



New Orchids (Orchidaceae) in the Flora of Vietnam II. Vandaeae

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ABSTRACT: The paper continues publications of new data on orchid diversity in Vietnam (Averyanov and Gruss, 2018a-d; Averyanov *et al.*, 2018a-e, 2019; Gruss *et al.*, 2018) obtained in 2017–2018. It includes data on 4 orchid species new to science (*Aerides phongthuyii*, *Cleisostoma uniseta*, *Macropodanthus brevidentatus* and *Schoenorchis tatonii*) and 2 species new for the flora of Vietnam (*Gastrochilus fuscopunctatus* and *Phalaenopsis malipoensis*). The valid name, synonyms, type, citations of relevant regional taxonomic publications, data on ecology, phenology and distribution, estimated IUCN Red List status, studied specimens, brief taxonomic notes, and illustrations are provided for each recorded species. One new combination, *Macropodanthus clausus* (J.J. Sm.) Aver. (*Sarcochilus clausus* J.J. Sm.), is proposed.

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

INTRODUCTION

This paper represents the second part of our last account (Averyanov *et al.*, 2019), which continues the publication of new data on orchid diversity in Vietnam (Averyanov and Gruss, 2018a-d; Averyanov *et al.*, 2018a-e; Gruss *et al.*, 2018) obtained in the years 2017–2018. Like previous papers, it summarizes the results of joint efforts of professional botanists and orchid enthusiasts on studies of Vietnamese native orchids. This paper concerns taxa from tribe Vandaeae and includes data on four species new to science, namely *Aerides phongthuyii* Aver. & V.C. Nguyen, *Cleisostoma uniseta* Aver. & Vuong, *Macropodanthus brevidentatus* Aver. & Vuong and *Schoenorchis tatonii* Aver. Two species are reported as a new record for the flora of Vietnam. These species are: *Gastrochilus fuscopunctatus* (Hayata) Hayata and *Phalaenopsis malipoensis* Z.J. Liu & S.C. Chen. Valid names, synonyms, types, citations of relevant regional taxonomic 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 all species. A new nomenclature combination, *Macropodanthus clausus* (J.J. Sm.) Aver. (*Sarcochilus clausus* J.J. Sm.) is proposed. The list of all studied species arranged in alphabetical order is presented below.

MATERIALS AND METHODS

Voucher specimens cited here were collected during the years 2017–2018. Collected plants, flowers and inflorescences were fixed and stored in 60–65% ethanol before herbarium preparation. Measurements of the floral parts for descriptions were taken mostly from fresh or liquid-fixed materials. Fresh fleshy flowers or floral parts in small-flowering species were found to shrink up to about 30–40% in size in the drying process of making herbarium specimens (Fig 11). This is important to take into account when dried herbarium specimens are analyzed and identified. 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 herbarium specimens. Taxa distribution in Vietnam is indicated in the text by citing the provinces according to the official administrative country division (Viet Nam Administrative Atlas, 2007; Provinces of Vietnam, 2019). The online version of the IUCN Red List of Threatened Species (2017) was used for tentative estimation of preliminary species conservation status. Place of the housing of cited specimens is indicated by internationally accepted herbarium acronyms. The studied taxa are listed below



in alphabetical order. They may all be accessed in the database of LE Herbarium (<http://en.herbariumle.ru>).

TAXONOMIC TREATMENT

List of new orchids in the flora of Vietnam

Aerides phongthuyii Aver. & V.C. Nguyen, *sp. nov.*

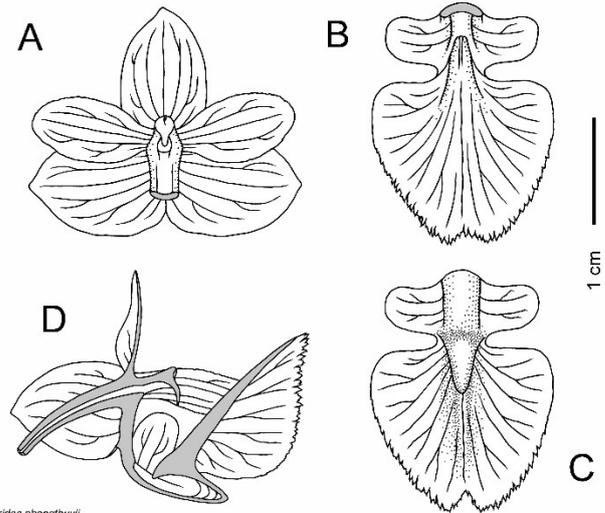
Fig. 1-3

Described from southern Vietnam. **Type** – VIETNAM, Gia Lai Province, Chu Prong District, dry Dipterocarp open forest at about 300–400 m a.s.l., epiphyte, not common, 15 May 2018, *Van Canh Nguyen*, AL 439 (holotype – LE01049434!).

Digital epitype. d-EXSICCATES OF VIETNAMESE FLORA 0347 / AL 438–440 (Fig. 2)

Etymology. The discoverer, Van Canh Nguyen named the plant after his fieldwork assistant, Phong Thuy.

Description. Epiphytic herb or subshrub with rigid semi-woody stem to 0.5 m long. Stem pendulous and ascending, with many light grey, wiry, flexuose roots in basal leafless part, leafy in apical half, with (4)6–14(16) distichous, sessile, equitant leaves. Leaf blade lorate, rigid, leathery, conduplicate, (14)18–26(30) cm long, (1.5)2–3(3.5) cm wide, obtuse to truncate or obscurely unequally bilobed at apex. Inflorescence axillary, pedunculate, subdense raceme arising from leafy part of stem; scape green, stout, straight or arching downwards, (1.5)2–4(4.5) cm long; rachis stout, green, (4)5–14(16) cm long, with few to many spirally arranged sparse flowers. Floral bracts brown, perpendicular to the rachis, ovate, concave, obtuse to acute, (1.5)2–3(3.5) mm long, (1.2)1.5–2(2.2) mm wide. Pedicel and ovary white, perpendicular to the rachis, terete, (8)9–10(11) mm long, (1.6)1.8–2.2(2.3) mm in diameter. Flowers widely opening, (2)2.2–2.5(2.7) cm across; sepals almost white; petals and lip side lobes white, tinged and spotted with purple; median lip lobe purple; spur and column white. Sepals broadly ovate to almost suborbicular, (8)9–12(13) mm long (8)9–12(13) mm wide; lateral sepals slightly oblique, at base completely adnate to column-foot. Petals spreading, oblong narrowly obovate, (9)10–12(13) mm long, (4.5)5–7.5(8) mm wide, finely erose denticulate along margin. Lip not movable, spurred, 3-lobed; side lobes erect, half-circular (3)3.5–4.5(5) mm tall and wide; median lobe ovate, straight, forward directed, (12)14–16(18) mm long (14)15–16(17) mm wide, margin erose-denticulate, apex emarginate, at base with a narrowly conoid callus near spur entrance; spur straight, shortly conoid, nearly perpendicular to median lobe, (3.8)4–4.4(5) mm long. (2.4)2.6–2.8(3) mm in diameter. Column erect, shortly cylindrical, (3.6)3.8–4.2(4.4) mm tall, (2.2)2.4–3(3.2) mm in diameter; rostellum prominent, subulate, forward directed, 1.8–2 mm long; column-foot at a broad angle, as broad as column, little longer, (4.6)4.8–5.25.4 mm long; anther



