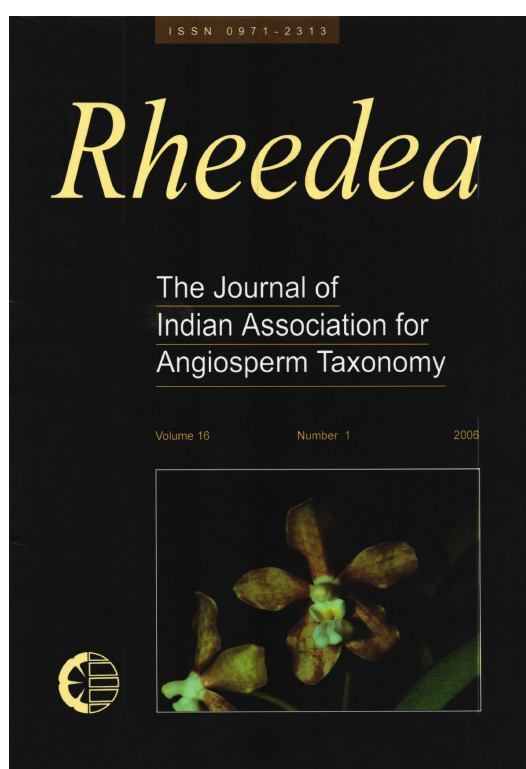




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Abstract

Seven new species of orchids viz.: *Calanthe duyana*, *Dendrobium chapaense*, *Epipactis alatus*, *Gastrodia major*, *G. punctata*, *Platanthera epiphytica* and *Zeuxine bidupensis* discovered recently from Vietnam are described with illustrations. Their morphological characters that make them taxonomically distinct from their respective most allied species are highlighted.

Keywords: New species, Orchidaceae, Vietnam

Introduction

This is eleventh in the series of papers dealing with new orchids discovered by the author and his colleagues in remote, unexplored mountain areas of Vietnam (Averyanov, 1988a, b, 1989, 1998, 1999, 2000, 2005; Averyanov & Averyanova, 2003, 2005; Averyanov & Duong Duc Huyen, 1993). Materials described here were collected mainly during 2005. All species are arranged in alphabetical order. Following abbreviations are used in the text: Prov. (Province), Distr. (District), vic. (vicinity, vicinities), mt. (mountain, mountains). *HAL* stands for Dr Nguyen Tien Hiep, Prof. L. Averyanov and Prof. Phan Ke Loc (collections in collaborative explorations of these persons) and *HLF*, collections made according to the explorations of Botanical Conservation Program in Vietnam supported by Henry Luce Foundation.

Newly discovered taxa

***Calanthe duyana* Aver., *sp. nov.* Figs 1, 3a,b**

Inflorescentia ex rhizomate exiens, 6–15 cm alt., bracteis latis albo-virescentibus praedita; rachis floribus (1)2–5(6) laxis remotis; sepala petalaeque alba; labium trilobatum, carinis duabus dentiformibus, album, lobis lateralibus purpureo-violaceis, raro centro flavo et disco maculis duabus rubris ornatis.

Type: VIETNAM, **Lam Dong** Prov., **Lac Duong** Distr., Da Chais Municipality, territory of Bi Doup – Nui Ba national park, around point 12° 06' 44" N latitude and

108° 39' 27" E longitude, at 1800–2000 m along main ridge and on Western slope of Bi Doup mt., 15 October 2005. *L. Averyanov, P.K.Loc, J.Regalado, T.T.T.Trang, T.V.Thao, N.V.Duy, N.T.Vinh, HLF 5233* (Holotype, HN; Isotype, LE).

Paratypes: VIETNAM, **Kontum** Prov., Close evergreen primary forest on N slope of Ngoc Linh mt. system at 2000 m., 10 March 1995. *L. Averyanov, N.T.Hiep, P.K.Loc et al., VH 639* (HN, LE); **Lam Dong** Prov., Bi Dup mt., 1997. *N.V.Duy, 274* (LE); **Lac Duong** Distr., 29 km to NE from Dalat city, Da Chay Municipality 12° 06' N, 108° 39' E. 22 March 1997. *L. Averyanov, N.Q.Binh, P.K.Loc, VH 3023* (HN, LE); **Lac Duong** Distr., Da Chais Municipality, territory of Bi Doup – Nui Ba National Park around point 12° 05' 27" N 108° 39' 43" E, 15 October 2005 *L. Averyanov, P.K.Loc, J.Regalado, T.T.T.Trang, T.V.Thao, N.V.Duy, N.T.Vinh, HLF 5254* (HN); Da Chais Municipality, territory of Bi Doup – Nui Ba National Park around point 12° 08' 17" N 108° 40' 47" E, at about 1600 m., 19 October 2005, *T.T.T.Trang, T.V.Thao, N.T.Vinh, HLF 5313* (HN); **Ninh Thuan** Prov., **Ninh Son** Distr., Phuoc Binh Municipality in 34 km to NE from Dalat city. 12° 07' N, 108° 42' E. 3 April 1997. *L. Averyanov, N.Q.Binh, P.K.Loc, VH 3630* (HN, LE); **Dak Nong** Prov., **Dak Glong** Distr., Dak Plao Municipality, territory of Ta Dung Nature Reserve, steep mt. slopes along main ridge of Ta Dung mt. system at 1700–1985 m., 9 November 2005, *L. Averyanov, P.K.Loc, T.V.Thao, N.T.Vinh, HLF 5618* (HN).

2 New Orchids from Vietnam

Creeping terrestrial semi-epiphytic herb. Rhizome rigid, 4-6 mm thick, densely covered with black fibrous remnants of distant disintegrated bracts. Orthotropic shoots very short, rigid, straight, not swollen, enclosed with leaf sheaths and numerous fibers of

disintegrated bracts, distant on rhizome with 3-5 cm intervals, at the base with a few rigid flexuose, wiry, dull greenish roots. Leaves elliptic to narrowly elliptic, acuminate, leaf blade 10-30 cm long, 2.5-5 cm wide, usually with 3 distinct prominent veins, narrowed

