



## New species of *Bulbophyllum* (Orchidaceae) in the flora of Vietnam II

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### Abstract

Three species, *Bulbophyllum layae*, *B. metallica* and *B. papilligerum* (all from sect. *Cirrhopetalum*) are described as new for science. All of these novelties are local endemics of limestone areas of northern Vietnam. Additionally, three species, *B. alcicorne* (sect. *Brachystachya*), *B. psittacoglossum* and *B. yunnanense* (both from sect. *Sestochilus*) are recorded for the flora of Vietnam for the first time. These species have wide distribution in mainland Asia. Data on ecology, phenology, distribution, brief relevant taxonomic notes, as well as color photographs, analytical plates of the type and voucher specimens are provided for all reported taxa. Lectotypification is provided for *B. yunnanense*.

**Keywords:** Orchidaceae, plant taxonomy, plant diversity, nature protection

### Introduction

*Bulbophyllum* Thouars (1822 tab. sp. 3, u) is one of the largest genera in the orchid family. It comprises about 2000 species distributed in tropical and subtropical zone of the World with the highest diversity in tropics of Africa and Asia (Seidenfaden & Wood 1992, Comber 1990, 2001, Pearce & Cribb 2002, Chen *et al.* 2009, Vermeulen 1991, Vermeulen *et al.* 2015, Zhou *et al.* 2016). In Vietnam, 137 species of this genus from 14 sections were documented before present study (Seidenfaden 1992, Averyanov 1994, Averyanov & Averyanova 2003, Averyanov *et al.* 2015, 2016, 2018, Nong & Averyanov 2015, Gruss & Averyanov 2016, Averyanov & Maisak 2017, Nguyen & Averyanov 2017). Meanwhile, the diversity of this genus in Vietnam and neighboring countries is very far from being acceptably inventoried. This is particularly true for miniature epiphytes of tall trees with small flowers very easily overlooked and rarely collected during botanical surveys. Illustrated descriptions for recently discovered species from this ecological group new for science, *Bulbophyllum layae* Aver. et Vuong, *B. metallica* Aver. et K.S. Nguyen, *B. papilligerum* Aver. (all from *B.* sect. *Cirrhopetalum*) and new for the flora of Vietnam, *B. alcicorne* E.C. Parish & Reichenbach (1874: 151), *B. psittacoglossum* Reichenbach (1863: 237), *B. yunnanense* Rolfe (1903: 14) are presented in this paper. The best herbarium specimen among two available syntypes of *B. yunnanense* is proposed as lectotype (*Hancock*, 587—K000810985). When the new data presented in this paper are included, the documented number of the genus species in Vietnam reaches at least 143 species. According to presently available data, this is largest genus in the orchid flora of Vietnam.

## Material and Methods

Herbarium specimens for the present study were collected during 2016–2018. Some previously gathered herbaria, early photographs and living collections also provided additional materials. Fresh flowers and inflorescences from living plants were fixed and stored in 50–60% ethanol. Measurements of the floral parts for the description were made on both herbarium and liquid-fixed material. According to our observations, fresh flowers and their fleshy parts shrink up to 15–20% in size during the drying process of making herbarium specimens, and thus it should be noted that the according measurements underestimate the actual size of flower parts. In descriptions of quantitative characters, infrequent extreme values (i.e. rarely occurring minimal and maximal values) of a variation range are parenthesized respectively before and after a normal variation range. Paragraphs for studied species are arranged below according to species name in alphabetic order. The annotation for each species includes the following data in separate lines:

- accepted name and main synonyms occurring in regional literature;
- data on type or authentic specimens;
- description and name etymology (for newly described taxa);
- lifeform, summarized available data on ecology, habitat elevation, phenology and observed rarity;
- distribution in Vietnam (mostly by listing the country provinces according to the current official administrative division (Vietnam Administrative Atlas 2007)) and general distribution;
- brief notes on taxonomy, supposed relations and/or biology;
- abbreviated and unified text of herbarium labels including geographical locality, collection date, collectors' names, collection number, acronym of herbarium where the cited specimen is housed and its barcode.

Illustrations of voucher specimens are provided for all recorded species. Analytical photos of various portions of the living plants were taken prior to drying for making voucher herbarium specimens and compiled into digital color plates. Online version of the IUCN Red List of Threatened Species (2018) was followed for estimation of preliminary species conservation status.

## Taxonomic treatment

### New taxa of *Bulbophyllum* Thouars in the flora of Vietnam

#### *Bulbophyllum alcornae* E.C. Parish & Rchb.f. (Fig. 1A–D)

Parish & Reichenbach 1874: 151; Seidenfaden 1979: 184, Fig. 132; Seidenfaden & Wood 1992: 497, Fig. 226 h–n, Pl. 35 d ; Kumar *et al.* 2018: 63, Fig. 1a. (*B.* sect. *Brachystachya* Bentham & Hooker 1883: 504; = *B.* sect. *Globiceps* Schlechter 1912: 704).

Described from Peninsular Myanmar (“NEIGHBOURHOOD OF MOULMEIN”). **Holotype**:—MYANMAR, “*Bulbophyllum alcornae* Par. Rchb. Orchid No 260. Cochlia (?) alcornis (Par.). see diagnosis—C. Parish Moulmein:—1868. Presented by REV. C. PARISH, April 1872.”—K000718406 (photo!).