Aerides phongthuyii
AL 439 Type

Fig. 1. New orchids in the flora of Vietnam. *Aerides phongthuyii* Aver. & V.C. Nguyen. **A** – Flattened sepals and petals. **B** – Flattened lip, frontal view. **C** – Flattened lip, view from below. **D** – Sagittal flowers section. All drawn from the type, *Van Canh Nguyen*, AL 439 (holotype, LE01049434) by L. Averyanov.

cap helmet shaped, 2.6–2.8 mm wide, at front with long forward directed beak. Fruits unknown. All measurements were taken from spirit material.

Habitat, phenology and conservation status. Large epiphytic herb or subshrub. Dry open Dipterocarp forests and woodlands on lateritic soils at elevations 300–400 m a.s.l. Not common. Flowers in May – June. Estimated IUCN Red List status – DD.

Distribution. Vietnam provinces: Dak Lak (Yok Don National Park), Dak Nong (Dak Mil District), Gia Lai (Chu Prong District). Endemic.

Notes. The new species is similar to *Aerides multiflora* Roxb. and the colour form of *A. falcata* Lindl. & Paxton widely known under the name *A. falcata* var. *houlettiana* (Rchb.f.) A.H. Kent (= *A. houlettiana* Rchb.f.). However, our plant distinctly differs from both species in its ovate and obscurely emarginate lip (vs. lip broadly ovate to almost circular, bilobulate or deeply emarginate at apex in *A. falcata*, and lip narrowly triangular to narrowly triangular ovate, entire, blunt or acute at apex in *A. multiflora*), and in its half-circular lip side lobes as long as broad (vs. lip side lobes oblong, narrowly ovate, subulate, much longer than broad in *A. falcata*, and insignificant, broad, hardly visible, much shorter than broad in *A. multiflora*). Superficially, these floral characters look intermediate between *A. falcata* and *A. multiflora* (Fig. 3). Hence, a hybrid origin of the new species is possible. Rather unusual rigid, strongly conduplicate leaves of the new species may also indicate that *A. crassifolia* C.S.P. Parish ex Burb. is one of the potential parent species. According to our observation the new species forms several populations in different locations in Dak Lak, Dak



Fig. 2. New orchids in the flora of Vietnam. *Aerides phongthuyii* Aver. & V.C. Nguyen. Digital epitype (d-EXSICCATES OF VIETNAMESE FLORA 0347/AL 438-440) corresponding to the types, *Van Canh Nguyen*, AL 439 (holotype, LE01049434) and paratypes *Van Canh Nguyen*, AL 438 (LE01049399) and *Van Canh Nguyen*, AL 440 (LE01049474). Photos by V.C. Nguyen, drawing, correction and design by L. Averyanov and T. Maisak.

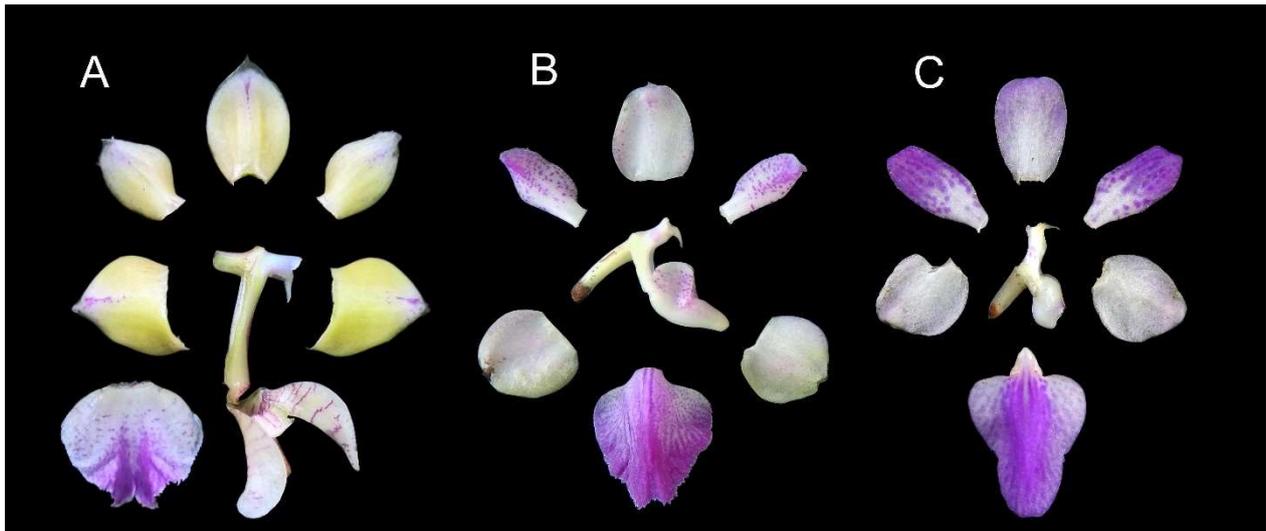


Fig. 3. Comparison of the floral morphology of *Aerides falcata* (A) *A. phongthuyii* (B) and *A. multiflora* (C). All material was collected in southern Vietnam around the populations of *A. phongthuyii*. Photos by V.C. Nguyen, correction and design by L. Averyanov and T. Maisak.

Nong and Gia Lai Provinces of southern Vietnam scattered on zone of lowland dry Dipterocarp forests. The plant is cultivated as an ornamental in some private gardens in the middle part of southern Vietnam.

Studied specimen: VIETNAM, Dak Lak Province, Yok Don National Park, dry Dipterocarp open forest at about 300–400 m a.s.l., epiphyte, not common, 15 May 2018, *Van Canh Nguyen, AL 438* (LE01049399!). Dak Nong Province, Dak Mil District, dry Dipterocarp open forest at about 300–400 m a.s.l., epiphyte, not common, 15 May 2018, *Van Canh Nguyen, AL 440* (LE01049474!).

Cleisostoma unisetum* Aver & Vuong, *sp. nov.

