

СИСТЕМАТИЧЕСКИЕ ОБЗОРЫ SYSTEMATIC REVIEWS

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THE ORCHIDS OF VIETNAM ILLUSTRATED SURVEY.

Part 4. SUBFAMILY *EPIDENDROIDEAE*

(tribes *Arethuseae* and *Malaxideae*)

ИЛЛЮСТРИРОВАННЫЙ ОБЗОР ОРХИДНЫХ ВЬЕТНАМА.

Часть 4. ПОДСЕМ. *EPIDENDROIDEAE*

(трибы *Arethuseae* и *Malaxideae*)

Summary. The article continues serial publication of illustrated critical taxonomical survey of orchids in the flora of Vietnam. This part of the monograph includes taxonomical treatment of tribes *Arethuseae* and *Malaxideae* of the largest subfamily, *Epidendroideae*, with 17 genera and 166 species, as well as some recent discoveries attributed to genera reviewed in previous issues of the monograph. Keys for identifications, valid name, necessary synonyms, type material citation, short description, data on ecology and distribution, as well as list of studied voucher specimens for each species are provided. Mentioned species are illustrated with original line drawings and color photographs. Eight species (*Liparis ngoclinhensis*, *L. longibracteata*, *Malaxis subtilis*, *Oberonia rhizoides*, *O. ngoclinhensis*, *O. sonlaensis*, *O. dolichostachys*, *Tainia acuminata*) are described as new for science. One nomenclature combination (*Miguelia shenzhenica* (Z.J. Liu et S.C. Chen) Aver.) is proposed.

Key words: Orchidaceae, Vietnam, orchid taxonomy, orchid diversity, nature protection.

Аннотация. Статья продолжает публикацию серийного издания иллюстрированного критического таксономического обзора орхидных флоры Вьетнама. Четвертая часть монографии включает стандартную таксономическую обработку триб *Arethuseae* и *Malaxideae* подсемейства *Epidendroideae*, включающих 17 родов и 166 видов. Для всех признаваемых видов приводятся законное название, наиболее значимые синонимы, цитирование аутентичного материала, краткое описание, данные по экологии и распространению, а также список изученных образцов. Все виды иллюстрированы черно-белыми рисунками и цветными фотографиями. Восемь видов (*Liparis ngoclinhensis*, *L. longibracteata*, *Malaxis subtilis*, *Oberonia rhizoides*, *O. ngoclinhensis*, *O. sonlaensis*, *O. dolichostachys*, *Tainia acuminata*) описываются в качестве новых для науки. Предложена одна новая номенклатурная комбинация в ранге вида (*Miguelia shenzhenica* (Z.J. Liu et S.C. Chen) Aver.).

Ключевые слова: орхидные, Orchidaceae, Вьетнам, систематика орхидных, разнообразие орхидных, охрана природы.

PREFACE

The article continues publication of illustrated critical taxonomical survey of orchids in the flora of Vietnam (Averyanov, 2008, 2010, 2011). The fourth part of the monograph presented here includes taxonomical treatment of tribes *Arethuseae* (subtrib. *Arundinae*, *Bletiinae*) and *Malaxideae* (subtrib. *Liparidinae*, *Oberoniinae*) of the largest

subfamily, *Epidendroideae*, with totally 17 genera and 166 species, as well as some recent discoveries attributed to the genera revisions of which were published in previous issues of the monograph. As in earlier parts, illustrated survey is presented here in the form of standard taxonomic treatment, which includes identification keys for all mentioned taxa and their short characterization. Correct name (with standard taxonomic reference), type, data

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about volume and distribution is reported for each taxonomic group. Data for each genus also include short description, total number of species and number of species in the flora of Vietnam (figures in brackets), as well as the genus distribution.

Presented data for each species include:

- valid name, most significant synonyms and citation of most important recent monographs and illustrations;

- available data about type;

- short description;

- available data on ecology, elevation of observed habitats, phenology, frequency of occurrence in the nature with approximate estimation of species status according to IUCN categories for the territory of Vietnam;

- general distribution and distribution in Vietnam (in brackets are mentioned in alphabetical order provinces where species was reported from);

- list of studied verified specimens and index of their host herbaria;

- when necessary, short notices on species taxonomy, biology, ecology, phenology or variation are also provided;

- line drawings and color photographs accompany in the book almost each species reported for the flora; collecting numbers of plants used as a model for illustration are cited on drawings or in notices to photographs.

Text of labels is maximally abbreviated whenever being cited. It usually includes only province name, district name, collectors name and collecting number, or, if necessary, date of collection. Largest recent collections are abbreviated and designated as series with following prefixes:

CBL – Cao Bang Limestone – collections on program of U.S.A. National Geographic Society “*Limestone Flora of Cao Bang Province of northern Vietnam*” (years 1998–1999, # 6300-98) with principal investigator Dr. Nguyen Tien Hiep;

CPC – collections made in expeditions managed by the Center for Plant Conservation (mainly Dr. Nguyen Tien Hiep, Prof. Leonid V. Averyanov and Prof. Phan Ke Loc);

CPNP – collections in Cuc Phuong national park (commonly without indication of collectors);

DDS – Prof. D.D. Soejarto – collections according to International Cooperative Biodiversity Groups program with this person as principal investigator;

DKH – Dr. D.K. Harder – collections according to expeditions with this person as a principal investigator;

HAL – Dr. Nguyen Tien Hiep, Prof. Leonid V. Averyanov, Prof. Phan Ke Loc – collections in collaborative explorations of these persons;

HLF – Henry Luce Foundation, collections of different collectors according to Vietnam Botanical Conservation Program supported from Henry Luce Foundation;

LX-VN – collections of Soviet (Liên Xô) – Viet Name Expedition (commonly without exact indication of collectors);

NMC – collections of staff member of Cuc Phuong national park – Mr. Nguyen Manh Cuong on the territory of the national park;

NTH – Dr. Nguyen Tien Hiep – collections in expeditions with this person as principal investigator;

P – Prof. Phan Ke Loc – collections in expeditions with this person as principal investigator;

VA – Vietnam-American Series – collections of international group with Dr. N.T. Hiep as principal investigator;

VH – Vietnamese Highlands – collections on program of U.S.A. National Geographic Society “*Flora of Highlands of South Vietnam*” (years 1993–2001, # 5094-93, 5803-96, 6383-98) with principal investigator Prof. Leonid V. Averyanov.

Modern administrative divisions of Vietnam with names of administrative units used in the text, as well as terminology list and terms explanation were presented in the first part of this monograph (Averyanov, 2008).

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formation in central Laos (Vientiane province, Vang Vieng and Kasi districts), 2012–2013.

Fauna & Flora International (Vietnam Program). “*The distribution of Paphiopedilum vietnamense and its current status in the wild*”. 2000; “*Community-based Conservation of the Hoang Lien Mountain Ecosystem, Vietnam, Flora and vegetation survey of Van Ban district, Lao Cai province of northern Vietnam*”, 2002; “*Preliminary survey of orchids and gymnosperms in Trung Khanh district, Cao Bang province northern Vietnam*”, 2004.

Fauna & Flora International Vietnam Conservation Support Program and the Ministry of Agriculture and Rural Development, Vietnam. “*Pu Luong – Cuc Phuong Limestone Landscape Conservation Project, Preliminary botanical survey of primary vegetation in Pu Luong nature reserve*”, 2003.

Fauna & Flora International (Vietnam Program) & Counterpart International. “*Preliminary survey of Orchids (Orchidaceae) in Phong Nha – Ke Bang National Park*”, 2005.

WWF Indochina Programme. Green Corridor Project in Thua Thien – Hue Province, VN 085301. “*Lowland flora and vegetation. Preliminary survey*”, 2005.

Basic Research program in Life Sciences of Viet Nam, # 611001. “*Threatened conifers and cycads of Vietnam*”, 2000–2002.

The Rufford Small Grant Foundation. “*Assessment of distribution and natural status of Paphiopedilum canhui, Vietnam*”, 2010–2011; “*Assessment of Xanthocyparis vietnamensis nature protected status in Tuyen Quang province, Vietnam*”, 2012–2013.

Chicago Zoological Society, Chicago Board of Trade Endangered Species Fund. “*Assessment of current natural status of critically endangered species – Paphiopedilum canhui for its conservation*”, 2010–2011.

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SUBFAMILY 5 EPIDENDROIDEAE LINDL.

(continuation)

Trib. *Arethuseae* (subtrib. *Arundinae*, *Bletiinae*)
and trib. *Malaxideae*
(subtrib. *Liparidinae*, *Oberoniinae*)

Trib. 5.5. *Arethuseae* Lindl.,

1821, Collect. Bot. App.; Rchb. f., 1868, in Seemann, Fl. Vitiensis: 295.

Type: *Arethusa* L.

28 (14) genera and 400 (66) species. Tropical zone of all continents, subtropic areas of Asia and N. America.

Subtrib. 5.5.1. *Arundinae* Dressler,

1990, Lindleyana 5, 2: 124. – Trib. *Arundineae* Holttum, 1953, Fl. Mal. 1: 182 (sub “*Arundina* tribe”), nom. invalid.

Type: *Arundina* Blume.

2 (1) genera and 12 (2) species. Tropics of Asia and tropical islands of western Pacific.

Arundina Blume,

1825, Bijdr., 6, fig. 73; id., 1825, ibid., 8: 401; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 370–374; Seidenf., 1986, Opera Bot., 89: 16–18; id., 1992, Opera Bot., 114: 77; Comber, 1990, Orch. Java: 87–88; id., 2001, Orch. Sumatra: 301–303; Seidenf., Wood, 1992, Orch. Malay. Sing.: 146–147; Aver., 1994, Ident. Guide Vietnam. Orch.: 88–89; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 865; Su Horng-Jye, 2000, Fl. Taiwan 5: 755; Pearce et Cribb, 2002, Orch. Bhutan: 319–321; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 11; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 253; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 265; Chen Sing-chi, Gale, 2009, Fl. China, 25: 314–315; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 466–473. – *Donacopsis* Gagnep., 1932, Bull. Mus. Natl. Hist. Nat. ser. 2, 4: 593; id., 1934, l.c. 6: 410, fig. 37, 1, p. veg. parte.

Type: *A. speciosa* Blume (*Arundina graminifolia* (D. Don) Hochr.).

Sympodial terrestrial herbs with very short rhizomes and erect tall, reed-like, many-leaved stems. Leaves grass-like, sheathing at the base, distichous, deciduous, convolute. Inflorescence terminal, few to many-flowered, sometimes branching raceme, with flowers opening in succession. Flowers short-lived, large, resupinate, white to purple. Sepals free, lip not mobile, without spur. Column foot absent. Pollinia 8, solid, caudicles without stipe and viscidium.

3–5 (2) species. Tropics of Asia and tropical islands of western Pacific.

Key to species

1. Plant develops few stout rigid stems to 2 m tall, 6–12 mm in diam., leaves light green, lanceolate, 15–25 cm long, 1–3 cm wide; inflorescence often branching, many-flowered; petals light pink or white, ovate, usually longer than 3 cm, about 2 cm wide, acute; lip about 4 cm long, 3 cm wide; capsule 4–6 cm long 1. *A. graminifolia*
- Plant develops dense clump of numerous slender herbaceous stems to 40–60 cm tall, 2–3 mm in diam. at base, leaves dark glossy green, linear, 5–15(20) cm long, 3–4 mm wide; inflorescence simple, commonly with 1–3 flowers; petals purple, lanceolate, less than 3 cm long and 8 mm wide, obtuse to roundish; lip 2.5–3 cm long, 2–2.5 mm wide; capsule less than 3 cm long 2. *A. caespitosa*

1. *A. graminifolia* (D. Don) Hochr.,

1910, Bull. New York Bot. Gard. 6: 270; Seidenf., 1986, Opera Bot., 89: 16, fig. 4, pl. 1d; id., 1992, Opera Bot., 114: 77; Comber, 1990, Orch. Java: 88, figs.; id., 2001, Orch. Sumatra: 301, fig.;

Seidenf., Wood, 1992, Orch. Malay. Sing.: 146, fig. 62, pl. 6d; Aver., 1994, Ident. Guide Vietnam. Orch.: 89; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 865, fig. 11208; Su Horng-Jye, 2000, Fl. Taiwan 5: 755, pl. 321, photo 86; Pearce et Cribb, 2002, Orch.

Bhutan: 319, fig. 76, pl. 12; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 12; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 253; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 265; Chen Sing-chi, Gale, 2009, Fl. China, 25: 315; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 471, fig. 379–383. – *Bletia graminifolia* D. Don, 1825, Prodr. Fl. Nepal: 29. – *Arundina speciosa* Blume, 1825, Bijdr. 8: 401; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 370. – *A. chinensis* Blume, 1825, Bijdr., 8: 402; Gagnep., 1933, l.c.: 371. – *A. bambusifolia* Lindl., 1831, Gen. Sp. Orchid. Pl.: 125; Gagnep., 1933, l.c.: 371. – ?*A. stenopetala* Gagnep., 1932, Bull. Soc. Bot. France 79: 32; id., 1933, l.c.: 372. – *Donacopsis laotica* Gagnep., 1932, Bull. Mus. Natl. Hist. Nat. ser. 2, 4: 593; id., 1934, l.c.: 410, fig. 37, 1, p. veg. parte.

Described from Nepal. **Type** – ?

Robust erect terrestrial herb. Stem thin, rigid, woody at base, to 2 m tall, with many grass-like leaves 8–20 cm long, 1–2 cm wide and terminal, often branching inflorescence of 1–5(15) odorless widely opening flowers, 4–7 cm across. Sepals and petals white to light pink-purple, 3–5 cm long, narrowly ovate to ovate, petals usually distinctly wider. Lip trumpet-shaped, 3–5 cm long, embracing the column, indistinctly 3-lobed with deeply cleft apex, undulate along margin, pink-purple, sometimes yellow at the center; disk with 3(5) low longitudinal lamellae. Column slender, without column foot, 2–3 cm long. Fruit cylindric capsule, 3–6 cm long, 1.5–2 cm wide. **Fig. 1**, a, b.

Ecology. Secondary grasslands on any soils at any elevations, often along steep grassy road cuts, sometimes open shrubs or open secondary forests on steep slopes or cliffs. Fl. Occasionally – any time, maximum – April – June. Very common (LC).

Distribution. Vietnam (probably all territory in any appropriate habitats). Tropics of Asia and tropical islands of western Pacific. Introduced and naturalized in Neotropics.

Studied specimens. Dak Lac, Ea H'Leo, *HAL 11415* (HN, LE, MO); Dak Nong, Dak Glong, *HLF 5582* (HN, LE); Gia Lai, *Averyanov et al., LX-VN s.n. a. 1985* (LE – photo); Ha Giang, Dong Van, *NTH 3342* (HN, LE); Kon Tum, Dak Gley, *VH 1726* (HN, LE, MO), *HAL 12016* (HN, MO); Kon Tum, Kon Plong, *Averyanov et al., LX-VN 2223* (HN, LE), *VH 5781* (HN, MO); Kon Tum, *VH 794* (HN, LE, MO); Lam Dong, Dalat, *Averyanov et al., LX-VN 1014* (HN, LE); Lam Dong, Lac Duong, *VH 3732* (HN, LE, MO), *VH 3974* (HN, LE, MO), *HLF 5274* (HN, LE); Lao Cai, between Sapa and Lao Cai, *Takhtajan 879* (LE); Lao Cai, Hoang Lien Son, Bac Ha, *Khoi, Hien, Do 313* (HN, LE); Ninh

Thuan, Ninh Son, *VH 3567* (HN, LE, MO); Quang Nam, Dai Loc, *CPC 3596* (CPC Herbarium); Quang Nam, Phuoc Son, *Averyanov et al., LX-VN 2886* (HN, LE); Quang Tri, Huong Hoa, *CPC 2806* (CPC Herbarium); Son La, Thuan Chau, *DKH 5671* (HN, LE, MO), *HAL 9705* (HN, LE, MO); Thanh Hoa, Muong Lat, *HAL 11217* (HN); Thua Thien – Hue, A Luoi, *HAL 7496* (HN), *HAL 7594* (HN, LE), *CPC 3175* (CPC Herbarium); Thua Thien – Hue, Phu Loc, *HLF 890* (HN), *HLF 1065* (HN, LE), *HLF 1295* (HN, LE); Vinh Phuc, Tam Dao, *Averyanov et al., LX-VN 2373* (HN, LE), *DKH 1777* (LE); Tonkin: bords du torrent de Ouonbi, *Balansa 317* (LE, P).

Note. One of the most common, variable and widespread orchid species in Vietnam. Typical pioneer element of secondary open plant communities, often observed along grassy road cuts and on grassy hill slopes with rocky degraded soils. One of few orchid species enable considerably spread its distribution in anthropogenic influenced areas. Ornamental and frequently cultivated.

Dwarf forms of this species described under the name *A. stenopetala* may be of hybrid origin (see note to following species).

2. *A. caespitosa* Aver.,

2007, Taiwania 52: 289, fig. 2B, 3 et 4; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 265. – *A. chinensis* auct. non Blume: Aver., 1994, Identification Guide Viet. Orch.: 88; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 12, p.p.

Described from central Vietnam (“Vietnam, Thua Thien – Hue Prov., A Luoi Distr., Huong Nguyen Municipality, in vicinities of Tra Ve forest protection station, around point 16°15'16"N, 107°26'57"E at elevation about 80 m a.s.l. Open riparian shrubs along rocky Tra Ve river valley on sandstone and granite outcrops”). **Type** (“6 May 2005. *L. Averyanov, P.K. Loc, T.V. Thao, N.T. Vinh, HAL 7953*”) – HN (holotype), LE (isotype). **Epitype** – d-EXSICCATES OF VIETNAMESE FLORA 0016/*HAL 7953*.

Lithophytic riparian herb with many caespitose reed-like stems 25–50(60) cm tall on short rhizome 2–3 mm thick. Stems in dense clusters (often with 100 and more shoots each), 2–4 mm thick, with 6–15 distichous leaves and terminal flower scape, leafless below. Leaves abbreviated to the top of stem, linear, strongly keeled, grass-like, 10–18 cm long, 2–5(6) mm wide, acute, dark glossy green. Scape erect or ascending, thin, rigid, 10–20 cm long, with 1–3 green sterile bracts and 1–4 flowered terminal, racemose, unbranched inflorescence. Floral bracts green, conduplicate,

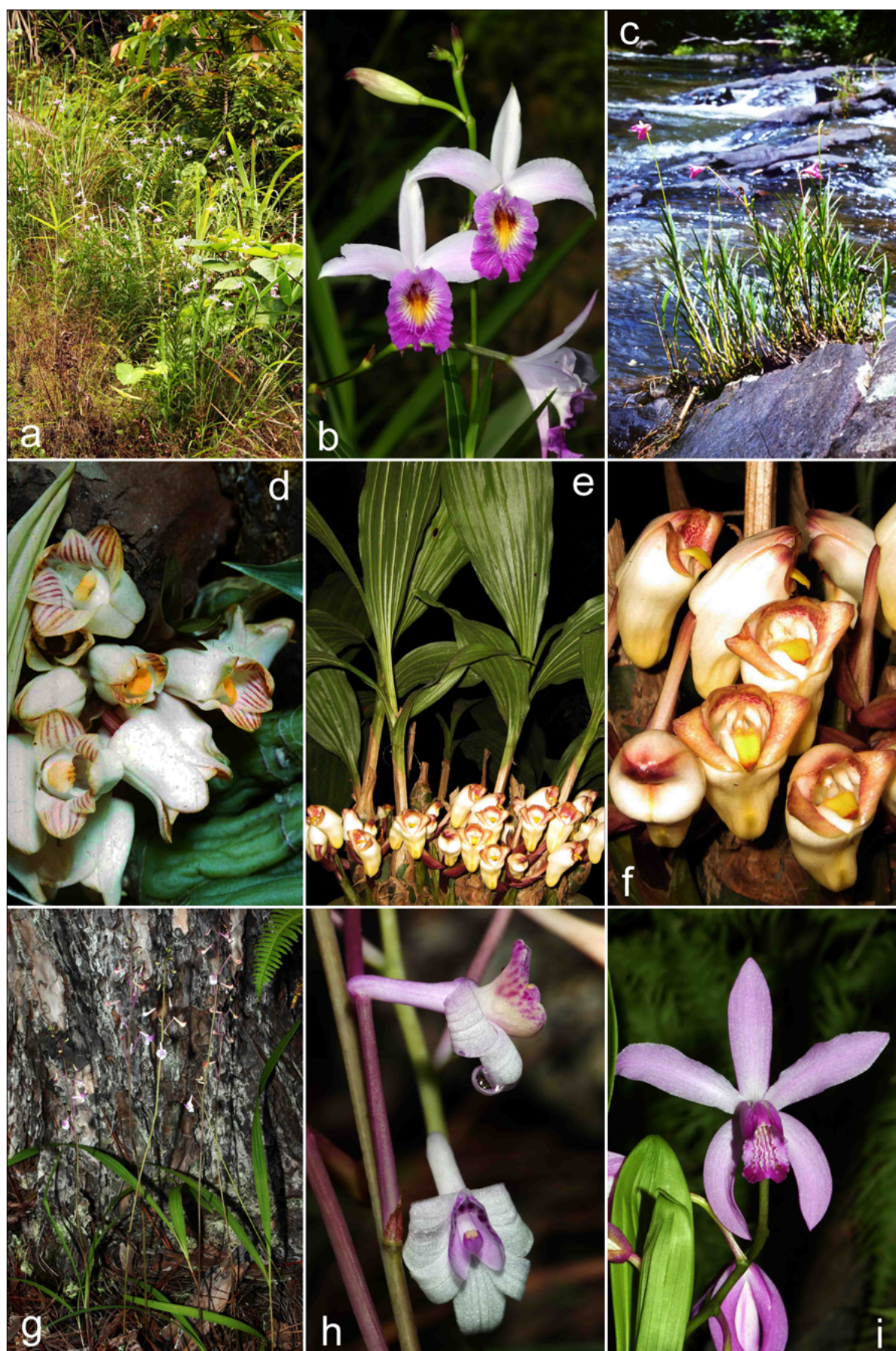


Fig. 1. *Arundina graminifolia*: a (CPC 3175), b (HAL 7594); *A. caespitosa*: c (Averyanov et al., LX-VN 1966); *Acanthephippium gougahensis*: d (Averyanov et al. 323, a. 1983); *A. sylhetense*: e, f (Dang Bui s.n., a. 2010); *Anthogonium gracile*: g, h (HLF 5199); *Bletilla striata*: i (China s.n.).

infundibular, broadly ovate, 2–4 mm long, persistent. Pedicel and ovary glossy green to purple-brown, glabrous, 10–14 mm long, 0.8–1 mm wide. Flowers fragrant, brightly purple, developed in succession, wide opening, 2.5–3 cm across, distant on 3–18 mm. Sepals oblong narrowly-ovate, 1.6–2.2 cm long, 5–7 mm wide, obtuse. Petals oblong-elliptic, 1.8–2.4 cm long, 6–8 mm wide, broadly-obtuse to roundish at apex. Lip sessile, trumpet-shaped, broadly-ovate in outline (when flattened), 2.2–2.8 cm long, 1.8–2.4 cm wide, with white center and 7–9 low keels traced with yellow warts, 3-lobed, wavy along margin. Lip

side lobes erect, embracing the column, triangular, with roundish apex, 7–9 mm long, 6–8 mm wide. Lip mid lobe semi-circular, 9–12 mm long and wide, emarginate to bilobed. Column white, erect, slender, 10–12 mm tall, 0.8–1.2 mm wide, at the base with small tuft of yellow-orange papillae. Capsule, 1.4–2.8 cm long, 5–8 mm wide. **Fig. 1, c; 2; 3.**

Ecology. Open wet sandstone and granite stream and rivers rocks along water line, particularly on small waterfall cliffs, occasionally flooded during torrential summer rains. 50–500 m. Fl. April – July. Very rare (CR).

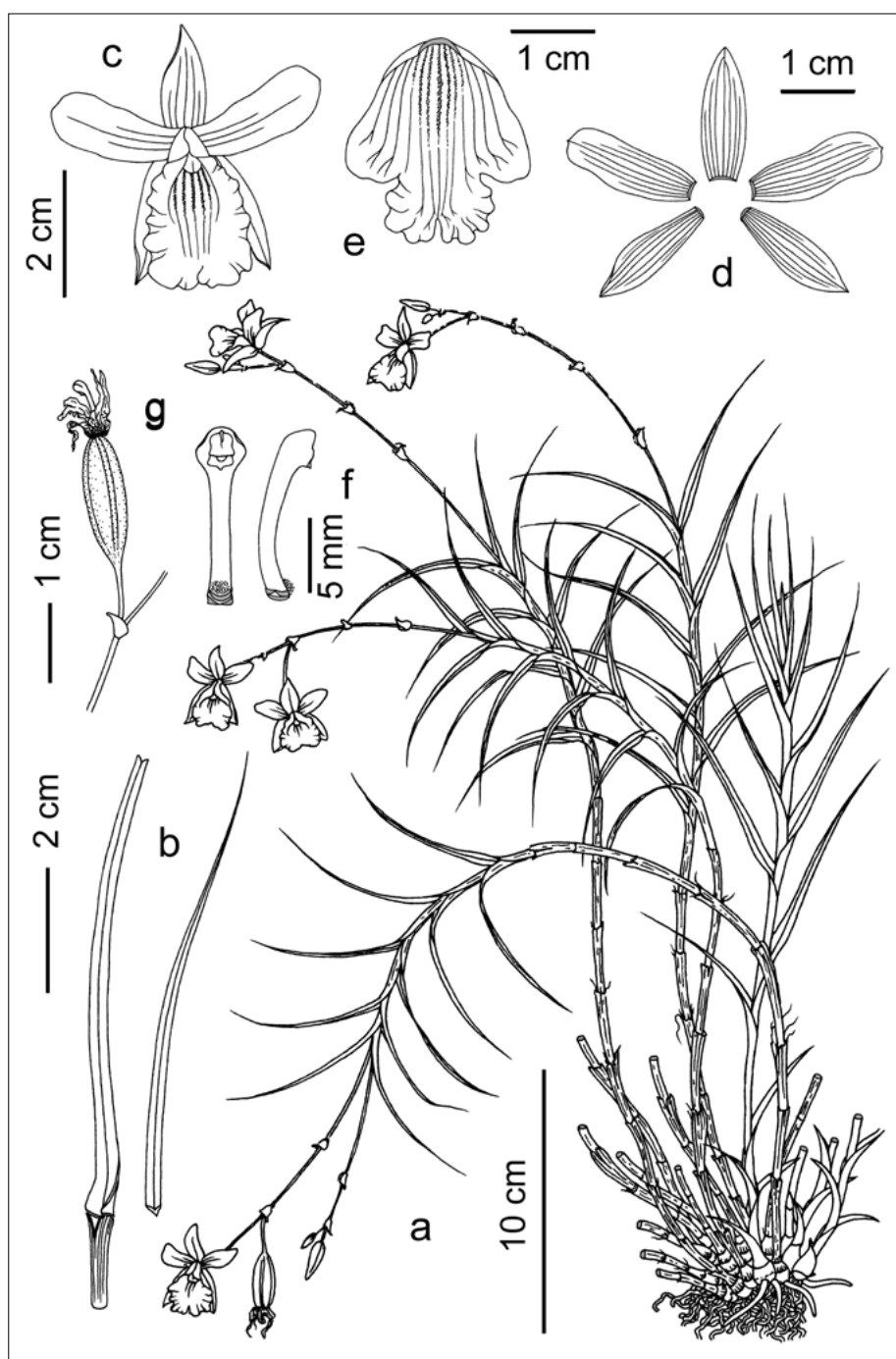


Fig. 2. *Arundina caespitosa*: a – flowering plant, b – portions of leaf, c – flower, d – flattened sepals and petals, e – flattened lip, f – column, frontal and side views, g – capsule (HAL 7953, type).



Fig. 3. Digital herbarium specimen of *Arundina caespitosa* (HAL 7953, epitype).

Distribution. Vietnam (Gia Lai, Khanh Hoa, Quang Nam – Da Nang, Quang Ninh?, Thua Thien – Hue). Laos, S. China?

Studied specimens. Gia Lai – Kon Tum, Kon Ha Nung, *Averyanov et al.*, *LX-VN 1966* (HN, LE); Khanh Hoa, Hon Ba, *sine coll. et n.*, 11 April 2011 (KRIB); Quang Nam, Dong Giang, *HAL 12093* (HN, LE, MO); Quang Nam – Da Nang, Phuoc Son, *Averyanov et al.*, *LX-VN 2851*, (HN, LE); Tonkin [Quang Ninh province?], Taai Wong Mo Shan and vicinity Tong Fa market Ha-coi., *W.T. Tsang 29471* (HN, LE).

Note. The plant strikingly differs from the previous widespread, common and very variable species in small dimensions of all its parts, dense caespitose habit, linear glossy, dark green leaves, small brightly purple flowers and specific ecology. It may be close to *A. minor* Lindl., endemic of Sri Lanka, from which it differs in longer and narrower leaves, much smaller floral bracts, smaller flowers, broader sepals, brightly purple lip (without yellow) with 7–9 warty keels.

Recent field observations in Vietnam demonstrated that *A. caespitosa* is very rare, critically endangered species, which stands on the verge of full extinction in the country. Some populations still survive on the territory of Laos in conditions of less anthropogenic impact (Schuiteman, 2010, pers. comm.).

The species has well prospects for cultivation as wonderful miniature ornamental plant on wet rocks in small home-garden basins of oriental style.

It is quite possible that unusually dwarf specimens of *A. graminifolia* described from southern Vietnam (Khanh Hoa, Nha Trang) and Cambodia (Kampot, Popok Vil waterfall) as *A. stenopetala* Gagnep. are in fact hybrid forms resulted from introgressive absorption of rare aboriginal endemic *A. caespitosa* by fast aggressively spreading and becoming very common *A. graminifolia*.

Subtrib. 5.5.2. *Bletiinae* Benth.,

1881, Journ. Linn. Soc. London (Bot.) 18: 287 (sub “*Bletieae*”). – Subtrib. *Calanthinae* Lindl., 1846, Veget. Kingd.: 182 (sub “*Calanthidae*”), nom. nud. – Trib. *Bletieae* Benth., 1873, Fl. Austr. 6: 270, 302 (sub “*Bletideae*”). – Trib. *Phajaeae* Pfitz., 1887, Entw. Nat. Anord. Orch.: 102 (sub “*Phajinae*”). – Subtrib. *Bletillinae* Schltr., 1914, Orch.: 106. – Subtrib. *Phajinae* Schltr., 1914, l.c.: 301. – Trib.

Nephelaphylleae Holttum, 1953, Fl. Mal. 1: 174 (sub “*Nephelaphyllum* tribe”), nom. invalid.

Type: *Bletia* Ruiz et Pavon.

26 (13) genera and 380 (64) species. Tropical zone of all continents, subtropic areas of Asia and N. America.

Acanthephippium Blume,

1825, Bijdr. 6, fig. 5; id., 1825, ibid. 7: 353 (sub “*Acanthophippium*” – sphalm.); id., 1818, Fl. Jav. 1: 6, emend.; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 333–334; Seidenf., 1986, Opera Bot., 89: 50–53; id., 1992, Opera Bot., 114: 83–84; Comber, 1990, Orch. Java: 89–90; id., 2001, Orch. Sumatra: 348–251; Seidenf., Wood, 1992, Orch. Malay. Sing.: 156–159; Aver., 1994, Ident. Guide Vietnam. Orch.: 109–114; Thomas, 1997, Orch. Monogr. 8: 119–134; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 876–877; Su Horng-Jye, 2000, Fl. Taiwan 5: 737–739; Pearce et Cribb, 2002, Orch. Bhutan: 274–276; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 9; Chen Sing-chi, Gale, Cribb, 2009, Fl. China, 25: 309–311; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 457–463.

Type: *A. javanicum* Blume.

Terrestrial herbs with fleshy ovoid to ovoid-cylindric pseudobulbs of few internodes clustering on short rhizome. Pseudobulbs covered with membranous sheaths, with 1–4 large plicate leaves articulated at apex. New shoot and lateral inflorescence arising from base of pseudobulb. Inflorescence short, erect, unbranched, fleshy, enclosed by few large imbricate sheaths, few flowered. Flowers resupinate, fleshy. Sepals connate at base forming urceolate mentum. Petals free, enclosed mentum, decurrent at base along column foot. Lip articulate at apex of column foot, 3-lobed; lateral lobes large, erect, broad; median lobe small reflexed, triangular to oblong; disk with varying number longitudinal keels. Column elongate, apically dilated, sometimes winged, with a column foot at base. Column foot very long, inflexed at middle, recurved toward apex. Anther subglobose to ovoid, 2-locular. Pollinia 8, in 2 groups of 4, obovoid, unequal in size, waxy, each group attached to a sticky viscidium by a broad caudicle. Rostellum broadly ovate; stigma broadly obovoid, entire. Capsule erect, ellipsoid, ridged.

11 (3) species. Tropical Asia, tropical islands of south-western Pacific.

Key to species

1. Pseudobulbs commonly with 1 leaf, rarely with 2–3 leaves; disc with 1(3) low keels; mentum at the middle suddenly narrowing into spur-like conical apex; flowers white, sepals with contrast dark purple venation 1. *A. striatum*

- + Pseudobulbs 2–3(4) leaves; disc with 3–5 distinct keels; mentum broadly round, often emarginate at apex; flowers yellowish-white, sepals without contrast purple venation 2
2. Sepals at apex with (4)6 broad purple longitudinal stripes; disk with 3 low papillose keels; median lip lobe cordate-triangular to almost round; column foot less than 3 cm long 2. *A. gougahense*
- + Sepals at apex with numerous small brownish-purple spots; disk with 3–5 high toothed lamellae; median lip lobe ligulate, distinctly longer than broad; column foot 3–4 cm long 3. *A. sylhetense*

1. *A. striatum* Lindl.,

1838, Bot. Reg. 24, misc. 45; Seidenf., 1986, Opera Bot., 89: 50, fig. 23, pl. 4 b; id., 1992, Opera Bot., 114: 84; Comber, 1990, Orch. Java: 90, fig.; Seidenf., Wood, 1992, Orch. Malay. Sing.: 157, fig. 68 a–f, pl. 7 d; Aver., 1994, Ident. Guide Vietnam. Orch.: 112; Thomas, 1997, Orch. Monogr. 8: 131, fig. 65, pl. 6 c; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 877, fig. 11257; Su Horng-Jye, 2000, Fl. Taiwan 5: 737, pl. 311, photo 82; Pearce et Cribb, 2002, Orch. Bhutan: 274, fig. 62; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 9; Chen Sing-chi, Gale, Cribb, 2009, Fl. China, 25: 310. – *A. sinense* Rolfe, 1913, Bull. Misc. Inf. Kew, 1913: 142. – *A. simplex* Aver., 1994, Ident. Guide Vietnam. Orch.: 109, fig. 4; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 877, fig. 11255 (sub *A. odoratum* – sphalm.); Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 9.

Described from Nepal. **Type** (“Nepal, via Bateman; cult. Kew”) – K-LINDL.

Plants to 45 cm tall. Pseudobulb 3–5 noded, narrowly ovoid, to 15 cm tall and 3 cm wide, 1(3)-leaved. Leaves subsessile to shortly petiolate, elliptic to obovate, acute, (15)20–30 cm long, 6–12(14) cm wide, with 3–5 prominent veins. Inflorescence to 12(15) cm tall, with several broad membranous bracts, 4–6(10) flowered. Floral bracts large, acute, cymbiform, (2)3–3.5 cm long. Flowers odorless, (2.5)3–4.5 cm long, fleshy, fragile, white, sepals with red-purple venation. Pedicel and ovary (2)3–3.5 cm long, sparsely finely pubescent. Dorsal sepal oblong, obtuse, 5–7-veined, adnate to lateral sepal, (1.5)2–2.5(2.9) cm long, 1–1.4 cm wide; lateral sepals oblique oblong, obtuse, recurved, 5–7-nerved, (2.6)3–3.5(3.8) mm long, 1.5–2 cm wide., adnate at base to column foot forming mentum, apex. Petals free, obtuse, obovate, (2)2.3–2.5(2.9) cm long, 0.8–1.1(1.2) cm wide. Lip moveable, placed on top of column foot, fleshy, 3-lobed, distinctly broader than long; lateral lobes erect, oblique half-round, (8)10(12) mm tall and wide; median lobe yellowish, with red spots or blotches, cordate to triangular, 4–6 mm long and broad, margin slightly undulate, apex acute, recurved. Disk with 1(3) low keels. Mentum suddenly narrowed at middle into spur-like apex 3–5(7) mm long. Column erect, 1–1.5 cm tall. Column foot 3–4 cm long, inflexed, adnate to lateral sepals. Anther about 3 mm tall. Rostellum flap

like, triangular. Stigma broadly obovoid. Capsule ellipsoid, ridged, (3.5)4–6 cm long to 3 cm in diam. **Fig. 4; 5.**

Ecology. Primary and secondary humid, shady, evergreen broad-leaved and mixed forests, commonly in flat shady places of rich soils. 300–1700 m. Fl. March – June. Not rare (LR).

Distribution. Vietnam (Dak Lac, Ha Giang, Hoa Binh, Kon Tum, Lam Dong, Lao Cai, Ninh Thuan, Quang Binh, Quang Nam, Quang Tri, Thua Thien – Hue, Vinh Phuc). NE. India, Nepal, Bhutan, S. China, Taiwan, S. Japan, Thailand, Vietnam, Malacca Peninsular, Java.

Studied specimens. Dak Lac, Krong Bong, *VH 6278* (HN, LE, MO, P); Ha Giang, Bac Me, *HAL 6452a* (HN, LE); Hoa Binh, Da Bac, *HAL 428* (HN, MO); Kon Tum, Kon Plong, *VH 5532* (HN, MO); Lam Dong, Dalat, *Vu Ngoc Long s.n. a. 1990* (LE); Lam Dong, Hon Giao, *VH 4395* (HN, LE, MO, P); Lam Dong, Lac Duong, *VH 2774* (HN, LE, MO), *VH 3747* (HN, LE, MO), *VH 4395* (HN, MO); Lam Dong, Langbian, *Averyanov et al., LX-VN 1664* (HN, LE), *LX-VN 1664* (HN, LE); Lao Cai, Van Ban, *DKH 6988* (HN, LE), *HAL 2796* (HN); Ninh Thuan, Ninh Son, *VH 3569* (HN, LE); Quang Binh, Le Thuy, *HAL 11460* (HN, MO); Quang Binh, Minh Hoa, *HAL 11647* (HN, LE, MO); Quang Nam, Dong Giang, *HAL 12124* (HN, MO); Quang Nam, SE Ngoc Linh mt., *VH 903* (HN, LE); Quang Tri, Huong Hoa, *HLF 5874* (HN), *CPC 2879* (CPC Herbarium); Thua Thien – Hue, Nui Bach Ma, *Poillane, 29855* (P); Thua Thien - Hue, Phu Loc, *HLF 1327* (HN); Vinh Phuc, Tam Dao, *Petelot, 5416* (P); Vinh Phuc, Tam Dao, *Averyanov et al., LX-VN 2325* (HN, LE); *LX-VN 2355* (HN, LE), *Averyanov, LX-VN s.n. a. 1988* (LE); d-EXSICCATES OF VIETNAMESE FLORA 0133/*HAL 11647* (HN, LE).

2. *A. gougahensis* (Guillaum.) Seidenf.,

1975, Contrib. Revis. Orch. Fl. Cambod. Laos Vietnam: 4, fig. 1; id., 1992, Opera Bot., 114: 84, fig. 43; Aver., 1994, Ident. Guide Vietnam. Orch.: 114; Thomas, 1997, Orch. Monogr. 8: 125, fig. 59; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 876, fig. 11254; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 9; Chen Sing-chi, Gale, Cribb, 2009, Fl. China, 25: 310; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 462, fig. 373–376. – *Calanthe gougahensis*

Guillaum., 1954, Bull. Mus. Natl. Hist. Nat. ser. 2, 26: 537. – *Acanthephippium thailandica* Seidenf., 1971, Bot. Tidsskr. 66, 4: 335, fig. 25; id., 1986, Opera Bot., 89: 53, fig. 25. – *A. odoratum* Aver., 1994, Ident. Guide Vietnam. Orch.: 112, fig. 5; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 877, fig. 11256 (sub *A. simplex* – sphalm.); Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 9. – *A. sinense* auct. non Rolfe: S. Hu, 1977, Gen. Orch. Hong Kong: 90, fig. 50; Barretto et Young Saye, 1980, Hong Kong Orch.: 14.

Described from southern Vietnam (“Annam: Gougah, 900 m”). **Type** (“C.R.S.T. N 153/sig., f. 144, 22 V 1954”) – P.

Plants to 45 cm tall. Pseudobulb narrowly ovoid, to 10(14) cm tall and 2–3 cm wide at the base with few broad membranous bracts and 2–4 leaves at the apex. Leaves subsessile to shortly petiolate, obovate, acute, 20–25 cm long, 3–7 cm wide, glossy green above, with 3–5 main veins. Inflorescence to 10(15) cm tall, fleshy, with few large herbaceous sterile bracts and 2–7 flowers. Floral bracts narrowly ovate, acuminate, 1.5–2.5(3) cm long, to 2 cm broad. Pedicel and ovary dull purple, 1.4–2 cm long. Flowers fragrant, creamy white, campanulate, 2.5–3 cm long. Sepals with (4)6 broad purple longitudinal stripes at recurved apex, connate at base forming urceolate tube; median sepal oblong, obtuse, 1.5–2 cm long, 8–10 mm wide; lateral sepals oblique ovate, shortly obtuse, 2–2.5 cm long, 1.2–1.5 cm wide, adnate to column foot. Petals oblique oblong, as long as median sepal, shortly acute. Lip moveable, placed on top of column foot, white to creamy, about 1 cm long, 2 cm broad, fleshy, 3-lobed; lateral lobes erect, hatchet-shaped, with fine purple marks; median lobe brightly yellow, triangular-cordate, rhombic to almost round, fleshy, verruculose, recurved; disk papillose, fleshy, with 3 low, verruculose keels. Mentum short, saccate, 6–7 mm long, round to emarginate at apex. Column fleshy, white, 1–1.4 cm tall. Column foot 1.5–2 cm long, inflexed. Anther 4 mm tall. Rostellum truncate with an apiculate tip. Stigma broadly obovoid. Capsule ellipsoid, 5–8 cm long, to 4 cm in diam. **Fig. 1, d; 6.**

Ecology. Primary and secondary broad-leaved forests on soils derived from silicate rocks, commonly in humid, shady places on rich soils. 50–900 m. Fl. April – May. Very rare (EN).

Distribution. Vietnam (Lam Dong, Thua Thien – Hue, Vungtau – Condao). SE. China, Thailand.

Studied specimens. Lam Dong, Dalat, Gougah, C.R.S.T. 226 (P); Lam Dong, Dalat, *Tixier*

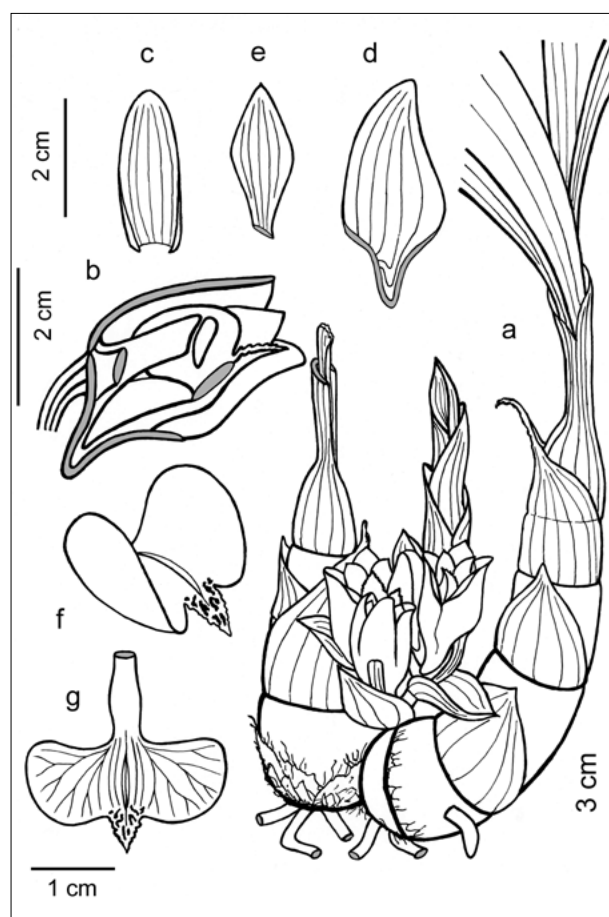


Fig. 4. *Acanthephippium striatum*: a – flowering plant, b – flower, side view, sagittal section, c – median sepal, d – lateral sepal, e – petal, f – lip, half-side view, g – flattened lip (Averyanov et al., LX-VN s.n., a. 1988).

s.n. (P); Thua Thien – Hue, Hue, *Dang Bui s.n.*, a. 2010 (LE – photo); Vungtau-Condao, Con Dao, *Averyanov et al.* 323, a. 1989 (HN, LE).

3. *A. sylhetense* Lindl.,

1833, Gen. Sp. Orchid. Pl.: 177; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 334; Seidenf., 1986, Opera Bot., 89: 52, fig. 24, pl. 4 c; Seidenf., Wood, 1992, Orch. Malay. Sing.: 157, fig. 68 j, k; Thomas, 1997, Orch. Monogr. 8: 133, fig. 66, pl. 6 a; Su Horng-Jye, 2000, Fl. Taiwan 5: 739; Pearce et Cribb, 2002, Orch. Bhutan: 276; Chen Sing-chi, Gale, Cribb, 2009, Fl. China, 25: 310.

Described from Bangladesh (“Sylhet”).

Type (“*Hooker et Thomson 198*”) – K-LINDL.

Plants to 50 cm tall. Pseudobulb narrowly ovoid, to 15 cm tall and 3 cm wide, of 3–6 nodes, with few broad papyraceous bracts, with 2–3(4) leaves at apex. Leaves subsessile to shortly petiolate, elliptic, acute, 5-veined, (25)30–40 cm long, (7)8–10(11) cm wide. Inflorescence to 15(20) cm tall, fleshy, with several broad sterile bracts and 3–5 dense flowers. Floral bracts purple, acute, cymbiform, 2–2.5 cm long. Flowers fragrant, fleshy, fragile, white (or

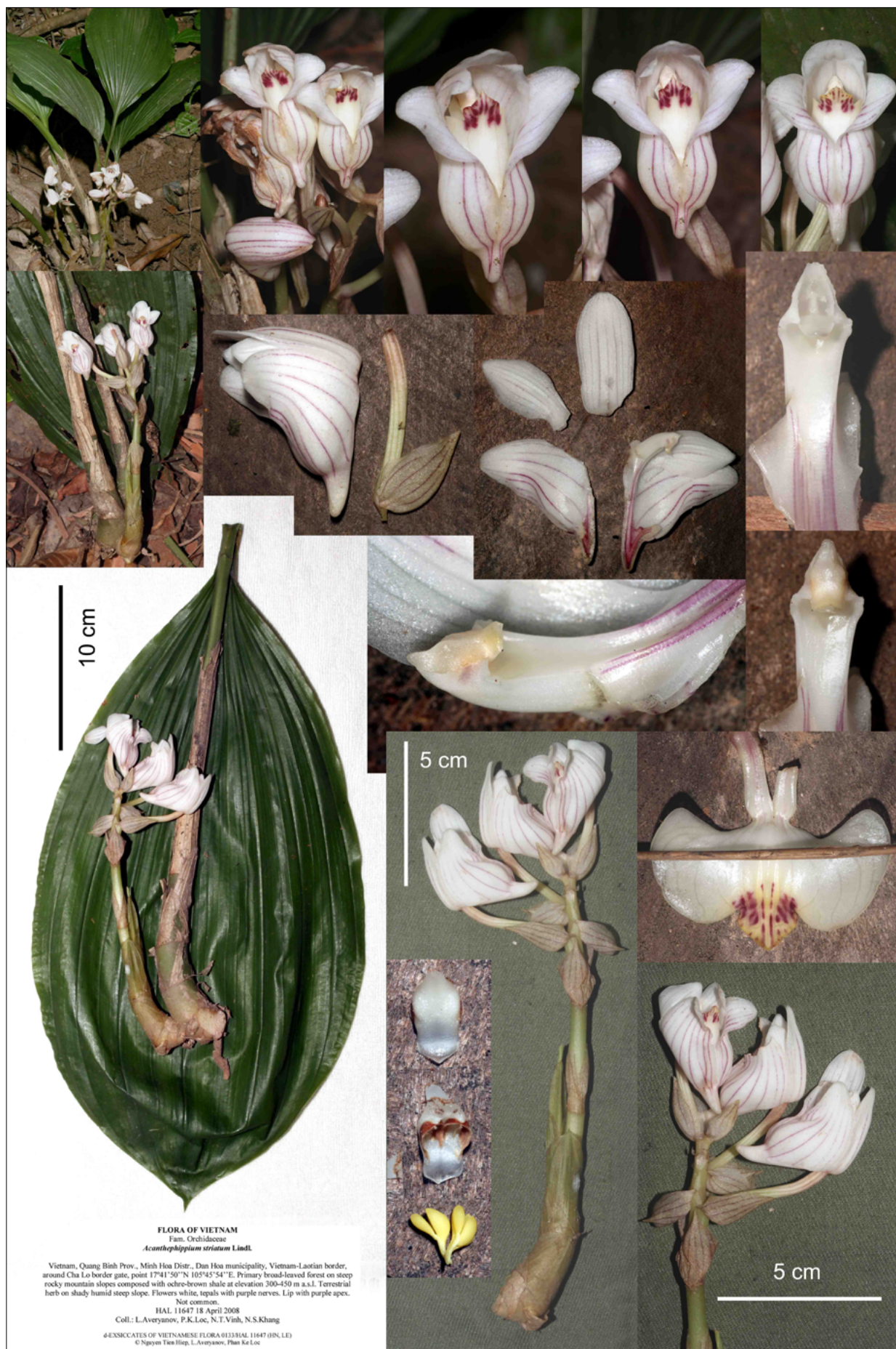


Fig. 5. Digital herbarium specimen of *Acanthephippium striatum* (HAL 11647).

light yellowish) with fine purplish-brown spots, campanulate-tubular, (3)4–4.5 cm long. Pedicel and ovary pale purple, 3–4 cm, sparsely finely pubescent. Dorsal sepal oblong, obtuse, 2–3 cm long, 1–1.5 cm broad, 7-veined. Lateral sepals oblique oblong, (3.5)4(4.5) cm wide, 1.7–2 cm wide, 7-veined, with recurved apices, connate at base forming an urceolate mentum. Petals obovate, obtuse, 2–2.5 cm long, 1–1.4 cm wide, 5-veined. Lip moveable, placed on top of column foot, fleshy, 3-lobed; about 1.5 cm long and broad; side lobes erect, white, half-round, embracing column, about 8 mm tall; median lobe lemon yellow, ligulate, obtuse, 6–8 mm long, strongly recurved. Disk with 3–5 toothed lamellae. Mentum saccate, obtuse-rounded at apex. Column 1.5 cm tall. Column 3.5–4.5 cm long, inflexed, adnate to lateral sepals. Anther 3 mm tall. Rostellum truncate. Stigma broadly obovoid. Capsule to 6 cm long. **Fig. 1, e, f.**

Ecology. Primary and secondary humid shady broad-leaved evergreen lowland and submontane forests on rich soils, commonly along valleys. 500–1300 m. Fl. April – July. Very rare (DD).

Distribution. Vietnam (Dien Bien). Bangladesh, NE. India, S. Japan, Myanmar, S. China (S. Yunnan), Taiwan, Thailand, Malaysia.

Studied specimens. Dien Bien, *Dang Bui s.n.*, a. 2010 (LE – photo).

Note. Very rare species known till now from Vietnam only by few photos of wild collected specimens originated from vicinities of Dien Bien Phu town without exact locality and collector name.

***Anthogonium* Wall ex Lindl.,**

1840, Gen. Sp. Orch. Pl.: 425; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 297; Seidenf., 1986, Opera Bot., 89: 67–68; id., 1992, Opera Bot., 114: 102; Aver., 1994, Ident. Guide Vietnam. Orch.: 98; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 877; Pearce et Cribb, 2002, Orch. Bhutan: 279–281; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 11; Chen Sing-chi, Wood, 2009, Fl. China, 25: 311.

Type: *A. gracile* Lindl.

Terrestrial ephemeroid tuberiferous herb to 50 cm tall. Tuber underground, oblique flattened to subglobose, 1–2 cm in diam., of several internodes. Leaves 2–3(5), petiolate, plicate, slender, linear to narrowly lanceolate, acuminate, (5)10–40 cm long, to 1(2) cm wide. Inflorescence erect, slender, simple or few branching raceme; peduncle slender, glabrous, pale green, glaucous, with several tubular sheaths; rachis 4–10 cm long, with (1)4–8(10) lax flowers; floral bracts ovate, acute, to 4 mm long.

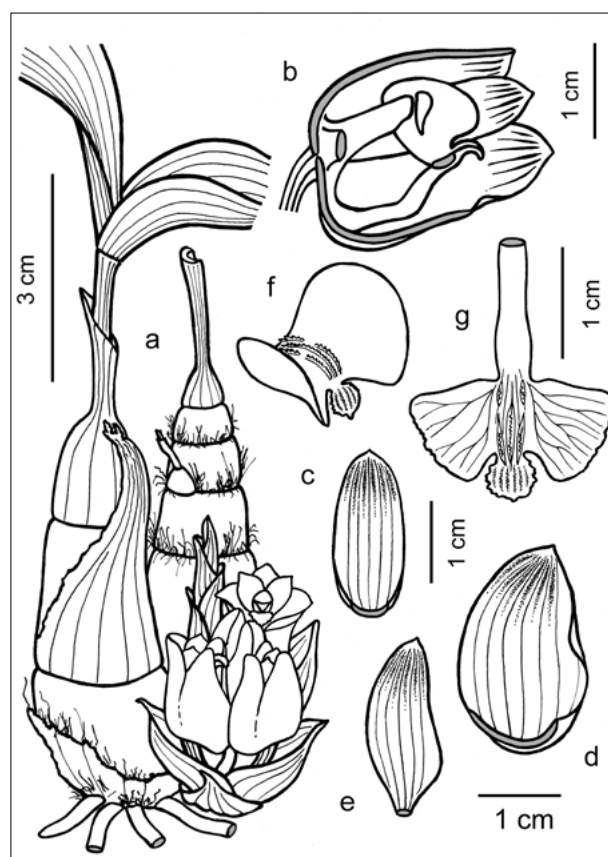


Fig. 6. *Acanthephippium gougahensis*: a – flowering plant, b – flower, side view, sagittal section, c – median sepal, d – lateral sepal, e – petal, f – lip, half-side view, g – flattened lip (Averyanov et al. 323, a. 1983).

Pedicel and ovary erect, 1.5–2 cm long. Flowers not resupinate, at acute angle to ovary, nodding, 1–1.8 cm long. Perianth segments spreading to strongly reflexed, purple-violet to white, 1–1.6 cm long. Sepals oblanceolate, basally connate forming tube 7–8 mm long. Petals spatulate, narrowing to linear base. Lip apically broadening to 3-lobed apex, with longitudinal purple lines and spots. Lip lobes ovate-triangular, obtuse, subsimilar. Column slender, 1.2–1.6 cm long, dilated and abruptly incurved, without foot. Anther cap yellow, rectangular. Pollinia 4, soft, without caudicle and viscidium. Capsule fusiform, 1–2.2 cm long, 3–5 mm in diam. **Fig. 1, g, h.**

Monotypic genus.

***A. gracile* Lindl.,**

1840, Gen. Sp. Orch. Pl.: 426; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 297, fig. 24, 1–8; Seidenf., 1986, Opera Bot., 89: 67, fig. 33; id., 1992, Opera Bot., 114: 102; Aver., 1994, Ident. Guide Vietnam. Orch.: 98; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 877, fig. 11258; Pearce et Cribb, 2002, Orch. Bhutan: 279, fig. 64, pl. 10; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 11; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 253; Schuiteman

et al., 2008, Nord. Journ. Bot., 26: 364; Chen Sing-chi, Wood, 2009, Fl. China, 25: 311.

Described from Nepal ("Nepal, Sheopore").

Type ("coll. Wallich Wall. Cat. 7398") – L-LINDL (holotype), K-W (isotype).

Ecology. Open secondary short tall grasslands, open shrubs, grassy secondary pine woodlands and open secondary pine forests on hill slopes composed by silicate rocks, sometimes along grassy road cuts. 1300–1800 m. Fl. September – October. Occasional (VU).

Distribution. Vietnam (Dak Lak, Lam Dong, Lao Cai, Son La). NE. India, Nepal, Bhutan, Bangladesh, Myanmar, S. China, Thailand, Laos, Cambodia.

Studied specimens. Dak Lak, Krong Bong, HLF 5449 (HN); Lam Dong, Camly, Evrard 268 (P); Lam Dong, Dalat, Evrard 1350 (P), N.T. Hiep 161 (HN, LE), Averyanov et al., LX-VN s.n., a. 1984 (LE – photo), HLF 5191a (HN, LE); Lam Dong, Dran, Dalat, Evrard 1245 (P), 1423 (P); Lam Dong, Lac Duong, HLF 5194 (HN), HLF 5199 (HN, LE), HLF 5312 (HN); Lao Cai, Chapa, Petelot 4955 (P), 5176 (P), 8530 (P); Son La, Phong Tho, DKH 5703 (HN, LE, MO).

Note. Flowers in population often vary from dark purple to nearly almost white. To the end of anthesis flowers usually become dirty purple-yellowish or dirty orange.

***Bletilla* Rchb. f.**

1853, Fl. Serr. Jard. Eur. 8: 246, nom. conserv.; Seidenf., 1992, Opera Bot., 114: 77–78; Aver., 1994, Ident. Guide Vietnam. Orch.: 94–95; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 878; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 13; Chen Sing-chi, Gale, Cribb, 2009, Fl. China, 25: 209–210; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 288–292. – *Bletia* Ruiz et Pav., 1794, Fl. Peruv. Prodr.: 119, p.p.; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 374.

Type: *B. gebina* (Lindl.) Rchb. f. (*Bletia gebina* Lindl., *Bletilla striata* (Thunb.) Rchb. f.).

Terrestrial tuberiferous ephemeroïd herbs. Tuber underground, subspherical, irregularly flattened, with 2–6 subsessile leaves on short erect stem. Leaves plicate, elliptic. Inflorescence terminal, few flowered raceme, with 1 or more short sterile bracts. Floral bracts lanceolate, caducous. Flowers resupinate, white to purple, or yellow-orange. Sepals and petals free, similar, free, spreading. Lip 3-lobed, without spur, nor moveable; lateral lobes erect, embracing column; disk with lamellate keels. Column arcuate, slender, winged, without column foot. Anther subterminal, incumbent. Pollinia 8, in 2 groups, oblong and laterally compressed, granular-farinaceous, with small caudicles and viscidia. Stigma suborbicular to transversely elliptic. Rostellum truncate. Capsule erect, oblong-fusiform.

6 (2) species. Tropical and subtropical mainland Asia, Japan, Taiwan.

Key to species

1. Flowers pink to purple, rarely white with pink tint; lip side lobes obtuse to acute; disk purple 1. *B. striata*
- + Flowers yellow to pale yellow-orange of yellow-greenish; side lobes round at apex; disc brightly yellow with small dark purple spots 2. *B. ochracea*

1. *B. striata* (Thunb.) Rchb.f.

1878, Bot. Zeit. (Berlin) 36: 75; Seidenf., 1992, Opera Bot., 114: 77; Aver., 1994, Ident. Guide Vietnam. Orch.: 94; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 878, fig. 11260; Chen Sing-chi, Gale, Cribb, 2009, Fl. China, 25: 210; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 291, fig. 49, 239, 240. – *Limodorum striatum* Thunb., 1784, Fl. Jap.: 28. – *Cymbidium hyacinthinum* Sm., 1805, Exot. Bot. 1: 117. – *Bletia hyacinthina* (Sm.) W.T. Aiton, 1813, Hortus Kew. 5: 206; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 374, fig. 33, 4–7.

Described from Japan ("in Saikoks").

Type – UPS?

Herb 15–50 cm tall with tuber 1–3 cm in diam. and 4–6 broadly lanceolate leaves 8–25 cm long. Peduncle 10–30 cm long with 1 sterile

bract; rachis flexuous, simple or rarely branched, 3–10-flowered. Floral bracts narrowly ovate, acute, 6–20 mm long. Flowers widely opening, pink to purple, 3–4(5) cm across. Sepals and petals broadly lanceolate, 1.5–3 cm long. Lip obovate, 1.5–2 cm long, 3-lobed; lateral lobes erect, acute; median lobe subquadrate, truncate, crisped at margin; disk with 5 lamellate undulate keels. Column slender, 1.4–2 cm tall, with narrow wings. Capsule fusiform, about 3 cm long. **Fig. 1, i.**

Ecology. Evergreen broad-leaved and coniferous grassy forests and rocky outcrops. 100–3200 m (data for China). Fl. April – May. Rare (VU).

Distribution. Vietnam? Myanmar, China, Korea, Japan, Laos?

Note. Any documented records of this species in Indochina are not yet available. Expectedly it

can be found in highland montane regions of northern Vietnam and Laos (Gagnepain, 1933, l.c.: 374). Often cultivated as ornamental and medicinal terrestrial herb and occasionally naturalized.

2. *B. ochracea* Schltr.,

1913, Repert. Spec. Nov. Regni Veg. 12: 105; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 13; Chen Sing-chi, Gale, Cribb, 2009, Fl. China, 25: 210.

Described from SW. China ("Yunnan: Auf Felsen unter Baumen bei Long-Ku, 700 m u. d. M."). **Type** ("Maire no. 14, bluhend im August") – ?

Herb 20–40 cm tall with tuber 1.5–2.5 cm in diam. and 3–4(5) broadly lanceolate, acuminate leaves 10–30 cm long, 1.5–2.5 cm wide. Inflorescence to 40 cm tall, rachis simple, slightly flexuose, with 3–8 flowers. Floral bracts narrowly ovate, acute, 1.5–2 cm long. Flowers odorless, widely opening, yellow to pale yellow-orange or yellow-greenish. Pedicel and ovary 1.5–2 cm long. Sepals and petals subsimilar, narrowly ovate, obtuse or shortly cucullate, outside with fine brown-purple spots, 1.5–2 cm long. Lip obovate, 1.5–2 cm long, 3-lobed; lateral lobes erect, roundish at apex; median lobe subquadrate, emarginate, undulate along margin; disk brightly yellow spotted with dark purple, with 5 lamellate undulate keels. Column white, 1.5–1.8 cm tall, with narrow wings. **Fig. 7, a, b.**

Ecology. Open secondary grassy shrubs and short tall grasslands on alluvial clay wet soils of limestone hill slopes, sometimes along grassy road cuts. 600–800 m. Fl. March – May. Very rare (DD).

Distribution. Vietnam (Bac Can, Cao Bang?). Myanmar, S. China, Korea, Japan.

Studied specimens. Bac Can, Ngan Son, CBL 1260 (HN, LE, MO); Bac Thai, Ngan Son, DKH 4364 (HN, LE, MO).

Note. The single population of *B. ochracea* known in Vietnam was discovered in Ngan Son district (Bac Can province) very near to the border of Cao Bang province, why species can be certainly found in the latter province. Noticeable, that this very rare species was observed in the discovered

locality as common and even abundant plant (observation in April 1999).

Cephalantheropsis Guillaum.,

1960, Bull. Mus. Natl. Hist. Nat. ser. 2, 32: 188; Seidenf., 1986, Opera Bot., 89: 38–40; id., 1992, Opera Bot., 114: 101–103; Seidenf., Wood, 1992, Orch. Malay. Sing.: 179–180; Ormerod, 1998, Orch. Digest, 62, 4: 155–158; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 874–875; Su Horng-Jye, 2000, Fl. Taiwan 5: 792–796; Comber, 2001, Orch. Sumatra: 276; Pearce et Cribb, 2002, Orch. Bhutan: 296–298; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 19; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 257; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 273; Chen Sing-chi, Gale, Cribb, 2009, Fl. China, 25: 288–289; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 417–422. – *Phaius* Lour., 1790, Fl. Cochinchin. 2: 529, p.p. – *Calanthe* R. Br., 1821, Bot. Reg. 7, sub t. 573, p.p.; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 384–398. – *Gastrochis* Schltr., 1924, Feddes Repert. (Beih.) 33: 166, p.p.; Aver., 1994, Ident. Guide Vietnam. Orch.: 98–99. – *Paracalanthe* Kudo, 1930, Journ. Soc. Trop. Agric. Taiwan, 2: 235, p.p.

Type: *C. lateriscapa* Guillaum. (*C. longipes* (Hook. f.) Ormerod).

Terrestrial sympodial herbs with short rhizome and few erect reed-like, many noded, stems leafy above. Leaves plicate, subsessile, articulate. Inflorescences 1–3, lateral, erect or ascending, loose many flowered raceme. Peduncle with few sterile bracts at base. Floral bracts lanceolate, caducous. Flowers resupinate, widely opening. Sepals and petals subsimilar, free, spreading to reflexed. Lip 3-lobed, spurless, concave; lip side lobes erect, loosely embracing column; median lobe rectangular, widening from short claw, 2-lobulate, crisped along margin; disk of 2 low keels. Column stout, winged, without a column foot. Anther terminal, incumbent. Rostellum ovate, small. Stigma suborbicular. Pollinia 8, in 2 groups, equal in size, narrowly obovoid, waxy, borne on a globose viscidium.

4 (2) species. Tropical and subtropical mainland Asia, S. Japan, Taiwan, Sumatra, Philippines.

Key to species

1. Plants (35)50–100 cm tall; sepals and petals green or yellowish-green; lateral lobes of lip triangular acute to attenuate; median lip lobe as wide as flattened lateral lobes 1. *C. obcordata*
- + Plants 30–50(70) cm tall; sepals and petals white; lateral lobes of lip broadly obtuse to roundish-truncate premarse; median lip lobe narrower than flattened lateral lobes 2. *C. longipes*

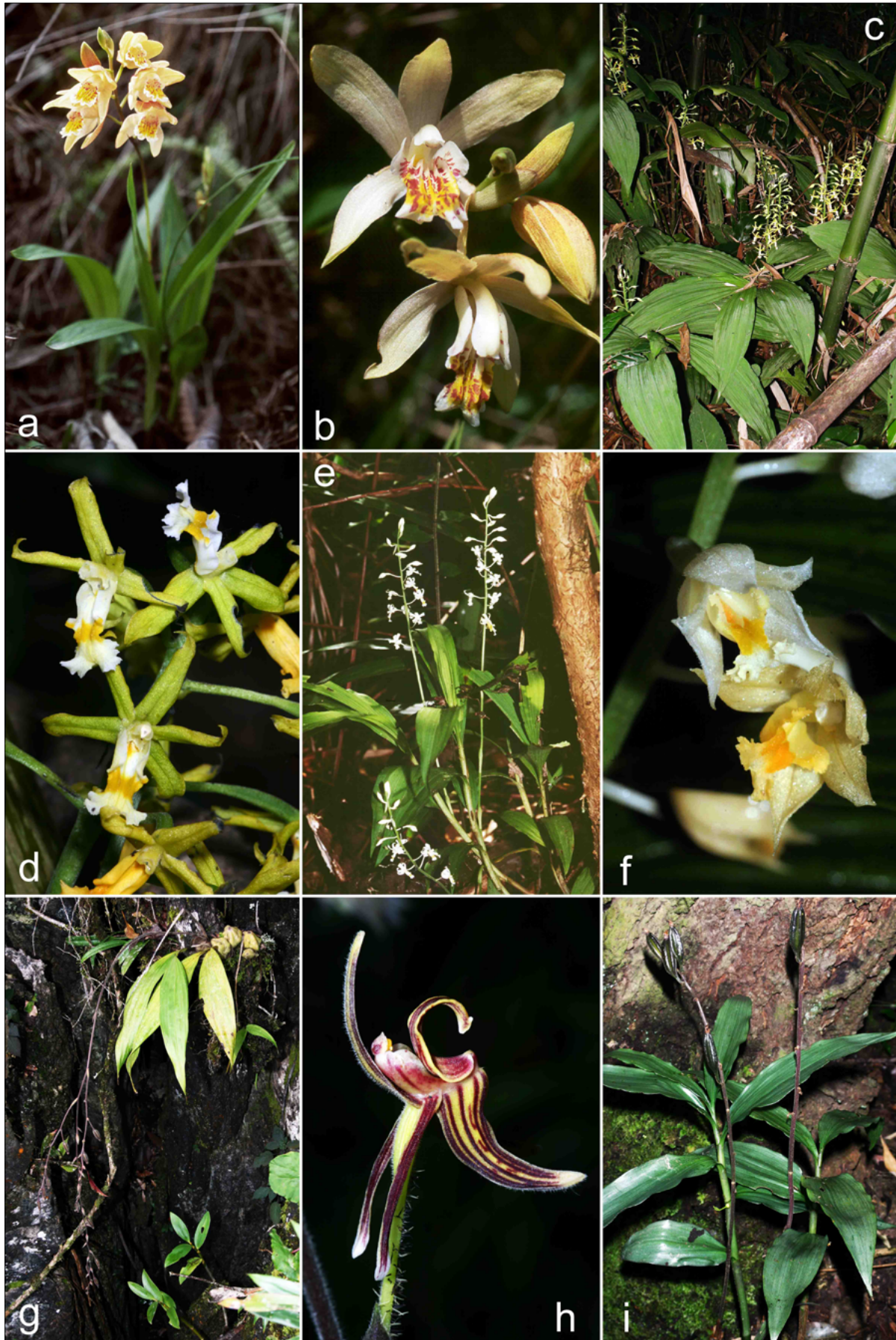


Fig. 7. *Bletilla ochracea*: a, b (CBL 1260); *Cephalantheropsis obcordata*: c (J. Skornickova s.n., a. 2010), d (HAL 10234); *C. longipes*: e (Averyanov et al., VH s.n., a. 1995), f (P.K. Loc et al., WP 1191c); *Eriodes barbata*: g (CPC 925), h (HAL 8624); *Plocoglottis bokorensis*: i (HLF 5569).

1. *C. obcordata* (Lindl.) Ormerod,

1998, Orch. Digest, 62, 4: 157, fig 1c-e, 2g-i; Comber, 2001, Orch. Sumatra: 276; Pearce et Cribb, 2002, Orch. Bhutan: 296–298; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 19; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 257; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 273; Chen Sing-chi, Gale, Cribb, 2009, Fl. China, 25: 288–289; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 417, fig. 343–347. – *Bletia obcordata* Lindl., 1831, Gen. Sp. Orch. Pl.: 123. – *Calanthe gracilis* Lindl., 1833, Gen. Sp. Orch. Pl.: 251; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 397. – *Calanthe bursicula* Gagnep., 1950, Bull. Mus. Natl. Hist. Nat. ser. 2, 22: 509. – *Cephalantheropsis gracilis* (Lindl.) S.Y. Hu, 1972, Quart. Journ. Taiwan Mus. 25, 3–4: 213; Seidenf., 1986, Opera Bot., 89: 38, fig. 17, pl. 3b; id., 1992, Opera Bot., 114: 102; Seidenf., Wood, 1992, Orch. Malay. Sing.: 180, fig. 77; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 874, fig. 11246; Su Horng-Jye, 2000, Fl. Taiwan 5: 795. – *Gastrorchis gracilis* (Lindl.) Aver., 1988, Prelim. list Vietnam. Orch.: 203; id., 1994, Ident. Guide Vietnam. Orch.: 99.

Described from NE. India (“Hab. in Sillet”).

Type (“Wallich”) – K?

Herb (35)50–100 cm tall. Leaves 4–8, elliptic, (12)15–30(35) cm long, 3–6(8) cm wide, shortly acuminate. Inflorescences 1–3, 35–60 cm tall; peduncle densely puberulent, with few sterile bracts. Rachis 5–15(20) cm long. Floral bracts lanceolate, 2–4 cm long, membranous, acuminate. Pedicel and ovary 1–2 cm long, densely puberulent. Flowers fragrant, spreading horizontally. Tepals yellowish-green to dull yellow, lip white with orange-yellow center, perianth turning orange-brown with age. Sepals and petals reflexed, broadly lanceolate; acute to shortly mucronate, (7)8–11(12) mm long, 3.5–4 mm wide, puberulent outside. Lip white, with yellow disc and yellowish at the base, cymbiform, oblong, 9–12 mm long, 3-lobed, with 2 lamellate, finely papillose keels. Lip side lobes erect, at apex attenuate-spatulate, forming forward directed or recurved auricles. Median lobe shortly clawed at the base, emarginate, 2–3 mm long, 5–7 mm wide, with rectangular lobules strongly crisped along margin. Column 3–4 mm tall, shortly winged below middle, hairy. Rostellum ovate-triangular, 0.8 mm long. Capsule fusiform, ridged, 1.5–2 cm long, 8–10 mm wide. **Fig. 7**, c, d.

Ecology. Primary evergreen humid broad-leaved, mixed and coniferous submontane and montane forests, commonly in shady depressions

with rich soils. 1000–2400 m. Fl. September – December. Not rare (VU).

Distribution. Vietnam (Cao Bang, Dak Lac, Ha Giang, Kon Tum, Lai Chau, Lam Dong, Lang Son, Lao Cai, Nghe An, Quang Tri, Thanh Hoa, Vinh Phuc). NE. India, Myanmar, S. China, Hainan, Taiwan, S. Japan, Thailand, Laos, Malacca Peninsular, Indonesia, Philippines.

Studied specimens. Cao Bang, Nguyen Binh, *CBL 545* (HN, LE, MO); Dak Lak, Krong Bong, *VH 6147* (HN, MO); Ha Giang, Yen Minh, *P.K. Loc et al., WP 812* (HN, LE); Kon Tum, Dak Gley, *VH 1658* (HN, LE, MO); Kon Tum, Dakto, Ngok Guga, *Poilane, 35585* (P); Kon Tum, Kon Plong, *VH 5403* (HN, MO); Kon Tum, Ngoc Linh mts., *VH 839* (HN, LE); Lai Chau, Tam Duong, *HAL 10234* (HN, LE, MO); Lam Dong, *Averyanov et al., LX-VN s.n.*, a. 1984 (LE – photo); Lam Dong, Dalat, Camly, *Evrard, 230* (P); Lam Dong, Lac Duong, *VH 3748* (HN, LE, MO), *VH 4423* (HN, LE, MO), *P.K. Loc et al., WP 1176B* (HN, LE – photo); Lam Dong, Prenh, Dalat, *Evrard 2082* (P); Lam Dong, Sapoum, Haut Donai, *Poilane, 23124* (P); Lam Dong, Langbian, *Takhtajan 405* (LE); Lang Son, Lung Lung, *Takhtajan 405* (LE); Lao Cai, Than Uyen, *NTH 2673* (HN, LE); Lao Cai, Van Ban, *HAL 2126* (HN); Nghe An, Tuong Duong, *HLF 7091* (HN, MO); Quang Tri, Dong Eri, *Poilane, 25325* (P); Quang Tri, Huong Hoa, *HLF 5805* (HN); Thanh Hoa, Ba Thuoc, *HAL 4103* (HN, LE – photo); Vinh Phuc, Tam Dao, *Hiep 15040* (HN, LE), *Averyanov et al., LX-VN 1361* (HN, LE); *LX-VN 2364* (HN, LE); *LX-VN 4030* (HN, LE), *J. Skornickova s.n.*, a. 2010 (LE – photo).

2. *C. longipes* (Hook. f.) Ormerod,

1998, Orch. Digest, 62, 4: 156, fig. 1a, b, 2d, e; Aver., 2001, Journ. Sci. (Hanoi), 17, 2:1, fig. 1; Pearce et Cribb, 2002, Orch. Bhutan: 296–298; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 19; Chen Sing-chi, Gale, Cribb, 2009, Fl. China, 25: 288–289. – *Calanthe longipes* Hook. f., 1890, Fl. Brit. India 6: 195. – *Cephalantheropsis lateriscapa* Guillaum., 1960, Bull. Mus. Natl. Hist. Nat. ser. 2, 32: 189; Seidenf., 1992, Opera Bot., 114: 102, fig. 55; Ormerod, 1998, Orch. Digest, 62, 4: 156, fig. 2c; Comber, 2001, Orch. Sumatra: 276; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 875, fig. 11247. – *Gastrorchis lateriscapa* (Guillaum.) Aver., 1988, Prelim. list Vietnam. Orch.: 204; id., 1994, Ident. Guide Vietnam. Orch.: 99.

Described from NE. India (“India, Sikkim, ...”). **Type** (“King s.n.”) – BM.

Herbs 30–50(70) cm tall. Leaves 4–7(8), elliptic, 8–20 cm long, 2–4(5) cm wide, shortly acuminate. Inflorescences 1–2, 10–20 cm long. Peduncle puberulent, with 3–4 sterile bracts and 5–15 flowers. Floral bracts caducous. Pedicel and ovary 1–2 cm long, puberulent. Flowers fragrant, spreading horizontally, widely opening, white; perianth turning orange with age. Sepals spreading or reflexed, broadly lanceolate to narrowly ovate, 6–8 mm long, 2–3 mm wide, puberulent outside, acuminate. Lip oblong, cymbiform, (5)6–8(10) cm long, 3–4 mm wide, 3-lobed. Lip side lobes erect, triangular-ovate, obtuse to roundish-truncate and irregularly incised with 2 lamellate yellow keels. Median lobe shortly clawed at base, transversely rectangular, often emarginate, strongly undulate along margin. Column 2.5–3.5 mm tall. Capsule fusiform, ridged, 1–1.5 cm long, 5–6 mm wide. **Fig. 7, e, f, 8.**

Ecology. Primary evergreen humid broad-leaved and mixed submontane and montane forests, commonly in shady depressions with wet rich soils. 600–1500 m. Fl. September – December. Not common (VU).

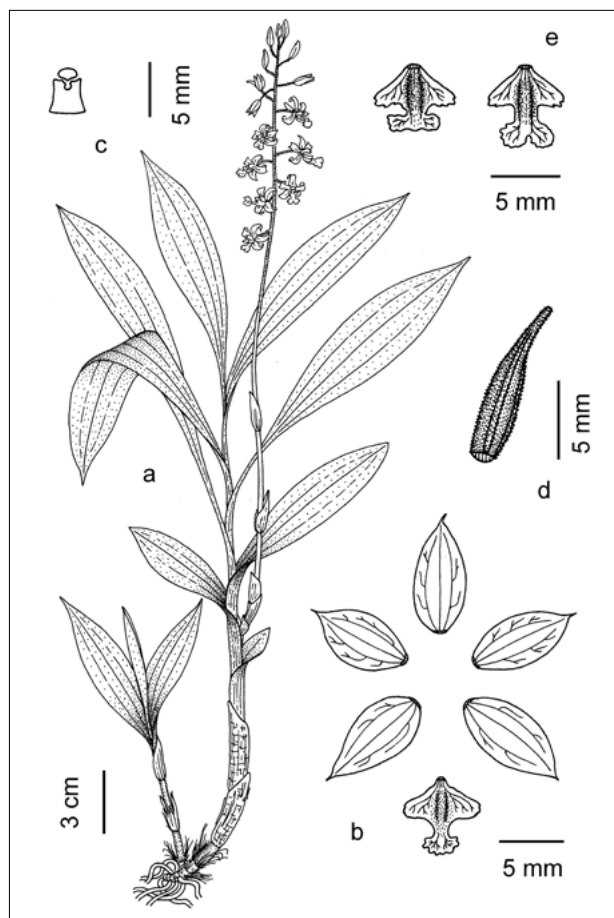


Fig. 8. *Cephalantheropsis longipes*: a – flowering plant, b – flattened sepals, petals and lip, c – column frontal view, d – pedicel and ovary, e – lip variation (VH 1926, 2404).

Distribution. Vietnam (Ha Giang, Kon Tum, Lam Dong, Lao Cai, Ninh Thuan, Thanh Hoa). Bhutan, NE. India, Myanmar, S. China, Taiwan, S. Thailand, Sumatra, Philippines.

Studied specimens. Ha Giang, Bac Me, HAL 6403 (HN); Kon Tum, Dak Gley, VH 1926 (HN, LE, MO, P); Kon Tum, Dak Gley, VH 2404 (HN, LE, MO, P); Lam Dong, Dalat, Camly, Evrard 230 (P); Lam Dong, Dalat, Langbian, Evrard 1767 (P); Lam Dong, Lac Duong, P.K. Loc et al., WP 1191c (LE); Lam Dong, Manline, Tixier 1259 (P); Lao Cai, Tonkin, route de Muong-Xen à Chapa, Chevalier 29372 (P); Ninh Thuan, Ninh Hai, HLF 4205 (HN, LE, MO); Thanh Hoa, Ba Thuoc, HAL 3961 (HN).

Note. Paul Ormerod treated *C. longipes* and *C. lateriscapa* as separate species, which differs in form of side lobes of epichile (Ormerod, 1998, l.c.). I could not distinguish separate entities on the base of very variable Vietnamese material. Additionally, some specimens of this polymorphic species exhibit certain resemblance to *C. obcordata* in form of tepals and lip, but have white flowers and general appearance of typical *C. longipes*. It is quite possible that such samples may be of hybrid origin.

Eriodes Rolfe,

1915, Orch. Rev. 23: 326.

Seidenf., 1986, Opera Bot., 89: 65–66; id., 1992, Opera Bot., 114: 85–86; Aver., 1994, Ident. Guide Vietnam. Orch.: 93–94; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 878; Pearce et Cribb, 2002, Orch. Bhutan: 298–300; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 35; Chen Sing-chi, Wood, 2009, Fl. China, 25: 285–286.

Type: *E. barbata* (Lindl.) Rolfe (*Tainia barbata* Lindl.).

Epiphytic, lithophytic or occasionally terrestrial herbs with stout creeping rhizome and few clustering subglobose, indistinctly ridged, glossy pseudobulbs (2.5)3–4(5) cm across leafy at apex. Leaves (1)2–3, shortly petiolate, narrowly elliptic, acuminate, 25–40 cm long, 2.5–5 cm wide. Inflorescence laxly flowered raceme or hardly branching panicle 50–80 cm long. Peduncle and rachis pubescent, with several densely pubescent sterile bracts. Floral bracts densely pubescent, lanceolate, acuminate, (0.5)1–1.5 cm long. Flowers (1)10–25(30), distant, odorless or fragrant, 2–2.5 cm in diam., tepals free, yellow with dark purple-violet stripes. Pedicel and ovary 2–3 cm long, pubescent with dense short hairs and large distant setose cilia. Sepals 1.5–2 cm long, median sepal oblong lanceolate, forward directed; lateral sepals oblique

falcate, reflexed, connate to column foot. Petals as long as sepals, reflexed, linear spatulate, shortly broadening at obtuse apex. Lip moveable, entire, ligulate, strongly recurved, (6)8–10 mm long, 3–5 mm wide, shortly sagittate at apex. Column as half as long of median sepal, winged, with distinct foot hooked at apex. Anther cap half globular, 8-locular. Pollinia 8, in 2 groups, attached to small viscidium. Stigma reniform. Rostellum in form of narrow bilobed membrane. Capsule on long stalk, fusiform 1.5–2.5 cm long, 5–8 mm in diam. **Fig. 7**, g, h.

Monotypic genus.

***E. barbata* (Lindl.) Rolfe,**

1915, Orch. Rev. 23: 326; Seidenf., 1986, Opera Bot., 89: 69, fig. 32, pl. 5a; id., 1992, Opera Bot., 114: 86, fig. 44; Aver., 1994, Ident. Guide Vietnam. Orch.: 94; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 878, fig. 11261; Pearce et Cribb, 2002, Orch. Bhutan: 298, fig. 67; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 35; Chen Sing-chi, Wood, 2009, Fl. China, 25: 285–286. – *Tainia barbata* Lindl., 1857, Gard. Chron., 1857: 68. – *Tainiopsis barbata* (Lindl.) Schltr., 1915, Orchis 9: 9; Seidenf., 1975, Contrib. Rev. Orch. Fl. Cambod. Laos Viet.: 106. – *Coelogyne nigrofurfuracea* Guillaum., 1955, Bull. Mus. Natl. Hist. Nat. ser. 2, 27: 143.

Described from NE. India (“India, Khasia”).

Type (“Griffith 5297”) – K.

Ecology. Primary evergreen humid broad-leaved, mixed and coniferous submontane and montane forests, commonly on very steep mossy rocky slopes. 1100–1500 m. Fl. October–December. Very rare (EN).

Distribution. Vietnam (Dien Bien, Ha Giang, Kon Tum, Lam Dong, Lao Cai, Son La). NE. India, Bhutan, Myanmar, SW. China, Thailand.

Studied specimens. Dien Bien, Tua Chua, CPC 925 (HN); Ha Giang, Meo Vac, HAL 8473 (HN); Kon Tum, Nhi Doi, Dinh, Dak Gley, Balansa 32786 (P); Lam Dong, Dalat town area, HAL 8624 (HN, LE); Lam Dong, Manline, Dalat, CRST 141 (P); Lam Dong, Dalat, Tixier 75 (P); Lao Cai, Sa Pa, Averyanov et al., HAL 8313a (LE – photo); Son La, Moc Chau, HAL 9327 (HN, LE, MO).

Note. Curious, taxonomically very isolated monotypic genus, combining characters of *Tainia*, *Eria*, *Bulbophyllum*, *Calanthe*, and *Spathoglottis*.

***Hancockia* Rolfe,**

1903, Journ. Linn. Soc. Bot. 36: 20; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 338–339; Turner, 1992, Orch. Monogr., 6: 63–64; Seidenf., 1992, Opera Bot., 114: 83; Aver., 1994, Ident. Guide

Vietnam. Orch.: 94; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 866; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 39; Chen Sing-chi, Wood, 2009, Fl. China, 25: 286.

Type: *H. uniflora* Rolfe.

Terrestrial sympodial creeping herbs with distant, fleshy, cylindric, ascending, petiole-like pseudobulbs covered by persistent papyraceous bracts. Pseudobulbs inconspicuous, of 1 internode, 1–2 cm apart from each other, 1–1.5 cm long, 1.5–2.5 mm in diam., 1-leaved. Leaves plicate, subsessile, ovate, acute, to shortly acuminate, 5–7.5 cm long, 2–3.3 cm wide, often finely crenulate along margin. Inflorescence terminal, arising from base of pseudobulb (heteranthous), 2–3 cm tall, 1-flowered. Floral bract cymbiform, 2–3 cm long. Pedicel and ovary glabrous, 2.5–3 cm long. Flower pink, resupinate, not opening widely. Sepals and petals free, subsimilar, oblong lanceolate, acute, 20–24 mm long, 3–4 mm wide. Lip adnate to column foot, elliptic, 3-lobed, 1.6–2 cm long, 0.9–1 cm wide, spurred at base; side lobes erect, triangular; mid-

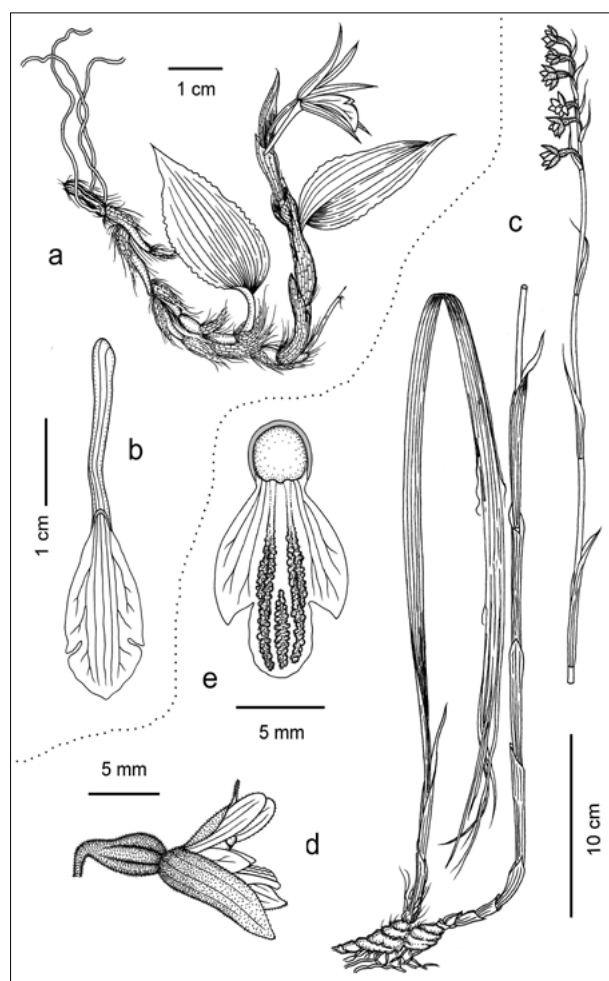


Fig. 9. *Hancockia uniflora*: a – flowering plant, b – flattened lip (Petelot 3561); *Pachystoma pubescens*: c – flowering plant, d – flower, side view, e – flattened lip (Tixier s.n., a. 1960).

lobe indistinctly cordate, obtuse; disc with 2 low, linear keels; spur tubular cylindric 1.6–2.2 cm long. Column straight, 1.4–1.6 cm long, with short indistinct foot. Anther cap 4-locular. Pollinia 8 on small caudicle. Capsule ellipsoid, 1.5–2.5 cm long. **Fig. 9**, a, b.

