



New Orchids (Orchidaceae: Cymbidieae and Vandaeae) in the Flora of Vietnam

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ABSTRACT: The paper continues publication of new original data on orchid diversity in Vietnam (tribes Cymbidieae and Vandaeae) obtained in 2016–2018. It includes data on 2 genera and 10 species new for the flora of Vietnam. Among them, six species are new to science (*Ascocentrum hienii*, *Biermannia canhii*, *Cymbidium tamphianum*, *Gastrochilus setosus*, *Malleola luongii*, *Robiquetia orlovii*). Four other species are found on the territory of Vietnam for the first time (*Bogoria raciborskii*, *Lesliea mirabilis*, *Pennilabium struthio*, *Uncifera obtusifolia*). Two genera, *Bogoria* and *Lesliea*, are newly recorded for the flora of Vietnam. One new nomenclature combination (*Ascocentropsis malipoensis*), one new name (*Ascocentropsis yunnanensis*) and one lectotype (for *Uncifera obtusifolia*) are proposed. When the new data presented in this paper are included, the known orchid flora of Vietnam comprises about 1220 documented species from 174 genera.

KEY WORDS: Flora of Vietnam, Indochina, Nature protection, New species, Orchidaceae, Plant geography, Plant taxonomy.

INTRODUCTION

The paper continues publication of new original data on orchid diversity in Vietnam obtained in the field studies mostly during years 2016–2018 since last our publications (Averyanov *et al.*, 2016a-d, 2017a, b; Averyanov and Maisak, 2017a, b; Nguyen Hoang Tuan and Averyanov, 2017). It summarizes the results of joint efforts of professional botanists and orchid enthusiasts on studies of Vietnamese native orchids from tribes Cymbidieae and Vandaeae leading to discovery of 2 genera and 10 species new for the flora of Vietnam. Among them, six species are new to science, namely *Ascocentrum hienii* Aver. et V.C. Nguyen, *Biermannia canhii* Aver., *Cymbidium tamphianum* Aver., *Gastrochilus setosus* Aver. et Vuong, *Malleola luongii* Aver. et V.C. Nguyen and *Robiquetia orlovii* Aver. Four other species are found on the territory of Vietnam for the first time, including *Bogoria raciborskii* J.J. Sm., *Lesliea mirabilis* Seidenf., *Pennilabium struthio* Carr

and *Uncifera obtusifolia* Lindl. Two genera, *Bogoria* J.J. Sm. and *Lesliea* Seidenf., are new records for the orchid flora of Vietnam. When the new data presented in this paper are included, the known orchid flora of Vietnam comprises about 1220 documented species from 174 genera. Valid name, synonyms, type, citations of relevant taxonomic regional publications, data on ecology, phenology and distribution, estimated IUCN Red List status and studied specimens as well as brief taxonomic and biological notes are provided for each studied species. One new combination, *Ascocentropsis malipoensis* (Z.J. Liu et L.J. Chen) Aver., comb. nov., one new name *Ascocentropsis yunnanensis* Aver., nom. nov. (= *Vanda malipoensis* L.H. Zou, Jiu X. Huang et Z.J. Liu) and lectotypification for *Uncifera obtusifolia* Lindl. are proposed. An illustrated annotated list of all studied species arranged in alphabetical order is presented below.



MATERIALS AND METHODS

Materials used in present studies were collected mainly during years 2016–2018. Some previously collected herbarium specimens and living samples also provided significant additional information of the current investigation. Fresh plants, as well as flowers and inflorescences from living plants, were fixed and stored in 60–65% ethanol. Measurements of the floral parts for descriptions were taken on both herbarium and liquid-fixed materials as fresh flowers and their fleshy parts often shrank up to 10–15% in size during the drying process when herbarium specimens were made. In describing quantitative characters, infrequent extreme values (i.e. rarely occurring minimal and maximal values) of a variation range are parenthesized before and after the normal variation range. Detailed analytical photos of plant parts compiled into plates referred to here as “digital plates” or “digital epitypes” were made from the living plants prior to preparation of the appropriate herbarium specimens. Taxa distribution in Vietnam is indicated in the text by mentioning concerned provinces according to the official administrative country division (Viet Nam Administrative Atlas, 2007). The online version of the IUCN Red List of Threatened Species (2017) was used for estimation of preliminary species conservation status. Place of housing of cited specimens are indicated by accepted acronyms or respected Herbaria. The studied taxa are listed below in alphabetical order.

TAXONOMIC TREATMENT

List of new orchids in the flora of Vietnam

Ascocentrum hienii Aver. & V.C. Nguyen, *sp. nov.*

Figs. 1A-E & 2.

Described from southern Vietnam. **Type:** “Dak Lak province, M’Drak district, Chu Mu Mt., evergreen forest at elevation about 1200 m a.s.l., very rare, flowers purple, 10 August 2017, *N.V. Canh et al., AL 331*” (holotype – LE).

Etymology. Species epithet refers the name of the plant discoverer, Mr. Pham Vo Hien, Vietnamese orchid lover from Ea H’Leo town of Dak Lak province.

Description. Miniature monopodial epiphyte. Stem erect, rigid, rather straight, (8)10–14(16) cm long, densely covered by distichous overlapping leaf sheaths, flattened, with several dull green stout thick wiry roots distant in basal leafless half of stem. Leaves sessile, joined, oblong-lanceolate, strongly conduplicate in basal part, (3.5)4–6.5(7) cm long, (8)10–12(14) mm wide, unequally bilobed at apex; apical lobes oblique round. Inflorescence erect raceme or few branched panicle; peduncle rigid, straight, glabrous, terete, (5)6–7(10) cm long, with (1)2–3(4) distant, sterile triangular, acute

bracts, (1.5)2–3(3.5) mm long, (0.8)1–1.4(1.6) mm wide; rachis longitudinally obscurely angled and ribbed, glabrous, (0.5)1–4(6) cm long with many subdense, spirally arranged flowers; floral bracts distant, narrowly triangular, (1.5)2–2.5(3) mm long, greenish to dull purple, acute, suddenly broadening at the base; flowers simultaneously opening. Flowers subsessile, widely opening, 6–7 mm across, purple, with yellow lip side lobes, hairy with scattered scurfy hairs. Pedicel and ovary purple, erect, straight, with scattered brownish scurfy hairs, terete, 6-ribbed, (7)8–10(11) mm long, 0.5–0.6 mm in diameter, much twisted. Sepals and petals free, ovate, spreading, slightly concave, blunt to round at apex; sepals (2.8)3–3.2(3.4) mm long, (1.8)2(2.2) mm wide, lateral sepals broadly attached to column foot; petals little smaller. Lip spurred, 3-lobed, firmly adnate to the column foot; lateral lobes small, insignificant, each in form of broad incurved fleshy fold below column base; median lobe fleshy, deltoid-sagittate, 1–1.2 mm long and wide, with 2 laterally spreading triangular side lobules and triangular, up curved, forward directed median lobule; spur twice longer as sepals, (5.8)6–6.5(6.8) mm long, 1.2–1.8 mm wide, forward curving, dorso-ventrally flattened at the middle, laterally compressed at apex, with no ornamentation inside; spur front-wall fleshy, forming concave hollow at the base of median lobe. Column dark purple, shortly cylindrical (0.7)0.8–1(1.1) mm tall and broad; rostellum in form of rather large, elliptic, bifid plate 0.7–0.8 mm long at front of column apex, stigma concave, almost circular; column foot continued as a fleshy spur back wall. Operculum dark purple, hemispheric, helmet-shaped, 0.75–0.8 mm in diameter, with small up curved narrowly triangular beak. Pollinia 2, globular, each deeply grooved forming 2 joined subequal halves; stipe in form of linear conduplicate lamella 0.7–0.8 mm long; viscidium narrowly elliptic 0.6–0.7 mm long, 0.25–0.3 mm wide, bifid at apex. Fruits not known.

Habitat, phenology and conservation status.

Miniature monopodial branch and trunk epiphyte. Primary evergreen broad-leaved submontane forests. 1200 m. Fl. July–August. Very rare. Estimated IUCN Red List status – DD.

Distribution. Vietnam province: Dak Lak (M’Drak district). Endemic.

Notes. New species may be solely compared with *Ascocentrum rubescens* (Rolfe) P.F. Hunt, but differs in many features, like much smaller size of whole plant, with leaves 3.5–7 cm long, 8–14 mm wide (vs. 7–12 × 1.5–2.5 cm), inflorescence 5–10 cm long (vs. 10–20 cm long), flowers 6–7 mm across (vs. flowers 8–9 cm across), sepals 2.8–3.4 mm long (vs. 4–4.5 mm long), short, hardly visible lip side lobes (vs. prominent semicircular side lobes 1–1.5 mm long), deltoid-sagittate median lip lobe (vs. simple, narrowly triangular median lip lobe), spur 5.8–6.8 mm long, distinctly flattened

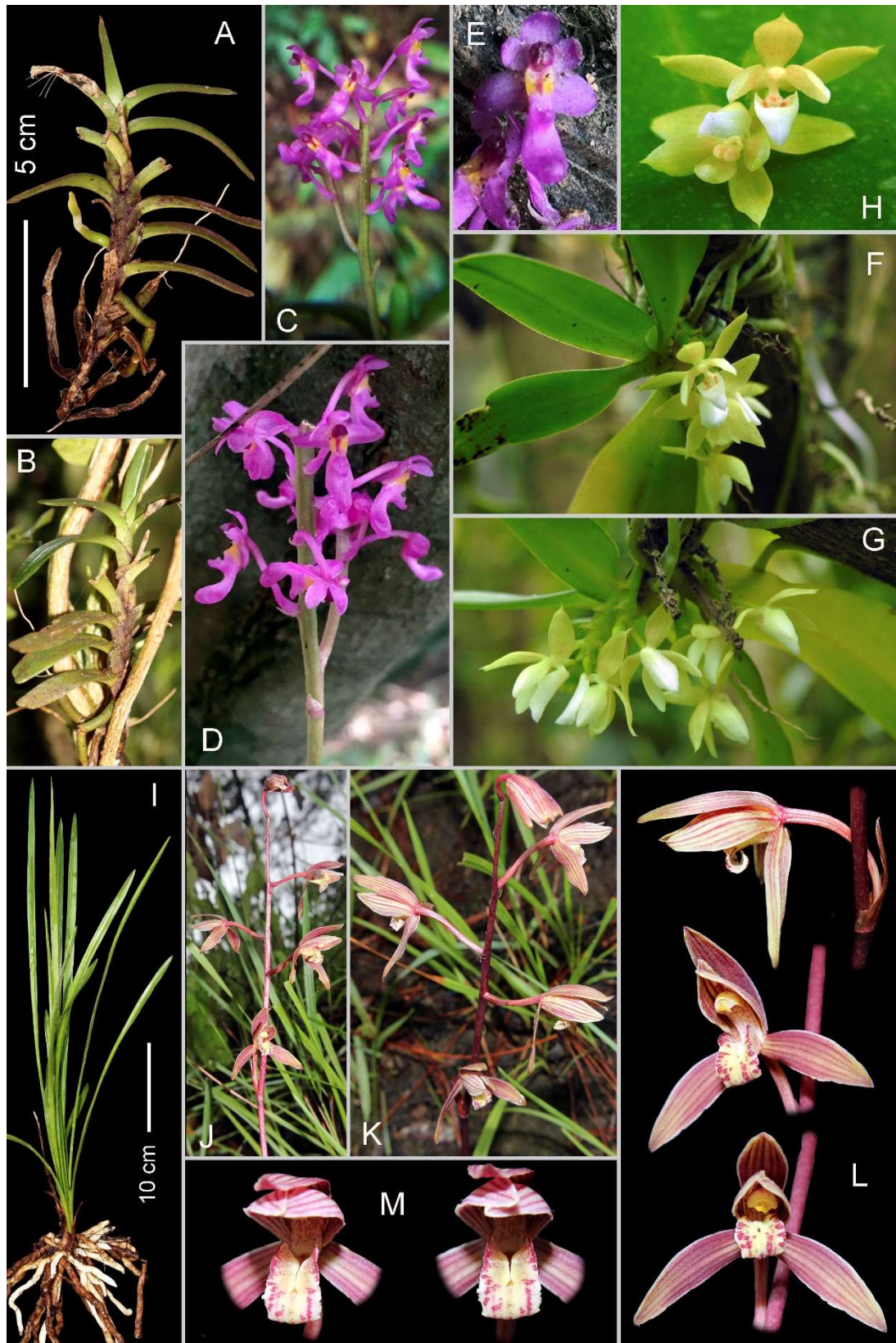


Fig. 1. New orchids in the flora of Vietnam. **A–E** – *Ascocentrum hienii* Aver. & V.C. Nguyen (AL 331, type). **F–H** – *Biemannia canhii* Aver. (AL 323a, type). **I–M** – *Cymbidium tamphianum* Aver. (AL 230, type). Photos by L. Averyanov (A, B), Nguyen Van Canh (C–H), Nguyen Phi Tam (I–M), correction and design by L. Averyanov.