Fig. 4 & 5

Described from southern Vietnam. **Type:** VIETNAM, Khanh Hoa Province, Cam Lam District, Hon Ba Nature Reserve, around point 12.116667°N 108.966667°E, at elevation about 1000 m a.s.l., evergreen broad-leaved submontane forest, epiphyte on tree trunk, 26 July 2018, *Truong Ba Vuong, Mang Van Lam, BV 337* (holotype – LE01042172!).

Digital epitypes. d-EXSICCATES OF VIETNAMESE FLORA 0329 / BV 337 & 0330 / BV 337 (Fig. 4 & 5).

Etymology: The species epithet refers alone seta-like extension of the lip apex.

Description: Trunk and branch monopodial epiphyte. Stem simple, rigid, rugose wrinkled throughout, pendulous or spreading, (12)14–16(20) cm long, (4.5)5–8(9) mm in diameter, with few wiry, straight to flexuose grey roots branching at apex; internodes (0.8)1–1.8(2.2) cm long. Leaves grassy green, glossy, sessile, dorsiventral, fleshy, rigid, spreading, almost perpendicular to stem, straight, conduplicate, oblong lanceolate, (6)8–14(16) cm long, (0.8)1–1.2(1.4) cm wide, with suddenly constricted, acute apex; leaf sheaths equitant, rigid, verruculose. Inflorescence lateral raceme (1.2)1.5–2(2.5) cm long, scape and rachis light grassy green; scape (4)5–8(10) mm long, straight, with (2)3–

4(5) dark brown, persistent, triangular, acute, sterile bracts, (1.8)2–3(3.2) mm long and wide; rachis straight, thickened, angled, (0.8)1–1.5(1.8) cm long, with few to many spirally arranged, subdense flowers distant at (1)1.5–2(3) mm. Floral bracts minute, dark brown, triangular, acute, (1.4)1.5–2(2.2) mm long and wide. Pedicel and ovary dull pink to purple, perpendicular to rachis, (2.5)3–4(4.5) mm long, 1–1.2 mm in diameter, straight to slightly curved, terete, glabrous. Flowers widely opening, (6.5)7–8(8.5) mm across; sepals and petals rather fleshy, glabrous, spreading or median sepal somewhat forward curved; sepals inside pale yellow, outside brownish-purple with yellow apex; petals on both sides pale yellow with 1–2 more or less distinct dull purple stripes; lip lemon-yellow with white base; column white with purple apical half; anther cap yellowish speckled with purple; pollinia pale yellow. Sepals narrowly obovate, very concave, rounded or blunt at apex, (4.8)5–6(6.2) mm long, (2.2)2.4–2.6(2.8) mm wide; dorsal sepal hooded; lateral sepals slightly oblique. Petals oblong or narrowly obovate, rounded to blunt, as long as sepals, (1.7)1.8–2(2.1) mm wide, slightly oblique. Lip spurred, (5.8)6–6.5(7) mm long (from spur apex to the apex of median lobe), 3-lobed. Side lip lobes triangular oblique-falcate, more or less straight, vertical, forward directed, (1.5)1.6–1.8(2) mm long, 1.2–1.3 mm wide at the base, triangular-acute at apex. Median lip lobe fleshy, triangular sagittate, (2.4)2.5–2.7(2.8) mm long, (3.6)3.8–4.2(4.4) mm wide, obtuse, straight, forward directed, at apex attenuate into a single straight or upcurved slender filiform seta (0.9)1–1.2(2.3) mm long; at the base with transversal papillose ridge (connate with distal part of spur septum), disc along median line with three fleshy glabrous, prominent calli: basal callus conoid, somewhat forward curved, median callus half round, laterally flattened, apical callus conoid,



Fig. 4. New orchids in the flora of Vietnam. *Cleisostoma unisetum* Aver. & Vuong. Digital epitype (d-EXSICCATES OF VIETNAMESE FLORA 0329 / BV 337) corresponding to the type, “*Truong Ba Vuong, Mang Van Lam, BV 337*” (holotype, LE01042172). Photos by T.B. Vuong, correction and design by L. Averyanov and T. Maisak.



Fig. 5. New orchids in the flora of Vietnam. *Cleisostoma unisetum* Aver. & Vuong. Digital epitype (d-EXSICCATES OF VIETNAMESE FLORA 0330 / BV 337) corresponding to the type prior to preparation of herbarium specimen from the living paint and alcohol fixed floral parts “*Truong Ba Vuong, Mang Van Lam, BV 337*” (holotype, LE01042172). Photos by L. Averyanov, correction and design by L. Averyanov and T. Maisak.



erect or somewhat forward directed, tooth-like; side lobes triangular, obtuse to acute, somewhat backward turned, 1.4–1.5 mm long. Spur short, broadly conoid, terete, parallel to column, (2.2)2.5–2.8(3) mm long, (2)2.2–2.4(2.6) mm wide, with almost round apex and incomplete glabrous longitudinal septum inside. Back-wall callus white, large, simple, rectangular, 1–1.2 mm long and tall, 0.6–0.8 mm wide, glossy smooth, at the base with lateral papillose arms spreading perpendicularly to lip margin. Column simple, shortly cylindrical, (2.6)3–3.5(3.8) mm high, 2–2.2 mm in diameter, with no wings; rostellum small, fleshy, bilobed, forward directed, furrowed longitudinally; stigma obscurely triangular to almost round. Anther cap hemispherical, (1.4)1.5–1.7(1.8) mm in diameter, with very short, insignificant beak. Pollinarium 1, with 2 pollinia, filiform stipe (tegula) 0.6–0.7 mm long and broad pliers-shaped viscidium, 1.2–1.4 mm broad. Pollinium ovoid, incompletely split into 2 subequal hemiovoid lobes. Fruits unknown. All measurements were taken from fresh and spirit material.

Habitat, phenology and conservation status. Branch and trunk epiphyte. Primary broad-leaved evergreen submontane forests on granite at elevation of around 1000 m a.s.l. Rare. Flowers in June – July. Estimated IUCN Red List status – DD.

Distribution. Vietnam: Khanh Hoa Province (Cam Lam District, Hon Ba Nature Reserve). Endemic of southern Vietnam.

Notes. The species belongs to *Cleisostoma* sect. *Echioglossum* (Blume) Seidenf., and seems most similar to *C. striatum* (Rehb. f.) Garay. It differs in the median lip lobe terminated with one apical seta (vs. medial lobe bicuspidate, terminated with two setae), in having petals with erose-fimbriate margin (vs. petals with entire margin) and in character of the calli on the lip disc (Fig. 4 & 5).