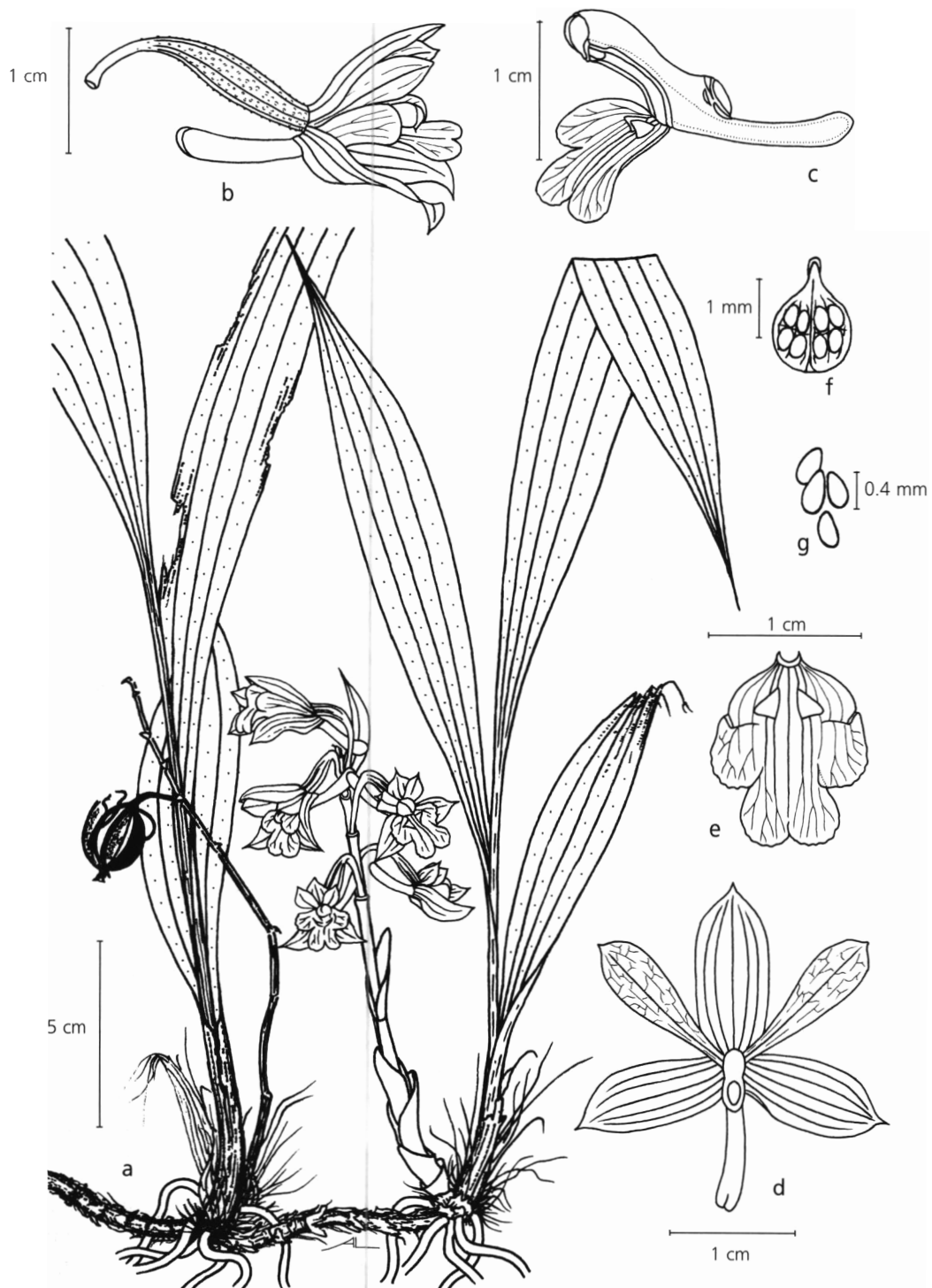


Figure 1. *Calanthe duyana* Aver. – a. Habit; b. Flower, side view; c. Column and lip, side view; d. Sepals, petals and spur spread out; e. Lip; f. Anther cap and pollinia, ventral view; g. Pollinia (all drawn from the type by L. Averyanov).

toward the base into narrow straight rigid 4-15 cm long, 2-4 mm thick petiole. *Inflorescence* a few flowered raceme arising from rhizome at the base of orthotropic shoots, 6-15 cm tall; stalk light green, 5-12 cm long, 2-3 mm thick, enclosed with broad, imbricate, obtuse white to light greenish, 1-3 cm long, 4-6 mm broad bracts; rachis 1-4 cm long with (1)2-5(6) flowers, distant with 5-15 mm intervals; floral bracts caducous, falling very early (usually in stage of flower bud), white, narrowly ovate to elliptic, acuminate, 1.5-2.5 cm long, 0.5-1 cm wide; pedicel with ovary white to light greenish, 1-1.8 cm long, 1-3 mm wide, arcuate to pendulous, surface of the ovary finely tuberculate. *Flowers* odorless, widely opening, pure white, rarely slightly yellowish, lip with purple violet side-lobes, rarely with yellow center and two red spots on the disk; sepals subsimilar, ovate to elliptic, 1.4-1.8 cm long, 5-7 mm wide, apiculate; petals narrowly obovate, 1.4-1.8 cm long, 4-5 mm wide, shortly apiculate; lip spurred, circular or broadly ovate in outline, 1.2-1.4 cm long, 1-1.2 cm wide, 3-lobed; sidelobes erect, semicircular, 3-4 mm long, 3-4 mm wide, finely irregular, crenulate along margin; midlobe 4-5 mm long, 6-7.5 mm broad, recurved, bifid with semicircular flat lobules; disc with 2 tall triangular, rigid, erect keels; spur cylindrical, 8-10 mm long, 1.5-2.5 mm wide, slightly broadening toward rounded apex; column stout, straight, channelled at front, pure white, 9-11 mm long, 2-2.5 mm wide, with beak-like rostellum; Anther cap white, hemispheric, attenuate into distinct obtuse beak at front, 1.5-2 mm in diameter; pollinia 8, brown, solid, triangular ovate, each about 0.4 mm long. *Fruit* broadly elliptic, dehiscent capsule 1.4-1.6 cm long, 6-7 mm wide.

Etymology: This species is named after the Vietnamese orchidologist N.V.Duy who made its discovery.

Flowering & Fruiting: September – November.

Habitat: Primary mt., closed wet mossy evergreen broad-leaved and coniferous forests on shale sandstone and granite at 1600-2000 m.

Distribution: Vietnam (Dak Nong Prov., Dak Glong District; Kontum Prov.; Lam Dong Prov. Lac Duong District and Ninh Thuan Prov. Ninh Son District).

Note: This new species is obviously related to yellow flowered *Calanthe clavata* Lindl. and *C. densiflora* Lindl. distributed widely in the mainland South East Asia but distinctly differs from both of them in a few flowered lax inflorescence and white flowers with purple-violet lip. All these three taxa form within the genus a distinct group of species having inflorescence arising from rhizome at the base of plagiotropic shoot (Sect. *Styloglossum* Breda).

***Dendrobium chapaense* Aver., *sp.nov.* Figs 2, 3c**

Flores 2.5–3 cm lt.; sepala et petala lateralibus alba, 1.8–2 cm lg.; labium aurantiaco-purpureum, trilobum, lobo medio acuto, margine undulato vel irregulariter dentato; calcar rectum, cylindricum, 1–1.2 cm lg.

Type: VIETNAM, Lao Cai Prov., Sa Pa Distr. Vic. of Sa Pa town mt., forest at about 1500-2000 m., 25 November 2005. L. Averyanov, P.K.Loc, HAL 8321 (Holotype, HN; Isotype, LE).

Epiphytic herb with short rigid rhizome and numerous clustering orthotropic stems. *Stems* not branched, green to yellowish-green, fleshy, 15-25 cm tall, 1-1.5 cm thick, with several distichous, lanceolate to narrowly ovate, sessile 6-10 cm long, 1-1.5 cm wide leaves and numerous thick, wiry, flexuose, rigid roots at the base; young stems and leaves with black bristle like, straight, rigid hairs. *Inflorescence* 1-2.5 cm long, arising from stem near the apex, 1-3(5) flowered, scape, rachis and floral bracts black haired; floral bracts scarious, dull yellowish-green to greenish, ovate, acute, 5-12 mm long, 3-4 mm wide; pedicel with ovary 2-3 cm long, very slender, glabrous; ovary white, circular in transverse section, 4-6 mm long, 3-3.5 mm thick; pedicel 1.5-2 mm thick, 2-2.5 cm long, white, green toward the base. *Flowers* odorless, widely opening, 2.5-3 cm across, resupinate, rigid and glossy, long lasting; sepals white, acute to acuminate, dorsal sepal narrowly ovate to ovate, 5-veined, 1.4-1.6 cm long, 5-6 mm wide; lateral sepals triangular, 5 veined, 2.2-2.5 cm long, with broad base adnate to long column foot forming spur-like, straight, cylindrical 1-1.2 cm long white mentum; petals white, lanceolate, narrowing toward the base, acute to acuminate, with 3 branching veins, 1.6-1.8 cm long, 3-4 mm wide; lip brightly yellow-orange, triangular, broadly obovate, 2-2.4 cm long, 2.2-2.5 cm wide, 3-lobed, narrowing toward the base, glabrous, with low, flat, wide, orange-red median keel dissected into 3 warty lines at the base of mid-lobe; side lobes obovate, 1-1.5 mm long, 1-1.2 cm wide, rounded, with numerous, orange-red, dichotomous veins; median lobe triangular, acute, 6-7.5 mm long, 5.5-6.5 mm wide, strongly undulate and irregularly dentate along the margin; column orange, glossy, short, stout, 4-4.5 mm tall, 2.5-3 mm wide, with white, short, acute, lateral stelidia at the apex; column foot 7-9 mm long; anther cap hemispheric, white, 1-1.2 mm across.