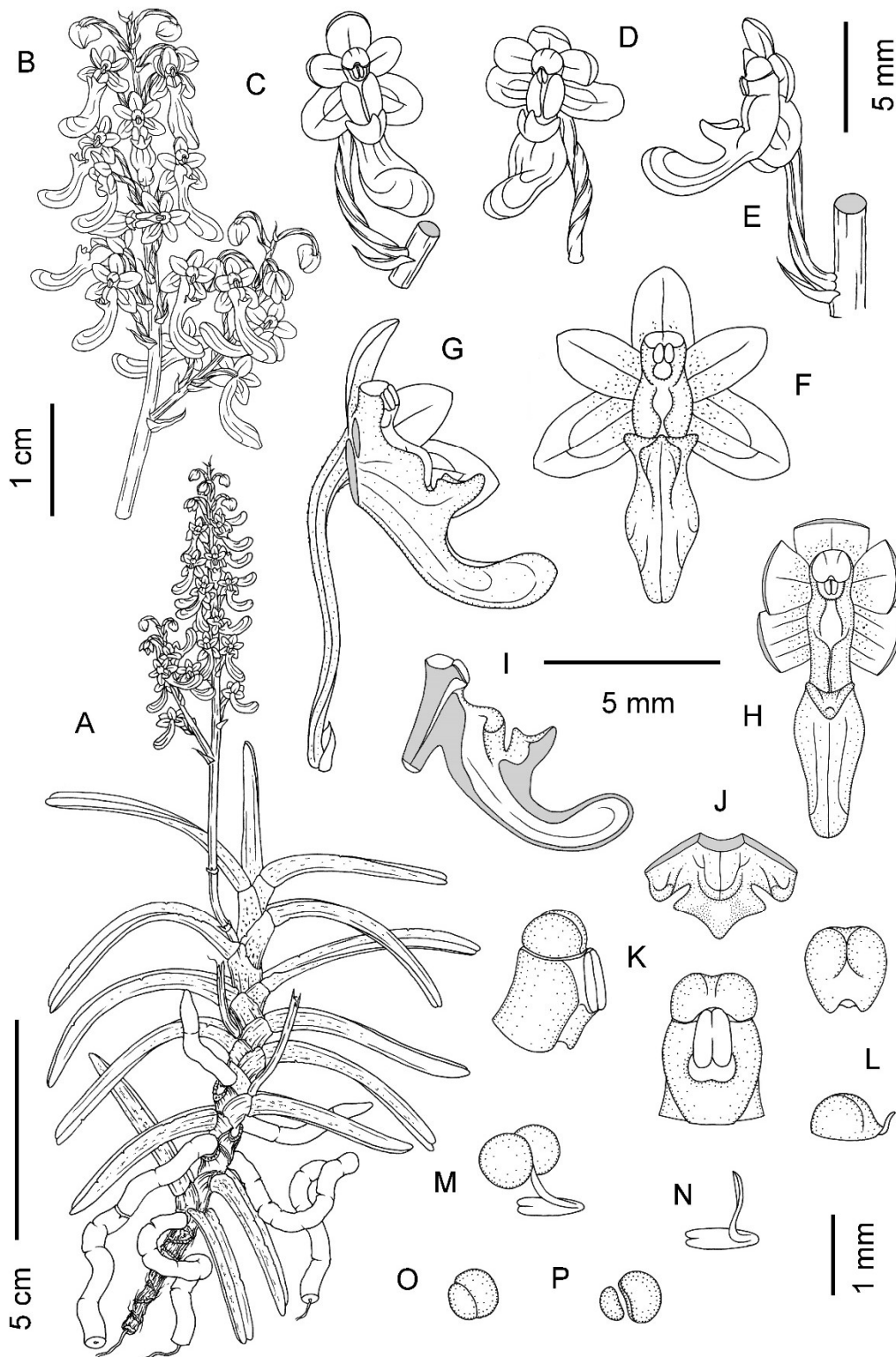


Fig. 2. New orchids in the flora of Vietnam. *Ascocentrum hienii* Aver. & V.C. Nguyen **A** – Flowering plant. **B** – Inflorescence. **C, D** – Flower, half-side view. **E** – Flower, side view. **F** – Flattened flower, frontal view. **G** – Flower with lateral sepal and petal removed, pedicel and ovary, side view. **H** – Column and lip, frontal view. **I** – Column and lip, sagittal section. **J** – Flattened median and side lobes, view from above. **K** – Column, side, and frontal view. **L** – Operculum, view from above, and side view. **M** – Pollinarium, side view. **N** – Stipe and viscidium, side view. **O** – Intact pollinium. **P** – Pollinium dipartite into two unequal particles. All drawn from the type – AL 331 by L. Averyanov.



dorso-ventrally at the middle, inflated and flattened laterally at apex (vs. spur 8–10 mm long, terete throughout its length).

The newly described plant and *A. rubescens*, are aberrant species, which share some morphological characters with *Aerides* Lour. Both species have rather isolated taxonomical position and may be segregated in rank of a separate genus having intermediate taxonomic position between *Ascocentrum* and *Aerides*. This idea was mentioned in earlier studies (Averyanov, 1988; Seidenfaden, 1992). The new species probably has also some relations to another aberrant species *Ascocentrum pusillum* Aver., which presently regarded as a member of the monotypic genus *Ascocentropsis* Senghas et Schildh. (= *Gunnaria* Z.J. Liu et L.J. Chen) with one presently included species, *A. pusilla* (Aver.) Senghas et Schildh. (Senghas, Schildhauer, 2000; Liu, Chen, 2009). When accepted this genus should also include *Ascocentropsis malipoensis* (Z.J. Liu et L.J. Chen) Aver., comb. nov. (= *Singchia malipoensis* Z.J. Liu et L.J. Chen, 2009, Journ. Syst. Evol. 47: 602) and *Ascocentropsis yunnanensis* Aver., nom. nov. (= *Vanda malipoensis* L.H. Zou, Jiu X. Huang et Z.J. Liu, 2014, Phytotaxa 186, 2: 94). The formal inclusion of the mentioned plants into *Vanda* R. Br. (Gardiner, 2012; Zou *et al.*, 2014) are not supported by their overall morphology.

According to available information, *A. hienii* is extremely rare and locally endemic with very restricted distribution in the eastern mountainous part of Dak Lac province of southern Vietnam.

***Biermannia canhii* Aver., sp. nov.**

Figs. 1F–H & 3.

Described from northern Vietnam. **Type:** Type herbarium specimen prepared from plant cultivated by N.V. Canh originated from northern Vietnam with no data about exact locality, 18 October 2017, *N.V. Canh, L. Averyanov, T. Maisak, AL 323a* (holotype – LE).

Etymology. Species epithet refers the name of the plant discoverer, eminent Vietnamese orchid enthusiast, Nguyen Van Canh.

Description. Miniature monopodial epiphyte. Stem 1–1.6 cm long, densely covered by distichous leaf sheaths, slightly flattened, with several pale green wiry roots clustering near stem base. Leaves (4)5–6(7), sessile, joined, oblong-elliptic, slightly falcate, (4)5–8(9) cm long, (1.2)1.4–1.8(2) cm wide, unequally bilobed at apex. Inflorescence stout, straight; peduncle glabrous terete, (2)3–4(5) mm long, with (1)2–3(4) distant, sterile triangular, acute bracts, about (1)1.2–1.4(1.6) mm long and wide; rachis flattened (rectangular in cross section), with scattered brownish scurfy hairs and (4)6–8(10) distichous triangular floral bracts; floral bracts distant on

(1.6)1.8–2.2(2.4) mm, triangular, acute, (1)1.4–1.8(2) mm long and wide; flowers in apical half of rachis, 1–2 at a time. Flowers subsessile, widely opening, fugacious, sepals and petals pale yellow, with scattered scurfy brownish hairs at the base. Pedicel and ovary light green, with scattered brownish scurfy hairs, terete, 6-ribbed, (2.8)3.2–3.6(3.8) mm long, (0.4)0.5–0.6(0.7) mm in diameter. Sepals subsimilar, narrowly ovate, (6.6)6.8–7.2(7.4) mm long, (2.4)2.6–3(3.2) mm wide, apiculate, straight, spreading; lateral sepals attached to column foot. Petals narrowly ovate, obtuse to blunt at apex, as broad as sepals, but little shorter, straight, slightly concave. Lip spurless, obscurely 3-lobed, firmly adnate at right angle to the column foot, lying almost parallel to the column, as long as sepals, (3.8)4–4.2(4.4) mm wide, white, with four pale brownish blotches near the base; lateral lobes insignificant, broadly triangular, erect; median lobe fleshy, broadly conoidal, (2.8)3–3.4(3.6) mm long, at front with 2 low ridges diverging from the apex; disc concave, with 2 hemispheric calluses at the base on lip median lobe. Column pale yellow, short and broad (1.7)1.8–2.2(2.3) mm tall, (0.9)1–1.2(1.3) mm wide; stigma large, almost circular, concave; column foot as long as column, at apex with pale yellow prominent subglobular callus 0.7–0.8 mm in diameter, slightly bifid at apex. Operculum hemispheric, (0.7)0.8–0.9(1) mm in diameter, with very short insignificant beak. Pollinia 2, globular, 0.3–0.4 mm in diameter, with small, hardly visible cavity; stipe broadly elliptic, 0.4–0.45 mm long, viscidium twice smaller, ovate.

Habitat, phenology and conservation status.

Miniature monopodial canopy herbaceous epiphyte. No data on ecology. Fl. July–August. Very rare. Estimated IUCN Red List status – DD.

Distribution. Northern Vietnam. Endemic.

Notes. The new species looks superficially similar with Himalayan *B. bimaculata* (King et Pantl.) King et Pantl., but well differs in scattered scurfy hairs on rachis, sepals and petals (vs. glabrous rachis and tepals), pale yellow, widely opening flowers (vs. flowers white, not widely opening), low insignificant broadly triangular lip side lobes (vs. prominent triangular falcate acute forward directed side lobes), disc with no 2 elongate basal calluses at the base (vs. disc with 2 elongate basal calluses), large, prominent subglobular callus placed in the front of the column foot apex (vs. no particular swellings on column foot), and in broadly obovate pollinarium stipe (vs. lanceolate to almost linear stipe). Three other species of the genus, *B. calcarata* Aver., *B. longiheila* Aver. et Nuraliev and *B. sigaldii* Seidenf. recorded in Vietnam (Averyanov and Averyanova, 2003; Averyanov *et al.*, 2018) have no visual morphological affinity with the newly described species.