Monotypic genus.

***H. uniflora* Rolfe,**

1903, Journ. Linn. Soc. Bot. 36: 20; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 339, fig. 30, 10–14; Turner, 1992, Orch. Monogr., 6: 63, fig. 33; Seidenf., 1992, Opera Bot., 114: 83, fig. 42; Aver., 1994, Ident. Guide Vietnam. Orch.: 94; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 866, fig. 11211; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 39; Chen Sing-chi, Wood, 2009, Fl. China 25: 286.

Described from S. China ("Yunnan: Mengtze, S.E."). **Type** ("*A. Henry 11112*") – K (holotype), NY (isotype).

Ecology. Primary evergreen humid broad-leaved montane forests, in shady damp mossy places. 1400–1500 m. Fl. June – August. Very rare (EN).

Distribution. Vietnam (Lao Cai). SW. China, S. Japan.

Studied specimens. Lao Cai, Chapa, *Petelot 3561* (P); Lao Cai, Fan Tsi Pan mt., Chapa, *Petelot s.n.* (P).

Note. Rare monotypic genus allied to *Tainia* Blume and *Nephelaphyllum* Blume, but having 1-flowered inflorescence and flowers with a very long spur.

***Pachystoma* Blume,**

1825, Bijdr., 6, fig. 29; id., 1825, ibid., 8: 376; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 375–376; Seidenf., 1986, Opera Bot., 89: 54–56; id., 1992, Opera Bot., 114: 86; Comber, 1990, Orch. Java: 97; id., 2001, Orch. Sumatra: 280–282; Seidenf., Wood, 1992, Orch. Malay. Sing.: 159; Aver., 1994, Ident. Guide Vietnam. Orch.: 95; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 878; Su Horng-Jye, 2000, Fl. Taiwan 5: 993–994; Pearce et Cribb, 2002, Orch. Bhutan: 300–302; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 48; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 276; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 301; Chen Sing-chi, Wood, 2009, Fl. China 25: 286–287; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 405–411. – *Apaturia* Lindl., 1831, Gen. Sp. Orch. Pl.: 130.

Type: *P. pubescens* Blume.

Terrestrial tuberiferous ephemeroïd herb with underground cylindric tuber 4–8 mm in diam., forming floriferous and vegetative shoots at different time. Leaves 1–2, linear, 10–50 cm long, 0.6–1 cm wide, appearing after anthesis. Inflorescence erect,

leafless raceme, to 60 cm tall, with 4–8 brownish sheaths; rachis sparsely pubescent, laxly many-flowered; floral bracts erect, narrowly lanceolate, membranaceous, sparsely pubescent, 1–2 cm long. Pedicel and ovary clavate, densely pubescent, (6)8–10(12) m long. Flowers nutant, campanulate to well spaced, yellowish-green tinged with pink or purple, about 1 cm across. Sepals subsimilar, narrowly ovate, pubescent, acute, 1.2–1.5 cm long, lateral sepals oblique, forming short mentum. Petals oblanceolate to spatulate, 1.2–1.3 cm long, hairy, obtuse. Lip joined to column foot, fleshy, ovate to broadly ovate, 1–1.3 cm long, saccate at the base, 3-lobed; side lobes erect, triangular oblong; median lobe round to obtuse or shortly apiculate, recurved, ciliate; disk with 3–5 verruculose keels. Column clavate, 9–10 mm tall, incurved, densely hairy, with short foot. Rostellum insufficient. Anther cap shortly pubescent. Pollinia 8, waxy, without stipe and viscidium. Stigma reniform. Capsule ellipsoid, ridged, rostrate. **Fig. 9**, c-e.

Monotypic genus.

***P. pubescens* Blume,**

1825, Bijdr., 6, fig. 29; id., 1825, ibid., 8: 376; Seidenf., 1986, Opera Bot., 89: 54, fig. 26; id., 1992, Opera Bot., 114: 86; Comber, 1990, Orch. Java: 77, figs.; id., 2001, Orch. Sumatra: 281, fig.; Seidenf., Wood, 1992, Orch. Malay. Sing.: 159, fig. 69, pl. 8b; Aver., 1994, Ident. Guide Vietnam. Orch.: 95; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 878, fig. 11259; Su Horng-Jye, 2000, Fl. Taiwan 5: 993; Pearce et Cribb, 2002, Orch. Bhutan: 300, fig. 68; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 48; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 276; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 301; Chen Sing-chi, Wood, 2009, Fl. China, 25: 286; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 406, fig. 333–337. – *Pachystoma senile* (Lindl.) Rchb. f., 1855, Bonpl., 3: 251; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 375, fig. 33, 8–15. – *Apaturia senilis* Lindl., 1831, Gen. Sp. Orch. Pl.: 130.

Described from Java ("Java, Tijradjas, Krawang"). **Type** ("*Blume s.n.*") – L (Herb. no. 903162353).

Ecology. Secondary grasslands and secondary open grassy shrubs. 10–1500 m. Fl. March – September. Very rare (DD).

Distribution. Vietnam (Bac Giang, Ha Tay, Lam Dong, Thanh Hoa). India, Nepal, Bangladesh, Myanmar, China, SE. tropical Asia, New Guinea, N. Australia, New Caledonia, New Hebrides.

Studied specimens. Bac Giang, Colani, *Petelot 2913* (P); Ha Tay, Rivière Noire, en aval de

Tu-vu, *Balansa* 2025 (P); Lam Dong, Dalat, *Tixier s.n.* (P); Lam Dong, Dankia, Dalat *Tixier s.n.* (P); Lam Dong, Langbian, *Chevalier* 30687b (P); Lam Dong, Lang-Bian, Dalat, *Chevalier* 30683 bis (P); Thanh Hoa, Langhanh, *CRST* 190 sig. (P); “Bum m’o et Ya t’lu”, *Hayata* 334 (P); “Marais de Ben Thom” *Regnier* 22 (P); “Mi hoi”, *Regnier* 21 (P); “Ni Hoi”, “Tonkin”, *Bon* 351 (P).

Note. Very variable and widespread species which obviously has become very rare in Vietnam. It was not observed in the country during last 50 years.

***Plocoglottis* Blume,**

1825, Bijdr., 8: 380; Seidenf., 1986, Opera Bot., 89: 69–74; id., 1992, Opera Bot., 114: 102–105; Comber, 1990, Orch. Java: 103–105; id., 2001, Orch. Sumatra: 289–293; Seidenf., Wood, 1992, Orch. Malay. Sing.: 180–183; Aver., 2002. Journ. Sci. (Hanoi), 18, 1: 1–6; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 53; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 306.

Type: *P. javanica* Blume.

Terrestrial sympodial herbs with erect or ascending pseudobulbs clustering on creeping rhizome. Pseudobulbs of 1 to several internodes with 1 to many leaves at apex when pseudobulb elongated to leafy stem. Leaves petiolate or sessile, plicate. Inflorescence many flowered lateral erect raceme, arising from base of pseudobulb. Flowers opening in succession, resupinate, widely opening. Sepals and petals free, spreading. Lip spurless, fleshy, elastically hinged to column, sensitive. Column foot very short or absent. Pollinia 4, solid, with caudicles and common viscidium.

Note. A distinctive genus, easily recognized by sensitive lip, which suddenly snaps upward against column when touched.

40–45 (2) species. Andaman Islands, Thailand, Laos, Vietnam, Malacca Peninsula, Indonesia, Philippines, New Guinea, Solomon Islands.

Key to species

1. Pseudobulbs cylindrical, 1–1.5 cm in diam., oblique, their basal portions appear as thick creeping rhizome, apical part ascending, bearing 1 leaf; inflorescence commonly less than 0.5 m tall; floral bracts ovate; lip convex, hemispherical, cup-like, about 5 mm wide 1. *P. javanica*
- + Pseudobulbs ovate or bottle-shaped, 2–4 cm in diam., vertical, closely arranged on thin plagiotropic rhizome, apically bear many leaved shoot; inflorescence commonly longer than 0.5 m; floral bract lanceolate; lip curved, but not hemispherical, about 1 cm wide 2. *P. bokorensis*

1. *P. javanica* Blume,

1825, Bijdr., 8: 381, fig. 21; Seidenf., 1986, Opera Bot., 89: 69, fig. 34; Comber, 1990, Orch. Java: 104, fig.; id., 2001, Orch. Sumatra: 292, fig.; Seidenf., Wood, 1992, Orch. Malay. Sing.: 181, fig. 78 a; Wood, Cribb, 1994, Orch. Borneo: 136; Aver., 2002. Journ. Sci. (Hanoi), 18, 1: 2, fig. 2; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 53.

Described from Java (“Java, Salak, Pantjar”). **Type** (“*Blume* 590”) – L?

Pseudobulbs slender, 1-leaved, 10 cm long, 1–1.5 cm wide, ascending, their basal parts covered at base by papyraceous sheets, appear as thick creeping rhizome. Leaves petiolate, petiole slender, 10–20 cm long, leaf blade elliptic, acuminate, 20–35 cm long, 8–12 cm wide. Inflorescence arising from middle part of pseudobulb or from its base; scape 20–50 cm tall, rachis of many flowers opening in succession. Floral bracts green, ovate, 7–9 mm long. Flowers odorless. Sepals and petals yellow, with irregular dull reddish-purple marks. Sepals narrowly ovate 1.5 cm long, 6 mm wide, shortly apiculate. Petals lanceolate, 1.2 cm long, 2 mm wide. Lip light lemon yellow, with small purple marks at base, con-

vex, hemispheric, cup-shaped, 4 mm long, 5 mm wide, ending in reflexed narrow tooth-like tip. Column 5–6 mm tall, 2.5 mm wide, dull yellow, white at base, with short purple stripe on each side of stigma, dull red-purple marked on dorsal surface. Anther cap and stigma dull yellow. Ovary green with indistinct pale brownish marks. **Fig. 10; 12**, a, b.

Ecology. Primary humid evergreen, broad-leaved submontane forests on granite and gneiss, commonly in shady places on deep soils rich in humus. 700–900. Fl. August – October. Very rare (CR).

Distribution. Vietnam (Khanh Hoa). Andaman Islands, Thailand, Malacca Peninsular, Sumatra, Java, Kalimantan.

Studied specimens. Khanh Hoa, Khanh Le, *VH* 2483a (LE).

Note. The discovery of *P. javanica* in Vietnam is really surprising. Nearest area of its known occurrence is situated in Peninsular Thailand more than 1000 km to the SW from Vietnamese locality. Thus, the distribution of this species brightly illustrates floristic connection of warm-living submontane flora of southern Vietnam and Malesia.

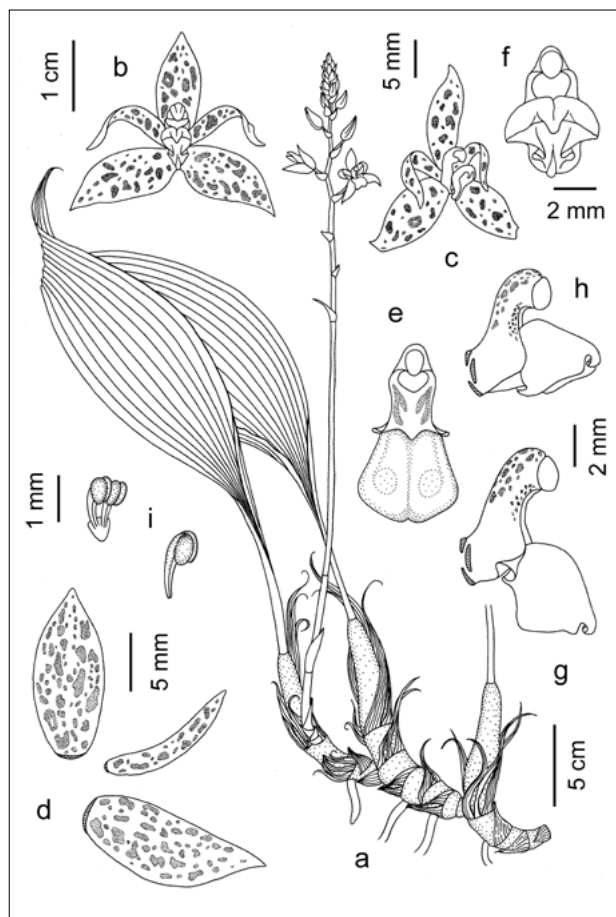


Fig. 10. *Plocoglottis javanica*: a – flowering plant, b – flower, frontal view, c – flower, half-side view, d – flattened sepals and petal, e, f – column and lip, frontal view, g, h – column and lip, side views, i – pollinaria (VH 2483a).

2. *P. bokorensis* (Gagnep.) Seidenf.,

1979, Dansk Bot. Ark., 33, 3: 219; Seidenf., 1986, Opera Bot., 89: 71, fig. 38; id., 1992, Opera Bot., 114: 105, fig. 56; Aver., 2002, Journ. Sci. (Hanoi), 18, 1: 3, fig. 3; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 53; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 306. – *Bulbophyllum bokorensis* Gagnep., 1950, Bull. Mus. Natl. Hist. Nat. ser. 2, 22: 399.

Described from Cambodia (“Bokor”). **Type** (“*Maspero s.n.*”) – P.

Pseudobulbs erect, ovate, bottle-shaped, 10–12 cm tall, 2–4 cm in diam., closely arranged on thin rhizome, apically elongated into many-leaved stem to 1 m tall. Young pseudobulbs covered by several papyraceous sheets, old one naked. Leaves sessile, elliptic, (3)5–10 cm long, 2–3.5 cm wide. Inflorescence arising from base of pseudobulb, scape erect, 0.5–1.5 m tall, with many flowers opening in succession. Floral bracts green, lanceolate, 1.5–2 cm long. Sepals and petals yellow with irregular dull red-purple marks. Sepals narrowly ovate, 1.2–1.5 cm long, 6–8 mm wide, shortly apiculate. Petals

broadly lanceolate, 14 cm long, 3 mm wide. Lip yellowish-white, curved, 7–8 mm long, 10 mm wide, ending in narrow tooth-like tip. Column yellowish-white, 6–7 mm long, 4–4.5 mm wide. Anther cap and stigma yellow. Ovary green with pale brownish tint. Capsule ellipsoid 2.5–3.5 cm long. **Fig. 7, i; 11.**

Ecology. Primary humid evergreen, broad-leaved submontane and montane forests on silicate rocks, commonly in shady places on deep soils rich in humus. 700–1300. Fl. August – October. Very rare (EN).

Distribution. Vietnam (Dak Lac, Dak Nong, Khanh Hoa). Thailand, Laos, Cambodia.

Studied specimens. Dak Lac, Krong Bong, Chu Yang Sinh mt., VH 6435 (HN, LE, MO); Dak Nong, Dak Glong, Ta Dung mt., HLF 5569 (HN, LE); Khanh Hoa, Khanh Le, VH 2483c (LE).

Note. The species represents typical element of endemic warm-loving flora of southern Indochina.

Nephelaphyllum Blume,

1825, Bijdr. 6, fig. 22; id., 1825, ibid., 8: 372; Seidenf., 1986, Opera Bot., 89: 21–23; id., 1992, Opera Bot., 114: 81–83; Comber, 1990, Orch.

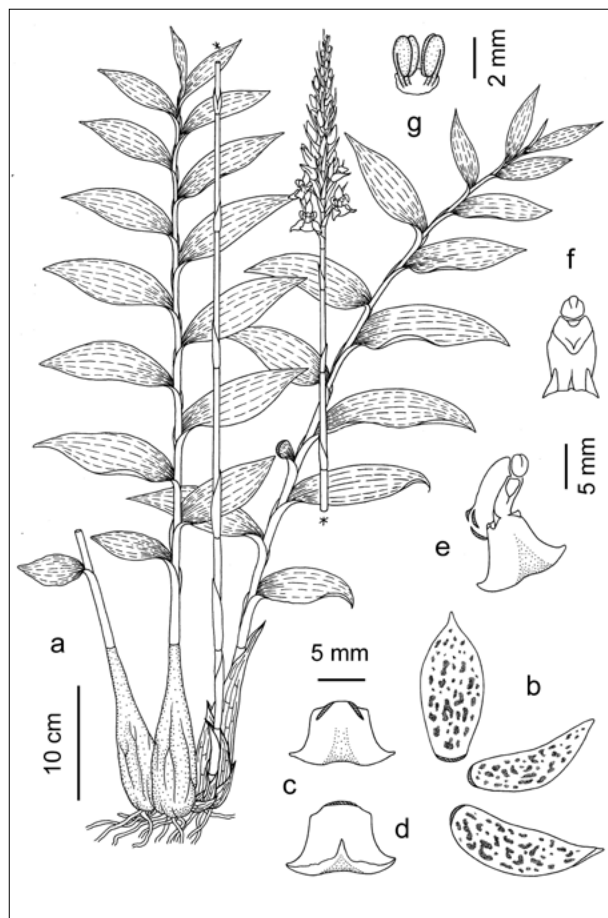


Fig. 11. *Plocoglottis bokorensis*: a – flowering plant, b – flattened sepals and petal, c, d – lip, frontal view and view from behind, e – column and lip, half-side view, f – column, frontal view, g – pollinarium (VH 6435).

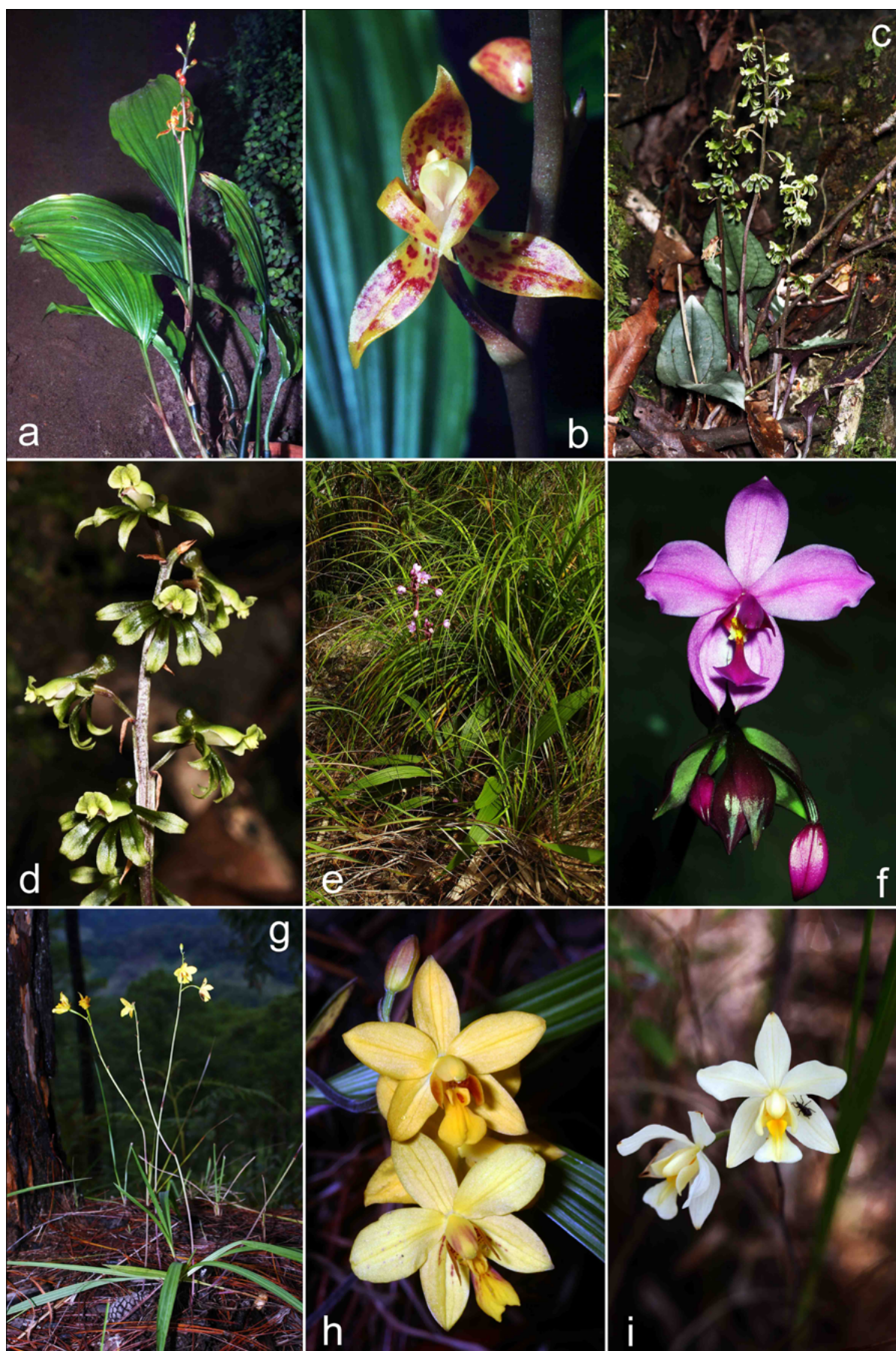


Fig. 12. *Plocoglottis javanica*: a, b (VH 2483a); *Nephelaphyllum tenuiflorum*: c, d (CPC 3793); *Spathoglottis plicata*: e (J. Skornickova HB-101), f (Averyanov s.n., a. 2005); *S. pubescens*: g, h (HLF 5454); *S. eburnea*: i (Cambodia, Telepova 503).

Java: 105–106; id., 2001, Orch. Sumatra: 278–280; Seidenf., Wood, 1992, Orch. Malay. Sing.: 148–151; Aver., 1994, Ident. Guide Vietnam. Orch.: 90–91; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 866; Pearce et Cribb, 2002, Orch. Bhutan: 314–316; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 45; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 299; Chen Sing-chi, Wood, 2009, Fl. China, 25: 280–281; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 381–386.

Lectotype: *N. pulchrum* Blume.

Terrestrial (rarely epiphytic or lithophytic) sympodial, creeping herbs with cylindrical, ascending 1-leaved petiole-like pseudobulbs and cordate,

sessile, usually mottled leaves. Inflorescence unbranched, erect few flowered raceme. Peduncle with few sterile bracts. Flowers not resupinate, widely simultaneously opening. Sepals and petals free, sub-similar, lanceolate-spatulate to narrowly obovate, reflexed. Lip immobile, concave, parallel to column, spurred, entire or 3-lobed; disk hairy, keeled or long papillose; spur cylindric, clavate or saccate. Column flat, winged. Anther cap indistinctly 4-locular, with 2 horns. Pollinia 8 in 2 groups, solid, with caudicles, without viscidium. Capsules with persistent perianth.

18 (2) species. Tropics of Asia and tropical islands of western Pacific.

Key to species

1. Flowers close together in head-like inflorescence; stalk shorter than leaves; lip erect, 11 mm or more wide; epichile with 3 low warty keels 1. *N. pulchrum*
- + Flowers distant on loose raceme; stalk much longer than leaves; lip horizontal or drooping, less than 10 mm wide; epichile with a high tuft of fat papillae, hypochile long pubescent in 2 rows 2. *N. tenuifolium*

1. *N. pulchrum* Blume,

1825, Bijdr., 6, fig. 22; id., 1825, ibid., 8: 373; Seidenf., 1986, Opera Bot., 89: 21, fig. 6, pl. 2 a; id., 1992, Opera Bot., 114: 82, fig. 41; Comber, 1990, Orch. Java: 106; id., 2001, Orch. Sumatra: 280, fig.; Seidenf., Wood, 1992, Orch. Malay. Sing.: 150, fig. 64 a-f, pl. 7 b; Aver., 1994, Ident. Guide Vietnam. Orch.: 90; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 866, fig. 11212; Pearce et Cribb, 2002, Orch. Bhutan: 314; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 45; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 299. – *Tainia pulchra* (Blume) Gagnep., 1932, Bull. Mus. Natl. Hist. Nat. ser. 2, 4: 706; id., 1933, Fl. Gen. Indo-Chine 6, 3: 381, fig. 34, 2–5.

Described from Java (“Salak”). **Type** (“Blume”) – L?, BO?

Rhizome 4–8(10) mm in diam., fleshy, with papyraceous broad sheaths. Pseudobulbs cylindric, (2)4–6 cm long, 3–8 mm in diam., ascending, petiole-like, fleshy. Leaf sessile, cordate, 3–10 cm long, 2.5–6 cm wide, fleshy, green, with violet tint to dull brownish, mottled with indistinct dark green spots. Inflorescence erect, fleshy, 4–8 cm tall, with few dense pinkish or yellowish flowers. Sepals and petals narrowly obovate, 1.2–1.8 cm long, 2–3(4) mm wide, obtuse. Lip oblong, entire, concave, 1.6–2 cm long, 8–12 mm wide, pinkish to yellowish, with 3 low papillose keels in apical part. Spur white, 3–3.5 mm long, club shaped. Column short and broad, 5–6 mm tall, winged along sides. **Fig. 13**, a, b.

Ecology. Primary broad-leaved lowland humid shady forests on deep soils rich in humus. Fl. June – August. Very rare (DD).

Distribution. Vietnam (Phu Yen). NE. India, Bhutan, Myanmar, Thailand, Cambodia, Malacca Peninsula, Sumatra, Java, Kalimantan, Philippines.

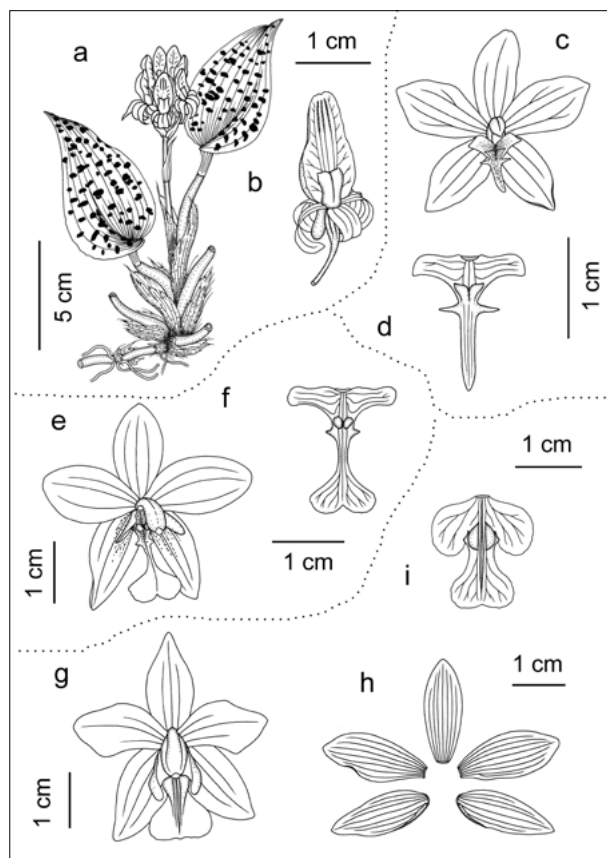


Fig. 13. *Nephelaphyllum pulchrum*: a – flowering plant, b – flower (Rives s.n.); *Spathoglottis aurea*: c – flower, d – flattened lip (Kalimantan, s.n.); *S. affinis*: e – flower, f – flattened lip (Evrard 1727); *S. eburnea*: g – flower (Telepova 503), h – flattened sepals and petals, i – flattened lip (Poilane 13850, type).

Studied specimens. Phu Yen, Between Yen-bay and Phu Yen-binh, *Rives s.n.* (P)

Note. Species is known from Vietnamese territory till now by alone questionable collection (*Rives s.n.*).

2. *N. tenuiflorum* Blume,

1825, Bijdr., 8 : 373; Seidenf., 1986, Opera Bot., 89: 21, fig. 6, pl. 2 a; id., 1992, Opera Bot., 114: 82; Comber, 1990, Orch. Java: 106, fig.; id., 2001, Orch. Sumatra: 278, fig.; Seidenf., Wood, 1992, Orch. Malay. Sing.: 151, fig. 64 g-k; Aver., 1994, Ident. Guide Vietnam. Orch.: 91; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 866, fig. 11213; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 45; Chen Sing-chi, Wood, 2009, Fl. China, 25: 281. – *Nephelaphyllum cristatum* Rolfe, 1896, Kew. Bull., 1896: 194; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 383, fig. 316–318. – *Tainia tenuiflora* (Blume) Gagnep., 1932, Bull. Mus. Natl. Hist. Nat. ser. 2, 4: 706; id., 1933, Fl. Gen. Indo-Chine 6, 3: 380. – *Tainia cristata* (Blume) Gagnep., 1932, Bull. Mus. Natl. Hist. Nat. ser. 2, 4: 708; id., 1933, Fl. Gen. Indo-Chine 6, 3: 382. – *Nephelaphyllum cristigerum* Aver., 1988, Bot. Journ. (Leningrad) 73, 3: 432.

Described from Java (“Salak”). **Type** (“Blume”) – L?, BO?

Terrestrial, occasionally epiphytic and lithophytic herb. Rhizome 2–5 mm in diam., fleshy, with membranous sheaths. Pseudobulbs cylindric, 1–2 cm long, 1.5–2 mm in diam., ascending, petiole-like, fleshy. Leaf sessile, cordate, 2–6(7) cm long, 1.5–3(3.5) cm wide, fleshy, brightly green to dull purple, mottled with indistinct dark green-violet spots. Inflorescence erect, 10–22 cm tall, laxly (1)3–10(12) flowered. Floral bracts lanceolate, membranous, 4–6 mm long. Pedicel and ovary 0.5–1 cm long. Flowers green. Sepals and petals narrowly obovate, 8–12 mm long, 2–3 mm wide, acute to shortly apiculate. Lip oblong, concave, 1–1.5 cm long, 6–7 mm wide, base shortly spurred, slightly 3-lobed; lateral lobes narrow; median lobe suborbicular, emarginate, base with a cluster of long fat papills; disk with dense long hairs. Spur 3–3.5 mm long, club shaped. Column 6–6.5 mm tall, 3–3.5 mm wide, winged along sides. Capsule ellipsoid, 2.5–3 cm long. **Fig. 12, c, d.**

Ecology. Primary and secondary evergreen broad-leaved, mixed and coniferous humid forests, commonly in shady wet places on deep soils rich in humus, often on steep rocky slopes. 400–2200 m. Fl. May – July. Not common (VU).

Distribution. Vietnam (Bac Kan, Cao Bang, Dak Nong, Ha Giang, Ha Tay, Hoa Binh, Kon Tum, Lai Chau, Lam Dong, Ninh Thuan, Phu Tho, Quang

Binh, Quang Tri, Son La, Thai Nguyen, Thanh Hoa, Thua Thien – Hue, Tuyen Quang, Vinh Phuc). Thailand, Malacca Peninsula, S. China, Hong Kong, Indonesia.

Studied specimens. Bac Kan, Cho Don, HAL 4727 (HN, LE), HLF 880 (HN); Cao Bang, Trung Khanh, HAL 5563 (HN, LE); Dak Nong, Dak Glong, HLF 5568 (HN, LE); Ha Giang, Bac Me, HAL 6505 (HN, LE); Ha Giang, Quan Ba, NTH 3615 (HN, LE), DKH 4806 (HN, LE, MO); Ha Giang, Yen Minh, CBL 2174 (HN, MO); Ha Tay, Bavi, Balansa 2001 (P); Hoa Binh, Mai Chau, HAL 884 (HN, MO); Kon Tum, Dak Gley, VH 1875 (HN, MO), VH 2266 (HN, LE MO); Kon Tum, Kon Plong, VH 5314 (HN, MO), VH 5541 (HN, MO), VH 5543 (HN, LE, MO); Kon Tum, Ngoc Linh mt., VH 638 (HN, MO), VH 881 (HN); Kon Tum, Mt. Man Ray, Poilane 18228 (P); Lai Chau, Sin Ho, HAL 8772 (HN, LE, MO), HAL 8788 (HN, LE, MO), HAL 9931 (HN, LE); Lam Dong, Dalat town, VH 2514 (HN, MO); Lam Dong, Lac Duong, VH 3392 (HN, MO), VH 3394 (HN, MO); Ninh Thuan, Ninh Son, VH 3526 (HN, MO), VH 3628 (HN, MO); Phu Tho, Tan Son, CPC 4644 (CPC Herbarium); Quang Binh, Bo Trach, HAL 6063 (HN), HAL 6182 (HN), HAL 6233 (HN); Quang Binh, Minh Hoa, CPC 3793 (CPC Herbarium), CPC 4277 (CPC Herbarium), CPC 4427 (CPC Herbarium); Quang Binh, Quang Ninh, HAL 6317 (HN), HAL 11572 (HN, LE, MO); Quang Tri, Huong Hoa, HLF 5867 (HN, LE); Son La, Moc Chau, DKH 7407 (HN, MO); Thai Nguyen, Vo Nhai, NTH 3822 (HN, LE); Thanh Hoa, Ba Thuoc, HAL 3227 (HN); Thua Thien – Hue, A Luoi, HAL 7693 (HN), HAL 7694 (HN); Thua Thien – Hue, Huong Thuy, HAL 8189 (HN); Thua Thien – Hue, Phu Loc, N.T. Hiep et al., CFN-302B (HN, LE), HLF 1187 (HN); Tuyen Quang, Na Hang, HLF 701 (HN), CPC 4561 (CPC Herbarium); Vinh Phuc, Tam Dao, Averyanov et al., TD 17 (HN, LE), Averyanov et al., LX-VN 2384 (HN, LE); Vietnam, sine loc., Simond drawing 123 (P).

Spathoglottis Blume,

1825, Bijdr., 6, fig. 76; id., 1825, ibid., 8: 400; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 366–370; Seidenf., 1986, Opera Bot., 89: 57–64; id., 1992, Opera Bot., 114: 96–88; Comber, 1990, Orch. Java: 101–103; id., 2001, Orch. Sumatra: 294–297; Seidenf., Wood, 1992, Orch. Malay. Sing.: 159–163; Aver., 1994, Ident. Guide Vietnam. Orch.: 95–98; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 875–876; Su Horng-Jye, 2000, Fl. Taiwan 5: 1031; Pearce et Cribb, 2002, Orch. Bhutan: 306–308; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.:

56; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 281; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 309–310; Chen Sing-chi, Bell, 2009, Fl. China, 25: 287–288; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 411–416.

Type: *S. plicata* Blume.

Terrestrial and occasionally lithophytic, tuberiferous, ephemeroid herb with ovoid underground tuber and few petiolate, lanceolate to narrowly elliptic, acuminate leaves. Inflorescence erect raceme arising from base of pseudobulb with sev-

eral sterile sheaths and few flowers. Floral bracts shorter than pedicel and ovary. Flowers nutant, widely opening. Sepals and petals free, subsimilar. Lip not spurred, 3-lobed; lateral lobes suberect; median lobe clawed at base; disk with keels and various calli. Column arcuate, slender, widening to the apex, winged, without foot. Rostellum insignificant. Pollinia 8, in 2 groups, subequal, waxy, with lone triangular viscidium.

46 (5) species. Tropics of Asia, Australia and tropical islands of western Pacific.

Key to species

1. Flowers purple; petals distinctly larger than sepals 1. *S. plicata*
- + Flowers yellow to white, rarely with light purple tint or small purple marks; sepals and petals subsimilar ... 2
2. Median lip lobe obtriangular, much broadening from narrow base 3
- + Median lip lobe ligulate, narrowing to the apex from base 2. *S. aurea*
3. Calli at base of median lip lobe globular-clavate, joined at their base, mottled with purple; median lip lobe with long, non-keeled neck 3. *S. affinis*
- + Calli at base of median lip lobe lamellate, not joined at their base (except their proximal point), commonly pure yellow; median lip lobe with short neck or neck lacking 4
4. Median lip lobe distinctly longer than broad, with distinct neck; calli at the base of median lobe triangular or rhomboid; median keel commonly strongly raising distally; flowers yellow, sometimes with light purple tint on sepals and with small purple markings on lip 4. *S. pubescens*
- + Median lip lobe as long as broad, neck of median lobe indistinct or lacking; calli at the base of median lobe semicircular; median keel rather low, not strongly raising distally; flowers yellowish-white to white with yellow lip center 5. *S. eburnea*

1. *S. plicata* Blume,

1825, Bijdr., 6, fig. 76; id., 1825, ibid., 8: 401; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 367; Seidenf., 1986, Opera Bot., 89: 58, fig. 27; id., 1992, Opera Bot., 114: 58; Comber, 1990, Orch. Java: 102, fig.; id., 2001, Orch. Sumatra: 294, fig.; Seidenf., Wood, 1992, Orch. Malay. Sing.: 161, fig. 2, 5, 70, a, pl. 8c; Aver., 1994, Ident. Guide Vietnam. Orch.: 97; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 875, fig. 11249; Su Horng-Jye, 2000, Fl. Taiwan 5: 1031, pl. 441; Pearce et Cribb, 2002, Orch. Bhutan: 308; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 56; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 281; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 309; Chen Sing-chi, Bell, 2009, Fl. China, 25: 287. – *Calanthe poilanei* Gagnep., 1951, Bull. Mus. Natl. Hist. Nat. ser. 2, 22: 625.

Described from Java (“Java”). **Type** (“*Blume s.n.*”) – L (holotype – Herb. no. 903162735), P (isotype).

Terrestrial herb with linear-lanceolate leaves, 30–80 cm long, 5–7 cm wide. Inflorescence to 1 m long, with 9–16 purple, successively opening flowers. Pedicel and ovary 2.5–3.5 cm long. Sepals and petals ovate, concave, acute, 1.5–1.8 cm long, sepals sparsely pubescent, petals distinctly wider. Lip, 1.5–2.5 cm long; side lobes erect, falcate, trun-

cate at apex; median lobe broadening to the apex, flabellate, truncate or emarginate, with distinct neck at base; disc with 2 triangular-ovoid, pubescent yellow calli at base of median lobe. Column pink, 1.2–1.6 cm tall. **Fig. 12**, e, f.

Ecology. Secondary grasslands, open shrubs and grassy secondary woodlands, usually on steep slopes. Fl. Any time, maximum in May – September. In nature habitats very rare (DD). Widely cultivated and occasionally naturalized.

Distribution. Vietnam (Dak Lak, Khanh Hoa, Ninh Thuan, Quy Nhon). Tropical Asia, Australia and tropical islands of western Pacific.

Studied specimens. Dak Lak, Darlac, *Poilane 32450* (P); Khanh Hoa, *Averyanov et al.*, a. 2005 (LE – photo); Khanh Hoa, Hon Ba, June 2011, *J. Skornickova, HB-101* (LE – photo); Ninh Thuan, Baran, Phanrang, *Poilane 9153* (P); Quy Nhon, *Averyanov et al.*, a. 1995 (LE – photo).

Note. The species includes many horticultural forms, differing in size, color and in shape of flower. Many of them are widely cultivated and occasionally naturalized.

2. *S. aurea* Lindl.,

1850, Journ. Hort. Soc., 5: 34; Seidenf., 1992, Opera Bot., 114: 88; Comber, 1990, Orch.

Java: 102, fig.; id., 2001, Orch. Sumatra: 296, fig.; Seidenf., Wood, 1992, Orch. Malay. Sing.: 163, fig. 70 j, k, pl. 8d; Aver., 1994, Ident. Guide Vietnam. Orch.: 97; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 875, fig. 11250; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 56.

Described from Malacca Peninsula (“Malacca”). **Type** – K.

Leaves 30–50 cm long, 2.5–4 cm wide. Inflorescence hairless, to 60 cm tall with few brightly yellow flowers 3–3.5 cm across, lip sometimes with few small purple streaks. Pedicel and ovary 2–2.7 cm long. Sepals and petals narrowly ovate, acute, 2.5 cm long, 1 cm wide. Lip side lobes ligulate-oblong, erect; median lobe with small triangular auricle on either side near base, lanceolate to cuneate or slightly spatulate, narrowing or slightly broadening toward obtuse or acute apex; calli at base of median lobe narrowly ovoid, often with fine crimson spots. Column slender, 1.5 cm long. **Fig. 13**, c, d.

Ecology. Secondary grasslands and secondary open grassy shrubs, commonly on rocky slopes. 700–1500 m. Fl.? Occurrence doubtful.

Distribution. Vietnam? Malacca Peninsula, Sumatra, Java.

Note. Questionable record coming from a single report (P.H. Ho, 2000, l.c., fig. 11250) probably based on cultivated plant not confirmed by herbarium voucher specimen.

3. *S. affinis* de Vriese,

1854, Ill. Orch., 2, pl. 15; Seidenf., 1986, Opera Bot., 89: 58, fig. 28, pl. 4d; id., 1992, Opera Bot., 114: 87; Comber, 1990, Orch. Java: 103, fig.; Seidenf., Wood, 1992, Orch. Malay. Sing.: 161, fig. 70 c, d; Aver., 1994, Ident. Guide Vietnam. Orch.: 97; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 876, fig. 11251; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 56; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 281; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 309. – *Spathoglottis lobbii* Rchb. f., 1862, Ann. Bot. Syst., 6: 455; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 367.

Described from Java (“Salak”). **Lectotype** – Ic. “*Spathoglottis affinis*” (De Vriese, 1854, l.c., tab. 15).

Terrestrial and occasionally lithophytic herb with leaves to 30 cm long, 2 cm wide. Scape 20–30 cm long, finely hairy. Rachis long, slender, erect, with distant yellow flowers 2.5–3 cm across. Sepals and lip often with reddish-brown marks at base. Sepals and petals ovate, obtuse to roundish at apex, 1.5–1.8 cm long. Lip with oblong, erect side lobes; median lobe obcordate, attenuate at the base into

continuous narrow neck; neck with small triangular auricle on either side near base; disc with 2 triangular-obovoid calli touching each other. **Fig. 13**, e, f.

Ecology. Secondary grasslands and secondary open grassy shrubs, commonly on rocky slopes. (200)600–1600 m. Fl. August – October. Rare (DD).

Distribution. Vietnam (Ba Ria – Vung Tau, Binh Thuan, Lam Dong, “Cochinchina”). Myanmar, Thailand, Laos, Cambodia, Malacca Peninsula, Java, Kalimantan.

Studied specimens. Ba Ria – Vung Tau, Mt. Dinh, Baria, *Chevalier* 644 (P), *Pierre* 6553 (K, P), *Poilane* s.n. (P); Binh Thuan, Phanthiet, *Ev-rard* 1727 (P), *Poilane* 644 (P); Lam Dong, Dankia, *Chevalier* s.n. (P), *Poilane* 18586 (P); Lam Dong, Lang Hanh, Mt. Donai, *Poilane* 21138 (P); Lam Dong, Langbian, *Chevalier* 30707 (P); Lam Dong, Pangour, Dalat, *Tixier* s.n. (P); Lam Dong, Yabak, Samnuea, *Chevalier* 35 (P); Cochinchina, sine loc., *Regnier* s.n. (?).

Note. Present occurrence of this species in Vietnam remains uncertain. It was not documented by herbarium collections during last 50 years.

4. *S. pubescens* Lindl.,

1831, Gen. Sp. Orch. Pl.: 120; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 368; Seidenf., 1986, Opera Bot., 89: 60, fig. 29; id., 1992, Opera Bot., 114: 88, fig. 45; Aver., 1994, Ident. Guide Vietnam. Orch.: 96; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 876, fig. 11253; Pearce et Cribb, 2002, Orch. Bhutan: 308; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 56; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 281; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 310; Chen Sing-chi, Bell, 2009, Fl. China, 25: 288; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 412, fig. 338–342. – *S. fortunei* Lindl., 1845, Bot. Reg. 31, tab. 19. – *S. pubescens* var. *fortunei* (Lindl.) Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 369.

Described from India, Bangladesh and Vietnam (“India, Prome”, “Bangladesh, Sylhet”, “Vietnam, Mt. Taong Dong”). **Type** (“coll. Wallich, Wall. Cat. 3744A”, “coll. Wallich, Wall. Cat. 3744B”, “coll. H. Bruce, Wall. Cat. 3744C”) – K-LINDL (syntypes), K-W (isotype); K-LINDL (syntype), K-W (isotype); K-LINDL (syntype), K-W (isotype).

Terrestrial and occasionally lithophytic herb. Leaves linear to lanceolate, 20–40 cm long, 1–1.5(3) cm wide. Inflorescence slender, (10)20–35(45) cm long, with 2–6(10) sparse yellow flowers. Floral bracts broadly lanceolate, acute, pubescent, 5–9 mm long. Pedicel and ovary 2–2.5 cm long,

densely pubescent. Flowers yellow, sometimes with brownish or purple tint at the base of tepals. Sepals and petals subsimilar, narrowly ovate, (0.8)1.2–2 cm long, obtuse; sepals pubescent; petals somewhat broader. Lip 1–1.8 cm long, concave; side lobes usually brownish, erect, oblong, rounded or truncate at apex; median lobe obovate, with distinct neck at base, broadening to truncate or emarginate apex; disk with 3 keels, median of which rising distally; calli at the base of median lobe yellow, lamellate, triangular or rhomboid. Column 8–10 mm tall. Capsule fusiform, nutant, 1.5–2.5 cm long. **Fig. 12**, g, h.

Ecology. Secondary grasslands, grassy open secondary shrubs and woodlands on silicate soils, sometimes along grassy wet road cuts. 600–1800 m. Fl. August – November. Not common (LR).

Distribution. Vietnam (Dak Lak, Kon Tum, Lai Chau, Lam Dong, Lao Cai, Ninh Thuan). NE. India, Bangladesh, Myanmar, China, Thailand, Laos, Cambodia.

Studied specimens. Dak Lak, Krong Bong, Chu Yang Sinh mt., *HLF 5454* (HN, LE); Kon Tum, Dak Gley, *VH 2095a* (HN); Lai Chau, Phong Tho, *DKH 5702* (HN, LE); Lam Dong, *Averyanov et al., LX-VN s.n.*, a. 1985 (LE); Lam Dong, Bidoup, Ht. Donai, *Poilane 31042* (P); Lam Dong, Camly, Dalat, *Evrard 220* (P), *1092* (P), *1093* (P); Lam Dong, Dalat, *Evrard 1061* (P), *Lecomte et Finet 1502* (P); Lam Dong, Gougah, Dalat, *CRST 104/TS* (P); Lam Dong, Lac Duong, *HLF 5369* (HN, LE); Lam Dong, Langbian, *Eberhardt 213, 1902* (P), *Micholitz s.n.* (K); Lao Cai, Chapa, *Hautefeuille 222* (P); *Petelot 5164* (P), *N.D. Khoi 1068* (HN, LE); *Averyanov et al.*, 28 Oct. 2012 s.n. (LE); Ninh Thuan, Cana, Phanrang, *Poilane 12452* (P); Northern Vietnam, sine loc., *Avrorin 2452* (LE).

5. *S. eburnea* Gagnep.,

1931, Bull. Mus. Natl. Hist. Nat. ser. 2, 3: 685; id., 1933, Fl. Gen. Indo-Chine 6, 3: 369, fig. 32, 3–8; Seidenf., 1986, Opera Bot., 89: 63, fig. 30; id., 1992, Opera Bot., 114: 88; Aver., 1994, Ident. Guide Vietnam. Orch.: 96; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 876, fig. 11252; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 56; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 281; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 309.

Described from Cambodia (“Cambodge: montagnes de Dang-reck, prov. de Siem-reap, entre Samrong et Aulong-veng”). **Type** (“*Poilane 13850*”) – P.

Leaves linear to lanceolate, 25–35 cm long, 1–1.5 cm wide. Inflorescence 40–55 cm tall, pubescent, with (1)4–7 white flowers. Floral bracts

narrowly ovate, acute, 8–10 mm long. Pedicel and ovary pubescent, 2.2–2.8 cm long. Sepals and petals narrowly ovate, obtuse, 1.5–2 cm long. Lip with yellow center, 1.5–2 cm long, 1.2–1.4 cm wide; side lobes erect, broadly obovate, round at apex, occasionally with fine red marks; median lobe has no distinct neck, obcordate, as long as broad, truncate to shallowly emarginate, usually with small triangular lateral teeth at the base; calli at the base of neck half-circular; disc with low keel raising on midvein of median lobe. Column winged, broadening to apex, 8–10 mm long. **Fig. 12**, i; **13**, g-i.

Ecology. Secondary wet grasslands, secondary open grassy shrubs and Dipterocarp woodlands, often on rocky slopes. 500–600 m. Fl. October. Very rare (DD).

Distribution. Vietnam (Thu Thien – Hue). Thailand, Laos, Cambodia.

Studied specimens. Thu Thien – Hue, San Chieng Krai, Hue, *Hayata et Legrange s.n.* (TI).

Note. Very rare endemic of southern Indochina known from Vietnam till now from the single collection. Photo recorded here as no. 11, was made in Cambodia, Cardamom mt. by Dr. M. Telepova.

Phaius Lour.,

1790, Fl. Cochinchin.: 529; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 383–384; Seidenf., 1986, Opera Bot., 89: 41–49; id., 1992, Opera Bot., 114: 99–101; Comber, 1990, Orch. Java: 98–101; id., 2001, Orch. Sumatra: 282–289; Seidenf., Wood, 1992, Orch. Malay. Sing.: 176–178; Aver., 1994, Ident. Guide Vietnam. Orch.: 99–102; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 869; Su Horng-Jye, 2000, Fl. Taiwan 5: 998–1003; Pearce et Cribb, 2002, Orch. Bhutan: 302–306; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 51; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 277; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 304; Chen Sing-chi, Cribb, Bell, 2009, Fl. China, 25: 290–292; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 423–435.

Type: *P. grandifolius* Lour. (*P. tankervilleae* (Banks ex L'Hér.) Blume).

Terrestrial and lithophytic sympodial herbs with ovate to cylindric few-leaved pseudobulbs clustering of short rhizome. Leaves elliptic, sessile or shortly petiolate, acute to acuminate. Inflorescence lateral erect raceme arising from base, middle or apical part of pseudobulb, with few to many dense flowers. Floral bracts large, acute, herbaceous, caducous. Flowers large, resupinate. Sepals and petals subsimilar. Lip adnate to column basal wings, spurred (rarely spurless), entire or 3-lobed, more or less embracing column. Column erect, broadening

at apex. Stigma concave. Anther terminal, 2-locular; pollinia 8, in 2 groups, clavate, waxy, with caudicles attached to amorphous viscidium.

40 (7) species. Tropical Africa, Madagascar, tropical and subtropical Asia, Australia and tropical islands of western Pacific.

Key to species

1. Inflorescence arising from base of pseudobulb; pseudobulbs subglobular, ovate to conic ovate-cylindrical; leaves form more or less elongate pseudo stem at pseudobulb apex 2
- + Inflorescence arising from middle or apical part of pseudobulb; pseudobulbs cylindrical, stem-like with more or less distant leaves forming no pseudo stem 4
2. Flowers mostly yellow to almost white or greenish-white, broadly campanulate; sepals and petals concave usually cucullate; median lip lobe hardly protruding, strongly plicate, yellow-brown; column long hairy throughout; leaves often with yellow spots 1. *P. flavus*
- + Flowers mostly purple or buff, yellowish to white, broadly opening; sepals and petals slightly concave usually straight, spreading; lip distinctly 3-lobed; median lobe wavy, not strongly plicate, with no contrast brown margin; column glabrous or shortly hairy at the base; leaves pure green, without yellow spots 3
3. Inflorescence (0.5)1–2 m tall, distinctly longer than leaves; sepals and petals mostly purple or buff, very rare pure yellowish or white; lip purple to yellowish-buff, very rare white with yellow-purple markings and stripes; spur commonly less than 1.2 cm long 2. *P. tankervilleae*
- + Inflorescence less than 0.5 m tall, twice shorter than leaves; sepals and petals pure white; lip white with light purple stripes on side lobes and light yellow disc; spur commonly longer than 1.5 cm 3. *P. longicornu*
4. Sepals and petals white or light lilac-violet (yellowish-orange after anthesis) 5
- + Sepals and petals chestnut or purple-brown 6
5. Sepals, petals and lip light lilac-violet; lip distinctly 3-lobed, side-lobes straight or slightly wavy; disc glabrous, with 1 hairy keel running from lip base to base of median lobe; spur 1–1.5 cm long 4. *P. mishmensis*
- + Sepals and petals white, lip purple to purple-violet with whitish marks; lip hardly 3-lobed or almost entire, side flanges plicate along margin; disc with sparse long hairs and with hairy callus placed near lip apex; spur less than 1 cm long 5. *P. tonkinensis*
6. Lip pure light yellow to yellow; disc glabrous; spur 1.8–2.2 cm long 6. *P. wenshanensis*
- + Lip white or yellow with numerous purple or purple-brown marks and stripes; disc pubescent with long white hairs; spur less than 1 cm long 7. *P. indochinensis*

1. *P. flavus* (Blume) Lindl.,

1831, Gen. Sp. Orch. Pl.: 128; Seidenf., 1986, Opera Bot., 89: 41, fig. 18, pl. 3 c; id., 1992, Opera Bot., 114: 99; Comber, 1990, Orch. Java: 99, fig.; id., 2001, Orch. Sumatra: 283, fig.; Seidenf., Wood, 1992, Orch. Malay. Sing.: 177, fig. 76 c, d, pl. 10 d; Aver., 1994, Ident. Guide Vietnam. Orch.: 101; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 869, fig. 11223; Su Horng-Jye, 2000, Fl. Taiwan 5: 999; Pearce et Cribb, 2002, Orch. Bhutan: 303, fig. 69 a-l; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 51; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 277; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 304; Chen Sing-chi, Cribb, Bell, 2009, Fl. China, 25: 290. – *Limodorum flavum* Blume, 1825, Bijdr., 8: 375.

Described from Java (“Java, Mount Gede”).

Type (“*Blume s.n.*”) – L (holotype – Herb. no. 903162381).

Terrestrial and lithophytic herb. Pseudobulbs ovoid-conic, 5–15(20) cm tall, 1.5–4(5) cm in diam., at apex with 4–8 elliptic, acuminate leaves 25–60 cm long, 5–20 cm wide. Inflorescences arising from base of pseudobulb, shorter than leaves, 30–70(90) cm tall, with 5–20(25) flowers. Floral

bracts caducous, ovate-lanceolate, 2.5–4 cm long. Pedicel and ovary glabrous, 2–3 cm long. Flowers not widely opening, 4–7 cm across. Sepals and petals subsimilar, pale yellow to yellow-greenish or almost white, narrowly ovate, 2.5–4 cm long, acute. Lip entire or indistinctly 3-lobed, yellow, with orange-brown or brown plicate apical margin; disk glabrous; spur conic, obtuse, 5–8(10) mm long. Column white, 1.5–2 cm tall, densely white pubescent. Rostellum suborbicular. Anther cap white. Capsule ellipsoid, 3–4 cm long. **Fig. 14**, a, b.

Ecology. Primary humid evergreen broad-leaved, mixed and coniferous forests on any soils, commonly in shady places on deep soils rich in humus. 500–2000 m. Fl. (January) March – June. Not rare (VU).

Distribution. Vietnam (Bac Kan, Cao Bang, Dak Nong, Dien Bien, Ha Giang, Hoa Binh, Lai Chau, Kon Tum, Lam Dong, Ninh Thuan, Quang Binh, Son La, Thanh Hoa). Tropical Asia and tropical islands of western Pacific.

Studied specimens. Bac Kan, Ba Be, *HLF* 534 (HN, LE); Bac Kan, Cho Don, *HAL* 4677 (HN), *HLF* 755 (HN); Cao Bang, Bao Lac, *CBL* 325 (HN, LE, MO), *CBL* 1403 (HN, LE, MO), *CBL* 1478

(HN, LE, MO); Cao Bang, Tra Linh, *CBL* 1031 (HN, LE, MO); Cao Bang, Trung Khanh, *HAL* 5448 (HN, LE); Dak Nong, Dak Glong, *HLF* 5663 (HN); Dien Bien, Muong Cha, *CPC* 1943 (CPC Herbarium); Ha Giang, Meo Vac, *CBL* 1856 (HN, LE, MO); Ha Giang, Quang Ba, *DKH* 4808 (HN, LE), *HAL* 1434 (HN), *HAL* 8399 (HN), *HAL* 11860 (HN, LE); Ha Giang, Yen Minh, *CBL* 1983 (HN, LE, MO); Hoa Binh, Lac Son, *CPC* 1488 (CPC Herbarium); Hoa Binh, Mai Chau, *DKH* 7781 (HN, MO), *HAL* 670 (HN, MO), *HAL* 716 (HN, MO); Hoa Binh, Tan Lac, *CPC* 492 (CPC Herbarium), *CPC* 728 (CPC Herbarium), *CPC* 1754 (CPC Herbarium), *CPC* 1977 (CPC Herbarium); Kon Tum, Ngoc Linh mt., *VH* 791 (HN, LE, MO); Lai Chau, Sin Ho, *NTH* 2770 (HN, LE); Lam Dong, Bidup *VH* 2637 (HN), *VH* 3540 (HN); Lam Dong, Djiring, Braian, *Poilane* 24664 (P); Lam Dong, Dalat, *Tixier* 23/59 (P); Lam Dong, Lac Duong, *VH* 2637 (HN, LE), *VH* 3117 (HN, LE, MO), *VH* 3700 (HN, LE, MO), *VH* 4442 (HN, LE, MO, P); Ninh Thuan, Ninh Son, *VH* 3540 (HN, LE); Quang Binh, Bo Trach, *HAL* 6138 (HN); Quang Binh, Le Thuy, *HAL* 11459 (HN, MO); Quang Binh, Minh Hoa, *CPC* 4231 (CPC Herbarium); Son La, Moc Chau, *DKH* 7382 (HN, MO), *DKH* 7467 (HN, MO), *HAL* 9507 (HN, MO); Thanh Hoa, Ba Thuoc, *HAL* 3218 (HN).

Note. Ornamental terrestrial orchid easily growing in cultivation.

2. *P. tankervilleae* (Banks ex L'Hér.)

Blume,

1856, Mus. Bot. Lugd. Bat., 2: 177; Seidenf., 1986, Opera Bot., 89: 43, fig. 19, pl. 3 d; id., 1992, Opera Bot., 114: 100; Comber, 1990, Orch. Java: 101, fig.; id., 2001, Orch. Sumatra: 284, fig.; Seidenf., Wood, 1992, Orch. Malay. Sing.: 176, fig. 76 a, pl. 10 c; Aver., 1994, Ident. Guide Vietnam. Orch.: 101; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 869, fig. 11226; Su Horng-Jye, 2000, Fl. Taiwan 5: 1001, photo 131; Pearce et Cribb, 2002, Orch. Bhutan: 305, pl. 11; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 51; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 277; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 304; Chen Sing-chi, Cribb, Bell, 2009, Fl. China, 25: 291; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 427, fig. 348–353. – *Limodorum tankervilleae* Banks ex L'Hér., 1789, Sert. Angl.: 28. – *Phaius wallichii* Lindl., 1831, Pl. Asiatic Rar., 2: 46; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 384, fig. 34, 6; Chen Sing-chi, Cribb, Bell, 2009, Fl. China, 25: 292; Barretto, Cribb, Gale, 2011, l.c.: 431, fig. 354–357. – *Calanthe bachmaensis* Gagnep., 1950, Bull. Mus. Natl. Hist. Nat. ser. 2,

22: 509; *P. baolocensis* N.V. Duy, T. Chen et D.X. Zhang, 2012, Adansonia, ser. 3, 34, 2: 252.

Described from China (“Habitat in China”).

Type – Ic. *J. Sowerby* “1787” – BM.

Pseudobulbs subglobose to conic 5–10 cm tall with 2–6 leaves 30–100 cm long, 8–20 cm wide. Inflorescences arising from base 50–200 cm tall, with 10–25 loose flowers. Floral bracts caducous, ovate to lanceolate, 3–6 cm long. Flowers widely opening, 7–12 cm across. Pedicel and ovary glabrous, 2.5–4.5 cm long. Sepals and petals purple-brown or buff, often whitish outside, very rare pure yellowish or white. Sepals and petals narrowly ovate, acute to acuminate 4–6.5 cm long. Lip purple to yellowish-buff, very rare white with yellow-purple markings and stripes, trumpet-like, broadly rhombic ovate, 3.5–6 cm long. 2–5 cm wide, indistinctly 3-lobed; undulate along margin, apex of median lobe truncate, emarginate, rounded or mucronulate; disk usually with 2–3 pubescent keels. spur cylindric, 0.3–1.2 cm long, often unequally 2-lobed at apex. Column white, 2–2.2 cm tall, shortly hairy. Capsule pendulous, ellipsoid, 4–5 cm long, with persistent column. **Fig. 14**, c-g.

Ecology. Wet secondary grasslands, open grassy swamps, damp grassy places in secondary shrubs and woodlands, spring swamps along stream and rivers valleys 400–1500 m. Fl. February – May. Not common (VU). Widely cultivated and occasionally naturalized.

Distribution. Vietnam (Cao Bang, Dak Lac, Dong Nai, Ha Noi, Kon Tum, Lam Dong, Ninh Thuan, Thua Thien – Hue, “Brelum, Cochinchina”). Tropical Asia, Australia and tropical islands of western Pacific. Naturalized in tropics of the New World.

Studied specimens. Cao Bang, Nguyen Binh, *CBL* 1262 (HN, LE, MO); Dak Lac, Krong Bong, *VH* 6069 (HN, LE, MO); Dong Nai, Bien Hoa, *Pierre* 1122 (P); Ha Noi, *Alleizette s.n.* (P), *Bon* 1766 (P); Kon Tum, Ngok Pan, *Poilane* 35951 (P); Kon Tum, Ngoc Linh mt., *VH* 9 (HN, LE, MO, P); Lam Dong, Annam, Manline, *Sigaldi* 211 (P); Lam Dong, Braian, *Poilane* 24639 (P); Lam Dong, Dalat, *Grillet* 271 (P), *Sigaldi s.n.*, a. 1954 (P), *Boden Kloss s.n.* (BM), *Averyanov et al.*, *LX-VN s.n.*, a. 1983 (LE), *Averyanov et al.*, *LX-VN s.n.*, a. 1985 (LE), *Averyanov et al.*, *HAL s.n.*, a. 1997 (LE – photo), *Averyanov et al.*, *HAL s.n.*, a. 2004 (LE – photo); Lam Dong, Lac Duong, *VH* 3970 (HN, LE, MO); Lam Dong, Timmon, *Lichy* 99 (P); Ninh Thuan, Ninh Hai, *HLF* 4176 (HN, LE, MO); Thua Thien – Hue, Nui Bach Ma, *Poilane* 29735 (P); Thua Thien – Hue, Phu Loc, *HLF* 1499 (HN); “Brelum, Cochinchina,” *Thorel s.n.* (P).

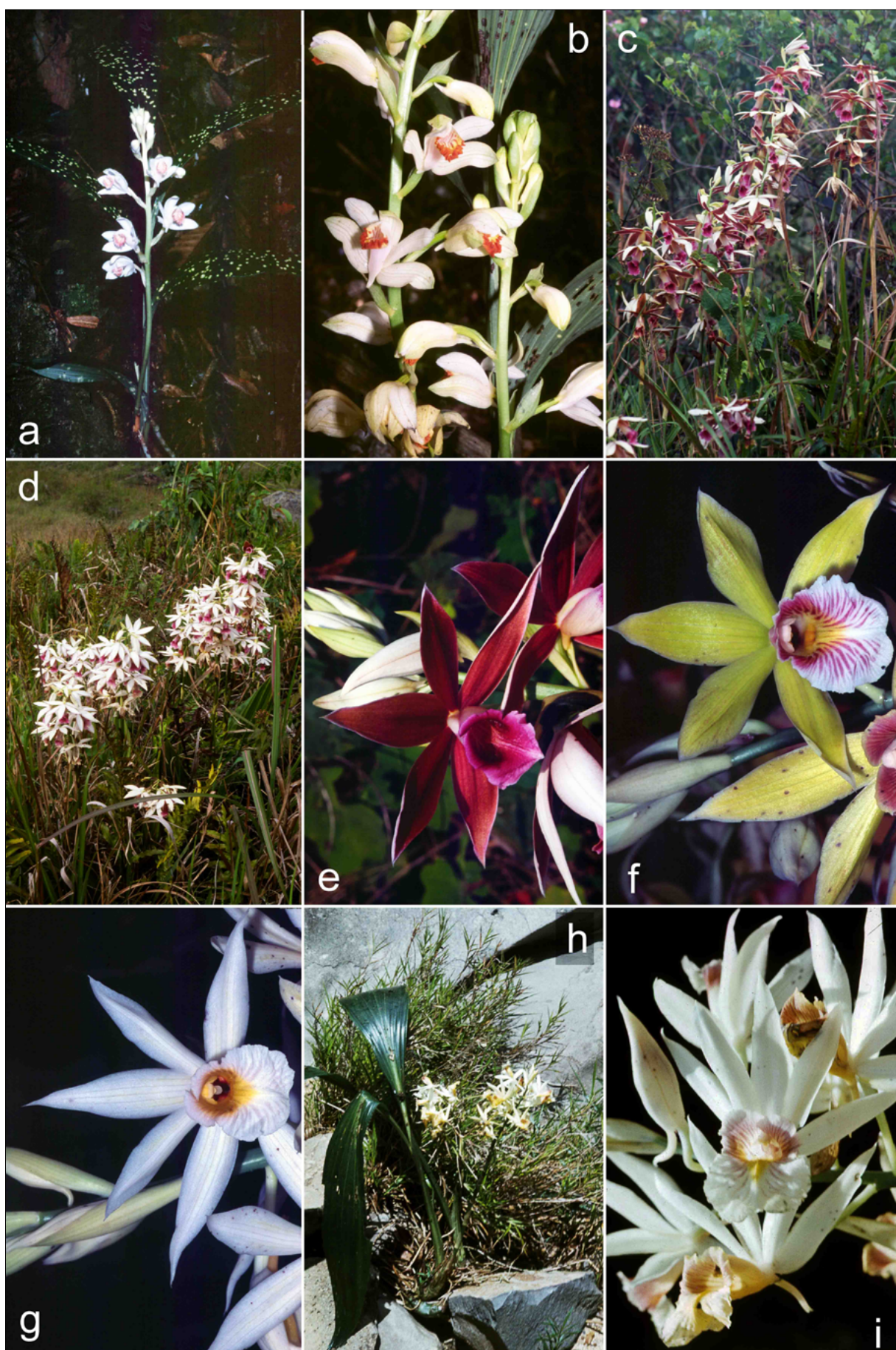


Fig. 14. *Phaius flavus*: a (HAL 670), b – (CBL 1478); *P. tankervilleae*: c, d, e (VH 9), f (Averyanov et al., HAL s.n., a. 2004), g (Averyanov et al., HAL s.n., a. 2004); *P. longicornu*: h, i (Averyanov et al., LX-VN 1985).

Note. Ornamental terrestrial orchid easily growing in cultivation. Extremely wide variation of this species in its natural populations in Vietnam gives no reason for segregation of plants named sometimes as a separate species *P. wallichii* as and even a variety distinct from *P. tankervilleae*. Description of recently proposed *P. baolocensis* N.V. Duy, T. Chen et D.X. Zhang entirely fits its range of variability as well.

3. *P. longicornu* Guillaum.,

1957, Bull. Mus. Natl. Hist. Nat. ser. 2, 29: 348; Aver., 1994, Ident. Guide Vietnam. Orch.: 102; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 51. – *P. hainanensis* C.Z. Tang et S.J. Cheng, 1982, Acta Phytotax. Sin. 20: 199, fig. 1; Chen Sing-chi, Cribb, Bell, 2009, Fl. China, 25: 292.

Described from southern Vietnam ("Annam: region de Dalat: pres des chutes de Gougah et a Manline"). **Type** ("C.R.S.T. N 211/sig., f. 138, 1955") – P.

Lithophytic and occasionally terrestrial herb. Pseudobulb ovoid, 4–6 cm tall with 2–3 leaves 40–60 cm long. Inflorescences arising from base of pseudobulb, twice shorter than leaves; 20–30(35) cm tall with 5–12 simultaneously opening flowers. Scape at the base with sparse brownish scaly hairs. Floral bracts caducous, ovate, 3–5.5 cm long. Pedicel and ovary 2–3 cm long. Flowers 8–9 cm in diam. Sepals and petals pure white, broadly lanceolate, acute to acuminate, (3.5)4–5 cm long. Lip white to yellowish obovate, 3–3.5 cm long, 3–3.2 cm wide, 3-lobed; lobes suborbicular, undulate along margin, often pinkish or yellowish with purple venation; disk yellowish to yellow, with 2 yellow glabrous keels. Spur curved, white, cylindric, (1.5)1.6–2 cm long, unequally 2-lobed at apex. Column 1.2–1.4 cm tall, dorsally finely hairy. Stigma concave, ovate. Rostellum large ligulate. **Fig. 14**, h, i; **15**.

Ecology. Wet open rocky places along streams and rivers, moist crevices of waterfall cliffs on silicate rocks. 600–1200 m. Fl. April – May. Very rare (EN).

Distribution. Vietnam (Kon Tum, Lam Dong, Thua Thien – Hue). SW. China (Hainan).

Studied specimens. Kon Tum, Konplong, Averyanov et al., LX-VN 2292 (HN, LE); Lam Dong, Dalat, Grillet 271 (P), Averyanov et al., HAL s.n. a. 2004 (LE – photo); Thua Thien – Hue, A Luoi, A Nor waterfall, HAL 7535 (HN, LE), HAL 7741 (HN), HAL 7742 (HN); Thua Thien – Hue, Phu Loc, Bach Ma mt., HLF 1178 (HN); d-EXSICCATES OF VIETNAMESE FLORA 0020/HAL 7535.

Note. Very rare aboriginal species, which is probably able to form natural hybrids with close and widespread *P. tankervilleae*.

4. *P. mishmensis* (Lindl. et Paxt.) Rehb. f.,

1857, Bonplandia, 5: 43; Seidenf., 1986, Opera Bot., 89: 47, fig. 21; id., 1992, Opera Bot., 114: 101; Aver., 1994, Ident. Guide Vietnam. Orch.: 100; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 896, fig. 11225; Su Horng-Jye, 2000, Fl. Taiwan 5: 999, pl. 424; Pearce et Cribb, 2002, Orch. Bhutan: 303, fig. 69 m, n; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 51; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 277; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 304; Chen Sing-chi, Cribb, Bell, 2009, Fl. China, 25: 291. – *Limatodes mishmensis* Lindl. et Paxt., 1852, Flower Gard., 3: 36. – *Calanthe crinita* Gagnep., 1931, Bull. Mus. Natl. Hist. Nat. ser. 2, 3: 322; id., 1933, Fl. Gen. Indo-Chine 6, 3: 396. – *Calanthe ramosa* Gagnep., 1951, Bull. Mus. Natl. Hist. Nat. ser. 2, 22: 626.

Described from NE. India ("India, Mishmee Hills"). **Type** ("Griffith s.n.") – K-LINDL.

Terrestrial and occasionally lithophytic herb 0.5–1.2(1.6) m tall with pseudobulbous cylindric stem to 1.5 cm in diam. Leaves distant at apical part of stem, elliptic, 10–25(30) cm long, 4–7 cm wide, acute. Inflorescences arising from middle or apical part of stem, glabrous, 25–40 cm long, with 2–6(10) sparsely flowers. Floral bracts caducous, glabrous, narrowly ovate, acute, 3–4 cm long. Pedicel and ovary, glabrous, 2–3 cm long. Flowers not widely opening, 5–6 cm in diam., lilac-pink to very light purple-violet, dirty yellowish to the end of anthesis. Sepals and petals broadly oblanceolate, obtuse, 2–3.5 cm long. Lip obovate, 2–3.5 cm long, 1.5–2.5 cm wide, 3-lobed, undulate along margin; median lobe reflexed, rounded retuse to emarginate; disk with 1 densely hirsute keel coming from lip base to base of median lobe. Spur narrowly cylindric, slightly curved, almost white, 1–1.6 cm long. Column white, 1.2–1.6 cm tall. Capsule pendulous, ellipsoid, 3–4 cm long. **Fig. 16**, a, b; **17**, f.

Ecology. Primary humid evergreen broad-leaved, mixed and coniferous forests on any rocks, usually in shady places on deep soils rich in humus. 400–1700 m. Fl. (March) September – December. Not rare (VU).

Distribution. Vietnam (Bac Kan, Cao Bang, Dak Lac, Ha Giang, Hoa Binh, Kon Tum, Lai Chau, Lam Dong, Lang Son, Lao Cai, Nghe An, Ninh Binh, Quang Binh, Thanh Hoa, Vinh Phuc). NE. India, Bhutan, Myanmar, China, Thailand, Laos, S. Japan (Ryukyu Islands), Philippines.



Fig. 15. Digital herbarium specimen of *Phaius longicornu* (HAL 7535).

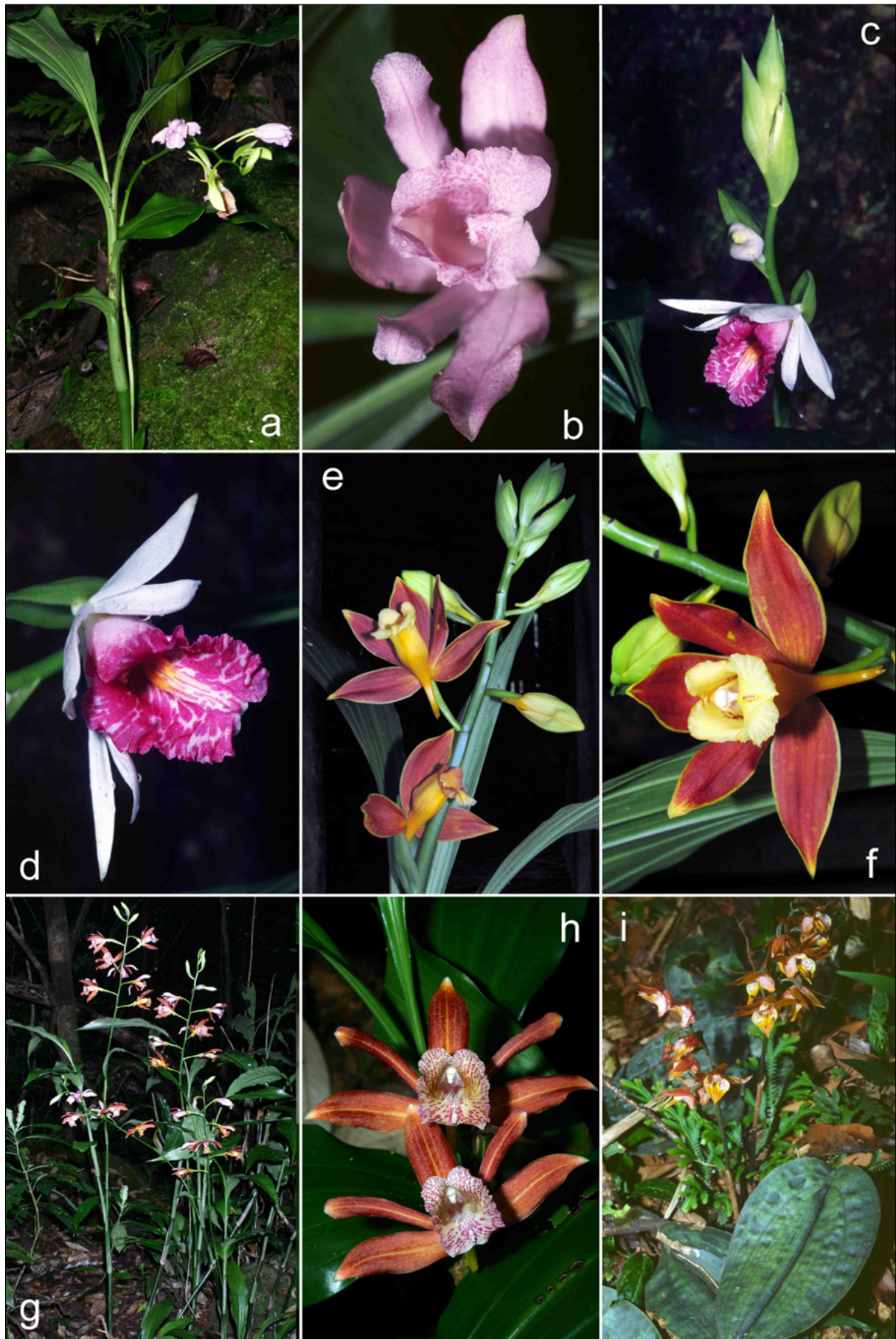


Fig. 16. *Phaius mishmensis*: a (HAL 9830), b (HAL 2897); *P. tonkinensis*: c, d (HAL 3211); *P. wenshanensis*: e, f (HAL 4517); *P. indochinensis*: g, h (HLF 5664); *Tainia cordifolia*: i (Averyanov et al., TD 7).

Studied specimens. Bac Kan, Cho Don, *HAL* 4873 (HN, LE); Cao Bang, Trung Khanh, *HAL* 5534 (HN, LE); Dak Lac, Krong Bong, *VH* 6235 (HN, MO); Ha Giang, Bac Me, *HAL* 6531 (HN); Ha Giang, Hoang Su Phi, *HAL* 6609 (HN); Hoa Binh, Da Bac, *HAL* 497 (HN, MO); Hoa Binh, Tan Lac, *CPC* 601 (CPC Herbarium), *CPC* 631 (CPC Herbarium), *CPC* 708 (CPC Herbarium), *CPC* 820 (CPC Herbarium); Kon Tum, Dak Gley, *VH* 2327 (HN, LE, MO); Lai Chau, Sin Ho, *HAL* 9830 (HN, LE, MO); Lam Dong, Haut Donai, *Poilane* 23521 (P); Lam Dong, Dalat, *Tixier* 17/60 (P), *VH* 2521 (HN, LE, MO); Lam Dong, Lac Duong, *VH* 3716 (HN, LE, MO); Lang Son, Bac Son, *HAL* 6772 (HN); Lao Cai, Van Ban, *HAL* 2797 (HN); Nghe An, Tuong Duong, *HLF* 6733 (HN, MO), *HLF* 6781 (HN, MO); Ninh Binh, Cuc Phuong, *HAL* 2897 (HN, LE); Quang Binh, Bo Trach, *HAL* 6271 (HN); Thanh Hoa, Ba Thuoc, *HAL* 2972 (HN), *HAL* 3211 (HN); Thanh Hoa, Quan Hoa, *HAL* 3792 (HN); Vinh Phuc, Tamdao, *Eberhardt* 3694 (P), *Averyanov et al.*, *LX-VN* 3914 (HN, LE).

5. *P. tonkinensis* (Aver.) Aver.,

2005, Checklist Pl. Sp. Vietnam, 3: 638. – *P. mishmensis* var. *tonkinensis* Aver., 1997, Bot. Journ., 82, 3: 133. – *P. longicruris* auct. non Z.H. Tsi: Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 51.

Described from northern Vietnam (“N. Vietnam, Prov. Cao Bang, Distr. Tra Linh, Subdistr. Quoc Toan ... near Thang Heng lake in environs of Thang Hen and Lung Tao villages”). **Type** (“Averyanov et al., *CB* 18.”) – LE (holotype), HN (isotype).

Terrestrial or occasionally lithophytic herb of habit similar with previous species. Flowers more or less widely opening, 5–6 cm in diam., Sepals and petals white, straight, broadly oblanceolate, obtuse, (2.5)3–4 cm long; petals distinctly narrower. Lip purple to purple-violet with white irregular marks, broadly rhombic, 3–3.5 cm long and broad, entire or indistinctly 3-lobed, emarginate, plicate along margin, sparsely hairy inside with long ciliate hairs; disk at apical part with knob-like hirsute callus. Spur rather short, conic, slightly bifid at apex, white, 5–7(9) mm long. Column white, 1.6–2 cm tall. Capsule pendulous, narrowly obovoid, 3–4 cm long. **Fig. 16, c, d; 17, a-e.**

Ecology. Primary humid evergreen broad-leaved, mixed and coniferous forests on rocky solid limestone, commonly in shady places on deep soils rich in humus. 250–1000 m. Fl. September – November. Not common (VU).

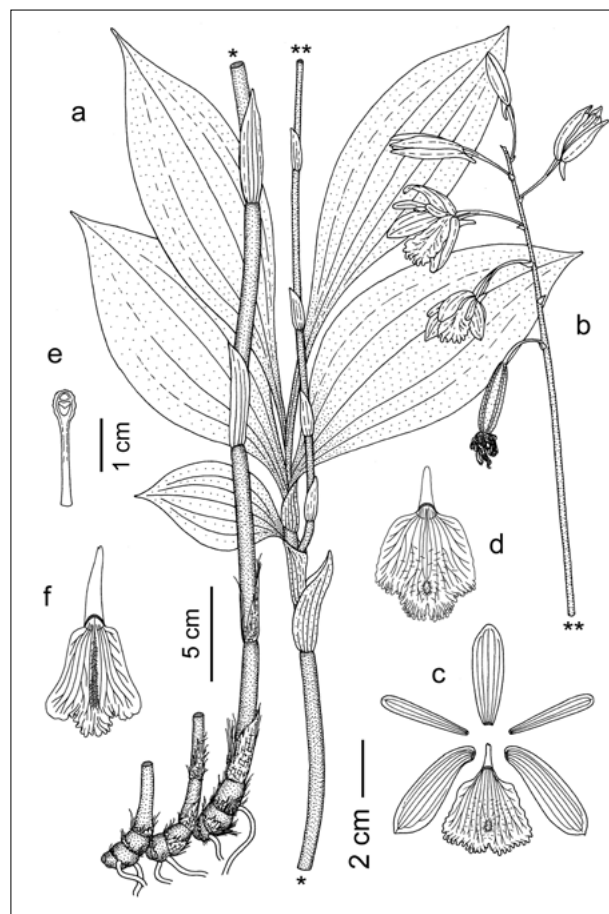


Fig. 17. *Phaius tonkinensis*: a – flowering plant, b – inflorescence, c – flattened sepals, petals and lip, d – flattened lip, e – column, frontal view (*CB* 18); *P. mishmensis*: f – flower (*VH* 2327).

Distribution. Vietnam (Bac Kan, Cao Bang, Ha Giang, Hoa Binh, Lang Son, Thai Nguyen, Thanh Hoa). S. China.

Studied specimens. Bac Kan, Ba Be, *HLF* 533 (HN, LE), *HLF* 636 (HN, LE); Bac Kan, Cho Don, *HLF* 759 (HN); Bac Kan, Na Ri, *NTH* 3687 (HN, LE), *NTH* 3732 (HN, LE), *DKH* 7525 (HN, LE, MO); Cao Bang, Tra Linh, *CBL* 1253 (HN, LE, MO); Ha Giang, Quan Ba, *NTH* 3563 (HN, LE); Hoa Binh, Da Bac, *HAL* 265 (HN, MO); Hoa Binh, Lac Son, *CPC* 1487 (CPC Herbarium, LE); Hoa Binh, Tan Lac, *CPC* 601 (CPC Herbarium); Lang Son, Huu Lung, *NTH* 3255 (HN, LE); Thai Nguyen, Dong Hy, *HAL* 26 (HN, MO); Thanh Hoa, Ba Thuoc, *HAL* 958 (HN, MO); Thanh Hoa, Co Lung, *HAL* 3211 (HN).

Note. Local endemic of limestone areas of northern Vietnam and adjacent regions of southern China.

6. *P. wenshanensis* F.Y. Liu,

1991, Acta Bot. Yunnan., 13: 372; Chen Sing-chi, Cribb, Bell, 2009, Fl. China, 25: 291; Que-

sada-Pallares, 2012, Orch. Soc. Great Brit. Journ. 61, 1: 25, photos.

Described from SW. China ("Yunnan: ..., Wenshan ... , Alt. 1300 m, terrestrial in dense forest"). **Type** ("1988, *F.Y. Liu* ... 88003") – KUN.

Plants 0.5–1 m tall with juicy, green, pseudobulbous stem to 1.5 cm in diam., bearing 5–7 elliptic, acute leaves (10)15–35 cm long, distant along apical part of stem. Inflorescences arising from middle or lower part of stem, glabrous, to 45 cm long, not exceeding leaves, with 4–6(8) sparse flowers, glabrous. Floral bracts caducous, narrowly ovate, obtuse, 2.5–3.5 cm long. Flowers widely opening, 6–8 cm across. Pedicel and ovary glabrous, 2.5–3 cm long. Sepals and petals yellow outside, purple-brown inside, narrowly ovate, acute, 3.5–4 cm long, 1–1.5 cm wide. Lip trumpet-like, obovate-triangular, yellow, 3.5–4 cm long and broad, 3-lobed, undulate along margin; side lobes with purple-brown markings; median lobe half-round, apiculate to emarginate. Disk with 2 or 3 yellow glabrous ridges and obovate callus at center of median lobe. Spur yellow, horn-shaped, 1.5–2(2.3) cm long, hooked at apex. Column glabrous, yellow, with small purplish marks, 2.5–2.7 cm tall, Anther cap pale yellow. Capsule ellipsoid, 4 cm long, 1.5 cm in diam. **Fig. 16**, e, f.

Ecology. Primary humid evergreen broad-leaved forests, commonly in shady places on deep soils rich in humus. 500–1500 m. Fl. September – October. Very rare (DD).

Distribution. Vietnam (Lao Cai, Tuyen Quang). SW. China (Yunnan).

Studied specimens. Lao Cai, Sapa, *Quesada-Pallares*, 2012, l.c., photos; Tuyen Quang, Na Hang, *CPC 4517* (CPC Herbarium, LE).

Note. Ornamental species, occasionally cultivated.

7. *P. indochinensis* Seidenf. et Ormerod,

1995, Opera Bot., 124: 17; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 51; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 304. – *P. indigoferus* auct. non Hassk.: Seidenf., 1986, Opera Bot., 89: 49, fig. 22, pl. 4a; id., 1992, Opera Bot., 114: 101, fig. 54; Aver., 1994, Ident. Guide Vietnam. Orch.: 100; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 869, fig. 11224; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 277.

Described from central Thailand ("Salaeng Haeng River, Thung Salaeng Luang"). **Type** ("*GT 5603*") – C.

Terrestrial herb to 0.6–1(1.5) m tall with pseudobulbous, juicy, green stem to 1.5 cm in diam.,

and 3–5 elliptic leaves 30–40 cm long, 7–10 cm wide. Inflorescence arising from apical part of stem, glabrous, with few sheaths, to 50 cm long, bearing (2)5–12 distant, widely opening flowers. Floral bracts lanceolate, acute 1.5–2.2 cm long as long as pedicel and ovary. Sepals and petals spreading, purple-brown to purple-chestnut, narrowly obovate, obtuse, 3–3.5 cm long, sepals distinctly longer and broader. Lip trumpet-like, white to yellowish with purple marks and stripes, broadly obovate, 3–3.5 cm long and broad, 3-lobed, undulate along margin, ling sparsely hairy inside; side lobes erect half round; median lobe indistinctly squarish, often truncate; disk with flat broad keel glabrous at the base, apically pubescent, at the middle part keel with rising edges, ending in median lobe in form of elongate rugose callus. Spur conical, 3–5 mm long. Column 2–2.2 mm tall. Winged at apex, white speckled with fine purple marks. Operculum white 3 mm long. **Fig. 16**, g, h.

Ecology. Primary humid evergreen broad-leaved forests, commonly in shady places on deep soils rich in humus. 1400–2000 m. Fl. September – November (January). Very rare (VU).

Distribution. Vietnam (Dak Nong, Dong Nai, Kon Tum, Lam Dong, Ninh Binh, Phu Tho). Thailand, Laos.

Studied specimens. Dak Nong, Dak Glong, *HLF 5664* (HN, LE); Dong Nai, Bienhoa, *Pierre 1350* (P); Kon Tum, Mang Giang, *Ban 230* (HN, LE); Lam Dong, Dalat, *HAL 8637* (HN, LE), *N.V.Duy 334* (LE); Ninh Binh, *Bon 414* (P); Phu Tho, *Eberhardt 5046* (P).

Note. Rare species worthy of cultivation as ornamental plant.

