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## *Billolivia lamdongensis* (Gesneriaceae), a new species from Vietnam

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*Billolivia lamdongensis* Hareesh, T.A. Le & D.D. Nguyen *sp. nova* (Gesneriaceae) is described and illustrated from Central Highlands, Vietnam. It resembles *B. vietnemensis* but differs from the latter in having short hairs on the adaxial surface of the lamina; ovate-lanceolate bracts; linear calyx lobes 3/4 length of the corolla tube; a white corolla with a yellow throat and a dark purple patch between the upper lips on both surfaces; and fruits with pubescence all over.

*Billolivia* (Gesneriaceae) is a genus endemic to Vietnam, with 14 recognized taxa (Middleton *et al.* 2014a, Hareesh *et al.* 2019). It resembles *Cyrtandra* by having flowers with two fertile stamens and indehiscent fruits, but differs from it by having an alternate rather than opposite or pseudoalternate leaf arrangement (Middleton *et al.* 2014a). During floristic explorations in Central Highlands of Vietnam, the authors found plants seemingly belonging in *Billolivia* growing in the rocky crevices of Trieu Hai forest areas in Lam Dong Province. The floral parts were dissected at the time of collection, and preserved in FAA for subsequent studies. In addition, flowering or fruiting shoots were taken for voucher specimen preparation and one immature shoot was planted in the garden. After critical examination of the materials and consulting relevant literature (Middleton *et al.* 2014a, 2014b, Vũ *et al.* 2015, Nguyen *et al.* 2016, Ly 2017, Luu

*et al.* 2015, 2018a, 2018b, Hareesh *et al.* 2019) and herbarium materials (digital images from P, K and E), we concluded we had an undescribed species at hand.

***Billolivia lamdongensis* Hareesh, T.A. Le & D.D. Nguyen, *sp. nova* (Figs. 1 and 2)**

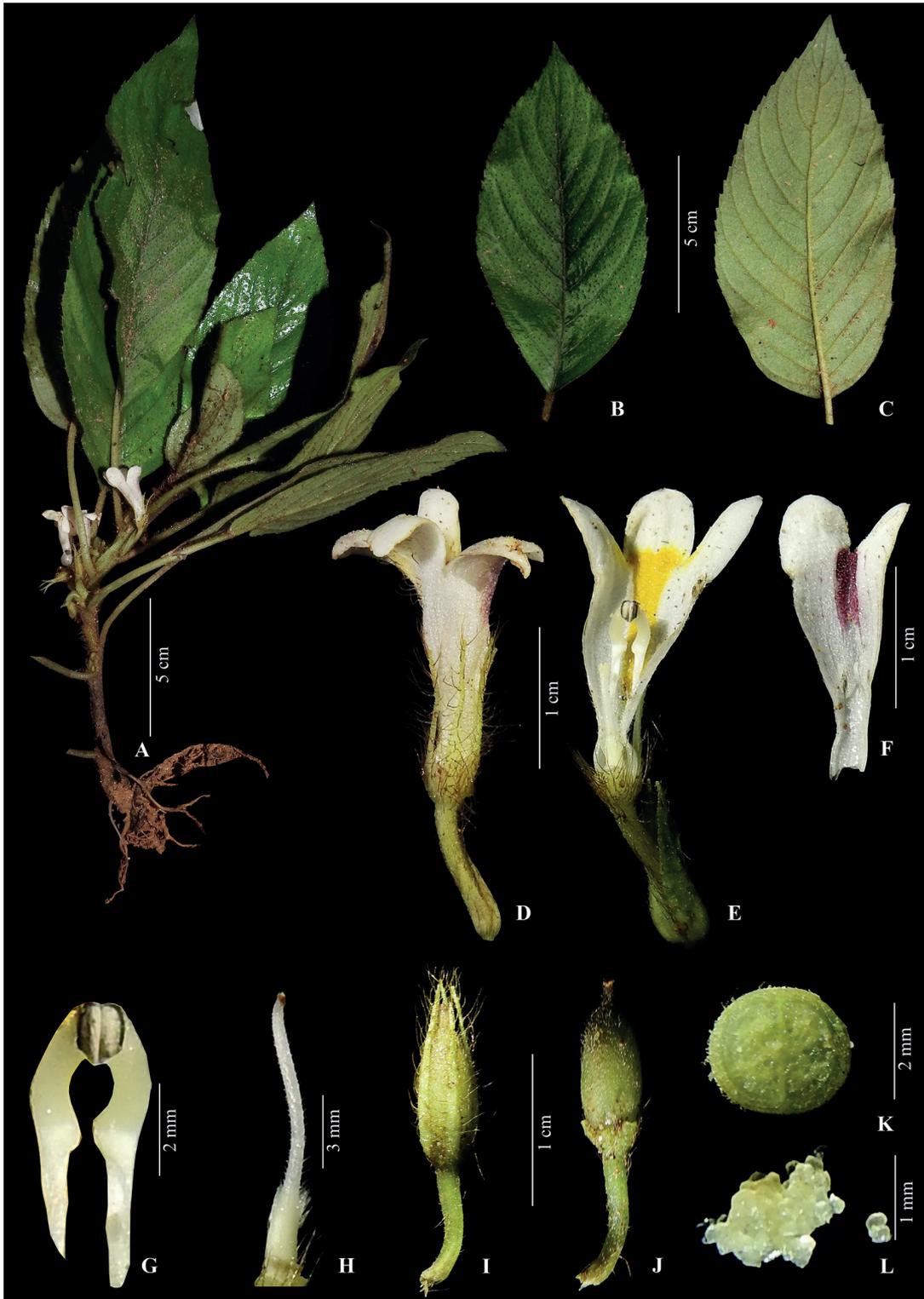
TYPE: Vietnam. Central Highlands, Lam Dong Province, Đa Têh District, Trieu Hai Commune, 11°30'33.9"N, 107°32'47.2"E, ±250 m a.s.l., 26 August 2020 Nguyen Danh Duc & Tuan Anh Le LTA-387 (holotype VNMN, isotypes VNMN, HN).

