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***Billolivia cadamensis* (Gesneriaceae), A NEW SPECIES
FROM CENTRAL VIETNAM**

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ABSTRACT: A new species, *Billolivia cadamensis* Q. D. Nguyen, N. L. Vu & H. T. Luu, sp. n. of the family Gesneriaceae is described from Quang Ngai Province, central Vietnam. The new taxon is close to *B. tichii* but differs in shorter stem, abaxially glabrous bracts, calyx divided into 5 lobes to base, outside pubescent apical half of corolla tube, oblong or deltoid corolla lobes, dense hairs on apical 3/4 of the ovary and white corolla lobes. A key to all already known species from *Billolivia* of Vietnam is given.

Keywords: Gesneriaceae, *Billolivia*, new species, Vietnam.

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INTRODUCTION

Billolivia is a genus of the Gesneriaceae established recently with five species, namely *B. longipetiolata*, *B. minutiflora*, *B. poilanei*, *B. vietnamensis* and *B. violacea* (Middleton et al., 2014a). In the same year, *B. moelleri* was described as the sixth taxon of the genus (Middleton et al., 2014b). Shortly later, two more new species, i.e. *Billolivia kyi* and *Billolivia tichii* were discovered from the same Da Lat Plateau (Hong Truong Luu et al., 2015; Vũ Ngọc Long et al., 2015).

Our continuous search for the genus in

Vietnam has gathered several putative new taxa that are under examination. In this paper, we describe one of them as a new species from central Vietnam.

MATERIALS AND METHODS

The materials studied were collected from the type location in Quang Ngai Province, Vietnam. The new species was determined based on comparison of its morphological characteristics with those of its congeners.

RESULTS AND DISCUSSION

Key to all known species of *Billolivia* (based on [1])

- 1a. Calyx divided into 5 lobes almost to base2
- 1b. Calyx connate into a tube at base for at least 4 mm, margin 5-lobed.....5
- 2a. Calyx lobes > 3.5 mm wide3
- 2b. Calyx lobes < 2.5 mm wide5
- 3a. Petioles < 5 cm long, leaf margins minutely dentate or crenate, often appearing entire, calyx lobes 4.8-5.8 mm wide.....*B. poilanei*
- 3b. Petioles > 7 cm long, leaf margins coarsely dentate, calyx lobes 3.5-4 mm wide.....4
- 4a. Corolla throat with purple lines in tube and onto lobes *B. cadamensis*
- 4b. Corolla throat without purple lines in tube and onto lobes*B. kyi*
- 5a. Leaf abaxially with hairs only on veins or with only occasional hairs on lamina; corolla 12-15

- mm long; unfertilised ovary glabrous..... *B. minutiflora*
- 5b. Leaf abaxially with pubescence throughout; corolla 18-25 mm long; unfertilised ovary pubescent at apex..... *B. vietnamensis*
- 6a. Corolla throat white with purple lines in tube and onto lobes..... 7
- 6b. Corolla throat without purple lines in tube and onto lobes..... 8
- 7a. Calyx lobes 3.5-4 mm wide, corolla tube about 15 mm long..... *B. moelleri*
- 7b. Calyx lobes 1.5-2 mm wide, corolla tube 20-22 mm long..... *B. tichii*
- 8a. Calyx fused into a tube for 7-9 mm; corolla lobe tips pink or red; leaf lamina margins coarsely dentate; petioles 9-18 cm long..... *B. longipetiolata*
- 8b. Calyx fused into a tube for 4-6 mm; corolla lobe tips violet; leaf margins minutely dentate or appearing entire; petioles 6-12.5 cm long..... *B. violacea*

DESCRIPTION OF THE NEW SPECIES

Billolivia cadamensis Q. D. Nguyen, N. L. Vu & H. T. Luu, sp. n.

Allied to *B. tichii* in general appearance but different in having much shorter stem, glabrous bracts, calyx divided into 5 lobes to base, outside pubescent apical half of corolla tube, oblong or deltoid corolla lobes, dense hairs on apical 3/4 of the ovary and white corolla lobes.

Terrestrial herb; stems up to 15 cm long, pubescent with brown multicellular uniseriate hairs. Leaves alternate; petioles 10-20 cm long, with appressed brown multicellular uniseriate hairs; lamina elliptic, 14-17 cm long, 7-10 cm wide, base round to cuneate, apex obtuse, margin coarsely dentate, 12-14 of secondary veins on each side of midrib, adaxial lamina dark green, glabrous, margin ciliate, abaxial lamina pale green, with sparse appressed brown hairs mainly on midrib and venation. Inflorescences axillary, 2-4-flowered; peduncle brownish pink, 0.3-0.6 cm long, sparsely pubescent; bracts ovate, to 6-10 × 2-3 mm, apex acute, glabrous on both surfaces, with ciliate margins; pedicels pinkish white, 1-1.5 cm long, sparsely strigose. Calyx brownish red, 18-21 mm long, 3.5-4 mm wide, 5 ± equal lobes to base, glabrous on both surfaces, with ciliate margins. Corolla 22-26 mm long, composed of a narrow tube which slightly flares towards oblique mouth and a 2-lipped limb with lobes recurved; tube 15-17 mm long, white, outside ½ base pubescent and ½ apex pubescent, inside glabrous; throat white, turning light yellow after