Tainia Blume,

1825, Bijdr. 6, fig. 48; id., 1825, ibid. 7: 354; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 376–383; Seidenf., 1986, Opera Bot., 89: 27–37; id., 1992, Opera Bot., 114: 78–81; Comber, 1990, Orch. Java: 107–108; id., 2001, Orch. Sumatra: 297–301; Seidenf., Wood, 1992, Orch. Malay. Sing.: 153–156; Aver., 1994, Ident. Guide Vietnam. Orch.: 91–93; Turner, 1992, Orch. Monogr. 6: 73–98; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 867–868; Su Horng-Jye, 2000, Fl. Taiwan 5: 1041–1045; Pearce et Cribb, 2002, Orch. Bhutan: 316–318; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 57; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 281; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 310–311; Chen Sing-chi, Wood, 2009, Fl. China, 25: 281–285; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 386–405. – *Ania* Lindl., 1831, Gen. Sp. Orch. Pl.: 129;

Turner, 1992, l.c. 6: 49–62. – *Mitopetalum* Blume, 1856, Mus. Bot. Lugd. Bat. 2: 185. – *Ascotainia* Ridl., 1907, Mat. Fl. Mal. Pen. 1: 115. – *Mischobulbum* Schltr., 1911, Feddes Repert. (Beih.), 1: 98; Seidenf., 1986, l.c. 89: 24–26; id., 1992, l.c. 114: 83; Seidenf., Wood, 1992, l.c.: 151–153; Aver., 1994, l.c.: 89–90; Turner, 1992, l.c. 6: 65–73; P.H. Ho, 2000, l.c. 3: 875; Su Horng-Jye, 2000, l.c. 5: 971–974; Comber, 2001, l.c.: 277–278; Pearce et Cribb, 2002, l.c.: 312–314; Aver. et Averyanova, 2003, l.c.: 45; Newman et al., 2007, l.c.: 274; Schuiteman et al., 2008, l.c. 26: 299.

Type: *T. speciosa* Blume.

Terrestrial, rarely epiphytic or lithophytic sympodial herb with plagiotropic creeping rhizome and more or less distant, erect, 1-leaved pseudobulbs. Leaves sessile to long petiolate, plicate or

conduplicate, elliptic, straight to finely undulate along margin. Inflorescence heteranthous erect loose raceme arising from base of pseudobulb. Peduncle glabrous, with few tubular sterile bracts. Floral bracts persistent. Flowers resupinate. Sepals and petals subsimilar, linear to narrowly ovate, acute to acuminate; lateral sepals oblique. Lip immobile, 3-lobed, rare entire, spurred or spurless, saccate; commonly with various longitudinal keels. Column straight, slightly curved, concave, with narrow forward faced wings, with or without column foot. Anther ovoid, 4-locular. Pollinia 8, subequal, hard, with short caudicles joined at base. Capsule straight, cylindric to ellipsoid.

32 (13) species. Tropical and subtropical Asia, tropical islands of western Pacific.

Key to species

1. Leaves sessile 2
- Leaves petiolate 5
2. Pseudobulbs long, cylindrical, petiole-like, 4–8 cm long, 3–8 mm in diam.; leaf blade fleshy, sub-succulent, 7–18 cm long, 4–10 cm wide 3
- Pseudobulbs conical-ovoid to ovoid, tetragonal in section, less than 4 cm tall, 1–2 cm in diam.; leaf blade herbaceous-membranaceous or very rigid coriaceous, less than 7 cm long, 2–4(5) cm wide 4
3. Lip broadly ovate, 3-lobed, with even margin; side lobes semicircular, erect; median lobe triangular; sepals oblique lanceolate, acute, 2.5 cm or shorter, 4–7 mm wide; lateral keels at middle tall, lamellate-lunate 1. *T. cordifolia*
- + Lip narrowly triangular, entire, acuminate to the apex; lip sides in basal half down recurved, margin in apical half crisped-undulate; sepals narrowly lanceolate, acuminate to almost caudate, longer than 2.5 cm, 3–4 mm wide; all keels on disk similar, hardly visible 2. *T. acuminata*
4. Leaves very rigid, coriaceous, conduplicate, persistent, long-living, dark purple below; pseudobulbs attenuate at apex; lip spurless, uniform light greenish; anther cap without horns at apex 3. *T. longiscapa*
- + Leaves herbaceous-membranaceous, thin, plicate, dying during rainless season, light green; pseudobulbs not attenuate or hardly attenuate at apex; lip spurred, white with greenish nerves and purplish at base; anther cap with 2 prominent erect horns at apex 4. *T. cornuta*
5. Pseudobulbs slender, cylindric, clavate or conical, much longer than broad; lip spurless, sometimes slightly saccate at the base; column footless or with short foot 6
- + Pseudobulbs inflated, globose to ovoid, as long as broad or not much longer; lip spurred; column with long distinct foot 9
6. Inflorescence 15–25 cm long, as long as leaves or little longer, with 3–6; flowers (4)5–6 cm across; sepals and petals 3–4 cm long; lip rhomboid, entire or indistinctly 3-lobed, about 3.5 cm long 5. *T. macrantha*
- + Inflorescence 30–100 cm long, much longer than leaves, many flowered; flowers 2–4 cm across; sepals and petals 1–2.5 cm long; lip obovate to broadly obovate, distinctly 3-lobed, 0.8–2 cm long 7
7. Petiole as long as leaf blade or longer; sepals and petals 2–2.5 cm long, lip 1.5–2 cm long; lateral keels low, finely wavy, median keel straight lamellate rising at middle 6. *T. paucifolia*
- + Petiole usually shorter than leaf blade; sepals and petals 1–1.5 cm long, lip 0.8–1.2 cm long; keels straight, papillose, all keels low, subequal or lateral much taller at middle 8
8. Sepals and petals olive-green, more or less suffused with brown; lip side lobes triangular-falcate, acute; median lip lobe yellowish to light yellow, suborbicular or broadly obovate; lateral keels at middle arcuate-lunate, distinctly taller than median keel 7. *T. latifolia*
- + Sepals and petals yellowish to olive-green with dark brown margin to entirely brownish purple; lip side lobes triangular, obtuse; median lip lobe brightly yellow, transversely rhomboid; disk with 3 low subsimilar keels 8. *T. dunnii*
- 9(5). Lip entire, rarely very indistinctly 3-lobed 9. *T. hongkongensis*
- + Lip always distinctly 3-lobed 10
10. Lip elongate, more than twice longer than broad 10. *T. angustifolia*

- + Lip obovate, twice long as broad or shorter 11
- 11. Lip with 3 keels 11. *T. penangiana*
- + Lip with 5 keels 12
- 12. Tepals yellow-brownish, olive-orange to purple-brown; lip white to light yellowish; keels decreasing at middle and rising to median lobe, sometimes undulate 12. *T. viridifusca*
- + Tepals dull orange to yellowish-brown; lip white; keels interrupt, suddenly rising to base of median lobe, more or less straight 13. *T. ruybarrettoii*

1. *T. cordifolia* Hook. f.,

1889, Icon. Pl., 19, tab. 1861; Chen Sing-chi, Wood, 2009, Fl. China, 25: 282; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 388, fig. 319–321. – *Mischobulbum cordifolium* (Hook. f.) Schltr., 1911, Repert. Spec. Nov. Regni Veg. Beih., 1: 98; Turner, 1992, Orch. Monogr., 6: 65, fig. 34, pl. 6b; Seidenf., 1992, Opera Bot., 114: 83, pl. 5c; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 875, fig. 11248; Su Horng-Jye, 2000, Fl. Taiwan 5: 971–974, pl. 413; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 45. – *Nephelaphyllum simondii* Gagnep., 1950, Bull. Mus. Natl. Hist. Nat. ser. 2, 21: 504. – *Mischobulbum simondii* (Gagnep.) Seidenf. ex Aver., 1990, Vasc. Pl. Syn. Vietnam, 1: 122; Aver., 1994, Ident. Guide Vietnam. Orch.: 90. – *Tainia wrayana* auct. non (Hook. f.) J.J. Sm.: Aver., 1998, Nov. Syst. Pl. Vasc., 31: 59; Averyanova, 2003, Updated Checklist Orch. Viet.: 45.

Described from Taiwan (“Taiean, Kelung”).

Type (“Ford s.n.”) – K.

Pseudobulbs cylindrical, petiole-like, 4–8 cm long, (3)5–8 mm in diam., with sessile, ovate, acute leaves 7–18 cm long, 4–10 cm wide, often spotted with dark green blotches above. Inflorescence to 20–30 cm long, with (2)4–10(15) loose, widely opening flowers 3–4 cm across. Floral bracts cuneate, acuminate, 5–7 mm long. Pedicel and ovary 0.8–1.2 cm long. Sepals and petals brown to olive-brown with purplish brown nerves, broadly lanceolate to narrowly ovate, acuminate 1.8–2.5 cm long, 4–7 mm wide; lateral sepals adnate to column foot forming broad mentum; petals wider and shorter. Lip white, spotted with purple, broadly ovate, 1.5–2.5 cm long, 3-lobed; side lobes round, erect; median lobe yellow, fleshy, triangular, acute; disk with 3 yellow keels, lateral keels at the middle rising into lamellate-lunate plates. Column white, with purple-red spots, 0.8–1.2 cm tall, winged, with foot 1–1.4 cm long, 5 mm wide. Operculum hemispheric, sometimes with 2 bosses at the back. **Fig. 16, i; 18, a; 19, a, b.**

Ecology. Terrestrial herb. Primary humid evergreen broad-leaved, mixed and coniferous forests mostly on silicate rocks, commonly in shady mossy places on soils rich in humus. 200–1200 m. Fl. February – June. Not common (VU).

Distribution. Vietnam (Dak Lak, Dak Nong, Ha Tinh, Hoa Binh, Kon Tum, Lao Cai, Phu Tho, Quang Binh, Vinh Phuc). NE. India, SE. China, Hong Kong, Taiwan, Thailand, Malacca Peninsula, Kalimantan.

Studied specimens. Dak Lak, Krong Bong, *HLF 5417* (HN, LE); Dak Nong, Dak Glong, *HLF 5501* (HN, LE), *HLF 5532* (HN); Ha Tinh, Huong Son, *HAL 5339* (HN, LE); Hoa Binh, Tan Lac, *CPC 677* (CPC Herbarium); Kon Tum, Dak Gley, *VH 2238* (HN, LE, MO); Kon Tum, Kon Plong, *VH 5547* (HN, LE, MO); Phu Tho, Tan Son, *HAL 12763* (HN); Quang Binh, Le Thuy, *HAL 11442* (HN, MO); Quang Binh, Minh Hoa, *HAL 11809* (HN, MO); Quang Binh, Minh Hoa, *CPC 3909a* (CPC Herbarium); Vinh Phuc, Tamdao, Simond drawing 106 (P?), *Averyanov et al.* *TD 7* (HN, LE).

Note. Species desirable for cultivation as ornamental plant.

2. *T. acuminata* Aver., sp. nov.

Described from NW. Vietnam (“Lao Cai, Van Ban District; Nam Xe Municipality; Nam Xi Tan Village ... N side of road between Nam Xe and Khau Co Pass at near 40 km to Than Uyen mark”). **Type** (“26 February 2001, *DKH 6906*”) – HN (holotype), LE, MO (isotypes).

Pseudobulbs terete, petiole-like, ascending, (4)6–8 cm long, (3)4–6(8) mm in diam., with sessile, ovate oblong, acute or shortly apiculate leaves 10–18 cm long, 6–10 cm wide, usually spotted with slightly concave, dark green blotches above. Inflorescence 15–20(25) cm long, with (2)4–6(8) loose, widely opening flowers 4–5 cm across. Floral bracts narrowly cuneate, acuminate, 6–10 mm long, 0.5–1 mm wide. Pedicel and ovary 5–8 mm long. Sepals and petals light yellow-brown with dark purple-brown nerves, lanceolate to narrowly lanceolate, acuminate into thread-like apex, 2.5–3.5 cm long, 3–5 mm wide; lateral sepals adnate to column foot; petals little wider and shorter. Lip white or light yellowish, spotted with purple at base, with pink-purple nerves to the apex, narrowly triangular, acuminate, 2.5–3 cm long, 7–9 mm wide at the base, entire, spurred; lip sides in basal half down recurved, apical part more or less flat, irregularly crisped-undulate

along margins; apex acute to shortly caudate; disk with 3 insignificant low keels. Spur conical, 4–5 mm long, 1.5–2 mm wide, with recurved, obtuse apex. Column white, with 4 purple stripes, 0.9–1.1 cm tall, wings broadening to the base, foot broad, 8–12 mm long, 3 mm wide. Rostellum large, triangular ovate. Operculum white, helmet-like, 1.6–2 mm in diam., with prominent bidentate beak. Pollinia subequal, ovoid. **Fig. 18**, d, c; **20**.

Etymology. Species name reflects characteristically acuminate apices of sepals, petals and lip.

Ecology. Terrestrial herb. Primary humid evergreen broad-leaved closed forests on silicate rocks, mainly on granite and quartzite, commonly in shady damp places on soils rich in humus. 700–1200 m. Fl. February – March. Locally common (VU).

Distribution. Vietnam (Lao Cai). Endemic.

Studied specimens. Lao Cai, Van Ban, *DKH 6674* (HN, LE, MO); Lao Cai, Van Ban, *HAL 2693* (HN, LE – photo).

Notes. In a very limited known area of distribution, this species was observed as locally frequent and even abundant plant of the forest floor. Succulent leaves often form plantlets at the sinus of sessile leaf blade as it is also often observed in *T. cordifolia*. The species is desirable for cultivation as ornamental plant.

3. *T. longiscapa* (Seidenf.) J.J. Wood et A.L. Lamb,

2008, Males. Orch. Journ., 2: 54; Chen Sing-chi, Wood, 2009, Fl. China, 25: 282. – *Mischobulbum longiscapum* Seidenf., 1992, Orch. Monogr., 6: 67; Turner, 1992, Orch. Monogr., 6: 67, fig. 36; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 274. – *Tainia ovifolia* Z.H. Tsi et S.C. Chen, 1994, Acta Phytotax. Sin., 32: 558; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 281. – *Mischobulbum ovifolium* (Z.H. Tsi et S.C. Chen) Aver., 2003, Updated Checkl. Orch. Vietnam: 89; Averyanova, 2003, Updated Checklist Orch. Viet.: 45; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 299.

Pseudobulbs densely clustering, purplish, conical ovoid, tetragonal in section, 2–4(5) cm tall, 1–2 cm across at the base, attenuate to the apex. Leaves sessile, dark green below, dirty purple-violet above, ovate, acute, 4.5–7(10) cm long, 3–4(4.5) cm wide, very rigid, coriaceous. Inflorescence 20–35 cm long, with 1–3 sterile bracts and (1)3–5 loose flowers. Floral bracts cuneate, acuminate, narrowly lanceolate, 0.8–1.5 cm long. Flowers uniform light green to yellowish-green, 2–3 cm across. Pedicel and ovary as long as floral bracts. Sepals and petals broadly lanceolate, acuminate, 1.2–1.8 cm long, 2–4

mm wide, lateral sepals adnate to column foot forming broad mentum. Lip obovate, 1–1.2 cm long, 3-lobed; side lobes triangular, acute; median lobe broadly ovate, 6–8 mm wide, often shortly mucronate. Disk with 3 lamellate keels, median smaller or almost lacking. Column, broad, 4–6 mm tall, almost footless. Capsule shortly cylindrical, nutant, (1)1.2–1.8 cm long. **Fig. 18**, e, f; **19**, d, e; **21**.

Ecology. Lithophytic, terrestrial and occasionally epiphytic herb. Primary evergreen broad-leaved lowland forests on rocky limestone, commonly on upper part of slopes and on mountain tops, usually on shady mossy rocks. 200–800 m. Fl. March – May. Not common (VU).

Distribution. Vietnam (Quang Binh, Quang Tri). Thailand, S. China, Hainan, Laos.

Studied specimens. Quang Binh, Bo Trach, *HAL 6370* (HN); Quang Binh, Minh Hoa, *VH 4653* (HN, LE, MO), *HAL 5837* (HN, LE), *HAL 5969* (HN), *HAL 6033* 19d, c, (HN), *HAL 11681* (HN, LE, MO), *HAL 11831* (HN, LE, MO), *HAL 12481* (HN), *CPC 2567* (CPC Herbarium), *CPC 3957* (CPC Herbarium); Quang Binh, Quang Ninh, *HAL 11503* (HN, LE, MO); Quang Binh, Tuyen Hoa, *CPC 2713* (CPC Herbarium); Quang Tri, Huong Hoa, *HLF 5919* (HN, LE); d-EXSICCATES OF VIETNAMESE FLORA 0136/*HAL 11681*.

4. *T. cornuta* Aver.,

2012, Turczaninowia, 15, 1: 14.

Described from central Vietnam (“Quang Nam Prov., Dai Loc Distr., Dai Hong municipality, environs of Dai Hong town around point 15°49’19”N 107°56’58”E”). **Type** (“19 May 2011, *CPC 3394*”) – CPC Herbarium (holotype), LE (isotype).

Pseudobulbs densely clustering, leafless at anthesis, brownish, ovate to narrowly ovate, oblique, (1.5)2–3(3.5) cm tall, 0.5–1(1.5) cm wide, tetragonal in section. Leaves sessile, ovate, (2)3–5(6) cm long, 2–3 cm wide, apiculate, thin, plicate, usually dying after rainy season. Inflorescence glaucous, arising from basal part of pseudobulb, 20–(30)35 cm long, with (1)2–3(5) loose flowers. Peduncle, in basal part bears 2–3(4) sterile bracts. Floral bracts papyraceous, narrowly cuneate, acuminate, 3–6 mm long. Pedicel and ovary twice longer than floral bracts. Flowers widely opening, 2.5–3 cm in diam., odorless, all opening at the same time. Sepals and petals uniform light green, lanceolate to broadly lanceolate, 1.5–2 cm long, 1.5–3 mm wide, acute; petals twice broader; sepals adnate to column foot. Lip white with greenish or reddish nerves, laterally greenish, entire, ovate, (9)10–11(12) mm

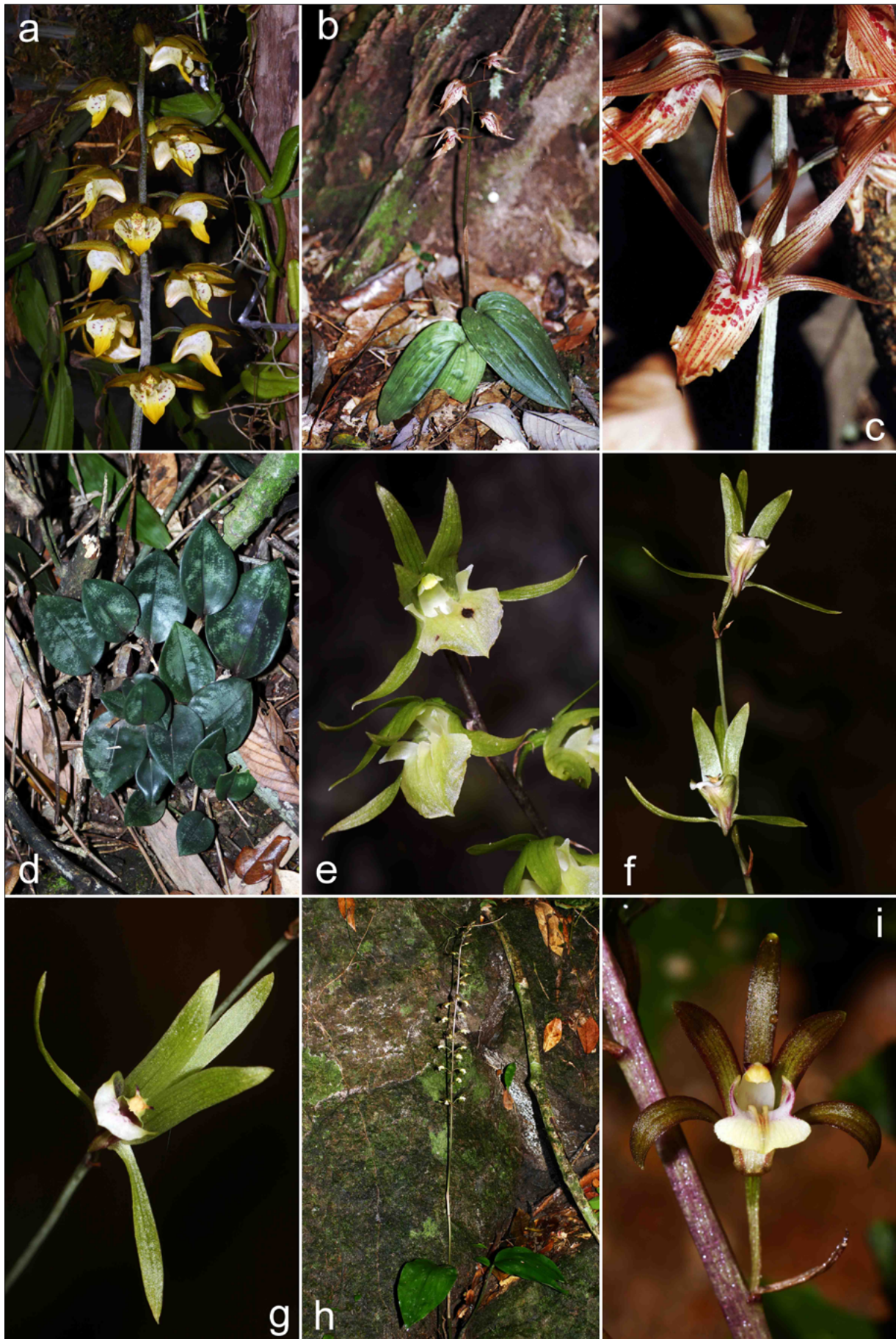


Fig. 18. *Tainia cordifolia*: a (HLF 5532); *T. acuminata*: b, c (HAL 2693); *T. longiscapa*: d (HAL 6033), e (HAL 11681); *T. cornuta*: f, g (CPC 3394, type); *T. latifolia*: h, i (HAL 6266).

long, 8–9 mm wide, strongly recurved, irregularly undulate along margin, with 2 fleshy keels strongly undulate along edge, shortly spurred at the base. Spur, straight, broadly conical, about 1 mm long and broad. Column pinkish-green, erect, 4.5–5 mm tall, 4–4.5 mm wide, with large triangular, finely denticulate, incurved lateral wings 2–2.5 mm wide; dorsally column with prominent longitudinal keel increasing to the top. Column foot 2.5–3 mm long. Stigma subquadrate. Rostellum in form of broad erect plate; clinandrium deep, with 2-lobed lateral arms embracing operculum base. Operculum light yellow, helmet-shaped, with 2 erect, or slightly laterally curved, finger-like horns, white at the base, dark purple to the apex. Pollinia 8: 4 small – ovoid and 4 larger – clavate. Capsule narrowly ovoid, indistinctly ridged, drooping, to 2 cm long. **Fig. 18, f, g; 22.**

Ecology. Terrestrial herb. Primary and secondary rich evergreen broad-leaved dry forests on

sandstone, commonly on shady, very steep slopes. 300–500 m. Fl. April – May. Very rare (EN).

Distribution. Vietnam (Quang Nam). Local endemic of eroded sandstone formations in central part of Vietnam.

Studied specimens. Species is known till now only by lone type collection.

Notes. *Tainia cornuta* represents local endemism connected with ancient eroded sandstone formations found in Quang Nam province of central Vietnam. Species grows in rather dry habitats, when bulbs completely lack leaves during rainless season. Commonly plant becomes leafless at anthesis that normally never observed in its congeners.

5. *T. macrantha* Hook. f.,

1889, Icon. Pl. 19, tab. 1860; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 378; Seidenf., 1992, Opera Bot., 114: 80, fig. 39; Turner, 1992, Orch. Monogr. 6: 82, fig. 46; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 868, fig. 11219; Chen Sing-chi, Wood, 2009, Fl. China, 25: 285. – *Mischobulbum macranthum* (Hook. f.) Rolfe, 1912, Orchid Rev. 20: 127; Aver., 1994, Ident. Guide Vietnam. Orch.: 90; Aver. et Averyanova,

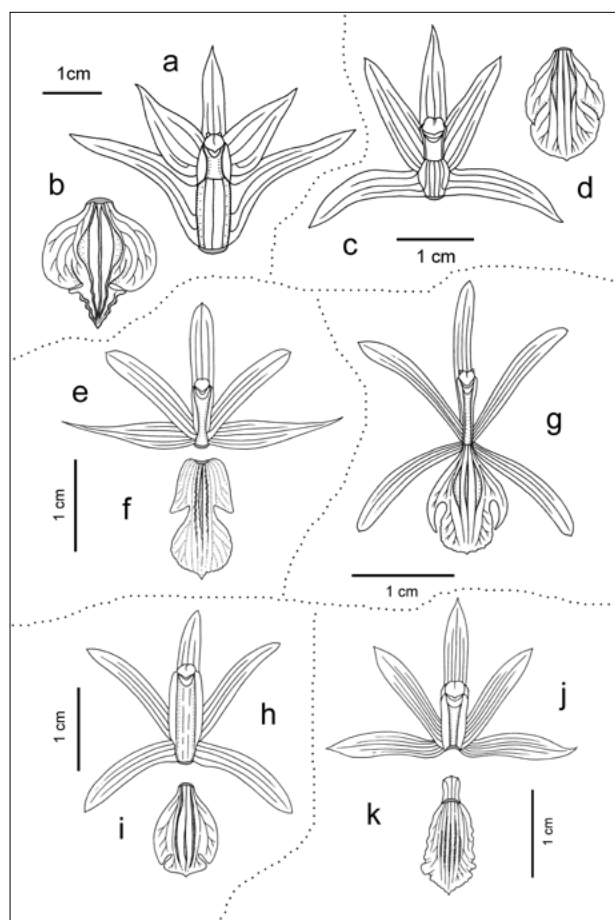


Fig. 19. *Tainia cordifolia*: a – flattened flower without lip, b – flattened lip (Averyanov et al., TD 7); *T. longiscapa*: c – flattened flower without lip, d – flattened lip (VH 4653); *T. pauciflora*: e – flattened flower without lip, f – flattened lip (Averyanov et al., LX-VN 4305); *T. latifolia*: g – flattened flower (HAL 2700); *T. dunnii*: h – flattened flower without lip, i – flattened lip (HAL 6266); *T. hongkongensis*: j – flattened flower without lip, k – flattened lip (Averyanov et al., 140, a. 1987).

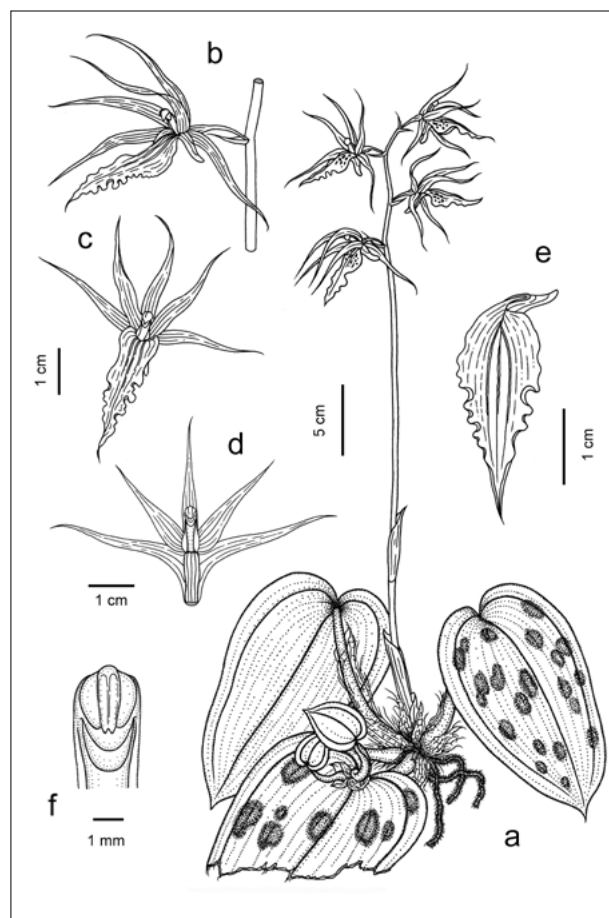


Fig. 20. *Tainia acuminata*: a – flowering plant (HAL 2693), b, c – flower, half-side and frontal views, d – flattened flower without lip, e – flattened lip; f – column, frontal view (DKH 6906, type).



Fig. 21. Digital herbarium specimen of *Tainia longiscapa* (HAL 11681).

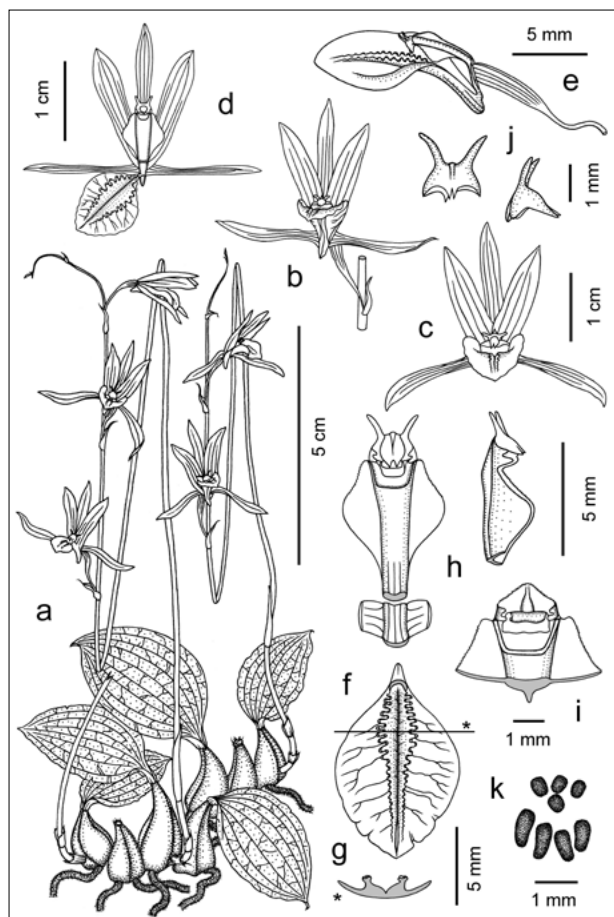


Fig. 22. *Tainia cornuta*: a – flowering plant, b–d – flower, e – column and lip, side view, f – flattened lip, g – transversal lip section, h – column, frontal and side views, i – upper part of column, j – operculum, frontal and side view, k – pollinia (CPC 3394, type).

2003, Updated Checklist Orch. Viet.: 45; Zhihui Xu et al., 2010, Wild Orch. Yunnan: 209, fig. 289a, b.

Described from S. China (“South China; prov. Lofaushan, opposite Hongkong”). **Type** (“C. Ford 153”) – K.

Pseudobulbs ascending, terete, 8–10 cm long, 5–7 mm wide. Petiole 6–8 cm long, leaf blade broadly elliptic, shortly acuminate, 15–20 cm long, 6–10 cm wide. Inflorescence 20–30(40) cm long with 3–6(15) lax flowers. Floral bracts cuneate, acuminate, 0.5–1 cm long. Pedicel and ovary 1–1.5 cm long. Sepals and petals brownish-purple, greenish and spotted with brownish-red to the base, narrowly ovate, acuminate, 2.5–3(3.5) cm long, 0.5–1 cm wide; lateral sepals adnate to short column foot forming broad short mentum. Lip rhomboid, cuneate at the base, 2.5–3.5 cm long, 1.5–2 cm wide, indistinctly 3-lobed. Side lobes small, erect, triangular. Median lobe triangular, elongate, acute. Disk with 3 keels, lateral keels rising at middle into triangular-lunate lamellae. Column about 1–1.5 cm tall, with narrow wings, foot 1 cm long. **Fig. 23.**

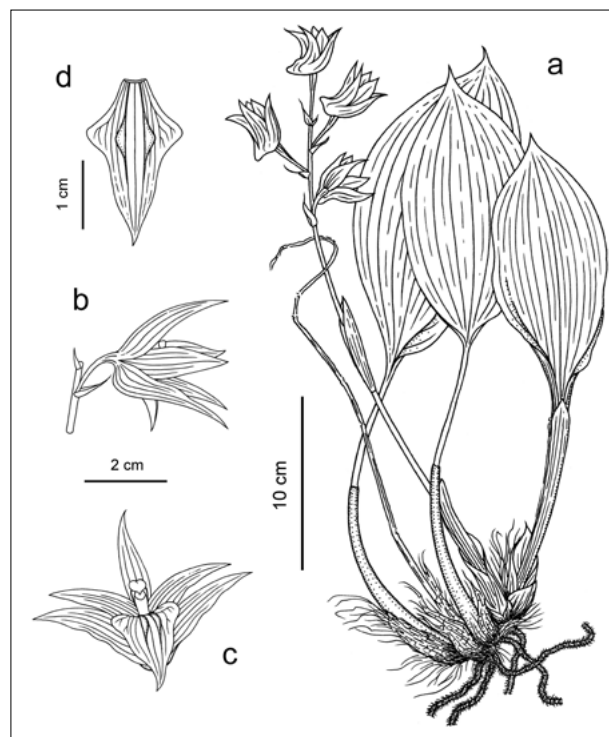


Fig. 23. *Tainia micrantha*: a – flowering plant (Poilane 12798), b, c – flower, side and frontal view, d – flattened lip (Hook. f., type).

Ecology. Terrestrial and lithophytic herb. Primary broad-leaved evergreen humid forests on granite, often on shady rocky damp slopes of stream and river canyons. 1500 m. Fl. July – August. Very rare (DD).

Distribution. Vietnam (Lao Cai). S. China.

Studied specimens. Km 16 route de Ta Phinh pres Chapa, Poilane 12798 (P).

Note. Extremely rare species worthy of cultivation as ornamental plant. The single collections in Vietnam was made in 1926, since then no observation was recorded.

6. *T. paucifolia* (Breda, Kuhl et Hasselt)

J.J. Sm.,

1912, Bull. Jard. Bot. Buitenzorg, ser. 2, 8: 5; Seidenf., 1992, Opera Bot., 114: 80; Comber, 1990, Orch. Java: 108, fig.; id., 2001, Orch. Sumatra: 299, fig; Seidenf., Wood, 1992, Orch. Malay. Sing.: 156, fig. 67 d, e, pl. 7c; Aver., 1994, Ident. Guide Vietnam. Orch.: 92; Turner, 1992, Orch. Monogr., 6: 86, fig. 50, pl. 7b; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 868, fig. 11220; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 57. – *Octomeria paucifolia* Breda, Kuhl et Hasselt, 1827, Gen. Sp. Orch. Asclep., 3, tab. 5. – *Tainia latilingua* Hook. f., 1890, Fl. Br. Ind., 5: 822; Seidenf., 1986, Opera Bot., 89: 37, fig. 9f, 16; Aver., 1989, Bot. Journ. (Leningrad), 74, 9: 1354.

Described from Java. **Type** – Ic. “*Octome-ria pauciflora*” (Breda, Kuhl et Hasselt, 1827, l.c., tab. 5).

Pseudobulbs 3–5 cm long, 5 mm wide. Petiole 12–20 cm long, leaf blade elliptic, acuminate to 15–20 cm long, 3–5(7) cm broad. Inflorescence 30–40(60) cm tall, with few to many lax flowers open together. Sepals and petals pale greenish to dull purple–brown, broadly lanceolate to oblong, obtuse, 1.5–2(2.5) cm long, 3–4 mm wide. Lip broadly obovate, 1–1.5(2) cm long, 3-lobed, yellowish to almost white, pink at the base. Side lobes triangular, erect, obtuse. Median lobe circular to rhomboid, 0.5–1 cm long and wide, round to shortly apiculate, finely toothed along edges, bearing 3 finely undulate keels, median rising at middle. Column winged, foot 2–3 mm long. **Fig. 19**, e, f.

Ecology. Terrestrial herb. Primary evergreen broad-leaved and mixed shady forests on silicate rocks. 500–700 m. Fl. January – February. Very rare (DD).

Distribution. Vietnam (Kon Tum). S. Thailand, Malacca Peninsular, Java, Sumatra, Kalimantan.

Studied specimens. Gia Lai, Tam Lap, Kbang, *Averyanov et al.*, *LX-VN 4305* (HN, LE).

Note. Occurrence of this species in Vietnam needs confirmation by more collections.

7. *T. latifolia* (Lindl.) Rehb. f.,

1857, Bonplandia, 5: 54; Seidenf., 1986, Opera Bot., 89: 35, fig. 9e, 15, pl. 3a; id., 1992, Opera Bot., 114: 79; Aver., 1994, Ident. Guide Vietnam. Orch.: 92; Turner, 1992, Orch. Monogr., 6: 78; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 868, fig. 11218; Su Horng-Jye, 2000, Fl. Taiwan 5: 1045; Comber, 2001, Orch. Sumatra: 300, fig.; Pearce et Cribb, 2002, Orch. Bhutan: 318, fig. 75; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 57; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 281; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 311; Chen Sing-chi, Wood, 2009, Fl. China, 25: 284. – *Ania latifolia* Lindl., 1831, Gen. Sp. Orch. Pl.: 129.

Described from NE. India (“Montes Sillet”).

Type (“*Bruce s.n.*, Wall. Herb. 3741”) – K-W.

Pseudobulbs 4–7 cm long, 0.5–1.5 cm wide at base. Petiole (7)10–30 cm long; leaf blade elliptic, acuminate, 18–40 cm long, 5–7 cm wide. Inflorescence peduncle (30)40–80 cm long, rachis olive-green or brownish to 20 cm long with many lax flowers. Pedicel and ovary 1–1.5 cm long. Sepals and petals olive-green to dark brown, lanceolate to broadly lanceolate, 1–1.5 cm long, obtuse; lateral sepals adnate to very short column foot forming short mentum. Lip light yellow, rarely with few

purple marks, obovate, 0.8–1.2 cm long, 4–9 mm wide, 3-lobed. Lateral lobes erect, falcate-triangular, obtuse to acute. Median lobe suborbicular or broadly obovate, 4 mm wide. Disk with 3 keels, lateral keels taller, arcuate. Column white, arcuate, 6–8 mm tall, foot 1–2 mm long. Anther cap yellow, with 2 purple-violet bosses at apex. **Fig. 18**, h, i; **19**, g.

Ecology. Terrestrial herb. Primary and secondary evergreen humid broad-leaved and coniferous shady forests, mainly on silicate rocks. (300)700–1300 m. Fl. January – April. Not common (VU).

Distribution. Vietnam (Cao Bang, Khanh Hoa, Kon Tum, Lao Cai, Ninh Binh). NE India, Bhutan, Bangladesh, Myanmar, S. China, Hainan, Taiwan, Thailand, Laos.

Studied specimens. Cao Bang, Bao Lac, *CBL 396* (HN, LE, MO); Khanh Hoa, Khanh Son, *VH 4376* (HN, LE); Kon Tum, Dacuy, *Averyanov et al.*, *LX-VN 2219* (HN, LE); Kon Tum, Dak Gley, *Ly 391* (HN), *VH 1663* (HN, LE, MO), *VH 1795* (HN, LE, MO), *VH 1946a* (LE), *VH 1955* (HN, LE, MO); Kon Tum, Kon Plong, *VH 5574* (HN, LE, MO); Kon Tum, Nin Dai Ding near Dakgley, *Poillane 32787* (P); Lao Cai, Van Ban, *DKH 6625* (HN, LE, MO), *DKH 6976* (HN, LE, MO), *HAL 2300* (HN, LE), *HAL 2700* (HN, LE); Ninh Binh, Ha Son Binh, Lam Son, Luang Son, *Tiep et al.*, *NOT 2821* (LE, UHN).

8. *T. dunnii* Rolfe,

1908, Journ. Linn. Soc. (Bot.), 38: 368; Seidenf., 1986, Opera Bot., 89: 37, fig. 9j (sub *T. quadratiloba*); Turner, 1992, Orch. Monogr., 6: 77, fig. 43; Su Horng-Jye, 2000, Fl. Taiwan 5: 1043, pl. 447; Chen Sing-chi, Wood, 2009, Fl. China, 25: 284; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 392, fig. 322–324.

Described from E. China (“China, Fujian (Fukien) Province, near Buon Kang”). **Type** (“*Dunn 3542*”) – K.

Pseudobulbs cylindric to narrowly ovoid, (1)3–8 cm long, 0.5–0.8 cm wide. Petiole (2)4–8 cm long; leaf elliptic, acuminate, 12–20(30) cm long, (1.5)3–7 cm wide. Inflorescence peduncle 30–60 cm long, rachis olive-green to brownish, to 20 cm long, laxly many flowered. Pedicel and ovary 1–1.4 cm long. Sepals and petals yellowish with dark brown margin to entirely brownish-purple, lanceolate, acute, 1–1.5 cm long, 2.5–3 mm wide; lateral sepals adnate to short column foot forming short mentum. Lip obovate, 0.8–1.2 cm long, 3-lobed. Side lobes pale yellow with many purple-brown spots to entirely dark purple-brown, erect, triangular, obtuse. Median lobe yellow, transversely rhomboid, shortly

mucronate or emarginate. Disk with 3 subsimilar low, papillose keels. Column white to light yellowish, arcuate, 7–9 mm tall, foot 1–2 mm long. Anther cap white to yellowish, sometimes with 2 purple-violet bosses at apex. **Fig. 19**, h, i; **24**, a, b.

Ecology. Terrestrial herb. Primary and secondary evergreen humid broad-leaved and coniferous shady forests, mainly on silicate rocks. 600–1800 m. Fl. January – March. Not common (VU).

Distribution. Vietnam (Dien Bien, Quang Binh, Quang Nam). E. and SE. China, Taiwan, Hong Kong, Hainan.

Studied specimens. Dien Bien, Muong Cha, *CPC 1088e* (LE); Quang Binh, Bo Trach, *HAL 6266* (HN, LE), Quang Nam, Ngoc Linh mt., *VH 888* (HN, LE).

Note. The species is very close to *T. latifolia* and quite probably represents its marginal form, which differs in lip with triangular side lobes, bright yellow transversely rhomboid mid lobe and subequal low keels.

9. *T. hongkongensis* Rolfe,

1896, Kew Bull., 1896: 195; Seidenf., 1986, Opera Bot., 89: 29, fig. 9k; id., 1992, Opera Bot., 114: 80, fig. 40; Aver., 1994, Ident. Guide Vietnam. Orch.: 92; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 867, fig. 11216; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 57; Chen Sing-chi, Wood, 2009, Fl. China, 25: 282; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 399, fig. 325–329. – *Ania hongkongensis* (Rolfe) Tang et F.T. Wang, 1951, Acta Phytotax. Sin., 1: 88; Turner, 1992, Orch. Monogr., 6: 54, fig. 28. – *Tainia angustifolia* auct. non (Lindl.) Benth. et Hook. f.: Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 383, p.p.

Described from Hong Kong (“Hongkong”). **Lectotype** (“Wright 522”) – K (lectotype), NY, P (isoleotypes).

Pseudobulbs globular to ovoid, 1–2 cm in diam. Petiole 10–20 cm long, leaf blade narrowly elliptic, acuminate oblong, 15–25 cm long, 2.5–4 cm wide. Inflorescence peduncle 15–40(50) cm tall; rachis 5–15 cm long with, several lax flowers. Floral bracts narrowly cuneate, acuminate, 6–12 mm long. Pedicel and ovary 1–1.5 cm long. Sepals and petals olive-green, often with brownish-purple nerves, broadly lanceolate to oblong, shortly apiculate, 1.5–2 cm long, 2.5–3.5 mm wide; lateral sepals adnate to column base. Lip white to yellowish, sometimes with greenish tint, entire, obovate (0.8)1–1.2 mm long, 5–6 mm wide, round or shortly mucronate at apex, spurred at base. Disk with 3–5 straight, low keels. Spur slightly flattened, 2.5–3.5 mm long. Col-

umn white, tinged with purple, 6–7 mm long, slightly dilated and winged toward apex. Anther cap dull yellow, hemispheric. **Fig. 19**, j, k; **24**, c.

Ecology. Terrestrial herb. Primary and secondary evergreen, broad-leaved and coniferous shady forests on any kind of soils. 100–700 m. Fl. January – May. Not common (VU).

Distribution. Vietnam (Quang Binh, Quang Ninh, Quang Tri, Thua Thien – Hue). SE. China, Hong Kong, Hainan.

Studied specimens. Quang Binh, Minh Hoa, *HAL 5986* (HN, LE); Quang Binh, Quang Ninh, *HAL 11582a* (HN, LE – photo); Quang Ninh, Ba Mun, *Averyanov et al.*, 140, a. 1987 (HN, LE); Quang Tri, Cu Bi, *Eberhardt 1975* (P); Quang Tri, Da Krong, *NTH 6119* (HN, LE); Thua Thien – Hue, A Luoi, *HAL 7887* (HN, LE).

10. *T. angustifolia* (Lindl.) Benth. et Hook. f.,

1883, Gen. Pl., 3: 515; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 383, p.p.; Seidenf., 1986, Opera Bot., 89: 31, fig. 9b, 12; id., 1992, Opera Bot., 114: 78; Aver., 1994, Ident. Guide Vietnam. Orch.: 93; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 867, fig. 11214; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 57; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 310; Chen Sing-chi, Wood, 2009, Fl. China, 25: 282. – *Ania angustifolia* Lindl., 1831, Gen. Sp. Orch. Pl.: 129; Turner, 1992, Orch. Monogr., 6: 51, fig. 25. – *Eulophia evrardii* Guillaum., 1930, Bull. Soc. Bot. France 77: 337.

Described from S. Myanmar (“Tavoy”). **Type** (“Gomez, Wall. Cat. 3740”) – K (holotype), BM, E, G (isotypes).

Pseudobulbs ovoid, 1.5–2 cm in diam. Petiole 20–30 cm long, leaf blade narrowly elliptic, acuminate, 30–60 cm long, 5–8 cm wide. Inflorescence peduncle 30–50 cm long, rachis 7–15 cm long with several lax flowers. Floral bracts cuneate, membranous, 1–1.5 cm long. Pedicel and ovary about 1.5–2 cm long. Sepals and petals yellowish green, narrowly ovate, acute, 1.5–2 cm long, 3.5–5 mm wide; lateral sepals adnate to column base. Lip white, tinged with purple, oblong, 1.5–2 cm long, 3-lobed. Side lobes erect, embracing column, oblique triangular. Median lobe white, transversely elliptic to broadly obovate, 5–6 mm wide, rounded or shortly apiculate. Disk with 5 purple lamellate keels suddenly raised on median lobe, sometimes undulate or denticulate. Spur slightly flattened, 4–5 mm long, 2–3 mm wide, obtuse. Column white tinged with purple, 1 cm long, 5 mm wide, broadly winged. Anther cap hemispheric, yellowish. **Fig. 24**, d, e; **25**; **26**, a, b.

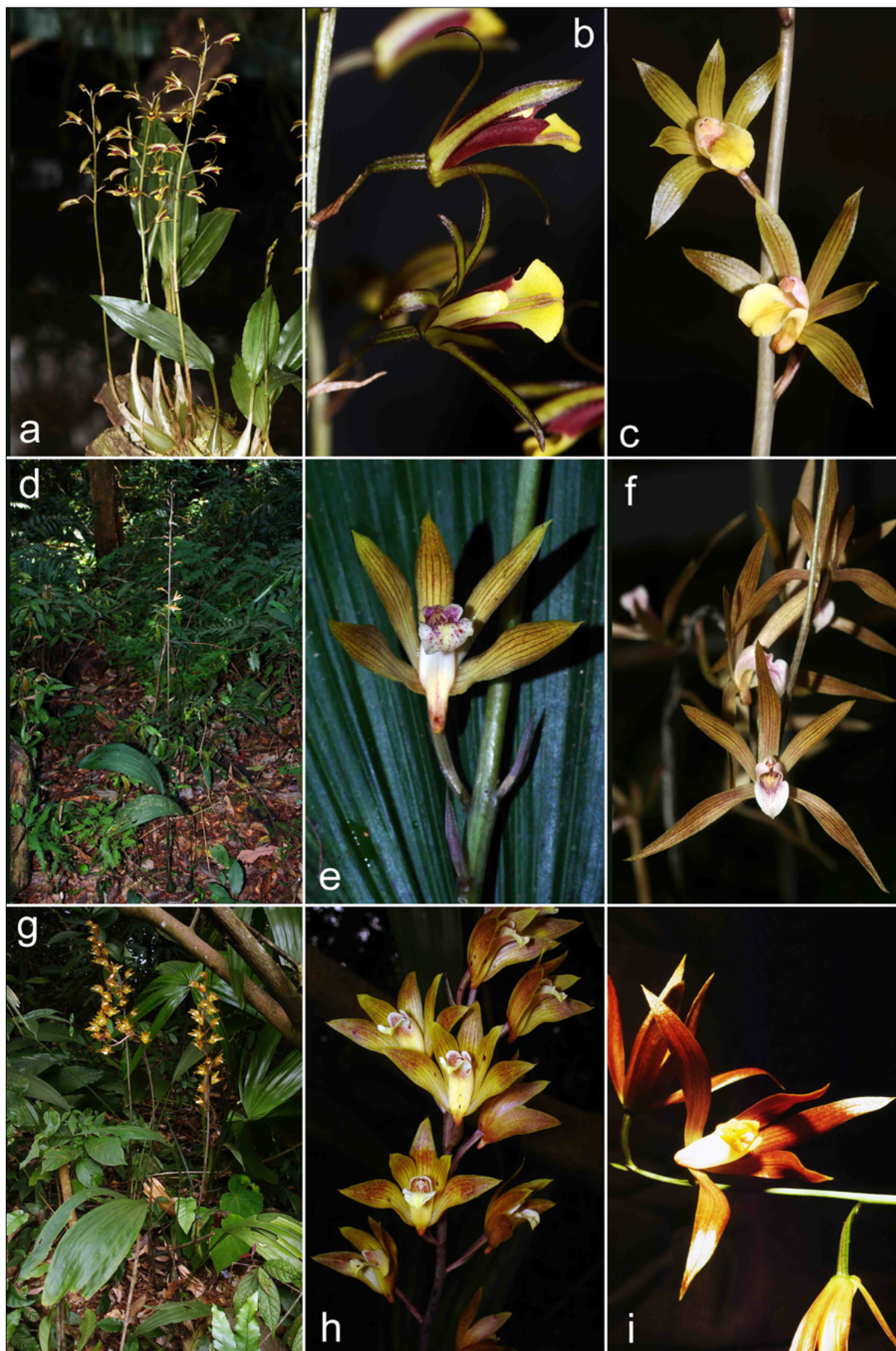


Fig. 24. *Tainia dunnii*: a, b (CPC 1088e); *T. hongkongensis*: c (HAL 11582a); *T. angustifolia*: d (HAL 12277), e (HLF 6740); *T. penangiana*: f (Averyanov et al., LX-VN s.n., a. 1988); *T. viridifusca*: g, h (J. Skornickova s.n., a. 2011); *T. ruybarrettoii*: i (Averyanov et al., LX-VN 0/108, a. 1989).



Fig. 25. Digital herbarium specimen of *Tainia angustifolia* (HAL 12277).

Ecology. Terrestrial and lithophytic herb. Primary and secondary evergreen broad-leaved shady forests on any kind of soils. 300–1100 m. Fl. January – May. Occasional (VU).

Distribution. Vietnam (Bac Can, Ha Giang, Ha Tinh, Hoa Binh, Lam Dong, Lao Cai, Nghe An, Ninh Thuan, Quang Binh). Myanmar, Thailand, S. China, Laos.

Studied specimens. Bac Can, Na Ri, *NTH* 3712 (HN, LE); Ha Giang, Quang Ba, *DKH* 4809 (HN, LE, MO); Ha Tinh, Huong Son, *HAL* 5183 (HN, LE); Hoa Binh, Da Bac, *HAL* 593 (HN, LE, MO); Lam Dong, Dalat, *Tixier s.n.* (P), *HAL* 4601 (HN, LE); Lam Dong, Prenh, Dalat, *Evrard* 1457 (P); Lao Cai, Van Ban, *DKH* 6979 (HN, LE, MO); Nghe An, Tuong Duong, *HLF* 6740 (HN, LE, MO); Ninh Thuan, W of Cana, *Evrard* 2387 (P); Ninh Thuan, Ninh Hai, *HLF* 4411 (HN, LE, MO); Quang Binh, Bo Trach, *HAL* 6318 (HN, LE); Quang Binh, Minh Hoa, *HAL* 12477 (HN, LE); d-EXSICCATES OF VIETNAMESE FLORA 0156/*HAL* 12277.

11. *T. penangiana* Hook. f.,

1890, Fl. Brit. Ind. 5: 820; Seidenf., Wood, 1992, Orch. Malay. Sing.: 156, fig. 67a-c; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 57; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 281; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 311; Chen Sing-chi, Wood, 2009, Fl. China, 25: 283. – *Tainia hookeriana* King et Pantl., 1895, J. As. Soc. Bengal, pt. 2, Nat. Hist. 64, 2: 336; Seidenf., 1986, Opera Bot., 89: 32, fig. 9c, d, 13, 14; Seidenf., 1992, Opera Bot., 114: 80, pl. 5b; Aver., 1994, Ident. Guide Vietnam. Orch.: 93; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 867, fig. 11217; Su Horng-Jye, 2000, Fl. Taiwan 5: 1043. – *Ania penangiana* (Hook. f.) Summerh., 1939, Bot. Mag. 161, tab. 9553; Turner, 1992, Orch. Monogr. 6: 55, fig. 29, pl. 5c. – *Tainia taiwaniana* S.S. Ying, 1987, Quart. J. Chin. Forest. 20: 55.

Pseudobulbs globose to ovoid, 2–4 cm in diam. Petiole 20–40 cm long, leaf blade elliptic, acuminate, 30–40 cm long, 5–8(10) cm wide. Peduncle 30–60 cm long, rachis 15–25 cm long, with few to many lax flowers. Floral bracts cuneate, 4–7 mm long. Pedicel and ovary 1–1.5 cm long. Sepals and petals yellowish-green with brownish-purple nerves, suffered with brown, lanceolate, acuminate, (1.5)2–3.5(4) cm long, 3–5 mm wide. Lip white with small purple marks, obovate, 1.2–1.6 cm long, 3-lobed, spurred. Side lobes triangular falcate, obtuse or blunt. Median lobe almost orbicular, sometimes yellowish at apex, shortly apiculate. Disk with 3 keels, usually slightly raised on median lobe. Spur 2–3 mm long, shortly cylindrical to half globular.

Column 0.8–1.2 cm tall. Anther cap hemispheric, yellowish, often with purple tint. **Fig. 24**, f, **26**, c, d.

Ecology. Terrestrial herb. Primary and secondary evergreen humid broad-leaved and coniferous shady forests on silicate rocks. 900–1400 m. Fl. February – April. Not common (VU).

Distribution. Vietnam (Ba Ria – Vung Tau, Dak Nong, Khanh Hoa, Kon Tum, Lam Dong). NE. India, S. China, Hainan, Taiwan, Thailand, Malacca Peninsula.

Studied specimens. Ba Ria – Vung Tau, Baria, Dinh, *Pierre* 6675 (P); Dak Nong, Ta Dung mt, *Truong s.n.*, a. 2011 (LE – photo); Khanh Hoa, Lien Khay, Da Ninh, *Tixier* 32 (P); Kon Tum, Dacuy, *Averyanov et al.*, *LX-VN* 2220 (HN, LE); Kon Tum, Kbang, *Averyanov et al.*, *LX-VN* 2069 (HN, LE); Lam Dong, Manline, Dalat, *Tixier* 8/59 (P); Lam Dong, Dalat, *Averyanov et al.*, *LX-VN s.n.*, a. 1988 (LE), *VH* 2604 (HN, LE, MO).

12. *T. viridifusca* (Hook.) Hook. f.,

1890, Fl. Brit. Ind. 5: 820; Seidenf., 1986, Opera Bot., 89: 28, fig. 9a, 11, tab. 2b; id., 1992, Opera Bot., 114: 78; Aver., 1994, Ident. Guide Vietnam. Orch.: 93; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 868, fig. 11221; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 57; Chen Sing-chi, Wood, 2009, Fl. China, 25: 283. – *Calanthe viridifusca* Hook., 1852, Bot. Mag. 78, tab. 4669. – *C. eberhardtii* Gagnep., 1932, Bull. Soc. Bot. France, 79: 162. – *Ania viridifusca* (Hook.) Summerh., 1939, Bot. Mag. 161, tab. 9553; Turner, 1992, Orch. Monogr. 6: 60, fig. 32.

Described from NE. India (“Assam”). **Type** (“*Simons s.n.*”) – K?

Pseudobulbs globose to broadly ovoid, 2–4 cm in diam. Petiole 25–45 cm long, leaf blade elliptic, acuminate, 30–40(50) cm long, (3)4–10 cm wide. Inflorescence peduncle (30)40–70 cm long, rachis 15–25 cm long, with many lax flowers. Floral bracts cuneate, acuminate, 1–1.5 cm long. Pedicel and ovary 1.5–2 cm long. Sepals and petals yellow-brownish, olive-orange to purple-brown, broadly lanceolate to narrowly ovate, 1.5–2.2 cm long, 4–5 mm wide, apiculate; lateral sepals adnate to column foot. Lip white, sometimes with many small purple marks, obovate, 1–1.5 cm long, 7–9 mm wide, 3-lobed. Side lobes ovate-oblong, round at apex. Median lobe orbicular, sometimes yellowish, mucronate. Disk with (3)5 keels decreasing at middle and rising to median lobe, sometimes undulate. Spur saccate-conic, 2–3 mm long. Column 0.8–1 cm tall. Anther cap hemispheric, white, often with 2 purple spots at apex. **Fig. 24**, j, h; **26**, e, f.

Ecology. Terrestrial herb. Primary and secondary evergreen humid broad-leaved and coniferous shady forests on silicate rocks. 600–1300 m. Fl. February – April. Not common (VU).

Distribution. Vietnam (Bac Kan, Hoa Binh, Kon Tum, Ninh Thuan, Thai Nguyen, Yen Bai). NE. India, Myanmar, Thailand, China.

Studied specimens. Bac Kan, Yen Lao, Ba Kan, *Eberhardt* 4673 (P); Hoa Binh, *J. Skornickova* s.n., a. 2011 (LE – photo); Kon Tum, Kon Plong, *DKH* 4672 (HN, LE, MO); Ninh Thuan, Nui Chua mt., *HLF* 4214 (HN, LE, MO), *HLF* 4677 (HN, LE, MO); Thai Nguyen, Thai Nguyen to Cho Chu, *Eberhardt* 3984 (P); Yen Bai, *Rives* s.n. (P).

13. *T. ruybarrettoi* (S.Y. Hu et Barretto) Aver., 1994, *Ident. Guide Viet. Orch.*: 403; Aver. et Averyanova, 2003, *Updated Checklist Orch. Viet.*: 57; Chen Sing-chi, Wood, 2009, *Fl. China*, 25: 283; Barretto, Cribb, Gale, 2011, *Orch. Hong Kong*: 402, fig. 330–332. – *Ania ruybarrettoi* S.Y. Hu et Barretto, 1976, *Chung Chi Journ.* 13, 2: 25; Turner, 1992, *Orch. Monogr.* 6: 59, fig. 31, pl. 6a.

Described from Hong Kong (“Hong Kong, New Territories, Sha Tau Kok, North flank of Pat Sin Range”). **Type** (“S.Y. Hu 13098A”) – K (holotype), PE (isotype).

Pseudobulbs globose to ovoid, 2–4 cm across. Petiole 30–60 cm long, leaf blade narrowly elliptic, acuminate, 20–50 cm long, (3)4–8 cm wide. Inflorescence peduncle 40–60 cm tall, rachis 10–25 cm long with few to many lax flowers. Floral bracts cuneate, 1–1.5 cm long. Pedicel and ovary as long as floral bracts. Sepals and petals dull orange to yellowish-brown, sometimes with purple-brown veins, broadly lanceolate to lanceolate, acute or acuminate, 2–4 cm long, 4–5 mm wide. Lip white with many small purple marks, obovate, 3-lobed, (1.2)1.5–2(2.5) cm long, spurred. Side lobes erect, broadly triangular, obtuse. Median lobe broadly ovate to almost orbicular, often apiculate, 3–6 mm across, slightly undulate along margin. Disk with 5 low keels suddenly rising at center of median lobe. Spur orange, 2–3(5) mm long, 2 mm wide. Column white, spotted with purple, slightly arcuate, 1–1.4 cm tall. Anther cap white to yellowish, often with 2 deep purple spots. **Fig. 24, i; 26, g, h.**

Ecology. Terrestrial herb. Primary and secondary evergreen humid broad-leaved and coniferous shady forests on silicate rocks. 500–1500 m. Fl. January – May. Not common (VU).

Distribution. Vietnam (Kon Tum, Lam Dong, Quang Binh, Quang Tri, Vinh Phuc). SE. China, Hong Kong, Hainan.

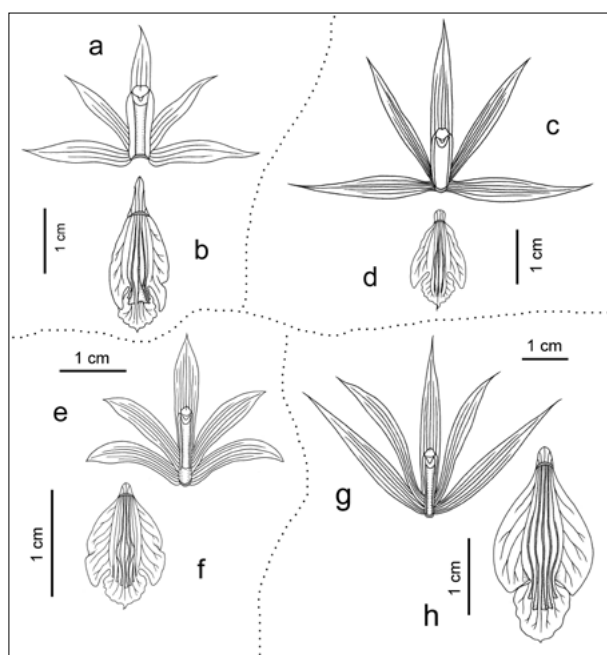


Fig. 26. *Tainia angustifolia*: a – flattened flower without lip, b – flattened lip (HAL 6318); *T. penangiana*: c – flattened flower without lip, d – flattened lip (Averyanov et al., LX-VN s.n., a. 1988); *T. viridifusca*: e – flattened flower without lip, f – flattened lip (HAL 4677); *T. ruybarrettoi*: g – flattened flower without lip, h – flattened lip (HLF 6261).

Studied specimens. Kon Tum, Kon Plong, *DKH* 4672 (HN, LE, MO); Kon Tum, Ngoc Linh mt., *VH* 131 (HN, LE, MO); Lam Dong, Dalat, *VH* 2605 (HN, LE, MO); Quang Binh, Quang Ninh, *HAL* 11582 (HN, LE, MO); Quang Tri, Huong Hoa, *HLF* 6261 (HN, LE); Vinh Phuc, Tam Dao, *Averyanov et al., LX-VN* 0/108 (LE).

Note. Highly questionable taxon, which may be regarded as marginal form of widespread and very variable *T. viridifusca*.

***Calanthe* R. Br.,**

1821, *Bot. Reg.* 7, sub tab. 573; Gagnep., 1933, *Fl. Gen. Indo-Chine* 6, 3: 384–398; Seidenf., 1975, *Dansk Bot. Ark.*, 29, 2: 1–50; id., 1992, *Opera Bot.*, 114: 88–99; Comber, 1990, *Orch. Java*: 90–97; id., 2001, *Orch. Sumatra*: 253–276; Seidenf., Wood, 1992, *Orch. Malay. Sing.*: 163–179; Aver., 1994, *Ident. Guide Vietnam. Orch.*: 102–109; P.H. Ho, 2000, *Ill. Fl. Vietnam* 3: 870–874; Su Horng-Jye, 2000, *Fl. Taiwan* 5: 776–791; Pearce et Cribb, 2002, *Orch. Bhutan*: 281–296; Aver. et Averyanova, 2003, *Updated Checklist Orch. Viet.*: 18–19; Newman et al., 2007, *Checkl. Vasc. Pl. Lao*: 257; Schuiteman et al., 2008, *Nord. Journ. Bot.* 26: 272–273; Chen Sing-chi, Cribb, Gale, 2009, *Fl. China*, 25: 292–309; Barretto, Cribb, Gale, 2011, *Orch. Hong Kong*: 435–457.

Type: *Limodorum veratrifolium* Willd. (*Calanthe triplicata* (Willem.) Ames).

Terrestrial, rarely lithophytic or epiphytic sympodial herbs. Stems clustering together or distant on creeping rhizome. Stems erect, pseudobulbous or not. Leaves lanceolate to broadly elliptic, attenuate, subsessile or narrowing in lower part into petiole-like base. Inflorescence erect, few- to many-flowered raceme, arising from leaf axil, from base of pseudobulb or from rhizome. Floral bracts persistent

or caducous. Flowers resupinate. Sepals and petals subsimilar, free; petals often smaller. Lip adnate to column wings forming tube, or adnate only to base of column, lobed or entire, spurred or not; disk often with keels or warty callosities at the base. Column short and thick, footless or with short foot, winged. Rostellum lobed or unlobed. Pollinia waxy, 8, in 2 groups with small caudicle and viscidium.

180 (24) species. Tropical and subtropical areas of the world.

Key to species

1. Plants without distinct pseudobulbs; inflorescence glabrous or hardly puberulent; leaves not deciduous, without articulation; inflorescence arising from leafy stems 2 (subgen. 1. *Calanthe*)
- + Plants with large pseudobulbs; inflorescence, floral bracts and flowers villose; leaves deciduous in rainless season, with articulation at the base; plants flowers without leaves 21 (subgen. 2. *Preptanthe*)
2. Floral bracts persistent, remaining long after anthesis; rostellum 2- or 3-lobed 3 (sect. 1. *Calanthe*)
- + Floral bracts caducous, drooping before or soon after flowers open; rostellum unlobed 16 (sect. 2. *Styloglossum*)
3. Lip spurless 1. *C. puberula*
- + Lip spurred 4
4. Lip unlobed or indistinctly 2- or 3-lobed, often emarginate 5
- + Lip distinctly 3-lobed 6
5. Floral bracts and sepals reflexed; flowers yellow; spur 0.8–1 cm long 2. *C. whiteana*
- + Floral bracts and sepals not reflexed; flowers white, tinged purple; spur 2–3 cm long 3. *C. petelotiana*
6. Lip without warty callosity at the base or with inconspicuous callosity 7
- + Lip with prominent warty callosities at the base 9
7. Median lip lobe with 2–3 prominent warty keels; sepals and petals brown, lip yellow 4. *C. mannii*
- + Median lip lobe without prominent keels; flowers light purple, pink or white, lip sometimes brownish at center 8
8. Spur longer than 1.5 cm, as long as median sepal or longer, lip side lobes large, reniform, rounded at apex, 6–8 mm wide 5. *C. alleizettii*
- + Spur less than 1 cm long, much shorter than median sepal, lip side lobes small triangular, acute, 1 mm wide at the base 6. *C. velutina*
9. Median lip lobe shallowly emarginate, often mucronate at apex or not; leaves densely pubescent with short soft hairs; flowers pink 7. *C. sylvatica*
- + Median lip lobe divided by deep sinus into 2 lobules; leaves glabrous or sparsely hairy; flowers white or yellow, rare lip with purple-violet tint at base 10
10. Leaves narrowly lanceolate to ensiform or almost linear, 0.8–2(5) cm wide; floral bracts reflexed; median sepal less than 1 cm long 8. *C. davidii*
- + Leaves broadly lanceolate to elliptic ovate, 4–12 cm wide; floral bracts not reflexed; median sepal longer than 1 cm 11
11. Median lip lobe obcordate, its lobules divided by narrow slit, much wider than side lobes; flowers white, lip occasionally with violet tint at the base, sepals often greenish to apex; leaves distinctly divided into petiole and leaf blade; basal parts of ascending stems form creeping rhizome 9. *C. alismifolia*
- + Median lip lobe divided into spreading lobules not much wider than side lobes; sepals and petals white or light green, lip white with yellow, orange or red callus at the base; leaves not distinctly divided into petiole and leaf blade, gradually attenuate to the base; stems clustering touching each other, not forming creeping rhizome 12
12. Sepals and petals entirely light green 13
- + Sepals and petals white, occasionally greenish to apex 14
13. Leaves uniform green; spur longer than 2 cm 10. *C. herbacea*
- + Leaves with several silver bands; spur less than 2 cm long 11. *C. argenteo-striata*
14. Spur 1–1.2(1.5) cm long 12. *C. odora*
- + Spur 1.5–4(5) cm long 15
15. Lateral sepals acuminate, shortly apiculate; lip side lobes and lobules of median lobe broadly lanceolate, more than 2 mm wide, truncate or roundish at apex, broadest at middle or in apical part; warty lip callosity yellow, orange or red, shorter than 4 mm, not forms distinct longitudinal keels 13. *C. triplicata*

- + Lateral sepals cuspidate; lip side lobes and lobules of median lobe triangular lanceolate, 2 mm wide at base, acuminate, acute, broadest at the base; lip callosity yellow, forms 3 warty undulate keels to 4 mm long 14. *C. leonidii*
- 16(2). Flowers white, lip white, yellow or purple 17
- + Flowers yellow 18
17. Stems clustering on short rhizome, each with 4–6 narrowly elliptic or lanceolate leaves; inflorescence many flowered, dense; flowers nutant; petals spreading; lip yellow at the base, with yellow side lobes 15. *C. angustifolia*
- + Stems distant on creeping rhizome, each with 2–3(4) elliptic leaves; inflorescence with (1)3–10(12) lax flowers; flowers horizontal; median sepal and petals connivent into hood; lip purple at the base, with purple side lobes 16. *C. duyana*
18. Lip transversely oblong, distinctly broader than long; side lobes very small or lacking 17. *C. lyroglossa*
- + Lip ovate or obovate, as long as broad or longer; side lobes large, as large as lobules of median lobe or nearly so 19
19. Rachis short, inflorescence dense, head-like; lip adnate to base of column wings; spur cylindric, straight or hardly curved; column slender, 10–13 mm tall 18. *C. densiflora*
- + Rachis elongate, inflorescence subclax raceme; lip adnate to entire length of column wings; spur clavate, more or less curved; column thick, 5–8 mm tall 20
20. Lip with 2 triangular keels at the base between side lobes, median lobe flat, without ornamentation 19. *C. clavata*
- + Lip with 2 triangular keels at the base between side lobes and 2 twice smaller triangular keels on disk at the base of median lobe 20. *C. chevalieri*
- 21(1). Lip side lobes reflexed from column, straight, obovate, with even margin and rounded apex; median lobe bilobed or deeply emarginate 22
- + Lip side lobes erect, trumpet-like, embracing column, subquadrate, with denticulate or crenulate margin and truncate apex; median lobe entire or hardly emarginate 23
22. Lip white with yellow center; sepals and petals 2 cm or longer; median lip lobe much broader than side lobes 21. *C. vestita*
- + Lip pink, purple to the base; sepals and petals 1.8 cm long or less; median lip lobe subequal wide as side lobes 22. *C. rubens*
23. Median keel extends to epichile in form of low limb or distinct vein; flowers pink, lip with numerous purple marks and stripes, epichile purple 23. *C. cardioglossa*
- + Median keel extends to epichile in form of narrow lamellate plate; flowers white, sometimes with pink tint, rare pink, with purple spotting 24. *C. succedanea*

C. subgen. 1. *Calanthe*;

C. subgen. Eucalanthe Schltr., 1912, Feddes Repert. (Beih.), 1: 376.

Lectotype: *C. triplicata* (Willem.) Ames.

Stems leafy around the year, thickened at the base or not, clustering together or distant on creeping rhizome. Leaves not deciduous, long living, without articulation. Inflorescence, rachis, floral bracts, pedicel and ovary glabrous or shortly puberulent.

130 (20) species. Tropical and subtropical regions of the Old World.

C. sect. 1. *Calanthe*;

C. sect. Eucalanthe J.J. Sm., 1905, Fl. Buitenzorg 4, 1: 202. – *C. sect. Calothyrsus* Schltr., 1912, Feddes Repert. (Beih.) 1: 376.

Lectotype: *C. triplicata* (Willem.) Ames.

Floral bracts green, herbaceous, not erect, more or less horizontal or reflexed, shorter than flowers, always persistent during anthesis and fruiting. Rostellum 2–3-lobed.

80–100 (14) species. Tropical and subtropical regions of the Old World.

1. *C. puberula* Lindl.,

1833, Gen. Sp. Orch. Pl.: 252; King et Pantl., 1898, Ann. Bot. Gard. (Calcutta) 8, tab. 224; Seidenf., 1992, Opera Bot., 114: 94, fig. 50; Aver., 1994, Ident. Guide Vietnam. Orch.: 104; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 873, fig. 11240; Su Horng-Jye, 2000, Fl. Taiwan 5: 787, pl. 93; Pearce et Cribb, 2002, Orch. Bhutan: 289; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 19; Chen Sing-chi, Cribb, Gale, 2009, Fl. China, 25: 298.

Described from NE. India (“Sylhet”). **Type** (“Wallich 7342”) – K?

Terrestrial herb. Stems clustering, with 4–5 acuminate, glabrous or sparsely puberulent leaves 12–22 cm long, 5–7 cm wide. Inflorescences 1 or 2, erect, arising from apical part of pseudobulb, 20–40 cm tall; rachis 6–14 cm long, with 4–10 lax flowers. Floral bracts lanceolate, acuminate, 1.3–2 cm long,

puberulent. Pedicel and ovary 1.5–2 cm, densely puberulent. Flowers light pink-violet; sepals, ovate, cuspidate, 1–1.6(2) cm long, 4–6 mm wide, puberulent; petals linear lanceolate, acuminate, 1.1–1.3 cm long. Lip ovate in shape, 1–1.3 cm long, 0.6–1 cm wide, spurless, 3-lobed; side lobes oblong-falcate, with entire margin, obtuse; median lobe rhombic obovate, irregularly denticulate, acute. Column 4–5 mm tall. Rostellum 3-lobed; anther cap ovate, 4 mm across. Pollinia clavate, with conspicuous caudicles and linear viscidium. **Fig. 27, a-c.**

Ecology. Primary evergreen broad-leaved forests. 1200–3000 m. Fl. June – August. Very rare (DD).

Distribution. Vietnam (Lam Dong). NE. India, Bhutan, Nepal, China, Taiwan, Korea, Japan.

Studied specimens. Lam Dong, Annam: Lang Bian, *Tixier 1059* (P).

Note. Identification of a single available, very old collection from Vietnam is questionable. Presence of this species in the country needs confirmation by comprehensive observations. Picture 27, a-c is copied from King et Pantl., l.c., tab. 224.

2. *C. whiteana* King et Pantl.,

1896, Journ. Asiat. Soc. Bengal 2, Nat. Hist. 65, 2: 121; Pearce et Cribb, 2002, Orch. Bhutan: 294; Chen Sing-chi, Cribb, Gale, 2009, Fl. China, 25: 299. – *C. wardii* W.W. Sm., 1921, Not. Roy. Bot. Gard. Edinburgh 13: 194.

Described from NE. India (“India, Choongthang (Chunthang) ...”). **Type** (“*Pantling 365*”) – CAL (holotype), BM, K (isotypes).

Terrestrial rosulate herb. Stems densely clustering, each with 3(4) narrowly elliptic, acuminate leaves 25–35 cm long, 2.5–4.5 cm wide. Inflorescence arising from leaf axil, erect, stout, puberulent, to 0.8 m tall. Rachis 9–20 cm long, with 10–20 lax flowers. Floral bracts persistent, reflexed, narrowly lanceolate, 1–3 cm long, sparsely puberulent. Pedicel and ovary 1 cm long, puberulent. Flowers pale yellow. Sepals reflexed, narrowly ovate, obtuse, 0.9–1 cm long, slightly puberulent. Petals lanceolate, obtuse, 8–9 mm long. Lip reniform, 5–6 mm long, 12–14 mm wide, unlobed, emarginate, entire or slightly erose along margin; disk with 3 warty keels; spur cylindric, 8–10 mm long, puberulent. Column white, short, 3 mm across, dilated toward apex, puberulent, wings decurrent to base of lip. Rostellum 2-lobed. Pollinia unequal, 4 ovoid to clavate, with orbicular viscidium. **Fig. 28, a, b.**

Ecology. Primary broad-leaved evergreen humid closed forests on shale and granite. (1000)1500–1800 m. Fl. May – June. Very rare (DD).

Distribution. Vietnam (Lao Cai). NE. India, Bhutan, N. Myanmar, SW. China.

Studied specimens. Lao Cai, Sa Pa, *Khang s.n.*, a. 2011 (CPC Herbarium, LE – photo).

Notes. Extremely rare species known globally only from few collections. It is considered as one of the most beautiful of all *Calanthes* and has certain potentials for cultivation as ornamental plant.

3. *C. petelotiana* Gagnep.,

1932, Bull. Soc. Bot. France, 79: 163; id., 1933, Fl. Gen. Indo-Chine 6, 3: 396, fig. 36, 2-4; Seidenf., 1992, Opera Bot., 114: 92, fig. 46; Aver., 1994, Ident. Guide Vietnam. Orch.: 103; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 873, fig. 11239; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 19; Chen Sing-chi, Cribb, Gale, 2009, Fl. China, 25: 299.

Described from northern Vietnam (“Tonkin: route de Cha-pa au col. De Lo-qui-ho”). **Type** (“*Petelot s.n.*”) – P.

Terrestrial herb. Stem with 2(3), narrowly elliptic, acute leaves, 40–60 cm long, 4.5–8 cm wide. Inflorescence synanthous, erect, puberulent, 20–25 cm; rachis (4)6–12 cm long, with (4)6–10 lax flo-

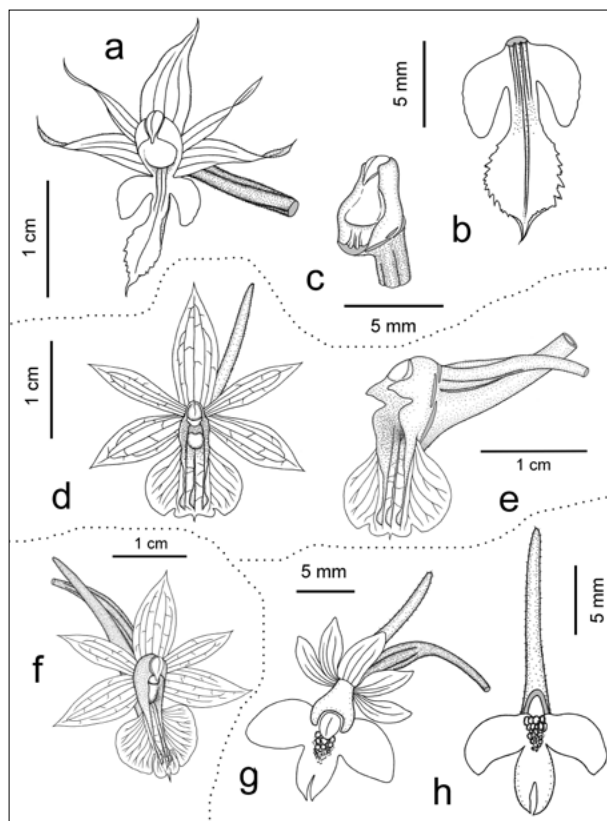


Fig. 27. *Calanthe puberula*: a – flower, b – flattened lip, c – column, half-side view (copied from King et Pantl., 1898); *C. petelotiana*: d – flower, e – column and lip, half-side view (CBL 1402); *C. alleizettii*: f – flower (DKH 7508); *C. davidii*: g – flower, h – flattened lip (Duthie, s.n.).

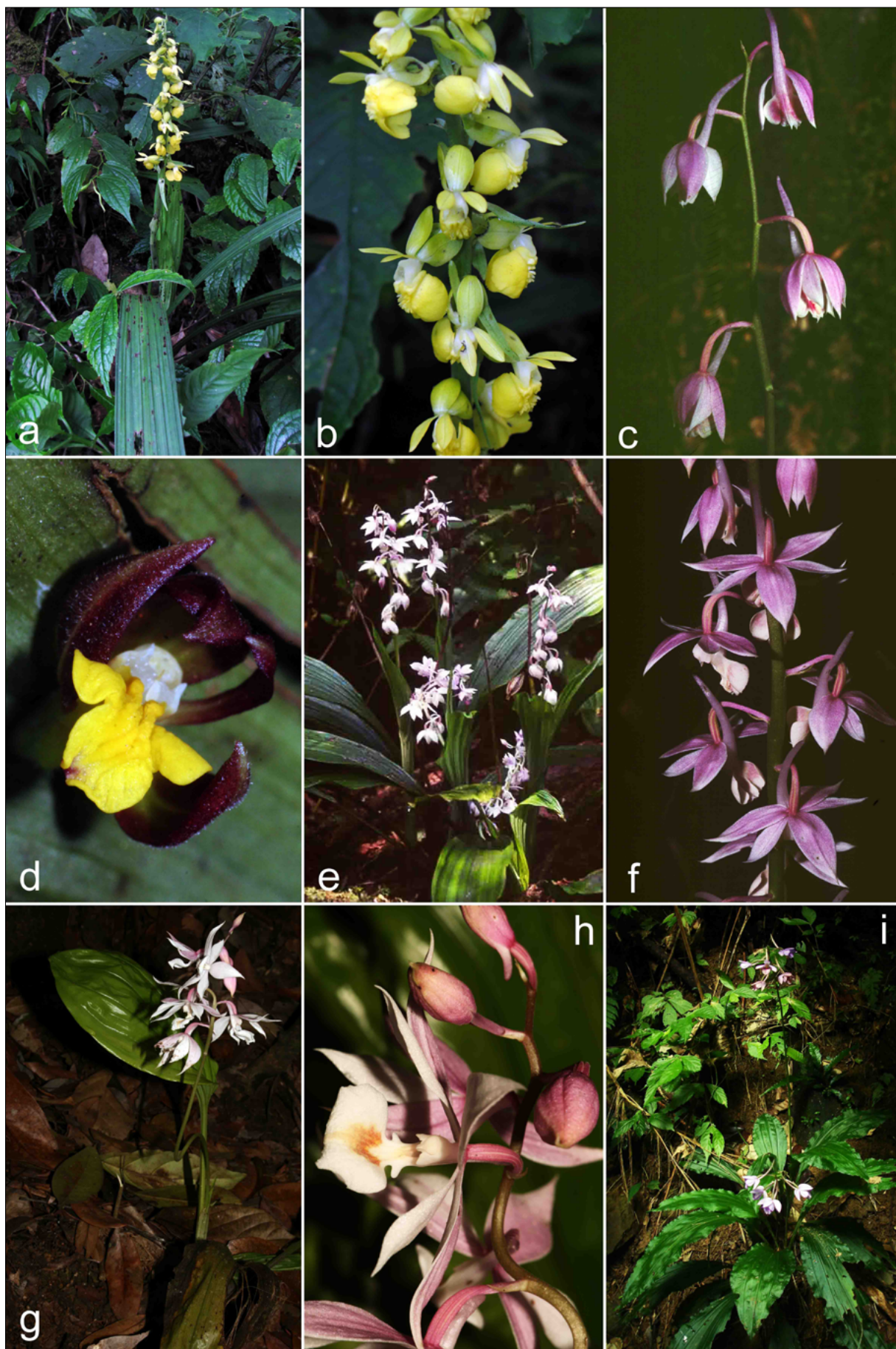


Fig. 28. *Calanthe whiteana*: a, b (Khang s.n., a. 2011); *C. petelotiana*: c (CBL 1402); *C. manii*: d (HAL 12865); *C. alleizettii*: e, f (HAL 2627); *C. velutina*: g, h (CPC 1898); *C. sylvatica*: i (J. Skornickova HB-93).

wers. Floral bracts lanceolate, 5–7 mm long, shortly puberulent. Pedicel and ovary 2–3 cm long, finely puberulent. Flowers light violet to almost white. Sepals and petals elliptic, shortly attenuate, 1–1.5 cm long, petals narrower. Lip adnate to column wings, entire or indistinctly 3-lobed, transversely elliptic, 5–7 mm long, 1–1.2 cm wide, shallowly emarginate and mucronate in sinus; disk with 3 fleshy keels thickened toward apex; spur cylindric, 1.2–1.6 cm long, sparsely puberulent outside, densely setose around entrance. Column short, thick, 3–4(5) mm tall, puberulent at front. Rostellum 2-lobed. Pollinia obovoid with oblong small viscidium. **Fig. 27**, d, e; **28**, c.

Ecology. Primary humid broad-leaved evergreen forests on silicate soils, commonly in shady wet slopes. 1500–1700 m. Fl. March – April. Rare (DD).

Distribution. Vietnam (Cao Bang, Lao Cai). S. China.

Studied specimens. Cao Bang, Bao Lac, *CBL 1402* (HN, LE, MO); Lao Cai, route de Chapa au Col de Lo Qui Ho, *Petelot 5417* (P).

4. *C. mannii* Hook. f.,

1890, Fl. Brit. India 5: 850; Pearce et Cribb, 2002, Orch. Bhutan: 288; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 19; Chen Sing-chi, Cribb, Gale, 2009, Fl. China, 25: 303. – *C. pusilla* Finet, 1900, Bull. Soc. Bot. France, 46: 436. – *C. brachychila* Gagnep., 1932, Bull. Soc. Bot. France, 79: 162; id., 1933, Fl. Gen. Indo-Chine 6, 3: 390; Seidenf., 1992, Opera Bot., 114: 94, fig. 49; Aver., 1994, Ident. Guide Vietnam. Orch.: 104; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 890, fig. 11230.

Described from N. India (“India, W. Himalaya, ...”, Khasia Hills, Mairang, ...”, E. Khasia Hills, ...”). **Syntypes** (“*Duthie 5996*”, “*Mann s.n.*”, “*Clarke 49321*”) – K.

Terrestrial herb with 3–5 oblanceolate, acute, puberulent leaves 20–15 cm long. Inflorescence synanthous, erect, 20–40 cm long, densely puberulent; rachis 4–10 cm long with many sublux flowers. Floral bracts, lanceolate, 2–4 mm long, glabrous. Pedicel and ovary 5–7 mm long, densely puberulent. Flowers dark brown, with golden yellow lip. Sepals narrowly ovate, acute, concave, 7–9 mm long, densely puberulent. Petals lanceolate oblong, acute, 6–7 mm long. Lip adnate to column wings, subquadrate, 4–5 mm long, 3–4 mm wide, 3-lobed; lateral lobes ovate, oblique, obtuse-rounded at apex; median lobe reniform, emarginate and mucronate in sinus; disk with 3 keels raised into lunate swellings on median lobe; spur straight, 1–3 mm long, puberu-

lent. Column white, 3 mm tall, dilated at apex. Rostellum 2-lobed. Pollinia narrowly ovoid, with small orbicular viscidium. **Fig. 28**, d.

Ecology. Open secondary evergreen broad-leaved forests, secondary shrubs and short tall grasslands on wet mossy ground on soils of any kind. 1400–2000 m. Fl. March – April (May). Very rare (DD).

Distribution. Vietnam (Cao Bang, Lao Cai, Yen Bai). NE. India, Bhutan, Nepal, Myanmar, S. China.

Studied specimens. Lao Cai, Tonkin, Chapa, *Petelot s.n.* (P); Yen Bai, Mu Cang Chai, *HAL 12865* (CPC Herbarium); Cao Bang, Bao Lac, *CBL 1544* (HN, LE).

Notes. Recent discoveries (*HAL 12865* and *CBL 1544*) confirm occurrence of this very rare species reported earlier for Vietnam on the base of a single, rather questionable specimen (type of *Calanthe brachychila*).

5. *C. alleizettii* Gagnep.,

1950, Bull. Mus. Natl. Hist. Nat. ser. 2, 22: 508; Seidenf., 1992, Opera Bot., 114: 94, fig. 48; Aver., 1994, Ident. Guide Vietnam. Orch.: 104; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 870, fig. 11228; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 18; Chen Sing-chi, Cribb, Gale, 2009, Fl. China, 25: 306.

Described from Vietnam (“Tonkin: col de Lo-qui-ho, prov. Lao-kay, *Poillane 25425*”, “Cochinchine: env. de Bien Hoa, *D. Alleizette*”). **Lectotype** (“*Alleizette s.n.*”) – P.

Terrestrial herb with 1(2) obovate or elliptic, acute, glossy green leaves 30–60 cm long, 7–12(15) cm wide. Inflorescence, synanthous, erect, 30–40(5) cm long; rachis 5–10(15) cm long, with few to many lax flowers. Floral bracts narrowly lanceolate, acuminate, 4–7 mm long. Pedicel and ovary 1.4–2 cm long, densely puberulent. Flowers light violet to almost white, 2.5–3 cm across, nutant. Sepals ovate, acute, apiculate 1.4–1.7 cm long. Petals narrowly ovate oblong, obtuse, 1.2–1.4 cm long. Lip adnate to column, broadly ovate, 6–8 mm long, 1–1.2 cm wide, 3-lobed; side lobes reniform, oblique flabellate; median lobe much smaller, obovate retuse, apiculate at sinus; disk with 3(5) keels rising on medial lobe; spur cylindrical, 1.5–2.2 cm long, finely puberulent. Column short and thick, 3–5 mm tall. **Fig. 27**, f; **28**, e, f.