Gastrochilus fuscopunctatus (Hayata) Hayata, 1917, Icon. Pl. Formosan. 6 (Suppl.): 78; Schltr., 1919, Repert. Spec. Nov. Regni Veg. Beih. 4: 288; Su Horng-Jye, 2000, Fl. Taiwan 5: 887, 1108, photo 116; Chen *et al.*, 2009, Fl. China 25: 496; Lin *et al.*, 2016, Taiwania 61, 2: 97; Zhou *et al.*, 2016, Phytotaxa 276: 61.

Fig. 6

≡ *Saccolabium fuscopunctatum* Hayata, 1912, Icon. Pl. Formosan. 2: 143.

Described from Taiwan (“Taiwan: Arisan, ...”). **Holotype** (“... Jan., 1912, B. Hayata et S. Sasaki s.n.”) –TI.

Habitat, phenology and conservation status. Miniature trunk and branch epiphyte. Primary submontane evergreen, broad-leaved humid forest on karstic limestone at elevations 1050–1150 m a.s.l. Flowers in June – July. Rare. Estimated IUCN Red List status – DD.

Distribution. Vietnam: Ha Giang Province (Quang Ba District). S. China (S. Yunnan). Taiwan.

Notes. This species superficially resembles *Gastrochilus pseudodistichus* (King & Pantl.) Schltr. and *G. kadooriei* Kumar *et al.*, (the last one is very common on karstic limestone of northern Vietnam). However, it clearly differs from both species in the shorter stems and distinctly larger leaves. Vietnamese plants differ a little from Taiwanese specimens of *G. fuscopunctatum* in the somewhat convex lip (Pankaj Kumar, pers. comm.), but generally they agree well with the morphology of the type specimen housed at TI Herbarium.

Studied specimens. Northern Vietnam, Ha Giang Province, Quan Ba District, Tung Vai Commune, Thang Village, around point 23.053611°N 104.863611°E, at elevation of 1050–1150 m a.s.l., steep slopes of stream valley composed of eroded stratified limestone, primary evergreen broad-leaved very humid forest, epiphyte on mossy tree along stream, rare, 21 April 2018, L. Averyanov, Nguyen Sinh Khang, Nguyen Tien Hiep, Nguyen Quang Hieu, Chuong Quang Ngan, T. Maisak, VR 510/6, herbarium specimen prepared in 13 May 2019 (LE01055079); VR 546a, herbarium specimen prepared in 6 July 2018 (LE 01048906!); Plate – d-EXSICCATES OF VIETNAMESE FLORA 0317 / VR 546a (Fig. 6).

Macropodanthus brevidentatus Aver. & Vuong, *sp. nov.* Fig. 7 & 8G–I

Described from southern Vietnam. **Type** – VIETNAM, Khanh Hoa Province, Khanh Son District, O Kha Mountain, evergreen broad-leaved forest at elevation around 1159 m a.s.l., 28 March 2018, *Truong Ba Vuong*, BV 318 (holotype – LE01050162!).

Digital epitope. d-EXSICCATES OF VIETNAMESE FLORA 0314 / BV 318 (Fig. 7)

Etymology. The plant name refers to the short, tooth-like lip side lobes.

Description. Monopodial branch epiphyte. Stem hanging, to 4 cm long, straight to curved, stout, covered by distichous leaf sheaths, in basal half with many axillary wiry white roots. Leaves 4–6, narrowly oblong ligulate, (7)8–11(12) cm long, (1)1.2–1.4(1.6) cm wide; apex unequally bilobed with obtuse lobes and small seta in middle; leaf sheaths about 5 mm long. Inflorescence glabrous, pendulous, to 7.8 cm long; scape about 1 cm long, with 2 obtuse sterile inflorescence bracts, 1–1.5 mm long; rachis 6.5–6.8 cm long, slightly zigzag, with 7 simultaneously opening flowers; floral bract triangular, acute, 3 mm long. Pedicel and ovary thin, yellow or greenish yellow, curved, 2.2–2.3 cm long. Flowers widely opening; sepals and petals white to pale yellow with brown blotches adaxially; lip white, purple at middle, spur pale yellow, with many small brown spots. Dorsal sepal ovate, concave, obtuse, hooded, 8–9 mm long, 5 mm wide. Lateral sepals broadly ovate, slightly oblique, 10 mm long, 7 mm wide, obtuse. Petals narrowly obovate, obtuse, 6–7 mm long, 3–4 mm wide. Lip joined to column-foot apex at acute angle, immovable, laterally flattened, 7.5–8.5 mm long, 3-lobed, spurred, with claw about 3 mm long, narrowing to the base; side lobes erect, falcate, about 2



Fig. 6. New orchids in the flora of Vietnam. *Gastrochilus fuscopunctatus* (Hayata)Hayata. Plate – d-EXSICCATES OF VIETNAMESE FLORA 0317 / VR 546a (LE 01048906). Photos, design and correction by L. Averyanov and T. Maisak.

mm long, rounded at apex, each with a small insignificant tooth near the base; median lobe fleshy, conoid, obtuse, forward directed, 2.5–3 mm long, at the base with erect prominent triangular acute tooth, about 1 mm tall; disc with white, fleshy callus at the middle; spur large, forward directed (almost parallel to column), conoid, rounded at apex, 6.5–7.5 mm long, 2–2.5 mm in diameter. Column yellow, cylindrical, about 6 mm tall, slightly curved; column-foot prominent, at a straight angle to column and ovary, about 1 cm long; stigma large, concave, almost circular; rostellum 2-lobed, forward directed, 2–2.5 mm long. Anther cap hemispheric, with prominent beak 2–2.5 mm long; pollinaria with 2 pollinia, linear hyaline stipe 2.5–3 mm long and narrowly ovate viscidium; pollinia pale yellow, ovoid, each with small hardly visible lateral groove. Fruits unknown. All measurements were taken on fresh and spirit material.

Habitat, phenology and conservation status. Branch epiphyte. Submontane evergreen broad-leaved humid forests at elevations of 1100–1200 m. Very rare. Flowers in March – May. Estimated IUCN Red List status – DD.

Distribution. Vietnam: Khanh Hoa Province (Khanh Son District, Hon Ba Nature Reserve). Endemic.