ETYMOLOGY. The specific epithet refers to the type locality (Lam Dong Province) of the species.

Lithophytic herb, up to 25 cm tall; stems decumbent, densely villose, pale green to brownish yellow. Leaves alternate; petioles 4–5.5 cm long, densely villous with yellowish brown



**Fig. 1.** *Billolivia lamdongensis*. — **A:** Habit. — **B:** Inflorescence, side view. — **C:** Flower, top view. — **D:** Flower, front view.



**Fig. 2.** *Billolivia lamdongensis* (type material). — **A:** Habit. — **B:** Adaxial view of lamina. — **C:** Abaxial view of lamina. — **D:** Flower with bract. — **E** and **F:** Longitudinal sections of flower. — **G:** Stamens. — **H:** Carpel, showing disc, ovary, style and stigma. — **I:** Fruit with calyx. — **J:** Fruit. — **K:** Cross-section of fruit. — **L:** Immature seeds.

**Table 1.** Morphological differences between *Billolivia lamdongensis* and *B. vietnamensis* (data from Middleton et al. 2014a).

	<i>B. lamdongensis</i>	<i>B. vietnamensis</i>
Plant height (cm)	25	20
Bracts	ovate-lanceolate	ovate
Adaxial surface of lamina	bearing short hairs	bearing long hairs
Calyx	3/4 length of corolla tube, lobes linear, 10–12 × ca. 0.5 mm	1/2 length of corolla tube, lobes narrowly ovate, 6–9 × 0.8–1.3 mm
Corolla colour	white, with yellow throat and dark purple patch on both surfaces between upper lips of corolla tube	white, with purple line along tube and on lobes, with yellow throat
Corolla tube vestiture	covered with short hairs	covered with long hairs
Fruits	10–13 × 3.5–4.5 mm, pubescent all over	6.5–8.5 × 3–4.5 mm, pubescent distally

uniseriate hairs, terete, yellowish green or pale green; lamina 7.5–14 × 4–6 cm, elliptic to ovate, base rounded to sub-acute, apex acute, margin coarsely dentate, sparsely short pubescent on both surfaces, margin ciliate, dark green above, pale green below; secondary veins 8–10 on each side of midrib. Inflorescences axillary, sessile; bracts 10–13 × 3–5 mm, ovate-lanceolate, foliaceous, 1-ribbed, pale green to pale pink, densely villous; pedicels 10–13 mm long, terete, densely villous with yellowish brown hairs, pale green. Calyx 5-lobed divided from base, yellowish green or pale green, densely villous; lobes 10–12 × ca. 0.5 mm, linear, caudate acuminate at apex. Corolla 18–20 mm long, composed of a straight to slightly bent narrow tube which slightly flares towards an oblique mouth and a 2-lipped limb with recurved lobes; tube 14–16 mm long, contracted below middle, then flaring towards mouth; tube and lobes white with dark purple patch between upper lips on both surfaces and yellow patches inside mouth of lower lip towards 3/4 length of tube; upper lip 2-lobed, lobes ca. 5 × 5–5.5 mm, orbicular; lower lip 3-lobed, lobes 5–7 × 3.5–5 mm, orbicular to obovate; corolla with short hairs all over except long colourless hairs outside lobes and glandular hairs throughout tube and lobes inside. Stamens inserted at 4–5 mm from corolla base; anthers ca. 1 × 1.5 mm, dorsifixed, cohering, touching each other, dark purple; filaments slightly curved, 8–9 mm long, white, sparsely pubescent; lateral staminodes ca. 2 mm long, medial staminodes ca. 1 mm long. Disc an annular ring, ca. 1 mm high, glabrous, pale

whitish green. Ovary 3–3.5 × ca. 1.5 mm, glabrous on base towards 3/4 length and pubescent onwards; style 8–9 mm long, white, white pubescence throughout; stigma slightly bilobed, glabrous, white or whitish yellow. Fruits 10–13 × 3.5–4.5 mm, ellipsoid, greenish, yellowish brown pubescence throughout; seeds (immature) many, ovoid, black. Flowering starts in June, fruiting ends in September.

*Billolivia lamdongensis* morphologically resembles *B. vietnamensis* (see Middleton et al. 2014a), but there are also several differences (Table 1).

**HABITAT AND POPULATIONS.** *Billolivia lamdongensis* is known only from Trieu Hai Commune forest areas in Đạ Têh District, Lam Dong Province, Central Highlands, Vietnam. The plants grow at ± 250 m a.s.l. on moist slopes in the evergreen understory patches on rocky crevices besides streams and waterfalls in association with *Phyllagathis* sp., *Aspidistra* sp., *Zingiber collinsii*, etc. We found about 5 mature and around 10 immature individuals growing in small clusters within an area of less than 1 km<sup>2</sup>. Currently, we consider the taxon Data Deficient (DD) until further field studies can be performed. The species is threatened by tourism and deforestation.

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