Ecology. Primary and rich secondary humid mossy evergreen broad-leaved, mixed and coniferous forests on any kind of rocks, commonly in shady places on deep soils rich in humus. 800–1800 m. Fl. March – April. Not common (VU).

Distribution. Vietnam (Dong Nai, Ha Giang, Hoa Binh, Lai Chau, Lao Cai, Quang Tri, Son La). S. China.

Studied specimens. Dong Nai, Bien Hoa, *Alleizette s.n.* (P); Ha Giang, Bac Me, *HAL 6402* (HN, LE); Hoa Binh, Mai Chau, *DKH 8024* (HN, LE, MO); Hoa Binh, Mai Chau, *HAL 693* (HN, MO); Hoa Binh, Mai Chau, *HAL 787* (HN, MO); Lai Chau, Phong Tho, *HAL 10517* (HN, MO); Lao Cai, Col de Lo qui Ho, *Poillane 25425* (P); Lao Cai, Van Ban, *HAL 2306* (HN, LE); Lao Cai, Van Ban, *HAL 2627* (HN, LE); Lao Cai, Hoang Lien Son mt., *Nuraliev, Sokoloff 244* (LE); Quang Tri, Huong Hoa, *HLF 5995* (HN); Son La, Moc Chau, *DKH 7508* (HN, LE, MO).

Notes. The species is very close to *C. petelotiana* and may be regarded as its variety or form. According to the available material it differs from *C. petelotiana* in distinctly 3-lobed lip, usually 1-leaved stem and in, commonly, much broader leaf blade.

6. *C. velutina* Ridl.,

1921, Journ. Nat. Hist. Soc. Siam. 4, 3: 119; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 398; Seidenf., 1992, Opera Bot., 114: 95, fig. 51; Aver., 1994, Ident. Guide Vietnam. Orch.: 104; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 874, fig. 11244; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 19. – *C. integrilabris* Gagnep., 1931, Bull. Mus. Natl. Hist. Nat. ser. 2, 3: 323; id., 1933, l.c.: 386, fig. 34, 7–10, fig. 35, 1–3; P.H. Ho, 2000, l.c.: 872, fig. 11236.

Described from southern Vietnam (“Lang-bian Peaks, 6,500 ft.”). **Type** (“*B. Kloss*”) – BM.

Terrestrial herb with 1 broadly elliptic, acute, glossy green leaves 20–30 cm long, 8–12 cm wide. Inflorescence, synanthous or hysteroanthopus, erect, 20–35 cm long; rachis 5–15 cm long, with few to many lax flowers. Floral bracts narrowly cuneate, acuminate, 5–8 mm long. Pedicel and ovary puberulent, 1.4–1.8 cm long. Flowers light purple-violet to white with purple tint, widely opening, horizontal or slightly nutant, lip nearly white, with dull brownish spot at center. Sepals broadly lanceolate to narrowly ovate, acuminate 1.8–2.2 cm long, lateral sepals oblique falcate. Petals narrowly obovate, shortly apiculate, 1.5–1.8 cm long. Lip adnate to column, broadly obovate, 1.5 cm long and wide, 3-lobed; side lobes small, triangular of finger-like, 1–2 mm long; median lobe much larger, reniform, emarginate, 1.4–1.5 cm wide; disk without distinct ornamentation; spur conical cylindrical, 5–8(10) mm long, purple-violet. Column short and thick, 4–6

mm tall; column wings continue to lip base forming cymbiform claw. Rostellum bifid. Pollinia narrowly clavate with oblong viscidium. **Fig. 28**, g, h.

Ecology. Primary and rich secondary humid evergreen broad-leaved, mixed and coniferous forests on any kind of rocks, commonly in shady places on deep soils rich in humus. 1000–1700 m. Fl. March – May. Rare (VU).

Distribution. Vietnam (Lam Dong, Son La). Endemic.

Studied specimens. Lam Dong, Dalat, *Hayata 601* (P), *Averyanov s.n.*, a. 1995 (LE); Lam Dong, Lac Duong, Bi Dup mt., *VH 4525* (HN, LE); Son La, Yen Chau, *DKH 7283* (HN, LE, MO), *CPC 1898* (CPC Herbarium; LE – photo).

Note. Disjunctive distribution of this species looks strange. It is quite possible that the main area is situated in Laos connecting both isolated localities known up to now in Vietnam. The species is very similar and may be conspecific with *C. chrysoglossoides* J.J. Sm. (1910, Bull. Dep. Agric. Indes Neerl. 43: 24) occurring in Sumatra and Java.

7. *C. sylvatica* (Thouars) Lindl.,

1833, Gen. Sp. Orchid. Pl.: 250; Comber, 1990, Orch. Java: 96, fig.; id., 2001, Orch. Sumatra: 269, fig.; Seidenf., Wood, 1992, Orch. Malay. Sing.: 167, fig. 72a, pl. 9c; Su Horng-Jye, 2000, Fl. Taiwan 5: 789; Pearce et Cribb, 2002, Orch. Bhutan: 290; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 19; Chen Sing-chi, Cribb, Gale, 2009, Fl. China, 25: 300. – *Centrosis sylvatica* Thouars, 1822, Hist. Orch., tab. 35. – *Bletia masuca* D. Don, 1825, Prodr. Fl. Nepal.: 30. – *Calanthe masuca* (D. Don) Lindl., 1833, Gen. Sp. Orchid. Pl.: 249; Seidenf., 1975, Dansk Bot. Ark., 29, 2: 19, fig. 6, pl. 2; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 441, fig. 361–364.

Described from Mascarene Islands and Madagascar (“iles Australes d’Afrique, de France, de Bourbon et de Madagascar”). **Type** (Herbier du Petit-Thouars, *s.n.*) – P.

Terrestrial and lithophytic herb with 3–6(8), elliptic, acuminate leaves, densely pubescent with soft short hairs; leaf blade 20–40 cm long, 8–12 cm wide. Inflorescence arising from leaf axil, erect, (30)40–60 cm long with many lax flowers. Floral bracts, triangular, 1–1.8 mm long, densely puberulent. Flowers light pink-purple. Pedicel and ovary 2.5–3.5 cm long, densely puberulent. Sepals narrowly ovate to ovate, 2–2.5 cm long, acute to shortly apiculate. Petals obovate, 1.5–2 cm long, acute to shortly apiculate. Lip adnate to column, broadly obovate, 1–1.8 cm long, 3-lobed; side lobes falcate-

oblong, 4–5 mm long, 1.5–2 mm wide; median lobe reniform, 1–1.4 cm wide, emarginate to shallowly 2-lobed; disk with warty purple-brown callosity forming 3 indistinct rows; spur cylindric or slightly clavate, 2.5–4.5 cm long. Column 4–6 mm tall. Rostellum 2-lobed. Pollinia narrowly obovoid with oblong viscidium. **Fig. 28**, i; **29**, a.

Ecology. Primary and rich secondary evergreen broad-leaved, mixed and coniferous forests on any kind of rocks, commonly in shady places on deep soils rich in humus, sometimes on rocky slopes in rock crevices. 400–1500 m. Fl. September – November. Not common (VU).

Distribution. Vietnam (Cao Bang, Hoa Binh, Khanh Hoa, Lam Dong; Quang Nam, Quang Tri, Son La). Africa, Madagascar, Sri Lanka, India, Bhutan, Nepal, Myanmar, China, Japan, Thailand, Malaysia, Indonesia.

Studied specimens. Cao Bang, Nguyen Binh, *CBL 564* (HN, LE, MO); Hoa Binh, Mai Chau, *DKH 7797* (HN, LE, MO); Khanh Hoa, Hon Ba, *J. Skornickova HB-93*, a. 2011 (LE – photo); Lam Dong, Bi Dup mt, *N.V.Duy, 313* (LE); Quang Nam, Dai Loc, *CPC 3410* (CPC Herbarium); Quang Tri, Da Krong, *HLF 6171* (HN, LE); Son La, Moc Chau, *HAL 9389* (HN, LE, MO).

Note. Author of *C. sinica* Z.H. Tsi (described recently from regions of southeastern Yunnan allied to Vietnamese border) distinguishes it from *C. sylvatica* in densely hairy leaves, short pedicel and ovary, and in smaller flowers. This plant may be a marginal form of the latter species that has very wide variation and distribution. Samples fitting the description of *C. sinica* were found in Vietnam near Chinese border (*CBL 564*).

8. *C. davidii* Franch.,

1888, *Nouv. Arch. Mus. Hist. Nat.*, ser. 2, 10: 85; Su Horng-Jye, 2000, *Fl. Taiwan* 5: 784, pl. 331; Chen Sing-chi, Cribb, Gale, 2009, *Fl. China*, 25: 301. – *C. pachystalix* Hook. f., 1890, *Fl. Br. Ind.* 5: 850; Duthie, 1906, *Ann. Roy. Bot. Gard. (Calcutta)*, 9, 2, tab. 104; Gagnep., 1933, *Fl. Gen. Indo-Chine* 6, 3: 389; Aver., 1994, *Ident. Guide Vietnam. Orch.*: 105; P.H. Ho, 2000, *Ill. Fl. Vietnam* 3: 872, fig. 11238.

Described from China (“Chine (Tibet oriental). – Province de Moupin”). **Type** (“*M. l’Abbe David*. – 1870”) – P.

Terrestrial herb with clustering stems, each stem with 3–4(5) lanceolate, acuminate leaves 20–60 cm long, 1–2 cm wide. Inflorescence arising from leaf axil, erect, 30–120 cm tall, densely puberulent, with many more or less dense small

flowers. Floral bracts reflexed, narrowly lanceolate, 1–1.5 cm long, puberulent. Pedicel and ovary 8–12 mm long, densely puberulent. Flowers yellowish green or white. Sepals and petals narrowly ovate, obtuse, reflexed, 6–9 mm long. Lip adnate to column, broadly triangular, 6–9 mm long and wide; side ovate triangular, truncate, down reflexed; median lobe much smaller, 2-lobed, with narrowly triangular, acute lobules; disk with large yellow warty callus; spur cylindric, 6–12 mm long, glabrous or sparsely puberulent. Column thick, 3 mm tall. Rostellum 2-lobed. Pollinia obovoid, with short caudicle and small viscidium small. Capsule ovoid, 1–1.4 cm long. **Fig. 27**, g, h.

Ecology. Primary and secondary evergreen broad-leaved shady forests. 1500 m. Fl. June – July. Very rare (DD).

Distribution. Vietnam (Lao Cai?). N. India, Nepal, China, Taiwan, Japan.

Note. This species is recorded on the base of alone old somewhat questionable poor collection (Seidenf., 1992, *Opera Bot.*, 114: 94) reported as “*Calanthe pachystalix* Rchb. f., Cha-pa, 1500 m (Petelot)” (Gagnep., 1933, l.c.: 389). I have not seen this specimen. Meanwhile, *C. davidii* is fairly common in Yunnan and its occurrence in northwestern Vietnam is highly probable. Record from Dalat (Gagnep., 1933, l.c.: 389) belongs to *C. angusta* (Seidenf., 1992, l.c.: 94).

Figure 27, g, h is copied from Duthie, 1906, l.c., 2, tab. 104.

9. *C. alismifolia* Lindl.,

1855, *Fol. Orch. Calanthe*: 8; Seidenf., 1992, *Opera Bot.*, 114: 94, fig. 47; Aver., 1994, *Ident. Guide Vietnam. Orch.*: 105; P.H. Ho, 2000, *Ill. Fl. Vietnam* 3: 870, fig. 11227; Su Horng-Jye, 2000, *Fl. Taiwan* 5: 778, pl. 329, photo 91; Pearce et Cribb, 2002, *Orch. Bhutan*: 283; Aver. et Averyanova, 2003, *Updated Checklist Orch. Viet.*: 18; Chen Sing-chi, Cribb, Gale, 2009, *Fl. China*, 25: 302.

Described from NE. India (“Wild in Sikkim..., in Khasia, ...”). **Syntypes** (“*J.D. Hooker*”, “*Hooker and Thomson*”) – K?

Terrestrial and occasionally lithophytic herb with rigid ascending stems, forming by their bases plagiotropic creeping rhizome, each stem with 3–6 broadly elliptic or ovate, acute leaves 10–25 cm long, 4–10 cm wide, with petiole-like base 5–20 cm long. Inflorescence 1–2, arising from leaf axils, erect, densely puberulent, 10–28 cm tall, with 3–10 close flowers. Floral bracts ovate, puberulent, acute, 5–10 mm long. Pedicel and ovary puberulent, 1–1.5 cm long. Sepals and petals narrowly obovate,

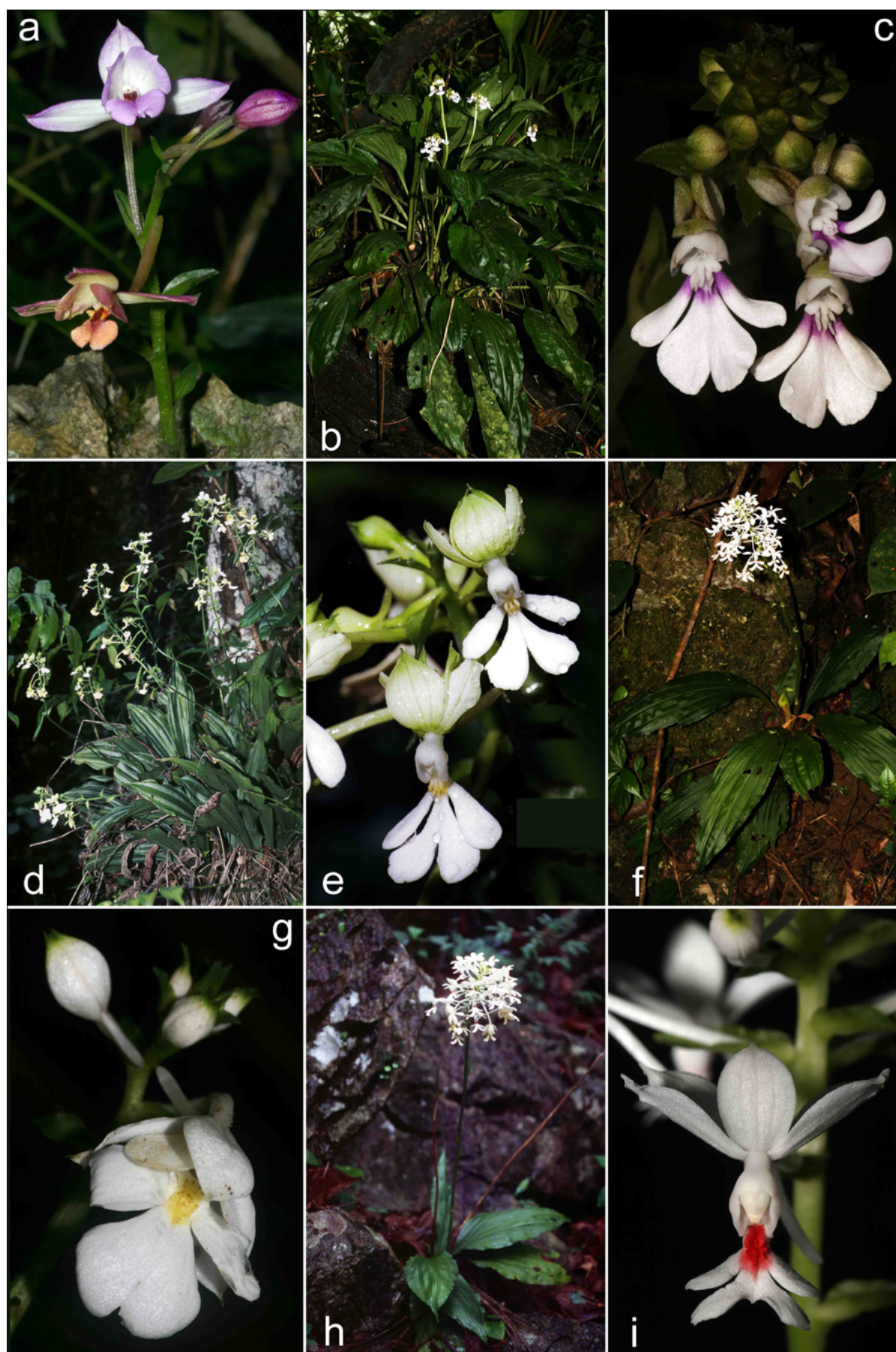


Fig. 29. *Calanthe sylvatica*: a (HAL 9389); *C. alismifolia*: b, c (CPC 3749); *C. argenteo-striata*: d (CBL 1670), e (Averyanov s.n., a. 2002); *C. odora*: f (CPC 3698), g (HAL 7238); *C. triplicata*: h (NTH 2954), i (Averyanov s.n., a. 2008).

acute to shortly apiculate, 7–10 mm long, 4–6 mm wide; sepals usually greenish, petals white. Lip white, sometimes violet to the base, adnate to column, deeply 3-lobed; side lobes narrowly oblong spatulate, 7–9 mm long, 1.5–2 mm wide, truncate or rounded at apex; median lobe obcordate, 10–14 mm long, 8–12 mm wide, divided by a deep sinus into 2 obovate or subrhombic lobules, 5–6 mm wide, entire or erose along margin. Disk with white or yellow warty callus at base. Spur straight, cylindric, greenish, 0.8–1.2 cm long. Column thick, 3.5–4.5 mm tall. Rostellum 2-lobed, with acute narrowly triangular lobes. Pollinia narrowly clavate with small ovate viscidium. Capsule ovoid, 1.8–2.2 cm long. **Fig. 29, b, c; 30.**

Ecology. Primary and rich secondary humid evergreen broad-leaved, mixed and coniferous forests on any kind of rocks, in shady places on deep soils rich in humus commonly in wet depressions or along stream slopes. 150–2300 m. Fl. January – February, July – August. Not rare (VU).

Distribution. Vietnam (Bac Kan, Cao Bang, Ha Giang, Hoa Binh, Khanh Hoa, Kon Tum, Lai Chau, Lao Cai, Lam Dong, Ninh Binh, Ninh Thuan, Quang Binh, Son La, Thanh Hoa, Thua Thien – Hue, Tuyen Quang). NE. India, Bhutan, China, Taiwan, Japan.

Studied specimens. Bac Kan, Ba Be, *HAL 116* (HN, MO), *HLF 611* (HN, LE); Bac Kan, Na Ri, *DKH 7628* (HN, MO), *HAL 5413* (HN, LE); Cao Bang, Bao Lac, *CBL 397* (HN, MO); Ha Giang, Quang Ba, *NTH 3565* (HN, LE), *DKH 5037* (HN, MO), *DKH 5111* (HN, MO); Ha Giang, Vi Xuyen, *DKH 6351* (HN, LE, MO); Hoa Binh, Lac Son, *CPC 1409* (CPC Herbarium); Hoa Binh, Mai Chau, *DKH 8128* (HN, LE, MO), *HAL 8974* (HN, MO), *HAL 9003* (HN, MO); Khanh Hoa, Khanh Son, *VH 4336* (HN, LE, MO); Kon Tum, Dak Gley, *VH 1794* (HN, LE, MO); Kon Tum, Ngoc Linh, *VH 637* (HN, LE, MO); Lai Chau, Sin Ho, *HAL 8770* (HN, MO); Lao Cai, Dan Khao, a. 1964 s. coll. 3155 (HN, LE); Lam Dong, Lac Duong, *VH 3142* (HN, LE, MO); Ninh Binh, Cuc Phuong, *Khoi CP 514* (HN, LE), *Bao CP 105* (HN, LE), a. 1964 s. coll. 7035 (HN, LE), a. 1965 s. coll. 4925 (HN, LE), *Averyanov et al., LX-VN 1820* (HN, LE), *N.M. Cuong et al., NMC 422* (Cuc Phuong national park Herbarium), *HAL 1682* (HN); Ninh Thuan, Ninh Son, *VH 3580* (HN, LE, MO); Quang Binh, Minh Hoa, *HAL 11679* (HN, MO), *HAL 12200* (HN, LE, MO), *CPC 3654* (CPC Herbarium, LE), *CPC 3749* (CPC Herbarium), *CPC 4141* (CPC Herbarium), *CPC 4198* (CPC Herbarium), *CPC 4435* (CPC Herbarium), *CPC 5041b* (CPC Herbarium); Quang Binh, Phong Nha – Ke

Bang, *HAL 6079* (HN, MO), *HAL 6112* (HN, MO); Quang Binh, Tuyen Hoa, *CPC 2504* (CPC Herbarium), *CPC 2597* (CPC Herbarium); Son La, Yen Chau, *DKH 7179* (HN, MO), *DKH 7283* (HN, MO); Thanh Hoa, Quan Hoa, *HAL 3582* (HN), *HAL 3799* (HN); Thua Thien – Hue, Huong Thuy, *HAL 8298* (HN); Thua Thien – Hue, Nam Dong, *HAL 10911* (HN, LE, MO); Tuyen Quang, Na Hang, *HAL 129* (HN, MO), *HAL 228* (HN, MO); d-EXSICCATES OF VIETNAMESE FLORA 0150/*HAL 12200*.

10. *C. herbacea* Lindl.,

1855, Fol. Orchid. 6: 10; King et Pantl., 1898, Ann. Bot. Gard. (Calcutta) 8, tab. 233; Seidenf., 1992, Opera Bot., 114: 94, pl. 5d; Aver., 1994, Ident. Guide Vietnam. Orch.: 104; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 872, fig. 11235; Pearce et Cribb, 2002, Orch. Bhutan: 287; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 18; Chen Sing-chi, Cribb, Gale, 2009, Fl. China, 25: 301.

Described from NE. India (“Sikkim”). **Type** (“J.D. Hooker”) – K?, P (isotype).

Terrestrial herb with 3–4 elliptic, acuminate, puberulent, distinctly petiolate leaves 30–40 cm long, 4–8(10) cm wide. Scape arising from leaf axil, erect, puberulent, 40–60(70) cm tall, with (6)8–15 subaxillary flowers on elongate rachis. Floral bracts lanceolate, 1–2 cm long, puberulent. Pedicel and ovary 1.5–2 cm long, puberulent. Sepals and petals greenish to yellow-green, reflexed, narrowly obovate, obtuse, 1–1.5 cm long, petals smaller and narrower. Lip white, adnate to column, 1–1.4 cm long, 1.2–1.8 cm wide, 3-lobed; side lobes obovate; median lobe divided by a deep broadly triangular sinus into 2 oblique obovate lobules; disk with warty yellow callus; spur cylindric, puberulent, (1)2–3 cm long. Column 5–7 mm tall. Rostellum 2-lobed. Pollinia narrowly clavate with small, subquadrate viscidium. **Fig. 31.**

Ecology. Primary and secondary humid evergreen broad-leaved forests on silicate rocks, commonly in shady wet valley slopes on deep soils rich in humus. 250–1700 m. Fl. June – August. Very rare (DD).

Distribution. Vietnam (Ha Giang, Lam Dong, Lao Cai). NE. India, S. China.

Studied specimens. Ha Giang, Meo Vac, *NTH 3413* (HN); Ha Giang, Yen Minh, *CBL 2093* (HN, LE, MO); Lam Dong, Dalat, *Lecoufle 20159* (C – photo); Lao Cai, Van Ban, *HAL 2035* (HN, LE), *HAL 2815* (HN, LE); Lao Cai, Than Uyen, *NTH 2813* (HN, LE, MO); Vinh Phuc, Tam Dao, *Averyanov et al., LX-VN 2366* (HN, LE).



Fig. 30. Digital herbarium specimen of *Calanthe alismifolia* (HAL 12200).

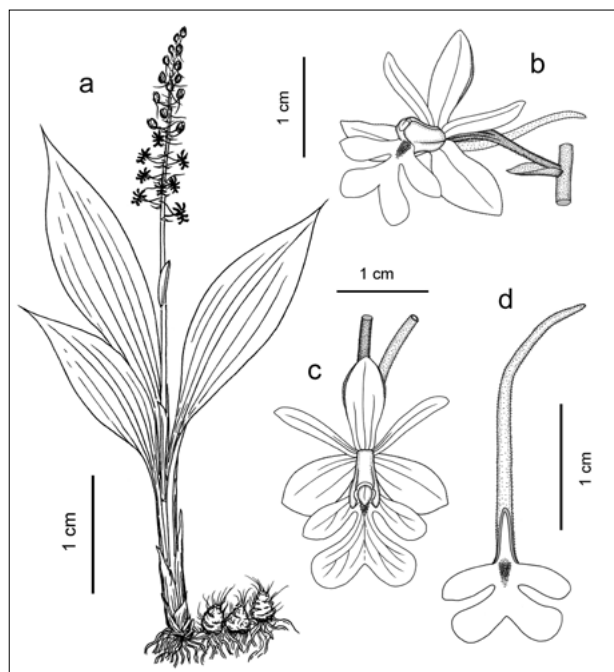


Fig. 31. *Calanthe herbacea*: a – flowering plant (NTH 2813), b, c – flower, d – fattened lip (Averyanov et al., LX-VN 2366).

Note. Some mentioned records of this species from Vietnam are based on sterile material that needs confirmation by new collections and observation of plants during anthesis.

11. *C. argenteo-striata* C.Z. Tang et S.J. Cheng,

1981, Orch. Rev. 89 (1051): 144, fig. 121; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 18; Chen Sing-chi, Cribb, Gale, 2009, Fl. China, 25: 302.

Described from southeast China (“Guangdong: Cong-hua Xian”). **Type** (“Dec 1963, Y.S. Shao 126”) – HT.

Terrestrial or lithophytic herb with 3–7 elliptic, acuminate, glabrous leaves (15)20–30(35) cm long, 5–10(12) cm wide, with silvery-whitish bands. Scape arising from leaf axil, erect, densely puberulent, 40–70 cm tall, with numerous, lax flowers on elongate rachis. Floral bracts narrowly ovate, attenuate, 1–1.5 cm long, puberulent. Pedicel and ovary 1–2.5(3) cm long, puberulent. Sepals and petals light green to greenish, reflexed, ovate, acute to shortly apiculate, 0.8–1.2 cm long. Lip white, adnate to column, 1.4–1.8 cm long and wide, 4-lobed; all lobes narrowly obovate, diverging, often finely irregularly denticulate at apex; disk with warty yellow callus at base; spur cylindric, sparsely puberulent, 1.5–2 cm long. Column 5–6 mm tall. Rostellum 2-lobed. Pollinia narrowly clavate with small, subsquare viscidium. Capsule fusiform, 1.5–2.5 cm long. **Fig. 29**, d, e.

Ecology. Primary and secondary evergreen broad-leaved, mixed and coniferous forests on any kind of rocks, but much more common on rocky limestone. 100–1600 m. Fl. April – June, December – January. Not rare (VU).

Distribution. Vietnam (Bac Kan, Cao Bang, Ha Giang, Kon Tum, Lang Son, Quang Binh, Thai Nguyen, Thanh Hoa). S. China.

Studied specimens. Bac Kan, Ba Be, *HAL* 86 (HN, MO), *HLF* 500 (HN, LE), *HLF* 653 (HN); Bac Kan, Cho Don, *HAL* 4786 (HN), *HLF* 839 (HN, LE); Bac Kan, Na Ri, *NTH* 3697 (HN, LE), *DKH* 7593 (HN, LE, MO), *HAL* 4890 (HN, LE); Cao Bang, Ha Lang, *CBL* 611 (HN, LE, MO), *CBL* 716 (HN, LE, MO), *CBL* 1670 (HN, LE, MO); Cao Bang, Nguyen Binh, *CBL* 1315 (HN, LE, MO); Cao Bang, Thach An, *CBL* 835 (HN, LE, MO), *CBL* 918 (HN, LE), *CBL* 918 (HN MO); Cao Bang, Tra Linh, Averyanov et al., CB 7 (HN, LE), Averyanov et al., CB 22 (HN, LE), *VH* 4904 (HN, LE, MO, P), *DKH* 4317 (HN, LE, MO); Cao Bang, Trung Khanh, *HAL* 5495 (HN, LE); Ha Giang, Dong Van, *CBL* 1760 (HN, LE, MO), *HAL* 8613 (HN), *NTH* 3523 (HN, LE); Ha Giang, Quang Ba, *DKH* 4804 (HN, LE, MO), *DKH* 6214 (HN, LE, MO); Ha Giang, Vi Xuyen, *DKH* 6499 (HN, MO); Kon Tum, Dak Gley, *VH* 2268 (HN, LE, MO); Lang Son, Huu Lung, *DKH* 4097 (HN, LE, MO); Quang Binh, Minh Hoa, *VH* 4640 (HN, LE, MO, P); Thai Nguyen, Vo Nhai, *NTH* 3769 (HN, LE); Thanh Hoa, Ba Thuoc, *HAL* 1071 (HN, MO); Thanh Hoa, Quan Hoa, *HAL* 3898 (HN).

12. *C. odora* Griff.,

1851, Not. Pl. Asiat. 3: 365; Pearce et Cribb, 2002, Orch. Bhutan: 288; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 257; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 272; Chen Sing-chi, Cribb, Gale, 2009, Fl. China, 25: 301. – *C. angusta* Lindl., 1855, Fol. Orchid. 6: 7; King et Pantl., 1898, Ann. Bot. Gard. (Calcutta) 8, tab. 232; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 390; Seidenf., 1975, Dansk Bot. Ark., 29, 2: 12, fig. 2; id., 1992, Opera Bot., 114: 94; Aver., 1994, Ident. Guide Vietnam. Orch.: 105; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 870, fig. 11229; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 18. – *C. pachystalix* auct. non Rchb. f. et Hook. f.: Gagnep., 1933, l.c.: 388.

Described from NE. India (“Uppper Assam, Suddyah...”). **Type** (“Griffith 477”) – probably lost. **Lectotype** – Ic. (“Upper Assam”, Herb. no. 21958) – W (designated by M.A. Clements, 1989, in Australian Orch. Research, 1: 32).

Terrestrial or lithophytic herb with 2–3(4) elliptic, acuminate leaves 30–50 cm long, 8–14 cm

wide. Scape erect, puberulent, 40–60 cm tall, with many subax flowers on elongate rachis. Floral bracts narrowly ovate, 8 mm long, puberulent. Pedicel and ovary 1–1.4 cm long, puberulent. Flowers white. Sepals and petals ovate, mucronate, 0.9–1.2 cm long. Lip adnate to column, 0.8–1.2 cm long, 3-lobed; side lobes obliquely obovate; median lobe divided by a deep triangular sinus into 2 obovate lobules; disk with warty yellow, orange or brownish callus; spur cylindric, 0.8–1.2(1.5) cm long. Column 3–4 mm tall. Rostellum 2-lobed. Pollinia narrowly clavate with small, oblong viscidium. **Fig. 29, f, g; 32.**

Ecology. Primary and secondary evergreen broad-leaved forests on any kind of rocks, commonly in shady places on deep soils rich in humus. 100–2000 m. Fl. April – September. Not rare (VU).

Distribution. Vietnam (Bac Giang, Lam Dong, Lao Cai, Ninh Binh, Quang Nam, Quang Ninh, Quang Tri, Thua Thien – Hue). NE India, Bhutan, Bangladesh, China, N. Thailand, Laos, Cambodia.

Studied specimens. Bac Giang, Lang Met, *Petelot 2912* (P); Lam Dong, Annam: Dalat, *Sigaldi s.n.*, 1954 (P), *Sigaldi s.n.*, 1958 (P), *Sigaldi s.n.*, 1964 (P); Lam Dong, Annam: Dran, prov. de Lang Biang, *Poillane 3915* (P); Lam Dong, Dran, *Hayata s.n.*, 1921 (P); Lao Cai, Chapa, *Petelot 5146* (P), *Petelot s.n.*, 1929 (P), sine coll. 2196, a. 1961 (HN, LE); Ninh Binh, Cuc Phuong, *Men et al. 446* (HN); Quang Binh, Minh Hoa, *CPC 3698* (CPC Herbarium, LE – photo), *CPC 3979* (CPC Herbarium), *CPC 4012* (CPC Herbarium), *CPC 4437* (CPC Herbarium), *CPC 5039* (CPC Herbarium), *CPC 5041a* (CPC Herbarium), *HAL 11739* (HN, LE, MO), *HAL 11827* (HN, LE, MO); Quang Nam, Phuoc Son, *HAL 11986* (HN, LE, MO); Quang Tri, Massif de Dong Tri, *Poillane 11041* (P); Thua Thien – Hue, A Luoi, *HAL 7238* (HN, LE), *HAL 7800* (HN); Thua Thien – Hue, Nam Dong, *Ng thi Nhan 847* (HN, LE), Nam Dong, *HAL 6961* (HN); d-EXSICCATES OF VIETNAMESE FLORA 0135/*HAL 11827*.

Note. Elongate inflorescence rachis (at the beginning of anthesis) with more or less distant flowers and flower buds is typical for true *C. odora* (King et Pantl., 1898, l.c., tab. 232). Nevertheless, flowers in most Vietnamese specimens are densely placed on abbreviated rachis that certainly resembles inflorescence of *C. triplicata*. Most probably, such specimens not rarely collected in Vietnam and mentioned here as *C. odora* represent in fact transitional forms between *C. odora* and *C. triplicata*. These plants probably represent hybrid forms of introgressive hybridization between two species. To

my personal impression, plants named here as *C. odora* more common on non limestone soils in the south and north-west of the country, while *C. triplicata* is more usual in limestone regions of central and northern Vietnam.

13. *C. triplicata* (Willem.) Ames,

1907, Philipp. Journ. Sci. (Bot.) 2: 326; Seidenf., 1975, Dansk Bot. Ark., 29, 2: 15, fig. 3, pl. 1; id., 1992, Opera Bot., 114: 94; Comber, 1990, Orch. Java: 94, fig.; id., 2001, Orch. Sumatra: 273, fig.; Seidenf., Wood, 1992, Orch. Malay. Sing.: 169, fig. 73a-b, pl. 9d; Aver., 1994, Ident. Guide Vietnam. Orch.: 105; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 874, fig. 11243; Su Horng-Jye, 2000, Fl. Taiwan 5: 791; Pearce et Cribb, 2002, Orch. Bhutan: 293; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 19; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 257; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 273; Chen Sing-chi, Cribb, Gale, 2009, Fl. China, 25: 302; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 447, fig. 365–368. – *Orchis triplicata* Willem., 1796, Ann. Bot. (Usteri), 18: 52. – *Limodorum veratrifolium* Willd., 1805, Sp. Pl. 4: 122. – *Calanthe veratrifolia* (Willd.) Ker Gawl., 1823, Bot. Reg. 9, tab. 720; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 389.

Described from Java? (“Habitat Mauritiae ...” – sphalm. sec. Seidenf., 1975, l.c.: 15). **Lectotype** – Ic. “*Flos triplicatus*” (Rumphius, 1750, Herb. Ambon. 6: 115, tab. 52, 2).

Terrestrial and occasionally lithophytic herb with 3–7 elliptic, acuminate, glabrous leaves 20–45 cm long, 5–14 cm wide. Scape arising from leaf axil, erect, densely puberulent, 40–80 cm tall, with numerous, close flowers on rather short rachis. Floral bracts narrowly ovate, attenuate, 1.5–2 cm long, puberulent. Pedicel and ovary 2–3(4) cm long, puberulent. Sepals and petals white, reflexed, ovate to obovate, acute to shortly apiculate, 1.2–1.6 cm long. Lip white, adnate to column, 1.2–1.8 cm long and wide, 4-lobed; all lobes narrowly oblong, diverging, 6–7 mm long, 2–3 mm wide, often finely irregularly denticulate at apex; disk with warty yellow, orange or red callus at base; spur cylindric, sparsely puberulent, (1.2)1.5–3(5) cm long. Column 5–6 mm tall. Rostellum 2-lobed, with truncate roundish lobes. Pollinia narrowly clavate with small, elliptic viscidium. Capsule fusiform, 3–4 cm long. **Fig. 29, h, i.**

Ecology. Primary and secondary evergreen broad-leaved, mixed and coniferous forests on any kind of rocks, but more common on rocky limestone, commonly in shady places on deep soils rich in humus, often on valley beds. 50–1700 m. Fl. March – June. Not rare (VU).

Fig. 32. Digital herbarium specimen of *Calanthe odora* (HAL 11827).

Distribution. Vietnam (Ha Giang, Hai Phong, Khanh Hoa, Kon Tum, Lai Chau, Lam Dong, Nghe An, Ninh Binh, Ninh Thuan, Quang Binh, Son La, Thanh Hoa, Thua Thien – Hue, Tuyen Quang). Tropical and subtropical Asia, N. Australia and tropical islands of western Pacific.

Studied specimens. An Giang, Haute austro-cochinchine: ad Nui Cam in prov. Chaudoc, *Harmand* 546 (P); Bac Giang, Lang Met, prov. de Bac-Giang, *Colani* 2912 (P); Bac Kan, Ba Be, *HLF* 525 (HN, LE), *HLF* 554 (HN, LE); Bac Kan, Cho Don, *HAL* 4715 (HN, LE); Cao Bang, Trung Khanh, *HAL* 5665 (HN); Dien Bien, Dien Bien, CPC 2349 (CPC Herbarium); Ha Giang, Quan Ba, *HAL* 1551 (HN); Ha Giang, Vi Xuyen, *DKH* 6500 (HN, LE, MO); Hai Phong, Cat Ba, *Averyanov et al., LX-VN* 3186 (HN, LE), *Averyanov et al., LX-VN* 3333 (HN, LE), *Averyanov et al., LX-VN* 3339 (HN, LE), *Averyanov et al., LX-VN* 3661 (HN, LE); Khanh Hoa, près Nhatrang, *Evrard* 662 (P); Khanh Hoa, Hon Ba mt., *Chevalier* 38630 (P); Kon Tum, Annam: Massif du Ngok Pan, *Poilane* 35917 (P); Kon Tum, près du village Moi de Tu-Inh, *Poilane* 32102 (P); Lai Chau, *HAL* s.n. (LE – photo); Lam Dong, Ba na près Tourane, *Poilane* 7347 (P); Lam Dong, Dalat, *Sigaldi* 191 (P), *Evrard* 917 (P), *Evrard* 1009 (P); Lam Dong, Prenn, *Tixier* s.n. (P); Lam Dong, Lang-bian, *Eberhardt* 207 (P); Nghe An, Tuong Duong, *HLF* 6954 (HN, MO); Ninh Binh, Cuc Phuong, *Averyanov et al., LX-VN* 1820 (HN, LE), *HAL* 1684 (HN), *P.K. Loc* 10386 (P); Ninh Thuan, Ca na, *Poilane* 8906 (P); Quang Binh, Phong Nha – Ke Bang, *HAL* 5852 (HN, MO), *HAL* 6080 (HN, MO); Quang Ninh, Ba Mun, *Averyanov, Kudryavtzeva* 165, a. 1987 (HN, LE); Son La, Moc Chau, *DKH* 7361 (HN, MO), *NTH* 2954 (HN, LE, MO); Son La, Yen Chau, *DKH* 7309 (HN, MO), *HAL* 9541 (HN, MO); Thanh Hoa, Ba Thuoc, *HAL* 3172 (HN), *HAL* 4055 (HN); Thua Thien – Hue, ad Hué, *Harmand* s.n. (P); Tuyen Quang, Na Hang, *HAL* 170 (HN, MO), *HAL* 241 (HN, MO), *HAL* 1706 (HN); Monts de l'Annam (flanc loatien), *Harmand* s.n. (P).

Note. Main distribution of this species probably comprises territories of central and northern Vietnam. Some old unidentified collections reported from southern part of the country (in Khanh Hoa, Kon Tum, Lam Dong and Ninh Thuan provinces) mentioned here may belong to southern geographical race described recently in specific rank as *C. leonidii*.

14. *C. leonidii* P.J. Cribb et D.A. Clayton, 2012, *Orch. Rev.*, 120 (1297): 44, fig., photos.

Described from southern Vietnam (“Lam Dong Province, near Dalat City, Prenn waterfall”).

Type (“11 April 1984, *Averyanov et al., LX-VN* 1423”) – LE, K (photo).

Terrestrial and occasionally lithophytic herb to 0.5 m tall. Inflorescence to 1 m tall, raceme cylindric with many lax white flowers. Median sepal and petals broadly lanceolate, acute to apiculate, 10–12 mm long, petals sometimes with greenish tint to the apex. Lateral sepals elliptic, cuspidate, 15–17 mm long. Lip side lobes and lobules of median lobe triangular lanceolate, acuminate, acute, broadest at the base, 2 mm wide. Callosity at the base of lip forms 3 warty, undulate yellow keels, 4 mm long. Spur cylindric, 1–1.2 cm long. Column thickened apically, 5–7 mm tall, 2–3 mm across at apex. **Fig. 33, a.**

Ecology. Primary and rich secondary evergreen broad-leaved forests on silicate rocks, commonly in rocky shady places on deep soils rich in humus. 600–1500 m. Fl. March – May. Occasional (VU).

Distribution. Vietnam (Dak Lak, Kon Tum, Lam Dong, Ninh Thuan). Endemic.

Studied specimens. Dak Lak, Krong Nang, *HAL* 11397 (HN, LE, MO); Dak Lak, Chu Yang Sinh, *VH* 6081 (HN, MO); Kon Tum, Ngoc Linh mt., *VH* 683 (HN, LE, MO), *VH* 1207 (HN, LE); Lam Dong, Prenn, *LX-VN* 1423 (HN, LE – photo); Ninh Thuan, Ninh Hai, *HLF* 4033 (HN, MO), *HLF* 4220 (HN, LE, MO); Ninh Thuan, Nui Chua mt., *HLF* 4678 (HN, LE, MO).

Note. Relation of this rather questionable species with widespread and very variable *C. triplicata* remains unclear. To my impression, *C. leonidii* replaces calcium-dependent *C. triplicata* (inhabitant of limestone regions of northern and central Vietnam) in areas of southern Vietnam composed predominantly by silicate rocks. Meanwhile, in some areas plants exhibit intermediate morphological features.

C. sect. 2. *Styloglossum* (Breda) J.J. Sm.,

1905, *Fl. Buitenzorg* 4, 1: 202, 206. – *Styloglossum* Breda, 1829, *Gen. Sp. Orch. Asclep.* 13, tab. 7.

Lectotype: *C. pulchra* (Blume) Lindl. (*Styloglossum nervosum* Breda).

Floral bract white, erect, imbricate, usually much longer than flowers, very early caducous, falling before flower opening. Rostellum unlobed.

40–50 (6) species. SE. Asia, Japan, Philippines, tropical islands of western Pacific.

15. *C. angustifolia* (Blume) Lindl.,

1833, *Gen. Sp. Orch. Pl.*: 251; Comber, 1990, *Orch. Java*: 92, fig.; id., 2001, *Orch. Sumatra*: 258; Seidenf., Wood, 1992, *Orch. Malay. Sing.*:



Fig. 33. *Calanthe leonidii*: a (Averyanov et al., LX-VN 1423, type); *C. angustifolia*: b, c (Duy s.n., a. 2010); *C. duyana*: d, e (HLF 5233, type); *C. lyroglossa*: f (HAL 608); *C. vestita*: g (Averyanov s.n., a. 2002, Thailand); *C. rubens*: h, i (HLF 7409).

171, fig. 74a-b; Su Horng-Jye, 2000, Fl. Taiwan 5: 780, pl. 330; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 18; Chen Sing-chi, Cribb, Gale, 2009, Fl. China, 25: 295. – *Amblyglottis angustifolia* Blume, 1825, Bijdr. 8: 369.

Described from Java (“Crescit: in umbrosis montium Provinciae Buitenzorg”). **Type** (“*Blume*”) – L?

Terrestrial, occasionally lithophytic or epiphytic herb with creeping rhizome and erect abbreviated stem with 4–6(10) narrowly elliptic, acuminate leaves 25–40 cm long, 2–3.5 cm wide. Inflorescence arising from base of stem, erect, (15)20–30 cm long, with many dense nutant white flowers. Floral bracts narrowly lanceolate, acuminate, glabrous, 2–3 cm long. Pedicel and ovary glabrous, 1.2–2 cm long. Sepals and petals narrowly ovate, acute to shortly apiculate, 8–12 mm long. Lip white or yellowish at base, adnate to column 8–10 mm long, 5–7 mm wide, 3-lobed; side lobes narrowly ovate; median lobe obcordate, 5–6 mm long and wide, retuse; disk with 2 triangular rising keels at base; spur clavate, 6–9 mm long. Column 4–5 mm tall. **Fig. 33**, b, c.

Ecology. Primary and rich secondary humid evergreen dense broad-leaved, mixed and coniferous forests on silicate rocks, commonly in shady mossy wet places on deep soils rich in humus. 1500–2300 m. Fl. March – April. Not common (VU).

Distribution. Vietnam (Kon Tum, Lam Dong, Lao Cai, Ninh Thuan). China, Hainan, Taiwan, Malacca Peninsula, Indonesia, Philippines.

Studied specimens. Kon Tum, Kon Plong, *DKH 4706* (HN, LE, MO); Kon Tum, Ngoc Linh mt., *VH 782* (HN, LE); Kon Tum, Kbang, *Averyanov et al., LX-VN 4306* (HN, LE); Lam Dong, Bi Dup mt, *VH 3002* (HN, MO); Lam Dong, Bidup-Nuiba, *Duy s.n. a. 2010* (LE – photo); Lam Dong, Lac Duong, *VH 2846* (HN, LE), *VH 2846* (HN, LE), *VH 4186* (HN, LE), *VH 4384* (HN, LE); Lao Cai, Than Uyen, *NTH 2687* (HN, LE, MO); Ninh Thuan, Ninh Son, *VH 3002* (HN, LE, MO).

16. *C. duyana* Aver.,

2006, Rheede, 16, 1: 1, fig. 1, 3a-b.

Described from southern 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 along main ridge and on Western slope of Bi Doup mt.”). **Type** (“15 October 2005. *L. Averyanov et al., HLF 5233*”) – HN (holotype), LE (isotype).

Terrestrial and occasionally semi-epiphytic herb with creeping rhizome and distant erect abbreviated stems, each with 2–3 narrowly elliptic,

acuminate leaves 10–30 cm long, 2.5–5 cm wide. Inflorescence erect, arising from rhizome at the base of stem, 6–15 cm long, with 3–12 lax flowers. Floral bracts white, narrowly ovate, acuminate, 1.5–2.5 cm long. Pedicel and ovary white, 1–1.8 cm, surface of the ovary finely tuberculate. Flowers odorless, widely opening, white, lip with purple-violet side lobes, rarely with yellow center and two red spots on the disk. Sepals and petals ovate, 1.4–1.8 cm long, 5–7 mm wide, apiculate. Lip spurred, ovate, 1.2–1.4 cm long, 1–1.2 cm wide, 3-lobed; side lobes erect, ovate, finely crenulate along margin; median obovate, retuse; disc with 2 erect keels; spur cylindrical, 8–10 mm long, often clavate. Column white, 9–11 mm tall, with beak-like triangular rostellum. Anther cap white, hemispheric. Pollinia triangular ovate. Capsule broadly ellipsoid, 1.4–1.6 cm long. **Fig. 33**, d, e; **34**.

Ecology. Primary humid mossy evergreen montane broad-leaved and coniferous forests on shale, sandstone and granite, commonly along edges of ridges. 1500–2200 m. Fl. September – November. Not common (VU).

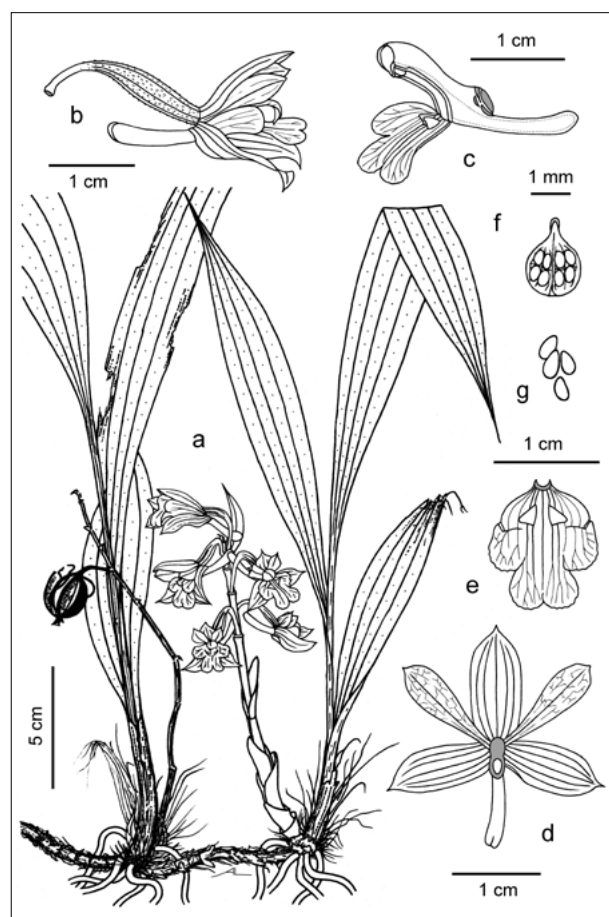


Fig. 34. *Calanthe duyana*: a – flowering plant, b – flower, side view, c – column and lip, side view, d – flattened flower without lip and column, e – flattened lip, f – operculum with pollinia, view from beneath, g – pollinia (HLF 5233, type).

Distribution. Vietnam (Dak Nong, Kon Tum, Lam Dong, Ninh Thuan). Endemic.

Studied specimens. Dak Nong, Dak Glong, *HLF 5618* (HN); Kon Tum, Ngoc Linh mountains, *VH 639* (HN, LE, MO); Lam Dong, Bi Dup mountains, *N.V.Duy, 274* (LE); Lam Dong, Da Chais, *HLF 5313* (HN, LE); Lam Dong, Lac Duong, *VH 3023* (HN, LE, MO), *HLF 5254* (HN, LE); Ninh Thuan, Ninh Son, *VH 3630* (HN, LE, MO).

Note. The species is closely related to yellow flowered *C. clavata* and *C. densiflora* distributed in mainland southeast Asia, but distinctly differs from both of them in few flowered lax inflorescence and white flowers with purple-violet lip.

17. *C. lyroglossa* Rehb. f.,

1878, Otia Bot. Hamburg. 1: 53; Seidenf., 1975, Dansk Bot. Ark., 29, 2: 22, fig. 8, pl. 3; id., 1992, Opera Bot., 114: 99; Seidenf., Wood, 1992, Orch. Malay. Sing.: 175, fig. 74g-k, pl. 10b; Aver., 1994, Ident. Guide Vietnam. Orch.: 107; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 872, fig. 11237; Su Horng-Jye, 2000, Fl. Taiwan 5: 786; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 18; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 257; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 272; Chen Sing-chi, Cribb, Gale, 2009, Fl. China, 25: 295. – *C. nephroidea* Gagnep., 1950, Bull. Mus. Natl. Hist. Nat. ser. 2, 22: 625.

Described from Philippines ("Mt. Mahahai Luconiae"). **Type** ("Wilkes") – W?

Terrestrial and occasionally semi-epiphytic herb with short rhizome and erect abbreviated stem with 3–6 narrowly elliptic, acuminate, glabrous leaves 30–60 cm long, 5–10 cm wide. Inflorescence 1–2(3), arising from base of stem, erect, 30–50 cm long, with many dense yellow flowers. Floral bracts white narrowly lanceolate, acuminate, glabrous, 3–5 cm long. Pedicel and ovary glabrous, 1–1.5 cm long. Sepals and petals ovate, petals acute, sepals shortly apiculate, 8–12 mm long. Lip adnate to column 6–8 mm long, 8–10 mm wide, 3-lobed; side very small, half-orbicular; median lobe transversely oblong or reniform, 3 mm long, 8–10 mm wide, emarginate; disk with 2 triangular rising keels at base; spur clavate, 5 mm long. Column thick, white, 4 mm tall. Rostellum triangular, unlobed. Pollinia clavate, with small peltate viscidium. Capsule pendulous, broadly ellipsoid, 1.2–1.8 cm long. **Fig. 33, f. 35.**

Ecology. Primary and rich secondary humid evergreen dense broad-leaved, mixed and coniferous forests on silicate rocks, commonly in shady mossy damp places on deep soils rich in humus, of-

ten along wet and swampy mountain stream valleys. 100–1800 m. Fl. January – March. Not rare (VU).

Distribution. Vietnam (Dak Lak, Ha Tinh, Hoa Binh, Kien Giang, Kon Tum, Lam Dong, Lao Cai, Nghe An, Quang Binh, Quang Nam, Thua Thien – Hue). NE. India, Myanmar, China, Taiwan, Hainan, Japan, Thailand, Laos, Cambodia, Malacca Peninsula, Philippines.

Studied specimens. Dak Lak, Chu Yang Sinh mt., *VH 6411* (HN, MO); Dak Lak, Ea H'Leo, *HAL 11433* (HN, MO); Ha Tinh, Huong Son, *HAL 5009* (HN, LE); Hoa Binh, Da Bac, *HAL 427* (HN, MO), *HAL 608* (HN, MO), *HAL 380* (HN, MO); Hoa Binh, Mai Chau, *DKH 8111* (HN, MO); Hoa Binh, Pa Co, *WP-426* (LE – photo); Kien Giang, Phu Quoc Island, *N.V. Khoi s.n.*, Nov. 2007 (LE – photo); Kon Tum, Kon Plong, *VH 5567* (HN, LE, MO); Kon Tum, Ngoc Linh mt., *VH 838* (HN, LE); Lam Dong, Blao, *Tixier s.n.* (P); Lam Dong, km 120 route coloniale n 20, prov. Haut Donai, *Poillane 21020* (P); Lam Dong, Phom Sapoum, Blao, *Poillane 22125* (P), *23739* (P); Lam Dong, Bao Loc, *Averyanov et al., LX-VN 1222* (HN, LE); Lao Cai, Van Ban, *HAL 2297* (HN, LE), *DKH 6583* (HN, LE, MO); Nghe An, Tuong Duong, *HLF 6601* (HN, LE, MO); Quang Binh, Minh Hoa, *HAL 11645* (HN, MO), *HAL 12254* (HN, LE, MO), *HAL 12399* (HN, LE); Quang Binh, Phong Nha – Ke Bang, *HAL 6215* (HN, MO), *HAL 6269* (HN, MO); Quang Nam, Dong Giang, *HAL 12132* (HN, LE, MO); Thua Thien – Hue, A Luoi, *HAL 7230* (HN); Thua Thien – Hue, Huong Thuy, *HAL 8147* (HN), *HAL 8231* (HN); Thua Thien – Hue, Nam Dong, *HAL 10843* (HN, LE, MO), *HAL 6935* (HN); Thua Thien – Hue, Xuan Loc, *HLF 1675* (HN), *HLF 1722* (HN); d-EXSICCATES OF VIETNAMESE FLORA 0148/*HAL 12132*.

18. *C. densiflora* Lindl.,

1833, Gen. Sp. Orch. Pl.: 250; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 394; Seidenf., 1992, Opera Bot., 114: 99, fig. 52; Aver., 1994, Ident. Guide Vietnam. Orch.: 107; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 871, fig. 11234; Su Horng-Jye, 2000, Fl. Taiwan 5: 784; Pearce et Cribb, 2002, Orch. Bhutan: 295; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 18; Chen Sing-chi, Cribb, Gale, 2009, Fl. China, 25: 295.

Described from NE. India ("Sylhet"). **Type** ("Wallich 7344") – K?

Terrestrial, lithophytic and semi-epiphytic herb with creeping rhizome and distant erect abbreviated stems, each with 2–4 narrowly elliptic, acuminate leaves 30–50 cm long, 3–7 cm wide. Inflo-



Fig. 35. Digital herbarium specimen of *Calanthe lyroglossa* (HAL 12132).

rescence erect, arising from base of stem, with many tubular scales below, 15–20 cm long, with many flowers in dense head. Floral bracts white, broadly lanceolate, acuminate, 1.5–2.5 cm long. Pedicel and ovary glabrous, 1.5–2 cm. Flowers pale yellow to yellow, not widely opening. Sepals and petals broadly ovate, petals acute, sepals shortly apiculate, 1.4–1.7 cm long. Lip adnate to column, almost orbicular, 0.8–1.2 cm long and wide, 3-lobed; side lobes ovate triangular; median lobe subquadrate, 4–6 mm long and wide, emarginate; disc with 2 erect, triangular, lamellate keels; spur straight, clavate, 1–1.2 cm long. Column white, 1–1.2 cm tall. Rostellum broadly ovate. Pollinia clavate ovoid with short caudicle and small globose viscidium. Capsule pendulous, broadly ellipsoid, 1–1.4 cm long. **Fig. 36.**

Ecology. Primary and rich secondary humid evergreen montane broad-leaved, mixed and coniferous forests on any kind of rocks, commonly in shady mossy damp depressions along edges of ridges on deep soils. 700–1800 m. Fl. August – September. Not common, but locally abundant (VU).

Distribution. Vietnam (Lang Son, Lao Cai, Nghe An, Son La, Thanh Hoa). NE. India, Bhutan, S. China, Taiwan.

Studied specimens. Ha Giang, Bac Me, *HAL* 6450 (HN, LE,); Ha Giang, Vi Xuyen, *DKH* 5317 (HN, LE, MO); Ha Giang, Yen Minh, *CBL* 2094 (HN, LE, MO); Hoa Binh, Da Bac, *HAL* 600 (HN, MO); Hoa Binh, Mai Chau, *HAL* 907 (HN, MO); Kon Tum, Kon Plong, *VH* 5313 (HN, MO); Lang Son, Bac Son, *HAL* 6761 (HN, LE,); Lao Cai, Chapa, *Petelot* 5155 (P); Lao Cai, Van Ban, *HAL* 2036 (HN, LE), *HAL* 2308 (HN), *DKH* 6533 (HN, MO), *DKH* 6739 (HN, MO); Nghe An, Tuong Duong, *HLF* 6780 (HN, MO); Son La, Thuan Chau, *HAL* 9634 (HN, LE, MO); Thanh Hoa, Ba Thuoc, *HAL* 4046 (HN), *HAL* 4062 (HN), *HAL* 4208 (HN).

Note. Some records for this species mentioned here are based on fruiting specimens and need verification by further observation of plants in anthesis phase.

19. *C. clavata* Lindl.,

1833, Gen. Sp. Orch. Pl.: 251; Seidenf., 1975, Dansk Bot. Ark., 29, 2: 22, fig. 7; id., 1992, Opera Bot., 114: 99; Seidenf., Wood, 1992, Orch. Malay. Sing.: 175, fig. 75j, k; Aver., 1994, Ident. Guide Vietnam. Orch.: 106; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 871, fig. 11233; Su Horng-Jye, 2000, Fl. Taiwan 5: 783; Pearce et Cribb, 2002, Orch. Bhutan: 295; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 18; Chen Sing-chi, Cribb, Gale, 2009, Fl. China, 25: 296.

Described from NE. India (“Sylhet”). **Type** (“*Wallich 7343*”) – K?

Terrestrial, lithophytic and semi-epiphytic herb with creeping rhizome and distant erect abbreviated stems, each with 3–6 narrowly elliptic, acuminate leaves 40–60 cm long, 3–6 cm wide. Inflorescence 1–2, erect, arising from base of stem, with few tubular scales below, 20–40 cm long, with many flowers in short, dense raceme. Floral bracts lanceolate, acuminate, 1.5–2(3) cm long. Pedicel and ovary glabrous, 1–1.5 cm long. Flowers yellow, not widely opening, campanulate. Sepals and petals broadly ovate, concave, petals acute, sepals shortly apiculate, 9–12 mm long. Lip adnate to column, ovate, 6–8 mm long, 5–6 mm wide, 3-lobed; side lobes ovate triangular; median lobe obovate to almost orbicular, 3–4 mm long, retuse or shallowly 2-lobed at apex; disc with 2 erect, triangular, lamellate keels; spur straight, clavate, 6–8 mm long. Column white, 5–6 mm tall. Rostellum triangular, undivided. Pollinia clavate with small globose viscidium. **Fig. 37, a, b.**

Ecology. Primary humid, evergreen broad-leaved forests on silicate rocks, commonly on steep shady wet slopes. 800–1300 m. Fl. November – December. Very rare (DD).

Distribution. Vietnam (Hoa Binh, Kon Tum, Vinh Phuc). NE. India, Myanmar, S. China, Taiwan, Hainan, N. Thailand.

Studied specimens. Hoa Binh, Mai Chau, *DKH* 7781 (HN, LE, MO); Vinh Phuc, Massif du Tam Dao, *Petelot* 5424 (P); Kon Tum, Kon Plong, *DKH* 4706 (HN, MO).

Note. Records of this species from Kon Tum province mentioned here (*DKH* 4706) is based on fruiting specimens and need verification by further observation of plants during anthesis.

20. *C. chevalieri* Gagnep.,

1931, Bull. Mus. Natl. Hist. Nat. ser. 2, 3: 322; id., 1933, Fl. Gen. Indo-Chine 6, 3: 387; Seidenf., 1992, Opera Bot., 114: 99, fig. 53; Aver., 1994, Ident. Guide Vietnam. Orch.: 107; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 871, fig. 11232; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 18.

Described from southern Vietnam (“Annam: massif du Hon-ba, prov. Nhatrang”). **Type** (“*Chevalier 38629*”) – P.

Stem abbreviated with 7–9 lanceolate, acuminate leaves 40–60 cm long, 2–3(4) cm wide. Inflorescence erect, arising from base of stem, with 2–3 tubular bracts at the base, 20 cm long, with many flowers in short, head-like raceme. Pedicel and ovary glabrous, 1–1.2 cm long. Sepals and pet-

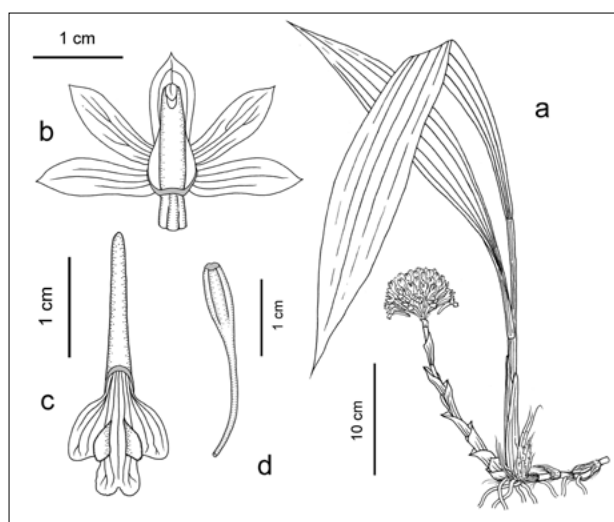


Fig. 36. *Calanthe densiflora*: a – flowering plant, b – flattened flower without lip, c – flattened lip, d – pedicel and ovary (DKH 5317).

als elliptic or narrowly ovate, 1.2 cm long, lateral sepals apiculate, petals obtuse. Lip obovate, 5–6 mm long and wide, 3-lobed; side lobes ovate; median lobe obcordate to almost orbicular, 3–4 mm long, retuse or shallowly 2-lobed at apex; disc with 2 erect, triangular, lamellate keels at the base between side lobes and 2 smaller triangular keels at the base of median lobe; spur clavate, 6–8 mm long. Column 6–8 mm tall. **Fig. 37**, c, d.

Ecology. Primary humid evergreen broad-leaved, forests on silicate rocks, in shady places on soils rich on humus. 1000–1500 m. Fl. August – September. Rare (DD).

Distribution. Vietnam (Khanh Hoa, Thua Thien – Hue). Endemic.

Studied specimens. Khanh Hoa, Massif du Hon Ba, *Chevalier* 38846 (P); Thua Thien – Hue, Hui Bach Ma, *Poilane* 27662 (P).

Note. Questionable species, which should be compared with *C. clavata* on the base of freshly collected plants. Available material insufficient for acceptable morphological analysis of the flower. Specimen labeled as “Isotype, *Chevalier* 38629” housed at Paris herbarium (P) belong to *C. lyroglossa*.

C. subgen. 2. *Preptanthe* (Rchb. f.) Schltr., 1912, Feddes Repert. (Beih.), 1: 376. – *Preptanthe* Rchb. f., 1853, Fl. Serr. 8: 245.

Lectotype: *C. vestita* Lindl.

Stems in form of large globular, ovoid or shortly cylindrical indistinctly angled pseudobulbs densely clustering each other on very short rhizome. Leaves with articulation at the base, deciduous during dry season. Inflorescence arising from the base of leafless pseudobulbs, ascending, bending at apex.

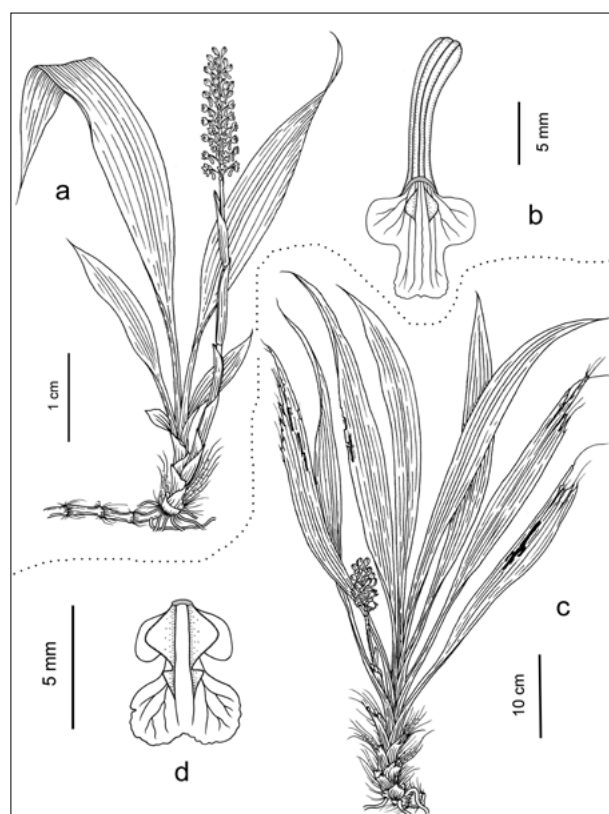


Fig. 37. *Calanthe clavata*: a – flowering plant, b – flattened lip (Petelot 5424); *C. chevalieri*: c – flowering plant, d – flattened lip (Chevalier 38629).

Peduncle, rachis, floral bracts, pedicel and ovary villose with long whitish hairs.

10 (4) species. SE. Asia, Philippines.

21. *C. vestita* Lindl.,

1833, Gen. Sp. Orch. Pl.: 250; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 387; Seidenf., 1975, Dansk Bot. Ark., 29, 2: 26, fig. 9, pl. 4; id., 1992, Opera Bot., 114: 89; Seidenf., Wood, 1992, Orch. Malay. Sing.: 165, fig. 71a, b, pl. 9a; Aver., 1994, Ident. Guide Vietnam. Orch.: 109; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 874, fig. 11245; Comber, 2001, Orch. Sumatra: 255, fig.; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 19; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 257; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 273.

Described from Myanmar (“Tavoy”). **Type** (“Wallich 7345”) – K?

Lithophytic herb. Pseudobulbs ovoid, silvery, to 10 cm tall. Leaves (25)30–45 cm long, 6–12 cm wide. Scape 40–70 cm long, with 4–12 lax, well open flowers. Pedicel and ovary 2.5–3.5 cm long. Flowers white, lip with yellow or red spot at center. Sepals and petals elliptic, sometimes slightly reflexed, 2 cm long. Lip spurred, broadly obovate, 2 cm long, 3-lobed; side lobes spreading, oblong, 1 cm long, 5 mm wide; median lobe obcordate, widening from narrow base, 1.2 cm long, 1.8 cm wide,

round to 2-lobed at apex. Spur slender, cylindrical, 2 cm long. **Fig. 33**, g.

Ecology. Dry open forests at low elevations. Fl. January – April, October – November. Very rare (DD).

Distribution. Vietnam (Ba Ria – Vung Tau, Binh Phuoc, Dong Nai). S. Myanmar, Thailand, Laos, Malacca Peninsula, Java, Sumatra, Kalimantan, Sulawesi, Seram, Moluccas, New Guinea, Philippines.

Studied specimens. Trien in prov. Bien Hoa, *Pierre* 6586 (P); Gia-ray, prov. de Bien Hoa, *Poillane* 2441 (P); Prov. de Bienhoa: Hui chua chuan, *Chevalier* 39962 (P); Prov. de Bienhoa: Mont de Hui, Chuachang, *Chevalier* 29895 (P); Prov. de Bienhoa: Nui Chua Chan, près Saigon, *Evrard* 7 (P).

Note. All available herbarium records of this species from Vietnam are questionable and may belong to *C. rubens*. Occurrence in Vietnam needs confirmation.

The species very rare in Vietnam is reported as a frequent plant in karstic limestone regions of southern Laos, where forms with pure white flowers and those that possess a red blotch at the base of the lip mid-lobe often grow intermixed (Schuiteman et al., 2008, l.c.: 273).

22. *C. rubens* Ridl.,

1890, Gard. Chron. 1 (1890): 576; Seidenf., 1975, Dansk Bot. Ark., 29, 2: 30, fig. 10, pl. 5; id., 1992, Opera Bot., 114: 89; Seidenf., Wood, 1992, Orch. Malay. Sing.: 165, fig. 71c, pl. 9b; Aver., 1994, Ident. Guide Vietnam. Orch.: 108; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 873, fig. 11241; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 19.

Described from Malacca Peninsula (“Langkawi Islands, lying off the west coast of the Malay Peninsula”). **Type** (“*Curtis* 2181”) – K?

Lithophytic herb. Pseudobulbs ovoid, silvery, 4–6(8) cm tall. Leaves 20–40 cm long, 4–8 cm wide. Scape 35–50 cm long, with 4–12 lax, well open flowers, rachis gradually increasing in length. Floral bracts broadly elliptic, 2 cm long. Pedicel and ovary 2–3.5 cm long. Sepals and petals white to light pink, elliptic to narrowly obovate, slightly reflexed, 1.5 cm long, sepals shortly apiculate, petals acute. Lip pink, purple to the base, spurred, broadly obovate, sometimes irregularly denticulate erose along margin, 1.6 cm long, 2 cm wide, 3-lobed; side lobes spreading, obovate, 1 cm long, 5–7 mm wide; median lobe short, obcordate, 1 cm wide, retuse to shallowly bilobed. Spur slender, cylindrical, 1.5 cm long. **Fig. 33**, h, i.

Distribution. Vietnam (Ba Ria – Vung Tau, Dak Lak, Tay Ninh). Thailand, Malacca Peninsula, Philippines.

Ecology. Dry open lowland forests on silicate rocks, commonly on steep rocky slopes or on shelves of vertical shady cliffs. 300–800 m. Fl. December – January. Very Rare (EN).

Distribution. Vietnam (Ba Ria – Vung Tau, Dak Lak, Tay Ninh). Thailand, Malacca Peninsula, Philippines.

Studied specimens. Ba Ria – Vung Tau, Con Dao, *Averyanov, Kudryavtzeva* 846, a. 1987 (HN, LE); Dak Lak, Buon Don, *HLF* 7174 (HN, LE, MO); Tay Ninh, Tay Ninh City, *HLF* 7409 (HN, LE).

Note. All record of *C. vestita* from Vietnam may actually belong to this species.

23. *C. cardioglossa* Schltr.,

1906, Feddes Repert. 2: 85; Gagnep., 1933, Fl. Gen. Indo-Chine 6, 3: 393; Seidenf., 1975, Dansk Bot. Ark., 29, 2: 35, fig. 12, pl. 6; id., 1992, Opera Bot., 114: 89; Aver., 1994, Ident. Guide Vietnam. Orch.: 108; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 871, fig. 11231; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 18; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 257; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 272.

Described from Thailand (“Siam: In den Wasserfallen Dor Sutep”). **Type** (“*Hosseus* 249”) – K (holotype), P (isotype).

Lithophytic and occasionally terrestrial herb. Pseudobulbs ovoid to clavate, often with prominent constriction and articulation at middle or in apical part, silvery, 4–6 cm tall. Leaves elliptic or narrowly obovate 20–40 cm long, 4–8 cm wide. Inflorescence 20–50 cm long, with 4–15 lax, well open flowers, rachis gradually increasing in length. Floral bracts narrowly ovate, attenuate, 1.2–1.8 cm long. Pedicel and ovary 2–3.5 cm long. Sepals and petals light pink with purple marks in apical half, elliptic to narrowly obovate, reflexed or revolute, 1–1.4 cm long, acute or shortly apiculate. Lip white to pink or pink-purple, with many purple marks, spurred, almost hemicircular, 1.2–1.6 cm long and wide, 3-lobed; side lobes erect, obtriangular, truncate and irregularly denticulate at apex; median lobe obovate, retuse; disk with 3 low keels between side lobes, median keel extends to median lobe in form of low limb of distinct vein. Spur greenish, filiform, 1.5–2 cm long. **Fig. 38**, a.

Ecology. Primary dry evergreen forest, usually on steep shady rocky slopes. 600–1500 m. Fl. December – February. Very rare (EN).

Distribution. Vietnam (Kon Tum, Lam Dong). Thailand, Laos.

Studied specimens. Kon Tum, Chu Mom Ray, *P.K. Loc* P 8043 (LE); Lam Dong, Dalat, *Si-*



Fig. 38. *Calanthe cardioglossa*: a (Averyanov s.n., a. 2005); *C. succedanea*: b (Averyanov s.n., a. 1995); *Liparis cordifolia*: c, d (HAL 3327); *L. mamillata*: e, f (J. Skornickova s.n., a. 2011); *L. ngoclinensis*: g (VH 1154, type); *L. nervosa*: h (HAL 2265), i (L. Averyanov, HAL s.n., a. 2002).

galdi 136 (P); Lam Dong, Dalat, Prenh, *Evrard* 2227 (P); Lam Dong, Haut Donai, Langhanh, *Tai* 29 (P); Lam Dong, Dalat, *Averyanov et al.*, *LX-VN* 721 (HN); Lam Dong, Datala, *Averyanov et al.*, *LX-VN* 1116 (HN, LE); Lam Dong, Dalat, *Averyanov et al.*, *LX-VN* s.n. a. 1983 (LE); Lam Dong, Dalat, *Averyanov et al.*, *LX-VN* s.n. a. 1995 (LE – photo), a. 2005 (LE – photo).

24. *C. succedanea* Gagnep.,

1931, Bull. Mus. Natl. Hist. Nat. ser. 2, 3: 324; id., 1933, Fl. Gen. Indo-Chine 6, 3: 391, fig. 35, 4–9, 36, 1; Seidenf., 1975, Dansk Bot. Ark., 29, 2: 32, fig. 11; id., 1992, Opera Bot., 114: 89; Aver., 1994, Ident. Guide Vietnam. Orch.: 108; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 873, fig. 11242; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 19; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 257; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 273.

Described from southern Laos and Cambodia (“Laos: Bassac” ..., “Cambodge: hauts plateaux boisés du Popokwil, pres Kompot ...”). **Syntypes** (“*Thorel* 2629”, “*Geoffray* 354”) – P.

Species morphologically differs from very close to *C. cardioglossa* in high lamellate median keel extending from lip base to median lobe and in usually very light, almost white flowers. Meanwhile, forms with pink tepals spotted with purple are also occasionally observed. **Fig. 38**, b.

Ecology. Primary dry evergreen forest, usually on steep shady rocky slopes. 1000–1500 m. Fl. December – February. Very rare (EN).

Distribution. Vietnam (Lam Dong). Thailand, Laos, Cambodia.

Studied specimens. Lam Dong, Dalat, *Averyanov s.n.* a. 1995 (LE – photo), a. 2005 (LE – photo).

Note. Doubtful species. It seems to be hardly specifically distinct from *C. cardioglossa*, differing only in more or less lamellate keel on the mid-lobe of the lip, whereas in *C. cardioglossa* the keel on median lip lobe is a little more than a swollen mid-vein (Schuiteman et al., 2008, l.c.: 273).

Trib. 5.6. *Malaxideae* Lindl.,

1821, Collect. Bot. App. – Trib. *Liparideae* Pfitz., 1887, Entw. Nat. Anord. Orch.: 100 (sub “*Liparidinae*”).

Type: *Malaxis* Soland. ex Sw.

6 (3) genera and 800–900 (100) species. Tropical, subtropical and moderate regions of all continents, boreal zone of Northern Hemisphere.

Subtrib. 5.6.1. *Liparidinae* Lindl. ex Miq.,

1857, Fl. Ind. Batav. 3: 618, 621 (sub “*Liparidae*”). – Subtrib. *Microstylidinae* Benth., 1881, Journ. Linn. Soc. London (Bot.) 18: 287 (sub “*Microstyleae*”). – Subtrib. *Malaxidinae* Benth. et Hook. f. 1883, Gen. Pl. 3: 463, 465 (sub “*Malaxeeae*”).

Type: *Liparis* Rich.

3 (2) genera and 500–600 (62) species. Tropical, subtropical and moderate regions of all continents, boreal zone of Northern Hemisphere.

Liparis Rich.,

1817, Orch. Eur. Annot.: 21, 30, 38, nom. conserv.; 1818, Mem. Mus. Hist. Nat. (Paris) 4: 43, 52; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 172–193; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 1–105; id., 1992, Opera Bot., 114: 128–145; Comber, 1990, Orch. Java: 128–141; id., 2001, Orch. Sumatra: 136–169; Seidenf., Wood, 1992, Orch. Malay. Sing.: 226–241; Aver., 1994, Ident. Guide Vietnam. Orch.: 136–148; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 900–909; Su Horng-Jye, 2000, Fl. Taiwan 5: 936–952; Pearce et Cribb, 2002, Orch. Bhutan: 195–212; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 41–43; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 272–273; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 295–297; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 211–228; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 292–320.

Type: *L. loeselii* (L.) Rich. (*Ophrys loeselii* L.).

Terrestrial, epiphytic and lithophytic herbs with short rhizome and clustering pseudobulbs, which sometimes appearing as a few-nodal, fleshy stem, covered at the base by sterile papyraceous bracts. Leaves 1 to several, linear to broadly ovate, sessile or with sheath like petiole, cauline or arising from pseudobulb apex, articulate at base, or not. Inflorescences erect to pendulous raceme, with few to many lax or dense flowers. Floral bracts small, persistent. Flowers usually resupinate. Sepals spreading, often with revolute margin, dorsal sepal free, lateral sepals occasionally fused for part or all of their length. Petals free, often reflexed, usually linear or filiform with revolute margin. Lip spurless, often reflexed, curved down, entire or lobed, usually with a basal callus. Column incurved, clavate, winged or not. Anther cap 2-locular. Pollinia 4 in 2 pairs, waxy, ovoid, flattened, each pair with a small viscidium. Rostellum small, blunt. Capsule ellipsoid to obovoid, often with 3 obtuse ridges.

200–250 (51) species. Tropical, subtropical and temperate areas of the world with maximal diversity in tropical Asia.

Key to species

1. Plants mostly terrestrial or lithophytic; leaves usually cauline, plicate of membranaceous thin texture, attenuate at the base into sheath-like petiole, not articulated at the base; pseudobulbs usually stem-like, cylindrical, covered by leaf sheaths 3 (sect. 1. *Liparis*)
- + Plants mostly epiphytic or lithophytic; leaves arising from pseudobulb apex, distinctly conduplicate, at least at the base, often more or less coriaceous, sessile or subsessile, with distinct basal articulation; pseudobulbs ovate to conical, usually naked in apical half 2
2. Inflorescence rachis more or less long, with lax to subdense, all faced (spirally arranged) floral bracts; flowers opening more or less simultaneously 21 (sect. 2. *Cestichis*)
- + Inflorescence rachis short, with distichous, densely imbricate floral bracts; flowers opening by 1–2 in succession 51 (sect. 3. *Distichae*)
3. Plant normally with 1, distinctly petiolate leaf; leaf blade usually perpendicular to petiole 4
- + Plant normally with 2 or more leaves; usually decurrent at base into recurved, sheath-like petiole 6
4. Lip almost flat, with entire or slightly irregularly denticulate at apex, without ornamentation or with hardly thickened dark green median vein; peduncle, rachis, floral bracts and flowers pure green; floral bracts shorter than half of pedicel and ovary 1. *L. cordifolia*
- + Side lip margins at lip base erect, epichile decurved, erose to ciliate, with 1–3 low fleshy glossy dark purple keels; peduncle, rachis, floral bracts and flowers greenish-purple to dirty purple; floral bracts as long as half of pedicel and ovary or longer 5
5. Epichile ovate, acute, ciliate along margin; laves relatively rigid, ovate, gradually narrowing to apex, 3–6 cm long; cuneate, truncate or round at base 2. *L. mamillata*
- + Epichile broadly obovate to pyriform, truncate or shallowly emarginate, shortly mucronate at sinus, finely eroded or denticulate along margin; laves thin, membranaceous, broadly ovate to almost orbiculate, shortly acuminate, 8–16 cm long; deep cordate at base 3. *L. ngoclinhensis*
6. Plants with long rhizome, pseudobulbs distant on rhizome on 2–5 cm or more 4. *L. petiolata*
- + Pseudobulbs densely clustered together 7
7. Ovary with 6 prominent wavy wings 5. *L. regnieri*
- + Ovary wingless or with narrow straight wings 8
8. Plants with stem-like cylindric to cylindric-conical pseudobulbs (2)5–20(30) cm long 9
- + Plants with abbreviated, ovoid, globose, or fusiform pseudobulbs, less than 4(5) cm long 13
9. Lip oblong to oblong obovate, 5–8 mm long, 4–6 mm wide, with entire margins, or slightly eroded at apex; epichile emarginate to bilobed 6. *L. nervosa*
- + Lip ovate, ovate elliptic, broadly ovate, obovate or broadly obovate, denticulate along margin 10
10. Lip ovate to ovate elliptic, acute, finely irregularly denticulate along margin, 6–9(10) mm wide, at the base with 2 erect, subulate or uncinat calli 7. *L. acuminata*
- + Lip broadly ovate, broadly obovate to flabellate, almost half circular, truncate, shallowly emarginate or orbicular at apex, dentate to dentate-fimbriate along margin, usually broader than 10 mm, at the base with 2 low boss-like or lamellate ridge-like calli 11
11. Lip broadly ovate, 15–17 mm long; calli near lip base fused into U-shaped callosity spreading longitudinally 8. *L. atrosanguina*
- + Lip broadly obovate, to flabellate, almost half circular, less than 15 mm long; calli near lip base in form of 2 separate bosses or in form of 2 low lamellae spreading longitudinally to the disk 12
12. Flowers purple-violet to dark violet; lip flabellate to almost half circular, 1–1.2 cm long, 1.2–2 cm wide, calli at lip base in form of 2 separate bosses 9. *L. gigantea*
- + Flowers green to dull yellow; lip broadly obovate to pyriform, (0.8)1–1.5 cm long, (0.6)0.8–1.2 cm wide, calli at lip base in form of 2 low lamellae spreading longitudinally to the disk 10. *L. sootenzanensis*
13. Miniature, dwarf plant, less than 3 cm tall 11. *L. nana*
- + Mature plants much larger than 3 cm tall 14
14. Leaves linear to lanceolate, more or less conduplicate, erect, grass-like, less than 1.5 cm wide 15
14. Leaves lanceolate to almost circular, plicate, recurved or prostrate, not grass-like, commonly more than 1.5 cm wide 16
15. Lip more than 3 cm wide; leaves linear lanceolate to lanceolate, (10)20–35 cm long, 0.8–1.5 cm wide 12. *L. ferruginea*
15. Lip less than 2 cm wide; leaves linear, 8–12 cm long, 0.5 cm wide 13. *L. acutissima*
16. Lip without calli at the base; plant with 2 opposite, petiolate leaves 14. *L. campylostalix*
16. Lip with various calli at the base; plant with 2 or more sessile or subsessile leaves 17
17. Pseudobulb globular or ovate, commonly subterranean or nearly so; leaves prostrate, spreading on ground 18
17. Pseudobulb ovate or conical, always placed above ground; leaves prostrate, spreading on ground 19
18. Leaves narrowly ovate, gradually acuminate; lip elliptic to almost orbicular, with median longitudinal glossy fleshy brightly green band 15. *L. tschangii*

- + Leaves broadly ovate to almost orbicular, acute or shortly attenuate; lip broadly obovate almost orbicular, without ornamentation on thin flat disk 16. *L. oppositifolia*
19. Floral bracts down deflexed, 5–15 mm long; leaves 2 17. *L. deflexa*
- + Floral bracts usually spreading horizontally, 1–5(6) mm long; leaves 2 or more 20
20. Pseudobulbs 1–2.5 cm tall; leaves green, 5–15 cm long, inflorescence 15–40 cm long; lip greenish, oblong obovate, truncate to emarginate, calli triangular, more or less fused at base 18. *L. odorata*
- + Pseudobulbs 2.5–4(5) cm tall; leaves gray-green, 4–6 cm long, inflorescence 10–15 cm long; lip dark purple-violet, obovate, round at apex or hardly emarginate, calli lamellate, spreading forward into cylindrical finger-like projections 19. *L. petraea*
- 21(2). Pseudobulbs with 2–5 leaves 22
- + Pseudobulbs with 1 leaf 34
22. Lip being flattened as long as lateral sepal or slightly shorter; column more or less slender, without additional lateral extra wings; pseudobulbs with 1–2 leaves; leaves commonly longer than 5 cm 23
- + Lip being flattened distinctly shorter than lateral sepal; column short, stout, usually often additional lateral, wings near apex; pseudobulbs with 2–5 leaves; leaves rarely longer than 5 cm 31
23. Pseudobulbs cylindrical, (3)6–12(16) cm long, 3–6(8) mm in diam., inflorescence with many dense flowers 20. *L. viridiflora*
- + Pseudobulbs globular, ovate to conical less than 6 cm long, 3–6(8) mm in diam., inflorescence few to many lax, sublux or subdense flowers 24
24. Pseudobulbs distinctly compressed, lens-shaped; plant epiphytic, inflorescence pendulous; lip with long attenuate apex bent down 21. *L. elliptica*
- + Pseudobulbs not compressed or hardly indistinctly compressed; plant epiphytic or lithophytic, inflorescence erect or curved; lip not long attenuate 25
25. Lip large, 1–1.4 cm long; pedicel and ovary 1.8–2.2 cm long 22. *L. distans*
- + Lip less than 1(1) cm long; pedicel and ovary less than 1.5(1.8) 26
26. Lip broadly ovate, broadly obovate or broadly elliptic; rachis with few flowers, distant on 1–1.5 cm 23. *L. petelotii*
- + Lip reniform, circular, flabellate-obtriangular, oblong-obovate or oblong; rachis with few or many flowers, distant less than 1 cm 27
27. Lip flabellate-obtriangular, broader than long, strongly bent to revolute at middle 24. *L. stricklandiana*
- + Lip reniform to almost circular, or oblong to oblong-obovate, as long as broad or longer, sometimes strongly bent, but not revolute 28
28. Lip reniform to almost circular; rachis (5)8–15 cm long, many flowered, commonly with more than 10 flowers 29
- + Lip oblong-rectangular or oblong-obovate; rachis less than 8 cm long, few flowered, commonly with less than 10 flowers 30
29. Lip with more or less prominent low fat longitudinal median keel; floral bracts lanceolate, 4–6 mm long, shorter than pedicel and ovary; flowers pure green; leaves 1.5–3 cm wide 25. *L. latilabris*
- + Lip flat, without ornamentation on disk; floral bracts narrowly ovate, 7–15 mm long, as long or longer than pedicel and ovary; flowers olive-green, yellowish or dull orange, rare pale green; leaves 3–4 cm wide 26. *L. plantaginea*
30. Lip oblong-obovate, dull green to dull yellowish, concave and bent near base, basally with thick low longitudinal ridge terminating distally in bilobed callus; rachis with all faced flowers; floral bracts narrowly triangular, herbaceous 27. *L. luteola*
- + Lip oblong rectangular, light greenish to almost white, with deep green or brown longitudinal stripe, concave and bent near middle, basally with 2 small hemispheric or tooth-like calli; rachis often zigzag, with more or less secund flowers; floral bracts broadly triangular to cordate, scarious, conduplicate, acuminate 28. *L. sparsiflora*
- 31(22). Lip apex 3-lobed 29. *L. filiformis*
- + Lip apex round, sometimes shortly apiculate 32
32. Column without additional keels on its lateral sides, each frontal keel attenuate into long pendulous filiform appendage; lip apex round or shortly indistinctly triangular; leaves 4–10 cm long 30. *L. resupinata*
- + Column with additional keels on its lateral sides, frontal keel newer attenuate into filiform appendage; lip apex shortly apiculate; leaves less than 4 cm long 33
33. Frontal wings triangular, raised at column apex; epichile 2 mm broad 31. *L. delicatula*
- + Frontal wings large, broad, semicircular, raising along all column length; epichile 1.5 mm broad 32. *L. tenuis*
- 34(21). Lip distinctly 3-lobed 35
- + Lip entire, emarginate or shallowly 2-lobed at apex 36

35. Sepals and petals 1–2 mm long; lip broadly ovate, 1.2–1.8 mm long, ecallose; side lobes falcate; median lobe rhombic, acute 33. *L. mannii*
- + Sepals and petals 3.5–4 mm long; lip oblong narrowly ovate, 3.5–4 mm long, disk with low ovate callosity; side lobes ovate; median lobe oblong ligulate, round at apex or shortly indistinctly apiculate 34. *L. tripartita*
- 36(34). Lip apex deeply emarginate to 2-lobed 37
- + Lip apex entire, obtuse, acute, round, truncate, rarely shallowly obscurely emarginate 40
37. Lip entirely brightly red; lip apex 2-lobed, finely ciliate along margin 35. *L. latifolia*
- + Lip white, greenish, yellowish, brownish, or rarely white with dull red center; lip apex emarginate, entire or denticulate along margin 38
38. Lip ecallose at base, rhomboid in shape, widest at middle, white with dull red center 36. *L. rhombea*
- + Lip with various callosities at base, oblong obovate to obovate, widening from base toward apex, white, greenish or yellowish 39
39. Inflorescence lax, few to many-flowered, arcuate, rachis 3–10(14) cm long; lip oblong rectangular to oblong obovate, 2.5–5 mm long, 1–3.5(4) mm wide, ecallose or with entire transverse unlobed callus at base, deeply emarginate or 2-lobed at apex, with oblong ovate lobules 37. *L. averyanoviana*
- + Inflorescence subdense, many-flowered, suberect, rather straight, rachis about 15–16 cm long; lip obovate, 6 mm long, 5 mm wide, with 2 hemispheric calli at base, emarginate-obcordate at apex, with almost round lobules 38. *L. emarginata*
- 40(36). Flowers small; sepals and petals 1.5–3 mm long; lip 1.5–3.5 mm long, 1–2 mm wide 41
- + Flowers of medium size, or relatively large; sepals and petals 4–12 mm long; lip 5–12 mm long, 3.5–12 mm wide 44
41. Plants miniature; pseudobulbs less than 1 cm tall; leaves commonly 2–8 cm long, less than 8 mm wide; inflorescence regularly less than 10 cm tall, rarely reach 15 cm long 42
- + Plants large; pseudobulbs 1–5 cm tall; leaves commonly 6–45 cm long, 1.5–4.5 cm wide; inflorescence 15–35 cm tall, rarely less than 15 cm long 43
- 42(40). Sepals and petals 1.5–2 mm long; lip 1.5–2 mm long, 1–1.2 mm wide, ecallose, apex triangular acute, often shortly mucronate 39. *L. cespitosa*
- + Sepals and petals 2–2.5 mm long; lip 3 mm long, 1.8 mm wide, with 2 small round calli at base, apex orbiculate, often with small median dent, finely irregularly crenulate along margin 40. *L. pumila*
43. Sepals and petals 3 mm long; lip 3–3.5 mm long, 1.8–2 mm wide; pseudobulbs more than 1 cm thick, erect, arising from base of previous one, dense clustering; leaves oblong oblanceolate, 25–45 cm long, not carinate; inflorescence shorter than leaves; floral bracts 4–8 mm long, shorter than flowers; capsule narrowly obovoid, 6–8 mm long 41. *L. dendrochiloides*
- + Sepals and petals 2.5 mm long; lip 2.5–3 mm long, 1.5–1.8 mm wide; pseudobulbs less than 1 cm thick, prostrate or ascending, arising from middle part of previous one, forming creeping rhizome; leaves elliptic, 6–15(20) cm long, often slightly carinate; inflorescence much longer than leaves; floral bracts 4–11 mm long, always exceeding flowers; capsule obovoid to subglobular, 3–4 mm long 42. *L. longibracteata*
- 44(40). Lip oblong rectangular, distinctly longer than wide, strongly bent at middle, concave channeled from base to middle; floral bracts cordate or broadly triangular 28. *L. sparsiflora*
- + Lip oblong obovate, obovate to orbicular, as long as wide or little longer, bent at base, concave channeled in basal part, more or less flat at middle; floral bracts narrowly triangular to cuneate 45
45. Column at front near apex wingless, narrowly winged, or with insignificant, low roundish wings 46
- + Column at front near apex with prominent, large, triangular, wings often with acute, falcate down recurved apex 48
46. Column stout, almost straight, wingless; inflorescence with 1–3(5) flowers; lip with prominent hemispheric callus at base 43. *L. rivularis*
- + Column slender, curved, with narrow or low roundish wings; inflorescence usually with more than flowers; lip with low entire rectangular callus, or with 2 separate roundish calli at base 47
47. Pseudobulbs oblique, ascending or more or less prostrate; inflorescence with (1)5–10(15) flowers; lip with 2 separate hemispheric calli at base; column at apex with low half-roundish wings 44. *L. chapaensis*
47. Pseudobulbs ovate, more or less erect; inflorescence with 25–30 flowers; lip with entire, low, rectangular callus at base; column narrowly winged at apex 45. *L. penduliflora*
- 48(45). Pseudobulbs erect, ovoid to almost globular, 5–15 mm thick, densely clustering, usually touching each other ... 49
- + Pseudobulbs prostrate or ascending, narrowly ovoid, conical or shortly cylindrical, 5–6 mm thick, distant on 1–5 cm apart on creeping woody rhizome 50
49. Sepals and petals 5–8 mm long; lip oblong obovate to obovate, 5–6.5 mm long, 3.5–5 mm wide, commonly fresh-opened olive-green to brownish-green; inflorescence with 5–25 subdense flowers ... 46. *L. bootanensis*
- + Sepals and petals 10–12 mm long; lip broadly obovate to almost circular, 8–12 mm long, commonly fresh-opened brightly green or light green; inflorescence with 3–8(12) distant flowers 47. *L. balansae*

- 50(48). Pseudobulbs 1–2 cm long; leaves narrowly elliptic, 4–12(14) cm long, 1.5–2 cm wide; sepals and petals 8–10 mm long; lip broadly obovate, 7–8 mm long 5–5.5 mm wide; column 4 mm tall 48. *L. bautingensis*
- + Pseudobulbs 2–2.5 cm long; leaves elliptic, 8–16 cm long, 3–4 cm wide; sepals and petals 10–12 mm long; lip broadly obovate to almost orbicular, 10–11 mm across; column 4.5–5 mm tall 49. *L. superposita*
- 51(2). Lip broadly obovate to almost orbicular, 8–10 mm long, flat, pale yellow-orange, glabrous, finely denticulate along margin; pseudobulbs 2–3 cm long; leaves to 35 cm long, 3 cm wide; rachis 1–5 cm long 50. *L. compressa*
- + Lip rectangular, 3.5–4 mm long, with 4 convex gibbosities, salmon-red, densely papillose, with entire margin; pseudobulbs 1–1.5 cm long; leaves to 15 cm long, 0.5–1 cm wide; rachis 1–3(4) cm long 51. *L. gibbosa*

L. sect. 1. Liparis.

Type: *L. loeselii* (L.) Rich. (*Ophrys loeselii* L.).