Etymology: Name of this species refers to montane area, the site of its discovery in the vicinity of Chapa (Sa Pa) town.

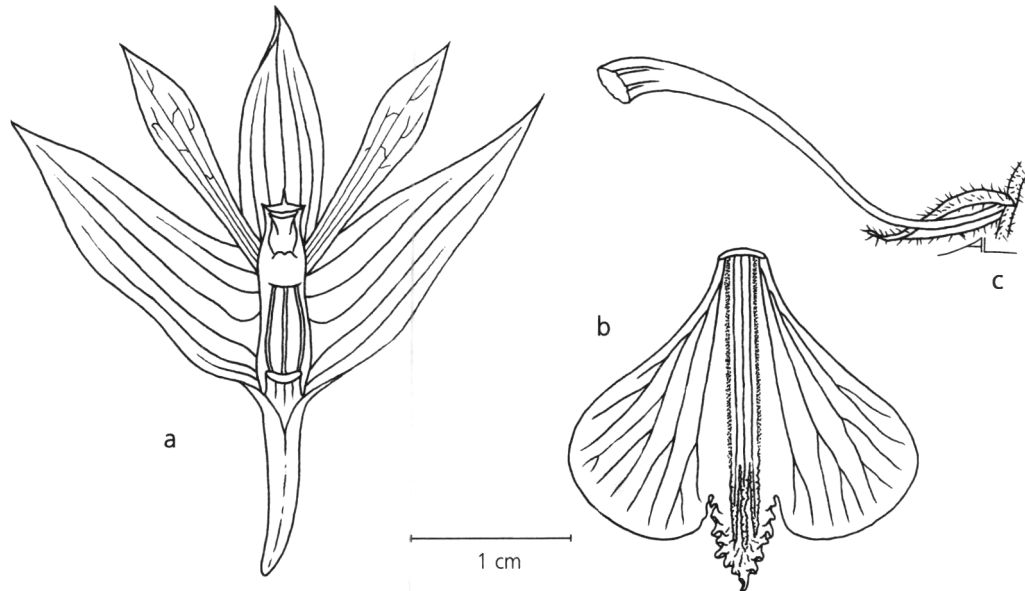


Figure 2. *Dendrobium chapaense* Aver. – a. Flower, lip removed; b. Lip; c. Ovary, pedicel and floral bract (all drawn from the type by L. Averyanov).

Flowering: October – November.

Habitat: Primary mt. closed wet mossy broad-leaved forests on granite at 1500-2000 m.

Distribution: Vietnam (Lao Cai Prov., Sa Pa Distr.)

Note: This new species is obviously very close to *D. longicornu* Lindl. (sect. *Formosae*) fairly common in northern Vietnam, eastern India and southern China. From this wide spread species the new taxon distinctly differs in having shorter and thicker stems, small flowers and in distinctly trilobed orange-red lip with acute triangular mid-lobe. Probably, this species represents the local endemism of Hoang Lien Son range highlands situated on north-western part of northern Vietnam.

***Epipactis alatus* Aver. et Efimov, sp.nov. Figs 3d-g, 4**

Flores non resupinati; ovarium pedicello duplo brevior, sparse pubescens; hypochilii lobi laterales subtriangulares; epichilium orbiculatum, concavum; stylidii anguste lanceolati; stigma latissimum, lobis lateralibus aliformibus rectangularibus.

Type: VIETMAN, Ha Giang Prov., Meo Vac Distr., Sung Tra Municipality, vic. of Ta Cha Lang village around point 23°10' 12" N, 105°17' 39" E, at about 1100-1150 m., 11 December 2005 L.Averyanov, P.K. Loc, T.V. Thao, P.V. The, N.S. Khang HAL 8513 (Holotype, HN; Isotype, LE).

Terrestrial or lithophytic herb with erect, slightly flexuose, 22 cm tall stem and very short rhizome

densely covered with numerous rigid, wiry roots. *Stem* glabrous, with 3-4 bracts at the base and 2-3 green leaves distant with 1.5-5.5 cm long intervals. *Leaves* thin, ovate-lanceolate to ovate, sessile, 2-7 cm long, 1-4 cm wide, acute, finely papillose along the margin. *Inflorescence* terminal raceme, 4 cm long, sparsely pubescent, with 2 sterile, basally ovate, 6-20 mm long, 3-8 mm wide bracts; floral bracts narrowly ovate, acute, 3-4 mm long, 2-3 mm wide. *Flowers* not resupinate, not widely opening, campanulate, about 1 cm across, tepals light purple-violet, lip purple-violet, epichile with yellow centre, hypochile with yellow center and numerous small deep brown warts, column and anther pure white; pedicel with ovary 10 mm long, sparsely pubescent, ovary twice shorter than pedicel; sepals subsimilar, ovate, 5-veined, acute, 10 mm long, 5-5.5 mm wide, outside sparsely pubescent, with low keel along median vein; petals ovate, shortly acuminate, 8.5 mm long, 5 mm wide, with 5 main veins; lip 12 mm long (when flattened), distinctly divided into hypochile, mesochile and epichile; hypochile concave, with broadly triangular-rounded 4 mm long side lobes, the disc with numerous small deep brown warts; mesochile elongate, about 3.5 mm long, 2 mm wide with two broad, fleshy, low keels; epichile circular, about 3.5 mm across, finely undulate and folded along the margin with small callus at the base; column 7 mm tall, broadening from narrow stalk into massive apex covered with forward pendent anther cap; stelia narrowly



Figure 3. *Calanthe duyana* Aver. – a, b. Flowering plant and flowers (type specimen); *Dendrobium chapaense* Aver. - c. Flower spread open (type specimen); *Epipactis alatus* Aver. et Efimov. – d. Habit; e-g. Flowers and column; *Gastrodia major* Aver. – h. Habit (type specimen). All photographed by L. Averyanov.

lanceolate; stigma 3 mm long, 4 mm wide, with prominent rectangular side lobes directed forward and aside, viscidium spherical; ovary 2.5 mm long, twice shorter than pedicel.

Etymology: The species name refers to very broad,

wing-like side lobes of stigma.

Flowering: November - December.

Habitat: Coniferous forests with *Tsuga chinensis* on rocky, highly eroded, marble-like limestone at 1100-1150 m.