Note. The new species resembles *Macropodanthus alatus* (Holtum) Seidenf. & Garay (\equiv *Sarcochilus alatus* Holtum), but clearly differs in much smaller flowers with median sepals 8–9 mm long (vs. 16–18 mm), petals 6–7 mm long (vs. 16–17 mm) and lips 7.5–8.5 mm long (vs. 17 mm), much smaller, falcate lip side lobes 2 mm long with insignificant, hardly visible teeth at base (vs. side lobes 5 mm long, with large acute-subulate teeth at the base), and proportionally long conoid spur nearly as long as lip (vs. lip distinctly longer than spur, spur clavate). The newly discovered species is also similar to *Macropodanthus clausus* (J.J. Sm.) Aver., **comb. nov.** (\equiv *Sarcochilus clausus* J.J. Sm., 1922, Bull. Jard. Bot. Buitenzorg III, 5: 93; = *Sarcochilus pierrei* Guillaumin, 1930, Bull. Soc. Bot. France 77: 327) in flower colour scheme, and shape of lip and spur, but clearly differs in tepal shape, lip position and shape of column, as well as in its distinct falcate lip side lobes (vs. side lobes in form of a small insignificant tooth). *Macropodanthus brevidentatus* has intermediate floral morphology between *M. alatus* and *M. clausus* (Fig. 8) and maybe a natural hybrid of these species.

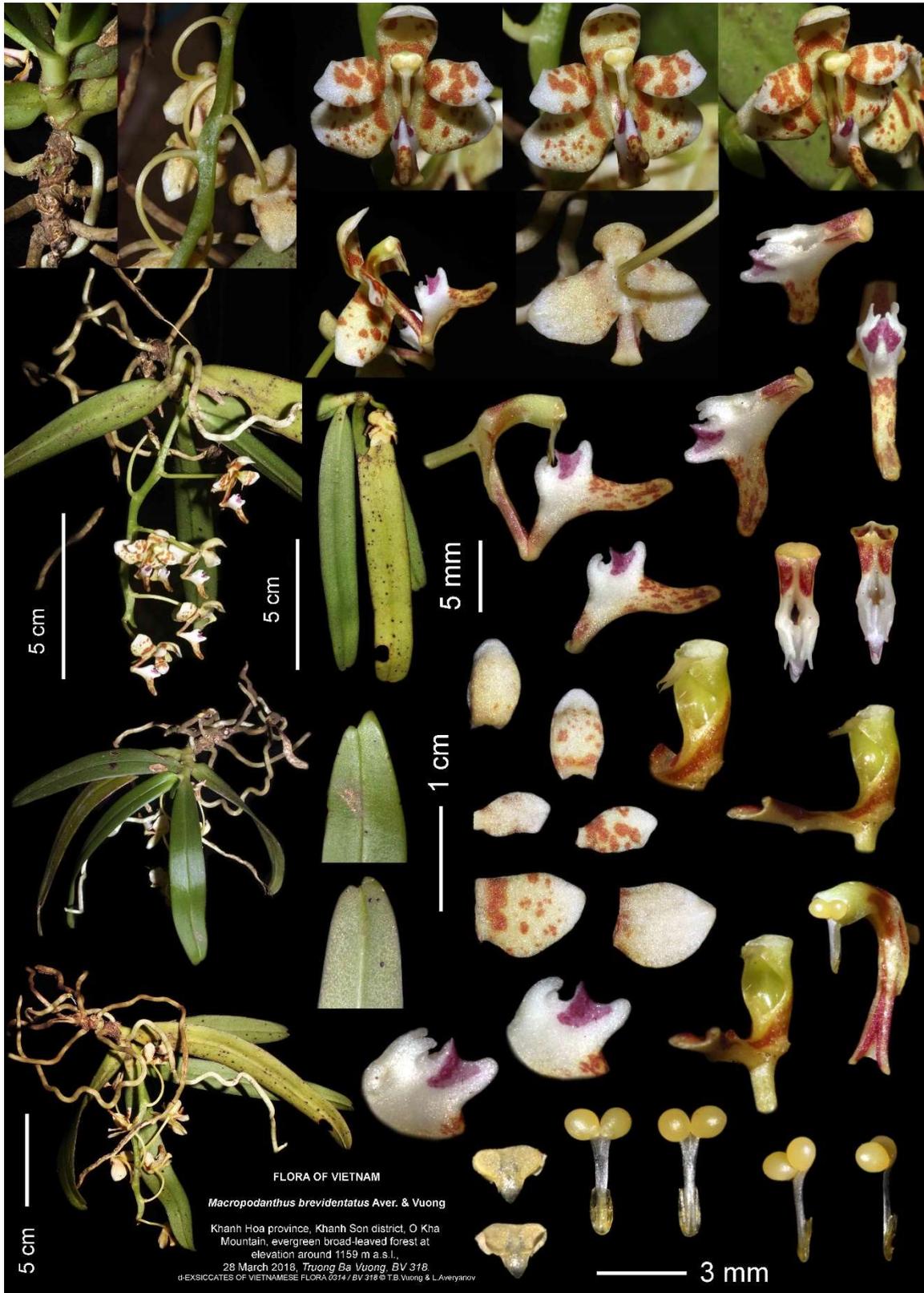


Fig. 7. New orchids in the flora of Vietnam. *Macropodanthus brevidentatus* Aver. & Vuong. Digital epitype (d-EXSICCATES OF VIETNAMESE FLORA 0314 / BV 318) corresponding to the type specimen prior to preparation of herbarium specimen *Truong Ba Vuong, BV 318* (holotype, LE01050162). All photos by T.B. Vuong, design and correction by L. Averyanov and T. Maisak.