**Habitat, phenology and conservation status**:—Clustering creeping branch epiphyte. Open dry evergreen broad-leaved or semideciduous Dipterocarp forests at elevations 500–800 m a.s.l. Locally common. Flowers in July–September. Estimated IUCN Red List status—DD.

**Distribution**:—VIETNAM, Binh Thuan province (Bac Binh, Thanh Linh and Tuy Phong districts). Southern part of Malay Peninsula (Peninsular Myanmar, Thailand, Malaysia) and Laos.

**Notes**:—Morphologically Vietnamese plants fit well with specimens described from Malay Peninsula and Laos (Seidenfaden 1979, Seidenfaden & Wood 1992, Kumar *et al.*, 2018). After discovery of this species in Laos (Kumar *et al.*, 2018) its occurrence in southern Vietnam looks not much surprising. Meanwhile, our discovery expands species area about three hundreds km to the east. In all known locations species grows in similar lowland dry Dipterocarp forests. Lectotype proposed by D. Clayton (2017: 64) may be regarded as a holotype as probably alone existing specimens collected by Parish before species publication (K000718406).

**Studied specimens**:—VIETNAM, Binh Thuan province, Bac Binh and Tuy Phong districts, close to border with Lam Dong and Ninh Thuan provinces, open dry Dipterocarp forest, locally very common. 15 July 2018, *Nguyen Van Canh*, AL 413 (LE01042181!). VIETNAM, Binh Thuan province, Bac Binh district, Kalon Song Mao nature reserve, around point 11°30'45.1"N 108°28'02.1"E, humid Dipterocarp forest, 500–800 m a.s.l., inflorescence scape 7 cm tall,

flower sepals light yellow with red nerves, common, 26 August 2018, *Pham Thi Thanh Dat, Nguyen Van Khang, Le Tuan Anh, PTTD 2* (LE01048131—photos!). VIETNAM, Binh Thuan province, Thanh Linh district, close to border with Lam Dong province, open dry Dipterocarp forest. 2018, *Ta Tuan, s.n.* (LE01048157—photos!).



**FIGURE 1.** *Bulbophyllum alaicorne* E.C. Parish & Rchb.f. A. Plant in natural habitat (*Ta Tuan, s.n.*). B–D. Flowering plant and inflorescences (*Nguyen Van Canh, AL 413*). *Bulbophyllum yunnanense* Rolfe. E & F. Flowering plant. G. Inflorescence with open flower and flower bud (*Nguyen Van Canh, AL 434*). Photos taken by *Ta Tuan* (A) and *Nguyen Van Canh* (B–G), correction and design by *L. Averyanov*.

***Bulbophyllum layae* Aver. et Vuong, *sp. nov.***

(*B. sect. Cirrhopetalum* (Lindley 1830: 58) Reichenbach 1861: 259). (Fig. 2)

Described from northwestern Vietnam. **Type:**—VIETNAM, “20 July 2018, *Truong Ba Vuong, BV 331*”, prepared from cultivated plant originated from Lao Cai Province, Bao Thang district (holotype: LE01042170!, living plant: VNM). **Epitype:**—d-EXSICCATES OF VIETNAMESE FLORA 0312 / *BV 331* (Fig. 2).

**Etymology:**—Plant discoverer, *Truong Ba Vuong* named it after his beloved mother, *Lay Thi Loi*.

**Description:**—Branch epiphyte with creeping rhizome and erect pseudobulbs. Rhizome thin, dull brownish-grey, flexuose, with 1-leaved pseudobulbs distant on (3.5)4–5(6) mm. Pseudobulbs grassy green, narrowly ovoid to ovoid, slightly oblique, wrinkled, (3)4–5(6) mm tall, (2.2)2.5–3(3.2) mm in diameter. Leaves sessile, lanceolate to oblong lanceolate, (3.5)4–5.5(6) cm long, (4.5)5–6.5(7) mm wide, obtuse to acute, narrowing at the base into short petiole-like stalk 1.5–2 mm long. Inflorescence with (1)2–4(5) flowers; scape erect or oblique, filiform, arising from the base of pseudobulb, (8)10–11(12) mm long, at base covered 2–3 small dark brownish, papyraceous, acute, tubular sheaths



FIGURE 2. *Bulbophyllum layae* Aver. et Vuong. Digital epitype, d-EXSICCATES OF VIETNAMESE FLORA 0312 / BV 331. Photos by Truong Ba Vuong, correction and design by L. Averyanov.