Terrestrial and occasionally lithophytic (very rare epiphytic) herbs. Pseudobulbs stem-like, covered by leaves sheaths. Leaves cauline, plicate, of membranaceous this texture, attenuate at the base into sheath-like petiole, without articulation at the base. Inflorescence erect, scape terete or finely longitudinally ridged.

100 (19) species. Tropical, subtropical and temperate areas of the world with maximal diversity in tropical Asia.

1. *L. cordifolia* Hook. f.,

1889, Icon. Pl., tab. 1811; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 11, fig. 2; id., 1992, Opera Bot., 114: 137, fig. 82, pl. 9b; Aver., 1994, Ident. Guide Vietnam. Orch.: 141; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 906, fig. 11369; Su Horng-Jye, 2000, Fl. Taiwan 5: 941; Pearce et Cribb, 2002, Orch. Bhutan: 198; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 41; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 215. – *L. argentopunctata* Aver., 1988, Bot. Journ. (Leningrad) 73, 1: 105, fig. 5. – *L. cordifolia* var. *argentopunctata* (Aver.) Aver. 1989, Bot. Journ. (Leningrad) 74, 9: 1352. – *L. clypeolum* auct. non Lindl.: P.H. Ho, 2000, l.c.: 906, fig. 11369.

Described from NE. India ("North-west Himalaya... Sikkim, at Yoksun... Khasia Hills"). **Syn-types** ("Clarke 25184") – K, ("Griffith 35") – L-LINDL, ("Hooker et Thomson 8") – K, LE.

Lithophytic herb with clustering ovoid somewhat flattened pseudobulbs (1)2–3 cm tall enclosed by white membranaceous sheaths and bearing 1 petiole glossy leaf. Leaf blade pure green or sometimes silvery spotted, ovate, broadly ovate to cordate, shortly acuminate, 3–10 cm long. Inflorescence 6–10(12) cm tall; peduncle slightly compressed, with narrow wings on both sides; rachis with many, dense flowers. Floral bracts triangular, acute, 0.5–1 mm long. Pedicel and ovary filiform, 6–12 mm long. Flowers pale green. Sepals and petals 6–10 mm long, acute; sepals lanceolate, 3-veined; petals linear, 1-veined. Lip broadly ob-

ovate, truncate and shortly mucronate, 6–8 mm long and broad, at base with concavity and 2 inconspicuous calli; midvein on disk thickened; margin erose denticulate. Column slightly curved, 4–5 mm tall, dilated at base, apex with short, half-rounded wings. **Fig. 38**, c, d; **39**, a, b.

Ecology. Primary evergreen broad-leaved humid forests predominantly on rocky limestone, and occasionally on granite and shale, commonly on wet, mossy, shady rock outcrops. 300–1900 m. Fl. September – October. Rare (VU).

Distribution. Vietnam (Bac Kan, Cao Bang, Ha Giang, Hoa Binh, Lai Chau, Lao Cai, Ninh Binh, Phu Tho, Thanh Hoa). NE. India, Bhutan, Nepal, S. China, Taiwan.

Studied specimens. Bac Kan, Na Ri, *HAL 5711* (HN); Cao Bang, Bao Lac, *CBL 1545* (HN, LE, MO); Ha Giang, Quang Ba, *DKH 4824* (HN, LE, MO), *DKH 5061* (HN, LE, MO); Hoa Binh, Lac Son, *CPC 1484* (CPC Herbarium); Lai Chau, Phong Tho, *HAL 10490* (HN, LE, MO); Lai Chau, Tam Duong, *HAL 10167* (HN, LE); Lao Cai, Sapa, *Takhtajan 40* (LE); Ninh Binh, Nho Quan, *NMC 535* (Cuc Phuong National Park Herbarium); Ninh Binh, Cuc Phuong, *Averyanov et al., LX-VN 1818* (HN, LE, C – photo); Phu Tho, Tan Son, *HAL 12673* (HN, LE), *CPC 4650* (CPC Herbarium); Thanh Hoa, Ba Thuoc, *HAL 1057* (HN, MO), *HAL 3327* (HN); Thanh Hoa, Co Lung, *HAL 3327* (HN); Thanh Hoa, Quan Hoa, *HAL 3791* (HN).

Note. *Liparis cordifolia* var. *argentopunctata* (Aver.) Aver. differs from the type variety in silvery spotted leaves. This rather questionable taxon was reported from rocky limestone areas of northern Vietnam (Ninh Binh, Thanh Hoa provinces) and Taiwan.

2. *L. mamillata* Aver.,

2003, Updated Checklist Orch. Vietnam: 42, 82.

Described from southern Vietnam ("Dak Lak Prov., Krong Bong Distr., Cu Pui Municipality, elevation from Dak Tour village to main peak of Chu Yang Sinh mt system (12°24'N, 108°26'E) along Dak Tour river (N slope)"). **Type** ("11 May 2000, *Averyanov et al., VH 6046*") – LE (holotype), HN (isotype).

Lithophytic and terrestrial herb with thin rhizome bearing clustering narrowly ovoid, longitudinally ribbed, pseudobulbs 1.2–2 cm tall, covered by broad white papyraceous sheaths. Leaf 1, arising from the base of pseudobulb, distinctly petiolate, with petiole 1.5–2.5 cm long; leaf blade narrowly ovate to ovate, acuminate, dark green, relatively rigid, 3–6 cm long, 1.8–3.2 cm wide. Inflorescence synanthous, ebracteate, apical, with 6–16 subdense flowers. Floral bracts erect, triangular ovate, attenuate, about 2–4 mm long. Pedicel and ovary straight, 3–3.5 mm long. Flowers 1–1.4 cm across. Sepals and petals green, sometimes with purple tint, 6–8 mm long obtuse; sepals triangular to narrowly ovate, 3-veined; petals linear to narrowly lanceolate, 1-veined. Lip ovate, 6.5–8 mm long, 3–3.5 mm wide, with small auricles, at basal part, strongly bent at middle, with 2 prominent calluses spreading on epichile into 2 parallel low callosities; epichile ovate, flat, erose to ciliate along margin, shortly apiculate. Column 4–4.5 mm tall, narrowing from broad massive base 2–2.5 mm wide to curved, hardly winged apical part, column base at front with 2 large prominent mamilla-like bosses. Capsule erect, cylindrical to narrowly obovoid, ridged. **Fig. 38, e, f; 39, c-h.**

Ecology. Primary evergreen, broad-leaved and mixed humid mountain forests on granite, commonly on shady wet mossy rocks along stream canyons. 1500–2000 m. Fl. May – June. Very rare (VU).

Distribution. Vietnam (Dak Lak, Dak Nong, Khanh Hoa). Endemic of Chu Yang Sin, Hon Ba and Ta Dung Mountains.

Studied specimens. Dak Nong, Dak Glong, Ta Dung mt., *HLF 5650* (HN, LE); Khanh Hoa, Hon Ba, *Jana Skornickova* s.n., a. 2011 (LE – photo, SING – photo).

Note. Taxonomically very isolated species. Identification of samples collected without flowers in Ta Dung Mountains need confirmation by further collections.

3. *L. ngoclinhensis* Aver., sp. nov.,

L. crassibasis auct. non J.J. Sm.: Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 41.

Described from southern Vietnam (“S. Vietnam, Prov. Kontum. ... NW slope of Ngoc Linh mountain system above Long Nam village.”). **Type** (“*L. Averyanov et al.*, *VH 1154*) – LE (holotype), HN, MO (isotypes).

Lithophytic and terrestrial herb with densely clustering ovoid pseudobulbs 2–3 cm tall enclosed by white membranaceous sheaths and bearing 1 petiolate leaf. Petiole erect, 6–12 cm long. Leaf blade thin, membranaceous, broadly ovate to almost orbiculate, shortly acuminate, 8–16 cm long, 7–12

cm wide, cordate at base. Inflorescence 12–20 cm tall; peduncle ebracteate, terete or hardly angled, 10–16 cm long, rachis dirty purple, thickened, fleshy, distinctly angled and often winged, 2–4 cm long with (6)10–15 subdense flowers. Floral bracts ovate to broadly triangular, obtuse, concave, 1–4 mm long. Pedicel and ovary suberect, filiform, dirty purple, 4–6 mm long. Sepals and petals light green, (6)7–9 mm long, acute, perpendicular to ovary; sepals lanceolate triangular; petals linear. Lip greenish to dirty purple, almost flat, broadly obovate to pyriform, emarginate and shortly apiculate, 5–7 mm long, 6–8 mm wide, finely erose along margin, with low glossy median purple longitudinal thickening spreading from lip base to its apex. Column dirty purple, slender, strongly curved, 4–5 mm tall, with short, triangular wings at apex; at base with prominent forward directed bilobed thickening. Capsule broadly obovate to almost globular, 7–8 mm long and broad, on thin ridged suberect stalk 4–5 mm long. **Fig. 38, g; 39, i-l.**

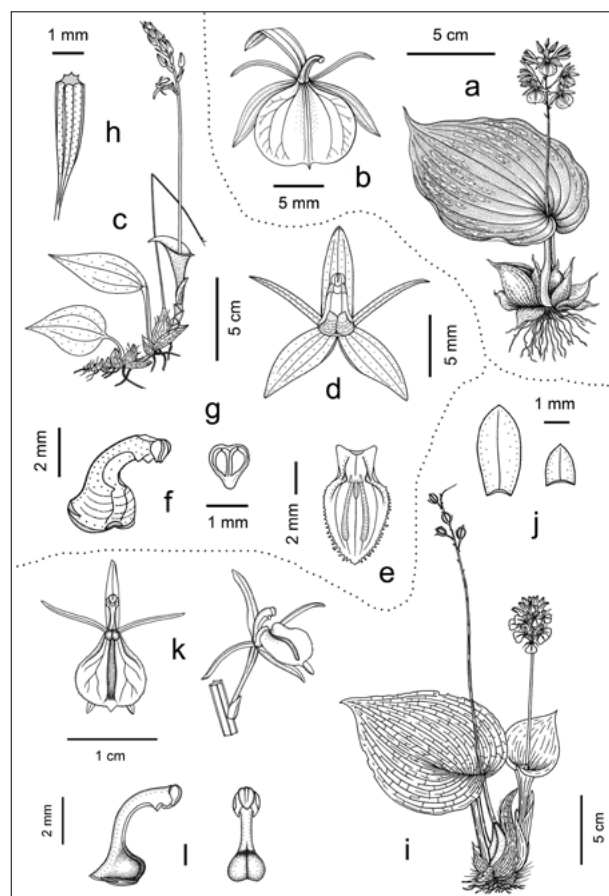


Fig. 39. *Liparis cordifolia*: a – flowering plant, b – flower (Averyanov et al., LX-VN 1818); *L. mamillata*: c – flowering plant, d – flattened flower without lip, e – flattened lip, f – column, side view, g – operculum, view from below, h – pedicel and ovary (VH 6046, type); *L. ngoclinhensis*: i – flowering plant, j – floral bracts; k – flower, frontal and side view, l – column, frontal and side view (VH 1154, type).

Etymology. Species name refers name of mountain system where it was discovered.

Ecology. Primary evergreen broad-leaved dry forests on granite, usually on steep wet rocky slopes. 1700–2000 m. Fl. June – August. Very rare (DD).

Distribution. Vietnam (Kon Tum). Endemic of Ngoc Linh mountain system.

Studied specimens. Kon Tum, NW slopes of Ngoc Linh mt., *VH 112a* (LE).

Note. The species is related to Javanese endemic *L. javanica* J.J. Sm., from which it differs in much larger leaves, dark purple inflorescence and purplish flowers, as well as in broadly obovate to pyriform, emarginate lip with low glossy, dark purple keel and in finely erose lip margin. Another related species, endemic of Sumatra, *L. crassibasis*, differs from *L. ngoclinhensis* in small ovate, gradually acuminate leaves, short petiole and inflorescence, and in distinctly smaller, pure green flowers.

4. *L. petiolata* (D. Don) P.F. Hunt et Summerh.,

1966, Kew Bull. 20: 52; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 12, fig. 3; id., 1992, Opera Bot., 114: 130; Aver., 1994, Ident. Guide Vietnam. Orch.: 140; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 908, fig. 11379; Pearce et Cribb, 2002, Orch. Bhutan: 202; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 42; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 220. – *Acianthus petiolatus* D. Don, 1825, Prodr. Fl. Nepal.: 29. – *Liparis pulchella* Hook. f., 1889, Icon. Pl. tab. 1810; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 181.

Described from Nepal (“Napalia”). **Type** (“Wallich 1945”) – BM (holotype), C, K, P, PR (isotypes).

Terrestrial herb with slender rhizome and more or less distant ovoid pseudobulbs 1.5–3 cm tall bearing 2 petiolate leaves. Leaf blade ovate to broadly ovate, shortly acuminate, 5–12 cm long, 3.5–8 cm wide. Inflorescence 10–25 cm tall with few lax flowers. Floral bracts triangular, 5–8 mm long, as long as pedicel and ovary. Flowers greenish white to light purple-green. Sepals and petals 7–8 mm long, acute; sepals narrowly lanceolate to lanceolate, 3-veined; petals linear, 1-veined. Lip ovate, acute to mucronate, 8–10 mm long, with 2 low basal calli and stout smooth median ridge coming from base to lip apex. Column arcuate, 2–3 mm tall, base thickened, apex slightly enlarged and narrowly winged. **Fig. 40, a–e.**

Ecology. Primary evergreen mountain humid forests on silicate rocks, commonly in shady

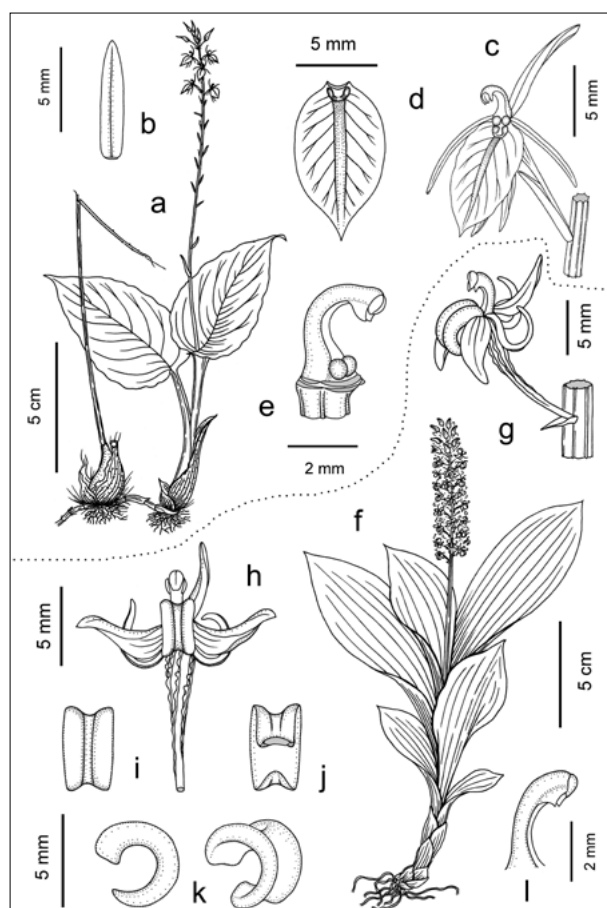


Fig. 40. *Liparis petiolata*: a – flowering plant, b – floral bract, c – flower, d – flattened lip, e – column, side view (Do et al. 101); *L. regnieri*: f – flowering plant, g, h – flower, frontal and side view, i–k – lip, frontal, back, side and half side views, l – column, side view (Regnier 218, type).

wet places. 1700–2300 m. Fl. July – August. Very rare (DD).

Distribution. Vietnam (Cao Bang, Lao Cai). NE. India, Bhutan, Nepal, Thailand.

Studied specimens. Cao Bang, Nguyen Binh, Pia Ouac, *Do et al.*, 101 (HN, LE); Lao Cai, Ta Yang Pinh, pres Chapa, *Poillane 12718* (P).

Note. Adequate illustration of this species is presented in the monograph of King et Pantling (1898, Ann. Bot. Gard. (Calcutta) 8, tab. 32, sub *Liparis nepalensis*). Sub-pinnate venation of leaves in this species is very characteristic and looks unique among its congeners.

5. *L. regnieri* Finet,

1908, Bull. Soc. Bot. France 55: 338; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 179; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 20, fig. 8; id., 1992, Opera Bot., 114: 130, fig. 76; Aver., 1994, Ident. Guide Vietnam. Orch.: 139; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 908, fig. 11380; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 43; Chen Sing-

chi, Ormerod, Wood, 2009, Fl. China, 25: 220. – *Liparis dalatensis* Guillaum., 1961, Bull. Mus. Hist. Nat. Hist. ser. 2, 33: 434.

Described from S. Vietnam (“Cochinchine. – Long-tanh et Tayninh”). **Type** (“Regnier 218”) – P.

Terrestrial herb with short abbreviated stem and 3–4 subradical, elliptic or ovate, shortly acuminate leaves 15–20 cm long. Inflorescence 25–35 cm tall, much exceeding leaves, densely many flowered. Floral triangular, very small. Pedicel and ovary 8–10 mm long, ovary with tall, wavy wings. Flowers yellowish-green. Sepals and petals 6–7 mm long, obtuse; sepals lanceolate to broadly lanceolate, 3(5) veined; petals linear, 1-veined. Lip oblong, 6–7 mm long, 3 mm wide, recurved, truncate and shortly mucronate at apex, with 2 erect conical basal calli. Column slightly curved, 3–4 mm tall, winged at apex. **Fig. 40**, f-l.

Ecology. Primary evergreen mountain forests of silicate rocks? 1500 m? Fl. August. Very rare (DD).

Distribution. Vietnam (Lam Dong). Myanmar, Thailand, S. China.

Studied specimens. Lam Dong, Dalat, *Tixier* 16 59 (P).

Note. In Vietnam, this species is extremely rare and known on the base of only 2 old collections without indication of exact data on ecology and habitat elevation. May be extinct.

6. *L. nervosa* (Thunb.) Lindl.,

1830, Gen. Sp. Orch. Pl.: 26; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 30, fig. 16; id., 1992, Opera Bot., 114: 132; Aver., 1994, Ident. Guide Vietnam. Orch.: 138; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 907, fig. 11376; Su Horng-Jye, 2000, Fl. Taiwan 5: 947; Pearce et Cribb, 2002, Orch. Bhutan: 199; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 42; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 273; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 296; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 218; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 307, fig. 253–257. – *Ophrys nervosa* Thunb., 1784, Fl. Jap.: 27. – *Liparis violaceonervosa* Guillaum., 1961, Bull. Mus. Hist. Nat. Hist. ser. 2, 32: 434. – *L. rheedii* auct. non Lindl.: Seidenf., 1976, Dansk Bot. Ark., 31, 1: 34, fig. 20; id., 1992, Opera Bot., 114: 133; Aver., 1994, Ident. Guide Vietnam. Orch.: 402; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 905, fig. 905; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 43.

Described from Japan (“Osacca et Iedo”). **Type** (“Thunberg s.n.”) – UPS-THUNB.

Terrestrial herb with fleshy, terete, many nodal stem (2)4–10 cm tall, 5–10 mm in diam., enclosed at the base by papyraceous sheets. Leaves 3–6, elliptic, 5–15 cm long, 3–8 cm wide, shortly acuminate. Inflorescence 10–25 cm long with many lax or sublux flowers. Floral bracts narrowly triangular, 1–2 mm long. Pedicel and ovary 8–15 mm long. Flowers green to purple-greenish, often with recurved sepals and petals. Sepals lanceolate to broadly lanceolate, indistinctly 3-veined, 8–10 mm long, 1.5–3 mm wide, obtuse, with revolute margin; lateral sepals slightly shorter and broader, oblique. Petals, filiform, 7–8 mm long, 1-veined. Lip oblong-obovate, 5–8 mm long, 4–6 mm wide, at base with 2 conical calli, epichile emarginate to bilobed. Column 4–5 mm tall, with broad wings in apical half. Capsule narrowly elliptic, to 1.5 cm long. **Fig. 38**, g, i.

Ecology. Primary and rich secondary evergreen broad-leaved and coniferous humid forests on any kind of rocks, commonly in shady places on deep soils. 250–2000 m. Fl. March – May. Not rare (VU).

Distribution. Vietnam (probably all provinces where appropriate habitats still exists). Tropical and subtropical areas of the world.

Studied specimens. Bac Kan, Cho Don, *HAL* 4625 (HN), *HAL* 4734 (HN, LE); Cao Bang, Arraya de Dengke a Phuc Han (region de Kao Bang), *Petelot s.n.*, a. 1893 (P); Cao Bang, Bao Lac, *CBL* 496 (HN, LE, MO), *CBL* 1408 (HN, LE, MO); Da Nang, Hoa Vang, *CPC* 3318 (HN); Ha Tinh, Huong Son, *HAL* 1251 (HN); Hai Phong, Cat Ba, *Averyanov et al.*, *LX-VN* 3337, (HN, LE); *LX-VN* 3394, a. 1986 (HN, LE); Hoa Binh, Da Bac, *HAL* 506 (HN, MO), *HAL* 589 (HN, MO); Hoa Binh, Mai Chau, *DKH* 7991 (HN, LE, MO); Kon Tum, Dak Gley, *VH* 1664 (HN, LE, MO); Kon Tum, Ngoc Linh mt., *VH* 676 (HN, LE, MO); Lam Dong, Dalat, *Tixier* 13 59 (P); Lam Dong, Preun au S. de Dalat, *Grillet* 170 (P); Lao Cai, Van Ban, *DKH* 6907 (HN, LE, MO), *HAL* 2675 (HN, LE); Nghe An, Tuong Duong, *HLF* 6590 (HN, LE, MO); Ninh Binh, Cuc Phuong, *Averyanov et al.*, *LX-VN* 1768 (HN, LE), *Averyanov et al.*, *LX-VN* 1817 (HN, LE), *Werff et al.*, 14230 (HN, LE), Jaramillo et al., *MAJ* 498 (HN), *HAL* 1666 (HN), Bao 106 (HN); Ninh Thuan, Ninh Hai, *HLF* 4213 (HN, MO); Phu Tho, Tan Son, *HAL* 12815 (HN); Quang Binh, Bo Trach, *HAL* 6066 (HN); Quang Binh, Minh Hoa, *HAL* 12253 (HN, MO); Quang Binh, Quang Ninh, *HAL* 11496 (HN, MO); Quang Nam, Ngoc Linh mt., *VH* 883 (HN, LE); Quang Ninh, Ba Mun, *Averyanov*, *Kudryavtzeva* 148, a.

1987 (HN, LE); Quang Ninh, Thanh Lan, *Kudryavtzeva, Ogureeva*, 777, a. 1990 (HN, LE); Son La, Yen Chau, *CPC 1860* (HN); Thai Nguyen, Vo Nhai, *NTH 3821* (HN, LE); Thanh Hoa, Ba Thuoc, *HAL 2996* (HN); Thua Thien – Hue, A Luoi, *HAL 7370* (HN), *HAL 7728* (HN); Thua Thien – Hue, Huong Thuy, *HAL 8169* (HN); Thua Thien – Hue, Nam Dong, *HAL 7008* (HN); Thua Thien – Hue, Phu Loc, *HLF 1279* (HN, LE), *HLF 2706a* (LE); Thua Thien – Hue, Xuan Loc, Bach Ma National Park, *HLF 1729* (HN); Tuyen Quang, Na Hang, *HAL 176* (HN, MO), *HAL 238* (HN, MO), *HAL 239* (HN, MO).

Note. Very variable and widespread species. It is represented in Vietnam by the type variety. Second Asian variety – *L. nervosa* var. *khasiana* (Hook. f.) P.K. Sarkar is restricted to NE. India and is distinguished by having only two or three leaves and petals that are neither reflexed nor twisted.

7. *L. acuminata* Hook. f.,

1890, Fl. Br. Ind. 5: 696; id., 1890, Ic. Pl. tab. 2007; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 180; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 34, fig. 18; id., 1992, Opera Bot., 114: 133, fig. 80; Aver., 1994, Ident. Guide Vietnam. Orch.: 139; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 904, fig. 11364; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 41;

Described from NE. India (“Khasia”). **Type** (“Griffith”) – K.

Terrestrial herb with narrowly conical pseudobulbs and (3)4(5) leaves with sheath-like petiole. Leaf blade elliptic, acuminate, 10–15 cm long. Inflorescence 20–30 cm tall, much exceeding leaves with several flowers. Floral bracts triangular, very small. Pedicel and ovary 6–10 mm long. Flowers greenish-purple. Sepals and petals 8–12 mm long; sepals lanceolate to narrowly ovate, 3(5)-veined; petals linear-lanceolate, with 1 vein. Lip broadly ovate, acute or almost round, finely denticulate, (6)8–9(10) mm long and wide, with 2 prominent uncinuate calli near base. Column distinctly arcuate, 5–6 mm long, with distinct wings widened toward column apex. **Fig. 41, a-d.**

Distribution. Vietnam (Khanh Hoa, Lam Dong, Quang Nam, Quang Tri, Thai Nguyen). NE. India, Cambodia.

Ecology. Primary evergreen broad-leaved humid forests on silicate rocks, commonly in shady places on soils rich in humus. 1000–1700 m. Fl. March – May. Rare (VU).

Studied specimens. Khanh Hoa, Massif de la Mere et l'Enfant, *Poilane 6441* (P); Lam Dong, Dalat, *C.R.S.T 35 EP* (P), *Evrard 1357* (P), *Schmid s.n.* (P); Lam Dong, Langbian, *Averyanov et al., LX-*

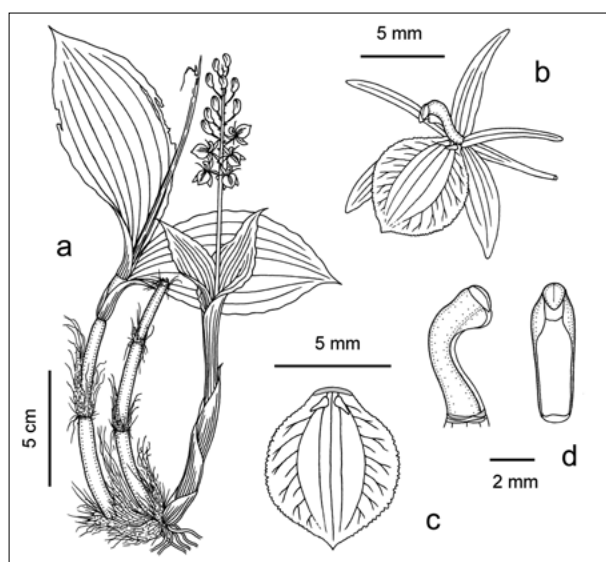


Fig. 41. *Liparis acuminata*: a – flowering plant, b – flower, c – flattened lip, d, e – column, side and frontal views (Averyanov et al., LX-VN 1548).

VN 1548 (HN, LE); Lam Dong, Prenh, *Evrard 1940* (P); Quang Nam, Mang Tra, *Poilane 31820* (P); Quang Nam, Sud Ouest de Eramy, *Poilane 31358* (P); Quang Tri, Dong Tri, Quangtri, *Poilane 25329* (P); Thai Nguyen, Thai-Nguyen, *Eberhardt s.n.* (P); “Cochinchina”, *Pierre s.n.* (P?).

8. *L. atrosanguinea* Ridl.,

1903, Journ. Straits Branch Roy. As. Soc. 39: 71; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 18, fig. 6; id., 1992, Opera Bot., 114: 130; Seidenf., Wood, 1992, Orch. Malay. Sing.: 231, fig. 96f; Aver., 1994, Ident. Guide Vietnam. Orch.: 139; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 905, fig. 11366; Comber, 2001, Orch. Sumatra: 140; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 41.

Described from Malacca Peninsula (“Malaysia, Perak, Larut Hills”). **Type** (“Curtis et Derry s.n.”) – SING.

Terrestrial herb with fleshy many-nodal, pseudobulbous stem 10–12 cm tall, 1.5–2 cm in diam., bearing several pinkish leaves; leaf blade 10–15 cm long, 4–5 cm wide, crisped along margin. Inflorescence 25–35 cm tall, with many well spaced crimson-purple flowers. Sepals and petals 1.5–1.6 cm long, obtuse; sepals lanceolate to broadly lanceolate, 3(5)-veined; petals linear, with 1 vein. Lip ovate to obscurely rhomboid, 1.7 cm long, 1.3 cm wide, shallowly emarginate, denticulate, with low 2-lobed median callus at base. Column slender, slightly curved, 5–6 mm tall, narrowly winged. **Fig. 42, h.**

Ecology. Mountain humid forests. 1600–1700 m.

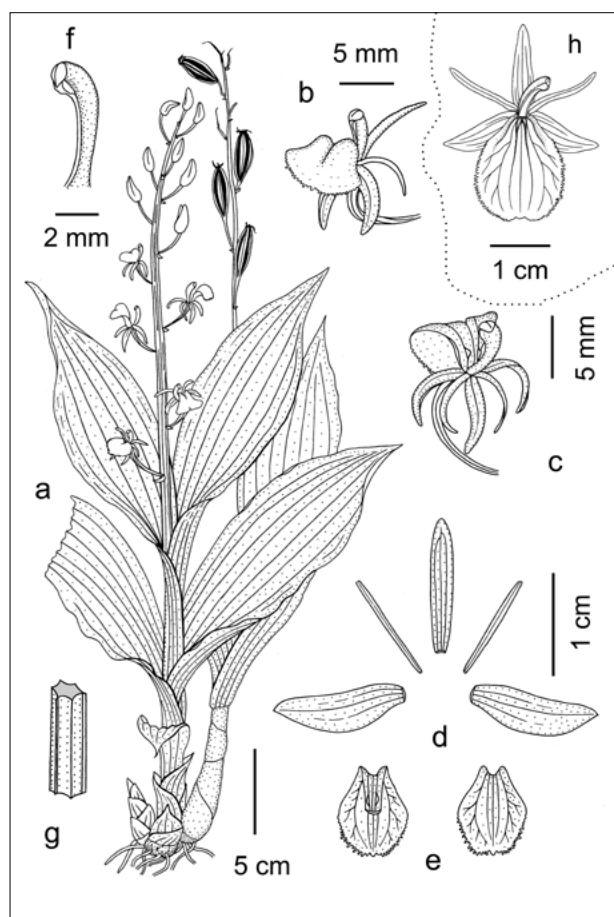


Fig. 42. *Liparis sootenzanensis*: a – flowering plant, b, c – flower, d – flattened sepals and petals, e – lip, frontal view and view from behind, f – column, side view; g – portion of peduncle (VH 4426); *L. atosanguinea*: h – flattened flower (plant from Malaya, s.n.).

Distribution. Vietnam? Andaman and Nicobar Islands, Thailand, Malacca Peninsula, Sumatra.

Note. The single specimen from Vietnam (*Tixier 17/59*, type of *L. tixieri*), which was identified tentatively as *L. atosanguinea* (Seidenfaden, 1992: 130) was treated later as conspecific with *L. sootenzanensis* (Chen Sing-chi, Ormerod, Wood, 2009: 219). I think, this is quite adequate opinion. Hence, occurrence of *L. atosanguinea* in Vietnam needs confirmation by future field studies. Data on ecology are recorded here for plants from Sumatra (Comber, 2001: 140); drawing copied from Malaysian plant (Rolfe, 1908, Bot. Mag. 134, tab. 8195 and Seidenf., 1976, l.c.: 17, fig. 6).

9. *L. gigantea* C.L. Tso,

1933, Sunyatsenia 1: 136; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 219; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 301, fig. 248–252. – *L. nigra* Seidenf., 1969, Bot. Tidsskr. 65, 1–2: 129, fig. 19; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 18, fig. 7; id., 1992, Opera Bot., 114: 130, pl.

9a; Aver., 1994, Ident. Guide Vietnam. Orch.: 139; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 908, fig. 11377; Su Horng-Jye, 2000, Fl. Taiwan 5: 948; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 42. – *L. macrantha* Rolfe, 1895, Ann. Bot. 9: 156, non Hook. f., 1889.

Described from S. China (“Guangdong, Sunyi”). **Type** (“S.P. Ko 51255”) – SYS.

Terrestrial or occasionally lithophytic herb with fleshy many-nodal, pseudobulbous stem 8–20 cm tall, 1–1.5 cm in diam., bearing 3–6 elliptic, acuminate leaves 10–18 cm long, 3.5–10 cm wide. Inflorescence axis longitudinally ridged, 20–45 cm tall, few to many flowered. Floral bracts triangular, 3–4 mm long. Pedicel and ovary dark purple 1.2–2 cm long. Flowers dark purple or purple-violet, 2.2–1.8 cm across. Sepals and petals 1.5–2 cm long, obtuse; sepals broadly lanceolate, 3(5)-veined; petals linear lanceolate, with 1 vein. Lip obovate, truncate or emarginate, bent at middle, 1–1.2 mm long, 1.2–2 cm wide; at base with 2 large, acute calli; denticulate along margin. Column slightly arcuate, (6)8–11 mm tall, winged apically. Capsule narrowly obovoid-oblong, to 3 cm long. **Fig. 43**, a, b.

Ecology. Primary and rich secondary evergreen, broad-leaved humid forests on any kind of soils, commonly in shady wet places on deep soils rich in humus. 50–1500 m. Fl. February – May. Not common (VU).

Distribution. Vietnam (Hanoi, Hoa Binh, Khanh Hoa, Lam Dong, Ninh Thuan, Quang Binh, Thanh Hoa, Thua Thien – Hue, Tuyen Quang, Vinh Phuc). Thailand, S. China, Taiwan, Hainan.

Studied specimens. Hanoi, Bavi, *Ly Nhan Ve 253* (HN, LE); Hoa Binh, Lac Son, *CPC 1527* (CPC Herbarium); Khanh Hoa, NE slope of Bi Dup mt., *Averyanov et al., QD 6*, a. 1995 (LE); Lam Dong, Lac Duong, *VH 3280* (HN, LE); Ninh Thuan, Ninh Hai, Nui Chua mt., *HLF 4213* (HN, LE); Ninh Thuan, Ninh Son, *VH 3541* (HN, LE); Quang Binh, Minh Hoa, *HAL 12536* (HN, LE), *CPC 3673* (CPC Herbarium), *CPC 4332* (CPC Herbarium), *CPC 5121* (CPC Herbarium); Thanh Hoa, Ba Thuoc, *HAL 3174* (HN); Thua Thien – Hue, Phu Loc, *HLF 1384* (HN, LE), *HLF 1638* (HN); Tuyen Quang, Na Hang, *HAL 166* (HN, MO), *CPC 4526* (CPC Herbarium); Vinh Phuc, Tam Dao, *Averyanov et al., LX-VN s.n.*, a. 1988 (LE).

Note. Nice species worthy of cultivation as easy and fast growing ornamental plant.

10. *L. sootenzanensis* Fukuy.,

1933, Ann. Rep. Taihoku Bot. Gard. 3: 84; Su Horng-Jye, 2000, Fl. Taiwan 5: 950, photo 125;

Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 219. – *L. tixieri* Guillaum., 1961, Bull. Mus. Hist. Nat. ser. 2, 33: 434. – *L. piriformis* Szlach., 1993, Fragm. Florist. Geobot. 38, 2: 456, fig. 5; Aver., 1994, Ident. Guide Vietnam. Orch.: 402; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 41. – *L. nigra* Seidenf. var. *flava* Aver., 1999, Bot. Journ. (St. Petersburg) 84, 10: 128. – *L. flava* (Aver.) Aver., 2003, Updated Checkl. Orch. Vietnam: 43, 79, fig. 5.

Described from Taiwan ("Taiwan"). **Type** ("N. Fukuyama 4104") – KPM (Herb. Orch. Fuk.).

Terrestrial herb with fleshy many-nodal, pseudobulbous stem 8–15 cm tall, 1–1.5 cm in diam., bearing 3–5(6) elliptic, acuminate leaves (15)20–35 cm long, 5–10 cm wide. Inflorescence axis angular and longitudinally winged, 25–60 cm tall, with 5–20 sublux flowers. Floral bracts triangular, 2–3 mm long. Pedicel and ovary 1.5–2 cm long. Flowers yellow-green, rarely with purple or violet tint. Sepals and petals (1)1.1–1.5 cm long, obtuse; sepals lanceolate to broadly lanceolate, 3(5)-veined; petals linear, with 1 vein. Lip obscurely rhomboid, truncate or emarginate, with small apical dent, strongly bent at middle, (8)1–1.5 mm long, (6)8–12 mm wide; at base with 2 low carinate calluses along veins; denticulate or fimbriate along margin. Column slender, slightly curved, 5–6 mm tall, narrowly winged. Capsule erect, cylindrical, ribbed, about 3 cm long, 6–8 mm in diam. **Fig. 42**, a–g; **43**, c–e; **44**.

Distribution. Vietnam (Dak Lak, Dak Nong, Kon Tum, Lam Dong, Nghe An, Quang Binh, Quang Tri, Thua Thien – Hue). Taiwan.

Ecology. Primary and rich secondary evergreen, broad-leaved humid forests on any kind of soils, commonly in shady wet places on deep soils rich in humus. 600–2000 m. Fl. January – May. Not common (VU).

Studied specimens. Dak Lak, Krong Bong, *VH 6027* (HN, LE, MO), *VH 6399* (HN, LE, MO); Dak Nong, Dak Glong, *HLF 5660* (HN); Kon Tum, Kon Plong, *VH 5149* (HN, LE, MO); Lam Dong, Dalat, *Tixier 17/59* (P), *Freie Paul s.n.* (P); Lam Dong, Lac Duong, *VH 4426* (HN, LE, MO, P); Nghe An, Tuong Duong, *HLF 7057* (HN, MO); Quang Binh, Bo Trach, *HAL 6230* (HN, LE), *HAL 6265* (HN); Quang Binh, Le Thuy, *HAL 11452* (HN, LE, MO); Quang Tri, Huong Hoa, *HLF 6297* (HN, LE); Thua Thien – Hue, A Luoi, *HAL 7405* (HN); d-EXSICCATES OF VIETNAMESE FLORA 0070/*HLF 6297*; d-EXSICCATES OF VIETNAMESE FLORA 0130/*HAL 11452*.

Note. This species, like *L. nigra*, is desirable for cultivation as ornamental plant.

Some specimens observed in southern Viet-

nam exhibit intermediate morphology between this species and *L. gigantea* and may be regarded as natural hybrids of *L. sootenzanensis* and *L. nigra* connected by introgressive hybridization (fig. 43, f).

I could not find the valid publication of *Liparis buicongii* N.T. Tich mentioned by P.H. Ho (2000, Ill. Fl. Vietnam 3: 908, fig. 11378). According to the short description and drawing, this plant looks conspecific with *L. sootenzanensis*.

11. *L. nana* Rolfe,

1913, Kew Bull. 1913: 28; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 192; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 20, fig. 9; id., 1992, Opera Bot., 114: 130, fig. 77; Aver., 1994, Ident. Guide Vietnam. Orch.: 140; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 907, fig. 11374. – *L. meniscophora* Gagnep., 1932, Bull. Soc. Bot. France 79: 166; id., 1932, l.c. 6, 2: 190. – *L. pygmaea* auct. non King et Pantl.: Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 43, 87.

Described from S. Vietnam ("Annam"). **Type** ("sine coll.") – K.

Terrestrial, lithophytic or epiphytic miniature dwarf herb. Pseudobulbs ovoid, densely clustering, 5 mm tall, with 2(3) shortly petiolate leaves. Leaf blade ovate to broadly ovate, 1–2(2.5) cm long, (0.5)1–1.5(2) cm wide. Inflorescence erect, 2.5–3 cm long with (1)3–5(8) purple flowers. Floral bracts broadly lanceolate, acute, 2–3 mm long. Pedicel and ovary 2–3 mm long. Sepals and petals 4–5 mm long, acute; sepals broadly lanceolate; petals linear. Lip obovate to obscurely rectangular, 3.5–4 mm long, 2.5–3 mm wide, truncate, shortly apiculate, finely erose along margin, with U-shaped callus at the base. Column broadly clavate, 2 mm tall, apex massive, with prominent petaloid wings at apex. **Fig. 45**, a–d.

Ecology. Primary evergreen humid mountain forests on silicate rocks. 1500 m. Fl. May – July. Very rare (DD).

Distribution. Vietnam (Lam Dong).

Studied specimens. Lam Dong, Dalat, *Ev-rard 1029* (P).

Note. Species has superficial resemblance to Himalayan *L. pygmaea* King et Pantl., from which differs in erose lip margin, characteristic U-shaped callus at the lip base and petaloid wings at the column apex. Petaloid wings at column apex are unique in the genus and place the plant as rather isolated species among its congeners. It is quite possible that species extinct in nature, as its last collections are dated as year 1924.

12. *L. ferruginea* Lindl.,

1848, Gard. Chron. 1848: 55; Seidenf., 1976,

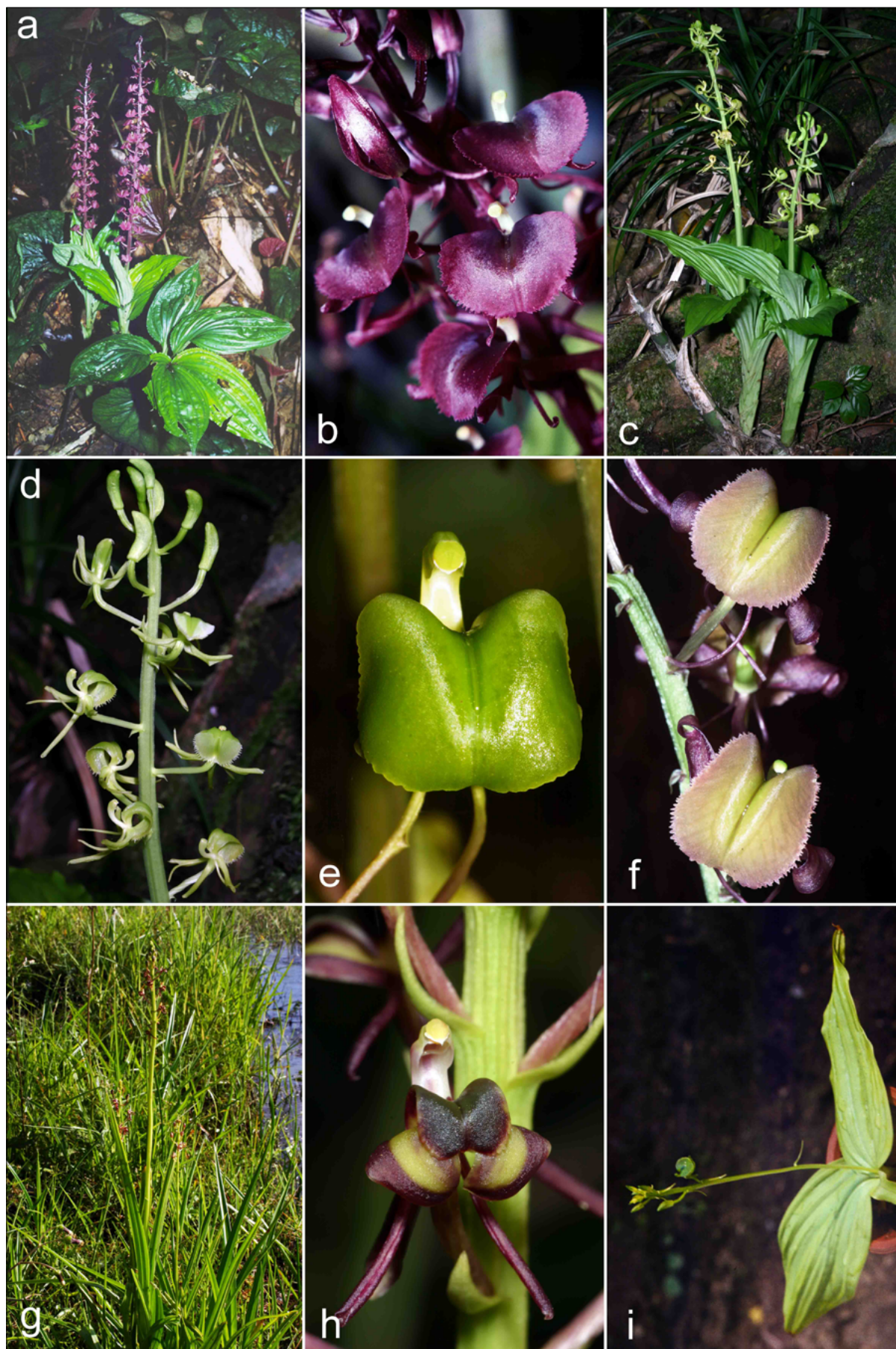
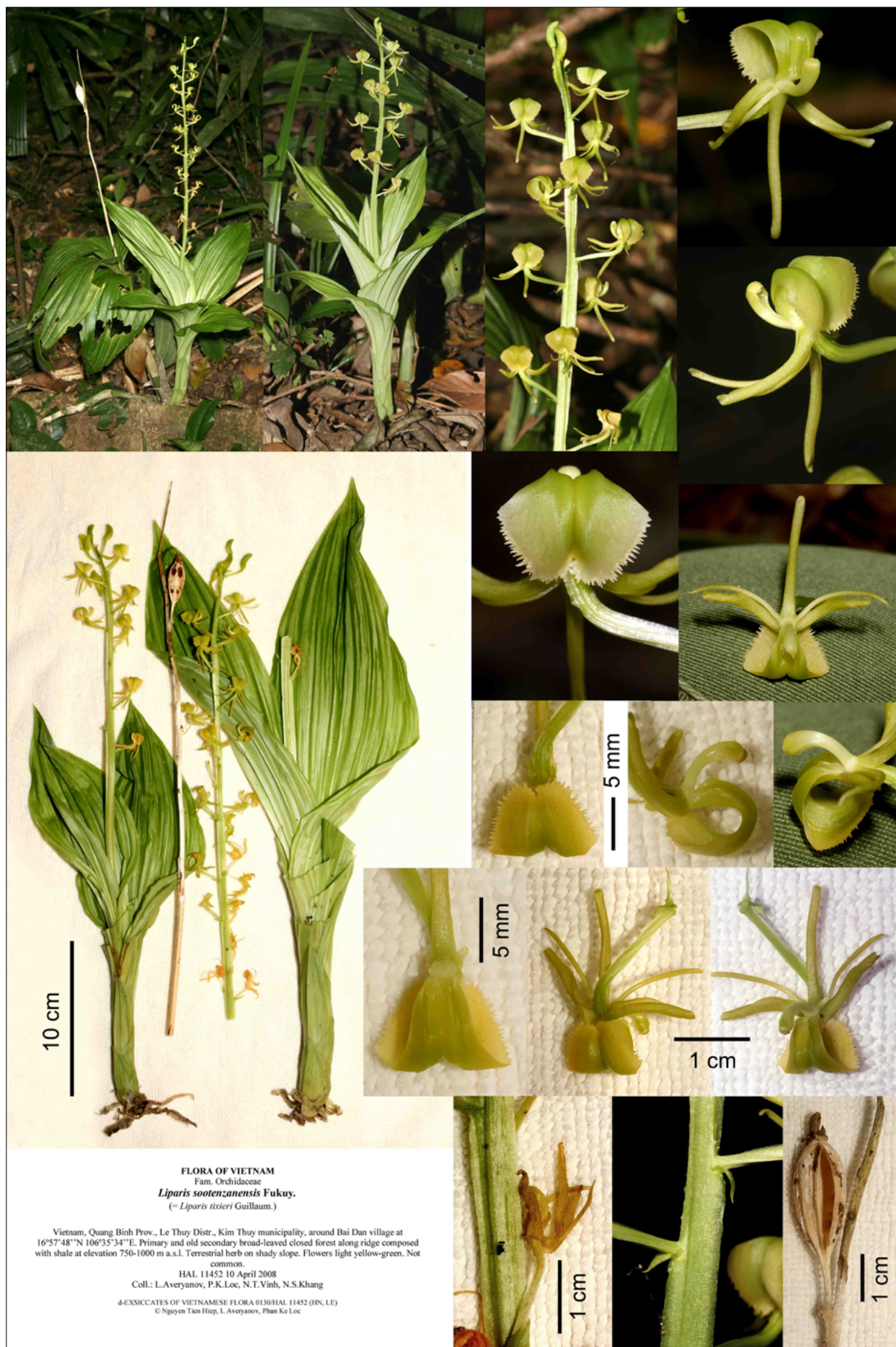


Fig. 43. *Liparis gigantea*: a (HAL 166), b (Averyanov et al., QD 6); *L. sootenzanensis*: c, d (HLF 6297), e (HAL 6230); *L. gigantea* × *L. sootenzanensis*: f (HLF 7057); *L. ferruginea*: g, h (HLF 5726); *L. tschangii*: i (Averyanov et al., LX-VN 2289a).

Fig. 44. Digital herbarium specimen of *Liparis sootenzanensis* (HAL 11452).

Dansk Bot. Ark., 31, 1: 40, fig. 23; id., 1992, Opera Bot., 114: 137; Seidenf., Wood, 1992, Orch. Malay. Sing.: 233, fig. 98a, b; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 906, fig. 11372; Comber, 2001, Orch. Sumatra: 141; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 220; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 298, fig. 245–247.

Described from Malacca Peninsula (“W. Malaysia, Penang”). **Type** (“cult. *Loddiges s.n.*”) – K-LINDL.

Terrestrial herb with small insignificant pseudobulb hidden by sheaths of 3–6 subradical, linear lanceolate to lanceolate, acute leaves (10)20–35 cm long, 0.8–1.5 cm wide. Inflorescence erect, 35–55 cm tall, several- to many-flowered. Floral bracts triangular, 4–6 mm long. Pedicel and ovary 0.8–1.2 cm long. Sepals and petals dull yellowish to dirty purple, 6–8(10) mm long, obtuse, strongly reflexed; median sepal narrowly ovate, 3-veined, lateral sepals oblique ovate, 5-veined; petals narrowly lanceolate, 1(3)-veined. Lip brown to dark brown–purple, recurved, oblong obovate, truncate or emarginate, often shortly apiculate, 4–6 mm long, 3–5 mm wide, at base with small basal backward spreading auricles and 2 prominent calli. Column curved, 3–4 mm, with insignificant wings at apex. Capsule erect, obovoid, 1–2 cm long, bearing persistent remnants of column. **Fig. 43**, g, h.

Ecology. Open grassy swamps, wet mossy streamsides and dump depressions among secondary shrubs, open secondary forests and Dipterocarp woodlands. 10–800 m. Fl. September – December. Rare (LR).

Distribution. Vietnam (Dak Nong, Tay Ninh, Thua Thien – Hue). Nepal, Thailand, S. China, Hainan, Malacca Peninsula, Indonesia.

Studied specimens. Dak Nong, Dak Glong, *HLF 5726* (HN, LE); Tay Ninh, Tan Bien, *HLF 7557*, (HN, MO), *HLF 7577a* (LE); Thua Thien – Hue, Cau Hai, Sud de Hue, *Poillane 27865* (P).

Note. The species is fairly rare, but sometimes it spreads in secondary grassy habitats like stream and rivers sides, swampy open grassy depressions, wet sides of rice paddies, damp pastures and often successively survive in populated areas.

13. *L. acutissima* Rchb. f.,

1878, Otia Hamb. 2: 37; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 175; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 45, fig. 26; id., 1992, Opera Bot., 114: 137, fig. 81; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 905, fig. 11365; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 41; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 272.

Described from S. Vietnam (“Ile Phu Quoc, Bay Doc”). **Type** (“*Godefroy 789*, Herb. Reichenbach 39793”) – W.

Terrestrial herb with ovoid pseudobulbs about 1 cm tall bearing (2)3–4 radical subsessile, erect, linear, grass-like leaves 8–12 cm long, 0.5 cm wide. Inflorescence 20–25 cm tall with few small lax flowers. Floral triangular, very small. Pedicel and ovary 3–5 mm long. Sepals and petals 3–4 mm long, obtuse; sepals lanceolate to narrowly ovate; petals linear. Lip strongly bent at middle, oblong obovate shallowly emarginate, 2–3 mm long, 1.5–2 mm wide, irregularly finely denticulate at apex, indistinctly thickened at base. Column curved, 1 mm tall, with rectangular wings at apex. **Fig. 45**, e, f.

Ecology. Lowland and hill secondary wet short tall grasslands and grassy open places among secondary forests on wet rich soils. Fl. June – October. Very rare (DD).

Distribution. Vietnam (Kien Giang). Thailand, Cambodia.

Notes. The species is reported from Vietnam based solely on the type collection. Presently may be extinct in the country. It is very close to widespread *L. jovispluvii*, from which it actually differs only by linear, grass-like leaves.

14. *L. campylostalix* Rchb. f.,

1876, Linnaea 41: 45; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 22, fig. 11; id., 1992, Opera Bot., 114: 131, fig. 78; Aver., 1994, Ident. Guide Vietnam. Orch.: 140; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 906, fig. 11370; Su Horng-Jye, 2000, Fl. Taiwan 5: 939; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 41; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 216.

Described from E. India (“India orientalis”). **Type** (“Herb. Reichenbach 39742”) – W.

Terrestrial or rarely epiphytic herb with ovoid pseudobulbs 5–12 mm tall and 2 petiolate leaves with ovate leaf blade acute, 5–10 cm long, 2–4 cm wide. Inflorescence 10–25 cm tall with few to many sublux flowers. Floral bracts triangular, acute, 1–5 mm long. Pedicel and ovary 5–10 mm. Flowers greenish to light purple. Sepals and petals 5–9 mm long, obtuse; sepals broadly lanceolate to narrowly ovate, 3-veined; petals linear, 1-veined. Lip oblong obovate, 5–6 mm long, 3–3.5 mm wide, truncate, emarginate or shortly apiculate, without callus at base. Column slightly curved, 3–4 mm tall, base dilated, apex with small subquadrate wings. **Fig. 45**, g–j.

Ecology. Secondary wet short tall grasslands. 1500–1700 m. Fl. August – October. Very rare (DD).

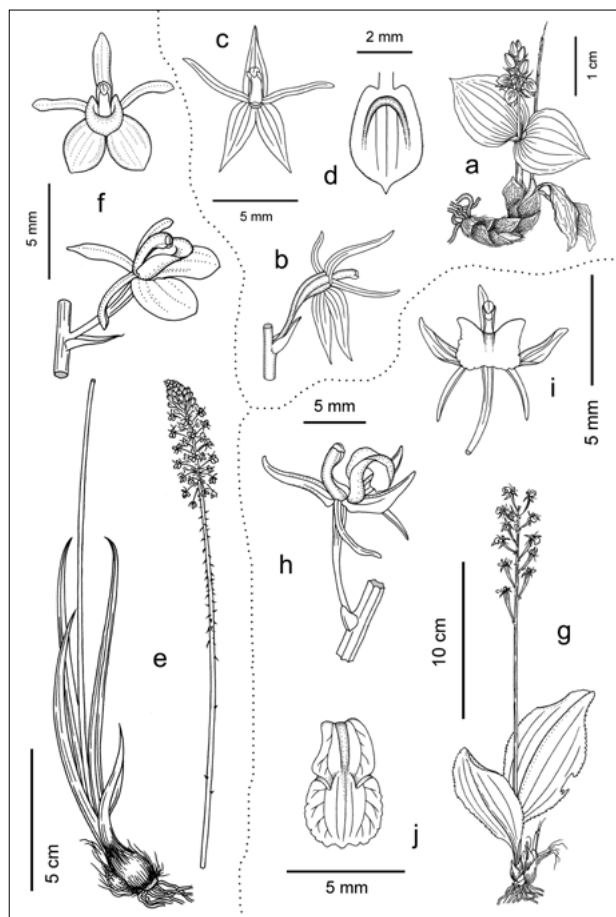


Fig. 45. *Liparis nana*: a – flowering plant, b, c – flower, frontal and side views, d – flattened lip (Evrard 1029); *L. acutissima*: e – flowering plant, f – flower, frontal and side views (Geoffray 488, Cambodia); *L. campylostalex*: g – flowering plant, h, i – flower, side and frontal views, j – flattened lip (plant from Japan, s.n.).

Distribution. Vietnam (Lam Dong). NE. India, China, Taiwan, Russia (S. of Far East), Korea, Japan.

Studied specimens. Lam Dong, Langbian, *Tixier* 76 58 (?).

Note. Location of the single collection from Vietnam is uncertain. Occurrence of this species in the country remains doubtful.

15. *L. tschangii* Schltr.,

1924, *Repert. Spec. Nov. Regni Veg.* 19: 380; Chen Sing-chi, Ormerod, Wood, 2009, *Fl. China*, 25: 217. – *L. sutepensis* Rolfe ex Downie, 1925, *Kew Bull.* 1925: 371; Gagnep., 1932, *Fl. Gen. Indo-Chine* 6, 2: 193; Seidenf., 1976, *Dansk Bot. Ark.*, 31, 1: 27, fig. 14; id., 1992, *Opera Bot.*, 114: 131; Aver., 1994, *Ident. Guide Vietnam. Orch.*: 140; P.H. Ho, 2000, *Ill. Fl. Vietnam* 3: 907, fig. 11373; Aver. et Averyanova, 2003, *Updated Checklist Orch. Viet.*: 43.

Described from SW. China ("China: Yunnan: Nanfautchoang"). **Type** (July 1920, *Tschang*

32) – HITBC (Xishuangbanna Tropical Botanical Garden).

Terrestrial herb with subglobular, often underground pseudobulbs 1–1.5 cm across bearing 2 radical subsessile, opposite, prostrate leaves. Leaf blade narrowly ovate, acuminate, 5–10 cm long, 2–4 cm wide. Inflorescence 15–20 cm tall with (5)10–20 lax flowers. Floral bracts deflexed, triangular, acuminate, 5–10 mm long as long as pedicel and ovary. Flowers emerald green. Sepals and petals 6–10 mm long, obtuse; sepals lanceolate to narrowly ovate, 3–5-veined; petals linear, 1-veined. Lip almost flat, elliptic to almost circular, with round or slightly emarginate apex, 6–10 mm long, 6–8 mm wide, finely denticulate along margin, with 2 low obscure basal calli and prominent low glossy median band on disk. Column slightly curved, 2.5–3.5 mm tall, base thickened, with narrow rounded wings at apex.

Fig. 43, i; 47, a.

Ecology. Open grassy places in dry secondary forests, woodlands and shrubs. 600–800 m. Fl. June – August. Very rare (DD).

Distribution. Vietnam (Kon Tum). Thailand, S. China, Laos.

Studied specimens. Kon Tum, Konplong, Averyanov *et al.*, *LX-VN 2289a* (LE).

Note. Very rare species. Presently it may be extinct in the country.

16. *L. oppositifolia* Szlach.,

1993, *Fragm. Flor. Geobot.* 38: 458, fig. 6; Aver., 1994, *Ident. Guide Vietnam. Orch.*: 402; Aver. et Averyanova, 2003, *Updated Checklist Orch. Viet.*: 42; Chen Sing-chi, Ormerod, Wood, 2009, *Fl. China*, 25: 215.

Described from Cambodia ("ME-KONG. Stung-Streng"). **Type** ("1866–1868, *Thorel 2201*") – P.

Terrestrial herb with underground ovoid, pseudobulb 1.6–2.4 cm tall bearing 2 radical, sessile, prostrate, subopposite, ovate, acute leaves, 5.5–12.5 cm long, 4.5–11 cm wide. Inflorescence to 32 cm tall, sublax, many flowered. Peduncle with numerous sterile deflexed, lanceolate, acute bracts to 8 mm long. Floral bracts triangular, acute, 4–11 mm long. Flowers green. Pedicel and ovary 5–6 mm long. Sepals and petals 6–6.5 mm long, obtuse; sepals narrowly ovate, 5-veined; petals narrowly lanceolate, 1-veined. Lip broadly obovate to suborbicular, 6–6.6 mm across, entire to shallowly erose along margin, truncate to shallowly emarginate, shortly apiculate, base with a fleshy bilobed callus. Column bent, 3–4 mm tall, with narrow triangular wings at apex. **Fig. 46, a, b.**

Ecology. Short tall secondary grasslands among open lowland forests, woodlands and shrubs. Fl. August. Very rare (DD).

Distribution. Vietnam? S. China, Laos, Cambodia.

Studied specimens. ME-KONG. Sine loco. 1866–1868, *Thorel s.n.* (P).

Note. Locality of the specimen cited as paratype of the species (*Thorel s.n.*) remains uncertain. This collection was made in unspecified lowland area of lower Mekong in region that may equally belong to both Cambodia and Vietnam.

It is noticeable, that both specimens described under the name *L. oppositifolia* actually differs from *L. deflexa* only in more broad and prostrate leaves that represent very usual modification observed in many *Liparis* species growing in rather open, sunny places. Usually such forms are hardly deserve species and even varietal rank. Both mentioned specimens were reasonably cited by Seidenfaden in his monograph as true *L. deflexa* (1992: 132). Figure 46, b is copied from Szlachetko drawing (1993, l.c.: 458, fig. 6, g). I have not seen personally the flowers of the type specimen.

17. *L. deflexa* Hook. f.,

1890, Fl. Br. Ind. 5: 697; id., 1890, Ic. Pl. tab. 2008; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 183; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 27, fig. 15; id., 1992, Opera Bot., 114: 132, fig. 79; Aver., 1994, Ident. Guide Vietnam. Orch.: 140; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 906, fig. 11371; Pearce et Cribb, 2002, Orch. Bhutan: 198; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 41; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 272; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 296.

Described from NE. India ("Sikkim Himalaya; at Darjeeling"). **Type** ("*Griffith 5367*") – K.

Terrestrial herb with clustering ovoid pseudobulbs 1–1.5 cm tall bearing 2 radical subsessile, opposite, erect leaves. Leaf blade elliptic, acuminate, 7–10 cm long, 3–5 cm wide. Inflorescence 20–30 cm tall with 10–20 lax flowers. Floral bracts deflexed, triangular, acuminate, 5–10(15) mm long. Pedicel and ovary 6–10 mm long. Flowers light yellow. Sepals and petals 4–6 mm long, obtuse; sepals lanceolate to narrowly ovate, 3–5-veined; petals linear, 1-veined. Lip more or less flat, broadly obovate to reniform flabellate, contracted at base, truncate or emarginate, 4–8 mm long, 5–6 mm wide, irregularly crenulate along margin, with 2 low obscure basal calli. Column curved, 2–3 mm tall, base thickened, with narrow rounded wings at apex. Fruit cylindric, 1–1.5 cm long, 3–5 mm in diam. **Fig. 46**, c-e.

Ecology. Primary evergreen broad-leaved humid mountain forests. 1500 m. Fl. June – August. Very rare (DD).

Distribution. Vietnam (Lao Cai). India, Bhutan, Nepal, Myanmar, Laos, Cambodia.

Studied specimens. Lao Cai, Hoang Lien Son, *Takhtajan 38* (LE).

Note. The single specimen cited here was collected without flowers and its identification remains tentative.

Adequate illustrations of this rare species are presented in the following editions: Hook. f., 1890, Icon. Pl. tab. 2008; King et Pantl., 1898, Ann. Bot. Gard. (Calcutta) 8, tab. 31.

18. *L. odorata* (Willd.) Lindl.,

1830, Gen. Sp. Orch. Pl.: 26; Comber, 1990, Orch. Java: 130, fig.; Pearce et Cribb, 2002, Orch. Bhutan: 201; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 273; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 218; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 311, fig. 258–260. – *Malaxis odorata* Willd., 1805, Sp. Pl. 4: 91. – *Empusa paradoxa* Lindl., 1824, Bot. Reg. 10, tab. 825. – *Liparis paradoxa* (Lindl.) Rchb. f., 1861, Walp. Ann. 6: 218; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 182; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 38, fig. 22; id., 1992, Opera Bot., 114: 136; Aver., 1994, Ident. Guide Vietnam. Orch.: 138; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 907, fig. 11375. – *L. odorata* var. *longiscapa* Rolfe ex Downie, 1925, Kew Bull., 1925: 370. – *L. longiscapa* (Rolfe ex Downie) Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 182. – *L. tonkinensis* id., 1932, Bull. Soc. Bot. France 79: 167; id., 1932, Fl. Gen. Indo-Chine 6, 2: 189.

Described from S. India. **Lectotype** – Rheede ic. "*Katou Ponniam – maravara*" (1693, Hort. Malab.: 55, 12, tab. 28).

Terrestrial herb with ovoid conical pseudobulbs 1–2.5 cm tall bearing 2–3 leaves with sheath-like petiole. Leaf blade broadly lanceolate to ovate, acuminate, 5–15 cm long, 2.5–6 cm wide. Inflorescence 15–40 cm, much exceeding leaves, several to many-flowered. Floral bracts often spreading horizontally, narrowly triangular, 3–5(6) mm long. Pedicel and ovary 6–8 mm long. Flowers greenish, with yellow or brown tint. Sepals and petals 6–10 mm long, reflexed, with revolute margin, obtuse. Median sepal lanceolate, lateral sepals narrowly ovate, oblique, slightly shorter, indistinctly 3-veined. Petals linear to lanceolate, less than 1 mm wide, 1(3)-veined. Lip oblong obovate, truncate or shallowly emarginate, 4–6 mm long and wide, with 2 prominent triangular calli near base, apical margin

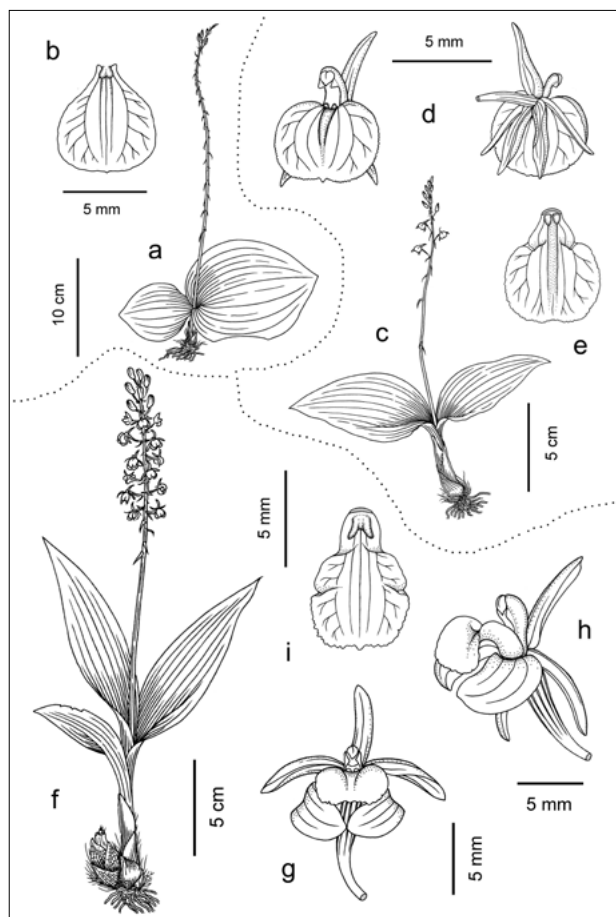


Fig. 46. *Liparis oppositifolia*: a – flowering plant, b – flattened lip (Thorel 2201, type); *L. deflexa*: c – flowering plant, d – flower, frontal view and view from behind, e – flattened lip (King & Pantling 336, NE. India); *L. odorata*: f – flowering plant, g, h – flower, frontal and side views, i – flattened lip (Petelot s.n., a. 1928).

finely denticulate; calli more or less fused at base, about 0.8 mm tall. Column slightly arcuate, 4–5 mm long, with insignificant wings widened toward column apex. Capsule obovoid, 1–1.5 cm long. **Fig. 46, f-i.**

Ecology. Primary evergreen broad-leaved humid mountain forests. 1400–1600 m. Fl. May – July. Rare (DD).

Distribution. Vietnam (Lao Cai). India, Bhutan, Nepal, China, Taiwan, Myanmar, Thailand, Laos, Japan, Pacific islands (Guam).

Studied specimens. Lao Cai, Chapa, *Petelot* 5167 (P), *Petelot* s.n., a. 1928 (P); Lao Cai, Ta Phing près de Chapa, *Poillane* 12832 (P).

Note. The species is close to *L. nervosa*, with which it can form natural hybrids.

19. *L. petraea* Aver. et Averyanova,
2006, Komarovia 4: 23.

Described from N. Vietnam (“Bac Kan Prov., Na Ri Distr., Liem Thuy Municipality, village Lung Vai, around point 21°57'18"N, 106°06'12"E,

at elevation 500–700 m a.s.l.”). **Type** (“28 May 2004, L. Averyanov, N.T. Hiep, P.V. The et al., HAL 4979”) – LE (holotype), HN (isotypes).

Terrestrial and lithophytic herb with cylindric pseudobulbs 2.5–4(5) cm tall, 4–5 mm in diam., bearing 2–3 dull gray-green leaves. Leaf blade ovate, 4–6 cm long, 1.5–2.5 cm wide, shortly acuminate. Inflorescence 10–15 cm tall with 4–10 lax flowers, stalk and rachis indistinctly angular in section, dark violet. Floral bracts triangular, acute, perpendicular to the rachis, 1–1.5 mm long. Pedicel and ovary white with violet tint, 7–8 mm long. Sepals and petals light yellow-green with violet tint, 6 mm long, obtuse; sepals narrowly ovate, 3-veined; petals narrowly lanceolate, 1-veined. Lip dark purple-violet, strongly bent at middle, obovate, 4 mm long and wide; epichile almost flat, round or slightly emarginate at apex, finely denticulate along margin, at base with 2 prominent lamellate calli spreading forward into cylindrical finger-like projections. Column white, slender, hardly curved, 2.5 mm long, with small insignificant wings at apex. **Fig. 47, b, c; 48, a-f.**

Ecology. Primary humid evergreen broad-leaved and coniferous forests on rocky limestone, commonly on steep rocky slopes near mountain tops. 500–800 m. Fl. May – July. Rare (VU).

Distribution. Vietnam (Bac Kan, Cao Bang).

Studied specimens. Cao Bang, Trung Khanh, *HAL* 5683 (HN, LE).

Note. The species has certain relation to *L. acuminata*, *L. nervosa* and *L. odorata*, but can be easily distinguished by its small plant size, dull silvery grey-green leaves (with three prominent veins), distinct short cylindrical projections of the callus at the base of the lip and flat deep violet epichile, finely denticulate along the margin. Most probably, this species is calcium dependent endemic of very strict area in limestone regions of eastern part of South-Chinese floristic province.

***L. sect. 2. Cestichis* Thouars ex Lindl.,**

1830, Gen. Sp. Orch. Pl.: 29. – *Cestichis* Thouars ex Pfitz. 1887, Entwurf. Naturl. Anord. Orch.: 56; Thouars, 1822, Hist. Orch. Iles Austr. Afr. tab. 90, stat. ambig. – *Liparis* grex *Coriifoliae* Ridl., 1886, Journ. Linn. Soc. London (Bot.) 22: 257, 282. – *L. sect. Coriifoliae* (Ridl.) Hook. f., 1890, Fl. Br. Ind. 5: 699.

Lectotype: *L. cespitosa* (Lam.) Lindl. (*Epidendrum cespitosum* Lam.).

Epiphytic and lithophytic herbs. Pseudobulbs densely clustered, ovate to conical, rarely cylindrical, usually naked in apical part. Leaves



Fig. 47. *Liparis tschangii*: a (Averyanov et al., LX-VN 2289a); *L. petraea*: b, c (HAL 4979, type); *L. viridiflora*: d (DKH 7530), e (HLF 5561); *L. elliptica*: f (Nuraliev 238), g (CPC 4178a); *L. distans*: h (HLF 740), i (HAL 8435).

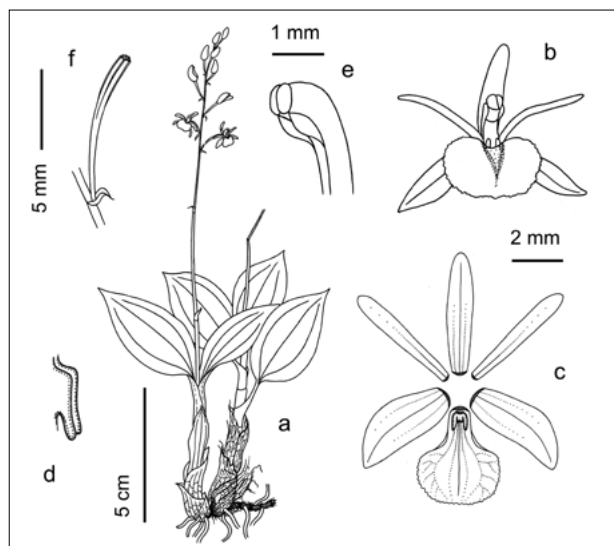


Fig. 48. *Liparis petraea*: a – flowering plant, b – flower, frontal view, c – flattened sepals, petals and lip, d – calli at lip base, e – column, side view, f – pedicel and ovary (HAL 4979, type).

arising from pseudobulb apex, conduplicate, often more or less coriaceous, sessile or subsessile, with articulation at base. Inflorescence erect, arcuate or pendulous; scape terete or flattened, longitudinally winged; rachis as long as scape, or nearly so. Floral bracts scarious or thin, herbaceous, all faced, flowers lax to subdense, spirally arranged; flowers opening more or less simultaneously; sepals and petals commonly with revolute margin.

100–140 (30) species. Tropical areas of the Old World with highest diversity in SE. Asia.

20. *L. viridiflora* (Blume) Lindl.,

1830, Gen. Sp. Orch. Pl.: 31; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 82, fig. 55; id., 1992, Opera Bot., 114: 144; Comber, 1990, Orch. Java: 136, fig.; id., 2001, Orch. Sumatra: 166, fig.; Seidenf., Wood, 1992, Orch. Malay. Sing.: 235, fig. 99a, b; Aver., 1994, Ident. Guide Vietnam. Orch.: 147; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 904, fig. 11363; Su Horng-Jye, 2000, Fl. Taiwan 5: 950; Pearce et Cribb, 2002, Orch. Bhutan: 211; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 43; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 273; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 296; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 224; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 318, fig. 264–266. – *Malaxis viridiflora* Blume, 1825, Bijdr. 8: 392. – *Liparis longipes* Lindl., 1830, Gen. Sp. Orch. Pl.: 30; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 177. – *L. dendrochilum* Rchb. f., 1872, Flora 55: 278. – *L. simondii* Gagnep., 1950, Bull. Mus. Hist. Nat. Hist. ser 2, 21: 738.

Described from Java (“in sylvis vallium Solassie provinciae Tjanjor”). **Type** (“Blume s.n., Herb. no. 90316728”) – L.

Epiphytic and lithophytic herb. Pseudobulbs usually straight, cylindric, (3)6–12(16) cm tall, 3–6(8) mm in diam., with 2 shortly petiolate, oblanceolate, acute to shortly apiculate leaves, 8–20 cm long. Inflorescence straight to slightly curved, 12–25 cm long; scape slightly compressed, very narrowly winged, with 1–2 sterile bracts near base; rachis 6–15 cm, many dense-flowered. Floral bracts narrowly lanceolate, 3–7 mm long, membranous, as long as pedicel and ovary. Flowers white, light greenish to pale yellowish-green. Sepals and petals obtuse, 2–3 mm long; sepals broadly lanceolate; petals linear. Lip oblong ovate, acute or indistinctly mucronate, fleshy, strongly recurved at middle, 2–3 mm long, 1.5–1.8 mm wide, ecallose. Column slightly arcuate, 1.5–2 mm tall, shortly winged at apex. Capsule obovoid, 4–5 mm long on stalk 4–6 mm long. **Fig. 47**, d, e.

Ecology. Primary and rich secondary forests, as well as secondary shrubs on any kind of rocks, but more common on rocky limestone. 150–1800 m. Fl. October – January (April). Common (LR).

Distribution. Vietnam (Bac Kan, Cao Bang, Dak Lak, Dak Nong, Dien Bien, Dong Nai, Ha Giang, Hoa Binh, Kon Tum, Lai Chau, Lam Dong, Ninh Thuan, Quang Binh, Quang Nam, Son La, Thai Nguyen, Thanh Hoa). Tropical Asia, islands of western Pacific.

Studied specimens. Bac Kan, Ba Be, *HLF* 517 (HN), *HLF* 542 (HN, LE), *HLF* 586 (HN, LE), *HLF* 643 (HN, LE); Bac Kan, Cho Don, *HLF* 859 (HN, LE); Bac Kan, Na Ri, *HAL* 4936 (HN), *HAL* 5426 (HN), *DKH* 7530 (HN, LE, MO), *DKH* 7635 (HN, LE, MO); Cao Bang, Ba Be, *HAL* 93 (HN, MO); Cao Bang, Bao Lac, *CBL* 448 (HN, LE, MO); Cao Bang, Ha Lang, *CBL* 597 (HN, LE, MO), *CBL* 720 (HN, LE, MO); Cao Bang, Thach An, *CBL* 921 (HN, LE, MO); Cao Bang, Tra Linh, *VH* 2462 (HN, LE); Cao Bang, Trung Khanh, *HAL* 5510 (HN, LE); Dak Lak, Krong Bong, *HLF* 5464 (HN, LE); Dak Nong, Dak Glong, *HLF* 5561 (HN, LE); Dien Bien, Dien Bien, *CPC* 2317 (CPC Herbarium), *CPC* 2405 (CPC Herbarium); Dien Bien, Muong Cha, *CPC* 2092 (CPC Herbarium); Dien Bien, Tua Chua, *CPC* 955 (CPC Herbarium), *CPC* 1030 (CPC Herbarium); Dong Nai, Bien Hoa, *Pierre* 1951 (P); Dong Nai, Bienhoa: Giarai, Mt Nui Chuo Chuan, *Chevalier* 30349 (P); Ha Giang, Dong Van, *HAL* 8582 (HN), *NTH* 3520 (HN, LE); Ha Giang, Meo Vac, *HAL* 8466 (HN); Ha Giang, Quan Ba, *HAL* 8326

(HN), *HAL* 8357 (HN, LE); Hoa Binh, Da Bac, *HAL* 302 (HN, MO); Hoa Binh, Lac Son, *CPC* 1481 (CPC Herbarium); Hoa Binh, Nau Chau, *DKH* 7720 (HN, LE, MO); Hoa Binh, Mai Chau, *Averyanov et al., s.n., a.* 1995 (LE); Kon Tum, Dak Gley, *VH* 1669 (HN, LE, MO); Lai Chau, Tam Duong, *HAL* 10271 (HN, LE, MO); Lam Dong, Dalat, *Kerr* 3323 (C), *Averyanov, LX-VN s.n. a.* 1983 (LE - photo), *Averyanov et al., LX-VN 0/629, LV-VN 0/208* (LE); Lam Dong, Fyan, *Tixier* 12 57 (P); Ninh Thuan, Ca Na, *Poillane* 8905 (P); Ninh Thuan, Ninh Hai, *HLF* 4263 (HN, LE, MO), *HLF* 4435 (HN, LE, MO), *HLF* 4710 (HN, LE, MO); Quang Binh, Bo Trach, *HAL* 6140 (HN), *S.K.Wu et al., WP* 946 (HN, LE); Quang Binh, Minh Hoa, *CPC* 5093 (CPC Herbarium); Quang Nam, Ngoc Linh mt., *VH* 891 (HN, LE, P); Son La, Moc Chau, *NTH* 2975 (HN, LE, MO), *HAL* 9322 (HN, LE, MO), *HAL* 9405 (HN, LE, MO); Son La, Yen Chau, *DKH* 7173 (HN, LE, MO); Thai Nguyen, Vo Nhai, *NTH* 3877 (HN, LE); Thanh Hoa, Ba Thuoc, *HAL* 4274 (HN), *HAL* 4337 (HN); Cochinchina, Pot Gal, *Tixier* 16 62 (P); Cochinchine, “Tong Man Mois”, *Regnier* 311 (P); Cochinchine, *Regnier s.n.* (P); Cochinchine, Song Lu ad arbor, *Pierre s.n., a.* 1877 (P); Cochinchine, Song Lu, *Pierre s.n., a.* 1877 (P).

Note. One of the most common orchid species, particularly in northern Vietnam.

21. *L. elliptica* Wight,

1851, *Icon. Pl. India Orient.* 5, tab. 1735; Seidenf., 1976, *Dansk Bot. Ark.*, 31, 1: 79, fig. 54; id., 1992, *Opera Bot.*, 114: 143; Comber, 1990, *Orch. Java*: 136, fig.; Aver., 1994, *Ident. Guide Vietnam. Orch.*: 147; P.H. Ho, 2000, *Ill. Fl. Vietnam* 3: 904, fig. 11362; Su Horng-Jye, 2000, *Fl. Taiwan* 5: 943; Pearce et Cribb, 2002, *Orch. Bhutan*: 207; Aver. et Averyanova, 2003, *Updated Checklist Orch. Viet.*: 42; Schuiteman et al., 2008, *Nord. Journ. Bot.*, 26: 296; Chen Sing-chi, Ormerod, Wood, 2009, *Fl. China*, 25: 226.

Described from S. India (“Coonoor, Neilgherries”). **Type** (“*Wight s.n.*”) – K.

Epiphytic and rarely lithophytic herbs. Pseudobulbs broadly ellipsoid to almost orbicular, distinctly compressed, 1–2 cm tall, with 2 shortly petiolate, narrowly obovate, acute leaves 4–10(12) cm long, 1.2–2.5 cm wide. Inflorescence arching or pendulous, 6–12 cm long; peduncle terete or slightly compressed, ebracteate or with few sterile bracts; rachis 3–8 cm long, with few to many subax flowers. Floral bracts cuneate, 1.5–3 mm long. Pedicel and ovary 4–4.5 mm long. Flowers pale yellowish green. Sepals and petals obtuse, 3.5–4.5 mm long;

sepals oblong lanceolate; petals filiform. Lip ovate, 4–5 mm long, ecallose, slightly undulate along margin, with bent down long attenuate apex. Column 1.5–2 mm tall, wingless. Capsule narrowly obovoid, 5–6 mm long on stalk about 2 mm long. **Fig. 47**, f, g.