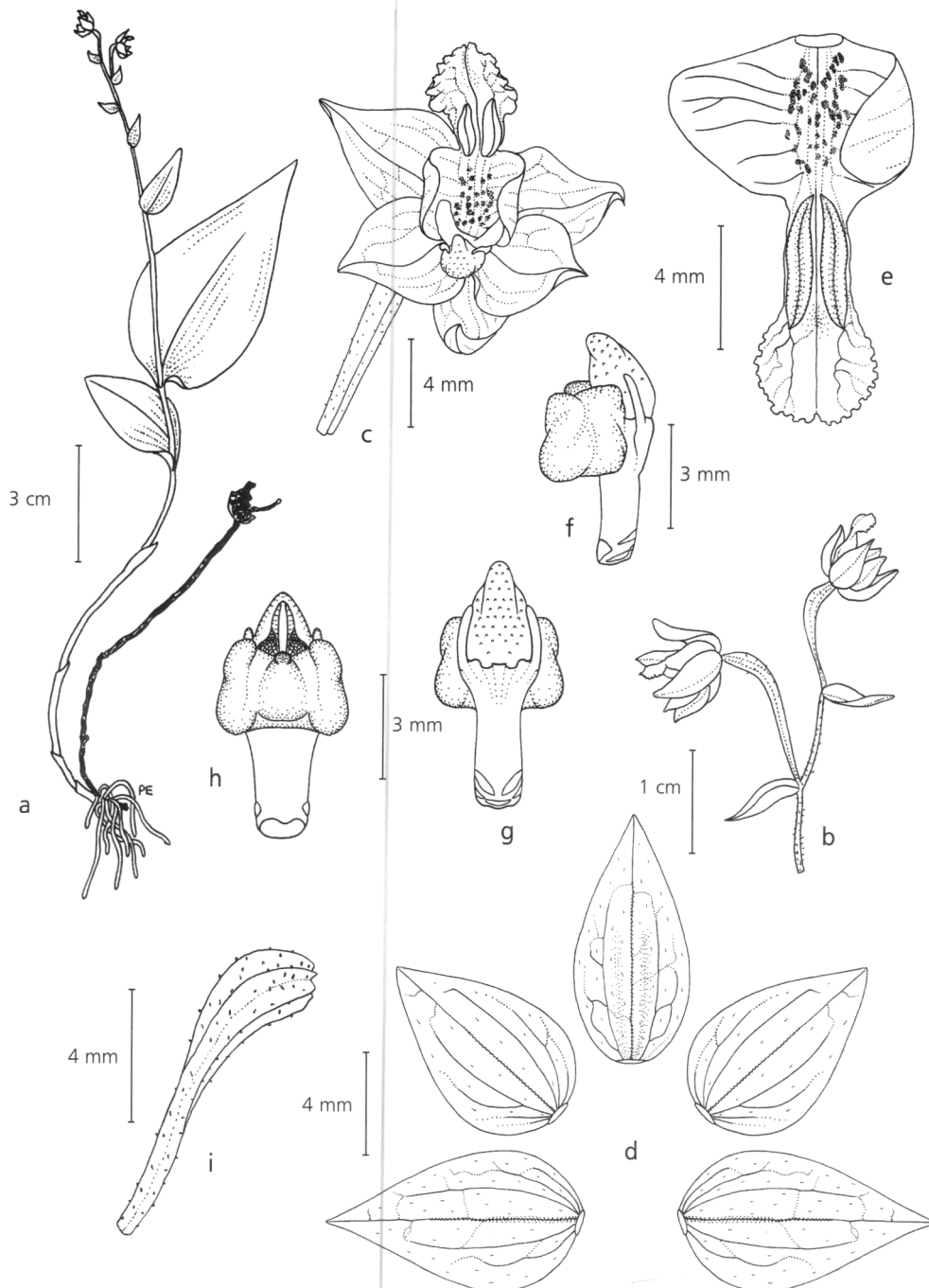


Figure 4. *Epipactis alatus* Aver. et Efimov – a. Habit; b. Inflorescence; c. Flower; d. Sepals and petals; e. Lip; f-h. Column, side, dorsal and ventral views (respectively); i. Ovary and pedicel (all drawn from the type by P. Efimov).

Distribution: Vietnam (Ha Giang Prov., Meo Vac Distr.).

Note: This new species has close resemblance with *Epipactis flava* Seidenf. reported from Thailand and probably with *E. mairei* Schltr. from China and Myanmar and some African species that have short rhizome with numerous roots and a long pedicel usually longer than ovary. However, this new taxon is unique in the genus in having non resupinate flowers. The deep brown warts crowded on honey-yellow disc of concave hypochile strikingly resemble larvae of some small representatives of Diptera or Hymenoptera possibly indicating the nature of entomophilous pollination in the species.

***Gastrodia major* Aver., *sp.nov.* Figs 3h, 5, 7a,b**

Planta 25-60 cm alt., tubero cylindrico 5-8 cm lg., 1.5-3 cm crasso; inflorescentia floribus 4-10 laxis, vix apertis; sepala omnia basi ad tres partes longitudinis connata; floris tubus 2-2.5 cm lg., 1-1.5 cm lt., olivaceo-brunneus, leviter rugosus, albo-verruculatus; labium orbiculatum, apice attenuatum callo rectangulato; columna stylidiis aliformibus lateralibus et carinis tribus a fronte instructa.

Type: VIETNAM, Dak Lak Prov., Krong Bong Distr., Hoa Son Municipality, vic. of Krong Kmar river, territory of Chu Yang Sin national park, NE slopes of Chu Yang Sin mt. system at elev. 700-900 m., around point 12° 27' 55" N 108° 19' 00" E 28 October 2005, L.Averyanov, T.V.Thao, N.T.Vinh, HLF 5444 (Holotype, HN; Isotype, LE).

Terrestrial, tuberiferous, leafless, achlorophyllous saprophyte. Tubers cylindrical, sometimes slightly bent, 5-8 cm long, 1.5-3 cm thick, fleshy, brown, covered with numerous narrowly triangular, acuminate, sometimes partially decomposed scales, densely hairy. *Stem* erect, rigid, straight or slightly flexuose, olive-brown, whitish toward the apex, 25-60 cm tall, 3-6 mm thick, with 5-8 broad, ovate to narrowly-ovate, obtuse, partially decomposing, 0.5-2 mm long, 3-8 mm wide bracts, with a few close, imbricate, narrowly-triangular, long, acute, brownish scales at the base, without roots. *Inflorescence* terminal, 4-15 cm long, lax raceme on a 20-45 cm long stalk with 4-10 distant flowers; floral bracts narrowly triangular, 1-1.5 cm long, 3-5 mm wide, rigid, deep brown, acute; pedicel with ovary 1.5-2 cm long, pedicel white to light brown, ovary 3-3.5 mm thick, short, triangular on transverse section, with finely tuberculate, olive-brown to yellowish-brown surface. *Flowers* bell-shaped, hardly opening, fleshy, ephemeral, with strong honey fragrance; flower tube outside olive-brownish, finely rugose, with numerous small, white

warts; sepals olive-brown outside, white to very light pinkish inside, subsimilar, oblong-ovate, 2-2.5 cm long, 5-7 mm wide, with low, broad and fleshy thickening along median vein and fleshy, obtuse apex, connate at base for $\frac{3}{4}$ - $\frac{4}{5}$ th of their length, free parts irregular crenulate and wavy along margin; petals thin, light salmon, connate to sepal tube for about $\frac{4}{5}$ th of their length, free part 4-5 mm long, 3-3.5 mm wide, triangular-cordate, obtuse to acute, narrowing to the base, straight along margin; lip white, entire, 7-11 mm long, 4-5.5 mm wide, circular to ovate with attenuate, obtuse, recurved, brightly orange, fleshy apex, straight along margin, with two ovate calli at the base, disc 5-veined with two low fleshy keels united toward the apex into thick fleshy rectangular callus; column 9-11 mm tall, 3.5-4 mm wide, straight, fleshy, white, light greenish at the base, with orange-brown, wing-like, straight, narrow, fleshy, obtuse stelidia on lateral sides at the apex, with 3 low, fleshy keels at front, median of which distinctly enlarging toward the base; anther cap white, hemispheric, 1.8-2.2 mm across. *Fruits* erect, narrowly cylindrical, 3-4 cm long, 4-6 mm wide, with tuberculate surface, pedicel in fruits elongating to 3.5-6 cm long.