(1.8)2–3(3.2) mm long; rachis very short, 0.4–0.5 mm long; floral bracts narrowly triangular, acute, (1.8)2(2.2) mm long. Pedicel and ovary dull red, (1.8)2(2.2) mm long; ovary conoid, 0.5–0.6 mm in diameter in broadest part, with 6 low longitudinal ridges. Flowers bright red, open simultaneously, arranged into loose, few-flowered umbel. Dorsal sepals narrowly ovate, (3.2)3.4–3.6(3.8) mm long, 1.4–1.6 mm wide, concave, fimbriate along margin (with hairs to 0.5 mm long), attenuate into prominent caudate apex to 1.5 mm long. Lateral sepals twisted at base, glabrous, almost linear (1.7)1.8–2(2.2) cm long, broadening at the base to 1.8–2 mm wide, filiform caudate in apical half, upper and lower margin connate at the middle, in basal and apical part free. Petals white with 3 broad bright red stripes fusing near base, narrowly ovate, slightly oblique, (1.9)2–2.2(2.3) mm long, (0.8)0.9–1(1.1) mm wide, acute, fimbriate along margin. Lip bright red, simple, fleshy, narrowly triangular ligulate, about (1.9)2–2.2(2.3) mm long, 0.5–0.6 mm wide, recurved at middle, adaxially longitudinally grooved, abaxially keeled, in basal half with dense short white setose hairs along margin. Column white with reddish base, stout, shortly cylindrical, (0.9)1–1.1(1.2) mm tall, 0.4(0.5)0.6 mm wide, column foot twice longer, up curved; stelia erect, triangular, insignificant; anther cap yellow, entire at front margin. Fruit unknown.

**Habitat, phenology and conservation status:**—Creeping branch miniature epiphyte. Evergreen broad-leaved humid forests. Rare. Flowers in July. Estimated IUCN Red List status—DD.

**Distribution:**—VIETNAM, Lao Cai province (Bao Thanh district). Endemic of northwestern Vietnam.

**Notes:**—New species superficially resembles juvenile specimens of widespread and variable *B. pecten-veneris* (Gagnepain 1931: 6) Seidenfaden (1974: 37), but well differs in short inflorescence scape, as long, or little longer than flowers (vs. scape much longer than flowers), small flowers 2.5–3 cm long (vs. flowers more than 4 cm long) and dense setose white hairiness of basal half of the lip (vs. lip with no hairs). Very few known about new species ecology. Most probably new species like *B. pecten-veneris* inhabits limestone forests at elevation 500–1500 m.

***Bulbophyllum metallica*** Aver. et K.S. Nguyen, *sp. nov.*

(*B. sect. Cirrhopetalum* (Lindley 1830: 58) Reichenbach 1861: 259). (Fig. 3 & 4)

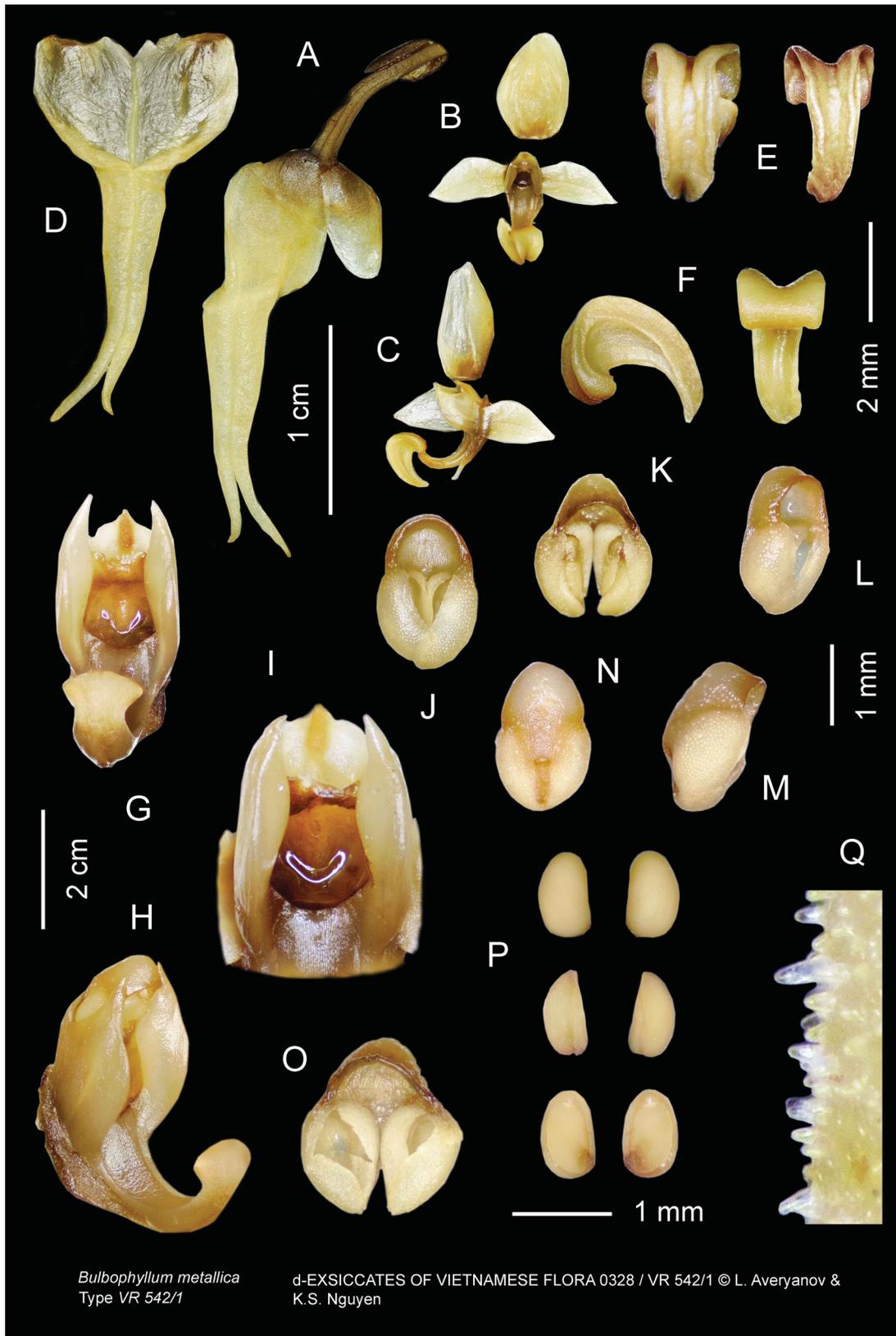
Described from northern Vietnam. **Type:**—VIETNAM, “17 October 2018, *L. Averyanov, Nguyen Sinh Khang, T. Maisak, VR 542/I*” (holotype: LE01042167!), prepared from cultivated plant collected in Ha Giang province, Quan Ba district, Tung Vai commune, Thang village, around point 23.053722N° 104.863556°E, at elevation 1050–1150 m a.s.l., steep slopes of stream valley composed with eroded stratified highly eroded limestone, primary evergreen broad-leaved very humid forest, creeping epiphyte on tall mossy tree, very rare, 21 April 2018, *L. Averyanov, Nguyen Sinh Khang, Nguyen Tien Hiep, Nguyen Quang Hieu, Chuong Quang Ngan, T. Maisak, Tu Bao Ngan, VR 542* (paratypes: HN, LE01042168!). **Epitype:**—d-EXSICCATES OF VIETNAMESE FLORA 0327 / VR 542/1 (Fig. 3 & 4).