anthesis, with a yellow patch on the lower, shortly stalked to subsessile glands and purple lines from inside tube and on the base of lobes (3 lines per lobe); upper lip 2-lobed, 13-15 mm long, lobes 7-8 × 6-7 mm, oblong; lower lip 3-lobed, 20-21 mm long, lobes deltoid, lateral lobes 8-9 × 6-7 mm, lower lobe 10-11 × 6-8 mm; all lobes white (turning light yellow after anthesis) outside pubescent with multicellular uniseriate hairs, inside with shortly stalked glands. Stamens 5 (2 fertile and 3 reduced) inserted at 10-11 mm from corolla base; 2 fertile filaments slightly curved, 5-6 mm long, white with a red dot in the middle, sparsely glandular puberulent. Disc bowl-shaped, 5-lobed at apex, 2 mm high. Ovary 2-locular, 3-4 mm long, 2.3 mm in diameter, basal 1/4 glabrous, apical 3/4 densely hairy; style 7-8 mm long, densely covered with glandular hairs; stigma lobes 1.3-1.5 mm long. Berries ellipsoid, 12-13 mm long, 6-7 mm in diameter, hairy at apex, translucent light brown, with persistent calyx and many seeds (fig. 1).

Typus: Vietnam. Central Vietnam, Quang Ngai Province: Tra Bong District, Ca Dam Mountain, approximate coordinates 15°09'31" N and 108°28'29" E, 1,015 m elevation, 12 March 2016. *Nguyen Quoc Dat, Vu Ngoc Long, Dinh Nhat Lam and Nguyen Hieu Cuong Pl-Q.NG 0392* (holotype SGN!, isotypes HN!, VNMN!).

Etymology: Named after the location (Ca Dam Mountain) where the new species was found.

Proposed Vietnamese name: Lưi hoa cà đăm.

Ecology

B. cadamensis was found on steep slopes and in moist gulleys in understorey of lower montane tropical evergreen closed forests at

around 1,000 m above sea level. Flowering was seen in February and March and fruiting in March and April.