Etymology: The species name refers to the largest dimensions of the plant known among all representatives of the genus in Vietnam.

Flowering & Fruiting: October – November.

Habitat: Secondary, evergreen, lowland and submontane, closed, broad-leaved, shady forests with bamboo on granite at 700-900 m.

Distribution: Vietnam (Dak Lak Prov., Krong Bong Distr).

Note: This novelty belongs to a group of species, sepals of which form broad floral tube with very short, free apices. In Indochinese Peninsula, this group comprises such species as *G. punctata* Aver., *G. siamensis* Rolfe ex Downie, *G. tonkinensis* Aver. et Averyanova, *G. taiensis* Tuyama and *G. verrucosa* Blume. From all these taxa, the new species clearly differs in its large habit, wing-like stelidia on lateral sides of the column apex and two keels joined on the apical part of the lip into rectangular swelling.

***Gastrodia punctata* Aver., *sp.nov.* Figs 6, 7c,d**

Planta 15-35 cm alt., tubero cylindrico 2-3 cm lg., 5-8 cm crasso; inflorescentia floribus 4-10 laxis, vix apertis; sepala omnia basi ad $\frac{3}{4}$ - $\frac{4}{5}$ longitudinis connata; floris tubus 8-14 mm lg., 5-6 mm lt., olivaceo-brunneus, maculis magnis argenteis numerosis ornatus; labium anguste ovatum, carinis carnosus vix elevatis quattuor, margine leviter

undulatum; columna tenuissima, medio distincte dilatata, apice styliidiis acutis denticuliformibus et basi callo falcato instructa.

Type: VIETNAM, Lam Dong Prov., Lac Duong Distr., Da Chais Municipality, territory of Bi Doup – Nui Ba

National Park, around point 12° 06' 44" N 108° 39' 27" E, at 1800-2000 m. on Western slope of Bi Doup mt., 15 October 2005 *Averyanov, P.K.Loc, J.Regalado, T.T.T.Trang, T.V.Thao, N.V.Duy, N.T.Vinh, HLF 5237a* (Holotype, HN; Isotype, LE).

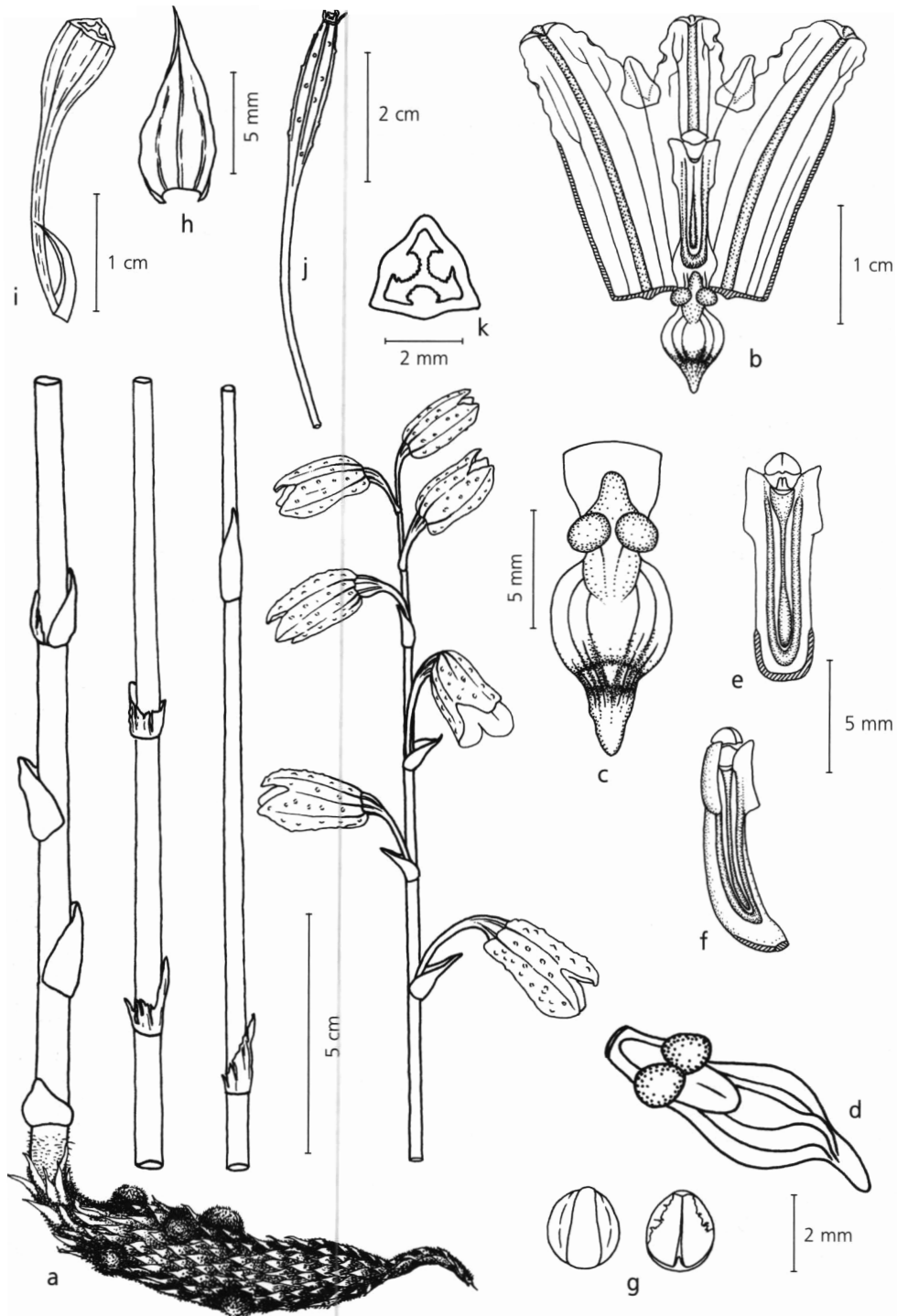


Figure 5. *Gastrodia major* Aver. – a. Habit; b. Floral tube spread open; c. Lip and column foot, front view; d. Lip and column foot, side view; e, f. Column, frontal and side views; g. Anther cap, ventral and dorsal views; h. Floral bract; i. Ovary, pedicel and floral bract; j. Ripening fruit with elongated pedicel; k. Ovary, transverse section (all drawn from the type by L. Averyanov).

