* (PSU).

**Note.** In morphology, *Lecanorchis vietnamica* resembles *L. triloba* J.J. Sm. but differs in having 1–4 flowered (vs more than 10-flowered) rachis and labellum without a pair of callus on disc (vs labellum with a pair of callus; Suetsugu *et al.* 2017b).

### Key to the Vietnamese species of *Lecanorchis*

- 1a. Labellum unlobed or indistinctly 3-lobed, distinctly cucullate, spatulate when flattened ..... 2
- 1b. Labellum distinctly 3-lobed, not cucullate, rhombic-obovate when flattened ..... 3
- 2a. Sepals oblong-oblongeolate, (2.8–) 3.0–4.0 mm wide; column fused with labellum about 1/2 its length; capsules blackish when ripe, usually spreading ..... *L. nigricans*\*
- 2b. Sepals oblong, 2.0–2.5(–3.0) mm wide; column fused with labellum about 2/3 its length; capsules bright brownish when ripe, usually ascending ..... *L. taiwaniana*
- 3a. Sepals and petals 18–22 mm long; mid-lobe of labellum shorter than 2.5 mm ..... *L. malaccensis*
- 3b. Sepals and petals up to 16 mm long; mid-lobe of labellum longer than 3 mm ..... 4
- 4a. Floral bracts 3–5 mm long; tepals 13–16 mm long; midlobe of labellum covered with hairs exceeding lateral margins . *L. vietnamica*
- 4b. Floral bracts 1–3 mm long; tepals 8–12 mm long; midlobe of labellum covered with hairs not exceeding lateral margins ..... *L. moritae*

\*Doubtfully recorded species.

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