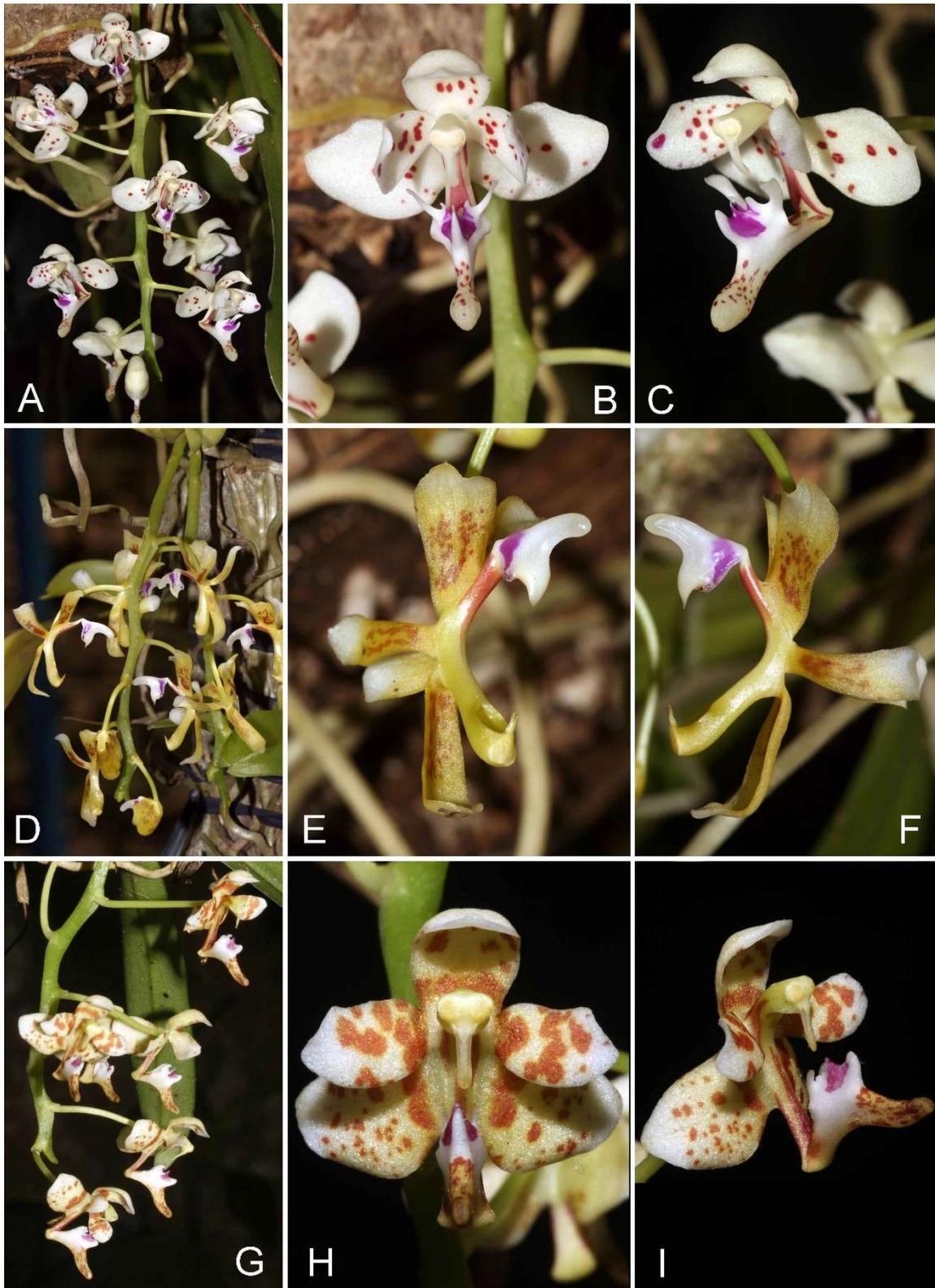


Fig. 8. Comparative floral morphology of *Macropodanthus alatus* (Holtum) Seidenf. & Garay, *M. clausus* (J.J. Sm.) Aver. and *M. brevidentatus* Aver. & Vuong. **A–C.** Inflorescence and flowers of *M. alatus* (Southern Vietnam, Lam dong province, Di Linh District, 2014, *Nguyen Van Tien*, AL 68). **D–F.** Inflorescence and flowers of *M. clausus* (Southern Vietnam, Lam dong province, Di Linh District, 2014, *Nguyen Van Tien*, AL 69). **G–I.** *M. brevidentatus* (type specimen, BV 318). Photos by L. Averyanov (A–F) and T.B. Vuong (G–I), design and correction by L. Averyanov.



Phalaenopsis malipoensis Z.J. Liu & S.C. Chen, 2005, Acta Bot. Yunnan. 27, 1: 37, fig. 1; Chen *et al.*, 2009, Fl. China 25: 481; Khyanjeet Gogoi *et al.*, 2012, Pleione 6, 2: 387; Zhou *et al.*, 2016, Phytotaxa 276: 109.

Fig. 9

Described from southern China ("China, SE Yunnan, Malipo County, Xia Jin Chang Xiang, alt. 1200 m. on tree, ..."). **Holotype** ("... 15 May 2004, Z.J. Liu 2890") – SZWN (Herbarium, Shenzhen City Wutongshan Nurseries), not seen.

Habitat, phenology and conservation status. Miniature trunk and branch epiphyte. Submontane evergreen broad-leaved humid forests on karstic limestone at elevation 1000–1100 m a.s.l. Flowers in March – April (May). Rare. Estimated IUCN Red List status – DD.

Distribution. Vietnam: Ha Giang Province (Quan Ba District). NE. India (Assam), S. China (SE. Yunnan).

Notes. The discovery of this species on Vietnamese territory not far from its *locus classicus* is not surprising. In Vietnam *P. malipoensis* grows in ecological conditions similar to those observed in China. The species differs from the closely related *P. gibbosa* H.R. Sweet, described from limestone of northwestern Vietnam, in its slender, straight rachis (vs. rachis more or less distinctly zigzag, rather stout) and narrowly oblong-obovate to narrowly obovate petals (vs. petals broadly obovate). The relationship between the two species remains unclear. At least some specimens from Laos and Vietnam show various combinations of the characters mentioned. According to our observation, the lip ornamentation is very similar in both species.

Studied specimen. Northern Vietnam, Ha Giang Province, Quan Ba District, Tung Vai Commune, Thung Pang Village, around point 23.0775N° 104.935278E°, steep rocky slopes near hill top composed of stratified and highly eroded limestone at elevation 1000–1100 m a.s.l., remnants of primary evergreen broad-leaved very humid forest, miniature epiphyte, rare, 17 October 2018, L. Averyanov, Nguyen Sinh Khang, T. Maisak, Truong Duc Thieu, VR 900, herbarium prepared in 26 Mar. 2019, Averyanov L., VR 900a (LE01049967!). Plate – d-EXSICCATES OF VIETNAMESE FLORA 0348 / VR 900a (Fig. 9).

***Schoenorchis tatonii* Aver., sp. nov.**

Fig. 10 & 11

Described from southern Vietnam. **Type** – VIETNAM, herbarium specimen prepared on 2018 August 31, L. Averyanov, T. Maisak, AL 371 / 1 (holotype – LE01048676!), plant was collected in Kon Tum Province, Kon Plong District, Mang Den Town Area, Ngoc Linh Mountains, evergreen broad-leaved humid forest at elevation 1500–2000 m a.s.l., miniature branch epiphyte, not common, 21 October 2017, Nguyen Ta Ton, s.n.

Digital epitype. d-EXSICCATES OF VIETNAMESE FLORA 0313 / AL 371 / 1 (Fig. 10)

Etymology. The specific epithet honors orchid enthusiast Mr. Nguyen Ta Ton, the discoverer of the plant.