Ecology. Primary and rich secondary evergreen broad-leaved, mixed and coniferous humid forests on any kind of rocks, commonly as epiphyte on shady places. 300–2000 m. Fl. October – January. Not common (VU).

Distribution. Vietnam (Dak Lak, Dak Nong, Ha Giang, Ha Noi, Ha Tinh, Kon Tum, Lai Chau, Lao Cai, Quang Binh, Quang Tri, Vinh Phuc). Sri Lanka, India, Bhutan, Nepal, S. China, Taiwan, Myanmar, Thailand, Indonesia, Philippines, New Caledonia, islands of western Pacific.

Studied specimens. Dak Lak, Chu Yang Sinh mt., *V.N. Long s.n., a.* 1994 (LE); Dak Nong, Dak Glong, *HLF* 5668 (HN); Ha Giang, Hoang Su Phi, *HAL* 6623 (HN, MO), *HAL* 6696 (HN, MO); Ha Tinh, Huong Son, *HAL* 5092 (HN); Kon Tum, Kon Plong, *VH* 5641 (HN, MO); Kon Tum, Ngoc Linh mt., *VH* 119 (HN, MO), *VH* 1102 (HN, LE); Kon Tum, Sa Thay, *P.K. Loc P* 7952 (LE); Lai Chau, Tam Duong, *HAL* 10180 (HN, MO); Lao Cai, Sa Pa, *Nuraliev* 238, a. 2010 (LE); Quang Binh, Bo Trach, *HAL* 6131 (HN, MO), *HAL* 6304 (HN, MO); Quang Binh, Minh Hoa, *CPC* 4178a (LE); Quang Tri, Huong Hoa, *HLF* 6531 (HN); Vinh Phuc, Tamdao, *Averyanov et al., LX-VN s.n., a.* 1988 (LE).

Note. The species is easily recognizable by its compressed, lens-like pseudobulbs and long attenuate, bent down lip apex.

22. *L. distans* C.B. Clarke,

1889, *Journ. Linn. Soc. London (Bot.)* 25: 71; Gagnep., 1932, *Fl. Gen. Indo-Chine* 6, 2: 184; Seidenf., 1976, *Dansk Bot. Ark.*, 31, 1: 76, fig. 50; id., 1992, *Opera Bot.*, 114: 143, pl. 10a; Aver., 1994, *Ident. Guide Vietnam. Orch.*: 144; P.H. Ho, 2000, *Ill. Fl. Vietnam* 3: 903, fig. 903; Pearce et Cribb, 2002, *Orch. Bhutan*: 212; Aver. et Averyanova, 2003, *Updated Checklist Orch. Viet.*: 42; Newman et al., 2007, *Checkl. Vasc. Pl. Lao*: 272; Schuiteman et al., 2008, *Nord. Journ. Bot.*, 26: 296; Chen Sing-chi, Ormerod, Wood, 2009, *Fl. China*, 25: 225.

Described from NE. India (“Kohima”). **Syn-types** (“*Clarke, 41071, 41105, 41574*”) – K.

Lithophytic herb. Pseudobulb narrowly ovoid, 2–6 cm long, with 2 narrowly oblanceolate, shortly petiolate, acute leaves 15–30 cm long, 1–2(2.5) cm wide. Inflorescence arcuate pendulous, 15–25(30) cm long with several distant flowers; peduncle narrowly winged, with 2–3 sterile cuneate

bracts. Floral bracts narrowly triangular, 0.6–1.2 cm long. Pedicel and ovary 1.8–2.2 cm long. Flowers olive-green to dull yellow. Sepals and petals 1–1.6 cm long; sepals narrowly lanceolate to linear; petals linear filiform. Lip ovate, obovate, or elliptic, 1–1.4 cm across, finely irregularly denticulate, rounded or shallowly obtuse at apex, with 2-lobed callus at base. Column arcuate, 5–6 mm tall, narrowly winged at apex. Capsule ellipsoid 1.2–1.6 cm long. **Fig. 47, h, i.**

Ecology. Primary and rich secondary evergreen, humid broad-leaved, mixed and coniferous forest predominantly on rocky limestone, commonly on shady cliffs near top of ridges. 250–1500(2000) m. Fl. September – December. Not rare (VU).

Distribution. Vietnam (Bac Kan, Cao Bang, Ha Giang, Hai Phong, Hanoi, Hoa Binh, Lai Chau, Lao Cai, Ninh Binh, Quang Binh, Son La, Thanh Hoa, Tuyen Quang, Vinh Phuc). NE. India, S. China, Taiwan, Thailand, Laos, Philippines.

Studied specimens. Bac Kan, Ba Be, *HLF 543* (HN, LE); Bac Kan, Cho Don, *HLF 740* (HN, LE); Bac Kan, Na Ri, *DKH 7598* (HN, LE, MO), *NTH 3713* (HN, LE); Bac Kan, *DKH s.n.*, a. 2002 (LE – photo); Cao Bang, Bao Lac, *CBL 323* (HN, MO), *CBL 324* (HN, LE, MO, P); Cao Bang, Ha Lang, *CBL 718* (HN, LE, MO, P); Cao Bang, Nguyen Binh, *CBL 558* (HN, MO, P), *CBL 572* (HN, MO); Cao Bang, Thach An, *CBL 849/4* (HN, LE, MO), *CBL 919* (HN, LE, MO, P); Cao Bang, Tra Linh, *VH 2480* (HN, LE); Cao Bang, Trung Khanh, *HAL 5560* (HN, LE); Ha Giang, Bac Me, *HAL 6514* (HN); Ha Giang, Dong Van, *HAL 8606* (HN); Ha Giang, Quan Ba, *DKH 5038* (HN, LE, MO), *DKH 6082* (HN, LE, MO), *HAL 8365* (HN, MO); Ha Giang, Vi Xuyen, *DKH 6419* (HN, MO); Ha Giang, Yen Minh, *HAL 8435* (HN), *NTH 3465* (HN, LE); Ha Giang, *HAL 8435* (HN); Hai Phong, Cat Ba, *Averyanov et al., LX-VN 3662* (HN); Hanoi, Bavi, *Petelot 6576* (K); Hanoi, Voxa, *Bon 3303* (P); Hoa Binh, Da Bac, *HAL 251* (HN, MO); Hoa Binh, Mai Chau, *VH 2436* (HN, MO), *HAL 689* (HN), *DKH 7756* (HN, LE, MO), *DKH 7967* (HN, LE, MO), *DKH 8051* (HN, LE, MO); Hoa Binh, Tan Lac, *CPC 568* (CPC Herbarium), *CPC 687* (CPC Herbarium, LE); Lai Chau, Sin Ho, *HAL 9876* (HN, LE, MO); Lao Cai, Than Uyen, *NTH 2685* (HN, LE); Lao Cai, Van Ban, *HAL 2320* (HN); Ninh Binh, Cuc Phuong, *Nga 1256* (Cuc Phuong national park Herbarium, HN, LE), *Lac Thinh 1168* (HN, LE), *Song 1203* (HN), *Lac Thinh 1168* (Cuc Phuong national park Herbarium), *N.M. Cuong 774* (Cuc Phuong national park Herbarium), *HAL 1669* (HN), *HAL 2864* (HN), *Soejarto 11021* (Cuc Phuong national park Herbarium, ILLS), *Soe-*

jarto 11203 (Cuc Phuong national park Herbarium, ILLS), *Soejarto 11327* (Cuc Phuong national park Herbarium, ILLS); Quang Binh, Minh Hoa, *HAL 5841* (HN), *HAL 5948* (HN), *CPC 4287* (CPC Herbarium); Son La, Moc Chau, *HAL 9393* (HN, LE, MO), *DKH 5735* (HN, LE, MO), *DKH 7383* (HN, LE, MO); Son La, Yen Chau, *HAL 9551* (HN, LE, MO), *DKH 7105* (HN, MO); Thanh Hoa, Lam Son, *Tiep et al., NOT 2624* (LE, UHN); Tuyen Quang, Na Hang, *HLF 672* (HN, LE), *HLF 673* (HN, LE), *HLF 678* (HN, LE); Vinh Phuc, Tamdao, *Averyanov et al., LX-VN 2381a* (LE, C – photo).

Note. One of the most common orchid species in limestone regions of northern Vietnam. Grows commonly as a lithophyte on vertical shady mossy limestone cliffs.

23. *L. petelotii* Gagnep.,

1932, Bull. Soc. Bot. France 79: 166; id., 1932, Fl. Gen. Indo-Chine 6, 2: 186; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 76, fig. 49; id., 1992, Opera Bot., 114: 143, fig. 86; Aver., 1994, Ident. Guide Vietnam. Orch.: 145; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 903, fig. 11357; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 42.

Described from NW. Vietnam (“Tonkin: Cha-pa”). **Type** (“*Petelot 5140*”) – P.

Species allied to *L. distans*, from which differs in smaller dimensions of flower. Vegetative parts of both species have no distinct differences. Floral bracts cuneate, acuminate, 0.5–1 cm long; pedicel and ovary 1–1.8 cm long. Flowers green to olive-green, later turning yellowish to yellowish-orange. Sepals and petals 6–10 cm long, acute; sepals narrowly-lanceolate; petals linear filiform. Lip ovate to broadly elliptic, bent near base, usually acute and finely irregularly denticulate along margin, 8–10 mm long, 5.5–8 mm wide. Column arcuate, 4–5 mm tall, with insignificant wings at apex. **Fig. 49, a, b.**

Ecology. Primary and rich secondary evergreen, humid broad-leaved forest on rocky limestone, commonly on shady cliffs near top of ridges. 250–1600 m. Fl. September – December. Not rare (VU).

Distribution. Vietnam (Cao Bang, Hanoi, Lao Cai, Quang Binh, Son La, Thanh Hoa, Vinh Phuc). Endemic.

Studied specimens. Cao Bang, Trung Khanh, *HAL 5528* (HN); Hanoi, Vo Xa, *Bon 2937* (P); Hai Phong, Cat Ba, *Averyanov et al., LX-VN 3662* (HN, LE); Ninh Binh, Cuc Phuong, *Gruschvitski 55* (LE), *Averyanov et al., LX-VN 1800* (HN, LE), *N.T. Hiep, NTH 3047* (Cuc Phuong national park Herbarium), *N.T. Hiep, NTH 3048* (Cuc Phuong national park Herbarium), *N.T. Hiep, NTH 3091*

(Cuc Phuong national park Herbarium), *N.M. Cuong*, 1709 (Cuc Phuong national park Herbarium, P), *N.M. Cuong*, 1301 (Cuc Phuong national park Herbarium, ILLS, P), *Soejarto* 11293 (Cuc Phuong national park Herbarium, ILLS); Quang Binh, Bo Trach, *HAL* 6075 (HN); Son La, Moc Chau, *DKH* 7385 (HN, LE, MO); Thanh Hoa, Thach Thanh, *HAL* 2883 (HN); Vinh Phuc, Tam Dao, *Averyanov et al.*, *LX-VN s.n.* (LE).

Note. It is rather questionable species that looks very close to *L. distans*, from which it differs obviously only in smaller floral parts.

24. *L. stricklandiana* Rehb. f.,

1880, Gard. Chron. 1: 232; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 69, fig. 43; id., 1992, Opera Bot., 114: 140, fig. 85; Aver., 1994, Ident. Guide Vietnam. Orch.: 145; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 903, fig. 11359; Pearce et Cribb, 2002, Orch. Bhutan: 210; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 43; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 225; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 314, fig. 261–263. – *L. malleiformis* W.W. Sm., 1921, Notes Roy. Bot. Gard. Edinburgh 13: 212; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 185.

Described from NE. India? (“may be of Assamese origin”). **Type** (“cult. *C.W. Strickland s.n.*”) – W.

Epiphytic and lithophytic herbs. Pseudobulbs narrowly ovate, 2–4 cm tall with 2(3) broadly oblanceolate, acute leaves 15–35 (40) cm long, 1.5–3(3.5) cm wide. Inflorescence erect or pendulous, 15–25(30) cm long. Scape compressed, narrowly winged, with 1–2 cuneate sterile bracts. Rachis 8–22 cm, densely many-flowered. Floral bracts narrowly triangular, 6–8(10) mm long. Pedicel and ovary 7–10 mm. Flowers light green to yellowish-green. Sepals and petals obtuse, 5–7 mm long; sepals narrowly ovate; petals filiform, slightly widened to apex. Lip flabellate obtriangular, strongly bent at middle, shortly mucronate, 4–5 mm long, 5–6 mm wide, with flat, entire, rectangular callus at base, irregularly erose along margin. Column slightly curved, 3–4 mm tall, slender, windless. Capsule broadly obovoid to almost globular, 7–8 mm long. **Fig. 49**, c, d.

Ecology. Primary and rich secondary evergreen broad-leaved, mixed and coniferous humid forests on any kind of rocks, usually on shady cliffs and steep rocky slopes near mountain tops or along stream valleys. 200–1900 m. Fl. October – April. Not rare (VU).

Distribution. Vietnam (Bac Kan, Cao Bang, Ha Giang, Ha Tinh, Hanoi, Hoa Binh, Kon Tum, Lai Chau, Lao Cai, Nghe An, Quang Binh, Son La, Thanh Hoa, Thua Thien – Hue, Vinh Phuc). NE. India, Bhutan, S. China, Hainan.

Studied specimens. Bac Kan, Cho Don, *HAL* 4869 (HN, LE, MO, *HLF* 756 (HN), *CPC* 1173 (CPC Herbarium, LE); Cao Bang, Bao Lac, *CBL* 323 (HN, LE, MO, P), *CBL* 398 (HN, LE, MO, P); Cao Bang, Trung Khanh, *HAL* 5535 (HN, LE); Ha Giang, Bac Me, *HAL* 6539 (HN, LE, MO); Ha Giang, Hoang Su Phi, *NTH* 2267 (HN, LE); Ha Giang, Meo Vac, *HAL* 8507 (HN); Ha Giang, Quan Ba, *Averyanov et al.*, *HG* 82 (HN, LE), *T.V.Thao* 17 (HN), *HAL* 8335 (HN), *NTH* 5946 (HN, LE), *DKH* 4892 (HN, MO), *DKH* 6227 (HN, MO), *DKH* 6398 (HN, MO), *DKH* 5112 (HN, MO); Ha Giang, Yen Minh, *CBL* 2095 (HN, LE, MO); Ha Tinh, Huong Son, *HAL* 1234 (HN), *N.T. Hiep* 10, a. 1992 (MO); Hanoi, Bavi, *Doan* 3432 (HN, LE); Hoa Binh, Mai Chau, *HAL* 734 (HN, MO), *HAL* 913 (HN, MO), *DKH* 8061 (HN, LE, MO); Hoa Binh, Tan Lac, *CPC* 702 (CPC Herbarium, LE), *CPC* 715 (CPC Herbarium), *CPC* 846 (CPC Herbarium); Hoa Binh, Tung Khe, *VH* 2442 (HN, LE, MO, P); Lai Chau, Tam Duong, *HAL* 10170 (HN, LE); Lao Cai, Chapa, Simond drawing 154 (P), *Averyanov et al.*, *HAL* s.n. (LE – photo); Lao Cai, Laokai, *Poillane* 18798 (P); Lao Cai, Van Ban, *HAL* 2319 (HN, LE), *HAL* 2798 (HN, LE), *DKH* 7041 (HN, MO); Lao Cai, Hoang Lien Son mt., *Nuraliev* 239 (LE); Nghe An, Tuong Duong, *HLF* 6724 (HN, MO); Quang Binh, Minh Hoa, *HAL* 5920 (HN, MO); Thanh Hoa, Ba Thuoc, *HAL* 4240 (HN); Thua Thien – Hue, A Luoi, *HAL* 7211 (HN); Thua Thien – Hue, Huong Thuy, *HAL* 8105 (HN); Thua Thien – Hue, Phu Loc, *HLF* 1003 (HN), *HLF* 1388 (HN), *HLF* 2706 (HN); Vinh Phuc, Tam Dao, *Averyanov et al.*, *LX-VN* 2326 (HN, LE), *Averyanov et al.*, *LX-VN s.n.*, a. 1985 (LE), *Averyanov et al.*, *LX-VN* 0/46 (LE), 0/60 (LE), *Doan* 4539 (HN).

Note. Easily recognizable species for its characteristic obtriangular-flabellate, strongly bent lip.

25. *L. latilabris* Rolfe,

1903, Journ. Linn. Soc. London (Bot.) 36: 6; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 181; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 76, fig. 51; id., 1992, Opera Bot., 114: 143, fig. 87; Aver., 1994, Ident. Guide Vietnam. Orch.: 145; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 901, fig. 11351; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 42; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 225.

Described from S. China ("Yunnan: Meng-tze"). **Type** ("*Hancock 255*") – K.

Epiphytic and lithophytic herb. Pseudobulbs ovoid to conical, 3–5 cm long, 2-leaved. Leaves oblanceolate, acute 10–30(35) cm long, 1.5–3 cm wide. Inflorescence slender, arching to pendulous, laxly many-flowered. Scape 8–15 cm long, narrowly winged, with 1–3 cuneate sterile bracts; rachis 5–15 cm long. Floral bracts cuneate, acuminate, 4–6 mm long. Pedicel and ovary 4–8 mm long. Flowers green to olive-green, later becoming yellowish to dull yellow-orange. Sepals and petals acute, 6–10 mm long; sepals narrowly lanceolate, inconspicuously veined; petals filiform. Lip reniform to almost orbicular, bent near the narrowed base, 6–8 mm across, finely irregularly crenulate along margin, with 2 short conical calli at base and thickened median vein. Column slightly curved, 2–2.5 mm tall, nearly wingless. Capsule broadly ellipsoid, 6–8 mm long. **Fig. 49**, a, f.

Ecology. Primary and rich secondary evergreen broad-leaved, mixed and coniferous humid forests predominantly on rocky limestone, usually on shady cliffs and steep rocky slopes near mountain tops. 300–1500 m. Fl. October – April. Not rare (VU).

Distribution. Vietnam (Bac Kan, Cao Bang, Dien Bien, Ha Giang, Hoa Binh, Lao Cai, Lai Chau, Ninh Binh, Quang Binh, Thai Nguyen, Thanh Hoa, Vinh Phuc). S. China.

Studied specimens. Bac Kan, Cho Don, *HAL 4721* (HN, LE), *CPC 1169* (CPC Herbarium, LE), *CPC 1267* (CPC Herbarium, LE); Bac Kan, Na Ri, *HAL 5406* (HN), *NTH 3727* (HN, LE); Cao Bang, Pho Bang, *N.H. Hien 73* (HN, LE); Dien Bien, Tua Chua, *CPC 961* (CPC Herbarium); Ha Giang, Bac Me, *HAL 6481* (HN, LE), *HAL 6584* (HN, LE); Ha Giang, Quang Ba, *DKH 4892* (HN, LE, MO), *DKH 5010* (HN, LE, MO), *DKH 5112* (HN, LE, MO), *DKH 6252* (HN, LE, MO); Ha Giang, Yen Minh, *HAL 8433* (HN); Hoa Binh, Mai Chau, *VH 2437* (HN, LE, P), *DKH 7723* (HN, LE), *DKH 7957* (HN, LE), *DKH 8119* (HN, LE); Hoa Binh, Pa Co *P.K. Loc*, a. 2003 (LE – photo); Lao Cai, Sapa, *Petelot 5156* (P), *Chevalier 29443* (P), *Doi 2914* (HN, LE), *Averyanov et al.*, *HAL 8309a* (LE – photo), *Werff 14432* (LE, MO); Lao Cai, Hoang Lien Son, *Khoi et Dao 233* (HN, LE), *Takhtajan 34* (LE); Lai Chau, Sin Ho, *HAL 8792* (HN, LE, MO); Ninh Binh, Cuc Phuong, *Hoi 277* (Cuc Phuong national park Herbarium), *Averyanov et al.*, *LX-VN 1800* (HN, LE); Quang Binh, Bo Trach, *HAL 6070* (HN, LE), *HAL 6161* (HN, LE); Quang Binh, Minh Hoa, *HAL 12498* (HN); Quang Binh, Phong Nha – Ke Bang, *HAL 6161* (HN); Thai Nguyen, Vo Nhai, *NTH 3800*

(HN, LE); Thanh Hoa, Ba Thuoc, *HAL 3367* (HN); Vinh Phuc, Tamdao, *Averyanov et al.*, *LX-VN 1396* (HN, LE), *Averyanov et al.*, *LX-VN 2320* (HN, LE), *Averyanov et al.*, *LX-VN 2370* (HN, LE).

Note. The species has close relation to Himalayan *L. plantaginea*, from which differs in small floral bracts, narrow leaves, short ovaries and olive-green to dull orange flowers.

26. *L. plantaginea* Lindl.,

1830, Gen. Sp. Orch. Pl.: 29; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 75, fig. 48; id., 1992, Opera Bot., 114: 143; Aver., 1994, Ident. Guide Vietnam. Orch.: 144; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 903, fig. 11360; Pearce et Cribb, 2002, Orch. Bhutan: 208; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 42.

Described from E. India ("India Orientali").

Type ("drawing – *Wallich 633*") – K.

Epiphytic herb. Pseudobulbs narrowly ovoid to conical, 2.5–6 cm tall, 2-leaved. Leaves broadly oblanceolate to narrowly obovate, acute, 18–22 cm long, 3–4 cm wide. Inflorescence erect or arching, with several lax flowers. Scape compressed, 9–11 cm long, narrowly winged, with 1–2 cuneate sterile bracts or naked; rachis 8–14 cm long. Floral bracts narrowly ovate, concave, acuminate, 0.7–1.5 cm long. Pedicel and ovary 1–1.4 cm long. Flowers uniformly green. Sepals and petals acute, 8–10 mm long; sepals broadly lanceolate, indistinctly 3-veined; petals linear. Lip concave, almost orbicular, erose-dentate along margin, bent near the narrowed base, 8–10 mm across, with 2 hemispheric calli at base, without distinct ornamentation on disk. Column hardly curved, 2.5–3 mm tall, with 2 small, angular apical wings, thickened at base. Capsule ellipsoid, about 1 cm long. **Fig. 50**, a-e.

Ecology. Primary and rich secondary evergreen broad-leaved forests on acidic, silicate rocks, usually on shady cliffs and steep rocky slopes near mountain tops. 1000–1500(2000) m. Fl. June – September (October). Very rare (DD).

Distribution. Vietnam (Lao Cai, Vinh Phuc). NE. India, Bhutan, Thailand.

Studied specimens. Lao Cai, Chapa (*Hayata s.n.* (TI); Vinh Phuc, Tamdao, *Hayata s.n.* (TI).

Note. The species has close relation to Indochinese *L. latilabris*, from which differs in large, broad floral bracts, broad leaves and pure green flowers. Figure 50, a-e is copied from adequate pictures of *L. plantaginea* which were published by Hook. f. (1895, Ann. Bot. Gard., Calcutta 5, tab. 4) and King et Pantling (1898, Ann. Bot. Gard. Calcutta 8, tab. 36).

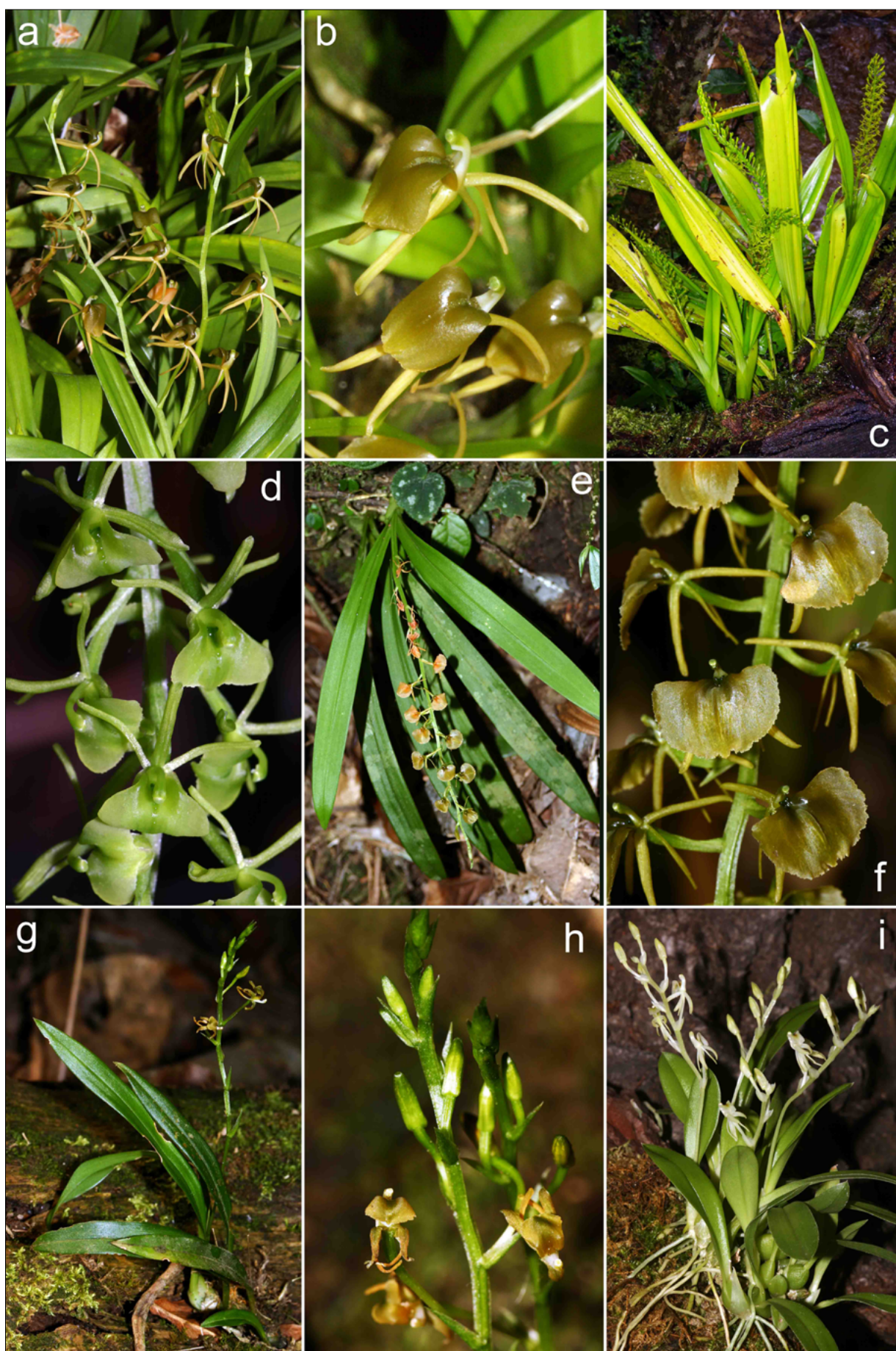


Fig. 49. *Liparis petelotii*: a, b (Averyanov et al., LX-VN s.n.); *L. stricklandiana*: c (Nuraliev 239), d (HAL 8335); *L. latilabris*: e (HAL 6161), f (HAL 8309a); *L. luteola*: g, h (HAL 6558); *L. sparsiflora*: i (CPC 2028a).

Identifications of both specimens collected in Vietnam are very doubtful and need confirmation.

27. *L. luteola* Lindl.,

1830, Gen. Sp. Orch. Pl.: 32; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 78, fig. 52; Pearce et Cribb, 2002, Orch. Bhutan: 212; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 42; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 226.

Described from Bangladesh ("Pandua").

Type ("*F. De Silva Wallich 1944*") – K-LINDL (holotype), K, K-W, P (isotypes).

Epiphytic and lithophytic herbs. Pseudobulbs ovoid, 5–7 mm tall, with 2 petiolate, narrowly oblanceolate or oblanceolate, acute leaves (4)6–12(14) cm long, 4–9 mm wide. Inflorescence 5–15 cm long, slender, suberect; peduncle slightly and narrowly winged, with 1(2) sterile bract or naked; rachis 3–6 cm long, with (1)2–6(10) lax flowers. Floral bracts narrowly triangular, 3–4(5) mm long. Pedicel and ovary (6)8–10(12) mm long. Flowers light dull green to dull yellowish. Sepals and petals 3.5–4 mm long; sepals broadly lanceolate, obtuse, to 1.5 mm wide, dorsally with raised median vein; petals filiform. Lip oblong obovate, emarginate and shortly apiculate, 3.5–4 mm long 2.5–2.8 mm wide, with thick low longitudinal ridge near base terminating distally in bilobed callus. Column slightly arcuate, 2–2.5 mm tall, with short wings at apex. **Fig. 49, f, g.**

Ecology. Primary and rich secondary evergreen, mixed and coniferous humid forests on any kind or rocks, but preferably on granite. 900–1600 m. Fl. April. Rare (DD).

Distribution. Vietnam (Ha Giang, Khanh Hoa, Kon Tum, Quang Binh). India, Bangladesh, Myanmar, N. Thailand, Hainan.

Studied specimens. Ha Giang, Bac Me, HAL 6558 (HN, LE); Khanh Hoa, Khanh Son, VH 4279 (HN, LE); Kon Tum, Ngoc Linh mt., VH 391 (HN, LE, MO, P), VH 736 (HN, LE, P); Quang Binh, Bo Trach, HAL 6116 (HN, LE).

Note. Some collections cited here are represented by fruiting specimens, identification of which needs verification.

28. *L. sparsiflora* Aver.,

2003, Updated Checklist Orch. Vietnam: 43, 87; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 227.

Described from southern Vietnam ("Kon Tim Prov., Dac Glei Distr. ... on S slope of Ngoc Linh mountain system ... elevation from Muong Hoong village"). **Type** ("31 March 1995, *L. Averya-*

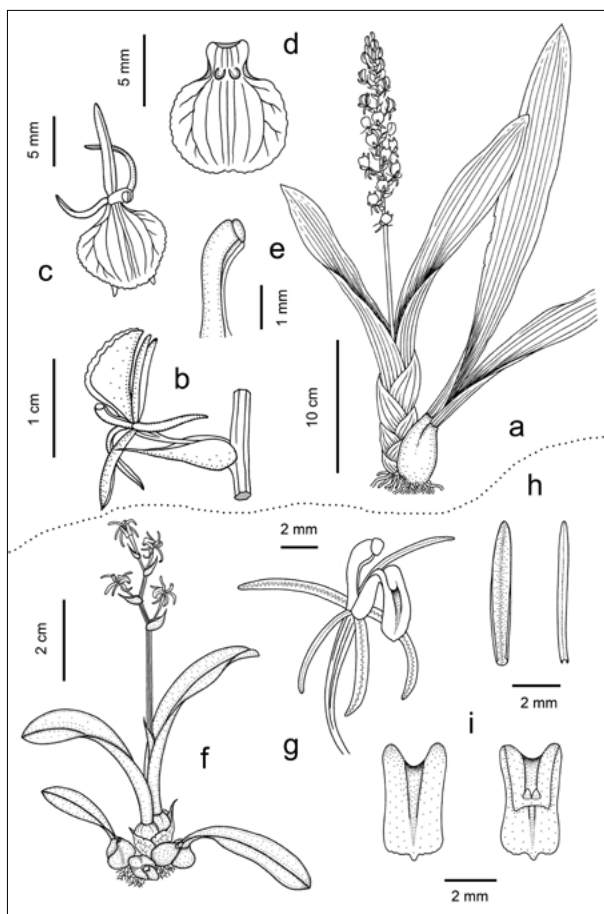


Fig. 50. *Liparis plantaginea*: a – flowering plant, b, c – flower, side and frontal view, d – flattened lip, e – column, side view (copied from Hook. f., 1895, Ann. Bot. Gard., Calcutta 5, tab. 4; and King et Pantling, 1898, Ann. Bot. Gard. Calcutta 8, tab. 36. *L. sparsiflora*: f – flowering plant, g – flower, half side view, h – sepal and petal, i – lip frontal view and view from behind (VH 1064a, type).

nov, N.T. Hiep, P.K. Loc et al., VH 1064a") – LE (holotype), HN (isotype).

Epiphytic herb. Pseudobulbs ovoid to subglobose, lobed on section, 0.8–1.2 cm tall and wide, with 1–2 leaves shortly petiolate, oblong or broadly oblanceolate, acute or shortly apiculate, slightly glaucous leaves, 4–8(10) cm long, 0.8–1.6 cm wide. Inflorescence 6–12 cm long, erect to arcuate, with, (1)4–10(15) lax flowers in secund spike; scape winged, 4–6 cm long, ebracteate or with 1 narrowly ovate, apiculate bract; rachis slightly curved, often zigzag, 2–8 cm long. Floral bracts broadly triangular to cordate, acuminate, hyaline with prominent median green vein. Flowers light pale green to almost white with green tint; lip with deep green or brown longitudinal stripe. Pedicel and ovary angular or narrowly winged, 6–8 mm long. Sepals and petals, obtuse, strongly reflexed, 5–6 mm long; sepals linear to narrowly lanceolate, 1-veined; petals filiform. Lip oblong rectangular, truncate, shortly apiculate, or emarginate, 6–7 mm long, 2.5–3 mm

wide, strongly recurved at middle, concave, at base with 2 small hemispheric or tooth-like calli. Column slightly curved, 4.5–5 mm tall, broadening to shortly winged apex. Capsule obovoid, 4–5 mm long, on stalk 3–3.5 mm long. **Fig. 49**, h; **50**, f-i; **51**, a, b.

Ecology. Primary and rich secondary evergreen broad-leaved, mixed and coniferous humid forests on any kind of rocks. 400–1300 m. Fl. July – October. Not common (VU).

Distribution. Vietnam (Ha Giang, Hoa Binh, Kon Tum, Quang Binh). SE. China (Hainan).

Studied specimens. Ha Giang, Quan Ba, *P.K. Loc P 12906E* (LE); Hoa Binh, Mai Chau, *HAL 746/1* (LE); Hoa Binh, Tan Lac, *CPC 2028a* (LE); Hoa Binh, Lac Son, *CPC 1621a* (LE); Kon Tum, Ngoc Linh mt., *VH 838a* (LE); Quang Binh, Minh Hoa, *VH 4637* (HN, LE, MO).

Note. The species is endemic to eastern Indochina and Hainan Island.

29. *L. filiformis* Aver.,

2005, *Rheedea* 15: 93, fig. 9, 11a, b. – *L. delicatula* auct. non Hook. f., 1890: Aver., 1998, Nov. Syst. Pl. Vasc. (St. Petersburg) 31: 57; Aver. et Averyanova, 2000, *Turczaninowia* 3, 2: 52; Aver., et al., 2000, *Lindleyana* 15, 3: 150. – *L. aurita* auct. non Ridl., 1885: Aver., 2002, *Turczaninowia* 5, 4: 83; Aver. et Averyanova, 2003, Updated Checkl. Orch. Vietnam: 41.

Described from N. Vietnam (“Cao Bang Prov., Ba Be Distr., Ba Be national park”). **Type** (“24 Oct. 1995, *L. Averyanov, N.T. Hiep, D.D. Hu-yen, CB 47*”) – HN (holotype), LE (isotype).

Miniature epiphyte. Pseudobulbs ovoid to narrowly ovoid, 0.5–1(1.5) cm tall, with (1)2–3(4) sessile or shortly petiolate, lanceolate to narrowly elliptic, acute leaves 2–7 cm long, 5–8 mm wide. Inflorescence slender to filiform, pendulous, with many lax flowers, 6–18 cm long, much longer than leaves. Scape with many distant, broad, acuminate sterile bracts. Rachis irregularly ridged, sometimes slightly zigzag. Floral bracts ovate to cuneate, acuminate, 1–1.5 mm long. Pedicel and ovary 2–2.5 mm long. Flowers 5–6 mm across. Sepals and petals light yellowish, light orange or pinkish to nearly almost white, 3.5–4.5 mm long; sepals ovate 2–3.5 mm wide, orbicular to obtuse; petals linear. Lip brown to dull orange, strongly bent downward from a short hypochile, forming vertical ears at the bend. Disk with high, U-shaped callus; epichile sub-quadrate, 2–2.5 mm long and broad, with 3-lobed apex; lateral lobes more or less rounded, median lobe narrowly-triangular, acute. Column stout, 2.5–3 mm

high, with large triangular wings. Fruit ovoid capsule, 4–5 mm long. **Fig. 51**, c, d; **52**, a-f.

Ecology. Primary and secondary evergreen humid broad-leaved forests predominantly on rocky limestone. 400–1550 m. Fl. June, October – January. Not common (VU).

Distribution. Vietnam (Cao Bang, Ha Giang, Hoa Binh, Ninh Binh, Son La, Thanh Hoa). Endemic of Vietnam.

Studied specimens. Cao Bang, Nguyen Binh, *CBL 561* (HN, LE, MO); Cao Bang, distr. Tra Linh, *CBL 1141* (HN, MO); Cao Bang, Trung Khanh, *HAL 5543* (HN, LE); Ha Giang, Quang Ba, *DKH 4826* (HN, LE, MO); Hoa Binh, Mai Chau, *DKH 7815* (HN, LE, MO); Hoa Binh, Tan Lac, *CPC 845* (CPC Herbarium, LE), *CPC 1765* (CPC Herbarium, LE); Ninh Binh, Cuc Phuong, *HAL 2901* (HN, LE); Son La, Yen Chau, *HAL 9552c* (LE); Thanh Hoa, Ba Thuoc, *HAL 4273* (HN, LE).

Note. The species belongs to the group of miniature species with long pendulous slender inflorescence, small strongly bended lip and large U-shaped callus on its centre. It differs from related species of this group, such as *Liparis aurita* Ridl., *L. delicatula* Hook. f. and *L. tenuis* J.J. Sm. distributed in Malesia in having distinctly 3-lobed epichile with triangular, acute median lobe. It also differs distinctly from similar Himalayan species, *L. assamica* King et Pantl., in lacking of extra keels on lateral sides of column and in having large U-shaped callus on the center of lip. This Vietnamese species represents, probably, strict endemism of northern part of Eastern Indochina and may be found beside Vietnam in Laos and S. China. Plants recorded by G. Seidenfaden in Thailand as *L. aurita* (Seidenf., 1976, *Dansk Bot. Ark.*, 31, 1: 86, fig. 59) may also belong here.

30. *L. resupinata* Ridl.,

1886, *Journ. Linn. Soc., Bot.* 22: 290; Seidenf., 1976, *Dansk Bot. Ark.*, 31, 1: 88, fig. 60; Pearce et Cribb, 2002, *Orch. Bhutan*: 209; Chen Sing-chi, Ormerod, Wood, 2009, *Fl. China*, 25: 228; Aver, 2010, *Taiwania* 55, 1: 6.

Described from NE. India (“India, Darjeeling..., Khasia and Mumbree..., Khasia Hills..., Sikkim...”). **Syntypes** (“*Griffith s.n.*”) – K-LINDL, (“*Griffith 5082*”) – AAU, C, K, S, (“*Lobb*”) – K-LINDL, (“*Hooker 90*”) – K-LINDL.

Miniature epiphyte or occasionally lithophyte. Pseudobulbs shortly cylindric, spindle-shaped, 1–3(4) cm long, with 2–4 lanceolate, subsessile, acuminate leaves (3)4–8(10) cm long, 0.5–1 cm wide. Inflorescence arching or pendant, 6–16

cm long, scape 2–4 cm long, with several sterile bracts; rachis (4)6–14 cm long, many-flowered. Floral bracts lanceolate, 2–3 mm long. Pedicel and ovary 2–5 mm long. Flowers pale green to dull, pale yellow-orange. Sepals and petals 2.5–3.5 mm long, obtuse; sepals narrowly ovate; petals linear. Lip oblong ovate, 1.5–2.5 mm long, strongly contracted with lateral splits at middle, forming epichile and hypochile, apex obtuse or roundish; hypochile with suborbicular lobes on both sides; epichile auriculate-sagittate at base; disc with 2-lobed callus. Column erect, 1.5–2 mm tall, at front with 2 suborbicular wings attenuate to pendulous filiform appendage at apex. Capsule oblong obovoid, 4–6 mm long. **Fig. 51**, e, f.

Ecology. Primary and secondary evergreen humid broad-leaved and coniferous forests on any kind of rocks, commonly on steep rocky slopes near to mountain tops or along damp stream valleys. 900–1900 m. Fl. October – December. Not common (VU).

Distribution. Vietnam (Lai Chau). N. India, Nepal, Bhutan, S. China, Thailand.

Studied specimens. Lai Chau, Phong Tho, *HAL 10583* (HN, LE, MO), *HAL 10792a* (HN, LE); Lai Chau, Sin Ho, *HAL 10001* (HN, LE); Lai Chau, Tam Duong, *HAL 10168* (HN, LE).

Note. Easily recognizable species for pendent filiform appendage on apex of column wings.

31. *L. delicatula* Hook. f.,

1890, Fl. Brit. India 5: 705; id., 1890, Icon. Pl. 19, tab. 1889; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 93, fig. 63; id., 1992, Opera Bot., 114: 145, fig. 88; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 904, fig. 11361; Pearce et Cribb, 2002, Orch. Bhutan: 206; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 41; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 272; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 296; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 227.

Described from NE. India ("Churra, Khasia"). **Type** ("Hooker et Thomson 1109") – K.

Miniature epiphyte. Pseudobulbs ovoid to cylindric-fusiform, 0.5–1 cm tall, with 2(3), oblong lanceolate, shortly petiolate, acute to apiculate leaves 1.2–4 cm long, 0.5–1 cm wide. Inflorescence 4–10 cm long, with few sterile bracts; rachis 2–5 cm long, with few to 15 flowers. Floral bracts ovate-lanceolate, 2–3 mm long. Pedicel and ovary 3–4 mm long. Flowers white. Sepals and petals 2.5–3 mm long, obtuse; sepals ovate; petals linear. Lip broadly elliptic to almost orbicular, 2–2.5 mm across; strongly folded down at middle forming hypochile

and epichile; epichile half orbicular, auriculate at base, rounded and shortly apiculate at apex; disc in center with massive concave callus. Column stout, 2–2.2 mm tall, with 2 triangular wings at front, near apex and 2 narrow wings on both lateral sides. Capsule trigonous-obovoid, 4 mm long. **Fig. 52**, g-j.

Ecology. Primary and secondary evergreen humid forests on valleys slopes. 500–2900 m. Fl. December – February.

Distribution. Vietnam (?). NE. India, S. China, Hainan, Laos.

Note. There are no yet records of this species in Vietnam confirmed by herbarium specimens. Meanwhile, it can be certainly found in the country. Data on ecology and phenology recorded here are copied from Flora of China (Chen Sing-chi, Ormerod, Wood, 2009, l.c.: 227). Figure 52, g-j is copied from authentic picture (Hook. f., 1890, l.c., tab. 1889).

32. *L. tenuis* Rolfe ex Downie,

1925, Bull. Misc. Inform. Kew 1925: 372; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 187; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 94, fig. 64; Aver., 2005, Turczaninowia 8, 1: 76, tab. 2a.

Described from north-western Thailand ("Doi Suthep, 3200 ft."). **Type** ("Kerr 250") – K (holotype), SING (isotype).

Miniature epiphyte. Pseudobulbs narrowly ovoid, about 1 cm tall, with (1)2(3), narrowly ovate, subsessile, acute leaves 2–3(4) cm long, 0.8–1.2 cm wide. Inflorescence 6–10 cm long, with few sterile bracts; rachis 2–4 cm long, with few to 10 flowers. Floral bracts narrowly triangular, 2–3 mm long. Pedicel and ovary 3–4 mm long. Sepals and petals 2.5–3 mm long, obtuse; sepals ovate; petals linear. Lip broadly elliptic to almost orbicular, 1.5 mm across; strongly folded down at middle forming hypochile and epichile; epichile half orbicular, auriculate at base, rounded and shortly apiculate at apex; disc in center with massive concave callus. Column stout, 1.6–2 mm tall, with 2 large rectangular wings at front and 2 large broad wings on both lateral sides. **Fig. 52**, k-n.

Ecology. Primary and secondary evergreen humid forests on valleys slopes. 900–1300 m. Fl. December – February.

Distribution. Vietnam (?). Thailand.

Note. The species is very close to *L. delicatula* and may represent its marginal form. Its occurrence in Vietnam did not yet confirmed by sure herbarium material. Meanwhile, it can be found in the country. Data on ecology and phenology mentioned here are recorded on the base of specimens

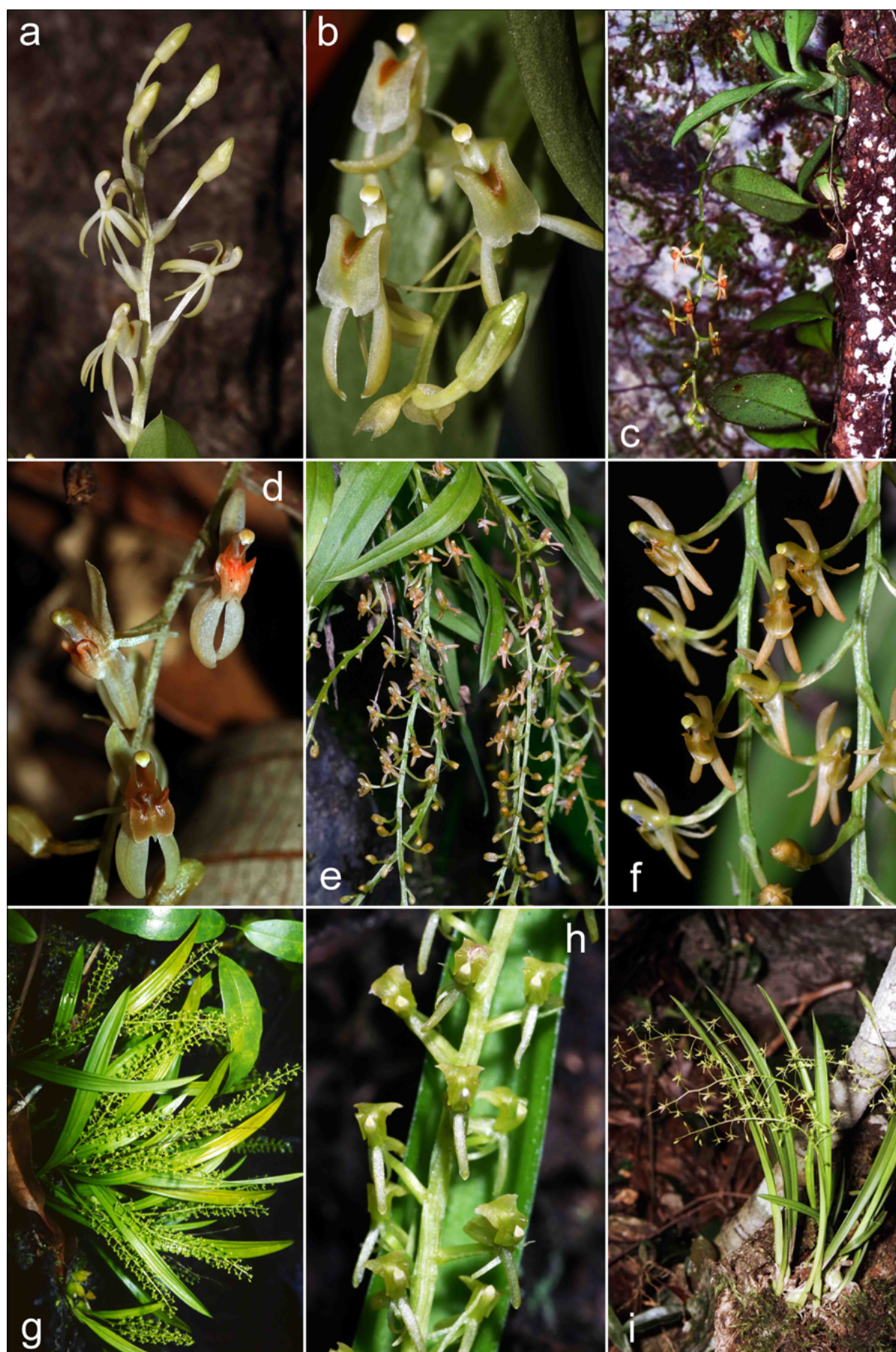


Fig. 51. *Liparis sparsiflora*: a (CPC 2028a), b (VH 1064a, type); *L. filiformis*: c (HAL 5543), d (CPC 845); *L. resupinata*: e (HAL 10168); f (HAL 8309 ass.); *L. mannii*: g (DKH 6077), h (HAL 9288); *L. tripartita*: i (HAL 3506, type).

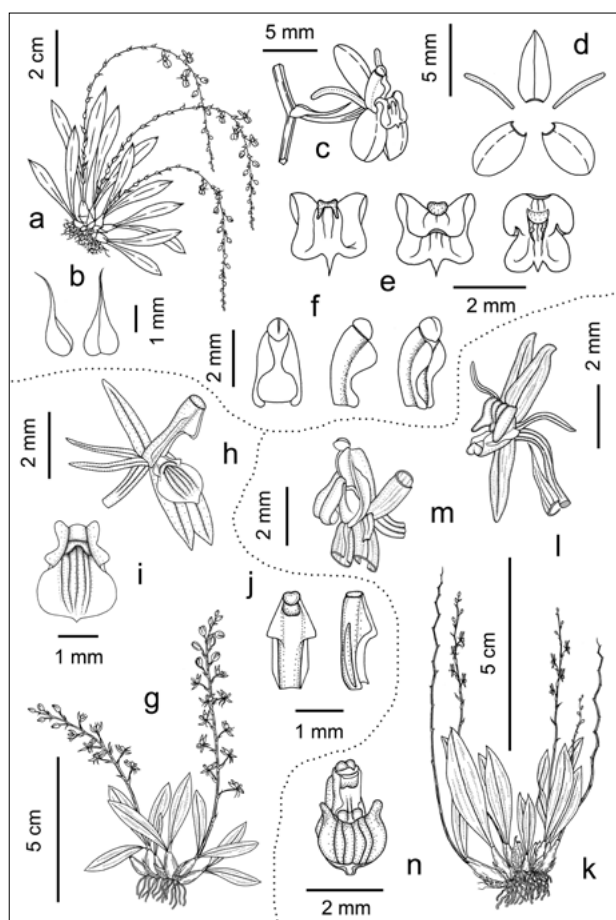


Fig. 52. *Liparis filiformis*: a – flowering plant, b – floral bracts, c – flower, side view, d – flattened sepals and petals, e – lip, frontal view, view from behind and flattened one, f – column, frontal view, side and half side views (Averyanov et al., CB 47, type); *L. delicatula*: g – flowering plant, h – flower, side view, i – flattened lip, j – column, frontal and side views (copied from Hook. f., 1890, Icon. Pl. 19, tab. 1889); *L. tenuis*: k – flowering plant, l – flower, half side view, m – column and lip, side view, n – column and lip, frontal view (copied from Seidenf., 1976, Dansk. Bot. Ark. 31, 1: 94, fig. 64).

from Thailand. Figure 52, k-n is copied from picture of G. Seidenfaden published in his *Liparis* monograph (Seidenfaden, 1976, l.c.: 94, fig. 64).

33. *L. mannii* Rchb. f.,

1872, Flora 55: 275; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 175; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 60, fig. 36; id., 1992, Opera Bot., 114: 138; Aver., 1994, Ident. Guide Vietnam. Orch.: 147; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 902, fig. 11355; Pearce et Cribb, 2002, Orch. Bhutan: 208; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 42; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 224.

Described from NE. India (“Assam”). **Type** (“Mann 27, Herb. Reichenbach 46235”) – W.

Lithophyte and occasionally epiphytic herb. Pseudobulbs narrowly ovoid to ovoid 1–2 cm tall, with 1 linear to shortly petiolate, narrowly lanceolate, acute leaf 7–15 cm long, 5–10 mm wide. Inflorescence slender, many-flowered; scape narrowly winged, 3–6 cm long; rachis 5–12 cm long. Floral bracts linear-cuneate, 1–2.5 mm long. Pedicel and ovary 1.5–2 mm long. Flowers resupinate, light green, 2 mm across. Sepals and petals 1–1.8(2) mm long, obtuse, reflexed; sepals narrowly ovate; petals linear to filiform. Lip ecallose, broadly ovate, 1.2–1.8 mm long, 3-lobed; side lobes falcate, erect; median lobe down recurved, rhombic, acute, erose along margin. Column slightly curved, 1–1.2 mm tall, wingless. Capsule broadly obovoid-ellipsoid, 2.5–3 mm long. **Fig. 51, g, h.**

Ecology. Primary and rich secondary evergreen broad-leaved, mixed and coniferous humid forests preferably on rocky limestone. 200–1500(1800) m. Fl. October – April. Not rare (VU).

Distribution. Vietnam (Bac Kan, Cao Bang, Dak Lak, Dien Bien, Ha Giang, Hoa Binh, Lam Dong, Lang Son, Ninh Binh, Phu Tho, Quang Binh, Son La, Thai Nguyen, Thanh Hoa, Tuyen Quang). NE. India, Bhutan, S. China.

Studied specimens. Bac Kan, Cho Don, *HLF* 784 (HN, LE), *HLF* 845 (HN, LE), *CPC* 1175 (CPC Herbarium, LE), *CPC* 1281 (CPC Herbarium, LE); Bac Kan, Na Ri, *HAL* 5421 (HN, LE), *NTH* 3667 (HN, LE); Cao Bang, Nguyen Binh, *CBL* 1301 (HN, LE, MO); Cao Bang, Tra Linh, *VH* 2464 (HN, LE), *DKH* 4278 (HN, LE, MO), *CBL* 1135 (HN, LE, MO, P), *CBL* 1214 (HN, LE, MO, P); Cao Bang, Trung Khanh, *HAL* 5489 (HN, LE), *HAL* 5624 (HN, LE); Dak Lak, Krong Bong, *VH* 6354 (HN, MO); Dien Bien, Dien Bien, *CPC* 2406 (CPC Herbarium); Dien Bien, Tua Chua, *CPC* 953 (CPC Herbarium), *CPC* 994 (CPC Herbarium); Ha Giang, Meo Vac, *HAL* 8462 (HN, MO), *CBL* 1868 (HN, MO), *CBL* 1869 (HN, LE, MO); Ha Giang, Quan Ba, *HAL* 1556 (HN), *HAL* 8396 (HN), *NTH* 3581 (HN, LE, MO), *DKH* 4816 (HN, LE, MO, P), *DKH* 5195 (HN, LE, MO), *DKH* 6077 (HN, LE, MO); Ha Giang, Vi Xuyen, *DKH* 6400 (HN, LE, MO), *DKH* 6441 (HN, LE, MO); Hoa Binh, Da Bac, *HAL* 262 (HN, MO); Hoa Binh, Lac Son, *CPC* 1479 (CPC Herbarium); Hoa Binh, Mai Chau, *HAL* 875 (HN, MO), *DKH* 7746 (HN, LE, MO), *DKH* 7840 (HN, LE, MO), *DKH* 7841 (HN, LE, MO), *DKH* 7949 (HN, LE, MO), *DKH* 8176 (HN, LE, MO); Hoa Binh, Tan Lac, *CPC* 715 (CPC Herbarium, LE); Hoa Binh, Tung Khe, *Averyanov et al.*, *HB* 13, a. 1996 (LE), *VH* 2443 (HN, LE, MO); Lam Dong, Dalat, *Evrard* 1261 (P),

Averyanov et al., *LX-VN 173* (HN); Lam Dong, Lac Duong, *VH 3121* (HN, LE, MO), *HLF 5212* (HN, LE); Lang Son, Bac Son, *HAL 6729* (HN, LE, MO); Ninh Binh, Cuc Phuong, sine coll., *CP 1117*; (Cuc Phuong national park Herbarium, LE), *Averyanov et al.*, *LX-VN 1801*; (HN, LE), *HAL 1636* (HN), *N.M. Cuong, NMC 778*; (Cuc Phuong national park Herbarium, HN), *Soejarto DDS 11292*; (Cuc Phuong national park Herbarium, ILLS); Phu Tho, Tan Son, *HAL 12643* (HN, LE), *CPC 4640* (CPC Herbarium); Quang Binh, Bo Trach, *HAL 6069* (HN, MO); Son La, Chieng Co, *CPC 1109* (CPC Herbarium); Son La, Moc Chau, *HAL 9288* (HN, LE, MO), *DKH 5850* (HN, LE, MO), *DKH 7384* (HN, LE, MO); Son La, Yen Chau, *HAL 9438* (HN, LE, MO), *DKH 7097* (HN, LE, MO); Thai Nguyen, Dong Hy, *HAL 18* (HN, MO); Thanh Hoa, Ba Thuoc, *HAL 1044* (HN, MO), *HAL 2983* (HN), *HAL 3318* (HN), *HAL 4343* (HN); Thanh Hoa, Lam Son, *Tiep et al.*, *NOT 2683* (LE, UHN); Tuyen Quang, Na Hang, *HAL 187* (HN, MO); Tonkin, Chua Hac, *Bon 2847* (P).

Note. Very common species in northern Vietnam, particularly on rocky highly eroded limestone, where it plays important role in lithophytic plant communities forming sometimes continuous cover on rocky mossy outcrops.

34. *L. tripartita* Aver. et Averyanova, 2006, *Komarovia* 4: 27.

Described from N. Vietnam ("Thanh Hoa Prov., Ba Thuoc Distr., Co Lung Municipality, Eo Dieu village, around point 20°26'06"N, 105°13'51"E"). **Type** ("25 Sept. 2003, *L. Averyanov, D.T. Doan, J. Regalado et al.*, *HAL 3506*") – LE (holotype), HN (isotype).

Lithophytic and epiphytic herb. Pseudobulbs subglobose to ovoid, 8–10 mm tall, with shortly petiolate, narrowly lanceolate to linear, acute to shortly apiculate leaf 12–18 cm long, 5–8 mm wide. Inflorescence lax, many-flowered, slender, arching; scape hardly winged, 6–8 cm long, ebracteate; rachis 8–12 cm long. Floral bracts narrowly cuneate, acuminate, hyaline, 2–5 mm long. Flowers 8–9 mm across, light green to yellowish-green. Pedicel and ovary 1.2–1.5 cm long. Sepals and petals 3.5–6 mm long, reflexed, acute; sepals narrowly ovate to broadly lanceolate, indistinctly veined; petals linear. Lip oblong ovate, with small auricles at the base, 3-lobed, 3.5–4 mm long, 2.5–3 mm wide across the side lobes, slightly curved, with low round callus on the disk; side lobes erect, broadly ovate, obtuse; median lobe straight, oblong ligulate, round, obtuse or shortly retuse at the apex. Column slender, slightly

curved, wingless, 2 mm tall, 1 mm wide. **Fig. 51**, i; **53**, a; **54**, a-d.

Ecology. Primary evergreen broad-leaved humid forests on rocky limestone, usually on rocky tops of remnant mountains. 900–1000 m. Fl. September – October. Very rare, but locally common (VU).

Distribution. Vietnam (Thanh Hoa). Local endemic.

Note. In vegetative parts, the species superficially resembles *L. mannii*. From all Indochinese species, *L. tripartita* strikingly differs in its 3-lobed lip with oblong ligulate median lobe. This species represents local endemism of limestone flora of Eastern Indochina and known up to now only on the base of type collection. In area of its discovery this species is very common and plays an important role in lithophytic plant communities on rocky limestone outcrops, particularly on isolated tops of remnant karstic ridges.

35. *L. latifolia* Lindl.,

1830, *Gen. Sp. Orchid. Pl.*: 30; Seidenf., 1976, *Dansk Bot. Ark.*, 31, 1: 54, fig. 31; Comber, 1990, *Orch. Java*: 138, fig.; id., 2001, *Orch. Sumatra*: 160, fig.; Seidenf., Wood, 1992, *Orch. Malay. Sing.*: 235, fig. 99f, g; Wood, Cribb, 1994, *Checklist Orch. Borneo*: 94; Chen Sing-chi, Ormerod, Wood, 2009, *Fl. China*, 25: 224. – *Malaxis latifolia* Blume, 1825, *Bijdr.*: 393, non Smith, 1812.

Described from Java ("Hab. in Provinciae Bantam regionibus montanis, ad montem Pantjan Provincia Buitenzorg, Javae"). **Type** ("*Blume s.n.*") – BO.

Epiphytic herb. Pseudobulbs ovate, to 8 cm tall, somewhat flattened and angular, 1-leaved. Leaf shortly petiolate, broadly lanceolate, acute, about 15–20 cm long, 3–4 cm wide. Inflorescence as long as leaves, scape little shorter than rachis which bears 15–20 flowers, half of which are open at one time. Pedicel and ovary about 1.5 cm long; floral bracts twice shorter. Sepals and petals 6–8 mm long, pale light green, strongly reflexed covering ovary, acute; sepals narrowly ovate; petals narrowly lanceolate to linear. Lip as long as sepals or little longer, brightly scarlet-red, at base channeled, with 2 raised oblong calli, strongly bent, apically 2-lobed; lobes parallel, not diverging, finely indented and white ciliate along margin. Column white slightly arching, 2.5–3 mm tall, with very small wings at apex. Operculum light yellow. **Fig. 53**, b, c.

Ecology. Lowland hill evergreen broad-leaved forest. Fl. November. 100–400 m. Very rare (DD).

Distribution. Vietnam (Kien Giang). Thailand, Hainan, Malacca Peninsula, Java, Sumatra, Kalimantan, Timor, New Guinea.

Studied specimens. Kien Giang, Phu Quoc, *N.V. Khoi s.n.*, Nov. 2007 (LE – photo).

Note. The single observed Vietnamese plant differs from true *L. latifolia* in smaller flowers, narrow and smaller leaves and in small pseudobulbs, as well as in flower coloration. It may represent new, yet undescribed species. From the closely related *L. crenulata* (Blume) Lindl. and *L. bicolor* J.J. Sm. (growing in Java and Sumatra), it differs in 1-leaved pseudobulbs. According to Blume (Lindl., 1830, l.c.: 32), the species blooms in Java during June – August.

Plants in Java growing in sunlight are tinged entirely red-brown, when those in shade remain pure green.

36. *L. rhombea* J.J. Sm.,

1910, Bull. Dept. Agric. Indes Neerl. 43: 35; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 53, fig. 30; id., 1992, Opera Bot., 114: 138, pl. 9d; Comber, 1990, Orch. Java: 139, fig.; Seidenf., Wood, 1992, Orch. Malay. Sing.: 236, fig. 99 h-i; Aver., 1994, Ident. Guide Vietnam. Orch.: 146; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 902, fig. 11353; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 43.

Described from Java (“Java, Salak”). **Type** (“cult. *Joseph*”) – L.

Epiphytic herb. Pseudobulbs ovoid, somewhat flattened, 1.5–3 cm tall, 1-leaved. Leaf sessile, broadly oblanceolate, acute, 10–15 cm long, 2–3 cm wide. Inflorescence erect, 7–20 cm long, with 10–30 lax flowers; scape 6–8 cm long, with 1–2 sterile cuculate bracts. Floral bracts 3.5–5 mm long. Pedicel and ovary 4–6 mm long. Sepals and petals white to light greenish-yellow, strongly reflexed and covering ovary, acute, 4–5 mm long; sepals narrowly ovate; petals linear. Lip white to light pink, being flattened rhomboid, 5 mm long and wide, strongly bent at middle, apically shallowly 2-lobed; lobes small, oblong ovate, finely dentate; disc with red-brownish glossy band widening toward apex. Column white, 2 mm tall, slightly curved, nearly windless. Operculum yellow. **Fig. 53**, d.

Ecology. Primary and rich secondary evergreen broad-leaved humid shady forests on silicate rocks. 500–600 m. Fl. January – February. Rare (DD).

Distribution. Vietnam (Ba Ria – Vung Tao). S. Thailand, Malacca Peninsula, Java, Kalimantan.

Studied specimens. Con Dao, *Averyanov, Kudryavtzeva* 333, a. 1989 (HN, LE).

Note. Easily recognizable species for glossy brightly red or red-brown band on the lip.

37. *L. averyanoviana* Szlach.,

1993, Fragm. Florist. Geobot. 38: 451, fig. 1; Aver., 1994, Ident. Guide Vietnam. Orch.: 401; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 41; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 272; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 221. – *L. conopea* Aver., 1997, Bot. Journ. (St. Petersburg) 82, 3: 131, fig. 1; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 41.

Described from S. China (“CHINA. Kouy-Tcheou. Houang-tre-pa”). **Type** (“13 Nov. 1917, *Cavalerie 4429*”) – P.

Epiphyte and lithophyte with 1-leaved, ovoid to conical pseudobulbs 1–1.5 cm tall. Leaves shortly petiolate, oblanceolate to narrowly elliptic, acute, 6–15(20) cm long, (1)1.5–2.5(3) cm wide. Inflorescence erect to arcuate, few to many flowered, rather lax. Scape 3–10 cm long, slightly flattened and narrowly winged, 1.5–2 mm wide, with 1–2 narrowly triangular bracts. Rachis 3–10(14) cm long. Floral bracts narrowly triangular, acuminate, 1.5–5 mm long. Pedicel and ovary (4)6–10 mm long. Flowers greenish to dull yellowish–orange, with cucumber odor, 4–6 mm across. Sepals and petals obtuse, 2.5–5 mm long; sepals broadly lanceolate to narrowly ovate; petals lanceolate to linear. Lip oblong indistinctly rectangular, (2.5)3–5 mm long, (1)1.5–3.5(4) mm wide; basal part narrow, channeled, with vertical sides nearly parallel to column; ecallose, or with a low transverse thickening near the base; epichile turned down, 2-lobed, lobes shortly oblong, finely toothed. Column white to greenish, 1.5–2.5(3) mm tall, bent at middle or nearly straight, almost wingless. **Fig. 53**, e, f; **54**, e–h.

Ecology. Primary and rich secondary evergreen humid broad-leaved and coniferous forests on rocky limestone, commonly on mossy rocky outcrops near mountain tops. 250–1300(1500) m. Fl. September – January. Not rare (VU).

Distribution. Vietnam (Bac Kan, Cao Bang, Hoa Binh, Lao Cai, Ninh Binh, Phu Tho, Quang Binh, Son La, Thanh Hoa, Tuyen Quang). S. China, Laos.

Studied specimens. Bac Kan, Ba Be, *HLF* 538 (HN, LE); Bac Kan, Cho Don, *HLF* 742 (HN, LE), *HLF* 866 (HN, LE); Bac Kan, Na Ri, *DKH* 7606 (HN, LE, MO); Cao Bang, Ha Lang, *CBL* 649 (HN, LE, MO), *CBL* 692 (HN, LE, MO); Cao Bang, Thach An, *CBL* 812 (HN, LE, MO), *CBL* 834 (HN, LE, MO), *CBL* 960 (HN, LE, MO); Cao Bang, Tra Linh, *VH* 2467 (HN, LE); Cao Bang, Trung Khanh, *HAL* 5559 (HN, LE), *HAL* 5588 (HN, LE), *HAL*

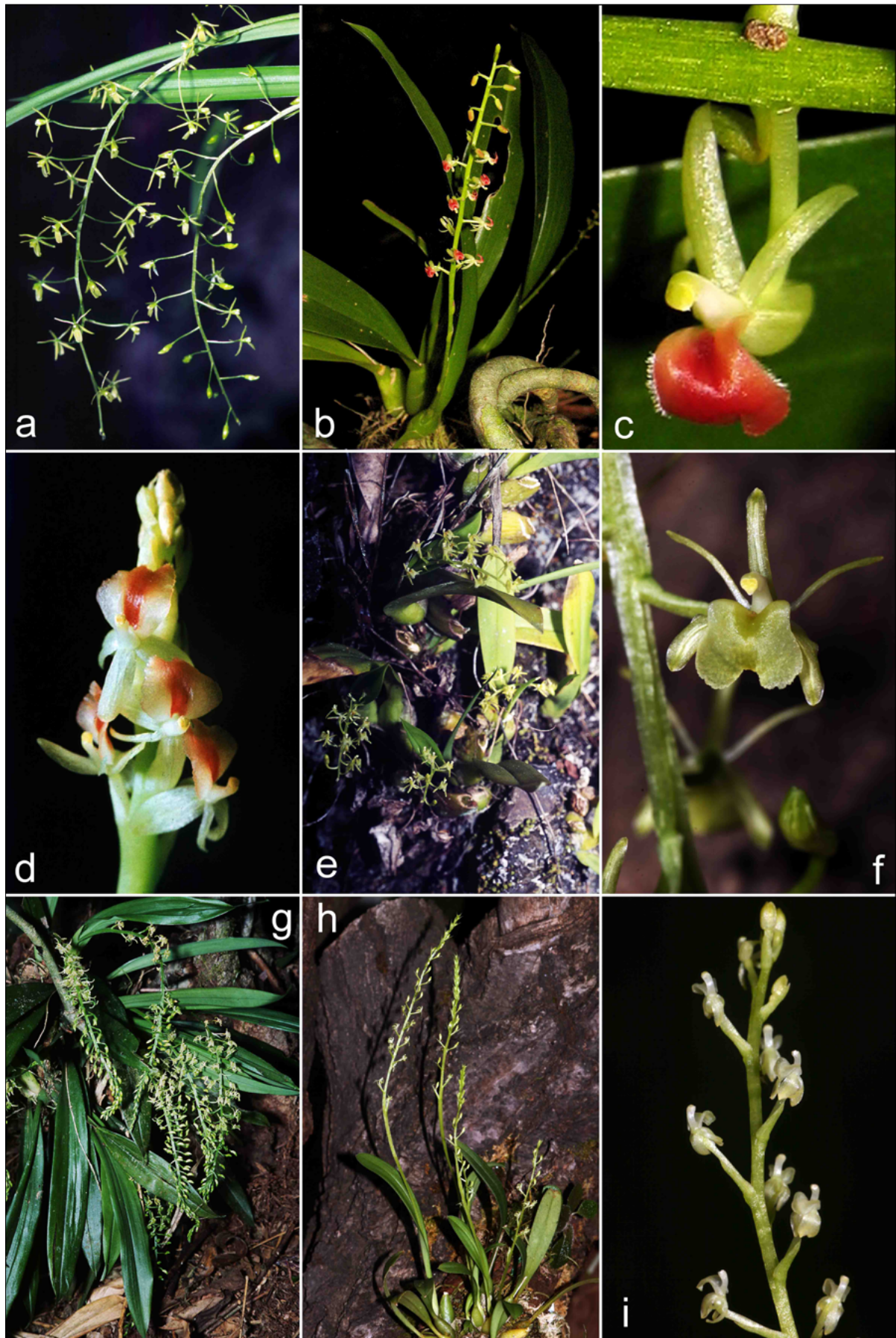


Fig. 53. *Liparis tripartita*: a (HAL 3506, type); *L. latifolia*: b, c (N.V. Khoi, s.n.); *L. rhombea*: d (Averyanov, Kudryavtzeva 333); *L. averyanoviana*: e (CBL 692), f (HAL 12813b); *L. emarginata*: g (Averyanov et al., HG 67, type); *L. cespitosa*: h (CPC 1384b), i (CPC 982b).

5624 (HN); Hoa Binh, Mai Chau, *DKH 8104* (HN, LE, MO); Lao Cai, Chapa, *Petelot 5174* (P), *Petelot 5214* (P); Lao Cai, Lao-kai, *Lecomte et Finet 420* (P); Ninh Binh, Cuc Phuong, *Grushvitsky et al. 55a* (LE), *HAL 1628* (HN), *HAL 1654* (HN), *N.M. Cuong et al., NMC 704, NMC 777, NMC 1301* (Cuc Phuong national park Herbarium), *Soejarto 11837* (Cuc Phuong national park Herbarium, ILLS); Phu Tho, Tan Son, *HAL 12813b* (LE); Quang Binh, Minh Hoa, *HAL 5842* (HN, MO); Son La, Moc Chau, *HAL 9323* (HN, LE, MO), *DKH 7511* (HN, MO); Thanh Hoa, Ba Thuoc, *HAL 3345* (HN), *HAL 3416* (HN); Tuyen Quang, Na Hang, *CPC 4554* (CPC Herbarium).

Note. This species is very variable in flower size. Specimens from Vietnam have smaller flowers and were described as *L. conopea*. They may represent separate variety, connected, however, with typical “Chinese” forms with transitional forms. *Liparis averyanoviana* is one of the most common species in lowland limestone areas of northern Vietnam. This obligate calcium dependent species, endemic for limestone areas of eastern Indochina plays important role in formation of herbaceous lithophytic plant communities.

38. *L. emarginata* Aver.,

1997, Bot. Journ. (St. Petersburg) 82, 3: 133, fig. 2; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 42.

Described from N. Vietnam (“Prov. Ha Giang, Distr. Bac Quang (Quan Ba), around 4 km to SW from Can Ty town”). **Type** (“27 October 1995, *L. Averyanov, N.T. Hiep, D.D. Huyen HG 67*”) – LE (holotype), HN (isotype).

Epiphyte or lithophyte with 1-leaved, ovate conical pseudobulbs 1.5 cm tall. Leaves shortly petiolate, narrowly elliptic, acute, 20–25 cm long, 2–2.5 cm wide. Inflorescence erect, many-flowered, subdense, 20–24 cm long. Scape 5–7 cm long, slightly flattened and narrowly winged, 2 mm wide, with 1–2 narrowly triangular bracts. Rachis 14–18 cm long. Flowers pale greenish, with cucumber odor. Floral bracts narrowly triangular, acuminate, 5–12 mm long. Pedicel and ovary 5–9 mm long. Sepals and petals obtuse, 5 mm long; sepals broadly lanceolate; petals linear to filiform. Lip 6 mm long, 5 mm wide; hypochile narrow, channeled, parallel to column, with 2 hemispherical calli at base; epichile with 2 rounded, finely toothed lobes. Column 2–2.5 mm tall, bending near apex, with 2 small semicircular wings. **Fig. 53**, g; **54**, i–m.

Ecology. Primary and secondary humid evergreen broad-leaved forests on shale and ser-

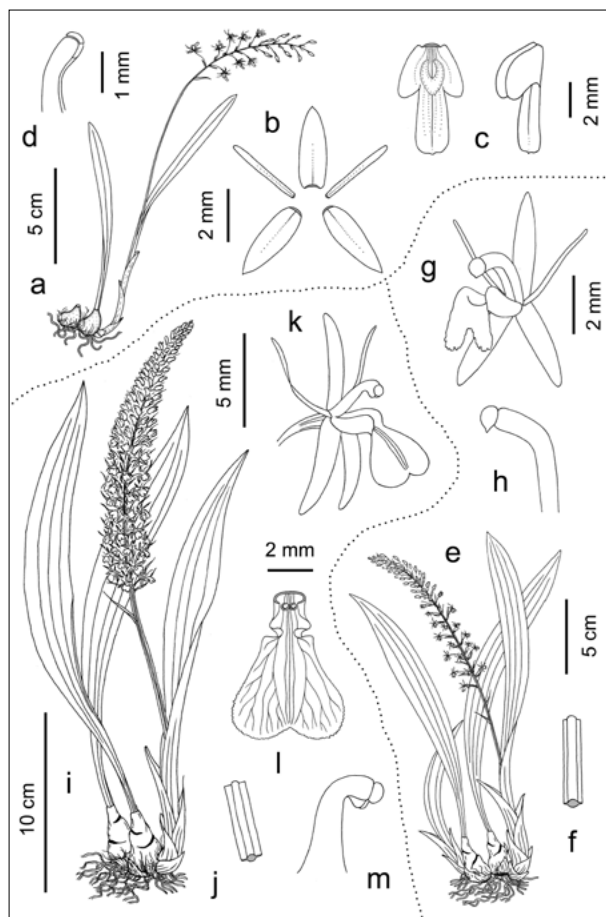


Fig. 54. *Liparis tripartita*: a – flowering plant, b – flattened sepals and petals, c – flattened lip, frontal and side views, d – column, side view (HAL 3506, type); *L. averyanoviana*: e – flowering plant, f – portion of scape, g – flowers, half side view, h – column, side view (VH 2467, type of *L. conopea*); *L. emarginata*: i – flowering plant, j – portion of scape, k – flower, half side view, l – flattened lip, m – column, side view (Averyanov et al., HG 67, type).

pentines, commonly on mossy shady places near ridge tops. 1000–1200 m. Fl. October – November. Rare (DD).

Distribution. Vietnam (Ha Giang). Endemic.

Studied specimens. Hoa Binh, Mai Chau, *DKH 8104* (HN, LE, MO).

Note. Species has relation to *L. averyanoviana*, from which it differs in the presence of semi-circular column wings, in 2 small hemispherical calli at the lip base and in the form of epichile. From also related *L. stricklandiana* this species differs in retuse epichile and in 1-leaved pseudobulbs. This rare species can be certainly found in limestone regions of southern China and northeastern Laos.

39. *L. cespitosa* (Lam.) Lindl.,

1825, Bot. Reg. 11, tab. 882; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 61, fig. 38; id., 1992, Opera Bot., 114: 139; Comber, 1990, Orch. Java: 135,

fig.; id., 2001, Orch. Sumatra: 165; Seidenf., Wood, 1992, Orch. Malay. Sing.: 235, fig. 99 c-e, pl. 13d; Wood, Cribb, 1994, Checklist Orch. Borneo: 90, fig. 6a, b; Aver., 1994, Ident. Guide Vietnam. Orch.: 146; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 902, fig. 11356; Su Horng-Jye, 2000, Fl. Taiwan 5: 939, fig. 399; Pearce et Cribb, 2002, Orch. Bhutan: 204; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 41; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 272; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 295; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 222. – *Epidendrum cespitosum* Lam., 1783, Encycl. 1: 187. – *L. pusilla* Ridl., 1886, Journ. Linn. Soc. 22: 294; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 176. – *L. poilanei* Gagnep., 1932, Bull. Soc. Bot. France, 79: 166; id., 1932, l.c. 6, 2: 177, fig. 17, 15–20, 18, 1. – *L. mantidopsis* Szlach., 1993, Fragm. Florist. Geobot. 38: 459, fig. 7; Aver., 1994, Ident. Guide Vietnam. Orch.: 401; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 42.

Described from Reunion Island (“Isle De Bourbon”). **Type** (“Jussieu”) hardly exists. **Neotype** (“Mauritius, Commerson s.n.”) proposed by Pearce et Cribb, 2002, l.c.: 204, as “lectotype” – P-LA.

Miniature epiphyte with dense, ovoid or narrowly ovoid 1-leaved pseudobulbs 0.5–0.8 cm tall, 3–5 mm wide. Leaf shortly petiolate, oblanceolate, acute, (2)3–8(12) cm long, 0.5–0.8 cm wide. Inflorescence erect, straight, (3)4–10(15) cm long. Scape slightly compressed and very narrowly winged. Rachis with few to many subax greenish-white flowers. Floral bracts cuneate, (1.5)2–4(5) mm long, as long as pedicel and ovary or little shorter. Sepals and petals obtuse, 1.5–2 mm long; sepals narrowly ovate, 1-veined; petals narrowly lanceolate to linear. Lip rectangular oblong, ecallose, strongly recurved at middle, 1.5–2 mm long, 1–1.2 mm wide, at base with small obscurely triangular auricles, apex acute or subtruncate and shortly mucronate, sometimes slightly undulate along margin. Column hardly arcuate, 1–1.2(1.4) mm tall, with small insignificant roundish wings at apex. Capsule almost globular, 2–3 mm across on stalk of the same length. **Fig. 53**, h, i.

Ecology. Primary and old secondary evergreen broad-leaved and coniferous forests on any kind of rocks. 500–2000 m. Fl. August – October. Not rare (VU).

Distribution. Vietnam (Dien Bien, Dong Nai, Ha Giang, Hoa Binh, Kon Tum, Lam Dong, Lao Cai, Ninh Thuan). Tropical area of the Old World extending to islands of western Pacific.

Studied specimens. Dien Bien, Tua Chua, *CPC 982a/2* (LE), *CPC 982a/16* (LE), *CPC 982b*

(LE); Dong Nai, Dinh, *Pierre s.n.*, a. 1866 (P); Ha Giang, Dong Van, *CBL 1876a* (LE); Hoa Binh, Lac Son, *CPC 1384b* (LE); Kon Tum, Dak Gley, *VH 2269* (HN, LE, MO); Kon Tum, Ngoc Linh mt., *VH 789* (HN, LE, MO, P); Lam Dong, Bao Loc, *Tixier 34 63* (P); Lam Dong, Dalat, *Evrard 1789* (P), *Sigaldi 238* (P); Lam Dong, Dalat, Suoi Vang, *Averyanov et al., LX-VN 1598* (HN, LE); Lam Dong, Langbian mt., *Averyanov et al., LX-VN 1553* (HN, LE); Lam Dong, Langhanh, *Sigaldi 255* (P); Lao Cai, Chapa, *Petelot 5159* (P); Lao Cai, Van Ban, *HAL 2018* (HN, LE), *HAL 2313* (HN, LE); Ninh Thuan, Cana, *Evrard 2402* (P), *Poillane 12428* (P).

Note. One of the most common species in Vietnam easily overlooked in botanical surveys due to its dwarf habit and very small unattractive flowers.

40. *L. pumila* Aver.,

2003, Updated Checklist Orchids Vietnam: 42, 85, fig. 7; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 223;

Described from northern Vietnam (“Hoa Binh Prov., Da Bac Distr., to the SW of Doan Ket village (20°54’01”N, 105°04’19”E”). **Type** (“29 March 2001, N.T. Hiep, L. Averyanov, N.T. Vinh, *HAL 317*”) – HN, LE.

Epiphytic herb. Pseudobulbs ovate to subglobose, 5–7 mm tall, 1-leaved. Leaves subsessile, broadly oblanceolate to elliptic, acute, 1–5(6) cm long, 5–8 mm wide. Inflorescence erect, straight; scape ebracteate, broadly winged, 1–3.5 mm long; rachis 1–3.5 cm long, with 5–15(20) rather lax flowers. Floral bracts narrowly triangular, 3–4 mm long, nearly as long as pedicel and ovary. Flowers light green, about 4–4.5 mm across. Sepals and petals 2.5 mm long; sepals narrowly ovate, 1-veined; petals linear. Lip oblong rectangular, 3 mm long, 1.8 mm wide, strongly curved, at the base with 2 small auricles and 2 small round calli along lateral veins; epichile broad, orbiculate, often with small median dent, finely irregularly crenulate along margin. Column slightly curved near apex, about 2 mm tall, with insignificant narrow wings. Capsules obovoid, 2–2.5 mm long. **Fig. 55; 56**, a, b.

Ecology. Primary evergreen broad-leaved and coniferous humid forests, mostly on rocky limestone, commonly on tops of ridges. 300–1600 m. Fl. (October) February – April. Locally common (VU).

Distribution. Vietnam (Bac Kan, Cao Bang, Ha Giang, Ha Tinh, Hoa Binh, Ninh Binh, Phu Tho, Quang Binh, Son La, Thai Nguyen, Thanh Hoa). S. China, Laos.

Fig. 55. Digital herbarium specimen of *Liparis pumila* (HAL 12707).

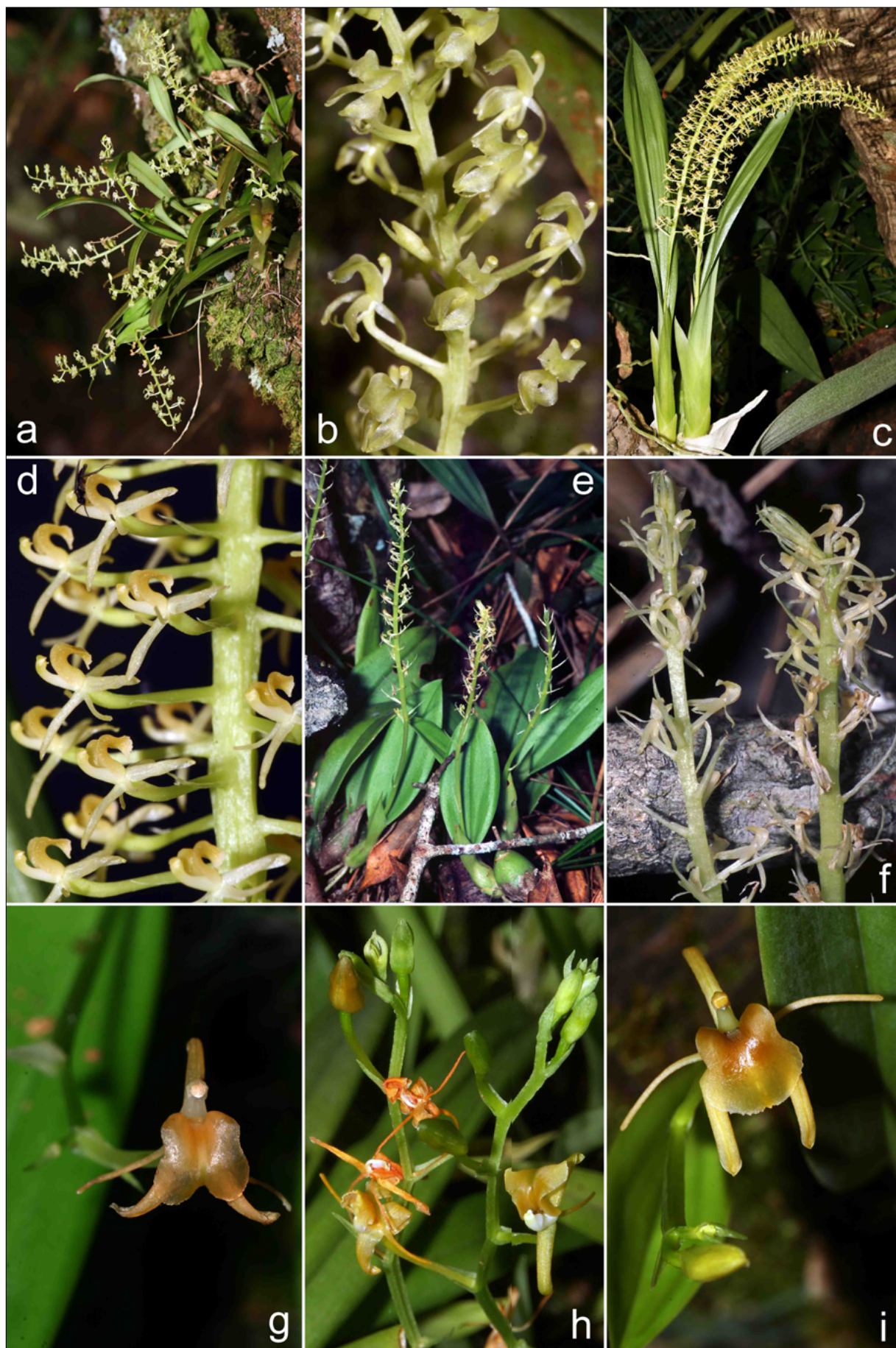


Fig. 56. *Liparis pumila*: a (CPC 1811), b (CPC 1901); *L. dendrochiloides*: c, d (HAL 11579); *L. longibracteata*: e, f (HAL 2979); *L. rivularis*: g (HAL 10443, type); *L. chapaensis*: h, i (Averyanov et al., LX-VN 0/80).

Studied specimens. Bac Kan, Cho Don, *HAL* 4712 (HN); Cao Bang, Tra Linh, *CBL* 1141 (HN, LE); Ha Giang, Bac Me, *HAL* 6444 (HN); Ha Giang, Quan Ba, *DKH* 5192 (HN, LE, MO); Ha Giang, Yen Minh, *NTH* 3505 (HN); Ha Tinh, Huong Son, *HAL* 5199 (HN, LE); Hoa Binh, Da Bac, *HAL* 317 (HN, MO); Hoa Binh, Lac Son, *CPC* 1621 (CPC Herbarium), *CPC* 1732 (CPC Herbarium); Hoa Binh, Mai Chau, *DKH* 7941 (HN, LE, MO), *DKH* 8073 (LE); Hoa Binh, Tan Lac, *CPC* 1796 (CPC Herbarium), *CPC* 2029 (CPC Herbarium); Ninh Binh, Cuc Phuong, *HAL* 1671 (HN), *HAL* 2902 (HN, LE); Phu Tho, Tan Son, *HAL* 12707 (HN, LE); Quang Binh, Bo Trach, *HAL* 6185 (HN), *HAL* 6359 (HN, MO); Quang Binh, Minh Hoa, *CPC* 4348 (CPC Herbarium), *HAL* 11706b (LE), *HAL* 5922 (HN); Son La, Thuan Chau, *CPC* 1811 (CPC Herbarium); Son La, Yen Chau, *CPC* 1901 (CPC Herbarium); Thai Nguyen, Vo Nhai, *NTH* 3807 (HN, LE); Thanh Hoa, Ba Thuoc, *HAL* 3346 (HN), *HAL* 4355 (HN); Thanh Hoa, Quan Hoa, *HAL* 3735 (HN); d-EXSICCATES OF VIETNAMESE FLO-RA 0161/*HAL* 12707.

Note. This species endemic to limestone areas of N. Vietnam, NE. Laos and S. China, probably, is not rare, but it is easily overlooked in collecting due to its dwarf habit and inconspicuous appearance.