**Etymology:**—The specific epithet refers to remarkable blue-green metallic leaf shine.

**Description:**—Branch and stem epiphyte with creeping and pendulous hanging rhizomes to 1.5 m long and suberect or obliquely directed pseudobulbs. Rhizome rigid, semiwoody, straight, 2–2.5 mm in diameter, with 1-leaved pseudobulbs distant on (6)8–14(16) cm. Pseudobulbs glossy dark green to dark brown-purple, narrowly cylindrical, straight or slightly curved, smooth or longitudinally irregularly grooved, (3.5)4–6(7) cm long, (3)3.5–5(5.5) mm in diameter, with many rigid straight, gray or dull brownish roots at the base. Leaves above dark green, sometime tinged with dirty purple, having blue-green metallic shining, below light pale green with dirty purple-violet median vein, subsessile, thin, coriaceous, lanceolate or narrowly oblong elliptic, (8)10–35(40) cm long, (0.8)1–2.2(2.4) cm wide, apex acute, narrowing at the base into short petiole-like stalk (1)2–3(3.5) mm long. Inflorescence (1)2–5(6) flowered umbel, with very short scape arising from the base of pseudobulb; scape horizontally directed, (0.5)0.7–1.2(1.5) cm long, at base covered by few scarious or papyraceous dull brownish-grey, loose sheaths; rachis very short, (1.5)2–5(5.5) mm long; floral bracts white to dull pink, narrowly ovate, concave, acute, (4)4.5–5.5(6) mm long, (1.8)2–2.2(2.4) mm wide (being flattened). Pedicel and ovary purple, (8)9–11(12) mm long, ovary conoid, (1.8)2–2.2(2.4) mm in diameter in broadest part, with 6 low longitudinal ridges. Flowers in loose umbel, not opening widely, open simultaneously, with light unpleasant smell. Median sepal fleshy, outside purple with white or light yellowish margin, inside uniform white or light yellowish, ovate or broadly elliptic, (5.8)6–6.5(7) mm long, (4.8)5–6.5(6.8) mm wide, concave, straight of irregularly finely erose along thin margin, obtuse to blunt at apex. Lateral sepals fleshy, almost white, heavily speckled with purple outside at basal and apical parts, half twisted at base, finely papillose, narrowly triangular (2)2.2–2.4(2.6) mm long, (4.8)5–6(6.2) mm broad at the base, tapering into caudate apex, upper and lower margins connate in middle, at apex free. Petals thin, 3-veined, light yellowish, finely speckled with purple, narrowly ovate rhomboid, slightly oblique, (3.8)4–4.2(4.4) mm long, (1.9)2–2.2(2.3) mm wide, almost flat, forward directed, acute, with entire margin. Lip white to light yellowish, triangular ligulate, (3.2)3.5–3.8(4) mm long, (1.3)1.4–1.6(1.7) mm wide, arcuate



**FIGURE 3.** *Bulbophyllum metallica* Aver. et K.S. Nguyen. Digital epitype corresponding to the type, “17 October 2018, L. Averyanov, Nguyen Sinh Khang, T. Maisak, VR 542/1 (holotype: LE01042167!). Photos by L. Averyanov and K.S. Nguyen, correction and design by L. Averyanov and T. Maisak.