Description. Miniature monopodial branch and

canopy epiphyte. Stem simple, erect or ascending, (1)1.5–3.5(4) cm long, leafy in apical two thirds, leafless in basal part, (2)2.5–3(3.5) mm in diameter, with many, straight to flexuose grey roots tufted at the base. Leaves grassy green, rugose, sessile, very fleshy, succulent, rigid, spreading at a wide angle to stem, straight, conduplicate to almost triangular in section or subterete, (1.2)1.4–2.8(3) cm long, (1.8)2–2.8(3) mm wide, obtuse to acute at apex, slightly constricted in place of articulation with leaf sheath; leaf sheaths equitant, rigid, verruculose, completely covering the stem. Inflorescence lateral suberect at base, raceme or few-branched panicle (1.2)1.5–3.8(4.2) cm long, scape and rachis light grassy green; scape (6)8–10(12) mm long, straight; rachis straight or arching, thin, slightly angled, (0.8)1–3.2(3.4) cm long, with many spirally arranged, lax flowers distant at (0.8)1–2.8(3) mm. Floral bracts minute, light green, triangular, acute, (0.3)0.4–0.5(0.6) mm long and wide. Pedicel and ovary light green, (0.7)0.8–0.9(1) mm long, about 0.3 mm in diameter, terete, glabrous. Flowers with unpleasant smell, not widely opening, (0.8)0.9–1(1.1) mm across, snow-white or with very light purple tint, glabrous; sepals and petals fleshy, forward directed and slightly recurved in apical half. Sepals ovate, very concave, blunt to obtuse at apex, (0.8)0.9–1.1(1.2) mm long, (0.55)0.6–0.7(0.75) mm wide; lateral sepals distinctly oblique. Petals oblong or narrowly ovate, rounded to blunt, as long as median sepal, (0.24)0.26–0.28(0.3) mm wide. Lip spurred, (1.3)1.4–1.6(1.7) mm long (from spur apex to the apex of median lobe), almost entire; median lobe very fleshy, oblong, (0.8)0.9–1(1.1) mm long, (0.45)0.5–0.6(0.65) mm wide, blunt to obtuse, straight, forward directed; at the base with massive fleshy transversal longitudinally furrowed callus almost completely closing entrance to the spur. Spur short, almost globular, parallel to column, (0.65)0.7–0.8(0.85) mm long and wide, with no prominent longitudinal septum or back-wall callus inside. Column light green, stout, very short, 0.2–0.3 mm tall and wide, with no wings; rostellum very small, broad, forward directed; stigma obscurely triangular to roundish. Anther cap brightly yellow, hemispherical, 0.2–0.3 mm in diameter, with very short, insignificant beak. Pollinarium 1, with 2 pollinia, flat ovate stipe (tegula) and flat oblong ovate viscidium. Pollinium ovoid or globular, hardly split into 2 unequal hemiovoid lobes. Fruit a narrowly obovoid to obovoid, light brown, longitudinally ridged capsule 2–3 mm long, 1.4–1.6 mm in diameter, with light grey capillitium fibres inside. All measurements were taken on fresh floral parts, which become much smaller after exsiccation in process of herbarium specimen preparation (Fig. 11).

Habitat, phenology and conservation status. Miniature branch epiphyte. Montane evergreen, broad-leaved humid forests on granite at elevations of 1500–

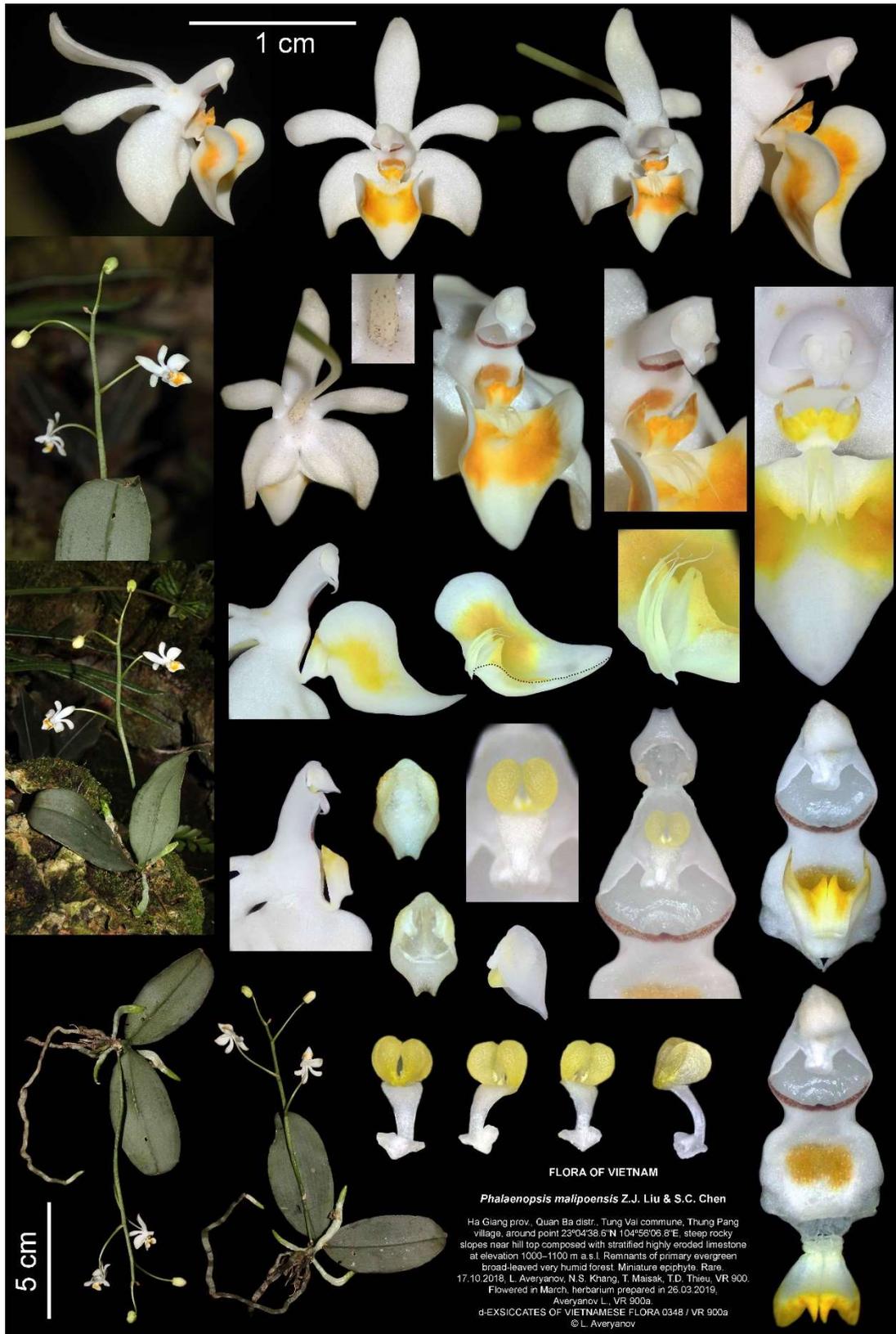


Fig. 9. New orchids in the flora of Vietnam. *Phalaenopsis malipoensis* Z.J. Liu & S.C. Chen. Digital epitope (d-EXSICCATES OF VIETNAMESE FLORA 0348/VR 900a) corresponding to the herbarium specimen, VR 900a (LE01049967). Photos, correction and design by L. Averyanov and T. Maisak.