Record of this species for Laos is based on collection – Borikhamxai, Khamkeut, *Averyanov et al.*, *LA-VN* 34, a. 2009 (HN).

41. *L. dendrochiloides* Aver.,

1988, Bot. Journ. (Leningrad) 73, 3: 432; Seidenf., 1992, Opera Bot., 114: 139, fig. 84; Aver., 1994, Ident. Guide Vietnam. Orch.: 145; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 902, fig. 11354; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 42; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 296. – *L. dendrochilum* auct. non Rchb. f.: Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 175.

Described from S. Vietnam (“Annam, Langbian”). **Type** (“Eberhardt 58B”) – P.

Epiphytic and lithophytic herbs with ovoid, slightly flattened 1-leaved, erect, densely clustered pseudobulbs. Pseudobulbs (2)3–5 cm tall, (1)1.5–3 cm wide, covered by large loose white papyraceous bracts. Leaves oblong oblanceolate, acute, (25)30–40(45) cm long, (1.5)2–4(4.5) cm wide, often with 3 prominent veins. Inflorescence erect or slightly curved, (20)25–35 cm long, shorter than leaves. Scape as long as rachis, or little shorter, flattened and narrowly winged. Rachis with many dense white to light yellowish flowers. Floral bracts narrowly cuneate, acuminate, scarious, 4–6(8) mm

long, shorter than flowers. Pedicel and ovary 5–8(9) mm long. Sepals and petals blunt, 3 mm long; sepals narrowly ovate; petals linear. Lip rhombic, strongly bent at middle, 3–3.5 mm long, 1.8–2 mm wide, at base channeled, with small lateral auricles, ecallose (or with 2 small dents?), apex broadly triangular, finely erose. Column arcuate, 2–2.2 mm tall, wingless. Capsule narrowly obovoid, 6–8 mm long on stalk of the same length. **Fig.** 56, c, d; 57, a.

Ecology. Primary and rich secondary evergreen broad-leaved humid forests on granite and shale, particularly along steep shady stream slopes of wet narrow canyons, often on stream bluffs in large colonies. 300–1000 m. Fl. November – December. Not common, but locally abundant (VU).

Distribution. Vietnam (Lam Dong, Lao Cai, Quang Binh, Thanh Hoa, Thua Thien – Hue). Endemic.

Studied specimens. Lao Cai, Laokay, *Simond* drawing 111B (P); Quang Binh, Bo Trach, *HAL* 6274 (HN, LE); Quang Binh, Le Thuy, *HAL* 11451 (HN, LE, MO); Quang Binh, Quang Ninh, *HAL* 11579 (HN, LE, MO); Thanh Hoa, Ba Thuoc, *HAL* 2979 (HN, LE); Thua Thien - Hue, Phu Loc, *HLF* 1513 (HN, LE); Thua Thien – Hue, Xuan Loc, *HLF* 1819 (HN, LE); N. Vietnam, Bai ha, *s. coll.*, 1268, a. 1962 (LE).

Note. Specimens of this species are usually easy recognizable for their very large size, particularly, for big leaves distinctly larger than in any other *Liparis* species in Indochina and long dense inflorescence with very small flowers.

42. *L. longibracteata* Aver., sp. nov.

Described from N. Vietnam (“N. Vietnam, Thanh Hoa Prov., Ba Thuoc Distr., Co Lung Municipality, Khuyn village, around point 20°26’31”N, 105°14’55”E”). **Type** (“17 Sept. 2003, *L. Averyanov, D.T. Doan, J. Regalado, N.T. Vinh, HAL* 2979”) – LE (holotype), HN (isotype).

Epiphytic and lithophytic herbs with narrowly ovoid, conical, elongate or spindle-shaped, 1-leaved, prostrate or ascending pseudobulbs 1–4 cm long, 0.5–1 cm wide. Each new pseudobulb arising from middle part of previous one, usually forming more or less distinct creeping rhizome, young covered with scarious papyraceous bracts, old naked. Leaves narrowly obovate, elliptic to broadly elliptic, acute, often shortly apiculate, dorsally with distinct keel, 6–15(20) cm long, 2–3(3.5) cm wide. Inflorescence erect, almost straight, (10)15–30(35) cm long, much longer than leaves. Scape usually twice shorter than rachis, almost terete, very nar-

rowly winged, with few scarious, cuneate sterile bracts. Rachis with many subdense white, greenish or yellowish flowers. Floral bracts narrowly cuneate, acuminate, scarious, (4)5–9(11) mm long, longer than flowers. Pedicel and ovary 4–6 mm long. Sepals and petals blunt, 2.5 mm long; sepals narrowly ovate; petals linear. Lip rhombic, strongly bent at middle, 2.5–3 mm long, 1.5–1.8 mm wide, at base channeled, apex broadly triangular, finely erose. Column hardly curved, almost straight, 1.6–1.8 mm tall, wingless. Capsule broadly obovate to almost globular, 3–4 mm across on stalk of the same length. **Fig. 56**, e, f; **57**, b–e.

Etymology. Species name reflects characteristically long floral bracts.

Ecology. Primary and rich secondary evergreen broad-leaved and coniferous humid forest on rocky limestone, commonly on mossy rocky outcrops near tops of ridges. 200–800 m. Fl. August – October. Not common (VU).

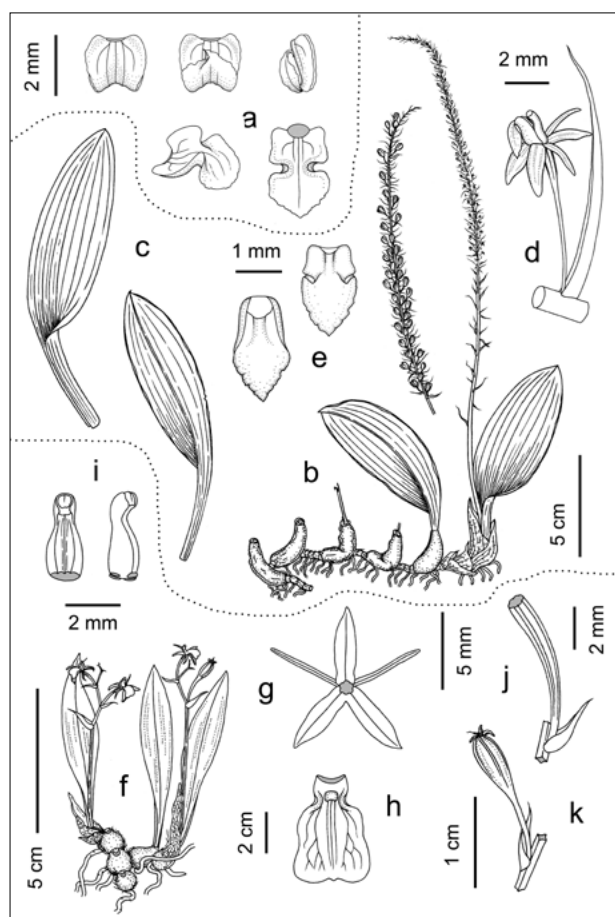


Fig. 57. *Liparis dendrochiloides*: a – lip, frontal view, view from behind, side view, half side and flattened views (HAL 11579); *L. longibracteata*: b – flowering plant, c – leaves, d – flower and portion of rachis, e – intact and flattened lip (CBL 1211); *L. rivularis*: f – flowering plant, g – flattened sepals and petals, h – flattened lip, i – column, frontal and side views, j – pedicel and ovary, k – ripe capsule (HAL 10443, type).

Distribution. Vietnam (Bac Kan, Cao Bang, Ha Giang, Hoa Binh, Quang Binh, Thai Nguyen, Thanh Hoa). Endemic.

Studied specimens. Bac Kan, Cho Don, *HLF* 843 (HN, LE); Bac Kan, Na Ri, *DKH* 7611 (HN, LE, MO); Cao Bang, Thach An, *CBL* 889 (HN, LE, MO); Cao Bang, Tra Linh, *CBL* 1211 (HN, LE, MO); Ha Giang, Dong Van, *NTH* 3538 (HN, LE); Ha Giang, Meo Vac, *CBL* 1869 (HN, LE, MO); Ha Giang, Quan Ba, *Averyanov et al.*, *HG* 83, a. 1995 (HN, LE); Hoa Binh, Lac Son, *CPC* 1384c (LE); Quang Binh, Minh Hoa, *CPC* 5034 (CPC Herbarium); Quang Binh, Tuyen Hoa, *CPC* 2626 (CPC Herbarium); Thai Nguyen, Vo Nhai, *NTH* 3824 (HN, LE); Thanh Hoa, Ba Thuoc, *HAL* 2979 (HN, LE).

Note. Flowers of this species are very similar to those of *L. dendrochiloides* which, however, are little larger. Furthermore, *L. longibracteata* differs from *L. dendrochiloides* in long floral bracts always exceeding flowers, in short, relatively rigid, elliptic, carinate leaves, inflorescence much longer than leaves, small subglobular fruits and in pseudobulbs arising from the middle part of previous one and forming more or less distinct creeping rhizome. Species has obvious calcium dependence and is very common in many limestone regions of northern Vietnam, where it plays important role in primary lithophytic plant communities. It can be certainly found in limestone areas of S. China and NE. Laos at the border with Vietnam.

43. *L. rivularis* Aver.,

2007, *Taiwania* 52: 299.

Described from NW. Vietnam (“Lai Chau Prov., Tam Duong Distr., Ho Thau Community, Ho Thau village, around point 22°25’20”N, 103°36’13”E”). **Type** (“7 Dec. 2006, *N.T. Hiep*, *L. Averyanov*, *P.V. The*, *HAL* 10443”) – LE (holotype), HN (isotype).

Lithophytic and occasionally epiphytic herb with 1-leaved, oblique ovoid to sub-globose crowded pseudobulbs 5–9 mm tall. Leaves sessile or shortly petiolate, relatively rigid, lanceolate to narrowly ovate, acute, 3–7 cm long, 0.8–1.2 cm wide. Inflorescence erect, with 1–3(5) lax flowers, 4–6 cm long; scape square in section, commonly 3–5 cm long, ebracteate; rachis zigzag. Floral bracts cuneate, acuminate, 4–7 mm long, shorter than ovary. Pedicel and ovary longitudinally ridged, 6–8 mm long. Flowers 6–7 mm across, olive-green, yellowish-brown to light dull orange. Sepals and petals reflexed, 5–5.5 mm long, obtuse; sepals broadly lanceolate, 1-veined; petals linear. Lip oblong rectangular, 5 mm long, 3.5–4 mm wide, narrowing to the

base, strongly recurved at basal third, with prominent hemispheric callus at the base; apex truncate or shallowly emarginate, sometimes with small blunt median tooth. Column straight, slightly curved, wingless or with small ears at apex, bottle-shaped, fleshy at the base, 2.5–3 mm tall, 1.3–1.4 mm wide. Capsule narrowly obovoid, 8 mm long on stalk 5–7 mm long. **Fig. 56**, g; **57**, f-k.

Ecology. Primary and secondary humid evergreen broad-leaved and coniferous forests on silicate rocks, commonly on shady wet mossy cliffs along small mountain rivers and streams, often along waterfalls. 1600–2700(3000) m a.s.l. Fl. June – July (November – December). Not rare, locally abundant (LR).

Distribution. Vietnam (Kon Tum, Lai Chau, Lam Dong, Lao Cai).

Studied specimens. Kon Tum, Ngoc Linh mt., *VH 119* (HN, LE, MO), *VH 736* (HN, LE, MO); Lam Dong, Lac Duong, Bi Dup mt., *VH 3406* (HN, LE, MO); Lao Cai, Sa Pa, Phang Xi Pang, *P.K. Loc P 7365* (LE).

Note. The species may be close to *L. esquirolei*, from which it differs in twice smaller flowers, truncate or shallowly emarginate lip and in regularly lithophytic habit. This dwarf plant with its unattractive small flowers is typical element of highland Vietnamese flora. It is often the only common orchid observed in highland areas above 2400 m a.s.l. *Liparis rivularis* regularly inhabits shady wet rocks and cliffs along small mountain rivers and streams, where often forms large dense colonies immersed into thick moss cover. Sometimes plants are shortly flooded with high water during summer torrential rains. Sporadically flowering specimens were collected in November – December. However, regular flowering of this species should be observed in June – July.

Another close miniature species common in highlands of Vietnam, *L. luteola*, differs from *L. rivularis* in 2-leaved pseudobulbs and preferably epiphytic habit.

44. *L. chapaensis* Gagnep.,

1932, Bull. Soc. Bot. France 79: 166; id., 1932, Fl. Gen. Indo-Chine 6, 2: 186, fig. 18, 2–7; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 58, fig. 35; id., 1992, Opera Bot., 114: 138, fig. 83; Aver., 1994, Ident. Guide Vietnam. Orch.: 146; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 901, fig. 11352; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 41; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 272; Chen Singchi, Ormerod, Wood, 2009, Fl. China, 25: 223.

Described from NW. Vietnam (“Tonkin... Lo-qui-ho, pres Cha-pa”). **Type** (“*Petelot 5173*”) – P.

Miniature epiphytic and rarely lithophytic herb with dense, prostrate, oblong obovoid, 1-leaved pseudobulbs 0.5–1 cm long, 4–6 mm wide. Leaves shortly petiolate, narrowly elliptic, acute, 3–5(10) cm long, 0.8–1.2 cm wide. Inflorescence erect or arching, 4–7 cm long; scape compressed, narrowly winged; rachis 2–4 cm long, with (1)3–15(20) lax flowers. Floral bracts cuneate, 4–8 mm long. Pedicel and ovary 8–10 mm long. Flowers green, olive-green or brownish, turning dull orange. Sepals and petals 4–6(8) mm long, acute; sepals oblong lanceolate, 3-veined; petals linear to filiform. Lip oblong obovate, about 4 mm long, 3 mm wide, with entire or 2-lobed callus at base, obscurely truncate and shortly mucronate at apex. Column white, slightly arcuate, 3 mm tall, with narrow short wings at apex. **Fig. 56**, h, i.

Ecology. Primary and rich secondary evergreen broad-leaves and coniferous humid forests, preferably on granite, shale and other silicate rocks. 600–1500(2000) m. March – May, October. Not rare (VU).

Distribution. Vietnam (Ha Giang, Ha Tinh, Lam Dong, Lao Cai, Ninh Binh, Vinh Phuc). Myanmar, S. China, Laos?

Studied specimens. Ha Giang, Bac Me, *HAL 6558* (HN, LE – photo); Ha Giang, Hoang Su Phi, *HAL 6618* (HN, LE); Ha Tinh, Huong Son, *HAL 1260* (HN, LE); Lam Dong, Dalat, *Sigaldi 260* (P); Lao Cai, Sapa, *Doan 2662* (HN, LE); Lao Cai, Van Ban, *HAL 2745* (HN, LE); Ninh Binh, Cuc Phuong, Ha Nam Ninh, *Truong 1117* (HN), *Averyanov et al., LX-VN 1801* (HN, LE); Vinh Phuc, Tam Dao, sine coll., *14966* (HN, LE), *Averyanov et al., LX-VN 0/80* (LE), *2326* (HN, LE); *2381* (HN, LE); *3974* (HN, LE), *3981* (HN, LE), *3983* (HN, LE).

Note. Questionable species very close to *L. esquirolii* Schltr. differing actually only in a little smaller flowers and in prostrate pseudobulbs, feature that looks very plastic ecologically.

Record of this species from Laos is based on wrongly identified specimen (*Poillane 1887* housed at P). Meanwhile, the species can be certainly found in northern areas of the country allied to borders with Myanmar, China and Vietnam.

45. *L. penduliflora* Szlach.,

1993, Fragm. Florist. Geobot. 38: 453, fig. 2; Aver., 1994, Ident. Guide Vietnam. Orch.: 402; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 42;

Described from NW. Vietnam (“VIETNAM. Environs de Chapa”). **Type** (“Sept 1929, *Petelot 4298 bis.*”) – P.

Epiphytic or lithophytic herb with crowded, ovate, 1-leaved pseudobulbs, 6–10 mm tall. Leaves broadly lanceolate to narrowly ovate, acute, 5–8 cm long, 1.5–2 cm wide. Inflorescence slender, arcuate, 8–10(12) cm long, longer than leaves; scape 2.5–3 cm long, narrowly winged; rachis 6–8 cm long, with 20–25 subdense flowers. Flowers 1 cm across. Floral bracts narrowly cuneate, acuminate, 6–8(9) mm long. Pedicel and ovary 8–11 mm long, narrowly winged. Sepals and petals 5–6 mm long, obtuse; sepals oblong narrowly ovate, 3-nerved; petals linear to filiform. Lip oblong obovate, 5–5.5 mm long, 3.5–4 mm wide, recurved, with small rounded lateral auricles and entire low rectangular callus at base, slightly constricted at middle, broadly obtuse at apex. Column 3.5 mm tall, bent and narrowly winged in apical part. **Fig. 58**, a, d.

Ecology. Primary and secondary evergreen broad-leaved humid forest on granite. 1800 m. Fl. September. Very rare (DD).

Distribution. Vietnam (Lao Cai). Endemic.

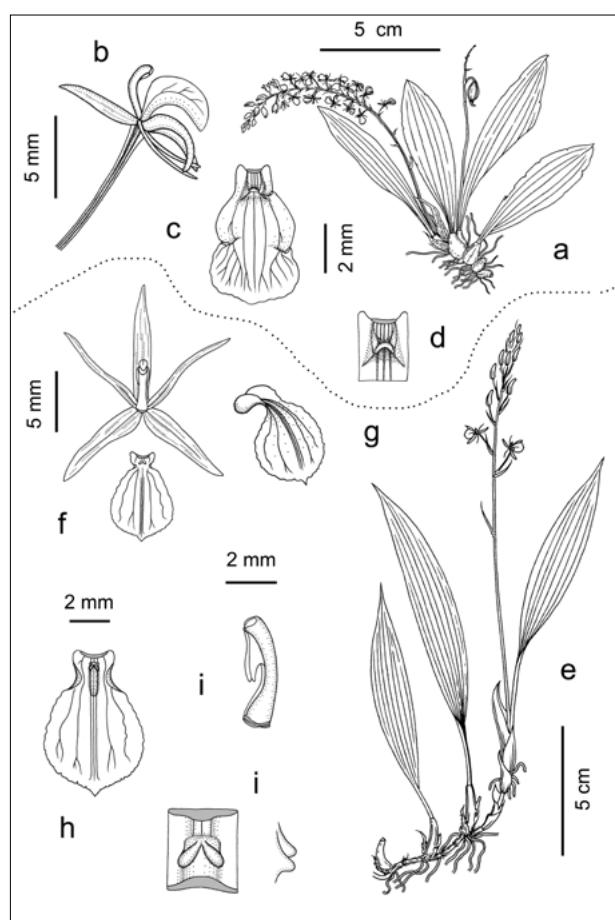


Fig. 58. *Liparis penduliflora*: a – flowering plant (Petelot 4298), b – flower, side view, c – flattened lip, d – callus at lip base (copied from Szlach., 1993, *Fragm. Florist. Geobot.* 38: 453, fig. 2); *L. bautingensis*: e – flowering plant, f – flattened flower and lip, g – lip, side view, h – flattened lip, i – column, side view, j – callus at lip base, frontal and side views (CBL 558).

Note. Very questionable taxon allied to variable *L. esquirolei*, *L. chapaense*, and *L. bootanensis*. It is known till now only from the type collection.

46. *L. bootanensis* Griff.,

1851, *Not. Pl. Asiat.* 3: 278; Gagnep., 1932, *Fl. Gen. Indo-Chine* 6, 2: 183; Seidenf., 1976, *Dansk Bot. Ark.*, 31, 1: 50, fig. 28; id., 1992, *Opera Bot.*, 114: 138; Comber, 1990, *Orch. Java*: 135, fig.; Seidenf., Wood, 1992, *Orch. Malay. Sing.*: 233, fig. 98 f-h; Aver., 1994, *Ident. Guide Vietnam. Orch.*: 145; P.H. Ho, 2000, *Ill. Fl. Vietnam* 3: 901, fig. 11350; Su Horng-Jye, 2000, *Fl. Taiwan* 5: 938; Pearce et Cribb, 2002, *Orch. Bhutan*: 204, fig. 49; Aver. et Averyanova, 2003, *Updated Checklist Orch. Viet.*: 41; Newman et al., 2007, *Checkl. Vasc. Pl. Lao*: 272; Schuiteman et al., 2008, *Nord. Journ. Bot.*, 26: 295; Chen Sing-chi, Ormerod, Wood, 2009, *Fl. China*, 25: 221; Barretto, Cribb, Gale, 2011, *Orch. Hong Kong*: 294, fig. 241–244. – *L. amphibius* Gagnep., 1950, *Bull. Mus. Hist. Nat. Hist. ser. 2*, 21: 737.

Described from Bhutan (“Bootan, Durunga”). **Type** (“Griffith 1460”) – K-LINDL.

Epiphytic and lithophytic herbs with crowded, narrowly ovoid to ovoid, 1-leaved pseudobulbs 0.8–1.5 cm tall, 5–10 mm thick. Leaves shortly petiolate, narrowly oblanceolate to oblong elliptic, acute, (4)6–20(25) cm long, 1–2.5(3.5) cm wide. Inflorescence 6–20(25) cm long; scape compressed, narrowly winged, with 1–2 triangular sterile bracts; rachis arching to pendulous, 4–8(12) cm long, with 5–25 lax flowers. Floral bracts cuneate, 3–8(10) mm long. Pedicel and ovary 4–10 mm long. Flowers olive-green to dull yellowish-orange, about 1 cm across. Sepals and petals acute, 5–8 mm long; sepals broadly lanceolate; petals linear to filiform. Lip oblong obovate to obovate, 5–6.5 mm long, 3.5–5 mm wide, with entire to irregular erose margin, at base with low, round, conical or finger-like dark green calli, at apex truncate, rounded or slightly notched, usually broadly apiculate. Column white, arcuate, 3–4 mm tall, with triangular falcate wings at apex. Operculum ovoid, 1 mm long, notched at apex. Capsule obovoid, 8–12 mm long on stalk of the same length. **Fig. 59; 60**, a, b.

Ecology. Primary and secondary evergreen broad-leaved and coniferous humid forests on any kind of rocks. (400)600–1700 m. Fl. October – March. Not rare (LR).

Distribution. Vietnam (Ha Giang, Ha Tinh, Hanoi, Hoa Binh, Khanh Hoa, Kon Tum, Lai Chau, Lam Dong, Lao Cai, Quang Binh, Thai Nguyen,



Fig. 59. Digital herbarium specimen of *Liparis bootanensis* (HAL 12416).

Thanh Hoa, Thu Thien – Hue, Vinh Phuc). NE. India, Bhutan, S. China, Taiwan, Myanmar, Thailand, Japan, Malacca Peninsula, Java, Philippines.

Studied specimens. Ha Giang, Bac Me *HAL* 6557 (HN, LE); Ha Giang, Quan Ba, *DKH* 6230 (HN, LE, MO); Ha Giang, Vi Xuyen, *DKH* 5356 (HN, LE, MO), *DKH* 6455 (HN, LE, MO); Ha Giang, Yen Minh, *HAL* 8413 (HN, LE); Ha Tinh, Huong Son, *HAL* 5340 (HN, LE); Hanoi, Voxa, Tonkin, *Bon s.n.*, a. 1882 or 1885 (P); Hoa Binh, Mai Chau, *HAL* 828 (HN, LE, MO); Khanh Hoa, Khanh Son, *VH* 4151 (HN, LE), *VH* 4364 (HN, LE, MO); Kon Tum, Kon Plong, *P.K. Loc P-10648* (LE); Kon Tum, Dak Gley, *VH* 623 (HN, LE, MO), *VH* 1665 (HN, LE, MO), *VH* 1670 (HN, LE), *VH* 12048 (HN, LE); Kon Tum, Ngoc Linh mt., *VH* 766 (HN, LE, MO); Kon Tum, Kon Plong, *DKH* 4702 (HN, LE, MO); Lai Chau, Sin Ho, *HAL* 9978 (HN, LE); Lai Chau, Tam Duong, *HAL* 10185 (HN, LE); Lam Dong, Lac Duong, *VH* 3752 (HN, LE, MO), *VH* 4140 (HN, LE); Lam Dong, Lang bian, *Tixier* 76 (P); Lam Dong, Prem, *Evrard* 1213 (P); Lao Cai, Chapa, *Lecomte* 420 (P), *Petelot* 5174 (P), *Petelot* 5174 (P), *Petelot* 5214 (P), *Petelot* 5214 (P), *Nuraliev s.n.*, a. 2010 (LE); Lao Cai, Van Ban, *HAL* 2058 (HN, LE); Quang Binh, Minh Hoa, *HAL* 12416 (HN, LE); Quang Binh, Phong Nha – Ke Bang, *HAL* 6214 (HN, LE); Quang Binh, Bo Trach, *HAL* 6214 (HN, LE); Thai Nguyen, Dai Tu, *VH* 5052 (HN, LE, MO); Thanh Hoa, Ba Thuoc, *HAL* 3966 (HN), *HAL* 4199 (HN), *HAL* 4344 (HN); Thu Thien – Hue, Phu Loc, *HLF* 1164 (HN, LE), *HLF* 1387 (HN, LE); Vinh Phuc, Tamdao, *Averyanov et al., LX-VN s.n.* (HN, LE); *Averyanov et al., LX-VN* 2380 (HN, LE), *Averyanov et al., LX-VN* 4427 (HN); d-EXSICCATES OF VIETNAMESE FLORA 0155/*HAL* 12416 (HN, LE).

Note. *Liparis bootanensis* is one of the most common and widespread species of the genus in Vietnam. *Liparis langbianense* N.T. Tich illustrated and mentioned by P.H. Ho (2000, Ill. Fl. Vietnam 3: 909, fig. 11381) as nom. nud., probably belong here. I did not find the valid description of this taxon and not seen any herbarium material.

47. *L. balansae* Gagnep.,

1932, Bull. Soc. Bot. France 79: 165; id., 1932, Fl. Gen. Indo-Chine 6, 2: 186; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 49, fig. 27; id., 1992, Opera Bot., 114: 138, pl. 9c; Aver., 1994, Ident. Guide Vietnam. Orch.: 146; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 901, fig. 11349; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 41; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 221. – *L.*

anatina Szlach., 1993, Fragm. Florist. Geobot. 38: 454, fig. 3; Ormerod, 2007, Taiwania 52, 4: 308.

Described from Vietnam (“Tonkin: ... Bavi ... Cha-pa ... Annam: Mere et l’Enfant, 2000 m alt., prov. Nhatrang”). **Lectotype** (“Bavi, *Balansa* 2022”) – P.

Epiphytic or rarely lithophytic herb with crowded, ovoid, 1-leaved pseudobulbs 1–1.5 cm tall. Leaves sessile to shortly petiolate, narrowly obovate to elliptic, acute, 8–15 cm long, 1–2(3) cm wide. Inflorescence 8–20(22) cm long, arching; scape compressed, narrowly winged; rachis with 3–8(12) distant flowers. Floral bracts cuneate, 0.5–1.5 cm long. Pedicel and ovary 1.5–1.8 cm long. Flowers dark green turning dull yellow-orange. Sepals and petals 1–1.2 cm long, obtuse; sepals broadly lanceolate; petals linear filiform. Lip broadly obovate to almost orbicular, 0.8–1.2 cm across, at base with 2 dark green calli, entire or slightly eroded along margin, apex rounded or hardly emarginate and shortly apiculate. Column white, slightly arcuate, 4–5 mm tall, with large triangular falcate acute wings at apex. Operculum green, hemispheric, with prominent, rectangular beak, about 2 mm long, notched at apex. Capsule obovoid, 1–1.2 cm long on stalk 1–1.5 cm long. **Fig. 60**, c, d.

Ecology. Primary and rich secondary evergreen broad-leaved humid forests, mostly on silicate rocks. 600–1300 m. July – October. Not common (VU).

Distribution. Vietnam (Da Nang, Dak Lak, Ha Giang, Ha Tinh, Hanoi, Khanh Hoa, Kon Tum, Lam Dong, Lao Cai, Ninh Thuan, Phu Tho, Thua Thien – Hue, Vinh Phuc). Thailand, S. China.

Studied specimens. Da Nang, Hoa Vang, *CPC* 3328 (CPC Herbarium); Dak Lak, Krong Bong, *VH* 6436 (HN, MO); Ha Giang, Vi Xuyen, *DKH* 5530 (HN, LE, MO); Ha Tinh, Huong Son, *HAL* 1277 (HN); Hanoi, Bavi, *Balansa* 2022 (P); Khanh Hoa, Mere et l’Enfant mt., *Poillane* 5093 (P); Kon Tum, Kon Plong, *VH* 5321 (HN, LE, MO); Lam Dong, Bidup Mt., *Truong s.n.*, a. 2012 (LE – photo); Lao Cai, Chapa, *Petelot* 5427 (K), *Petelot s.n.*, a. 1929 (P); Ninh Thuan, Ninh Hai, *HLF* 4315 (HN, LE, MO), *HLF* 4429 (HN, LE, MO); Phu Tho, Tan Son, *HAL* 12783e (LE); Thua Thien – Hue, *HAL* 7323 (HN); Vinh Phuc, Tam Dao, *Petelot* 5428 (AMES), *Averyanov et al., LX-VN* 0/56, 0/59, 0/79, 3897, 3947 (HN, LE).

Note. Easily recognizable species for its large dark green flowers, large rectangular operculum beak and prominent triangular-falcate wings at the front of column. Species owes large attractive flowers and is quite desirable for cultivation as ornamental plant.

Some records mentioned here are based on sterile specimens and need verification by observations of flowering plants.

48. *L. bautingensis* Tang et F.T. Wang,

1974, *Acta Phytotax. Sin.* 12: 39; Chen Sing-chi, Ormerod, Wood, 2009, *Fl. China*, 25: 221.

Described from Hainan ("Hainan: Pao-T'ing Hsien"). **Type** ("21 XII 1954, leg. *Tiaolo Exp. 3216*") – PE.

Lithophytic and occasionally epiphytic herb with creeping woody rhizome 2–2.5 mm in diam., often with remaining membranous sheaths. Pseudobulbs narrowly ovoid to shortly cylindric, 1–2 cm long, 5 mm thick, distant on 1.5–4 cm, prostrate or ascending, 1-leaved. Leaf petiolate; petiole 1–4 cm, narrowly elliptic, 4–12(14) cm long, 1.5–2 cm wide, shortly acuminate. Inflorescence 8–20 cm; scape cylindric, narrowly winged; rachis 2–10 cm long with 3–12(15) flowers. Floral bracts narrowly cuneate, (5)7–15 mm. Pedicel and ovary 1–1.5 cm long. Flowers yellowish-green to olive-brownish. Sepals and petals 8–10 mm long, obtuse; sepals lanceolate; petals linear. Lip broadly obovate, 7–8 mm long 5–5.5 mm wide; at base with 2 small calli united basally; irregularly denticulate to incise along margin, often obscurely apiculate. Column slightly arcuate, 4 mm tall, wings large, as long as half of column, 1 mm wide, hooked, with acute, downward directed apex. Capsule obovoid, ca. 1.2–1.4 cm long. **Fig. 58**, e-j.

Ecology. Primary evergreen and semideciduous broad-leaved and coniferous forests on rocky limestone, commonly on rocky outcrops of mountain tops. 600–1600 m. November–December. Not rare (VU).

Distribution. Vietnam (Cao Bang, Ha Giang). China (Hainan).

Studied specimens. Cao Bang, Bao Lac, *CBL 331* (HN, LE, MO); Cao Bang, Ha Lang, *CBL 749* (HN, LE, MO); Cao Bang, Nguyen Binh, *CBL 558* (HN, LE, MO); Ha Giang, Meo Vac, *CBL 1865* (HN, LE, MO); Ha Giang, Yen Minh, *CBL 1985* (HN, LE, MO).

Note. Easily recognizable species for its creeping rhizome, distant ascending pseudobulbs and narrowly elliptic leaves. Often plays important role in formation of primary herbaceous lithophytic communities on rocky limestone at elevations 800–1500 m. Vietnamese plants differs from the type in long, many flowered inflorescence and may represent separate mainland race. In other characteristics our specimens cited here look fitting

well the description of *L. bautingensis*, on which I have seen no authentic material.

49. *L. superposita* Ormerod,

2007, *Taiwania* 52: 311, fig. 4; Chen Sing-chi, Ormerod, Wood, 2009, *Fl. China*, 25: 222. – *L. bautingensis* auct. non Tang et F.T. Wang, 1974: Chen Sing-chi, 1999, *Fl. Reipubl. Popular. Sin.* 18: 79, fig. 12, 5, 6.

Described from S. China ("China – Yunnan, Mar-li-po: Hwang-jin-in, 1400–1800 m"). **Type** ("6 November 1947, *K.M. Feng 12963*") – AMES.

Lithophyte or occasionally epiphyte with creeping, woody rhizome 4 mm in diam. and distant, 1-leaved pseudobulbs. Pseudobulbs narrowly ovoid, conical or shortly cylindrical, 1–3(5) cm apart, prostrate or ascending, 2–2.5 cm long, 5–6 mm thick, covered by 1–3 triangular, greenish sheets 1.5–5 cm long. Leaves recurved, petiolate; petiole 1.5–3 cm long; blade elliptic, acute, 8–16 cm long, 3–4 cm wide. Inflorescence arching, narrowly winged, 14–17 cm long; scape 4–12 cm long; rachis with 4–6 lax flowers. Floral bracts cuneate, acute, 5–10 mm long. Pedicel and ovary narrowly winged, 15–22 mm long. Flowers light green or olive-green turning dull yellow-orange. Sepals and petals 10–12 mm long, obtuse; sepals oblong ligulate; petals linear. Lip broadly obovate to almost orbicular, 10–11 mm across, finely denticulate along margin, round or slightly emarginate at apex, with 2 short, parallel, elliptic calli at base. Column white, 4.5–5 mm tall, slightly curved to almost straight, with large triangular falcate wings at apex. Operculum green, hemispheric, with prominent, rectangular beak, about 2 mm long, notched at apex. **Fig. 60**, e-g.

Ecology. Primary and rich secondary evergreen and semideciduous broad-leaved and coniferous forests on rocky limestone, commonly on rocky outcrops of mountain tops. 900–1500 m. October – March. Not rare (VU).

Distribution. Vietnam (Cao Bang, Ha Giang, Hoa Binh, Son La). SW. China (Yunnan).

Studied specimens. Cao Bang, Bao Lac, *CBL 330* (HN, LE, MO), Cao Bang, Nguyen Binh, *CBL 1291* (HN, LE, MO); Ha Giang, Bac Me, *HAL 6484* (HN, LE, MO); *HAL 8392* (HN, LE); Hoa Binh, Mai Chau, *VH 2436* (HN, LE, MO), *DKH 7777* (HN, LE, MO), *DKH 7812* (HN, LE, MO), *DKH 8041* (HN, LE, MO); Son La, Moc Chau, *HAL 9331* (HN, LE, MO).

Note. Like previous species, this entity is easily recognizable by its creeping rhizome, distant ascending pseudobulbs and broad elliptic leaves. It

also plays important role in lithophytic communities on rocky limestone at elevations 1000–1500 m.

Liparis superposita is very close to *L. bautingensis* Tang et F.T. Wang described from Hainan, from which it differs in much longer pseudobulbs, much broader leaves, longer rachis and longer column (Ormerod, 2007, l.c.: 312).

***L. sect. 3. Distichae* (Ridl.) Seidenf. ex Aver.,**

1994, Ident. Guide Vietnam. Orch.: 148; *L. grex Distichae* Ridl., 1886, Journ. Linn. Soc. London (Bot.) 22: 258, 291.

Lectotype: *L. disticha* Lindl.

Epiphytic herbs. Pseudobulbs ovate, naked at apex. Leaves arising from pseudobulb apex, conduplicate, coriaceous, sessile, with articulation at the base. Inflorescence arcuate to pendulous; scape flattened, longitudinally narrowly winged; rachis many time shorter than scape. Floral bracts more or less rigid, distichous, densely imbricate; flowers opening by 1–2 in succession.

10 (2) species. Mainland tropical Asia, Indonesia.

50. *L. compressa* (Blume) Lindl.,

1830, Gen. Sp. Orch. Pl.: 32; Comber, 1990, Orch. Java: 133, fig.; id., 2001, Orch. Sumatra: 147, fig.; Seidenf., Wood, 1992, Orch. Pen. Mal. Sing.: 239, fig. 102 d-f; Wood, Cribb, 1994, Checklist Orch. Borneo: 90, fig. 5c, d; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 41; Aver., 2012, Turczaninowia 15, 1: 12, Fig. 1, l-o. – *Malaxis compressa* Blume, 1825, Bijdr.: 390.

Described from Java (“Crescit: in sylvis altioribus Provinciarum Buitenzorg, Bantam et Tjanjor”). **Type** (“*Blume s.n.*”) – BO.

Epiphyte with long creeping rhizome. Pseudobulbs 3–8 cm apart, ovoid, flattened, 1-leaved, 1.5–3 cm long. Leaves oblong oblanceolate, 30–35 cm long, 2–3 cm wide, gradually narrowed into channeled, petiole-like sheath 5 cm long. Inflorescence 25–30 cm long; scape curved, flattened, narrowly winged, widening to 3.5 mm wide near rachis; rachis 1–5 cm long, with close, narrowly triangular, conduplicate, oblique, distichous, imbricate floral bracts, 5–6 mm long. Flowers opening in succession by 1–2, pale yellow-orange. Sepals and petals acute, reflexed, 0.8–1 cm long; sepals narrowly ovate; petals filiform. Lip broadly obovate to almost orbicular, 0.8–1.2 cm across, with 2 hemispheric dark purple calli at narrowing base, finely denticulate along margin, round or shortly apiculate at apex. Column 2.5–3.5

mm tall, bent at middle, broadening at base, with short round wings at apex. **Fig. 60**, h, i.

Ecology. Primary and secondary broad-leaved evergreen humid forests on sandstone and shale. 800–2000 m. Fl. February – April, June – September. Not common (DD).

Distribution. Vietnam (Dak Lak, Lam Dong). Malacca Peninsula, Sumatra, Java, Kalimantan, Sulawesi, Philippines.

Studied specimens. Dak Lak, Krong Bong, *VH 6347* (HN, MO); Lam Dong, Bi Dup mt., *J. Skornickova s.n.*, a. 2011 (LE – photo, SING – photo); Lam Dong, Blao, *Schmid s.n.*, a. 1961 (P); Lam Dong, Dalat, *Grillet 279 sig.* (P), *Averyanov et al. s.n.*, a. 1995 (LE); Lam Dong, Lac Duong, *VH 2823* (HN, LE, MO), *VH 4093* (HN, LE, MO).

Note. The species is rather uncommon, but in some observed localities it was found as abundant plant that forms dense cover of epiphytic plant community.

51. *L. gibbosa* Finet,

1908, Bull. Soc. Bot. Fr. 55: 342; Seidenf., 1976, Dansk Bot. Ark., 31, 1: 95, fig. 65; id., 1992, Opera Bot., 114: 145; Comber, 1990, Orch. Java: 133, fig.; id., 2001, Orch. Sumatra: 148, fig.; Seidenf., Wood, 1992, Orch. Malay. Sing.: 240, fig. 102 g-i, pl. 14d; Wood, Cribb, 1994, Checklist Orch. Borneo: 93, fig. 5e, f; Aver., 1994, Ident. Guide Vietnam. Orch.: 148; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 909, fig. 11382; Pearce et Cribb, 2002, Orch. Bhutan: 212; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 42; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 272; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 296.

Described from Java (“Java”). **Type** (“*Blume s.n.*”) – P.

Epiphytic and occasionally lithophytic herb with slender creeping rhizome. Pseudobulbs 1–3 cm apart, ovoid, slightly oblique, 1-leaved, 1–1.5 cm long. Leaves oblanceolate, 6–12(15) cm long, 0.5–1 cm wide, gradually narrowed into short petiole-like base. Inflorescence to 10–15(20) cm long; scape erect, rather straight, slightly curved at apex, flattened, narrowly winged; rachis 1–3(4) cm long, zigzag, with narrowly triangular, conduplicate, oblique, distichous, floral bracts, 3–5 mm long. Flowers opening in succession by 1(2), pale salmon-red. Sepals and petals obtuse, 5 mm long; median sepal and petals spatulate oblanceolate, erect or spreading; lateral sepals ovate, strongly reflexed, covering ovary. Lip about 3.5–4 mm long and wide, strongly bent, epichile rectangular in shape, papillose, with 4 convex gibbosities, apex triangular, acute, backward recurved. Column 2–2.5 mm tall,

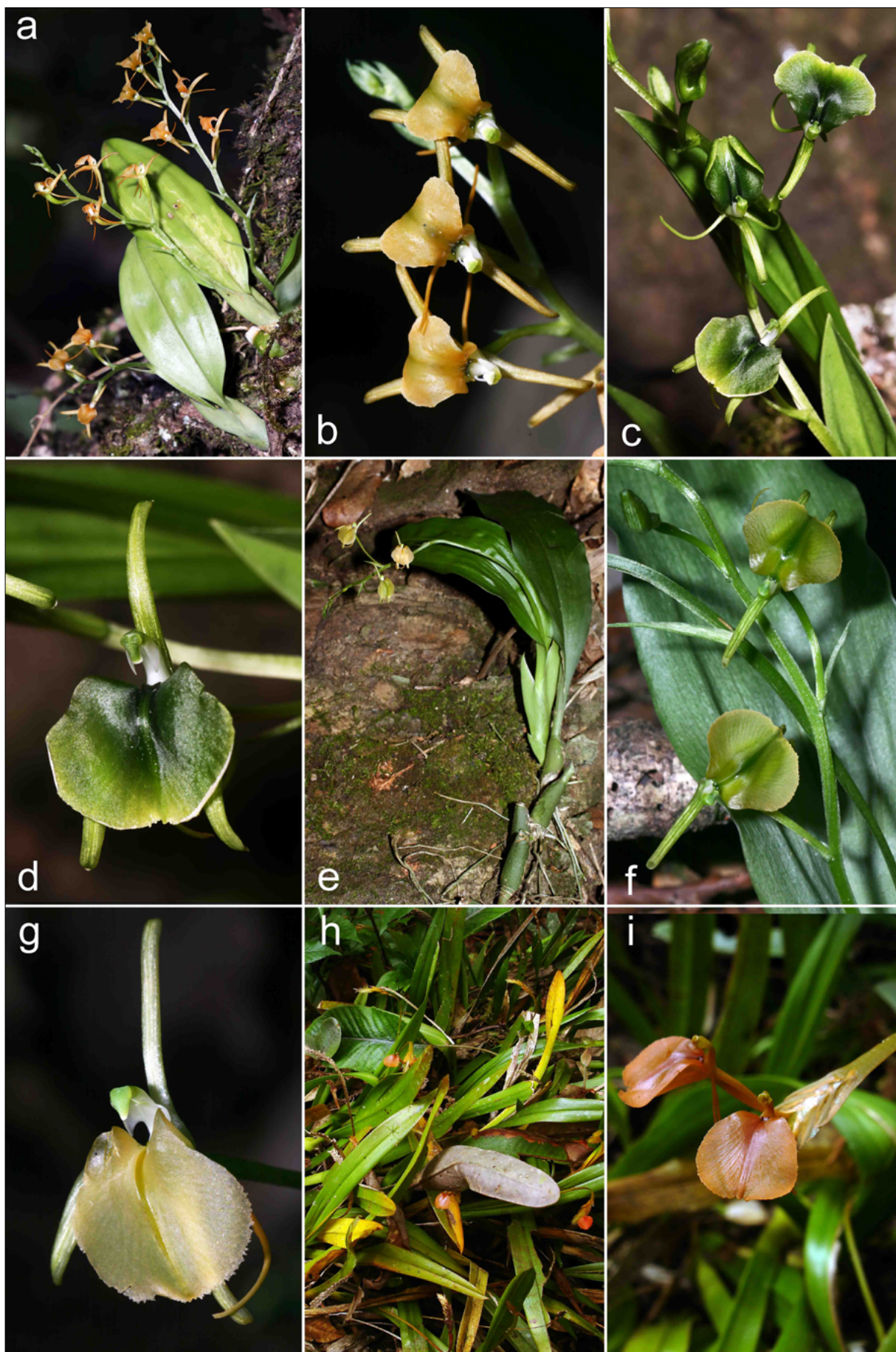


Fig. 60. *Liparis bootanensis*: a, b (HAL 6557); *L. balansae*: c, d (HAL 12783e); *L. superposita*: e (HAL 6484), f (HAL 8392), g (HAL 6484); *L. compressa*: h, i (Skornickova s.n., a. 2011).

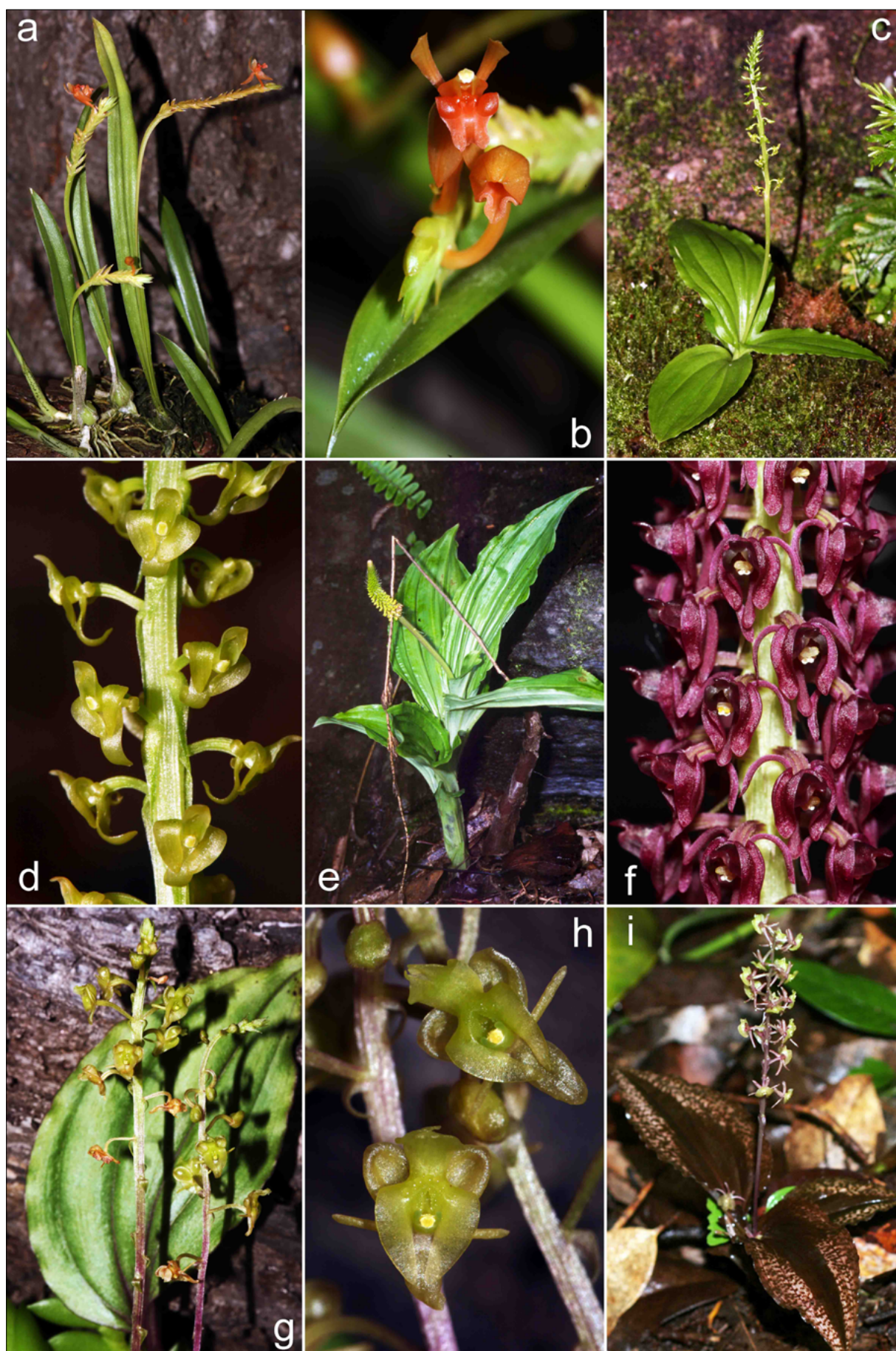


Fig. 61. *Liparis gibbosa*: a, b (HLF 4602); *Malaxis finetii*: c, d (CPC 3359a); *M. ophrydis*: e (HAL 4629), f (HAL 9902); *M. khasiana*: g, h (cultivated plant of unknown origin); *M. calophylla*: i (N.V. Khoi s.n., a. 2007).

almost straight, broadening at base, with prominent triangular wings at apex. **Fig. 61**, a, b.

Ecology. Primary evergreen, broad-leaved dry forests on granite. 800–1200 m. Fl. February, July, October. Very rare (DD).

Distribution. Vietnam (Lam Dong, Ninh Thuan). Sri Lanka, Myanmar, Thailand, Laos, Malacca Peninsula, Indonesia, New Guinea, islands of western Pacific.

Studied specimens. Lam Dong, Dalat, *Poilane 22123* (P); Ninh Thuan, Ninh Hai, *HLF 4382* (HN, LE, MO), *HLF 4602* (HN, LE, MO).

Note. Long living inflorescence of this species produces short lasting flowers occasionally time to time all around the year.

Malaxis Sol. ex Sw.,

1788, Prodr. Veg. Ind. Occid.: 8, 119; Seidenf., 1978, Dansk Bot. Ark., 33, 1: 42–94; id., 1992, Opera Bot., 114: 146–150; Comber, 1990, Orch. Java: 141–149; id., 2001, Orch. Sumatra: 170–185; Seidenf., Wood, 1992, Orch. Malay. Sing.: 218–226; Aver., 1994, Ident. Guide Vietnam. Orch.: 148–151; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 898–900; Su Horng-Jye, 2000, Fl. Taiwan 5: 963–969; Pearce et Cribb, 2002, Orch. Bhutan: 212–221; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 44; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 273–274; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 297–298; Chen Sing-chi, Wood, 2009, Fl. China, 25: 229. – *Microstylis* Nutt., 1818, Gen. North Amer. Pl. 2: 196; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 164–172. – *Dienia* Lindl., 1824, Bot. Reg. 10: sub tab. 825; Chen Sing-chi, Wood, 2009, Fl. China, 25: 234–235; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 326–332. – *Crepidium* Blume, 1825, Bijdr.: 387; Chen Sing-chi, Wood, 2009,

Fl. China, 25: 229–234; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 320–326. – *Anaphora* Gagnep., 1932, Bull. Mus. Natl. Hist. Nat. ser. 2, 4: 592; id., 1933, Fl. Gen. Indo-Chine 6, 3: 304–305.

Lectotype: *Malaxis spicata* Sw.

Terrestrial, lithophytic and occasionally epiphytic herbs with erect, fleshy pseudobulbous or slender, creeping herbs. Leaves plicate, 2 to several, narrowing at base into sheath-like petiole. Inflorescence apical, erect, raceme, with persistent, cuneate floral bracts usually recurved or reflexed. Flowers not resupinate. Dorsal sepal free, spreading; lateral sepals free or united, spreading. Petals free, spreading, usually narrower than sepals. Lip spurless, without ornamentation, erect, flat, with fovea at base, entire to lobed, basally auriculate or not apical margin entire or toothed. Column footless, with 2 apical arms on either side of clinandrium. Operculum movable, dorsal, with slender filament. Pollinia 4, subequal, in pairs, clavate, waxy, with 1 small viscidium or not; stigma elliptic; rostellum small, obtuse or rounded.

250–300 (11) species. Tropical, subtropical and temperate areas of the world with maximal diversity in tropical Asia.

Note. In this treatment, I do not follow the concept of reanimation of *Crepidium* Blume at the generic rank as well as I do not accept recent proposition of a series of “genera” like *Fingardia* Szlach., *Glossochilopsis* Szlach., *Oberonioides* Szlach., *Pseudoliparis* Finet, *Saurolophorkis* Marg. et Szlach., *Seidenfia* Szlach., *Seidenforchis* Marg., and *Tamayorkis* Szlach. Morphologically, such splitting of *Malaxis* looks fairly artificial that brings no new knowledge but only unnecessary spontaneous nomenclature fluctuations.

Key to species

1. Lip without auricles stretching backward on both sides of column 2
- + Lip with auricles stretching backward on both sides of column 3
2. Lip simple, obovate to tongue shaped, concave, without transversal calli 1. *M. finetii* (sect. 1. *Glossochilus*)
- + Lip 3-lobed at apex with transversal callus in front of column 2. *M. ophrydis* (sect. 2. *Gastroglottis*)
3. Lip at apex simple or more or less 3-lobed, apical part often emarginate or bilobulate 4 (sect. 3. *Malaxis*)
- + Lip at apex with several teeth 8 (sect. 4. *Crepidium*)
4. Lip with conspicuous sinuous fold from each side of middle part of apical half of lip which then widening into usually bilobed apex 3. *M. khasiana*
- + Lip without conspicuous lateral folds, more or less flat, but sometimes with constriction separating apical part of lip from side lobes 5
5. Lip obovate, broadening toward irregular squarish-truncate apical part, which at middle has small triangular bilobed prolongation; leaves purple-brown, variegated with white spotting along margin 4. *M. calophylla*
- + Lip ovate, narrowing toward roundish entire, notched or shallowly bilobed apical part; leaves uniform green 6
6. Flowers 2–3 mm across; sepals not longer than 3 mm; lip 2.5–3 mm long and wide 5. *M. subtilis*

- + Flowers more than 5 mm across; sepals and petals longer than 4 mm; lip longer than 6 mm from apex to tips of side lobes 7
- 7. Sides of apical part of lip with entire, more or less straight edge from base to entire or bilobulate apex 6. *M. acuminata*
- + Sides of apical part of lip with more or less distinct constriction, separating bilobulate apex from side lobes 7. *M. purpurea*
- 8(3). Lip apex orbicular, with 25–35 teeth or fringes along margin; flowers glossy, entirely dark purple to nearly blackish 8. *M. orbicularis*
- + Lip apex with 6–14(16) teeth at apex 9
- 9. Flowers 1–1.2 cm across; lip 6–8 mm long, lip apex with 8(10) broadly triangular teeth; sepals and petals 7–10 mm long; fovea narrow, flanked by indistinct ridges 9. *M. octodentata*
- + Flowers less than 1 cm across; lip less than 6 mm long, lip apex with 12–16 narrowly triangular teeth; sepals and petals 2–6 mm long; fovea large and broad, with raised longitudinal keels on each side 10
- 10. Lip (4)5–6 mm long; sepals and petals 4–5 mm long; flowers green with pinkish or purple markings 10. *M. polyodon*
- + Lip 3.4–3.8 mm long; sepals and petals 2–2.7 mm long; flowers greenish-yellow with purple area around fovea 11. *M. tixieri*

M. sect. 1. *Glossochilus* (Schltr.) Seidenf., 1978, Dansk Bot. Ark., 33, 1: 43. – *Microstylis* Nutt. sect. *Glossochilus* Schltr., 1911, Bot. Jahrb. 45, Beibl., 104: 12.

Type: *Malaxis chamaeorchis* (Schltr.) Seidenf. (*Microstylis chamaeorchis* Schltr.).

Flowers small, 3–4 mm across. Lip entire, broadly ligulate, elliptic, narrowly ovate or obovate, simple, without auricles at base, concave at basal half forming large ovate fovea-like cavity, without callosities or any other ornamentation.

3 (1) species. Thailand, Vietnam, Hainan, Sumatra.

1. *M. finetii* (Gagnep.) Tang et F.T. Wang, 1951, Acta Phytotax. Sin. 1, 1: 72; id., 1992, Opera Bot., 114: 147, fig. 89; Aver., 1994, Ident. Guide Vietnam. Orch.: 149; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 898, fig. 11341; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 44. – *Microstylis finetii* Gagnep., 1932, Bull. Soc. Bot. Fr. 79: 167; id., 1932, Fl. Gen. Indo-Chine 6, 2: 167, fig. 17, 8–14. – *Crepidium finetii* (Gagnepain) S.C. Chen et J.J. Wood, 2009, Fl. China, 25: 230.

Described from southern Vietnam (“Annam: Tourane, route de Hue...”). **Type** (“*Lecomte et Finet, N 1161*”) – P.

Terrestrial herb with cylindric, pseudobulbous stem 2–4 cm tall, 5–8 mm in diam., with 3–4 oblique ovate, acute leaves 4–9(11) cm long, 3–4 cm wide. Inflorescence erect, 12–20(35) cm long, with many, lax or subdense flowers; scape finely irregularly grooved; rachis 5–10(14) cm long. Floral bracts cuneate, reflexed, 2–4(6) mm long. Pedicel and ovary 2–3 mm long. Flowers greenish-yellow, 3–4 mm in diam. Sepals oblong narrowly ovate, obtuse, 2.5–3 mm long; median sepal erect, apically recurved; lateral sepals strongly incurved,

surrounding lip and column. Petals linear, 2.5–3 mm long, recurved to revolute. Lip erect, narrowly obovate, entire, 1.8–2 mm long, 1 mm wide, obtuse or roundish at apex, with large, deep ellipsoid fovea spreading from column on two thirds of the lip. Column erect 1–1.5 mm tall. Capsule ellipsoid 6(8) mm long on stalk 2 mm long. **Fig. 61, c, d.**

Ecology. Primary and rich secondary evergreen broad-leaved forests on sandstone, commonly in shady places on steep rocky slopes. 300–400 m. Fl. September – November. Very rare (DD).

Distribution. Vietnam (Da Nang, Quang Nam, Thua Thien – Hue). S. China (Hainan)?

Studied specimens. Quang Nam, Dai Loc, CPC 3359a (LE).

Note. Description of specimens from Hainan reported in “Flora of China” (S.C. Chen, J.J. Wood, 2009, l.c.: 230) does not fit well with Vietnamese plants and probably refers, to my suspicion, to another species close to *M. finetii*, but differing in the shape and ornamentation of the lip and in much larger size of the whole plant.

Closely related *M. chaemaorchis* (Schltr.) Seidenf. reported from Thailand and Sumatra differs from *M. finetii* in much shorter and narrower leaves, shorter inflorescence and in purplish (not light yellowish-green) flowers.

M. sect. 2. *Gastroglottis* (Blume) Seidenf., 1978, Dansk Bot. Ark., 33, 1: 43. – *Gastroglottis* Blume, 1825, Bijdr. 8: 397. – *Microstylis* Nutt. sect. *Gastroglottis* (Blume) Schltr., 1911, Feddes Repert. (Beih.) 1: 124. – *Dienia* Lindl., 1824, Bot. Reg. 10: sub tab. 825. – *Gastroglottis* Blume, 1825, Bijdr. 8: 397. – *Pedilea* Lindl., 1826, Orch. Scelet.: 27. – *Anaphora* Gagnep., 1932, Bull. Mus. Natl. Hist. Nat. ser. 2, 4: 592; id., 1933, Fl. Gen. Indo-Chine 6, 3: 304–305.

Type: *Malaxis latifolia* Sm. (*Gastroglottis montana* Blume, *M. ophrydis* (J. Koenig) Ormerod).

Flowers small, in dense inflorescence. Lip fleshy, apically with 3 fleshy lobes, without auricles at base, concave at basal half forming deep triangular fovea-like cavity, with distinct dent-like callus at base.

19 (1) species. Tropical Asia and Australia.

2. *M. ophrydis* (J. Koenig) Ormerod,

1995, Descr. *Epidendr.* J.G.König: 18; Comber, 2001, *Orch. Sumatra*: 172; Pearce et Cribb, 2002, *Orch. Bhutan*: 220; Aver. et Averyanova, 2003, *Updated Checklist Orch. Viet.*: 44; Newman et al., 2007, *Checkl. Vasc. Pl. Lao*: 274; Schuiteman et al., 2008, *Nord. Journ. Bot.*, 26: 298. – *Epidendrum ophrydis* J. Koenig, 1791, *Observ. Bot.* 6: 46. – *Malaxis latifolia* Sm., 1812, in Rees *Cyclop.* 22, n. 3; Seidenf., 1978, *Dansk Bot. Ark.*, 31, 1: 45, fig. 35; id., 1992, *Opera Bot.*, 114: 146; Comber, 1990, *Orch. Java*: 142, fig.; Seidenf., Wood, 1992, *Orch. Malay. Sing.*: 219, fig. 93a-c, pl. 13b; Aver., 1994, *Ident. Guide Vietnam. Orch.*: 149; Su Horng-Jye, 2000, *Fl. Taiwan* 5: 964, pl. 409; P.H. Ho, 2000, *Ill. Fl. Vietnam* 3: 899, fig. 11343. – *Dienia congesta* Lindl., 1824, *Bot. Reg.* 10: sub tab. 825. – *Microstylis congesta* (Lindl.) Rehb. f., 1861, *Ann. Bot. Syst.* 6: 206; Gagnep., 1932, *Fl. Gen. Indo-Chine* 6, 2: 171. – *Microstylis carnosula* Rolfe ex Downie, 1925, *Kew Bull.*, 1925: 368; Gagnep., 1932, *Fl. Gen. Indo-Chine* 6, 2: 172. – *Liparis krempfii* Gagnep., 1929, *Bull. Soc. Bot. France* 76: 514; id., 1932, *Fl. Gen. Indo-Chine* 6, 2: 187. – *Liparis turfosa* Gagnep., 1929, *Bull. Soc. Bot. France* 76: 515; id., 1932, *Fl. Gen. Indo-Chine* 6, 2: 188. – *Anaphora liparioides* Gagnep., 1932, *Bull. Mus. Natl. Hist. Nat.*, ser. 2, 4: 592; id., 1933, *Fl. Gen. Indo-Chine* 6, 3: 304, fig. 25, 8–13. – *Microstylis dalatensis* Guillaum., 1955, *Bull. Mus. Natl. Hist. Nat.* ser. 2, 27: 397. – *Malaxis vietnamensis* T.B. Nguyen et D.H. Duong, 1984, *Fl. Taynguyen. Enum.*: 202. – *Dienia ophrydis* (J. Koenig) Ormerod et Seidenf., 1997, *Contrib. Orch. Fl. Thailand* 13: 18; Chen Sing-chi, Wood, 2009, *Fl. China*, 25: 235; Barretto, Cribb, Gale, 2011, *Orch. Hong Kong*: 327, fig. 272–275.

Described from Thailand (presumably Phuket area). **Type** (“*Koenig s.n.*”) – LIV (holotype), K (isotype).

Terrestrial and occasionally lithophytic herb with conical fleshy pseudobulbous stem 6–12(15) cm tall, 1–2 cm in diam., with 4–5 oblique narrowly ovate, acuminate leaves, 10–20(25) cm long, 4–7 cm wide, sheathed at base. Inflorescence erect; scape stout 5–15(20) cm long, finely ridged; rachis 5–15(20) cm long, with many dense flowers. Floral

bracts cuneate, reflexed, 3–5 mm long. Pedicel and ovary 2–3 mm long. Flowers yellow-greenish to purple-violet. Sepals and petals 3–3.5 mm long; median sepal erect, oblong ligulate, straight; lateral sepals oblique narrowly ovate, incurved, surrounding lip and column; petals linear. Lip broadly ovate, fleshy, concave 2–2.5 mm long, without auricles at base, 3-lobed, median lobe narrowly ovate, longer than broad, blunt side lobes. Column stout, 1–1.2 mm tall. Capsules very dense arranged, erect, obovoid, 5–7 mm long on stalk 2–3 mm. **Fig. 61**, e, f.

Ecology. Primary and secondary evergreen forests, secondary scrub on any kinds of soils, commonly in shady damp slopes. 400–1200 m. Fl. May – June (July). Not rare (VU).

Distribution. Vietnam (Ba Ria – Vung Tau, Bac Kan, Da Nang, Dak Lak, Dong Nai, Ha Giang, Khanh Hoa, Kien Giang, Kon Tum, Lai Chau, Lam Dong, Quang Binh, Thua Thien – Hue). Tropical Asia and Australia.

Studied specimens. Ba Ria – Vung Tau, Iles de Poulo-Condor, *Harmand s.n.*, a. 1875–77 (P); Ba Ria – Vung Tau, Bay Canh Island, *Averyanov, Kudryavtzeva* 357 (HN, LE), *Averyanov, Kudryavtzeva* 357 a. 1989 (LE), *Averyanov, Kudryavtzeva* 882 (C, HN, LE); Bac Kan, Cho Don, *HAL* 4629 (HN, LE); Bac Kan, Na Ri, *NTH* 3692 (HN); Da Nang, Col des Nuages pres de Tourane, *Poilane* 7941 (P); Da Nang, Tourane, route de Hue, *Lecomte* 1161 (P); Dak Lak, Yok Don national park, *HLF* 7220 (HN, MO); Dong Nai, Tan Phu, Jun.-Jul. 2008 *Jana Skornickova s.n.* (LE – photo, SING – photo); Ha Giang, Quan Ba, *HAL* 8330 (HN); Khanh Hoa, Mere et l’Enfant, *Poilane* 6822 (P); Khanh Hoa, Nhatrang, *Krempf* 1570 (P); Kien Giang, Phu-Quoc, *Contest-Lacour* 78 (P), *Pierre s.n.*, a. 1874 (P), *N.V. Khoi, s.n.*, a. 2007 (LE – photo); Kon Tum, Dak To, *Poilane* 18478 (P); Kon Tum, Dacuy, *Averyanov et al., LX-VN* 2203 (HN, LE); Kon Tum, Dak Gley, *VH* 2095 (HN, LE); Kon Tum, Konplong, *Averyanov et al., LX-VN* 2289 (HN, LE); Lai Chau, Sin Ho, *HAL* 9902 (HN, LE, MO); Lam Dong, Dalat, *C.R.S.T.* 38 ep (P), *Grillet* 229 (P), *Tixier* 15 59 (P), *Hayata s.n.*, a. 1921 (P); Quang Binh, Minh Hoa, *HAL* 6018 (HN); Thua Thien – Hue, A Luoi, *HAL* 7654 (HN); Annam, *Eberhardt* 81 B (P).

Note. The species sometimes occurs in fairly dry conditions where it grows as a typical ephemeroid herb with juicy pseudobulbous stem lacking leaves during dry season.

M. sect. 3. Malaxis;

Microstylis sect. *Hololobos* Schltr., 1911,

Feddes Repert. (Beih.) 1: 124; *Malaxis* sect. *Hololobos* (Schltr.) K. Hill et D. Blaxell, 1985, Orchadian 8, 4: 80.

Type: *M. spicata* Sw.

Flowers small to medium sized in more or less lax inflorescence. Lip rather thin, elliptic, suborbicular, ovate or obovate, with prominent elliptic fovea, at base with prominent elongate triangular auricles embracing column; lip apex triangular, entire or indistinctly 3-lobed, median lobe entire, notched or shallowly bilobed.

80–120 (5) species. Tropical Asia and Australia.

3. *M. khasiana* (Hook. f.) Kuntze,

1891, Revis. Gen. Pl. 2: 673; Seidenf., 1978, Dansk Bot. Ark., 33, 1: 52, fig. 39; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 899, fig. 11342; Pearce et Cribb, 2002, Orch. Bhutan: 216. – *Microstylis khasiana* Hook. f., 1890, Fl. Brit. India 5: 686. – *Crepidium khasianum* (Hook. f.) Szlach., 1995, Fragm. Florist. Geobot., Suppl. 3: 127; Chen Sing-chi, Wood, 2009, Fl. China, 25: 233.

Described from NE. India (“Khasia Mts., 4–5000 ft.”). **Type** (“*Lobb s.n.*”) – K.

Terrestrial herb with erect, fleshy, cylindric stem 3–7 cm long, 2–4 mm in diam., apically with 4–5 shortly petiolate, oblique, narrowly ovate, acuminate leaves 5–8 cm long, 1.5–2.5 cm wide. Inflorescence erect, 15–30 cm long; rachis 5–15 cm long with many, rather lax flowers; flowers yellow-green, often with purple. Floral bracts cuneate, down reflexed, 3–5 mm long. Pedicel and ovary 3.5–4.5 mm long. Sepals and petals 2.4–2.8 mm long; sepals oblong ovate; petals linear. Lip broadly oblong in outline, guitar-shaped, 3.5–4 mm long, with constriction at middle, forming involute margin; apical part broadly ovate to suborbicular, shallowly 2-lobed, with sinus about 0.5 mm deep; auricles oblong ovate, 1–1.2 mm long; fovea elliptic, surrounded by fleshy rim. Column erect, stout, about 1 mm tall. **Fig. 61**, g, h; **63**, a.

Ecology. Evergreen broad-leaved humid forests, usually on rocky slopes. 1000–1100 m. Fl. July – October. Occurrence in Vietnam questionable.

Distribution. Vietnam (Dak Lak)? Nepal, NE. India, Thailand, S. China.

Note. The species was recorded from southern Vietnam (Hoason, Dak Lak) by P.H. Ho (2000, l.c., fig. 11342) without citation of any herbarium specimens. Occurrence of this species in Vietnam needs confirmation by voucher herbarium collections. Data on ecology and phenology are compiled from the “Flora of China” (Chen Sing-chi,

Wood, 2009, l.c.: 233); figures 63, a are based on Sikkim material (*R. Pantling* 283).

Closely related species, *M. godefroyi* (Rchb. f.) Kuntze, described from western Cambodia (Pursat Mt.) differs from *M. khasiana* in almost triangular lip with acute narrowly triangular ears lacking distinct marginal folds at the lip middle.

4. *M. calophylla* (Rchb. f.) Kuntze,

1891, Revis. Gen. Pl. 2: 673; Seidenf., 1978, Dansk Bot. Ark., 33, 1: 54, fig. 42; id., 1992, Opera Bot., 114: 147; Comber, 1990, Orch. Java: 141–149; id., 2001, Orch. Sumatra: 170–185; Seidenf., Wood, 1992, Orch. Malay. Sing.: 223, fig. 94c-d; Aver., 1994, Ident. Guide Vietnam. Orch.: 148–151; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 898–900; Pearce et Cribb, 2002, Orch. Bhutan: 215; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 44; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 273; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 298. – *Microstylis calophylla* Rchb. f., 1879, Gard. Chron. n.s., 12: 718. – *Crepidium calophyllum* (Rchb. f.) Szlach., 1995, Fragm. Florist. Geobot. Suppl., 3: 125; Chen Sing-chi, Wood, 2009, Fl. China, 25: 232.

Described from Malacca Peninsula (“Peninsular Malaysia ex Groenewegen (Amsterdam)”). **Type** (“cult. *Mackoy, Veitch et Bull*” Herb. no. 41044) – W.

Terrestrial herb with erect, fleshy, cylindric stem 1–3 cm tall, 2–3 mm in diam. Leaves 2–4, shortly petiolate, oblique, narrowly ovate, acuminate, brown-purple, 5–10 cm long, 1.5–3 cm wide, white mottled along margin. Inflorescence erect, 8–25 cm long; rachis 3–10 cm long, with few to many sublux flowers. Floral bracts cuneate, 2–5 mm long, down reflexed. Flowers pale yellowish green with purple. Pedicel and ovary 2.5–4 mm long. Sepals and petals 4–5 mm long, with revolute margin; sepals oblong narrowly ovate; petals narrowly lanceolate. Lip broadly obovate in outline, 5–6 mm long, 3.5–4.5 mm wide, abruptly contracted near apex into a short, shallowly 2-lobed apiculus; auricles narrowly ovate to triangular, 1.7–2.2 mm long; fovea ovate surrounded by a fleshy rim. Column stout, 1 mm tall, with large spatulate wings. Capsule obovoid, 9–13 mm long on stalk 4–5 mm. **Fig. 61**, i; **62**, a.

Ecology. Primary and old secondary, evergreen, broad-leaved rather dry forests. 20–1000 m. Fl. May – June. Very rare (EN).

Distribution. Vietnam (Kien Giang, Kon Tum). Nepal, Bhutan, NE. India, Myanmar, S. China, Hainan, Thailand, Cambodia, Malacca Peninsula, Kalimantan.

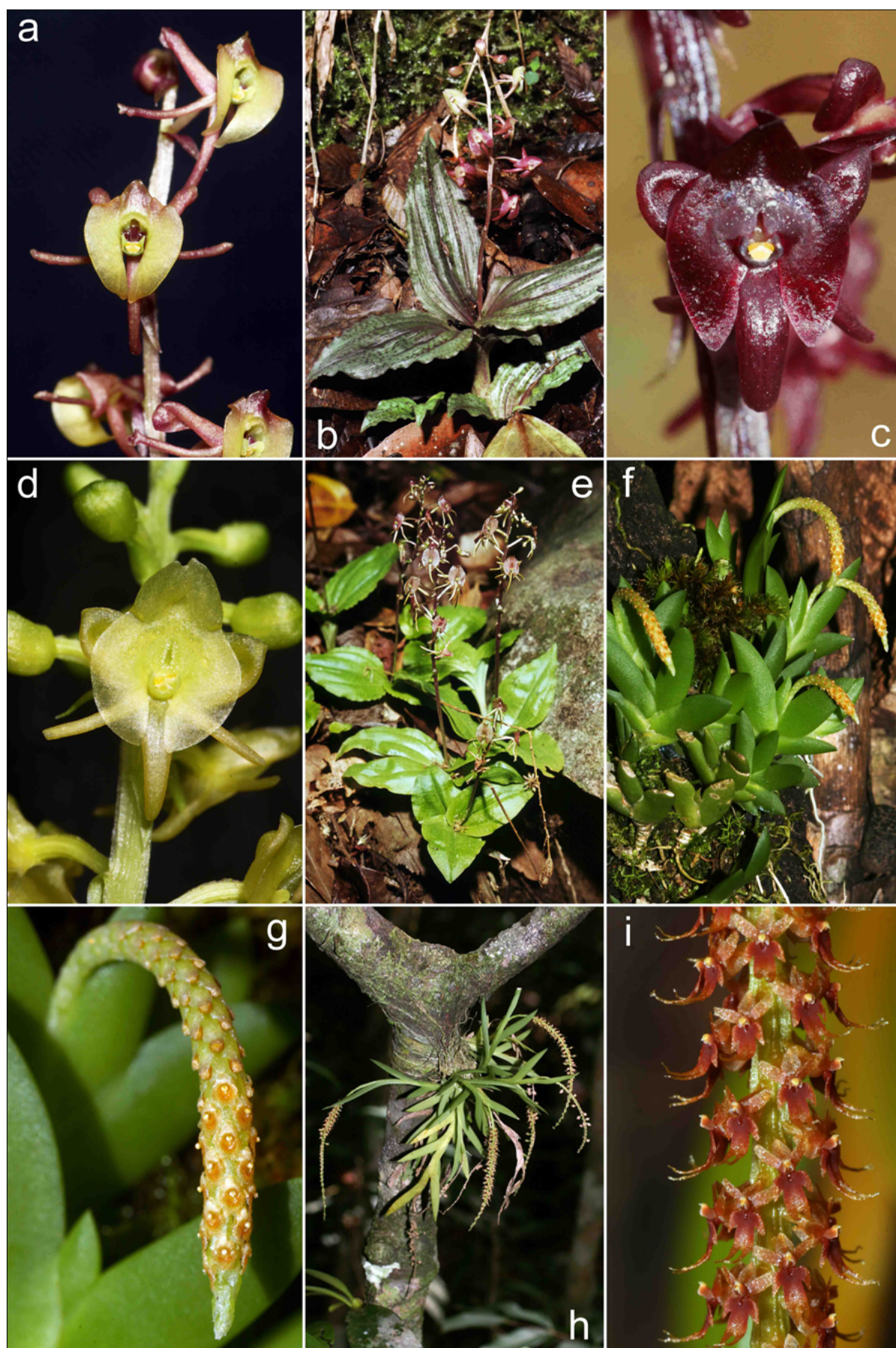


Fig. 62. *Malaxis calophylla*: a (cultivated plant of unknown origin); *M. acuminata*: b (HAL 1560), c (HAL 8945), d (Vietnam, sine loc.); *M. octodentata*: e (Averyanov, Kudryavtzeva, 428 a. 1989); *Oberonia rhizoides*: f, g (CPC 982a/15, type); *O. falcata*: h (N.V. Khoi s.n., a. 2008), i (HAL 11740b).

Studied specimens. Kien Giang, Phu Quoc Island, *N.V. Khoi s.n.*, a. 2007 (LE – photo); Kon Tum, Chu Pah, *P.K. Loc P-9860* (LE – photo).

Note. Easily recognizable species for its dull brown-purple leaves distinctly mottled with numerous small white dots along margin. It is worthy of cultivation as miniature terrestrial ornamental plant.

5. *M. subtilis* Aver., sp. nov.

Described from N. Vietnam (“Prov. Cao Bang, Distr. Tra Linh, municipality Quoc Toan, vicinity of Thang Heng and Lung Tao villages near Thang Heng lake”). **Type** (“25–27 May 1997, *L. Averyanov, N.T. Hiep, VH 4919*” – LE (holotype), HN, MO (isotypes).

Terrestrial and lithophytic herb with thin, terete, erect or ascending stem 1.5–6 cm tall, 1–2 mm in diam., bearing 3–4(5) oblique, narrowly ovate, acuminate, pink leaves (1.5)2–6 cm long, 0.6–1.8 cm wide. Inflorescence erect, 4–15 cm tall; rachis 1–5 cm long, with few to many, very small lax flowers. Floral bracts cuneate, acute, 1–2(2.5) mm long, down reflexed. Pedicel and ovary 1.5–3 mm long. Flowers light yellow-greenish with pink tint, 2–3 mm across. Sepals and petals blunt, 2.4–2.6 mm long, straight, with more or less revolute margin; sepals oblong ovate, 3-veined, 1.2 mm wide; petals broadly lanceolate, 1-veined, 0.3–0.4 mm wide. Lip obscurely broadly triangular to triangular ovate, nearly flat, or with forward directed fold of margin in apical part, 2.5–3 mm long, 2–3 mm wide, at base cordate to sagittate, with round to narrowly triangular lobes; apex broadly triangular, often slightly attenuate, entire or hardly notched; fovea ovate. Column short, stout, broadening to apex, 0.8–1 mm tall, at apex with broad spatulate wings. **Fig. 63**, b, d.

Etymology. Species name reflects characteristically dwarf habit of the plant.

Ecology. Primary evergreen mixed and coniferous dry forests (with *Pseudotsuga sinensis*) on rocky limestone, commonly on mossy rocky shady outcrops near mountain tops. 700–900 m. Fl. April – June. Very rare (DD).

Distribution. Vietnam (Cao Bang). Endemic.

Studied specimens. The species may be close to *M. acuminata*, from which it distinctly differs in very small flowers and subtle habit. It is known till now only from the type collection. The plant can be certainly found in limestone regions of S. China allied to Vietnamese border.

6. *M. acuminata* D. Don,

1825, Prodr. Fl. Nepal.: 29; Seidenf., 1978,

Dansk Bot. Ark., 33, 1: 55, fig. 43, 44; id., 1992, Opera Bot., 114: 147; Comber, 1990, Orch. Java: 148; id., 2001, Orch. Sumatra: 179, fig.; Aver., 1994, Ident. Guide Vietnam. Orch.: 150; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 898, fig. 11340; Pearce et Cribb, 2002, Orch. Bhutan: 213; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 44; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 273; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 297. – *Microstylis biloba* Lindl., 1830, Gen. Sp. Orch. Pl.: 20; Gagnep, 1932, Fl. Gen. Indo-Chine 6, 2: 170. – *Microstylis wallichii* Lindl., 1830, Gen. Sp. Orch. Pl.: 20. – *Microstylis pierrei* Finet, 1907, Bull. Soc. Bot. France 54: 534; Gagnep, 1932, Fl. Gen. Indo-Chine 6, 2: 169. – *Malaxis biloba* (Lindl.) Ames, 1908, Orch. 2: 122. – *Microstylis siamensis* Rolfe ex Downie, 1925, Kew Bull., 1925: 368; Gagnep, 1932, Fl. Gen. Indo-Chine 6, 2: 168. – *Malaxis pierrei* (Finet) Tang et F.T. Wang, 1951, Acta Phytotax. Sin. 1: 74. – *Malaxis siamensis* (Rolfe ex Downie) Seidenf. et Smitinand, 1959, Orch. Thail. Prelim. List: 150. – *Malaxis wallichii* (Lindl.) Deb, 1962, Bull. Bot. Surv. India 3: 128. – *Malaxis allanii* S.Y. Hu et Barretto, 1976, Chung Chi J. 13, 2: 18. – *Crepidium acuminatum* (D. Don) Szlach., 1995, Fragm. Florist. Geobot., Suppl. 3: 123; Chen Sing-chi, Wood, 2009, Fl. China, 25: 233; Barretto, Cribb, Gale, 2011, Orch. Hong Kong: 321, fig. 267–271.

Described from Nepal (“in Gosaingthan Nepalensium”). **Type** (“*Wallich*. Wall. Cat. 1938.1”) – BM.

Terrestrial and occasionally lithophytic herb with cylindric fleshy stem (1.5)3–6(8) cm tall, 4–6 mm in diam., bearing 3–5 oblique, ovate, acuminate, green to purple-violet leaves (3)6–12 cm long, 2.5–6 cm wide. Inflorescence erect, (6)10–30(45) cm tall; rachis (1)2–8(12) cm long, with few to many sublux flowers. Floral bracts cuneate, 3–5 mm long, down reflexed. Pedicel and ovary 7–10 mm long. Flowers yellowish-green to purple-brown, 0.5–1.5 cm across. Petals and sepals obtuse, 5–9 mm long, more or less straight, with revolute margin; median sepal oblong ligulate; lateral sepals obovate; petals linear. Lip oblong ovate, nearly flat, 6–12 mm long, 4–8 mm wide, at base with large ovate auricles embracing column, apex attenuate, shallowly 2-lobed, with sinus 1(2) mm, fovea narrowly elongate. Column stout, 1–1.5 mm tall. Capsule erect, obovoid oblong, 0.8–1.4 cm long on stalk 2–4 mm. **Fig. 62**, b-d.

Ecology. Primary and rich secondary evergreen broad-leaved and coniferous humid forests on any kind of soils, commonly on shady rocky places. 100–2000 m. Fl. March – June. Not rare (VU).

Distribution. Vietnam (Ba Ria – Vung Tau, Bac Kan, Cao Bang, Dong Nai, Ha Giang, Hoa Binh, Khanh Hoa, Lai Chau, Lam Dong, Lang Son, Ninh Binh, Phu Tho, Son La, Tay Ninh, Thai Nguyen, Thanh Hoa). Bhutan, Nepal, NE. India, China, Myanmar, Thailand, Cambodia, Malacca Peninsular, Indonesia, Philippines, Australia.

Studied specimens. Ba Ria – Vung Tau, Dinh in prov. Baria, *Pierre s.n.*, a. 1867 (P); Bac Kan, Ba Be, *HAL 102* (HN, MO), *HLF 605* (HN, LE); Bac Kan, Cho Don, *HAL 4674* (HN, LE); Bac Kan, Na Ri, *HAL 4941* (HN, LE), *NTH 3668* (HN, LE); Cao Bang, Ha Lang, *CBL 731* (HN, LE, MO), *CBL 752* (HN, LE, MO); Cao Bang, Nguyen Binh, *CBL 1308* (HN, LE, MO), *CBL 1581* (HN, LE, MO); Cao Bang, Tra Linh, *VH 4924* (HN, LE); Cao Bang, Trung Khanh, *HAL 5487* (HN, LE); Dong Nai, Nam Cat Thien, *Tam s.n.* (HN); Ha Giang, Dong Van, *NTH 3536* (HN, LE); Ha Giang, Quan Ba, *HAL 1560* (HN), *HAL 11855* (HN, LE); Ha Giang, Vi Xuyen, *DKH 6399* (HN, MO); Ha Giang, Yen Minh, *CBL 1980* (HN, LE, MO); Hoa Binh, Da Bac, *HAL 293* (HN, MO); Hoa Binh, Lac Son, *CPC 1583* (CPC Herbarium), *CPC 1722* (CPC Herbarium); Hoa Binh, Mai Chau, *HAL 694* (HN, MO), *HAL 914* (HN, MO), *HAL 8945* (HN, LE, MO), *DKH 8120* (HN, MO); Hoa Binh, Tan Lac, *CPC 1740* (CPC Herbarium), *CPC 1982* (CPC Herbarium); Khanh Hoa, Khanh Son, *VH 4351* (HN, LE, MO); Khanh Hoa, Nhatrang, *Poillane 4871* (P); Lai Chau, Sin Ho, *NTH 2794* (HN, LE); Lai Chau, Tam Duong, *HAL 10265* (HN, MO); Lam Dong, Dalat, *Sigaldi C.R.S.T. 112* (P); Lam Dong, Dantania, *Tixier 59* (P); Lam Dong, Lang Bian, *Ng et al.*, 788 (HN), *Vu Nguyen Tu 126* (HN, LE); Lam Dong, Bao Lam, *Nuraliev 643* (LE); Lang Son, Bac Son, *HAL 6726* (HN, MO); Lang Son, Huu Lien, *DKH 4100* (HN, LE, MO), *DKH 4185* (HN, MO); Lang Son, Huu Lung, *NTH 3254* (HN, LE); Ninh Binh, Cuc Phuong, *Bong 567* (HN), *Dong Con Chi 706* (HN), *Averyanov et al.*, *LX-VN 1807* (HN, LE), *HAL 1624* (HN), *NTH 3050* (HN); Phu Tho, Tan Son, *HAL 12650a* (LE); Son La, Moc Chau, *NTH 2977* (HN, LE); Son La, Yen Chau, *HAL 9442* (HN, MO), *HAL 9520* (HN, MO); Tay Ninh, *Mueller*, *Poillane 36* (P), *Pierre s.n.*, a. 1866 (P); Tay Ninh, Ninh Son, *HLF 7408* (HN, LE); Thai Nguyen, Dong Hy, *HAL 20* (HN, MO); Thanh Hoa, Ba Thuoc, *HAL 952* (HN, MO), *HAL 1073* (HN, MO), *HAL 2987* (HN), *HAL 3060* (HN), *HAL 3239* (HN), *HAL 4348* (HN); Thanh Hoa, Quan Hoa, *HAL 3611* (HN), *HAL 3701* (HN); Deon-ba, Cochinchine, *Pierre s.n.*, a. 1866 (P); Cai Cong, *Regnier 360* (P).

Note. One of the most common species in Vietnam, particularly in rocky limestone regions. Extremely variable in size of plant, color of leaves and in shape of the lip. Coloration of flowers varies from dark purple to light yellowish-green.

7. *M. purpurea* (Lindl.) Kuntze,

1891, Rev. Gen. 2: 673; Seidenf., 1978, Dansk Bot. Ark., 33, 1: 63, fig. 45; id., 1992, Opera Bot., 114: 147; Aver., 1994, Ident. Guide Vietnam. Orch.: 150; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 899, fig. 11345; Su Horng-Jye, 2000, Fl. Taiwan 5: 967, pl. 410; Pearce et Cribb, 2002, Orch. Bhutan: 216; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 44; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 274; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 298. – *Microstylis purpurea* Lindl., 1830, Gen. Sp. Orch. Pl.: 20. – *Crepidium purpureum* (Lindl.) Szlach., 195, Fragm. Florist. Geobot., Suppl. 3: 131; Chen Sing-chi, Wood, 2009, Fl. China, 25: 234.

Described from Sri Lanka (“in ... Zeylonae”). **Type** (“Ceylon, Near Galle, Macrae”) – K?

Terrestrial herb with erect, fleshy, cylindric stem 2–5 cm tall and 3–4 shortly petiolate, oblique ovate, acuminate leaves 8–16 cm long, 3–5.5 cm wide. Inflorescence erect 15–30 cm long; rachis 5–15 cm long with few to many distant flowers. Floral bracts cuneate, 3–5 mm, down reflexed. Flowers pale yellow to purple, 8–10 mm in diam. Pedicel and ovary 6–12 mm long. Sepals and petals 4.5–6 mm long; sepals oblong ovate; petals linear. Lip rectangular ovate, 6–8 mm long, abruptly shoulder-like contracted near middle, apex deeply 2-lobed, sinus 1.5–2.5 mm deep; auricles ovate to almost triangular, 2.5–3 mm long, fovea rather small, ovate. Column stout, 1 mm tall. **Fig. 63, e.**

Ecology. Evergreen broad-leaved humid mountain forests. 400–1800 m. Fl. June – July. Occurrence in Vietnam questionable.

Distribution. Vietnam (Lam Dong)? Sri Lanka, Bhutan, NE. India, S. China, Taiwan, Thailand, Philippines.

Studied specimens. Lam Dong, Dalat, *Sigaldi CRST 112 ts* (P).