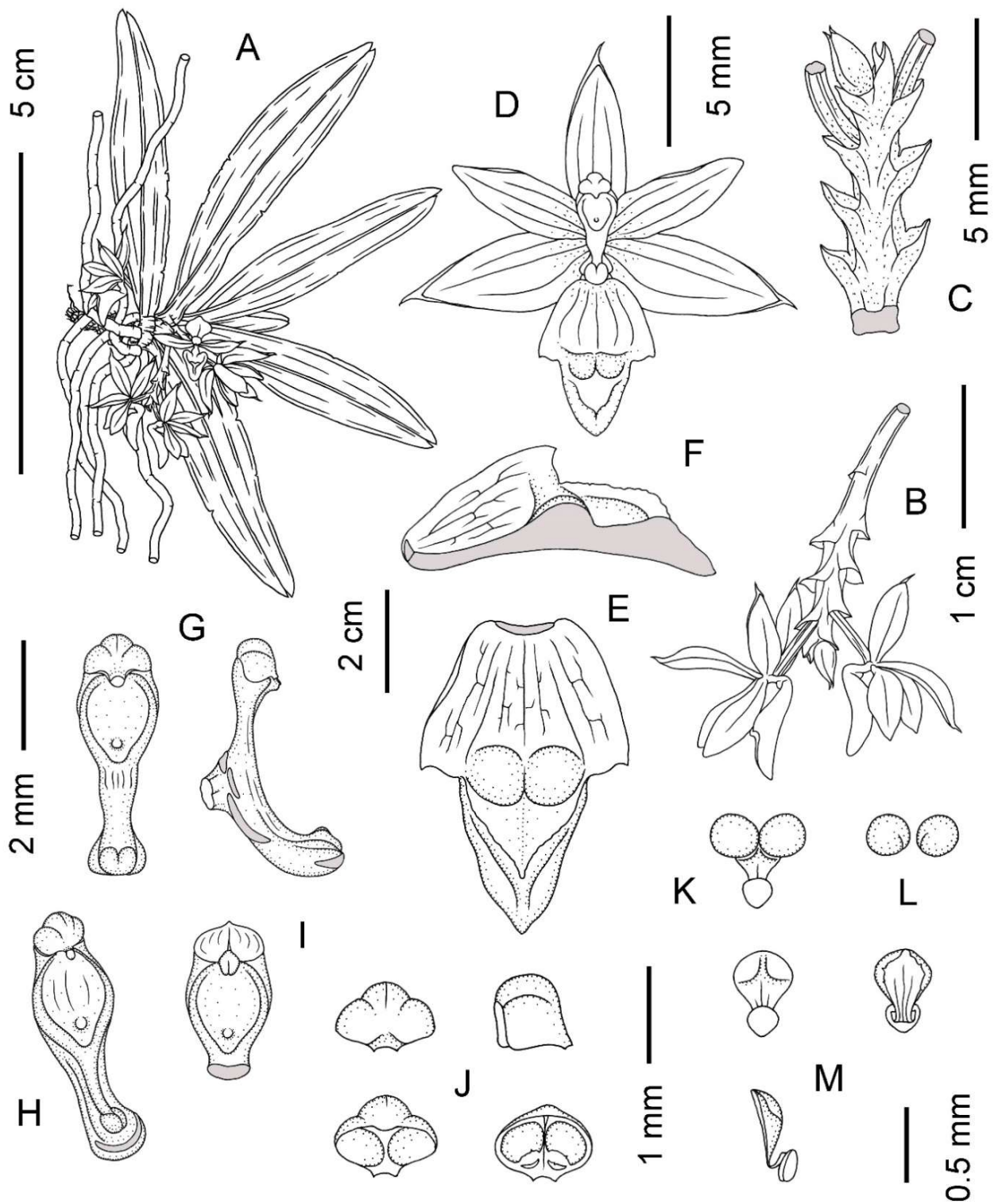


Fig. 3. New orchids in the flora of Vietnam. *Biemannia canhii* Aver. **A** – Flowering plant. **B** – Inflorescence. **C** – Rachis. **D** – Flattened flower, frontal view. **E** – Flattened lip, view from below. **F** – Lip, sagittal section. **G** – Intact column and column foot, frontal and side view. **H** – Intact column and column foot, half side view. **I** – Column with operculum and pollinarium removed, frontal view. **J** – Operculum, frontal view, side view, views from behind and from below. **K** – Pollinarium. **L** – Pollinia. **M** – Stipe and viscidium, frontal view, view from behind and side view. All drawn from the type – AL 323a by L. Averyanov.



Bogoria raciborskii J.J. Sm., 1905, Orch. Java 566: 1905; Comber, 1990, Orch. Java: 300, figs.

Fig. 4.

Described from Java (“Java: Kota Batoe, bei Buitenzorg”). **Type** (“*Raciborski*”) – BO?

Habitat, phenology and conservation status. Branch and canopy epiphyte on small trees. Primary broad-leaved evergreen lowland forests along streams. 400 m. Fl. February–April. Very rare. Estimated IUCN Red List status – EN.

Distribution. Vietnam province: Ninh Thuan (Ninh Hai district, Nui Chua national park). Java.

Notes. The genus *Bogoria* J.J. Sm. includes four presently known species spreading from Sumatra, Java, and Kalimantan to the Philippines and New Guinea. Its type species, *B. raciborskii* J.J. Sm. was hitherto reported as a rare endemic of Java growing in lowland forests from sea level to elevation 500 m (Comber, 1990). The surprising discovery of this species in southern Vietnam reveals its remarkable disjunction isolated by vast ocean space and extending primary known area to the north on more than 2000 km. It is one more record of true Malesian orchid genera in the flora of continental Asia, like *Abdominea* J.J. Sm., *Cordiglottis* J.J. Sm., *Grammatophyllum* Blume, *Hymenorchis* Schltr., *Macropodanthus* L.O. Williams, *Microtatorchis* Schltr. and *Octarrhena* Thwaites discovered recently also in southern Vietnam (Averyanov, 2012; Averyanov *et al.*, 2012, 2015, 2016d; Choudhary *et al.*, 2013). These data show remarkable evidence that floristic relations between eastern Indochina and western Malesia are closer than it was expected years ago.

Studied specimen. Southern Vietnam, Ninh Thuan province, Ninh Hai district, Vinh Hai commune, Vinh Hy Bay, Nui Chua National Park, about 400 m a.s.l., epiphyte on small trees along streams in seasonal lowland tropical forest, 2015, Pham Ngoc Lien sine no. Collected living plant later cultivated by Dinh Thao. Specimen for herbarium was fixed on 24 March 2016, *Luu Hong Truong, Tran Gioi, Pham Ngoc Lien, 1215* (SGN, LE). d-EXSICCATES OF VIETNAMESE FLORA 0273/*Luu et al., 1215* (Fig. 4).

***Cymbidium tamphianum* Aver., sp. nov.**

Figs. 11-M & 5.

Described from southern Vietnam.

Type: 10 October 2016, *Nguyen Phi Tam, L. Averyanov, T. Maisak, AL 230* (holotype – LE) prepared from plant cultivated and flowered in private garden of Nguyen Phi Tam in Dalat City, collected in Lam Dong province, Lac Duong district, Da Nhim municipality, around point 12°12'34"N, 108°60'74"E, open coniferous sub-montane grassy forest and woodlands with *Pinus kesiya* at elevation 1600 m a.s.l., September 2015, *Nguyen Phi Tam, sine no.*

Etymology. Species epithet refers name of its discoverer, Mr. Nguyen Phi Tam.

Description. Terrestrial, perennial, ephemeroïd, autotrophic rhizomatous herb. Stems slightly swelling or

hardly pseudobulbous at the base, erect, underground, very short, hardly visible; old stems leafless, covered at the base by brownish remnants of old cataphylls and leaves; young stems with (3)4–6(7) imbricate, cuneate, conduplicate cataphylls and (3)4–6(8) leaves; all stems densely clustered each other on very short plagiotropic rhizome; with large dense nest of numerous thick, fleshy, white flexuose roots (3.5)4–5(6) mm in diam. Cataphylls narrowly triangular to almost linear, (1)1.5–4.5(6) cm long, (4)5–6(8) mm wide, greenish to yellowish-green, fast becoming dark brown, papyraceous and eventually fibrous with age. Leaves sessile, erect, slightly recurved, rather coriaceous, conduplicate, dark glossy green, linear to narrowly lanceolate, (35)40–50(55) cm long, (6)8–10(12) mm wide, obscurely articulate at the base, tapering into acute apex, deciduous in dry season, emerging in early rainy season, only terminal pseudobulb with leaves during growing period. Inflorescence lax raceme, arising from the base of leafless pseudobulb before leaf formation, peduncle erect, dull pink to pink-brown, (12)15–20(25) cm tall, with (1)2–3(4) scarious, lanceolate, acute sterile bracts; rachis (4)5–8(10) cm long with (3)4–5(6) spirally arranged flowers, floral bracts dull pink, narrowly triangular-lanceolate, (6)8–12(15) mm long. Pedicel and ovary pink or pinkish-brown, slender, suberect, (1.8)2.2–2.8(3.2) cm long, 1.2–1.6 mm in diam., ovary slightly broadening toward flower base, shallowly grooved. Flowers widely opening, (2.8)3–4(4.2) cm across; sepals and petals yellowish to pinkish with dull purple stripes; lip white or light yellowish with purple or purple-brown marks and white keels; column white with many fine streaks at front; anther light yellowish to almost white. Sepals subsimilar, spreading, narrowly lanceolate to lanceolate, (2)2.2–2.4(2.6) cm long, (2.4)2.5–3(3.2) mm wide, 5–7-veined, acute to acuminate; lateral sepals slightly oblique. Petals little broader than sepals, forward directed, loosely clasping column, later spreading, broadly lanceolate, slightly oblique, obtuse, (1.7)1.8–2(2.2) cm long, (3.5)4–5(5.5) mm wide. Lip narrowly oblong in outline, not fused to the column base, (1.5)1.6–1.8(1.9) cm long, (5.5)6.5–7.5(8) mm wide, 3-lobed; lateral lobes suberect, almost semicircular (1.8)2–2.4(2.6) mm tall and broad; median lobe oblong, distinctly longer than side lobes, (8)9–10(11) cm long, (3.8)4–4.5(5) mm wide, strongly recurved, with irregularly undulate and denticulate incurved margin, densely papillose; disk with 2 longitudinal glabrous, lamellae keels extending from lip base to the base of median lobe, rising and connivent distally, forming almost close tube. Column stout and short, slightly curved, 8–9(10) mm tall, distinctly shorter than half of median sepal, slightly broadening toward the apex. Anther cup hemispheric, 3–3.5 mm across. Pollinia yellowish, 4, in 2 pairs, narrowly ovoid, 1–1.2 mm long, on small scarious viscidium.