**FIGURE 4.** *Bulbophyllum metallica* Aver. et K.S. Nguyen. A. Flattened flower, side view. B. Flattened flower, frontal view (lateral sepals removed). C. Flattened flower, half side view (lateral sepals removed). D. Flattened lateral sepals. E. Lip, frontal view. F. Lip, lateral view and view from behind. G. Column, frontal view. H. Column half side view. I. Column, apical part, frontal view. J, K. Anther cap, frontal view. L. Anther cap, half side view. M. Anther cap, side view. N. Anther cap, view from behind. O. Anther cap, with pollinia removed, frontal view. P. Pollinia. Q. Abaxial papillose surface of lateral sepals. Photos by L. Averyanov from the type (VR 542/1), correction and design by L. Averyanov and T. Maisak.

recurved at middle, shallowly grooved adaxially, obscurely keeled abaxially, narrowing to obtuse apex, simple (with no auricles), smooth. Column white, 2.4–2.6 mm tall, 2–2.2 mm wide, with large, broad, half-circular forward directed wings attenuate distally into triangular erect acute steldia 0.8–1 mm tall; column foot (2.6)2.8–3.2(3.4) mm long, forward curved, suddenly broadening at apex to 1.4–1.5 mm wide. Anther cap white, saccate, straight at frontal margin, 0.8–0.9 mm tall and broad, with prominent, finely papillose, ovoid basal inflation 1–1.2 mm long and wide; pollinia pale yellowish, 4, in 2 unequal pairs. Fruit dull green, narrowly ellipsoid capsule, (2)2.2–2.6(3) cm long, (4)5–7(8) cm in diameter, longitudinally 3-ridged, on terete stalk (9)10–14(16) mm long.

**Habitat, phenology and conservation status:**—Branch and stem epiphyte with hanging stems. Primary broad-leaved evergreen humid forests on granite, quartzite and limestone at elevation 1000–1200 m a.s.l., often along stream. Rare. Flowers in October (December). Estimated IUCN Red List status—DD.

**Distribution:**—VIETNAM provinces: Ha Giang (Quan Ba district), Lao Cai (Van Ban district) and Vinh Phuc (Tam Dao Mt.). Endemic of northern Vietnam.

**Notes:**—New species belongs to *Bulbophyllum* sect. *Cirropetalum* s.l. on the base of its floral morphology and formally allies to the group of species having short scape, few-flowered loose umbel-like inflorescence, entire margin of sepals and petals, simple lip and lateral sepals twisted at the base and connate on lower and upper edges. In eastern Indochina such combinations of morphological features exhibit such species as *B. seidenfadenii* A.D. Kerr, *B. spathulatum* (E.W. Cooper) Seidenf. and *B. unciniferum* Seidenf. From these species (as well as from other members of the section *Cirropetalum*) our plant strikingly differs in pendulous stems to 1.5 m long, narrowly cylindrical, petiole-like pseudobulbs to 7 cm long (3–5.5 mm in diameter), long down hanging coriaceous leaves to 40 cm long with blue-green metallic shine on adaxial side and very short scape, less than 1.5 cm long. Fleshy, hardly opening, white, purple speckled flowers are also very distinct from all other species known in Indochina. Even sterile plants are easy recognizable for amazing metallic blue or blue-green shining of adaxial leaf surface. For this remarkable character, plant was noted as a new species already in 2001 (LE01042169). However, plants with flowers used for appropriate description were found only seventeen years later. According to available data, new species is very rare plant growing usually along mountain streams in particular humid habitats.

**Studied specimens (paratypes):**—VIETNAM, Lao Cai province, Van Ban district; Liem Phu Municipality, Khuoi Ngoa village, near logging camp (*Fokienia*) along stream, 21.970556°N 104.330833°E, 606 m, occasional, pendant epiphyte, fruit dark green, longitudinally ridged, leaves with blue sheen, midrib darker green-purple, 21 February 2001, *D.K. Harder*, *L.V. Averyanov*, *P.K. Loc*, *G.E. Schatz*, *DKH 6550* (HN, LE01042169!, MO). VIETNAM, Lao Cai province, Van Ban district, Khanh Yen Ha municipality, to the S of Na Nheo village, around point 21.984444°N 104.252222°E, primary broad-leaved evergreen wet submontane forest on steep granite and quartzite slopes of stream canyon at elev. 1200 m a.s.l., creeping epiphyte on high mossy tree in shady slope, rare, 27 March 2002, *L. Averyanov*, *P.K. Loc*, *D.T. Doan*, *HAL 2828b* (HN). VIETNAM, plant cultivated in Hanoi private garden by Nguyen Minh Duc, originated from northern Vietnam, Vinh Phuc province, Tam Dao Mt., without exact location, 13 Dec 2006, *N.M. Duc*, s.n. (LE01048153—photos!). VIETNAM, 25 September 2018, *L. Averyanov*, *T. Maisak*, *VR 542/2* (paratype: LE01048915!), prepared from cultivated plant collected in Ha Giang province, Quan Ba district, Tung Vai commune, Thang village, around point 23.053722°N 104.863556°E, at elevation 1050–1150 m a.s.l., steep slopes of stream valley composed with eroded stratified highly eroded limestone, primary evergreen broad-leaved very humid forest, creeping epiphyte on tall mossy tree, very rare, 21 April 2018, *L. Averyanov*, *Nguyen Sinh Khang*, *Nguyen Tien Hiep*, *Nguyen Quang Hieu*, *Chuong Quang Ngan*, *T. Maisak*, *Tu Bao Ngan*, *VR 542*.