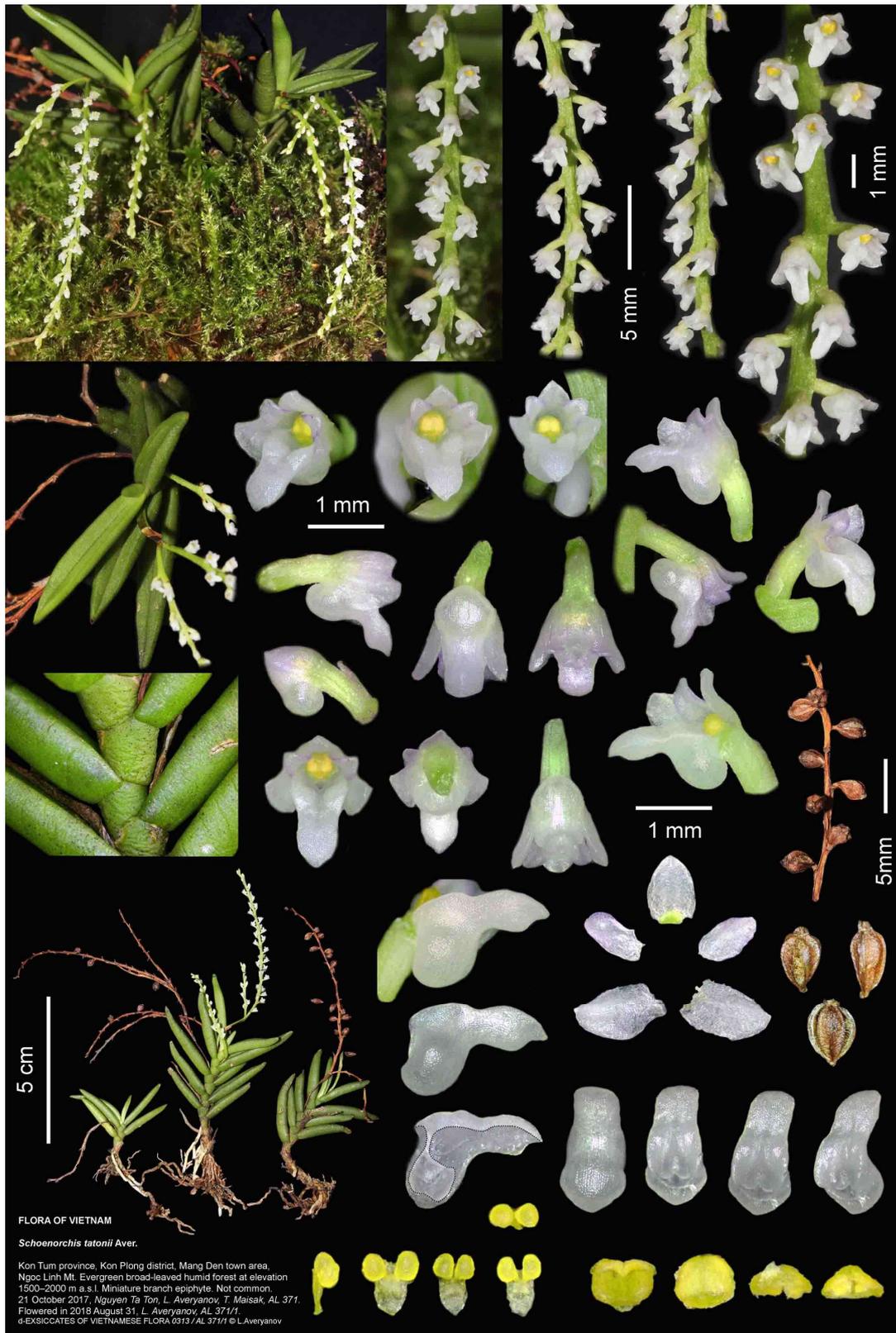


Fig. 10. New orchids in the flora of Vietnam. *Schoenorchis tatonii* Aver. Digital epitype (d-EXSICCATES OF VIETNAMESE FLORA 0313 / AL 371 / 1) corresponding to the type specimen prior to preparation of herbarium specimen L. Averyanov, T. Maisak, AL 371 / 1 (holotype, LE01048676). All photos, design and correction by L. Averyanov and T. Maisak.



Fig. 11. Example of shrinking of flowers size in orchid species with small fleshy flowers during preparation of herbarium specimen. A & B. Fresh flowers of *Schoenorchis tatonii* Aver. C & D. the same flowers after exsiccation. All photos, design and correction by L. Averyanov and T. Maisak.

2000 m a.s.l. Not common. Flowers in August – September. Estimated IUCN Red List status – DD.

Distribution. Vietnam: Kon Tum Province (Kon Plong District, Ngoc Linh Mountains). Endemic.

Notes. The new species belongs to the group of allopatric relatives of the widespread *Schoenorchis gemmata* (Lindl.) J.J.Sm. with minute white flowers distributed in Sri Lanka (*S. nivea* (Lindl.) Schltr.), the Malay Peninsula and the Andaman Islands (*S. minutiflora* (Ridl.) J.J.Sm.), Indonesia (*S. paniculata* Blume), and in Taiwan and the Philippines (*S. vanoverberghii* Ames). Our plant represents a similar allopatric race endemic to Ngoc Linh Mountains in southern Vietnam. In its morphology the new species closest to *S. vanoverberghii*, from which it distinctly differs in the small dimensions of the whole plant, with the stem 1–4 cm long (vs. 5–15 cm long), very fleshy, succulent, conduplicate leaves 1.2–3 cm long, 1.8–3 mm wide (vs. leaves coriaceous, more or less flat, 5–6 cm long and 4–7 mm wide), the short pedicel and ovary 0.8–1.2 mm long (vs. pedicel and ovary about 2 mm long), small flowers 0.8–1.1 mm in diameter (vs. 2.5–3 mm in diameter), the small hemispheric spur 0.65–0.85 mm long and wide, with no septa or ligulate appendage (vs. spur ovate to ellipsoid, about 1.3 mm long with a ligulate appendage on front wall of entrance), and narrowly obovoid or obovoid capsules 2–3 mm long (vs. capsules fusiform, 4–5 mm long).

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