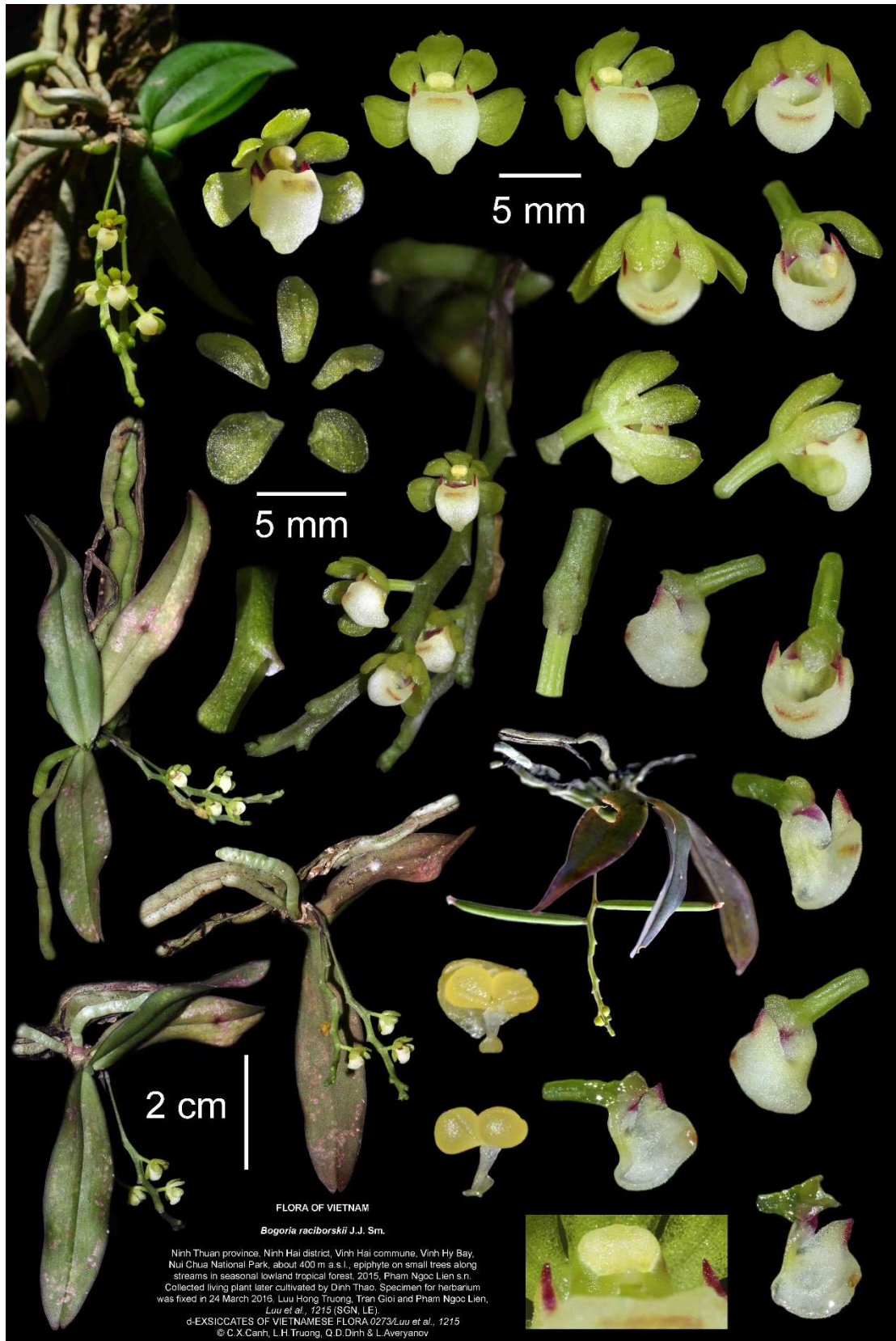


Fig. 4. New orchids in the flora of Vietnam. *Bogoria raciborskii* J.J. Sm. Plate – d-EXSICCATES OF VIETNAMESE FLORA 0273/Luu et al., 1215. Photos by Hong Truong Luu, correction and design by L. Averyanov.

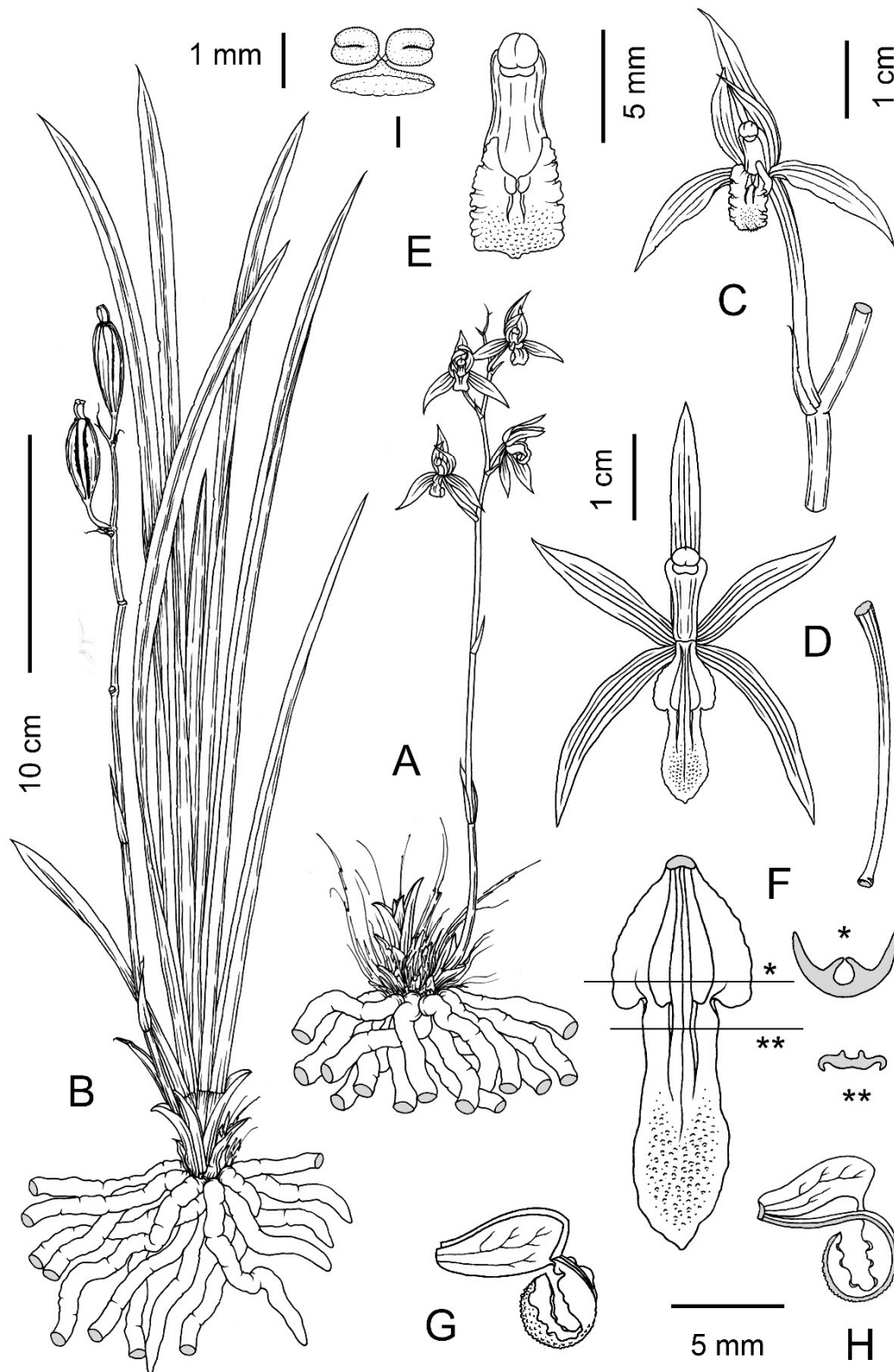


Fig. 5. New orchids in the flora of Vietnam. *Cymbidium tamphianum* Aver. **A** – Flowering plant. **B** – Fruiting plant. **C** – Flower and portion of rachis. **D** – Flattened flower and pedicel. **E** – Lip and column, frontal view. **F** – Flattened lip and its transversal sections along lines designated by single (*) and double asterisks (**). **G** – Lip, side view. **H** – Lip, sagittal section. **I** – Pollinarium, frontal view. All drawn from the type – AL 230 by L. Averyanov and T. Maisak.

**Habitat, phenology and conservation status.**

Perennial terrestrial ephemeroïd herb. Open secondary dry grassy coniferous forests and woodlands with *Pinus kesiya*. 1400–1600 m. Fl. July–October. Rare. Estimated IUCN Red List status – DD.

Distribution. Vietnam province: Lam Dong (Lac Duong district). Endemic.

Notes. The species is very remarkable for its ephemeroïd mode of life. According to morphological characters, this species is most close to Chinese *C. defoliatum* Y.S. Wu et S.C. Chen known from Fujian, Guizhou, Sichuan, and Yunnan (Liu *et al.*, 2006, 2009; Puy and Cribb, 2007). However, it is quite well different from the latter species in 3–8 leaves per stem (vs. 2–4 leaves) and distinctly larger flowers: 2.8–4.2 cm across (vs. 2–3 cm in diameter), sepals 2–2.6 cm long (vs. 1.2–2 cm long), petals 1.7–2.2 cm long (vs. 1–1.6 cm long) and column 8–10 mm tall (vs. 7–8 mm tall). Other specific characters, which strikingly segregate the new species from *C. defoliatum* are narrow sepals, proportionally short column (much shorter than half of median sepal), small short lip side lobes (much shorter than median lobe) and proportionally long median lip lobe with roughly papillose center. Like *C. defoliatum* our plant in its natural habitats remains leafless (or with few leaves?) during the dry season surviving by means of winter buds placed on short underground rhizome and dense nest of numerous fleshy storage roots. This plant flowers in the early rainy season and forms leaves after flowering. According to available observations, it is herbaceous element of dry open coniferous woods and woodlands with *Pinus kesiya* widely spreading in Lam Dong province and allied areas of Central Highlands or Tay Nguyen Plateau at elevations 1400–1600 m a.s.l.

Gastrochilus setosus* Aver. & Vuong, sp. nov.*Fig. 6.**

Described from northern Vietnam. **Type:** “Lao Cai province, Si Ma Cai district, Si Ma Cai Forest. 2 February 2018, *Truong Ba Vuong, BV 316*” (holotype – VNM, isotype – LE). d-EXSICCATES OF VIETNAMESE FLORA 0306/BV 316, 317.

Etymology. Species name refers the characteristic setose indumentum covering the lip and adaxial spur surface.

Description. Miniature epiphyte. Stem creeping or pendulous, simple or few branched, slender, (2)3–4.5(5) cm long, leafy throughout, covered by leaf sheaths, with several distant, white, wiry roots arising from nodes. Leaves sessile, distichous, rigid, close together, narrowly ovate, (1.2)1.4–2(2.2) cm long, (4)5–7(8) mm wide, green to dark green, with small sparse dull purplish marks along margin, tapering to acute apex bearing abaxially short unguiculate seta; apical half of leaf often recurved or twisted; at base articulate to short green sheath about 3 mm long, tinged with dull purple.

Inflorescence lateral, arising from apical half of stem, subumbellate, with (2)4–8(10) simultaneously opening flowers; scape (0.3)4–6(8) mm long, rachis (2)3–4(5) mm long, scape bract 1 to 2, broadly triangular, tubular, 1–2 mm long; floral bracts minute, green, triangular, acute, (0.4)0.5–1(1.2) mm long. Pedicel and ovary terete, straight to slightly curved, green, (3.5)4–5(6) mm long, spreading to suberect, glabrous or with sparse minute scurfy brownish hairs. Flowers not widely opening, slightly fragrant; sepals and petals yellowish-green, with purple median vein and few sparse purple speckles near the base; lip white, with greenish center of epichile and few small purple marks on hypochile; spur greenish with small sparse purplish speckles; column white; anther cap yellow. Sepals and petals subsimilar, narrowly ovate, (2.6)2.8–3.2(3.4) mm long, (1.4)1.5–1.8(2) mm wide, concave, blunt to almost round at apex. Lip spurred, distinctly divided into hypochile and epichile; hypochile broad, concave, almost round, (1.8)2–2.2(2.4) mm across, with no distinct side lobes, inside densely haired with long stiff white hairs; epichile reniform to half circular, (2.6) 2.8–3(3.2) mm long, (4)4.2–4.8(5) mm wide, concave to almost flat, sparsely ciliate throughout, in center with obscurely triangular cushion densely haired with long, erect, stiff hairs, at apex shallowly emarginate, with small triangular dent; spur spreading almost parallel to ovary, shortly cylindrical, terete or slightly laterally flattened, (3)3.2–3.6(3.8) mm long, (1.8)2(2.2) mm in diameter, blunt to almost round (sometime slightly swollen) at apex, with dense stiff white hairs inside. Column short and broad, about 1 mm tall and wide, with no column foot, rostellum in form of small, furcate forward directed dent. Anther cap glabrous, hemispheric, 1.2–1.4 mm across, with small forward directed triangular beak. Pollinia 2, subglobose, porate, attached to a slender, simple, filiform, hyaline linear stipe, viscidium small, simple, narrowly elliptic. Fruits unknown.

Habitat, phenology and conservation status.

Miniature branch pendulous epiphyte. Evergreen broad-leaved mountain forests. Fl. January–February. Very rare. Estimated IUCN Red List status – DD.

Distribution. Vietnam province: Lao Cai (Si Ma Cai district, Si Ma Cai Forest). Endemic.