***Bulbophyllum papilligerum* Aver., sp. nov.**

(*B.* sect. *Cirropetalum* (Lindley 1830: 58) Reichenbach 1861: 259). (Fig. 5)

Described from northwestern Vietnam. **Type:**—VIETNAM, “25 July 2018, *L. Averyanov*, *CPC 8123b/1*” (holotype: LE01042171!), prepared from cultivated plant collected in Son La province, Moc Chau district, Chieng Son commune, about 1 km to NE from Chieng Son village, around point 20.767222°N 104.617528°E, remnants of primary broad-leaved evergreen forest on tops of hills composed with karstic highly eroded yellow-white limestone at elevation 1050–1100 m a.s.l., epiphyte on mossy tree on hill top, not common, 29 September 2016, *L. Averyanov*, *N.T. Hiep*, *N.S. Khang*, *C.Q. Ngan*, *T.V. Maisak*, *N.T. Son*, *CPC 8123b*. **Epitype:**—d-EXSICCATES OF VIETNAMESE FLORA 0309 / *CPC 8123b/1* (Fig. 5).

**Etymology:**—The specific epithet refers to the bunch of long, many-celled, fleshy papillae on abaxial surface of petals near the apex.

**Description:**—Branch epiphyte with creeping rhizome and erect pseudobulbs. Rhizome stout with 1-leaved pseudobulbs distant on (4)6–10(12) mm. Pseudobulbs grassy green, narrowly ovoid to ovoid, slightly oblique, wrinkled,