Terrestrial, tuberiferous, leafless, achlorophyllous saprophyte. Tubers cylindrical, sometimes more or less bent, 2-3 cm long, 5-8 mm thick, fleshy, gray-brown, covered with scarce triangular-obtuse, partially decomposed densely hairy, scales. Stem erect, soft,

straight or slightly flexuose, deep brown to brown-black, 15-35 cm tall, 2-3 mm thick, with 3-4 broad, ovate to narrowly-ovate, obtuse, 4-20 cm long, 3-4 mm wide bracts, upper bract usually much longer than the others, with a few, close, small, imbricate, narrowly-

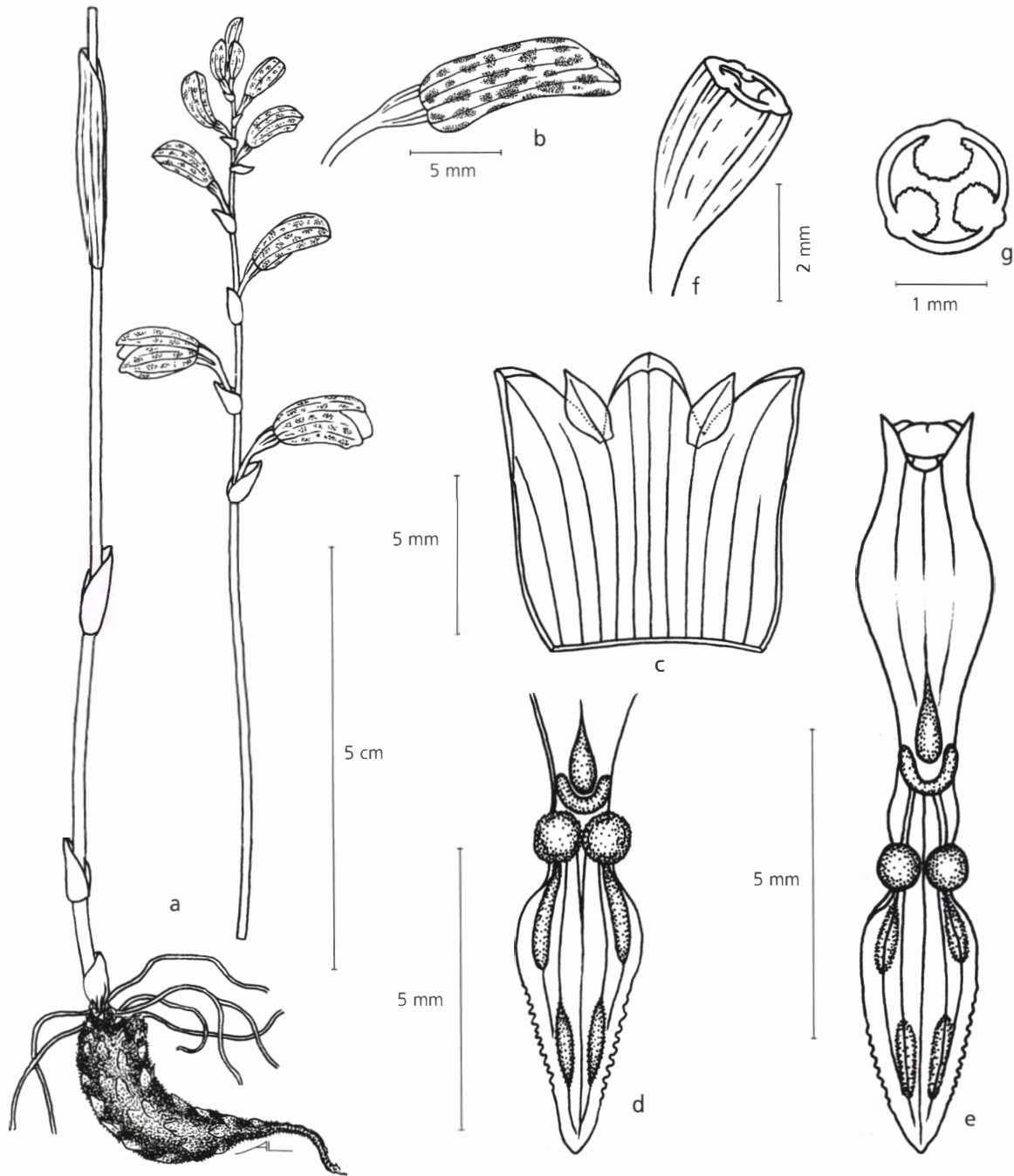


Figure 6. *Gastrodia punctata* Aver. – a. Habit; b. Flower bud; c. Floral tube spread open; d. Lip and base of column; e. Lip and column; f. Ovary, side view; g. Ovary, transverse section (all drawn from the type by L. Averyanov).

triangular, acute, decaying grey-brown scales at the base and a few, narrow, weak flexuose, roots. *Inflorescence* terminal, 4-8 cm long lax raceme with 4-10 distant flowers on a 12-27 cm long scape; floral bracts black, occasionally with small white marks, narrowly triangular, falcate, acute, 2-3 mm long, 1-1.5 mm wide; pedicel with ovary 3-5 mm long, pedicel white to light brown, ovary 2-2.5 mm thick, shortly cylindrical, circular in transverse section, with smooth surface, deep brown to brownish black with finest white marks. *Flowers* bell-shaped, hardly opening, fleshy, ephemeral; sepals and petals smooth outside, with a low thickening along the median vein terminating into fleshy apex; sepals brown to light brown, with numerous large silvery-white spots, subsimilar, oblong-ovate, 8-14 mm long, 2.5-4 mm wide, with fleshy, obtuse apex, connate with petals for $\frac{3}{4}$ - $\frac{4}{5}$ length; lateral sepals connate at base for about $\frac{2}{3}$ - $\frac{3}{4}$ th of their length from the base; petals thin, connate to sepal tube on about $\frac{3}{4}$ of their length, its free part 1.5-2 mm long, 0.8-1.2 mm wide, ovate, acute, narrowing to the base; lip narrowly ovate, flat, 5.5-6.5 mm long, 3-3.5 mm wide, entire, obtuse, with two spherical calli at the base, finely undulate along margin in apical portion, disc 5-veined with two low, fleshy keels at basal part and two similar keels toward the apex; column 5.5-6 mm tall, 3.5-4 mm wide, straight, flat, very thin, distinctly broadening at the middle, with narrowly triangular, acute stelia on lateral sides at the apex, with falcate callus at the base surrounding the ovate thickening lying along median vein; anther cap very small, hemispheric, about 0.8-1 mm across.

Etymology: The species name indicates the characteristic silvery-whitish punctation of brownish flower tube.

Flowering: October – November.

Habitat: Secondary and primary evergreen, closed broad-leaved forests on shale and granite at 1800-2000 m.

Distribution: Vietnam (Lam Dong Prov., Lac Duong Distr.).

Note: Like the previous novelty, *Gastrodia punctata* belongs to a group of species with sepals equally joined into floral tube. It is probably closer to *G. dyeriana* King et Pantl. reported from Bhutan, Nepal and northeast India but differs in deep, olive-brown silvery-white spotted flowers, in four keels on the lip and in prominent falcate callus at the base of column.

***Platanthera epiphytica* Aver. et Efimov, *sp.nov.*
Figs 7e, f, 8**

Planta foliis radicalibus solus; labium anguste lanceolatum, integrum, basi non dilatatum; stigma concavum, lobis non approximatis.

Type: VIETNAM, Lam Dong Prov., Lac Duong Distr., Da Chais Municipality, around point 12° 05' 27" N, 108° 39' 43" E, at about 2300 m. along the main ridge of Bi Doup mt., 15 October 2005 L. Averyanov, P.K. Loc, J. Regalado, T.T.T. Trang, T.V. Thao, N.V. Duy, N.T. Vinh, HLF 5250 (Holotype, HN; Isotype, LE).