Notes. The new species has certain resemblance with Taiwanese *G. hoi* T.P. Lin and *G. matsudae* Hayata in plant habit, flower color, and epichile hairiness, but differs in distinctly smaller flowers with sepals 2.6–3.4 mm long, 1.4–2 mm wide (vs. 4.5–6 mm long, 3–3.7 mm wide), reniform to almost round epichile 2.6–3.2 mm long, 4–5 mm wide (vs. semicircular epichile 3–5 mm long, 6–8 mm wide), spur back directed, parallel to ovary, 3–3.8 mm long, 1.8–2.2 wide (vs. spur forward curved, almost perpendicular to ovary, 3–5 mm long, 2–4 mm across) and many dense long setose hairs inside spur (vs. few or no hairs inside spur). Flowers on the



Fig. 6. New orchids in the flora of Vietnam. *Gastrochilus setosus* Aver. & Vuong. Digital epitype – d-EXSICCATES OF VIETNAMESE FLORA 0306/BV 316, 317. Photos by Ba Vuong Truong, correction and design by L. Averyanov.



newly discovered plant may be somewhat similar with *G. raraensis* Fukuyama also recorded from Taiwan (Lin *et al.*, 2016; Zhou, 2016). However, our plant differs from this later species in compact plant habit with a rather stout stem 2–5 cm long, covered with crowded leaves touching each other (vs. stem slender, elongate to 15 cm long, with distant leaves), purple-spotted lip with soft hairiness (vs. unspotted white to greenish lip with straight setose hairs) and shortly cylindrical spur parallel to ovary (vs. conoid spur almost perpendicular to ovary). The new plant may be also close to the invalidly published *G. prionophyllus* H. Jiang et D.P. Ye found in Yunnan (Xu *et al.*, 2010). The plant from Yunnan has a similar appearance of the whole plant and flowers, but its flower lip is entirely glabrous.

Studied specimen (paratype). Northern Vietnam, Lao Cai province, Si Ma Cai district, Si Ma Cai Forest. 2 February 2018, *Truong Ba Vuong, BV 317* (VNM).

Lesliea mirabilis Seidenf., 1988, *Opera Bot.* 95: 190; Li *et al.*, 2011, *Pl. Diversity Res.* 33: 643–644; Zhou *et al.*, 2016, *Phytotaxa* 276, 1: 82. ≡ *Doritis mirabilis* (Seidenf.) T. Yukawa et K. Kita, 2005, *Acta Phytotax. Geobot.* 56: 157. ≡ *Phalaenopsis mirabilis* (Seidenf.) Schuit., 2007, *Orchideen Journ.* 14: 62.

Fig. 7.

Described from northern Thailand (“Ban Mussoe, Tak”). **Type** (“*Tagawa et al. 8626*”) – KYO.

Habitat, phenology and conservation status. Miniature branch and canopy epiphyte. Primary and old secondary dry evergreen broad-leaved lowland forest, commonly along stream valleys. Fl. September–October. Very rare. Estimated IUCN Red List status – DD.

Distribution. Vietnam province: Gia Lai (Chu Prong district). Thailand, southern China (Yunnan).

Notes. *Lesliea* is morphologically a well-segregated monotype genus having relations to the *Phalaenopsis* alliance according to recent molecular data (Govaerts *et al.*, 2018). The one species of this genus is a very rare miniature canopy epiphyte recorded in few locations in Thailand and Yunnan (Seidenfaden, 1988; Li *et al.*, 2011). This new record in southern Vietnam essentially expands its known area of distribution in the southeastern direction.

Studied specimen. Southern Vietnam, Gia Lai province, Chu Prong district, La Ve commune, dry evergreen broad-leaved lowland forest, epiphyte along stream. 22 September 2017, Tong Thi Song Ha, Nguyen Hoang Tuan, sine no (LE). d-EXSICCATES OF VIETNAMESE FLORA 0292/T.T. S. Ha, N.H. Tuan sine no 22.09/2017 (Fig. 7).

Malleola luongii Aver. & V.C. Canh, *sp. nov.*

Figs. 8A–C & 9.

Described from southern Vietnam. **Type:** Lam Dong province, Dalat town area, Lam Ha District, Nam Ba town environs, Ta Nung pass, evergreen forest along stream at elevation about 1350 m a.s.l., epiphyte along

stream, very rare, flowers purple-violet, 10 June 2017, *N.V. Canh et al.*, sine no, herbarium specimen prepared by *L. Averyanov and T. Maisak* at 18 October 2017 *AL 322* (holotype – LE).

Etymology. Species epithet refers the name of the plant discoverer, Nguyen Van Luong, farmer and orchid lover from Nam Ha town, Lam Dong province.

Description. Miniature monopodial canopy epiphyte. Stem slender, hanging, (1.5)2–3.5(4) cm long, densely covered by distichous leaf sheaths, slightly flattened, with many pale green wiry roots clustering near stem base, leafy in apical half. Leaves (4)6–10(12), sessile, joined, broadly lanceolate to narrowly elliptic, oblique falcate, pure green, (2.5)3–4(4.5) cm long, (4.5)5–7(8) mm wide, spreading horizontally, apex oblique unequally bilobed. Inflorescence slender, glabrous, (1.5)2–2.5(3) cm long; peduncle greenish to dull purple, thin, terete, (0.6)0.8–1.2(1.4) cm long, naked or with 1 distant, sterile triangular, acute bracts, 1–1.2 mm long and wide; rachis terete, slightly longitudinally angled with (3)5–8 flowers; floral bracts distant on (0.6)1–2(2.2) mm, triangular, acute, (0.6)0.8–1(1.2) mm long and wide; flowers spirally arranged, spreading at right angle to rachis, simultaneously opening. Flowers subsessile, widely opening, (4)4.5–5(5.2) mm across, sepals and petals spreading, pink-purple, glabrous. Pedicel and ovary white, glabrous or with few short scurfy scattered brownish hairs, terete, obscurely 3-angular, (3.8)4–5(5.2) mm long, (0.4)0.5–0.6(0.7) mm in diameter. Sepals (2.4)2.5–2.6(2.7) mm long; median sepal narrowly ovate, (0.9)1–1.2(1.3) mm wide (being flattened), concave, cymbiform, dorsally gibbous and hooded, obscurely attenuate and blunt at apex; lateral sepals broadly obovate, broadening from narrow base, strongly oblique, (1.4)1.5–1.8(1.9) mm wide, almost round at apex. Petals oblong narrowly ovate, (1.9)2(2.1) mm long, (0.9)1(1.1) mm wide blunt to almost round at apex. Lip 3-lobed, spurred, firmly fused by lateral sides with column base, with spur lying almost parallel to ovary; side lobes purple, oblong half-round, (0.7)0.8–0.9(1) mm long and wide, erect, forward directed, lower margin inward curved; median lobe pure white to light pink, narrowly ligulate conoidal, subterete, attenuate, acute, (0.7)0.8–0.9(1) mm long, 0.2–0.3 mm wide, downward revolute to almost helicoid; spur glossy white, shortly cylindrical, with no constriction, (2.4)2.5–2.8(3) mm long, (1.3)1.4–1.5(1.6) mm in diameter, oblique conical and round at apex. Disc rather fleshy, adaxially with small but prominent squarish callus at the base of median lobe. Column white, footless, erect, shortly cylindrical, 1.4–1.6 mm tall, 1.3–1.4 mm in diameter, apex with 2 lateral conoid forward directed finely warty steldia 0.5–0.6 mm long, 0.25–0.3 mm in diameter at the base; rostellum small, placed between steldia; stigma large, concave, triangular cordate. Operculum light pale yellowish, proportionally very large, as tall and broad as column,

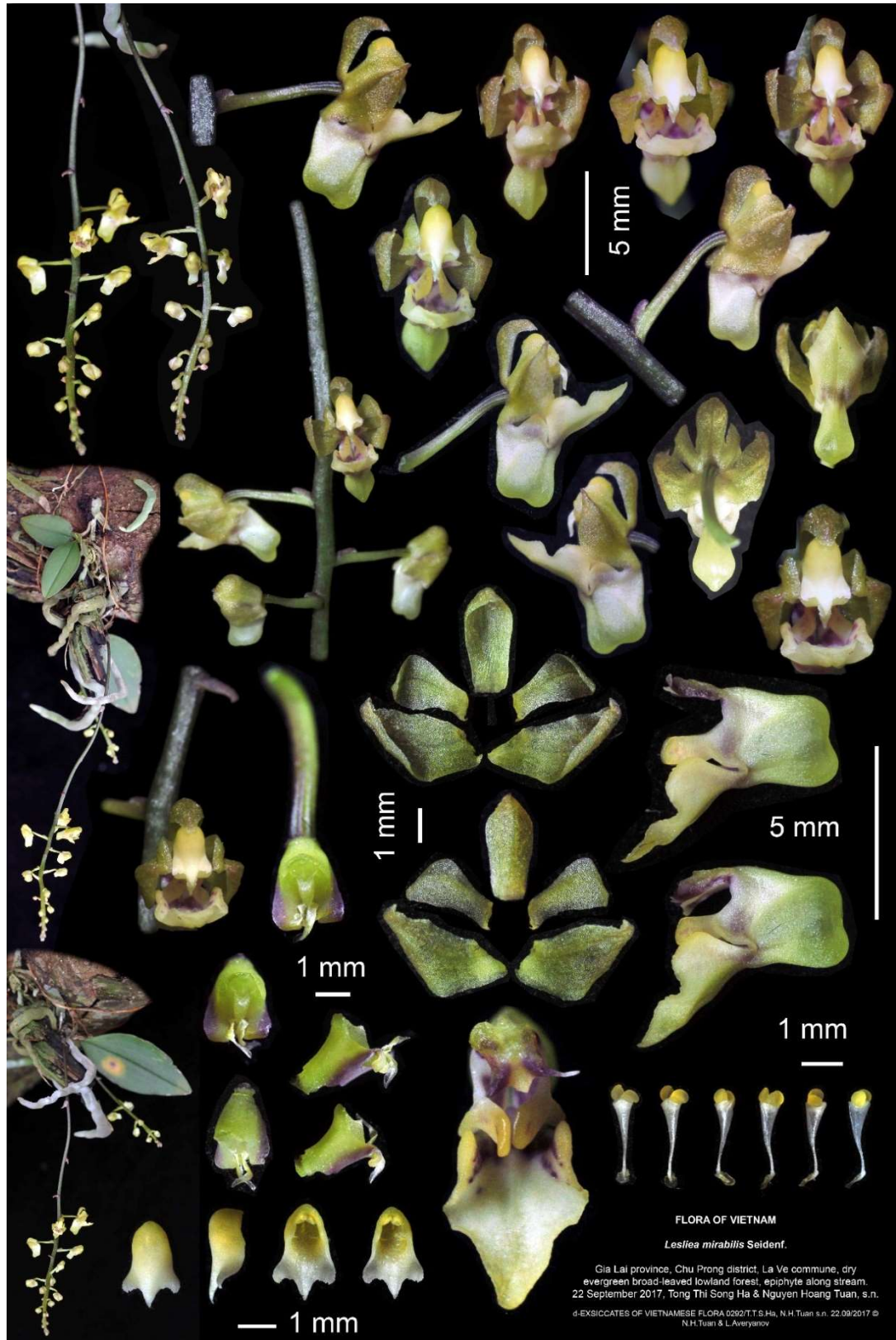


Fig. 7. New orchids in the flora of Vietnam. *Lesliea mirabilis* Seidenf. Plate – d-EXSICCATES OF VIETNAMESE FLORA 0292/T.T. S. Ha, N.H. Tuan sine no 22.09/2017. Photos by Nguyen Hoang Tuan, correction and design by L. Averyanov.