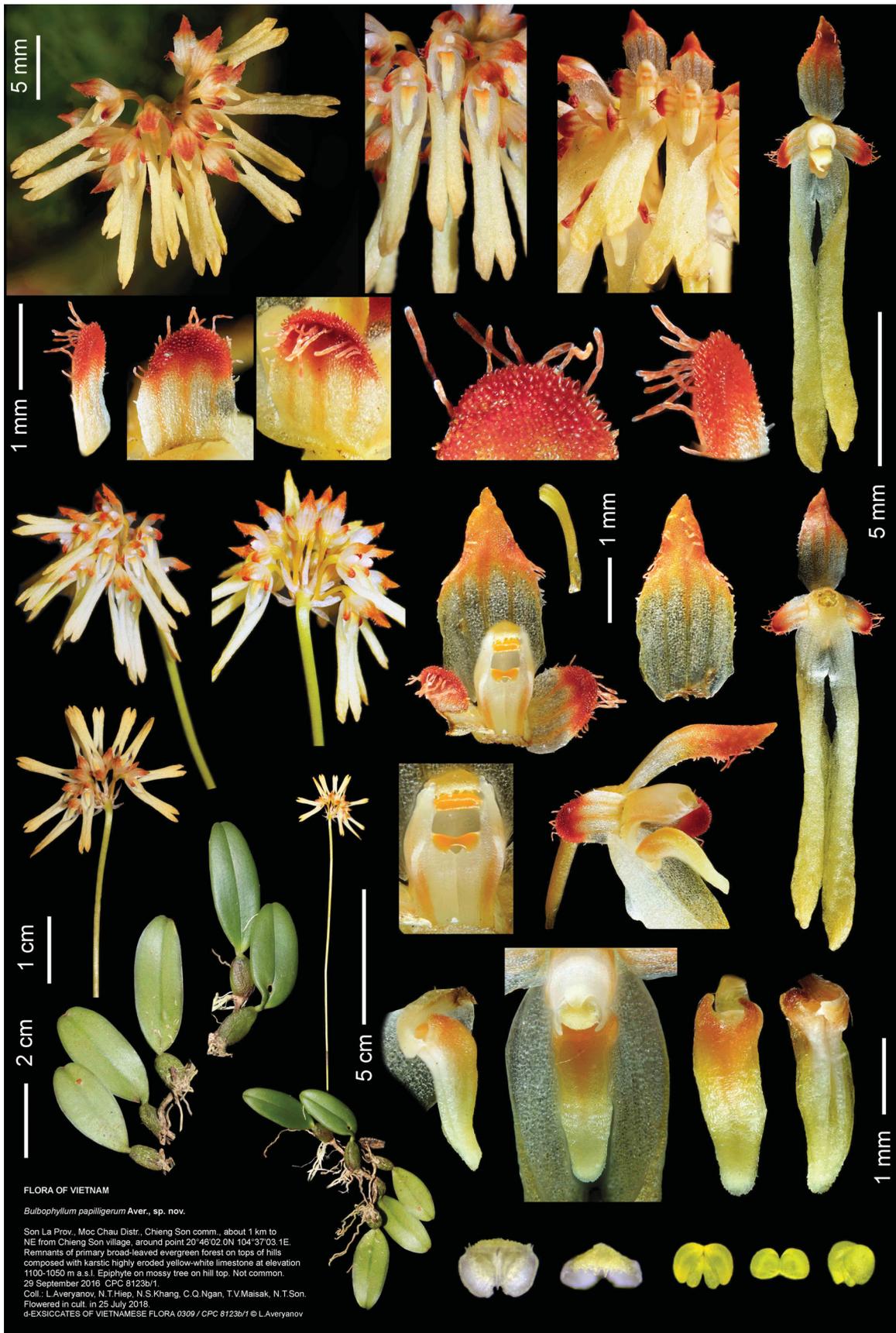


FIGURE 5. *Bulbophyllum papilligerum* Aver. Digital epitype, d-EXSICCATES OF VIETNAMESE FLORA 0309 / CPC 8123b/1. Photos, correction and design by D. Slastunov and L. Averyanov.

8–12 mm tall, 4–6 mm in diameter. Leaves sessile, rigid, narrowly ovate to oblong elliptic, (2.5)3–4(5) cm long, (8)10–12(14) mm wide, apex obtuse to shortly emarginate, narrowing at the base into very short petiole-like stalk about 1 mm long. Inflorescence head-shaped, with long scape arising from the base of pseudobulb and many flowers at apex; scape erect, (5)6–12(14) cm long, at base covered by few scarious or papyraceous dull grey sheaths; inflorescence bract 1–2, tubular, scarious, (3.5)4–5(5.5) mm long, obtuse; rachis very short, (1)1.5–2(2.5) mm long; floral bracts white, narrowly triangular, acute, (1.8)2–3(3.2) mm long. Pedicel and ovary pale yellow, terete, filiform, (3)3.5–5(5.5) mm long. Flowers aggregated in dense head-shaped cluster, opening simultaneously; sepals and petals light yellowish, apex of median sepal and petals bright red-orange, with orange veins; lateral sepal lemon-yellow in apical quarter. Median sepal narrowly ovate, (2.8)3–3.2(3.4) mm long, (0.9)1–1.2(1.3) mm wide, concave, sparsely fimbriate along margin, tapering toward acute apex. Lateral sepals twisted at base, glabrous, almost linear (9.5)10–11(11.5) mm long, broadening at the base and apex to 1–1.1 mm wide, upper margin connate in middle, in basal and apical part, as well as along lower margin free. Petals broadly ovate, slightly oblique, 3-veined, (1.1)1.2–1.4(1.5) mm long, (0.9)1(1.1) mm wide, round and papillous at apex, fimbriate on abaxial side near margin with long fleshy papillae. Lip orange-brown near the base, light lemon-yellow in apical half, broadly lanceolate, (1.6)1.8–2(2.2) mm long, (0.4)0.5(0.6) mm wide, recurved at middle, shallowly grooved adaxially, narrowing to roundish, finely papillose apex, near base with small triangular, back directed obtuse auricles. Column white or light yellowish, (1.4)1.5–1.6(1.7) mm long, (0.8)0.9–1(1.1) mm wide, simple with no particular wing and steldia; column foot (0.8)0.9–1(1.1) mm long, forward curved; anther cap simple, almost flat, yellow, straight at frontal margin; pollinia and stigma bright yellow. Fruit unknown.

**Habitat, phenology and conservation status:**—Creeping branch epiphyte. Primary broad-leaved evergreen forests on karstic rocky limestone at elevation 1000–1100 m a.s.l. Rare. Flowers in July–August. Estimated IUCN Red List status—DD.

**Distribution:**—VIETNAM: Son La province (Moc Chau district). Endemic of northwestern Vietnam.

**Notes:**—Species may be attributed to *Bulbophyllum* sect. *Cirropetalum* on the base of its obvious floral morphology. Among species of this section, it may be solely compared with *Bulbophyllum flaviflorum* (Tang, S. Liu & H.Y. Su) Seidenf., *Bulbophyllum hirundinis* (Gagnep.) Seidenf. and *Bulbophyllum pecten-veneris* (Gagnep.) Seidenf. From these species, discovered plant differs in erect scape (vs. scape pendulous or horizontal, down arching), head-like inflorescence (vs. umbellate inflorescence when flowers are spaced in one plane), smaller flowers 1.4–1.5 cm long (vs. flowers longer than 2 cm), lateral sepals free along lower margin, slightly broadening to obtuse or blunt apex (vs. lateral sepals joined along lower margin, tapering to acuminate or caudate apex), petals round at apex (vs. petals acute), bunch of fat long papillae on abaxial surface near petal apex (vs. petals ciliate or fimbriate along the margin, hairless on abaxial surface), adaxial surface of petal apex with many dense short conical glass-like papillae (vs. petal surface with no particular glass-like papillae), nor particular steldia (vs. steldia prominent, subulate), anther margin slightly erose (vs. frontal anther margin distinctly denticulate or fimbriate).

### *Bulbophyllum psittacoglossum* Rchb.f. (Fig. 6)

Reichenbach 1863: 237; Seidenfaden 1979: 30, Fig. 11; id. 1992: 317, Fig. 210; Chen *et al.* 2009: 408; Zhou *et al.* 2016: 19 (*B.* sect. *Sestochilus* (Breda 1828, tab. 3) Bentham & Hooker 1883: 502).