Epiphytic, tuberiferous herb with attenuate, fusiform tubers, one radical leaf and erect floriferous stem up to 22 cm tall having 1-2 distant leaves. *Floriferous stem* glabrous with 2 sheaths at base. *Leaves* deep green, glabrous, fleshy, leathery and glossy; radical leaf broadly ovate to broadly elliptic, 12 cm long, 7 cm wide, attenuate at the base into 3-4 cm long distinct petiole; stem leaves sessile, sheathed, ovate or narrowly ovate, 4-6 cm long, 3-1.5 cm wide, upper leaf smaller, bract-like. *Inflorescence* terminal spike, about 22 cm long with 5-7 cm long stipe, rachis 15-17 cm long; floral bracts narrowly ovate, 4.5-1.5 cm long, 1.5-0.5 cm wide, acute. *Ovary* sessile, 1.5 cm long, slightly curved, glabrous. *Flowers* resupinate, odorless, not widely opening, tepals green, lip yellowish-green with deep green apex, old thecae dull reddish-brown; dorsal sepal 5-veined, ovate, 6 mm long, 4.5 mm wide, rounded at the apex; lateral sepals 4-nerved, narrowly ovate, slightly oblique, twisted, 7 mm long, 2.5 mm wide, obtuse; petals 3-veined, ovate, oblique, broadly falcate, 8 mm long, 2.5 mm wide, obtuse, connivent with dorsal sepal into a hood; lip entire, oblong, with almost parallel margins; spur 15 mm long, 1-1.5 mm thick, cylindrical, not dilated at the apex; column rectangular, about 4 mm tall and wide; thecae distant, basally divergent; stigma concave, with 3 allied but not confluent lobes, central stigma lobe broad, transversely elliptic, lateral lobes small, transversely elliptic; rostellar lateral lobes flat; viscidium probably orbicular (not seen).

Etymology: The species name refers to the epiphytic habit of the plant.

Flowering: September - November.

Ecology. Primary, mossy, wet cloudy gnarled coniferous forests with *Fokienia hodginsii* at 2200-2400 m.

Distribution: Vietnam (Lam Dong Prov., Lac Duong Distr.).

Note: This species is closely related to *Platanthera angustilabris* Seidenf. described from Thailand but differs in much shorter leaves and much longer spur.



Figure 7. *Gastrodia major* Aver. – a. Flowers ; b. Floral tube spread open (type specimen); *Gastrodia punctata* Aver. – c. Inflorescence; d. Flowers (type specimen); *Platanthera epiphytica* Aver. et Efimov – e. Habit; f. Flower (type specimen); *Zeuxine bidupensis* Aver. - g. Inflorescence; h. Flowers (type specimen). All photographed by L. Averyanov.

Both species have similar ecology and form a distinct group within the Sect. *Platanthera*. Separate and not confluent stigma lobes and ligulate lip (not broadening at the base) indicate close affinity of these plants with the type species of the genus – *P. bifolia* (L.) Rich.

***Zeuxine bidupensis* Aver., sp.nov. Figs 7g, h, 9**

Sepala anguste ovata, subsimilia, 5-5.5 mm lg.; petala falcata, apice dilatata; labium poculiforme, intus glandulis uncinatis magnis duabus, inflationibus papillosis magnis duabus et epichilio plano orbiculato

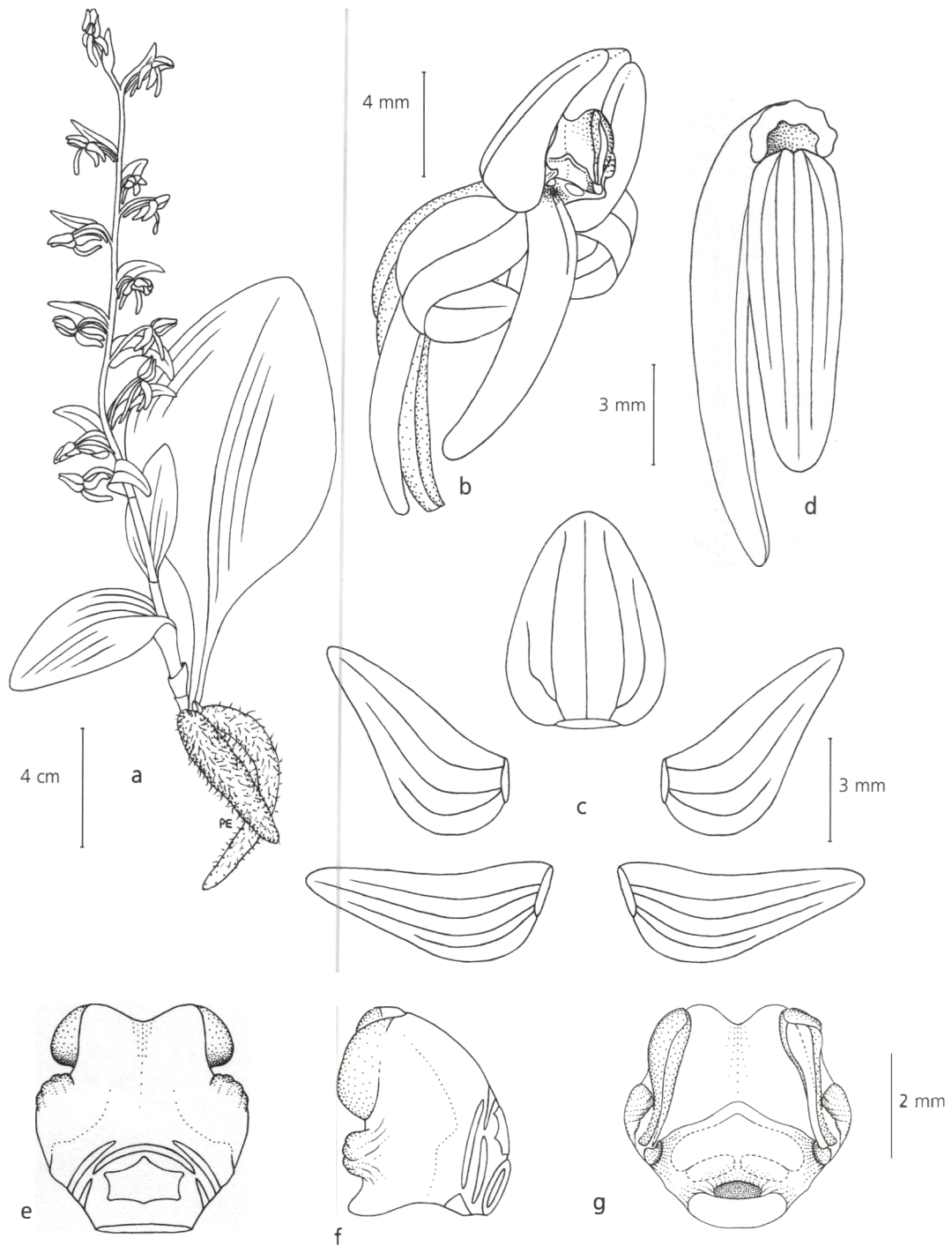


Figure 8. *Platanthera epiphytica* Aver. et Efimov – a. Habit; b. Flower, side view; c. Sepals and petals; d. Lip; e-g. Column, dorsal, side and front views, respectively (all drawn from the type by P. Efimov).

integro; column alis spathulatis angustis duabus et stigmatibus duobus.