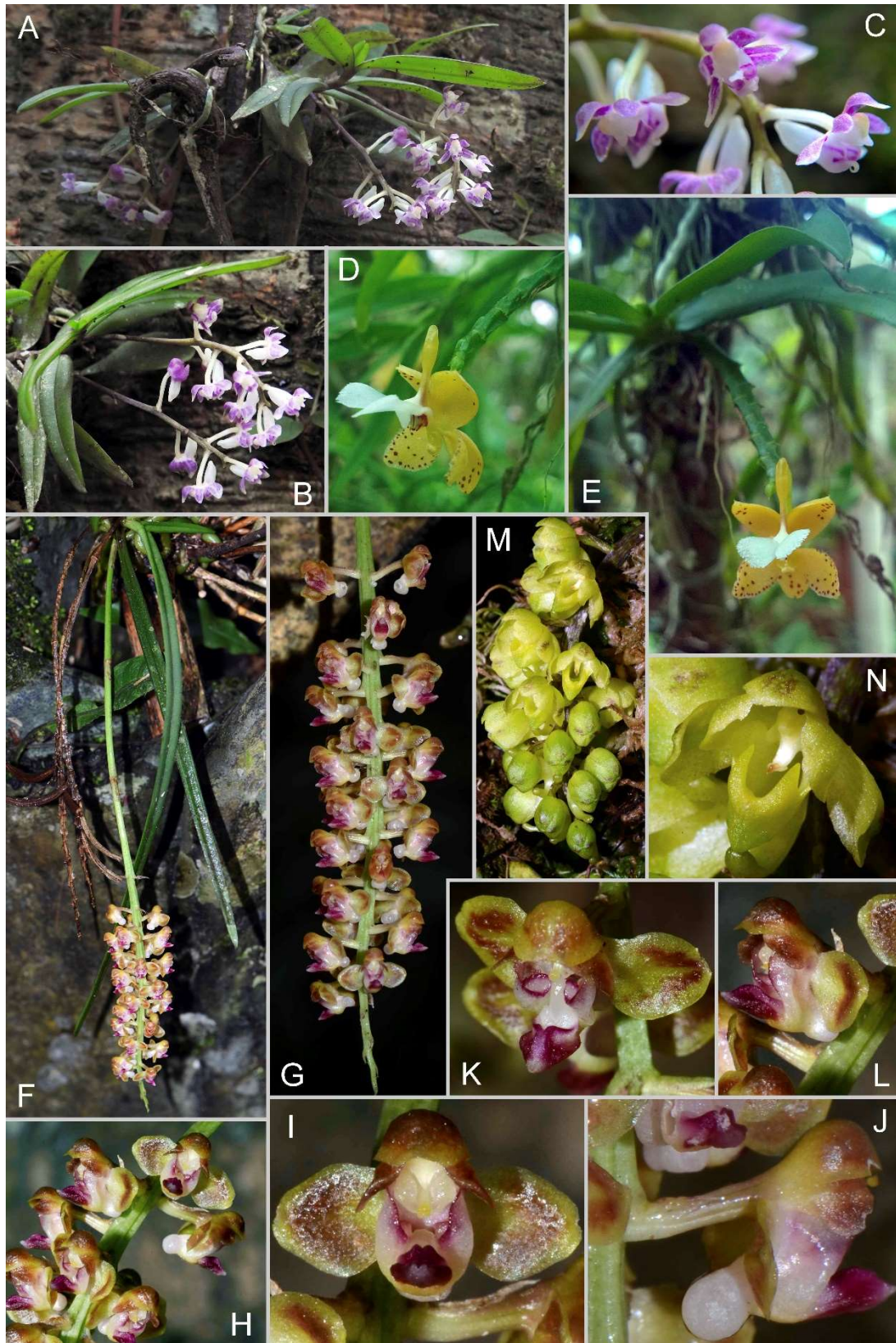


Fig. 8. New orchids in the flora of Vietnam. **A–C** – *Malleola luongii* Aver. et V.C. Canh (AL 322, type). **D, E** – *Pennilabium struthio* Carr. (Ta Nung Pass, 2017, N.V. Canh, sine no). **F–L** – *Robiquetia orlovii* Aver. (20 May 2016, Orlov sine no, type). **M, N** – *Uncifera obtusifolia* Lindl. (AL 276). Photos by Nguyen Van Canh (A–E), N. Orlov (F–N), correction and design by L. Averyanov.

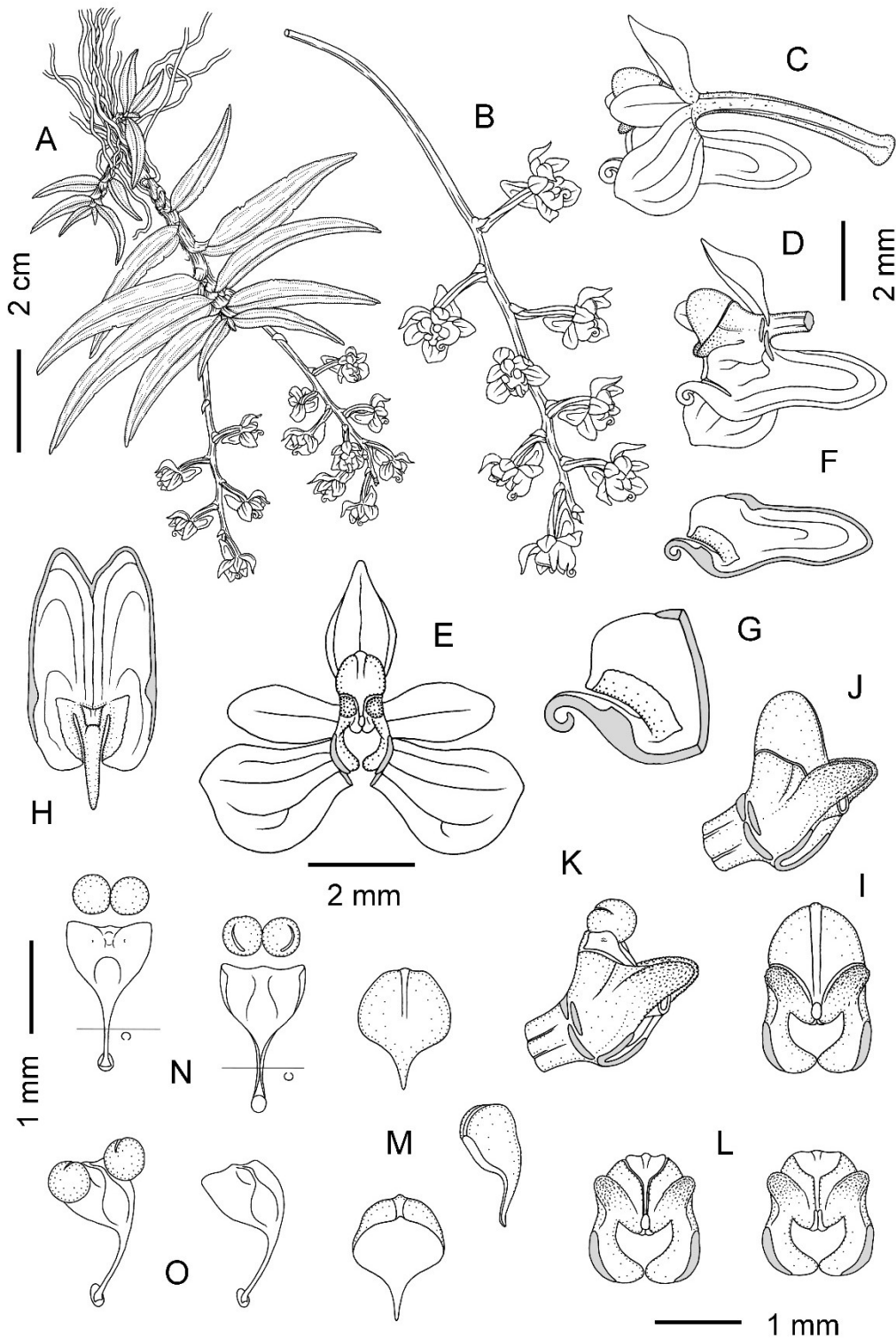


Fig. 9. New orchids in the flora of Vietnam. *Malleola luongii* Aver. & V.C. Canh. **A** – Flowering plant. **B** – Inflorescence. **C** – Flower, ovary and pedicel, side view. **D** – Flowers with lateral sepal and petal removed, side view. **E** – Flattened flower with lip removed, frontal view. **F** – Lip, sagittal section. **G** – Lip apex, sagittal section. **H** – Flattened lip apex with sagittally dissected spur. **I** – Intact column, frontal view. **J** – Intact column, side view. **K** – Column with operculum and one pollinium removed. **L** – Column with pollinarium stipe and column with no stipe. **M** – Operculum, view from above, side view, and view from below. **N** – Pollinarium with separated pollinia, frontal view, and a view from behind. **O** – Pollinarium and pollinarium stipe, half side views. All drawn from the type – AL 322 by L. Averyanov.



ovoid, with large, narrow, down directed beak. Pollinia 2, globular, 0.38–0.4 mm in diameter (0.2 mm when dry), with small, oblong groove on outer surface; stipe linear, translucent, longitudinally conduplicate, bent in the middle and suddenly much widening into broad plate with incurved lateral margins, 1.5–1.6 mm long, 0.9–1.1 mm wide in widest part; viscidium very small, ovate, about 0.1 mm long. Fruits unknown.

Habitat, phenology and conservation status. Miniature monopodial canopy epiphyte. Primary evergreen broad-leaved lowland forests along streams. 1350 m. Fl. May–June. Very rare. Estimated IUCN Red List status – DD.

Distribution. Vietnam province: Lam Dong (Lam Ha district). Endemic.

Notes. The newly discovered plant belongs to the so-called *Malleola dentifera* – *vietnamensis* complex, taxa of which spread from Indochina and Malacca Peninsula to Greater Sunda Islands (O’Byrne, 2017). It may be close in its morphology to two widespread, polymorphic species, *Malleola dentifera* J.J. Smith and *Malleola vietnamensis* (Guillaumin) Guillaumin solely recorded so far from eastern Indochina (Seidenfaden, 1988, 1992; Averyanov and Averyanova, 2003). Meanwhile, our plant differs from all known Indochinese plants regarded presently as a type subspecies of *M. vietnamensis* (including *M. dentifera* as a synonym of *M. vietnamensis*: O’Byrne 2017) in a series of distinct morphological features. From the closest *M. vietnamensis* var. *vietnamensis* our plant differs in distinctly smaller size with stem 1.5–4 cm long (vs. 10–45 cm long), leaves 2.5–4.5 cm long (vs. 3.2–10 cm long), inflorescence 1.5–3 cm long with 3–8 lax purple flowers 4–5.2 mm across (vs. inflorescence 2–7.5 cm long with 10–30 subdense yellow-brownish flowers 5.5–8.5 mm across), lip side lobes almost round (vs. side lobes triangular acute forming forward directed tooth), lip disc with distinct squarish callus at the base of median lobe (vs. disc fleshy with no particular calli), spur shortly cylindrical with no constriction, 2.4–3 mm long (vs. spur commonly dorso-ventrally flattened in apical half, 3.7–7 mm), column with narrow lateral, finely warty stelidia (column with massive hemispheric lateral swellings densely glandular hairy or papillose), operculum proportionally very large, as large or larger than column (vs. operculum twice smaller than column), pollinarium stipe 1.5–1.6 mm long (vs. 1.9–2 mm long), pollinia 0.38–0.4 mm in diameter to 0.2 mm in diameter when dry (vs. pollinia 0.4–0.9 mm in diameter).

It is noteworthy that like its allies, the new species exhibits certain apomorphic characters such as swelling lateral stelidia and apically broadening pollinarium stipe. These features along with subulate, downward revolute median lip lobe, lack of particular calli in spur and almost entire pollinia stand this group apart from the related genus *Robiquetia* Gaudich. by means of molecular cladistics (Kosyan and Schuiteman, 2014).

Pennilabium struthio Carr, 1930, Gard. Bull. Straits Settlement. 5: 151.

Fig. 8D, E.

Described from the Malay Peninsula “Kuala Teku on a branch of a tree overhanging the Teku River at an altitude of about 500 feet”. **Type:** “Pahang, Kula Teku, 500 feet, August 1928, C.E. Carr 174” – K (holotype – K000891590); paratypes: “Pahang, Kula Teku, 500 feet, September 1928, C.E. Carr 298” – K (K000891589; 10425.000).

Habitat, phenology and conservation status. Miniature monopodial canopy epiphyte. Primary evergreen broad-leaved lowland, submontane and montane forests on granite, commonly along streams. 200–2000 m. Fl. June–October. Rare. Estimated IUCN Red List status – DD.