≡ *Sarcopodium psittacoglossum* (Rchb.f.) Hooker, tab. 5408.

Described from Peninsular Myanmar (“... species was sent by the Rev. C. S. P. Parish from Moulmein, to Mr. Low, of the Clapton Nursery, and also to Kew ...”). **Type:**—MYANMAR, “Burma: Tenasserim *Parish, 140*”—K (fide Seidenfaden, 1979: 33).

= *B. affinoides* Guillaumin 1958: 459.

Described from southern Vietnam. **Type:**—VIETNAM, “Vietnam, Annam, Dalat, 01.01.1955, *Sigaldi, 43*”—P00252786 (photo!).

**Habitat, phenology and conservation status:**—Creeping trunk and branch epiphyte. Primary, evergreen, broad-leaved and coniferous forests on granite and sandstone at elevations 1000–1800 m a.s.l. Not common. Flowers in June–July. Estimated IUCN Red List status—DD.

**Distribution:**—VIETNAM provinces: Dak Lak (Chu Yang Sinh Mountains), Lam Dong (Dalat area). S. Myanmar, Thailand, Laos, S. China (Yunnan)?

**Notes:**—A holotype of *B. affinoides* (P00252786) consists of a single flower and a rough sketch of the flowering plant on the herbarium sheet. There exists a little doubt that it must be referred to *B. psittacoglossum* (Seidenfaden 1992). However, flowers dimensions are a twice smaller than those of specimen from Myanmar and Thailand and may belong to abnormal or weak plant. Plant from Vietnam reported here (LE01042178) in all characteristics fits well with specimens recorded from other locations of the species area (Fig. 6). Chinese records of *B. psittacoglossum* could be based on misidentified plants of *B. pectinatum* (Chen *et al.* 2009: 408). Specimen from Laos cited below (LE01048752) represents new additions to the Laotian flora.



FIGURE 6. *Bulbophyllum psittacoglossum* Rchb.f. Plate, d-EXSICCATES OF VIETNAMESE FLORA 0311 / AL 110. Photos, correction and design by L. Averyanov.

**Studied specimens:**—VIETNAM, Dak Lak province, Chu Yang Sinh Mountains, evergreen broad-leaved forest on local mountain top at elevation 1800 m a.s.l., 30 November 2015, *Nguyen Van Canh, s.n.*, flowered in hort. 12 July 2018, *L. Averyanov, AL 110* (LE01042178). LAOS, Khammouane province, Boualapha district, Nong Seng village, southern sandstone slopes at summit of Phou Chuang (Poujeuang) Mt. around point 17°35'00.3"N, 105°47'35.6"E, primary evergreen mixed and coniferous dense wind-formed forest at elev. 1000–1400 m a.s.l., creeping epiphyte and lithophyte on mountain top, occasional, 4 May 2018, *L. Averyanov, Khang Sinh Nguyen, T. Maisak, Littideth Xaiyavongsa, Siphanom Keovankham, AL 647* (LE01048752).

***Bulbophyllum yunnanense* Rolfe** (Fig. 1E–G)

Rolfe 1903: 14; Seidenfaden 1979: 31, Fig. 12; Chen *et al.* 2009: 408; Rokaya *et al.*, 2013: 518; Zhou *et al.* 2016: 22 (*B. sect. Sestochilus* (Breda 1828, tab. 3) Bentham & Hooker 1883: 502).

Described from southern China, Yunnan (“Yunnan: Mengtze, rocks on Great Black mountains, at 6000 ft. (*Hancock, 587!*); North mountains at 7000 ft. (*A. Henry, 11370!*).”). **Lectotype:**—CHINA, “*Hancock, 587!*”—K000810985 (photo!) designated here, paratype:—CHINA, “*Henry, 11370!*”—K000810986 (photo!).

= *B. otoglossum* Tuyama (1971: 177), Pearce & Cribb (2002: 444).

Described from Bhutan. **Type:**—BHUTAN, “Longtepang to Ritang, *Kanai, Murata, Ohashi, Tanaka & Yamazaki, s.n.*”—TI (holotype, fide Pearce, Cribb, 2002: 444).

**Habitat, phenology and conservation status:**—Creeping trunk and branch epiphyte. Primary broad-leaved evergreen forests at elevations 1500–1600 m a.s.l. Rare. Flowers in June–July. Estimated IUCN Red List status—DD.

**Distribution:**—VIETNAM: Lai Chau province (with no exact location). Nepal, Bhutan, S. China (Yunnan).

**Notes:**—This is not surprising discovery of the species described from the area located in southeastern Yunnan not far from Vietnamese border. This miniature plant is new addition for the flora of Vietnam. It has a large attractive flowers, hence this rare plant represents certain interest for ornamental horticulture.

**Studied specimen:**—Northern Vietnam, Lai Chau province, evergreen broad-leaved forest, at about 1500–1600 m a.s.l., creeping epiphyte on tall tree, sepals and petals whitish with purple spots, 30 June 2018, *Nguyen Van Canh, AL 434* (LE01042179!). Fig. 1E–G.

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