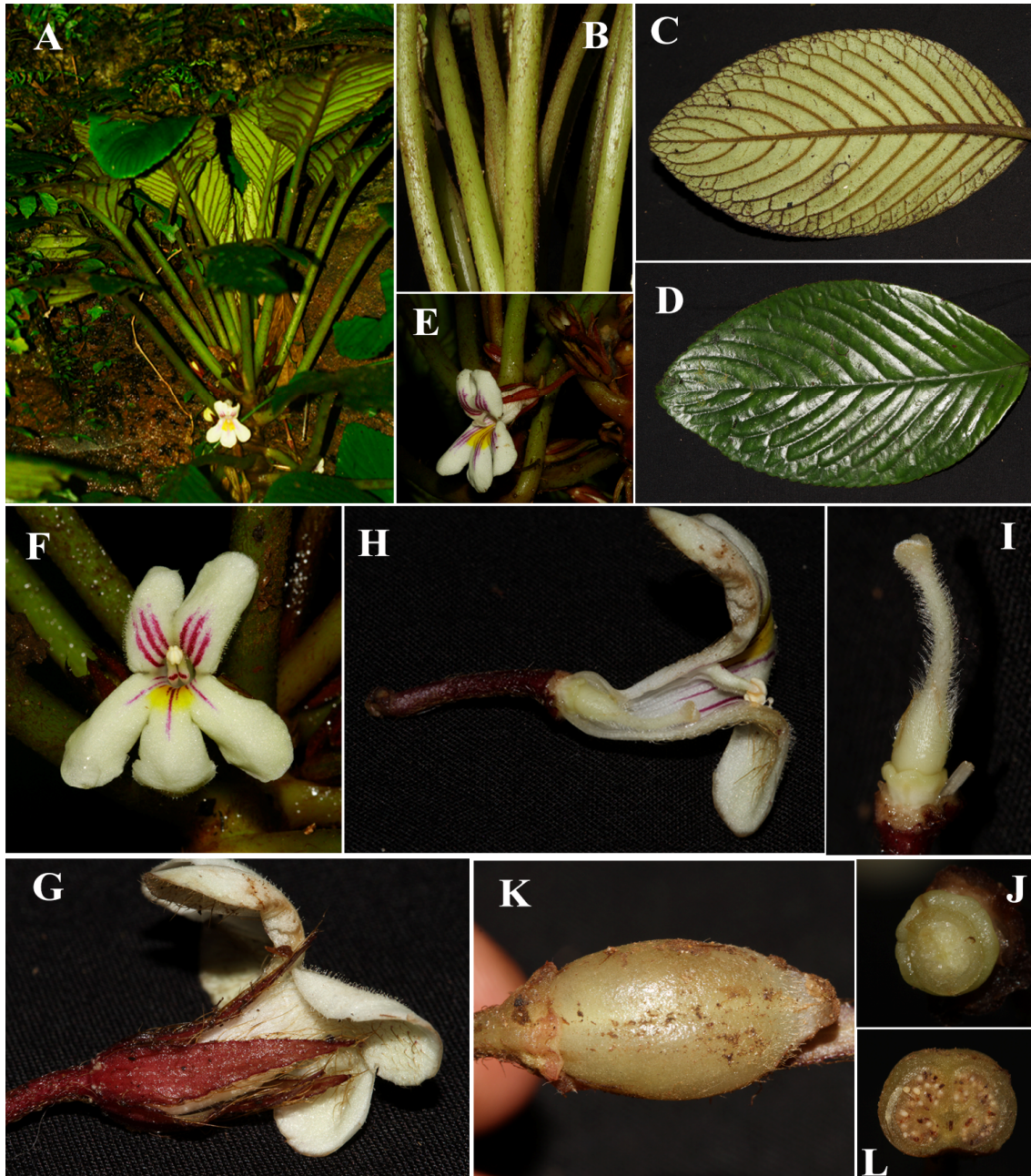


Figure 1. *Billolivia cadamensis* Q. D. Nguyen, N. L. Vu & H. T. Luu, sp. n.

A. Habit. B. Petioles. C. Abaxial lamina. D. Adaxial lamina. E. Inflorescence. F. Corolla lobes. G. Calyx. H: Longisection of corolla. I. Disc, ovary and style. J. Cross section of ovary. K. Fruit. L. Cross section of fruit. Photos: Nguyen Quoc Dat and Nguyen Hieu Cuong. Design: Luu Hong Truong.

NOTES

This is the ninth described taxon of *Billolivia* whose all species have been found from Vietnam. The finding of *B. cadamensis* marks the northernmost distribution of the genus.

The new species appears to be very similar to *B. tichii* in general appearance: elliptic leaf laminae, glabrous adaxial lamina, hairs mainly on abaxial midrib and venation, brownish pink and sparsely pubescent peduncle, bracts with pubescence on outer surface and ciliate margins, sparsely pubescent pedicels, brownish red calyx, white to light yellow corolla throat with shortly stalked to subsessile glands, purple lines on the base of lobes and white filaments with a red dot in the middle. However, the new species differs from the latter in having short stem (up to 15 cm long), obtuse leaf apex, glabrous bracts, calyx divided into 5 lobes to base, outside pubescent apical half of corolla tube, oblong or deltoid corolla lobes, dense hairs on apical 3/4 of the ovary, 7-8 mm style with denser long hairs and white corolla lobes (vs. up to 1 m long stem, acute leaf apex, abaxially pubescent bracts, calyx composed of a flaring tube and 5 lobes, outside glabrous corolla tube, orbicular corolla lobes, glabrous ovary, 15-17 mm long style and basally white and apically pink lobes).

The yellow patch and purple lines on the base of the corolla lobes in the new taxa recall those of *B. moelleri*. The two species also share short stem and ovary with glabrous base and glandular pubescent upper half but the later has elliptic to obovate leaf lamina with short acuminate apex, densely long pubescent bracts, calyx composed of a short tube and 5 lobes, outside densely hairy tube, 2 yellow stripes and no purple lines on ventral surface of corolla throat and orbicular corolla lobes with violet upper halves.

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***Billolivia cadamensis*, MỘT LOÀI MỚI CHO KHOA HỌC
THUỘC HỌ Gesneriaceae TỪ TRUNG BỘ VIỆT NAM**

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TÓM TẮT

Bài báo này mô tả một loài thực vật mới cho khoa học thuộc họ Gesneriaceae, *Billolivia cadamensis* Q. D. Nguyen, N. L. Vu & H. T. Luu, sp. n. (Lưu hoa Cà Đam), thu được từ núi Cà Đam, huyện Trà Bồng, tỉnh Quảng Ngãi, Trung bộ Việt Nam. Loài mới này rất giống loài *B. tichii* nhưng khác biệt ở các đặc điểm sau: thân ngắn, mặt ngoài lá bắc không lông, đài xẻ 5 thùy đến tận gốc, nửa phần trên của ống tràng có lông mặt ngoài, thùy của tràng hoa có dạng thuần hay tam giác, bầu có lông dày ở 3/4 trên và có thùy của tràng hoa màu trắng. Chúng tôi cũng cập nhật khóa định loại cho toàn bộ các loài đã biết thuộc chi *Billolivia* đã biết ở Việt Nam.

Từ khóa: Gesneriaceae, *Billolivia*, loài mới, Trung bộ, Việt Nam.