Distribution. Vietnam provinces: Gia Lai province (K’bang district, Chu Mom Ray nature reserve), Khanh Hoa (Khanh Son district), Kon Tum (Ngoc Linh Mountains), Lam Dong (Dalat City area, Ta Nung Pass). Malay Peninsula (Thailand and Malaysia).

Notes. The discovery of this species, known earlier only in southern part of Malay Peninsula, in several locations of southern Vietnam reveals an obvious lack of our knowledge about miniature canopy epiphytes often overlooked in botanical surveys. The discovered locations expand the formal species distribution with more than 800 km. They form an isolated area separated from the earlier known populations by vast ocean space of Siam Gulf.

Studied specimens. **Southern Vietnam,** Khanh Hoa, Khanh Son, Son Hiep, tropical evergreen forest on granite, along streams, at elevation 400–500 m a.s.l. in association with *Thrixspermum centipeda*, *Dendrobium crumenatum*, *Aerides odorata*, *Bulbophyllum flabellumveneris*, *Eria lasiopetala* etc., November 2014 (flowered in 19 March 2015), Tran Gioi, *Le Hong Son sine no* (SGN, LE – photo). **Southern Vietnam,** Kon Tum province, Ngoc Linh Mountains, evergreen broad-leaved mountain forest on granite at elevation 1500–2000 m a.s.l., 12 October 2016, Nguyen Van Canh, L. Averyanov, T. Maisak, *AL 270* (LE). **Southern Vietnam,** Gia Lai province, K’bang district, Chu Mom Ray nature reserve, near Waterfall, named 50 at elevation 600–800 m a.s.l., 26 July 2017, N.S. Khang *sine no* (LE – photo). **Southern Vietnam,** Khanh Hoa province, Khanh Son district, Son Hiep commune, evergreen forest along stream at elevations 200–450 m a.s.l., 9 August 2017, Nguyen Hoang Tuan, *Le Hong Son*, Nguyen Huy Hau, *sine no* (SGN, LE – photo). **Southern Vietnam,** Lam Dong province, Dalat City area, Ta Nung municipality, Ta Nung Pass, evergreen broad-leaved forest at elevation about 1400 m a.s.l., 2017, N.V. Canh, *sine no* (LE).

Robiquetia orlovii Aver., *sp. nov.*

Figs. 8F-L & 10.

Described from northern Vietnam. **Type:** “Vietnam, western part of Nghe An province, Pu Mat national park, 18°57’24.6’’N 104°41’04.3’’E, humid lowland primary broad-leaved evergreen shady forest with bamboo along rocky stream at elevation 420 m a.s.l., small pendulous epiphyte at nodes of rotten bamboo stems in wet place above the water, flowers simultaneously opening, sepals and petals dull yellow to dull orange, lip white, lobes



purple, spur, column and anther white, 20 May 2016, *N.L. Orlov et al., sine no* (holotype – LE).

Etymology. The specific epithet honors Prof. Nicolai Orlov, the discoverer of the plant.

Description. Perennial monopodial epiphytic miniature herb. Stem simple or basally few branched, rigid, pendulous, (0.6)0.8–1.2(1.6) cm long, (2.5)3–4(4.5) mm in diam., at base with many wiry, much flexuose, terete, greenish roots; internodes (3.5)4–5(5.5) mm long. Leaves (2)3–4(5), sessile, dorso-ventral, leathery, straight or slightly curved, conduplicate, linear-subulate, (4)5–10(12) cm long, (3.5)4–5(6) mm wide, acuminate, tapering to the apex. Inflorescence pendulous raceme (8)10–14(16) cm long, scape and rachis grassy green; scape (5)6–10(12) cm long, terete, down curved at base, with (1)2–3(4) short, broad, dull pale brownish sterile scarious bracts (4)5–7(8) mm long; rachis straight or slightly curved, somewhat thicker than scape, longitudinally ridged, with many spirally arranged, subdense flowers. Floral bracts pale greenish to yellowish, thick, narrowly triangular, acute, (1.8)2.2–2.6(3) mm long, (0.4)0.6–8(1) mm wide. Pedicel and ovary (2)2.2–3.8(4) mm long and (0.6)0.7–0.8(0.9) mm in diameter, longitudinally ridged, light green to dull olive, glabrous or with very small scattered rusty trichomes, straight or slightly curved, slightly broadening at the base. Flowers more or less widely opening, (5.5)6–7(7.5) mm across; sepals and petals rather fleshy, on both surfaces sparsely hairy with very small rusty trichomes, orange-brown, with light yellowish to almost white base; lip white, with purple lobes; column and anther cap white; pollinia yellowish. Median sepal forward directed, broadly ovate, cucullate, strongly concave, almost hemispheric, round at apex, (2.2)2.4–2.8(3) mm long, (1.6)1.8–2(2.2) mm wide. Lateral sepals spreading, oblique ovate, slightly concave, blunt to rounded at apex, (3)3.2–3.6(3.8) mm long, (2.8)3–3.2(3.4) mm wide. Petals forward directed, broadly obovate, to broadly obtriangular, truncate, (1.7)1.8–2(2.2) mm long and broad, slightly oblique, finely irregularly denticulate along margin. Lip spurred, (4.6)4.8–5(5.2) mm long (from spur apex to the apex of median lobe), 3-lobed; side lobes ovate to almost round, parallel and forward protruding, (1.8)2–2.2(2.3) mm long and broad at the base, each side lobe at front with fleshy enrolled fold forming inside miniature pocket; median lobe fleshy, narrowly ovate, (1.8)2–2.2(2.3) mm long, (1.2)1.4–1.6(1.8) mm wide, acute or hardly emarginate, forward directed or slightly upright, disc at the base of median lobe with tall narrow emarginate callus, median and apical part with 2 fleshy keels, separated by deep longitudinal furrow; spur obovoid to almost globular, narrowing at the base, saccate, (1.2)1.4–1.6(1.8) mm long and wide, with entire, round apex and incomplete longitudinal septum rising on front wall in the spur middle part. Back-wall callus in form of large, flat, pocket with scarious wall, 0.6–0.8 mm long and wide, with irregularly

dentate margin, opening proximally. Column short, broad, slightly back bent, (1.2)1.4–1.5(1.6) mm high and wide, with large, fleshy, forward-directed conoid, finely verruculose arms as long as column, with forward directed lamellate roundish twin keel at front supporting distally viscidium; stigma concave, transversely oblong. Anther cap helmet-shaped, 1–1.2 mm tall and broad, 3-lobed; side lobes obovate, convex; median lobe narrowly triangular, tapering to the apex, forming prominent down directed straight, acute beak 0.6–0.7 mm long, twice longer than side lobes. Pollinia 2, ovoid, 0.7–0.8 mm long, each split into 2 unequal adaxially flattened halves. Stipe (tegula) in form of simple, almost filiform conduplicate stalk 1.8–2(2.2) mm long, slightly broadening at base and apex; caudicles insignificant; viscidium attached to the stipe base, simple, in form of ovate concave plate, 0.25–0.3 mm long. Fruits cylindric, robbed, recurved capsule (1.8)2–2.6(3) cm long, (2.4)2.6–3.4(4) mm in diam.

Habitat, phenology and conservation status. Miniature pendulous epiphyte. Primary and secondary broad-leaved evergreen humid forests on silicate rocks, commonly on nodes of rotten bamboo stems in shady places along streams above the water. 400–450 m. Fl. April–May. Very rare. Formally IUCN Red List status should be estimated as – Data Deficient (DD). However, in fact, species probably stands on the verge of full extinction. At least one known habitat, where type specimens were originally collected, presently is destroyed.

Distribution. Vietnam provinces: Binh Phuoc (*sine loc.*), Nghe An (Con Cuong district, Pu Mat national park). Endemic.

Note. The genus *Robiquetia* Gaudich. in traditional sense (excluding taxa sometime included on the base of molecular data with no morphological support) includes about 40 species distributed from Himalayas to Australia and the south-west tropical Pacific Islands with highest diversity in Kalimantan and Philippines (Comber, 1990, 2001; Seidenfaden, 1992; Seidenfaden and Wood, 1992; Pearce and Cribb, 2002; Chen and Wood, 2009). Almost all known species are rather large plants with long stout pendulous stem and large broad leaves. The newly discovered species strikingly differs from all its congeners in linear, subulate, fleshy leaves, miniature habit and curious structure of the lip and back wall callus. According to available collections and observation, the new species is endemic to Vietnam. It is noteworthy, that in all known locations the plants were found growing along shady streams at nodes of dead or rotten bamboo stems, which, probably, represent its specific ecologic requirements.

Studied specimen (paratype). Southern Vietnam, Binh Phuoc province, humid evergreen lowland forest, small pendulous epiphyte at nodes of rotten bamboo stems, flowers simultaneously opening, sepals and petals dull orange-brown, lip white, lobes dull brownish-pink, spur, column and anther white, April 2014, *C.X. Canh et al., sine no* (LE – photo).

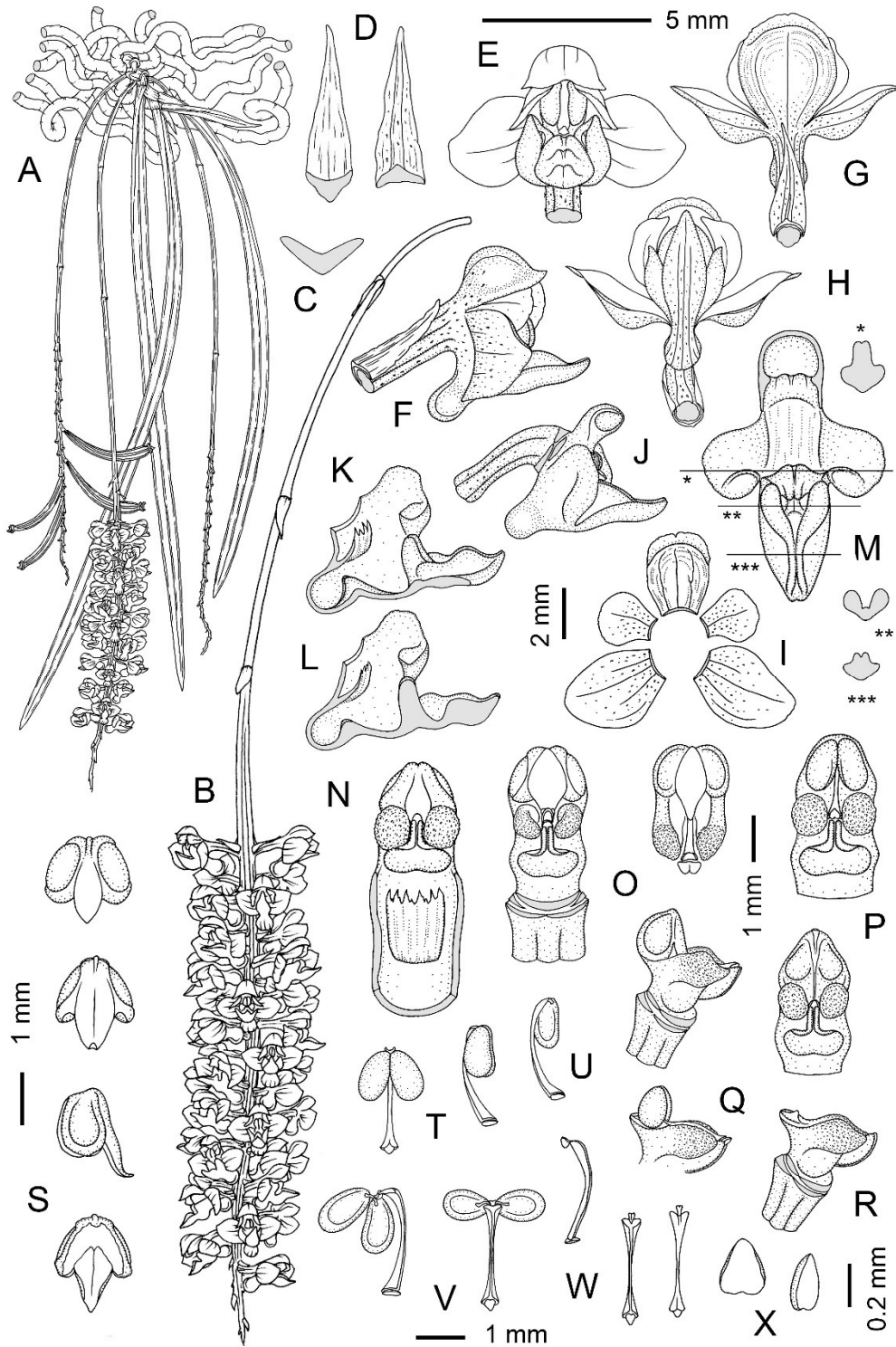


Fig. 10. New orchids in the flora of Vietnam. *Robiquetia orlovii* Aver. **A** – Flowering and fruiting plant. **B** – Inflorescence. **C** – Leaf, transversal section. **D** – Floral bracts. **E** – Flower, frontal view. **F** – Flower, side view. **G** – Flower, view from above. **H** – Flower, view from below. **I** – Flattened, sepals and petals. **J** – Ovary, lip and column, side view. **K** – Lip, tangential section. **L** – Lip sagittal section. **M** – Flattened lip, and transversal sections (along lines marked with asterisks). **N** – Column and spur base with wall-back callus, frontal view. **O** – Column with operculum, frontal view, view from above and side view. **P** – Column with removed operculum and with removed pollinarium. **Q** – Column with removed operculum, side views. **R** – Column with removed pollinarium. **S** – Operculum, view from above, frontal view, side view and view from below. **T** – Pollinarium, frontal and side view. **U** – Pollinarium, with removed pollinium, side view. **V** – Pollinarium with recurved pollinia. **W** – Pollinarium stipe, side view, side from behind and frontal view. **X** – Viscidium, frontal and side view. All drawn from the type – “20 May 2016, Orlov sine no” by L. Averyanov and T. Maisak.