T.T.T.Trang, T.V.Thao, N.T.Vinh, HLF 5319 (Holotype, HN; Isotype, LE).

Type: VIETNAM, Lam Dong Prov., Lac Duong Distr., Da Chais Municipality, territory of Bi Doup – Nui Ba national park, around point 12° 08' 17" N and 108° 40' 47" E, at about 1600 m., 19 October 2005.

Creeping, terrestrial herb with ascending, leafy, floriferous stem; plagiotropic part of stem 5-15 cm long, dull brownish-green, juicy, rooting at nodes, ascending leafy part 5-7 cm tall, with 5-6 leaves.

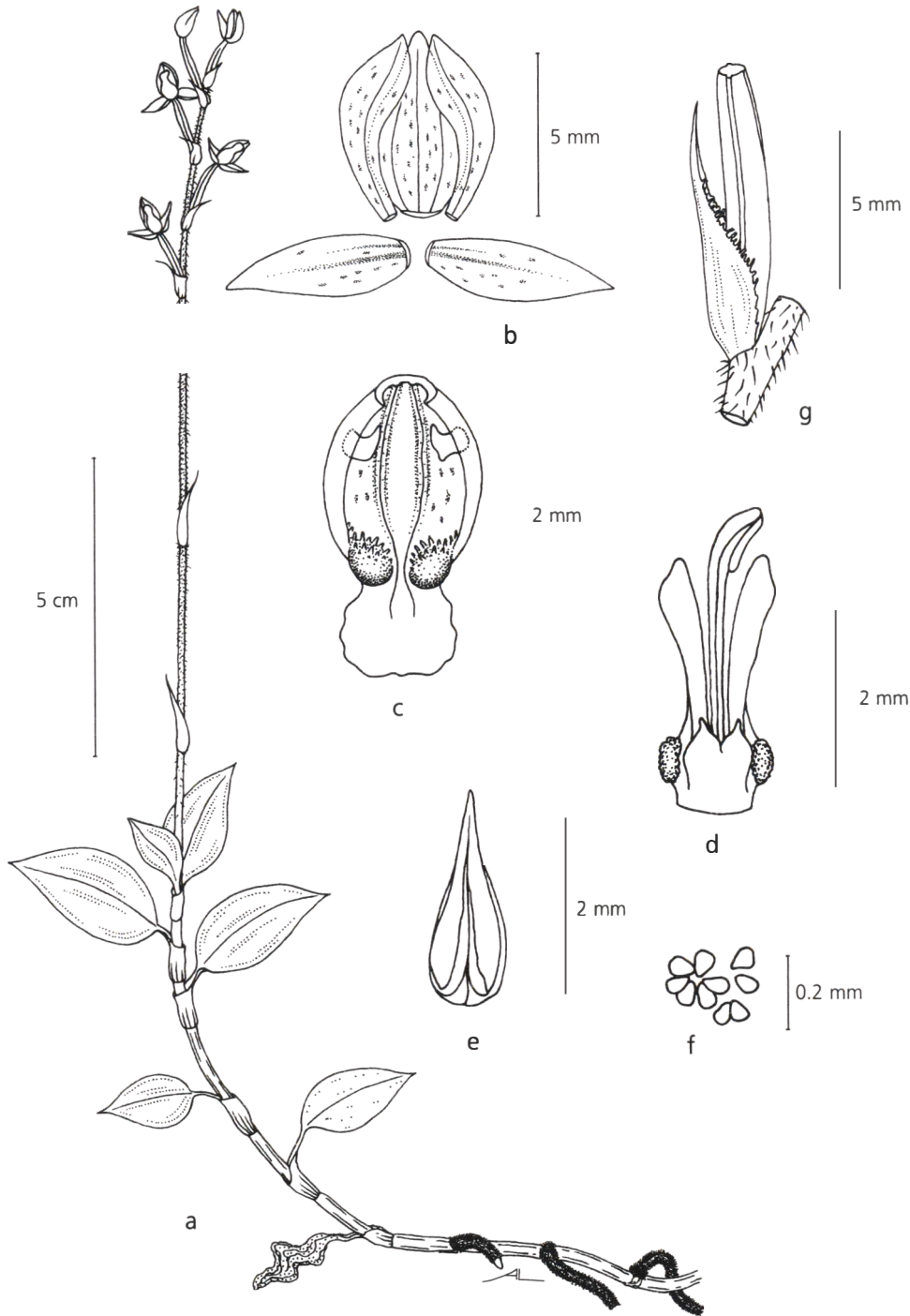


Figure 9. *Zeuxine bidupensis* Aver. – a. Habit; b. Sepals and petals; c. Lip; d. Column; e. Anther cap, ventral view; f. Pollinia; g. Ovary and floral bract (all drawn from the type by L. Averyanov).

Leaves petiolate; petiole and sheath 5-10 mm long, 1-2 mm wide; leaf blade ovate, usually slightly oblique, acute, 2-3 cm long, 1-1.5 cm wide, deep velvety brownish green, with no distinct median stripe. *Scape* 9-12 cm long, sparsely hairy, with 2-3 yellowish, lanceolate, acuminate bracts; rachis lax flowered, commonly with 3-5 flowers; floral bracts dull reddish-brown, triangular, acuminate, glabrous, erose-ciliate along the margin, 4-7 mm long, 2-3 mm wide; pedicel with ovary deep olive-green, 8-10 mm long, 1-1.5 mm wide, cylindric, glabrous, slightly twisted. *Flowers* odorless, hardly resupinate to resupinate; sepals deep olive-brown outside, glabrous, subsimilar, narrowly ovate, 5.5-6 mm long, 1.8-3 mm wide; dorsal sepal wider with 3 veins, obtuse, reddish inside, forward directed; lateral sepals with 1 very faint vein, acute, uniform deep olive-green, reflexed at a right angle; petals white, glabrous, 5-5.5 mm long, 1.2-1.5 mm wide, 1-veined, oblique, falcate, rising from narrow base to oblique, broad, obtuse apical part, densely connivent with the dorsal sepal forming a hood; lip 4-4.5 mm long, 2.5-3 mm wide, distinctly divided into hypochile and epichile; hypochile light yellowish, concave, oval in outline, cup-like, 2.5-3 mm long, 2.5-3 mm wide, with 2 swollen nerves and 2 massively hooked or indistinctly T-shaped glands inside; margins incurved, fleshy, coming apically into 2 round swellings, papillose inside; epichile about 1-1.2 mm long and 1.2-1.4 mm wide, flat, entire, circular with slightly crenulate margin; column about 3 mm tall, with 2 narrowly falcate vertical wings at front, long narrow rostellum and 2 convex stigmatic areas on lateral sides near the base; anther large, narrowly-ovate, acuminate, 2.2-2.5 mm long, 0.8-1 mm wide; pollinia massulae brown, triangular, about 0.1 mm across.

Etymology: Species name refers to the type locality of the species, Bi Doup mt. system.

Flowering: October – November.

Habitat: Primary mt. closed, wet, mossy, mixed and coniferous forests with *Pinus dalatensis* and *P. krempfii* on granite at 1600-1800 m.

Distribution: Vietnam (Lam Dong Prov., Lac Duong Distr.).

Note: The new species is allied to *Z. purpurascens* Blume known from Peninsular Malaysia, Java, Sumatra and Kalimantan but distinctly differs in its larger flowers, 2 large papillose swellings on the lip and in prominent, long, narrow, spatulate wings at front of the column.

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