Uncifera obtusifolia Lindl., 1858, Journ. Proc. Linn. Soc., Bot. 3: 40; Pearce, Cribb, 2002, Orch. Bhutan: 572, fig. 133; Xu *et al.*, 2010, Wild Orch. Yunnan: 454, fig. 657b, 455, fig. 657a; Zhou *et al.*, 2016, Phytotaxa 276, 1: 135.

Fig. 8M, N.

Described from northeastern India (“Base of Khasija, J.D.H. & T.T. (194)”). **Type:** “194 Base of Khasija J.D.H. & T.T. 22/8/50” – K (lectotype – K000895710, designated here; isolectotype – K000974381).

Habitat, phenology and conservation status. Pendulous medium sized epiphyte. Primary and secondary broad-leaved evergreen humid forests. 1700 m. Fl. in cultivation July–August. Very rare. Estimated IUCN Red List status – DD.

Distribution. Vietnam province: Lai Chau (Sin Ho district). Nepal, Bhutan, NE. India, Thailand, S. China (Yunnan).

Note. This is one more Himalayan orchid species found in the flora of Vietnam. Earlier records of this species for Laos and Vietnam were not supported by any cited herbarium collections (Xu *et al.*, 2010; Zhou *et al.*, 2016).

Studied specimen. Northwestern Vietnam, Lai Chau province, Sin Ho district, Sa De Phin, around point 22°18'55.0"N 103°13'31.8"E, at elevation about 1690 m a.s.l., 1 June 2017, *N.L. Orlov, L.K. Iohanssen, sine no*, herbarium voucher specimen prepared from cultivated flowering plant in August 2017, *N.L. Orlov, L. Averyanov AL 276* (LE).

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LITERATURE CITED

- Averyanov, L.V. 1988. New species and nomenclatural changes in the Orchidaceae family of Vietnamese flora. Botanical Journal (Leningrad) **73**(1): 100-107 (in Russian).
- Averyanov, L.V. 2012. New orchids (Orchidaceae) in the flora of Vietnam. Turczaninowia. **15**(1): 11-18.
- Averyanov, L.V. and A.L. Averyanova. 2003. Updated checklist of the orchids of Vietnam. Vietnam National University Publishing House. Hanoi.
- Averyanov, L.V. and T.V. Maisak. 2017a. New data on orchid diversity of Vietnam, 2012-2016. P. 77-80. Taxonomy and evolutionary morphology of plants. Materials of the Conference dedicated to 85 anniversary of V.N. Tikhomirov. January 31-3 February, 2017. Moscow, MAKS Press. 496 pp.
- Averyanov, L. and T.V. Maisak. 2017b. Present data on Vietnam orchid inventory. Abstracts of XIX International Botanical Congress. Shenzhen 23–29 July 2017: 36-37.
- Averyanov, L.V., Nong Van Duy and Phan Ke Loc. 2012. *Hymenorchis phitamii* (Orchidaceae) – new genus and species in the flora of Vietnam. *Taiwania* **57**(4): 372-376.
- Averyanov, L.V., Khang Sinh Nguyen, Nguyen Thien Tich, Phi Tam Nguyen, Van Duy Nong, Van Canh Nguyen and Canh Chu Xuan. 2015. New orchids in the flora of Vietnam. *Wulfenia* **22**: 137-188.
- Averyanov L.V., P.A. Ormerod, Nong Van Duy, Tran Van Tien, Tao Chen and Dian-Xiang Zhang. 2016a. *Bidoupia phongii*, new orchid genus and species (Orchidaceae, Orchidoideae, Goodyerinae) from southern Vietnam. *Phytotaxa* **266**(4): 289-294.
- Averyanov L.V., J. Ponert, P.T. Nguyen, V.D. Nong, K.S. Nguyen and V.C. Nguyen. 2016b. The Survey of *Dendrobium* sect. *Formosae* in Cambodia, Laos and Vietnam. *Adansonia* **38**(2): 55-73.
- Averyanov L.V., Truong Ba Vuong and Truong Quang Tam. 2016c. The genus *Liparis* (Orchidaceae) in Hon Ba nature reserve, Vietnam, Khanh Hoa province. *Turtzaninowia* **19**(2): 34-49.
- Averyanov, L.V., Van Duy Nong, Khang Sinh Nguyen, Tatiana V. Maisak, Van Canh Nguyen, Quang Thinh Phan, Phi Tam Nguyen, Thien Tich Nguyen, Ba Vuong Truong. 2016d. New species of orchids (Orchidaceae) in the flora of Vietnam. *Taiwania* **61**(4): 319-354.
- Averyanov, L.V., Khang Sinh Nguyen, Van Duy Nong, Van Canh Nguyen, Ba Vuong Truong and T.V. Maisak. 2017a. *Bulbophyllum* sect. *Hirtula* in eastern Indochina. *Taiwania* **62**(1): 1-23.
- Averyanov, L.V., C.X. Canh, N.H. Tuan, V.A. Phu, K.S. Nguyen, T.H. Nguyen and T.V. Maisak. 2017b. The genus *Cypripedium* (Orchidaceae) in the flora of Vietnam. *Turczaninowia* **20**(1): 118-124.
- Averyanov, L.V., M.S. Nuraliev, A.N. Kuznetsov and S. P. Kuznetsova. 2018. *Biermannia longicheila* (Orchidaceae, Aeridinae), a new species from southern Vietnam. *Phytotaxa* **343**(2): 000-000.
- Chen, X. and J.J. Wood. 2009. *Robiquetia* Gaudichaud. In: Wu, Z.G., P.H. Raven and D.Y. Hong (eds.), *Flora of China*, **25**: 475-476. Science Press and MBG Press. Beijing and St. Louis.
- Choudhary, R. K., Tran The Bach, Do Van Hai, Bui Hong Quang, Luu Van Nong, P. Kumar, S.-H. Park and J. Leei. 2013. *Cordiglottis longipedicellata* (Orchidaceae), a new species from Vietnam. *Ann. Bot. Fenn.* **50**(1-2): 95-98.
- Comber, J.B. 1990. *Orchids of Java*. Bentham-Moxon Trust. Kew.
- Comber, J.B. 2001. *Orchids of Sumatra*. The Royal Botanic Gardens. Kew.
- Gardiner L. M. 2012. New combinations in the genus *Vanda* (Orchidaceae). *Phytotaxa* **61**(1): 47-54.
- Govaerts, R., P. Bernet, K. Kratochvil, G. Gerlach, G. Carr, P. Alrich, A.M. Pridgeon, J. Pfahl, M.A. Campacci, Holland D. Baptista, H. Tigges, J. Shaw, P. Cribb, A. George, K. Kreuz and J.J. Wood. 2018. World Checklist



- of Orchidaceae. Royal Botanic Gardens Kew. <http://apps.kew.org/wcsp/home.do> [Accessed 3 March 2018].
- IUCN 2017. The IUCN Red List of Threatened Species. Version 2014.2. <http://www.iucnredlist.org> [Accessed: 3 March 2018].
- Kosyan, A. and A. Schuiteman.** 2014. New combinations in Aeridinae. *Phytotaxa* **161(1)**: 61-85.
- Li, J.W., G.D. Tao and Q. Liu.** 2011. *Lesliea*, a newly recorded genus of Orchidaceae from China. *Plant Diversity and Resources* **33**: 643-644.
- Lin, T.-P., H.-Y. Lu, C.-F. Hsieh and K.-H. Wang.** 2016. Complete list of the native orchids of Taiwan and their type information. *Taiwania* **61(2)**: 78-126.
- Liu, Z.-J. and L.-J. Chen.** 2009. *Singchia* and *Gunnaria*, two new genera of Orchidaceae. *Journ. Syst. Evol.* **47(6)**: 599-604.
- Liu, Z.J., X. Chen and Z.Z. Ru.** 2006. The genus *Cymbidium* in China. China Science Publishing & media Ltd. Beijing.
- Liu, Z.J., X. Chen and P.J. Cribb.** 2009. *Cymbidium* Swartz. In: Wu, Z.G., P.H. Raven and D.Y. Hong (eds.), *Flora of China*, **25**: 260-280. Science Press and MBG Press. Beijing and St. Louis.
- Nguyen Hoang Tuan and L.V. Averyanov.** 2017. Two endangered ornamental orchid species, *Bulbophyllum cowniorum* and *Esmeralda bella* (Orchidaceae), new in the flora of Vietnam. *Turczaninowia* **20(1)**: 68-74.
- O'Byrne, P.** 2017. A clarification of the *Malleola dentifera* - *Robiquetia insectifera* - *R. vietnamensis* complex. *Malesian Orchid Journal* **20**: 91-121.
- Pearce, N.R. and P.J. Cribb.** 2002. The orchids of Bhutan. The Charlesworth Group. Huddersfield.
- Puy, D.D. and P. Cribb.** 2007. *Cymbidium*. A Monograph. The Royal Botanic Gardens & Natural History Publications. Kota Kinabalu.
- Seidenfaden, G.** 1988. Orchid genera in Thailand XIV. Fifty-nine vandoid genera. *Opera Bot.* **95**: 1-398.
- Seidenfaden, G.** 1992. The orchids of Indochina. *Opera Bot.* **114**: 1-502.
- Seidenfaden, G. and J.J. Wood.** 1992. The Orchids of Malaysia and Singapore. Olsen & Olsen. Fredensborg.
- Senghas, K. and H. Schildhauer.** 2000. *Ascocentropsis*, eine neue südostasiatische Vandeengattung. *Journ Orchideenfreund* **7**: 287-291.
- Vietnam Administrative Atlas.** 2007. Cartographic Publishing House. Hanoi.
- Xu, Z.H., H. Jiang, D.P. Ye and E.D. Liu.** 2010. The wild orchids in Yunnan. Yunnan Science & Technology Press. Kunming.
- Zhou, X., Z. Cheng, Q. Liu, J. Zhang, A. Hu, M. Huang, C. Hu and H. Tian.** 2016. An updated checklist of Orchidaceae for China, with two new national records. *Phytotaxa* **276(1)**: 1-148.
- Zou, L.H., Z.J. Liu and J.X. Huang.** 2014. *Vanda malipoensis*, a new species of *Vanda* (Orchidaceae: Epidendroideae; Vandeae) from China: evidence from morphological and molecular phylogenetic analyses. *Phytotaxa* **186(2)**: 87-96.