Note. Very questionable record based on the single poor specimen (*Sigaldi CRST 112 ts*) tentatively identified by G. Seidenfaden as *M. biloba* (= *M. acuminata*). Data on ecology and phenology are copied from the “Flora of China” (Chen Sing-chi, Wood, 2009, l.c.: 234). Figure 63, e is based on plants from Sri Lanka regarded as species “locus classicus” (*Thwaites*, 3768).

M. sect. 4. Crepidium (Blume) Seidenf.,

1978, Dansk Bot. Ark., 33, 1: 43. –

Crepidium Blume, 1825, Bijdr. 8: 387. – *Microstylis* Nutt. sect. *Crepidium* (Blume) Ridl., 1888, Journ. Linn. Soc. London (Bot.) 24: 334. – *Microstylis* Nutt. sect. *Pleiodon* Schltr., 1911, Feddes Repert. (Beih.) 1: 125.

Lectotype: *Malaxis blumei* (J.J. Sm. et Boerl.) Bakhuizen f. (*Microstylis blumei* J.J. Sm. et Boerl., *Crepidium rheedii* Blume).

Flowers small to medium sized in more or less lax inflorescence. Lip rather thin, elliptic, suborbicular, ovate or obovate, with prominent elliptic fovea, at base with prominent elongate triangular auricles embracing column; lip apex roundish, with 4–40 dents along apical edge.

100–140 (4) species. Tropical Asia and Australia.

8. *M. orbicularis* (W.W. Sm. et Jeffrey) Tang et F.T. Wang,

1951, Acta Phytotax. Sin. 1, 1: 73; Seidenf., 1978, Dansk Bot. Ark., 33, 1: 84, fig. 59; id., 1992, Opera Bot., 114: 150; Aver., 1994, Ident. Guide Vietnam. Orch.: 151; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 900, fig. 11348; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 44. – *Microstylis orbicularis* W.W. Sm. et Jeffrey, 1916, Notes Roy. Bot. Gard. Edinb. 9: 111. – *M. tenebrosa* Rolfe ex Downie, 1925, Kew Bull., 1925: 369; Gagnep, 1932, Fl. Gen. Indo-Chine 6, 2: 166. – *Crepidium orbiculare* (W.W. Sm. et Jeffrey) Seidenf., 1997, Contr. Orchid Fl. Thailand 13: 18. 1997; Chen Sing-chi, Wood, 2009, Fl. China, 25: 231.

Described from S. China (“Tengyueh; Yunnan”). **Type** (“Howell 334”) – E.

Terrestrial herb with erect, cylindric, pseudobulbous stem 2–4 cm tall and 3–4 shortly petiolate, oblique ovate, acuminate leaves 5–12 cm long, 1.8–4.5 cm wide. Inflorescence erect, 15–40 cm long; rachis 5–9 cm, with few to many sublux flowers. Floral bracts cuneate, 5–7 mm long, down reflexed. Flowers dark purple, 6–7 mm in diam. Pedicel and ovary 5–6 mm long. Sepals and petals 5–6 mm long; sepals oblong narrowly ovate, obtuse, with revolute margin; petals narrowly lanceolate. Lip broadly obovate to almost orbicular, 6–8 mm long; apical margin with 15–20 fimbriate dents, 0.5–1 mm long; auricles ovate triangular to narrowly ovate, 3.5–4 mm long; fovea suborbicular. Column stout, 1 mm tall. **Fig. 63**, f.

Ecology. Evergreen broad-leaved humid mountain forests. 800–2100 m. Fl. June. Occurrence in Vietnam questionable.

Distribution. Vietnam (Lam Dong)? S. China, Thailand.

Studied specimens. This easily recognizable species was reported for southern Vietnam (Dalat) by P.H. Ho (2000, l.c., fig. 11348) without citation of any herbarium specimens. Occurrence of this species in Vietnam needs confirmation by herbarium vouchers. Data on ecology and phenology are copied from the “Flora of China” (Chen Sing-chi, Wood, 2009, l.c.: 231), drawings 63f are based on Thailand collection (Garret 880).

9. *M. octodentata* Seidenf.,

1978, Dansk Bot. Ark., 33, 1: 81, fig. 58; id., 1992, Opera Bot., 114: 149, pl. 10b; Aver., 1994, Ident. Guide Vietnam. Orch.: 151; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 900, fig. 11346; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 44. – *Microstylis venosa* auct. non J.J. Sm.: Gagnep, 1932, Fl. Gen. Indo-Chine 6, 2: 166; Seidenf., 1975, Contrib. Rev. Orch. Fl. Cambod. Laos Vietnam: 85.

Described from Thailand (“Thailand. Koh Kut, Chantaburi”). **Type** (“GT 3564”) – C.

Terrestrial herb with erect, cylindric, fleshy, pseudobulbous stem 1.5–2.5(3) cm tall and 2–3(4) subsessile, oblique ovate, acute leaves 4–7(9) cm long, 1.8–5 cm wide. Inflorescence erect, 12–25(30) cm long; rachis 3–12 cm, with few to many sublux flowers. Floral bracts cuneate, 5–10 mm long, down reflexed. Flowers pale pink, 10–15 mm in diam. Pedicel and ovary 5–11 mm long. Sepals and petals 7–10 mm long, with revolute margin; sepals narrowly lanceolate; petals linear. Lip broadly obovate to almost orbicular, 6–8 mm long; apical margin subtruncate, with 6–8 broad, triangular dents; auricles narrowly ovate to narrowly triangular, 3–3.5 mm long; fovea narrowly elliptic, surrounded by low, fleshy rim. Column stout, 1 mm tall. Capsule narrowly elliptic, 2 cm long, 4–5 mm in diam., on stalk 6–8 mm long. **Fig. 62**, e; **63**, g.

Ecology. Primary and secondary evergreen, broad-leaved, rather open forests on rocky slopes. 100–200 m. Fl. May – June. Very rare (EN).

Distribution. Vietnam (Ba Ria – Vung Tau, Dong Nai, Tay Ninh). Thailand, Cambodia.

Studied specimens. Ba Ria – Vung Tau, Bay Canh Island, Averyanov, Kudryavtzeva 428, a. 1989 (HN, LE); Dong Nai, Mt. Dinh, prov. de Baria, Piere s.n. (P); Tay Ninh, Cay Cong, Pierre s.n., a. 1867 (P).

10. *M. polyodon* (Hook. f.) Kuntze,

1891, Revis. Gen. Pl. 2: 673; Seidenf., 1978, Dansk Bot. Ark., 33, 1: 81, fig. 57; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 899, fig. 11344; Newman et al.,

2007, Checkl. Vasc. Pl. Lao: 274; Schuitman et al., 2008, Nord. Journ. Bot., 26: 298. – *Microstylis polyodon* Hook. f., 1890, Fl. Brit. India 5: 688; id., 1892, Ic. Pl., tab. 2002. – *Crepidium polyodon* (Hook. f.) Szlach., 1995, Fragn. Florist. Geobot. Suppl., 3: 130.

Described from peninsular Myanmar ("Tenasserim; at Moulmein"). **Type** ("Parish 215") – K.

Terrestrial herb with cylindric, fleshy, pseudobulbous stem 8–12 cm high, 1 cm in diam., apically with 4–5 shortly petiolate, oblique, narrowly ovate, acuminate leaves (6)8–12(14) cm long, 4–6 cm wide. Inflorescence erect, 20–40 cm long; rachis 10–20 cm long with many subdense pale yellow flowers sometimes with purple. Floral bracts narrowly cuneate, down reflexed. Sepals and petals 4–5 mm long; sepals oblong ovate; petals oblong narrowly lanceolate. Lip broadly obovate elliptic in outline, (4)5–6 long, 3–4 mm wide, with auricles nearly the half long; apex broadly triangular, each side with (3)6–7(8) large, narrowly triangular dents; fovea oblong, surrounded by a fleshy rim raising into 2 conical calli at lip base. **Fig. 63**, h–j.

Ecology. Evergreen, broad-leaved, rather dry forests with bamboo. 400 m. Fl. April – May. Occurrence in Vietnam questionable.

Distribution. Vietnam (Lam Dong)? Myanmar, Thailand, Laos.

Note. Species was recorded for southern Vietnam (Lamha, Lam Dong) by P.H. Ho (2000, l.c., fig. 11344) based on N.T. Tich's observation without citation of any herbarium specimens. Occurrence of this species in Vietnam needs confirmation by voucher herbarium collections. Drawings 63, h–j are copied from Hooker's authentic sketches (Hook. f., 1892, l.c., tab. 2002).

11. *M. tixieri* Seidenf.,

1992, Opera Bot., 114: 148, fig. 90; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 900, fig. 11347; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 44. – *Crepidium tixieri* (Seidenf.) Szlach., 1995, Fragn. Florist. Geobot. Suppl., 3: 132.

Described from southern Vietnam ("Vietnam: Dalat"). **Type** ("Tixier 45/60") – P.

Terrestrial herb with cylindric, fleshy, pseudobulbous stem 6–8(10) cm high, 1–1.2 cm in diam., apically with 4 petiolate, oblique, narrowly ovate, acuminate leaves 5–10 cm long, 3–5 cm wide. Inflorescence erect, 15–40 cm long; rachis 5–20 cm long with many subdense flowers; flowers greenish-yellow, lip lighter with a purple blotch around fovea. Floral bracts narrowly cuneate, 4–7 mm long, down

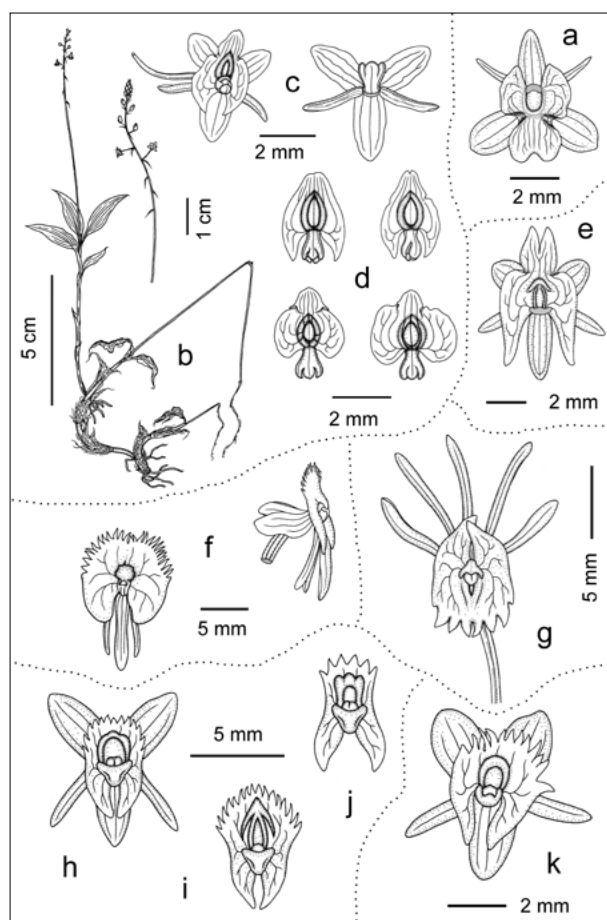


Fig. 63. *Malaxis khasiana*: a – flower without column, frontal view (Pantling 283, Sikkim); *M. subtilis*: b – flowering plant and inflorescence, c – intact flower and flower without lip, d – lip variation (VH 4919, type); *M. purpurea*: e – flower without column, frontal view (Thwaites 3768, Sri Lanka); *M. orbicularis*: f – flower, frontal and side views (Garret 880, Thailand); *M. octodentata*: g – flower, frontal view (Averyanov, Kudryavtzeva, 428 a. 1989); *M. polyodon*: h – flower, frontal view, i, j – lip variation (copied from Hook. f., 1892); *M. tixieri*: k – flower, frontal view (Tixier 45/60).

reflexed and adpressed to axis. Sepals and petals (2)2.5–2.7 mm long; sepals ovate, 1.5–1.7 mm wide; petals lanceolate. Lip broadly obovate in outline, 3.4–3.8 mm long, 3.2–3.4 mm wide, with auricles nearly the half long; apex broadly rounded, each side with 6–7 teeth; fovea oblong, surrounded by a rounded rim. **Fig. 63**, k.

Ecology. Primary evergreen broad-leaved humid forest on granite. 1500 m. Fl. May. Very rare (DD).

Distribution. Vietnam (Lam Dong). Endemic.

Note. Doubtful species known up to now only based on the type specimen. It looks very close to *M. polyodon* (Hook. f.) Kuntze, from which differs in twice smaller flowers and in slightly different shape of the lip.

Subtrib. 5.6.2. Oberoniinae Aver.,

1991, Bot. Journ. (Leningrad) 76, 1: 121.

Type: *Oberonia* Lindl.

3 (1) genera and 260–310 (38) species.

Tropical and subtropical zone of the Old World.

***Oberonia* Lindl.,**

1830, Gen. Sp. Orch. Pl.: 15 nom. conserv.; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 152–164; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 1–125; id. 1978, ibid. 33, 1: 7–41; id., 1992, Opera Bot., 114: 150–159; Comber, 1990, Orch. Java: 149–159; id., 2001, Orch. Sumatra: 185–204; Seidenf., Wood, 1992, Orch. Malay. Sing.: 241–257; Aver., 1994, Ident. Guide Vietnam. Orch.: 152–161; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 892–898; Su Horng-Jye, 2000, Fl. Taiwan 5: 981–984; Pearce et Cribb, 2002, Orch. Bhutan: 221–233; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 46–47; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 275; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 300–301; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 236–245.

Type: *Oberonia iridifolia* (Roxb.) Lindl. (*Cymbidium iridifolium* Roxb.).

Epiphytic and lithophytic herbs. Stems abbreviate or elongate, erect or pendulous, enclosed by leaf bases, densely clustered, very rarely distant on creeping rhizome. Leaves laterally flattened, rarely terete, usually fleshy, articulate at base or not, distichous and imbricate at base, dilated near base into flattened sheaths, often with a narrow membranous margin. Inflorescence terminal, pedunculate, many flowered raceme, spike or spadix; peduncle with few to many sterile bracts; floral bracts persistent. Flowers commonly in whorls, not resupinate, widely opening to almost flat, 1–2 mm in diam.; pedicel and ovary very short. Sepals and petals free, spreading. Lip spurless, spreading, sessile, entire or lobed, lateral lobes often embracing column. Column erect, short, lacking a foot. Anther cap terminal, 2-locular; pollinia 4, in 2 unequally pairs, waxy; viscidium absent or abbreviated. Stigma transversely reniform to ovate; rostellum distinct, protruding. Fruits ovoid to almost globular capsule 1–2 mm long.

250–300 (38) species. Tropical and subtropical zone of the Old World.

Key to species

1. Leaves not joined at the base 2 (subgenus *Menophyllum*)
- + Leaves joined at the base 22 (subgenus *Oberonia*)
2. Leafy stems distant on (0.2)0.5–1 cm on creeping rhizome 2–4(5) cm long 1. *O. rhizoides*
- + Leafy stem solitary or densely clustering 3
3. Stem longer than (4)5 cm, with many leaves 4
- + Stem less than 2(4) cm long, often almost acaulescent, commonly with 3–6(8) per stem 5
3. Stem usually more than 10 cm long; leaves imbricate, short, broad, ovate-triangular 2. *O. lycopodioides*
- + Stems (4)5–10(15) cm long; leaves distant, linear to narrowly ensiform-falcate 3. *O. falcata*
5. Median lip lobe distinctly 2-lobed 6
- + Median lip lobe not distinctly 2-lobed, but sometimes obcordate or emarginate 7
6. Stem 0.5 cm long; lip side lobes filiform; flowers red to red-brown 4. *O. rufilabris*
- + Stem 1–4 cm long; lip side lobes triangular-ovate, oblique; flowers yellow-green to reddish 5. *O. anthropophora*
7. Lip lobes half-circular, subsimilar, rachis inflated, spadix-like, flowers sessile, half sink into fleshy axis 6. *O. pachyphylla*
- + Lip side lobes clearly distinct from median lobe, rachis not inflated, flowers pedicellate 8
8. Stem 1–4 cm long; scape connate in lower part to uppermost leaf, appearing to arise from leaf blade 7. *O. obcordata*
- + Stem less than 1(2) cm long; scape not connate to uppermost leaf 9
9. Lip side lobes dentate or fringed, leaves often broader than 9 mm 10
- + Lip side lobes entire, irregularly erose, erose-denticulate or incised, leaves usually narrower than 8 mm ... 13.
10. Lip side lobes long fringed; inflorescence dense, stout, with spirally arranged flowers 8. *O. multidentata*
- + Lip side dentate; inflorescence slender, whorled in apical half 11
11. Lip side lobes with 4 almost equilaterally triangular dents 9. *O. quadridentata*
- + Lip side lobes with 5–8 irregular-erose, acute dents 12
12. Flowers dark purple to red-brown, in rather dense inflorescence, usually touching each other 10. *O. jenkinsiana*
- + Flowers yellow to orange, usually in rather lax inflorescence, not touching each other 11. *O. rasmussenii*
- 13(9). Petals denticulate, irregularly incise or distinctly erose 14
- + Petals entire or hardly erose 15

14. Lip indistinctly 3-lobed, broader than long, deeply incise to fimbriate 12. *O. trochopetala*
+ Lip distinctly 3-lobed, longer than broad, side lobes slightly erose, median lobe with almost entire margin 13. *O. rosea*
- 15(13). Petals slightly erose or hardly irregularly denticulate 16
+ Petals entire 17
16. Inflorescence 6–9 cm long; each whorl of 5–6 flowers; whorls mostly 2 mm distant; lip median lobe truncate to emarginate 14. *O. tixieri*
+ Inflorescence to 18 cm long; whorls close, of about 8–10 flowers; lip median lobe orbicular at apex 15. *O. acarus*
- 17(15). Lip side lobes irregularly denticulate 16. *O. huensis*
+ Lip side lobes entire or slightly erose or hardly irregularly denticulate along margin 18
18. Lip side lobes and median lobe entire along margin; side lobes 3–4 times smaller than median lobe 17. *O. dolichocaulis*
+ Lip side lobes and median lobe slightly erose or finely irregularly denticulate; side lobes as large as median lobe, or few smaller 19
19. Side lobes short and broad, much shorter than long, often rather fat, recurved; sepals mostly recurved; flowers greenish to yellow-orange 18. *O. emarginata*
+ Side lobes ovate or indistinctly rectangular, as long as broad or longer, spreading; sepals recurved or not; flowers reddish to reddish-brown 20
20. Floral bracts much longer than flowers; leaves 5–8 cm long; inflorescence as long as leaves, or little longer 19. *O. longibracteata*
+ Floral bracts shorter or little longer than flowers; leaves 2–5 cm long; inflorescence 10–15 cm long, much longer than leaves 21
21. Median lobe orbicular or obcordate, rounded at apex; side lobes entire along margin; inflorescence to 15 cm long 20. *O. pumilio*
+ Median lobe subquadrate, emarginate to irregularly incised at apex; side lobes erose to denticulate; inflorescence to 10 cm long 21. *O. variabilis*
- 22(1). Inflorescence spadix-like with inflated, fleshy rachis; flowers subsessile 23
+ Inflorescence – simple spike, not spadix-like, rachis not inflated and fleshy; flowers pedicellate 25
23. Leaves 1.5–3 cm long; stems erect, clustering or distant on short creeping rhizome; lip 3-lobed, with 2-lobed or emarginate apex 22. *O. ngoclinhensis*
+ Leaves 3–12 cm long; stems pendulous, solitary or clustering few together without creeping rhizome; lip entire, not lobed 24
24. Leaves 3–5 cm long; scape fused with leaf in basal part, appearing to arise from inner side of leaf blade; flowers sink into individual pits of fleshy axis; lip ovate to cordate; flowers more or less distant, usually not touching each other 23. *O. pachyrachis*
+ Leaves 5–12 cm long; scape not fused with leaf, but distinctly winged; flowers not sink into fleshy axis; lip almost circular, oblate; flowers very dense, imbricate 24. *O. integerrima*
- 25(22). Leaves terete, subterete or ellipsoid in transversal section 26
+ Leaves laterally compressed, ensiform, sharp-edged 29
26. Leaves glaucous, finely white speckled; lip fimbriate, covered by globular, glass-like papills; petals oblong narrowly ovate, entire along margin 25. *O. cavaleriei*
+ Leaves uniform green; lip erose, without globular inflated cells; petals ovate to broadly ovate, deeply erose 27
27. Floral bracts caudate, caudate appendage more than 3 times longer than bract blade 26. *O. trichophora*
+ Floral bracts acute to acuminate, without long caudate appendage 28
28. Inflorescence 10–12 cm long, twice longer than leaves; sepals strongly recurved, much smaller than petals; lip distinctly 3-lobed; flowers dull yellowish-orange 27. *O. langbianensis*
+ Inflorescence 3–7 cm long, as long, or shorter than leaves; sepals not much recurved, as long as petals; lip indistinctly 3-lobed, rectangular to half circular; flowers dark green to olive-brown 28. *O. dalatensis*
29. Leaves 15–40 cm long; flowers 2–3 mm across; lip disc often with 2 large, blister-like calli at base of median lobe 29. *O. ensiformis*
+ Leaves less than 15 cm long; flowers 1–2 mm across; lip disc without blister-like calli 30
30. Side lobes of lip fringed to lacinate 31
+ Side lobes of lip entire, shallowly wavy to finely erose or irregularly dentate 33
31. Lip distinctly 3-lobed, rectangular in outline; side lobes fringed-fimbriate 30. *O. evrardii*
+ Lip unlobed or indistinctly 3-lobed, ovate to half circular in outline; flanges or side lobes irregular lacinate 32
32. Rachis very dense flowered; lip half circular in outline, unlobed 31. *O. mucronata*
+ Rachis lax flowered; lip ovate in outline, with indistinct side lobes and narrow median lobe 32. *O. gammiei*
- 33(30). Median lobe of the lip entire, unlobed, subquadrate to indistinctly obcordate 33. *O. sonlaensis*

- + Median lobe of the lip deeply emarginate or 2-lobed at apex, ovate, obovate or obcordate 34
- 34. Median lobe of lip broadly obcordate, much broadening from very narrow base to the apex, much broader than flattened side lobes; lobules of median lobe rounded, irregularly dentate 34. *O. kwangsiensis*
- + Median lobe ovate to obovate in outline, not much broadening from the base, narrower or little broader than flattened side lobes; lobules of median lobe ovate, lanceolate to triangular, with entire or slightly wavy margin 34
- 34. Lip oblong rectangular in outline, twice long as broad; side lobes in form on small auricles at the base of lip; lobules of median lobe narrowly triangular, acute to acuminate 35
- + Lip broadly ovate, obovate to indistinctly quadrate in outline, as long as broad or little longer; side lobes large, half circular to flabellate; lobules of median lobe ovate, blunt to roundish at apex 36
- 35. Plants with well developed stems 1–4.5 cm long; leaves narrowly lanceolate, grass-like, 2–5 mm wide; lobules of median lobe triangular oblique, divergent, divided by V-shaped sinus 35. *O. caulescens*
- + Plants with abbreviated stems less than 1 cm long; leaves ensiform, triangular broadly lanceolate, 6–12 mm wide at the base; lobules of median lobe narrowly triangular-subulate, straight, more or less parallel, divided by II-shaped sinus 36. *O. falconeri*
- 36. Lobules of median lip lobe ovate to broadly oblong, divided by a narrow split, touching each other 37. *O. acaulis*
- + Lobules of median lip lobe oblong ovate, divided by a wide, V- or II-shaped sinus, usually divergent, not touching each other 38. *O. dolichostachys*

***O.* subgen. 1. *Menophyllum* Schltr.,**

1911, Bot. Jahrb. 45, Beibl. 104: 13. – *O.* sect. *Caulescentes* Hook. f., 1888, Fl. Br. Ind. 5: 685.

Lectotype: *O. padangensis* Schltr.

Leaves at the base without articulation. Stem elongate or abbreviated.

About 150 (21) species. Tropical and sub-tropical Asia with highest diversity in New Guinea.

1. *O. rhizoides* Aver., sp. nov.

Described from north-western Vietnam (“Dien Bien Prov., Tua Chua Distr., Sin Chai Municipality, around point 22°03’38”N 103°19’56”E”). **Type** (“14 December 2010, Averyanov et al., CPC 982a/15”) – LE.

Miniature plant with creeping rhizome 2–5(7) cm long, (1)1.5–2 mm thick and few distant erect stems. Stems distant on 0.5–1.5 cm from each other, abbreviate, 1–3 mm long, completely covered by 3–4 imbricate leaves. Leaves very fleshy, triangular, acute, (1)1.5–2(2.5) cm long, 0.5–1.2 cm wide. Inflorescence 1.5–2.5(3) cm long; scape stout, erect, 0.6–1.2 cm long, covered by many narrowly ovate acuminate sterile bracts 0.7–1 mm long; rachis arching, inflated, fleshy spadix 0.8–1.8(2) cm long, 1.2–1.7 mm in diam. Floral bracts broadly ovate to almost triangular, 0.8–1 mm long and wide, acute, entire along margin, straight before flowering, during anthesis strongly recurved. Pedicel and ovary 0.3–0.4 mm long, completely sink into deep, ovate rachis alveoli. Flowers 1–1.4 mm across, dull yellowish; lip dull, light orange-brown. Sepals and petals entire along margin, 0.6–0.7(0.8) mm long. Sepals ovate to broadly ovate, acute to obtuse. Petals narrowly ovate to oblong, obtuse. Lip straight to slightly irregular along margin, broadly ovate in

outline, 1 mm long, 0.7–0.8 mm wide, with broad, indistinct side lobes to almost entire at base, lip apex subquadrate to half circular, broadly emarginate to shallowly 2-lobed, with small median blunt dent; disk with distinct orbicular fovea. Capsule broadly ellipsoid to ovoid, 2–3 mm long. **Fig. 62**, f, g; **64**, a-e.

Etymology. Species name reflects rhizomatous character of the plant.

Ecology. Primary evergreen broad-leaved forest on rocky limestone, commonly on mossy trees in shady, humid places on tops of ridges. 500–1500 m. Fl. December – January (February). Very rare (EN).

Distribution. Vietnam (Dien Bien, Lang Son, Son La). Endemic of limestone regions of north-western Vietnam.

Studied specimens. Lang Son, Bac Son, HAL 6724a (LE – photo); Son La, Chieng Co, CPC 1136 (LE).

Note. Our plant belongs to group of 3 very rare rhizomatous species (*Oberonia pumila* (S.C. Chen et K.Y. Lang) Ormerod, *O. seidenfadenii* (H.J. Su) Ormerod and *O. sinica* (S.C. Chen et K.Y. Lang) Ormerod) described from southern Gansu and Taiwan. Vietnamese species morphologically most close to Taiwanese *O. seidenfadenii* from which differs in non articulate leaves and in sub-entire, broadly emarginate lip lacking distinct side lobes. One more species of this group – *O. ngoclinhensis* discovered in southern Vietnam is described below.

2. *O. lycopodioides* (J. Koenig) Ormerod,

1995, Opera Bot., 124: 21; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 47. – *Epidendrum lycopodioides* J. Koenig, 1791,

Observ. Bot. 6: 55. – *Oberonia anceps* Lindl., 1838, Sertum Orch. sub. pl. 8; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 161; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 63, fig. 37; id. 1978, ibid. 33, 1: 24, fig. 14; id., 1992, Opera Bot., 114: 155; Seidenf., Wood, 1992, Orch. Malay. Sing.: 247, fig. 105a-d; Aver., 1994, Ident. Guide Vietnam. Orch.: 154; Comber, 1990, Orch. Java: 152, fig.; id., 2001, Orch. Sumatra: 200; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 893, fig. 11318.

Described from Malacca Peninsular ("Malacca"). **Type** ("Koenig, 5 Sept. 1779") – K (lectotype, hic designatus), LIV (isolectotype).

Stems zigzag, (6)8–25 cm long, internodes about 1 cm, the stem and leaves 2–3 cm wide. Leaves oblique, blunt, 1.5–3 cm long, nearly straight, outer edge curved, to 8 mm wide near base. Inflorescence 3–8 cm long, very dense, with flowers completely covering fleshy rachis, spreading to almost base, scape about 1 cm. Pedicel and ovary 0.5–0.7 mm long, densely white hairy. Flowers yellow to orange,

1–1.5 mm across. Floral bracts ovate, with erose-ciliate margin. Sepals and petals 0.6–0.7(1) mm long. Sepals triangular-ovate, as broad as long, blunt or rounded. Petals twice narrower, acute. Lip almost square when flattened, 1 mm long and broad, with very small erect side lobes; apex rounded, often slightly toothed and notched. Capsule ovoid, ridged, 3 mm long. **Fig. 64**, f-i.

Ecology. Primary and secondary broad-leaved evergreen forests, commonly along mountain rivers and streams. 800–1600 m. Fl. March – April. Not common (VU).

Distribution. Vietnam (Kon Tum, Lam Dong, Ninh Thuan). Myanmar, Thailand, Cambodia, Malacca Peninsula, Philippines, Sumatra, Java, Ambon, Sulawesi.

Studied specimens. Kon Tum, Dak Mek River, *VH 1042* (HN, LE, P); Kon Tum, Ngoc Linh mt., *VH 116* (HN, LE, MO, P), *VH 351* (HN, LE, MO, P); Lam Dong, Dalat, *Kerr 3254* (C); Lam Dong, Lac Duong, *VH 3214* (HN, LE, MO, P), *HLF 5291* (HN, LE, MO); Lam Dong, region de Bellevue *Sigaldi C.R.S.T 275* (P); Ninh Thuan, Cana, province de Phanrang, *Poillane 5916* (AMES, L, P); Ninh Thuan, Cana, Signal de 1200 m, *Evrard 2370* (P).

Note. One of the most easily recognizable species for its long stems covered by numerous short, triangular, imbricate leaves.

3. *O. falcata* King et Pantl.,

1895, Journ. As. Soc. Bengal 64, 2: 329; id., 1898, Ann. Bot. Gard. (Calcutta) 8, tab. 14; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 75, fig. 46-48; id. 1978, ibid. 33, 1: 30, fig. 20; id., 1992, Opera Bot., 114: 156; Seidenf., Wood, 1992, Orch. Malay. Sing.: 250, fig. 106c, d; Aver., 1994, Ident. Guide Vietnam. Orch.: 154; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 894, fig. 11324; Comber, 2001, Orch. Sumatra: 198, fig.; Pearce et Cribb, 2002, Orch. Bhutan: 229; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 46; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 275; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 300.

Described from NE. India? ("Sikkim: at Labha, elevation about 6000 feet? ... locality and elevation are however doubtful"). **Type** ("*Pantling 218C*") – CAL (holotype), BM (isotype).

Stems slender, pendulous, (5)10–15 cm long, internodes 1–2.5 cm long. Leaves at about 45° to the stem, apex usually incurved, acute, (1.5)2–5(6) cm long, (1.5)2–3(3.5) mm wide. Inflorescence (3)4–10 cm long, 3 mm wide, bearing flowers almost to the base. Floral bract ovate, obtuse, 1.2 mm long,

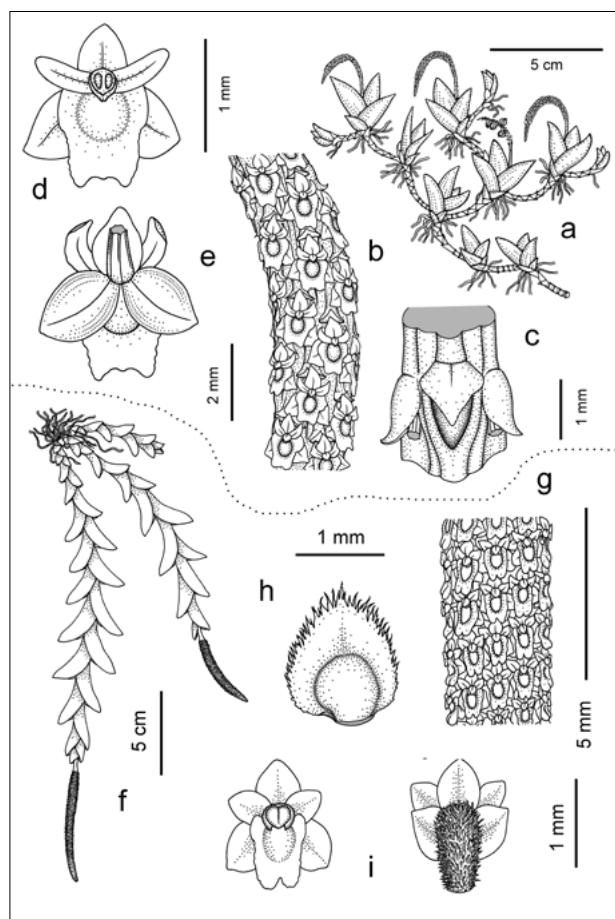


Fig. 64. *Oberonia rhizoides*: a – flowering and fruiting plant, b – portion of inflorescence, c – portion of rachis with removed flowers, d – flower, frontal view, e – flower, view from behind (CPC 982a/15, type); *O. lycopodioides*: f – flowering plant, g – portion of inflorescence, h – floral bract, i – flowers, frontal view and view from behind (VH 351).

margin erose or sparsely denticulate. Flowers purple brown to olive-greenish or almost white. Sepals and petals 0.7–0.8 mm long, spreading. Sepals subsimilar, triangular, obtuse. Petals less than half as wide as sepals, elongate, blunt, entire. Lip twice longer than sepals, 3-lobed, side lobes spreading, small, subulate; midlobe oblong, twice long as wide, 2-lobed, lobes variable in length, narrowly triangular, acute or acuminate, often forward directed. **Fig. 62**, h, i; **65**, a-c.

Ecology. Primary and secondary evergreen broad-leaved and coniferous forests on any kind of mother rocks, commonly as canopy epiphyte in shady humid places near mountain tops. 500–2000 m. Fl. September – November. Not common (VU).

Distribution. Vietnam (Da Nang, Ha Giang, Khanh Hoa, Kien Giang, Kon Tum, Lam Dong, Lao Cai, Ninh Thuan, Quang Binh, Thua Thien – Hue). NE. India, Nepal, Bhutan, Thailand, Laos, Malacca Peninsula, Sumatra.

Studied specimens. Da Nang, Ba-na près de Tourane, *Poilane* 7372 (P); Ha Giang, Hoang Su Phi, HAL 8879 (LE); Ha Giang, Quan Ba, HAL 8397a (HN, LE); Khanh Hoa, massif du Hon Ba, province de Nhatrang, *Chevalier* 38804 (P); Kien Giang, Phu Quoc, *N.V. Khoi s.n.*, September 2008 (LE – photo); Kon Tum, Kon Plong, *VH* 5640 (HN, LE, MO), *DKH* 4676 (HN, LE, MO); Lam Dong, Bi-Dong, *Pilane* 31041 (P); Lam Dong, Dalat, *Tixier* 4 195 (P); Lam Dong, Manline, Dalat, *Schmid s.n.* 18/4/1954 (P); Lam Dong, Lac Duong, *VH* 2811 (HN, LE, MO), *VH* 3008 (HN, LE, MO), *VH* 3740 (HN, LE, MO), *VH* 4455 (HN, LE, MO), *HLF* 5210 (HN, LE), *S.G. Wu WP* 1269B (HN, LE); Lao Cai, Than Uyen, *NTH* 2839 (HN, LE); Ninh Thuan, Ninh Son, *VH* 3596 (HN, LE); Quang Binh, Minh Hoa, *HAL* 11740b (HN, LE); Thua Thien – Hue, Bach Ma, *Poilane* 27706 (P), *Hiep CFH* 334 (LE).

4. *O. rufilabris* Lindl.,

1838, Sertum Orch., tab. 8A; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 158; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 88, fig. 57; id. 1978, ibid. 33, 1: 32, fig. 21; id., 1992, Opera Bot., 114: 156; id., 1995, ibid. 124: 20, pl. 3c, d; 4a; Seidenf., Wood, 1992, Orch. Malay. Sing.: 253, fig. 107d-f; Aver., 1994, Ident. Guide Vietnam. Orch.: 157; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 897, fig. 11336; Pearce et Cribb, 2002, Orch. Bhutan: 232; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 47; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 275; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 240. – *O. neotixieri* Guillaum., 1963, Bull. Mus. Natl. Hist.

Nat. ser 2, 35: 204. – *O. pulchrebracteata* Tixier et Guillaum., 1963, Bull. Mus. Natl. Hist. Nat. ser. 2, 35: 204.

Described from southern Myanmar (“discovered in the Burmese empire”). **Type** (“Moulmein, *Giffith* 1834”) – K-LINDL.

Stem 0.5 cm long, solitary, with (3)4–6(9), distichous, equitant, ensiform, lanceolate to ovate, acute leaves 1–6 cm long, 3–8(12) mm wide. Scape 1–2 cm long, with many caudate sterile bracts. Rachis 2.5–5 cm long. Floral bracts ovate to lanceolate, 1.5–2(3) mm long, acuminate to aristate or caudate. Flowers 3–5(6) in a whorl, red. Pedicel and ovary 0.5 mm long. Sepals and petals 0.8–0.9 mm long, entire, obtuse; sepals ovate, concave; petals lanceolate to oblong sometimes hardly erose. Lip 1.2–1.4 mm long, 3-lobed; side lobes narrowly lanceolate to filiform, 0.3 mm long, laterally spreading; median lobe deeply divided into 2 divergent, lanceolate or linear-lanceolate lobules 0.7 mm long, at base with minute, elongate fovea. Capsule obovoid, 1–2 mm long, on stalk 0.5 mm long. **Fig. 65**, d-f; **66**, a, b.

Ecology. Primary and secondary evergreen broad-leaved forest on any kind of mother rocks, commonly as canopy epiphyte in humid places near mountain tops. 900–1400 m. Fl. (September) November – December. Not common (VU).

Distribution. Vietnam (Dak Nong, Dien Bien, Dong Nai, Hoa Binh, Kon Tum, Lai Chau, Lam Dong, Ninh Thuan, Quang Tri). NE India, Nepal, Bhutan, Bangladesh, Myanmar, S. China, Hainan, Thailand, Cambodia, Malacca Peninsula.

Studied specimens. Dak Nong, Dak Glong, *HLF* 5584 (HN, LE); Dien Bien, Tua Chua, *CPC* 982a/7 (LE); Dong Nai, Nam Cat Thien, *Vu Ngoc Long* B47 (LE); Hoa Binh, Tan Lac, *CPC* 2028a (HN, LE); Kon Tum, Dak Gley, *VH* 2325a (HN, LE); Lai Chau, Phong Tho, *HAL* 10792 (HN, LE, MO); Lam Dong, road between Saigon and Dalat at 127 km, *Tixier* 8/62 (P), *Tixier* 3/63 (P); Ninh Thuan, Cana, Phanrang, *Poilane* 5808 (P); Quang Tri, Da Krong, *HLF* 6138 (LE); Cochinchina, *Thorel s.n.* (P).

5. *O. anthropophora* Lindl.,

1830, Gen. Sp. Orch. Pl.: 16; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 93, fig. 62; id. 1978, ibid. 33, 1: 33, fig. 23; Seidenf., Wood, 1992, Orch. Malay. Sing.: 254, fig. 107l-n; Pearce et Cribb, 2002, Orch. Bhutan: 233; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 46; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 300; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 240.

Described from Myanmar ("Tavoy"). **Type** ("W. Gomes, Wall. Cat. 1951") – K-LINDL (holotype), K-W (isotype).

Stem 1–4 cm long, clustering few together, each with 4–9, distichous, lanceolate, slightly falcate, acute leaves 1.5–5 cm long, 3–6 mm wide. Scape 0.5–2 cm long, sometimes with few greenish foliaceous bracts. Rachis pendent, 4–8 cm long, flowers in irregular close whorls. Floral bracts lanceolate, acuminate, 1–1.5 mm long, straight or slightly erose along margin. Flowers light green to pale red-brown, 1–1.5 mm in diam. Pedicel and ovary 1–1.5 mm long. Sepals and petals 0.7–0.8 mm long, obtuse, entire; sepals ovate; petals oblong to lanceolate, sometimes with toothed blunt tips. Lip twice longer than sepals, 1.5–1.8 mm long, 3-lobed; side lobes ovate to lanceolate, falcate, acute, 0.3 mm long; median lobe deeply divided into 2 lanceolate to filiform lobules with small dent between them. **Fig. 65, g, h; 66, c, d.**

Ecology. Primary and secondary evergreen broad-leaved forests, commonly as canopy epiphyte

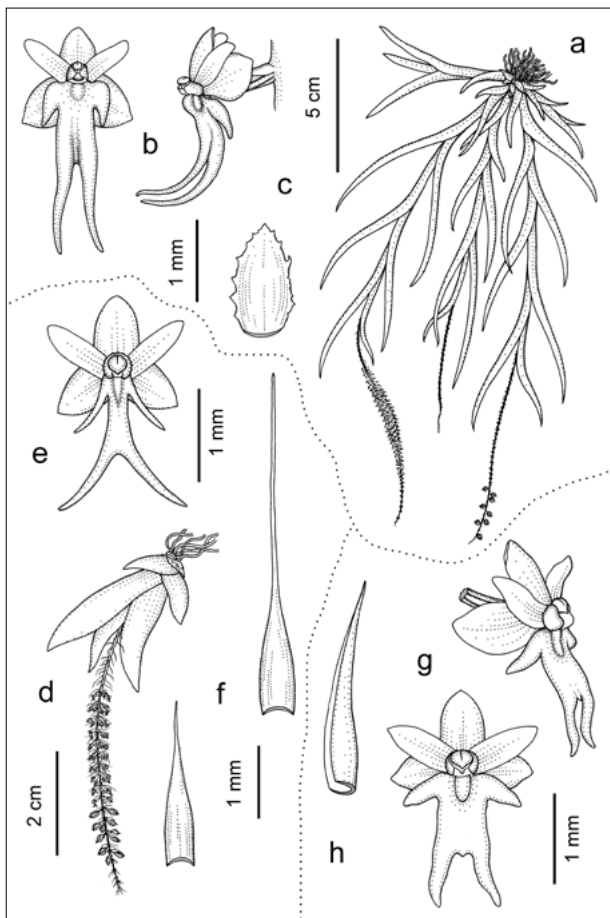


Fig. 65. *Oberonia falcata*: a – flowering plant (N.V.Khoi s.n., Sept. 2008), b – floral bract, c – flowers, frontal and side views (HAL 1174b); *O. rufilabris*: d – flowering plant (HLF 5584), e – flower, frontal view, f – floral bracts (CPC 2028a); *O. anthropophora*: g – flowers, frontal and side views, h – floral bract (Averyanov et al., HAL s.n.).

along humid, shady stream canyons. 1300–1400 m. Fl. December – January. Very rare (VU).

Distribution. Vietnam (Ha Giang, Kon Tum). NE. India, Bhutan, Myanmar, Thailand, Laos, Malacca Peninsula, Hainan?

Studied specimens. Ha Giang, Averyanov et al., HAL s.n. (LE – photo); Kon Tum, Ngoc Linh, Averyanov et al., VH 1042a (LE – photo).

6. *O. pachyphylla* King et Pantl.,

1898, Ann. Bot. Gard. (Calcutta) 8: 5, tab. 4; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 102, fig. 69; id. 1978, ibid. 33, 1: 35, fig. 26; id., 1992, Opera Bot., 114: 157; Aver., 1994, Ident. Guide Vietnam. Orch.: 155; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 896, fig. 11332; Pearce et Cribb, 2002, Orch. Bhutan: 231; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 47; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 301. – *O. crassirachis* Guillaum., 1964, Bull. Mus. Natl. Hist. Nat. ser. 2, 35: 648.

Described from NE. India ("Sikkim-Himalaya, at Salgurra, near Siliguri"). **Type** ("Pantling 429") – CAL.

Miniature plant 1.5–2.5(3) cm tall. Stem very short with 4–5 fleshy triangular, acute leaves 1.5–2 cm long, 0.5–1 cm wide. Inflorescence erect, many flowered; scape 0.5–1.5 cm long, with few ovate, sterile bracts 1 mm long; rachis slightly arching, fleshy spadix 1.5–3 cm long. Floral bracts broadly ovate, 1.5–2 mm long, blunt, straight or finely erose along margin. Flowers dull yellow to reddish-brown, 1.2–1.8 mm across, half sink into rachis. Sepals and petals 0.8–1 mm long, obtuse, entire; sepals broadly ovate; petals narrowly ovate. Lip broadly ovate to indistinctly triangular, obscurely 3-lobed, 0.7–0.8 mm long, 1 mm wide; side lobes indistinct, broad, erose; median lobe half-circular with nearly entire margin, disc has half-moon shaped callus behind which there is deep pit-like nectary. **Fig. 66, e, f; 67, a-d.**

Ecology. Primary and secondary evergreen broad-leaved and coniferous, open dry forests on soils derived from silicate rocks, commonly as canopy epiphyte, often on full sun. 800–1800 m. Fl. October – November. Very rare (VU).

Distribution. Vietnam (Lam Dong, Ninh Binh, Ninh Thuan). NE. India, Nepal, Bhutan, Thailand, Laos, Cambodia.

Studied specimens. Lam Dong, Dalat, Tixier 10 60 (P), Tixier 10 61 (P); Ninh Binh, Cuc Phuong, Song 1205 (HN); Ninh Thuan, Krong Pha, Tixier s.n., drawing (P).

Note. This rare species prefers open dry, very light forests. Recently it was found in southern

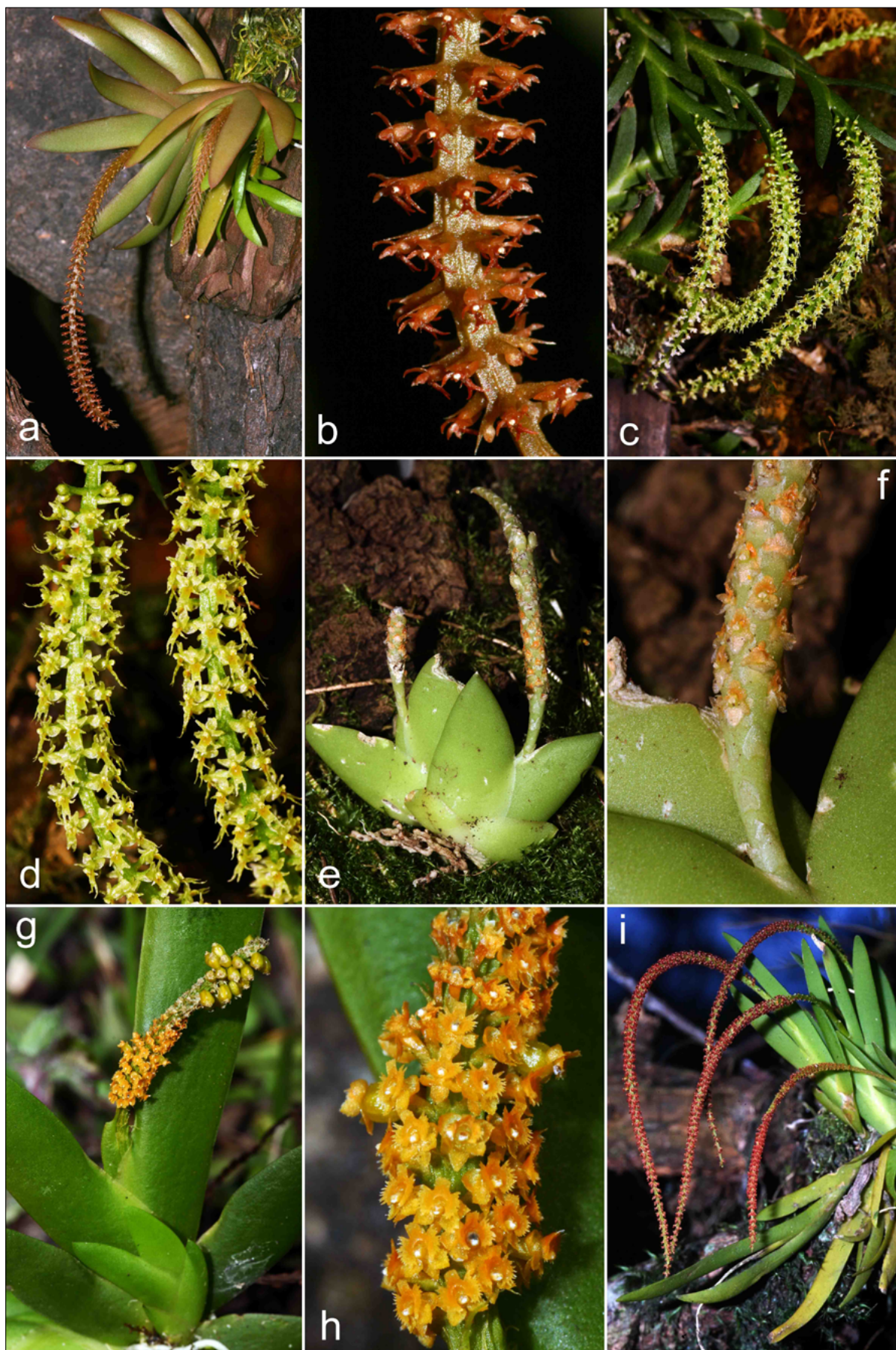


Fig. 66. *Oberonia rufilabris*: a, b (CPC 2028a); *O. anthropophora*: c, d (Averyanov et al., HAL s.n.); *O. pachyphylla*: e, f (Maisak s.n., a. 2012, Cambodia); *O. multidentata*: g, h (HAL 9839, type); *O. jenkinsiana*: i (HAL 3766).

Cambodia as element of dry open *Dipterocarp* woodlands (S. Cambodia, Aoral mt., *Maisak s.n.*, Nov. 2012 – LE).

Oberonia apiculata Kerr (1927, Kew Bull. 1927: 212; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 163) regarded sometimes as a synonym of *O. pachyphylla* probably represents separate species, well recognized for its joined, narrow leaves.

7. *O. obcordata* Lindl.,

1859, Fol. Orchid. 8: 7; King et Pantl., 1898, Ann. Bot. Gard. (Calcutta) 8: 9, tab. 11; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 71, fig. 42, 43; id. 1978, ibid. 33, 1: 30, fig. 19; Pearce et Cribb, 2002, Orch. Bhutan: 230; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 240.

Described from NE. India ("India, Sikkim, ... India, Darjeeling, ... India, Khasia, ..."). **Syntypes** ("*Hook et Thomson 112*") – K-LINDL, ("*Griffith s.n.*") – K-LINDL, ("*Griffith s.n.*") – K-LINDL.

Stems 1–3(4) cm long, solitary or few together, each with 5–7 lanceolate, slightly falcate, acute leaves (2.5)3–5(10) cm long, 3–5(8) mm wide. Inflorescence erect, verticillate, densely many-flowered, 3–5(7) cm long; scape 0.5–1 cm long, connate in lower part to uppermost leaf, with few lanceolate sterile bracts. Floral bracts lanceolate, acuminate, 1.5–2 mm long, slightly erose. Flowers reddish-orange, red or brown, 1–1.5 mm across. Pedicel and ovary 1–1.5 mm. Sepals and petals 0.8–0.9 mm long, entire, obtuse; sepals ovate; petals oblong ovate. Lip ovate, slightly longer than sepals, 3-lobed; side lobes narrowly ovate, 0.4 mm long; median lobe obcordate or 2-lobed. **Fig. 59**, e–g.

Ecology. Primary and secondary evergreen broad-leaved forests on granite, commonly as canopy epiphyte on mossy trees on very steep humid rocky slopes and cliffs. 1700–1900 m. Fl. November – January. Very rare (DD).

Distribution. Vietnam (Lai Chau). NE. India, Nepal, Bhutan, Thailand, China.

Studied specimens. Lai Chau, Phong Tho, HAL 10636 (HN, LE, MO).

Note. Figures 59, e–g are copied from King et Pantl. (1898, l.c., tab. 11).

8. *O. multidentata* Aver.,

2007, Taiwania 52: 300, fig. 2G, 10.

Described from northwestern Vietnam ("Lai Chau Prov., Sin Ho Distr., Ma Quai Municipality, Can Ti village, around point 22°24'18"N, 103°22'45"E"). **Type** ("16 Nov. 2006, HAL 9839") – HN (holotype), LE (isotype).

Stem less than 5 mm long, 3–4 tufted together, each with 3–4 broadly-lanceolate, ensiform, straight or slightly falcate, acute, leaves 3–8 cm long, 0.6–1.2 cm wide. Inflorescence 3–4 cm long, dense, many-flowered. Scape 1–1.5 cm long, 1–1.5 mm thick, covered with numerous narrowly cuneate, acuminate bracts. Rachis 2.5–3.5 cm long, thick, longitudinally ridged with many spirally arranged flowers. Floral bracts triangular-ovate, acute, with 2–3 large dents along each side, 0.8–1.5 mm long, 0.5–0.6 mm wide, shorter or slightly longer than flowers. Pedicel and ovary 0.8–0.9 mm long. Flowers yellow-orange, widely opening, 1.2–1.5 mm across. Sepals sub-similar, ovate, entire, concave, acute, 0.5–0.7 mm long, reflexed. Petals ovate to narrowly-ovate, as long as sepals, finely erose-denticulate. Lip 3-lobed, 0.9–1.1 mm long and wide, with concave fovea at base. Side lobes large, half circular, deeply lacinate to fimbriate. Median

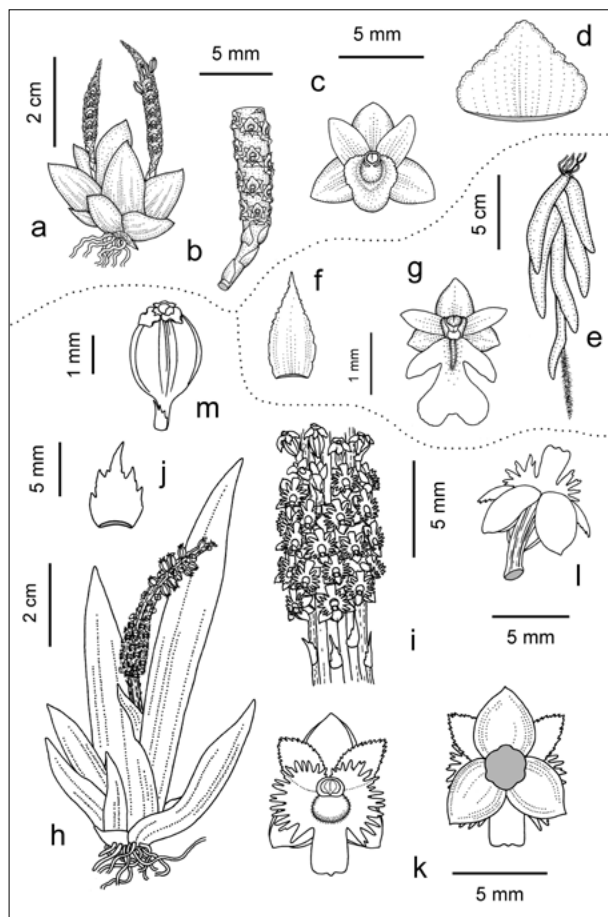


Fig. 67. *Oberonia pachyphylla*: a – flowering plant, b – portion of inflorescence, c – flower, frontal view, d – floral bract (*Maisak s.n.*, a. 2012, Cambodia); *O. obcordata*: e – flowering plant, f – floral bract, g – flower, frontal view (copied from King et Pantl., 1898); *O. multidentata*: h – flowering plant, i – portion of inflorescence, j – floral bract, k – flowers, frontal view and view from behind, l – flower, view from below, m – capsule (HAL 9839, type).

lobe rectangular, entire, truncate, longer than side lobes, sometimes blunt at apex. Fruit obovoid, stalked, ridged capsule 1.8–2.2 mm long. **Fig. 66**, g, h; **67**, h-m.

Ecology. Primary and secondary broad-leaved evergreen forests on limestone and sandstone at elev. about 1200 m a.s.l., canopy epiphyte on tall trees. Fl. September – November. Rare (DD).

Distribution. Vietnam (Lai Chau). Endemic of northwestern Vietnam.

Note. This species known on the base of a single collection may be more or less close to such Indochinese endemics as *O. rasmussenii* Seidenf. and *O. quadridentata* Aver., which also have dentate lip side lobes. From both mentioned species, *O. multidentata* distinctly differs in numerous long, narrowly cuneate regular dents of side lobes, in thick truncate inflorescence rachis and in few broad leaves. All mentioned species are probably local endemics with very limited distribution.

9. *O. quadridentata* Aver.,

1988, Bot. Journ. (Leningrad) 73, 3: 423, fig. 1; Seidenf., 1992, Opera Bot., 114: 157, fig. 98; Aver., 1994, Ident. Guide Vietnam. Orch.: 156, fig. 7; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 896, fig. 11333; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 47.

Described from northern Vietnam (“Prov. Vinh Phu, Tamdao”). **Type** (“Averyanov, LX-VN 0/271, 1985”) – LE.

Stems clustering, 1–2 cm long, with 4–6(7) fleshy, ensiform, acute, distichous leaves (2)5–10(12) cm long, 0.5–1.5 cm wide. Inflorescence erect, curved or slightly flexuose, verticillate, densely many-flowered; scape 1–1.5(2) cm long with few small, sterile bracts; rachis 3–5(7) cm long. Floral bracts triangular-lanceolate, acuminate, entire, as long as flowers or little longer. Pedicel and ovary about 1 mm long. Flowers dull greenish to light brown, 1 mm in diam. Sepals and petals subsimilar, ovate, obtuse, hardly irregularly dentate, 0.5 mm long; lateral sepals outside with short keel near apex. Lip 3-lobed, 0.5 mm long and wide; side lobes subquadrate, truncate, with 4 triangular dents; median lobe subquadrate, truncate or roundish, entire. **Fig. 68**, a-c.

Ecology. Primary evergreen broad-leaved forests on rhyolite, particularly on mossy gnarled trees of very steep rocky slopes and cliffs. 900–1100 m. Fl. September – October. Very rare (VU).

Distribution. Vietnam (Vinh Phuc). Endemic.

Studied specimens. Vinh Phuc, Tam Dao, Averyanov et al., LX-VN 0/316 (LE).

Note. Easily recognizable species for its nearly almost equilateral triangular dents on lip side lobes.

10. *O. jenkinsiana* Griff. ex Lindl.,

1859, Fol. Orchid. 8: 4; King et Pantl., 1898, Ann. Bot. Gard. (Calcutta) 8: 6, tab. 5; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 107, fig. 76; id. 1978, ibid. 33, 1: 36, fig. 28; Pearce et Cribb, 2002, Orch. Bhutan: 230; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 239.

Described from NE. India (“India, Assam, Deborrow Mook..., India, Khasia...”). **Syntypes** (“Jenkins s.n.”) – K-LINDL, (“Lobb s.n.”) – K-LINDL.

Stems erect or pendent 1–3 cm long, with 3–6(7) ensiform, acute, distichous leaves 3–7(10) cm long, 3–8 mm wide. Inflorescence arcuate, pendent, verticillate, densely many-flowered; scape 1.5–2.5 cm long, more or less connate in lower part to uppermost leaf, with many narrowly lanceolate, acuminate sterile bract 2.5–5 mm long; rachis 2.5–10 cm long. Floral bracts cuneate, acuminate, 1–1.5 mm long. Pedicel and ovary 0.6–1 mm long. Flowers 1 mm across, brownish-red. Sepals and petals subsimilar, ovate, acute, entire, 0.5–0.8 mm long. Lip 3-lobed, 0.7–0.8 mm long, 0.8–1 mm wide when flatten; side lobes broad, truncate flabellate, irregularly denticulate to fimbriate; median lobe broadly obovate to obcordate, obscurely 2-lobed or entire. **Fig. 66**, i; **68**, d-g; **70**, a.

Ecology. Primary and secondary evergreen broad-leaved forests on any kind of mother rocks, commonly as canopy epiphyte in humid places near mountain tops. 600–900 m. Fl. March – April, September – November. Very rare (VU).

Distribution. Vietnam (Ninh Thuan, Thanh Hoa). NE. India, Bhutan, Myanmar, S. China, Thailand.

Studied specimens. Ninh Thuan, Ninh Hai, HLF 4215 (HN, LE, MO); Thanh Hoa, Quan Hoa, HAL 3766 (HN, LE).

11. *O. rasmussenii* Seidenf.,

1975, Bot. Tidsskr. 70, 1: 79; Seidenf., 1978, Dansk Bot. Ark., 33, 1: 36, fig. 27; id., 1992, Opera Bot., 114: 157, pl. 10d; Aver., 1994, Ident. Guide Vietnam. Orch.: 155; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 897, fig. 113343; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 47.

Described from Thailand (“Thailand ... kheo Kaw Ma on the road to Pai”). **Type** (“GT, 8059”) – C.

Questionable species allied to *O. jenkinsiana*, from which it differs (according to description)

in dense inflorescence, dark brown flowers and in narrower leaves. **Fig. 68**, h, i; **70**, b, c.

Ecology. Primary and secondary evergreen broad-leaved forests on silicate mother rocks, commonly as canopy epiphyte in humid places. 600–800 m. Fl. September – October. Very rare (DD).

Distribution. Vietnam (Kon Tum). Thailand.

Studied specimens. Kon Tum, Konplong, Averyanov *et al.*, LX-VN 0/251 1985 (LE).

12. *O. trochopetala* Gagnep.,

1929, Bull. Soc. Bot. Fr. 76: 327; id., 1932, Fl. Gen. Indo-Chine 6, 2: 154; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 101, fig. 68; id., 1992, Opera Bot., 114: 157, fig. 97; Aver., 1994, Ident. Guide Vietnam. Orch.: 155; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 898, fig. 11338; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 47.

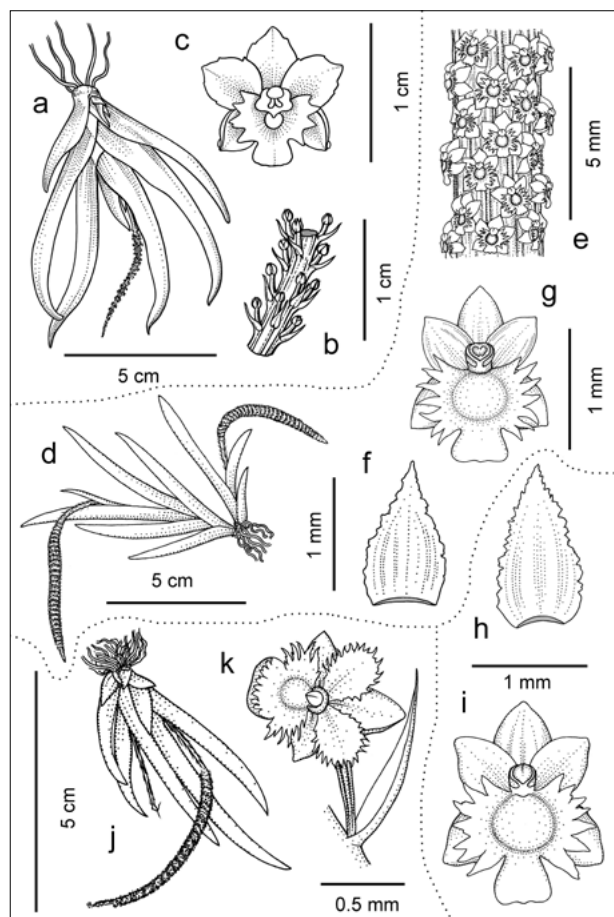


Fig. 68. *Oberonia quadridentata*: a – flowering plant, b – portion of inflorescence, c – flower, frontal view (Averyanov *et al.*, LX-VN 0/271, type); *O. jenkinsiana*: d – flowering plant (copied from King et Pantling, 1898), e – portion of inflorescence, f – floral bract, g – flower, frontal view (HAL 3766); *O. rasmussenii*: h – floral bract, i – flower, frontal view (Averyanov *et al.*, LX-VN 0-251); *O. trochopetala*: j – flowering plant, k – flower, pedicel and floral bract (Poilane 3357, type).

Described from southern Vietnam (“Annam: Nhatrang”). **Type** (“*Poilane 3357*”) – P.

Stems very short, densely clustering, each with 3–5 leaves. Leaves lanceolate to narrowly lanceolate, subulate, acute, 6–12 cm long, 4–7 mm wide. Inflorescence many flowered, dense; peduncle 1.5–2.5 cm long with 1–3 sterile, acute bracts; rachis 5–8(9) cm long. Floral bracts narrowly lanceolate, acuminate, with straight margin. Flowers white to yellowish, 1 mm across. Sepals and petals 0.5–0.6 mm long. Sepals ovate, concave, entire. Petals broadly obovate to almost circular finely denticulate to long papillose along margin. Lip half-circular flabellate, 0.5–0.7 mm long, indistinctly 3-lobed, erose denticulate along margin. **Fig. 68**, j, k; **69**, a.

Ecology. Primary dry broad-leaved forests. Fl. May – June. Very rare (DD).

Distribution. Vietnam (Phu Khanh). Endemic.

Note. The species is known solely on the base of the type collection.

13. *O. rosea* Hook. f.,

1890, Icon. Pl. tab. 2005; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 83, fig. 53; id., 1992, Opera Bot., 114: 159, fig. 101; Seidenf., Wood, 1992, Orch. Malay. Sing.: 251, fig. 106g, h; Aver., 1994, Ident. Guide Vietnam. Orch.: 155; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 897, fig. 11335; Su Horng-Jye, 2000, Fl. Taiwan 5: 984; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 47; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 239.

Described from Malacca Peninsula (“Malay Peninsula ... Perak, Gunong Batu Pateh”). **Type** – K?

Stems erect or pendulous, solitary or few together, 2–3 cm long with 3–6 ensiform, distichous, acute leaves 3–9 cm long, 4–6 mm wide. Scape 0.5–1.5 cm long with many small sterile bracts; rachis 3–8(9) cm long, many dense-flowered, verticillate. Pedicel and ovary 1 mm long. Floral bracts oblong narrowly ovate, attenuate, 1–1.5 mm long, apical margin entire or finely erose. Flowers pink to red, or orange-brown, 1.5–2 mm in diam. Sepals and petals ovate, obtuse, 0.8–0.9 mm long, 0.6–0.7 mm wide; petals erose along margin. Lip 0.9–1 mm long and wide, 3-lobed; lateral lobes subquadrate, erose; median lobe rectangular, truncate, shallowly emarginate, longer than side lobes, about 0.4 mm long, entire or somewhat irregularly dentate. **Fig. 69**, b–g; **70**, d, e.

Ecology. Primary evergreen broad-leaved forest on silicate rocks, usually as canopy epiphyte on steep rocky humid slopes. 150–1200 m. Fl. March – April. Very rare (VU).

Distribution. Vietnam (Kon Tum, Lam Dong, Thua Thien – Hue). Taiwan, Malacca Peninsula.

Studied specimens. Kon Tum, Dak Gley, *VH 1799a* (LE); Kon Tum, Kon Plong, *VH 5702* (HN, LE, MO); Lam Dong, Dilinh, *Nguyen Thi Do 149* (HN, LE); Thua Thien – Hue, Nam Dong, *HAL 10885* (HN, LE, MO).

Note. Some samples from Vietnam morphologically approach *O. huensis*. Figures 69, b-d are copied from Hook. f. (1890, l.c., tab. 2005).

14. *O. tixieri* Guillaum.,

1961, Bull. Mus. Natl. Hist. Nat. ser. 2, 32: 564; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 111, fig. 78; id., 1992, Opera Bot., 114: 157, fig. 99; Aver., 1994, Ident. Guide Vietnam. Orch.: 156; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 897, fig. 11337; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 47.

Described from southern Vietnam (“Annam: Blao”). **Type** (“5/12/59 *Tixier*”) – P.

Stems erect or pendulous, solitary or few together, 0.5–1.5(2) cm long with 3–5(6) ensiform, distichous, acute leaves 3–6(7) cm long, 4–6 mm wide. Scape 0.5–2 cm long with many small sterile bracts; rachis 5–8(9) cm long, with many distant dense whorls. Flowers pink to purple, 1.2–1.4 mm in diam. Sepals and petals ovate, obtuse, 0.7–0.8 mm long, 0.5–0.6 mm wide; petals erose along margin. Lip 0.7–0.8 mm long and wide, 3-lobed; lateral lobes subquadrate, irregularly pectinate; median lobe obovate, truncate, shallowly emarginate and somewhat crenulate, as long as side lobes, 0.4–0.5 mm long. **Fig. 69**, h, i.

Ecology. Primary evergreen broad-leaved forest on silicate rocks, usually as canopy epiphyte. 600–1000 m. Fl. November – December? Very rare (DD).

Distribution. Vietnam (Lam Dong, Quang Tri). Endemic.

Studied specimens. Quang Tri, Trung An, *Petelot 5671* (AMES); Lam Dong, Bao Loc, *Tixier s.n.*, drawing (P).

Note. The species should be compared with closely related *O. clarkei* Hook. f., from which it differs in larger leaves and in much longer inflorescence with distinctly distant floral whorls.

15. *O. acarus* Evrard ex Gagnep.,

1932, Bull. Soc. Bot. Fr. 79: 168; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 156, fig. 17, 7; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 111, fig. 79; id., 1992, Opera Bot., 114: 158, fig. 100; Aver., 1994, Ident. Guide Vietnam. Orch.: 157; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 892, fig. 11316; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 46.

Described from southern Vietnam (“Annam: Dalat”). **Type** (“*Evrard 1303*”) – P.

Stem 1–3 cm long, solitary, with (3)4–6 distichous, equitant, slightly falcate, acute leaves, 2–5 cm long, 4–6 mm wide. Scape (2)3–4(5) cm long, with many sterile whitish aristate bracts 1.5–2 mm long. Rachis 7–18 cm long, verticillate, many dense-flowered. Floral bracts lanceolate, attenuate, 1.5–2 mm long, much longer than flowers. Pedicel and ovary 1 mm long. Sepals and petals ovate, obtuse, 0.7–0.8 mm long, 0.4–0.5 mm wide, petals; sepals entire; petals little smaller, slightly wavy along margin. Lip broadly ovate, 0.8–1 mm long and wide, 3-lobed; side lobes subquadrate to half circular, erose to denticulate; median lobe longer than side lobes, oblong-ovate, entire, orbicular at apex. **Fig. 69**, j, k.

Ecology. Primary evergreen broad-leaved forest on granite. 1400–1500 m. Fl. September – October. Very rare (DD).

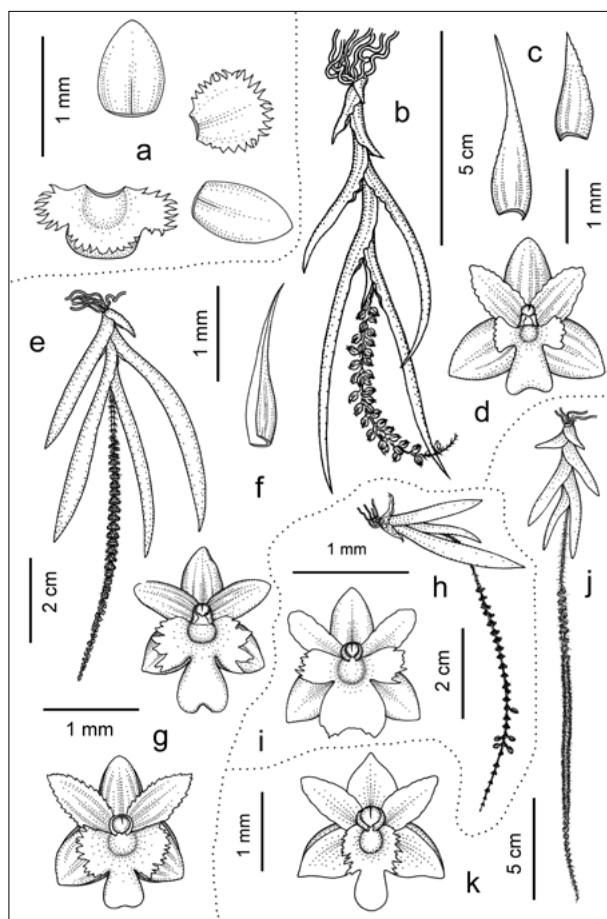


Fig. 69. *Oberonia trochopetala*: a – flattened sepals, petal and lip (Poilane 3357, type); *O. rosea*: b – fruiting plant, c – floral bracts, d – flower, frontal view (copied from Hook. f., 1890, type), e – flowering plant, f – floral bract, g – flowers, frontal view (HAL 10885); *O. tixieri*: h – flowering and fruiting plant, i – flower, frontal view (Tixier s.n., type); *O. acarus*: j – flowering plant, k – flower, frontal view (Evrard 1303, type).

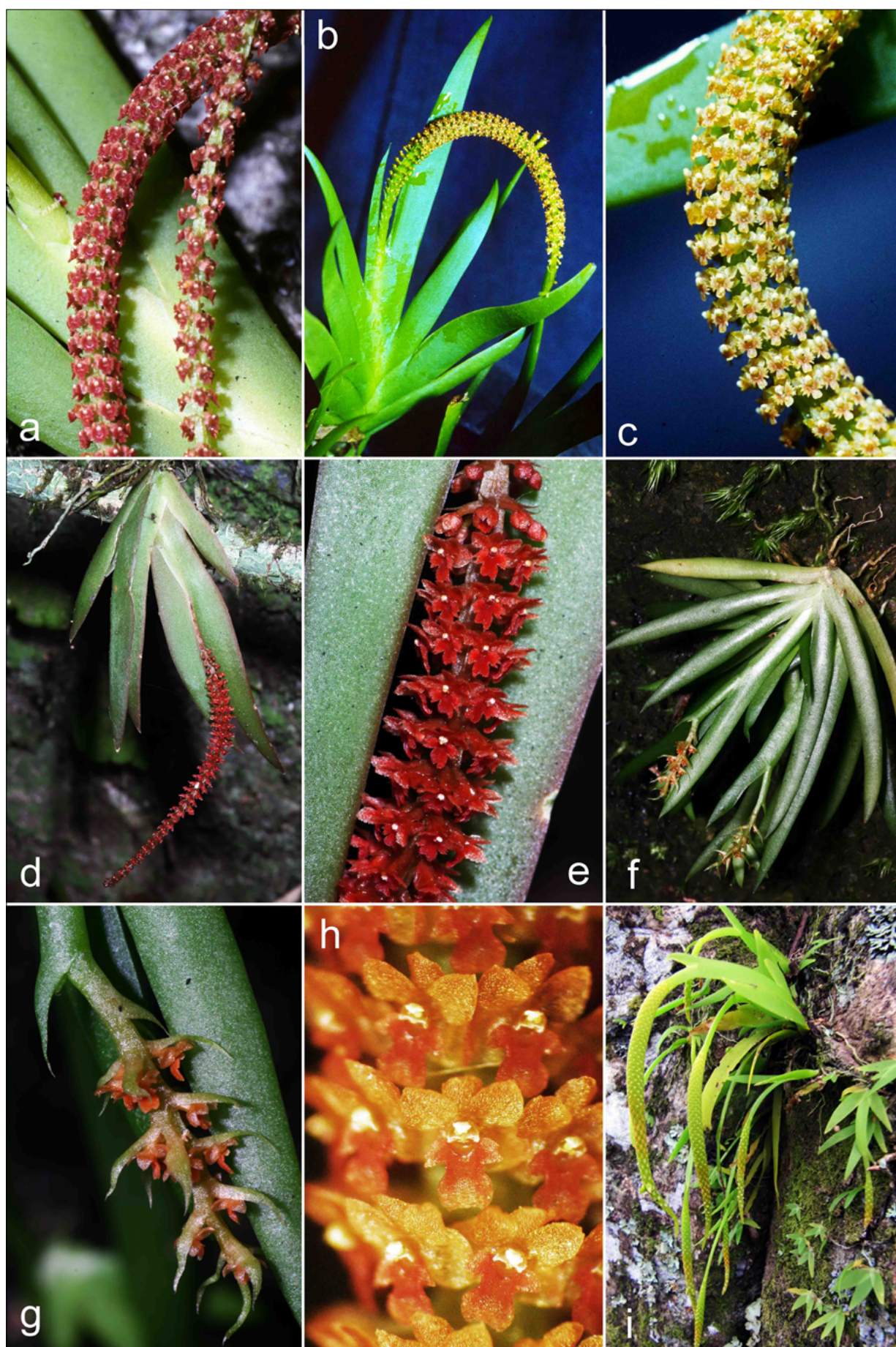


Fig. 70. *Oberonia jenkinsiana*: a (HAL 3766); *O. rasmussenii*: b, c (Averyanov et al., LX-VN 0-251); *O. rosea*: d, e (HAL 10885); *O. longibracteata*: f, g (HLF 5486); *O. variabilis*: h (HAL 10668a); *O. pachyrachis*: i (A. Petrov s.n.).

Distribution. Vietnam (Lam Dong). Endemic.

Note. The species is known by the single (type) collection. It looks very close to *O. jenkinsiana*, but differs in lip twice longer than broad, in long floral bracts and in longer inflorescence. The study of variation of both mentioned species is needed for better understanding of their nature and status.

16. *O. huensis* Aver.,
2005, Rheede 15: 97.

Described from central Vietnam ("Thua Thien-Hue Prov., Nam Dong Distr., Huong Son Municipality, around point 16°09'52"N, 107°36'22"E, at elev. c. 300 m"). **Type** ("23 March 2005, HAL 6793") – HN (holotype), LE (isotype). **Epitype** – d-EXSICCATES OF VIETNAMESE FLORA 0031/HAL 6793.

Stems 0.5–1.5 cm long, solitary or 3–5 tufted together, with (4)5–7 lanceolate-ensiform, straight or slightly falcate, acute, leaves 2–6 cm long, 3–7 mm wide. Inflorescence 6–14 cm long, verticillate, densely many-flowered. Scape 1–3 cm long, with many narrowly triangular acute to acuminate sterile bracts; rachis 4–13 cm long, longitudinally ridged; flowers at middle part of rachis arranged spirally or in close irregular whorls; in apical part in distant regular whorls, each with 7–9 flowers. Floral bracts longer than flowers, green to red, narrowly ovate, acute to acuminate, entire or finely denticulate along margin, 1.5–2 mm long, 0.2–0.4 mm wide. Pedicel and ovary 0.3–0.5 mm long. Flowers brightly red to red-brown, 1–1.2 mm across. Sepals and petals ovate, entire, concave, obtuse to rounded, 0.7–0.8 mm long, 0.2–0.4 mm wide, petals slightly smaller. Lip 3-lobed, 0.7–1 mm long and wide, with concave fovea at base; side lobes half circular, erose, irregularly denticulate to crenulate along margin; median lobe, orbicular to broadly obovate, with entire edges, bilobulate at apex, usually with small blunt median dent; lobules broad, oblique to falcate, incurved, obtuse to acute. Fruit narrowly-obovate, stalked; capsule 2–2.5 mm long. **Fig. 71.**

Ecology. Primary evergreen, broad-leaved, closed, shady, lowland forests on clayey shale and rocky limestone at elevations 300–700 m, commonly on mossy trees along streams. Fl. March – June. Locally common (VU).

Distribution. Vietnam (Bac Kan, Thua Thien – Hue). Endemic.

Studied specimens. Bac Kan, Na Ri, HAL 4937 (HN; LE); Thua Thien – Hue, Huong Thuy, HAL 8279 (LE).

Note. In shape and structure of lip, the species resembles strict endemics *O. marina* J.B. Comber, *O. rosea* Hook. f., *O. quadridentata* Aver. and *O. rasmussenii* Seidenf. reported from Thailand, Taiwan, Vietnam, Malacca and Java. However, it differs from all these species in distinctly bilobulate lip with retuse or acute incurved lobules, long pendulous inflorescence and in long floral bracts much exceeding flowers. This species is probably endemic to lowland areas of central and northern parts of Vietnam.

17. *O. dolichocaulis* Seidenf.,

1995, Opera Bot., 124: 20, fig. 9, pl. 3b; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 46.

Described from northwestern Thailand ("Tatnoi Falls, Doi Inthanond km 22, 840 m"). **Type** ("GT 8236a") – C.

Stem 1–2 cm long with distichous overlapping ensiform leaves 2–3 cm long. Inflorescence 4–5 cm long, scape 1–1.5 cm long, with many cuneate sterile bracts. Flowers dull yellow to purple, distinctly verticillate with whorls of (3)6–8 flowers. Floral bracts narrowly triangular, acute, entire or irregularly serrulate, 1–1.5 mm long, as long as flower. Sepals and petals ovate, subsimilar, entire, obtuse, 0.5 mm long; petals slightly narrower. Lip 0.6–0.7 mm long and wide, longer than the dorsal sepal, 3-lobed, with entire edges; side lobes ovate; median lobe much larger, broader than long, ovate-reniform, slightly retuse at apex. **Fig. 72, a–d.**

Ecology. Primary evergreen, broad-leaved humid forests on silicate rocks, commonly as canopy epiphyte. (840)1100–1200 m. Fl. October – December. Very rare (DD).

Distribution. Vietnam (Kon Tum). Thailand.

Studied specimens. Kon Tum, Dak Gley, VH 1799b (HN, LE).

18. *O. emarginata* King et Pantl.,

1898, Ann. Bot. Gard. (Calcutta) 8: 6, tab. 2A; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 106, fig. 73; id. 1978, ibid. 33, 1: 37, fig. 30; id., 1992, Opera Bot., 114: 158; Aver., 1994, Ident. Guide Vietnam. Orch.: 155; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 893, fig. 11321; Pearce et Cribb, 2002, Orch. Bhutan: 229; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 46. – *O. micrantha* King et Pantl., 1898, l.c.: 6, tab. 5.

Described from NE. India ("Sikkim, at Namgah"). **Type** ("Pantling 423") – CAL (holotype), BM, K, L, P, W (isotypes).

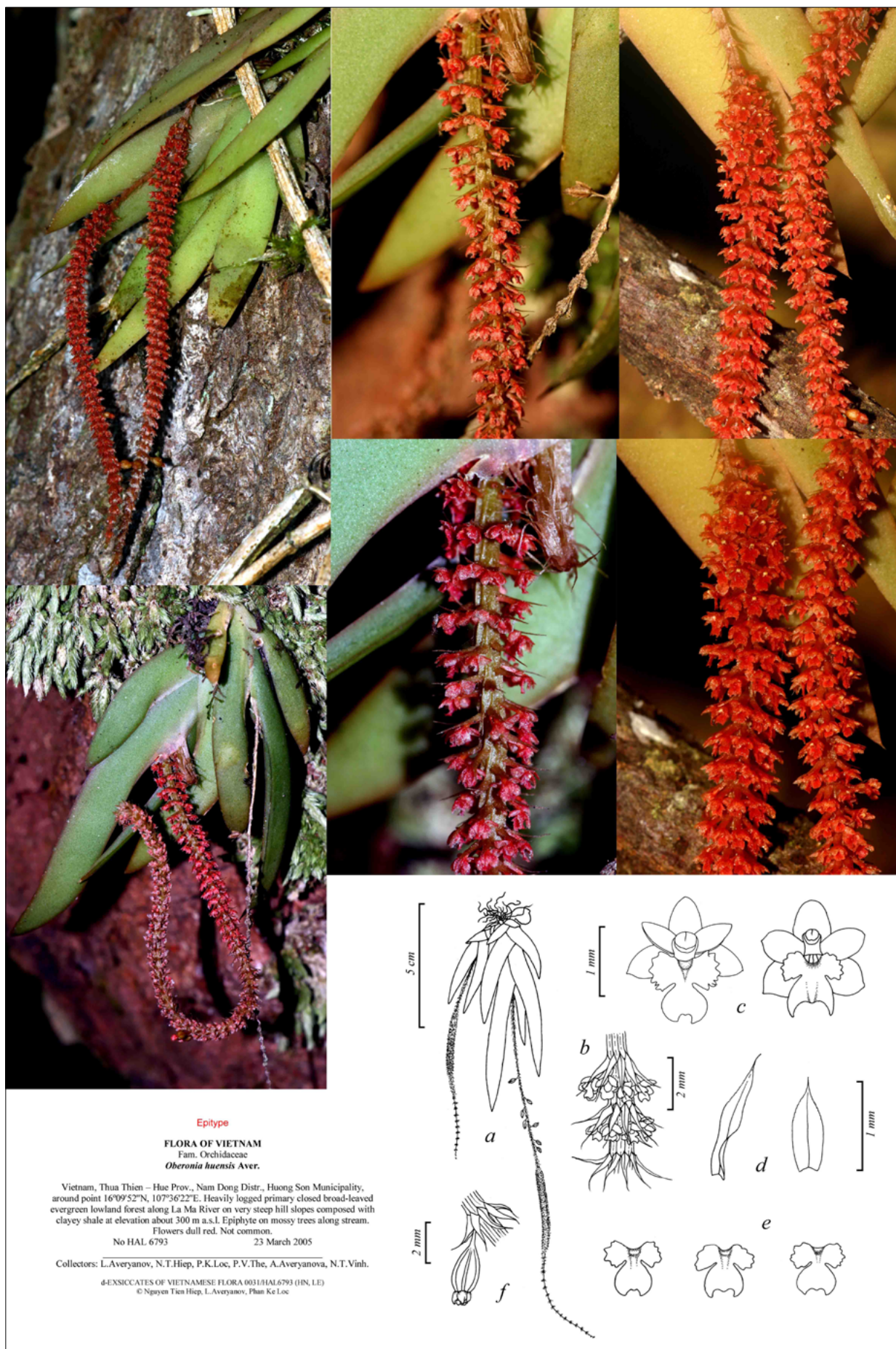


Fig. 71. Digital herbarium specimen of *Oberonia huensis* (HAL 12707, epitype).

Stems erect or pendent, 1.5–4 cm long with 5–7 ensiform distichous, acute leaves 1–3.5 cm long, 2–3 mm wide. Inflorescence erect, arching, verticillate, densely many-flowered; peduncle 1–1.5 cm long, with few linear, hyaline sterile bracts 1 mm long; rachis 2–5.5 cm long. Floral bracts narrowly ovate, acute, entire, 1 mm long. Flowers dull green to yellowish and yellow-orange, 0.7–0.8 mm across. Pedicel and ovary 0.5–0.7 mm long. Sepals and petals subsimilar, ovate, acute, 0.5 mm long, entire. Lip 3-lobed, 0.5–0.7 mm long and wide when flattened; side lobes oblong, rounded at apex, with entire margin; median lobe half circular to obcordate, obscurely 2-lobed and finely erose incised at apex. **Fig. 72**, e-h.

Ecology. Primary evergreen, broad-leaved humid forests on silicate rocks, commonly as canopy epiphyte. 800–1000 m. Fl. September – October. Very rare (DD).

Distribution. Vietnam (Kon Tum). NE. India, Bhutan, Thailand.

Studied specimens. Kon Tum, Konplong, Mang Den, *Averyanov et al.*, *LX-VN 0/40* (LE).

19. *O. longibracteata* Lindl.,

1830, Gen. Sp. Orch. Pl.: 15; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 161; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 83, fig. 52; id. 1978, ibid. 33, 1: 39, fig. 33; id., 1992, Opera Bot., 114: 156; Aver., 1994, Ident. Guide Vietnam. Orch.: 154; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 896, fig. 11331; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 47; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 239.

Described from Sri Lanka (“Hab. in Zeylona ...”). **Type** (“Ceylon, *Hantani et Hewahette, Macrae s.n.*”) – K?

Stem less than 1 cm long. Leaves 5–6(7), fleshy, laterally compressed, distichous, lanceolate, 3–6 cm long, 3–6 mm wide, acute. Peduncle 5–7 cm long, connate in lower part with uppermost leaf, appearing to arise from leaf blade, lower part with 1 or 2 large sterile bracts; rachis 2.5–3.5 cm long, with few to many lax flowers. Floral bracts large, triangular-cuneate, 4–5 mm long, much exceeding flowers. Flowers shortly pedicellate, 1–1.5 mm in diam. Sepals and petals subsimilar, ovate, obtuse, 0.8–1 mm long, 0.4–0.5 mm wide, petals slightly narrower. Lip broadly ovate, about 0.7 mm long, 3-lobed; side lobes ovate to oblong, erose at margin, much smaller than median lobe; median lobe subquadrate or broadly elliptic, 0.6 mm long and wide, inconspicuously erose along margin, apex round to slightly emarginate. **Fig. 70**, f, g; **72**, i-k.

Ecology. Primary and secondary evergreen broad-leaved and mixed forests on any kind of rocks, commonly as lithophyte on wet mossy bluffs along shady humid mountain canyons, particularly near waterfalls, rarely as epiphyte. (300)600–1500 m. Fl. September – November. Not common (VU).

Distribution. Vietnam (Da Nang, Dak Lak, Dak Nong, Khanh Hoa, Quang Nam, Quang Tri, Thua Thien – Hue). Sri Lanka, Thailand, Hainan.

Studied specimens. Da Nang, Hoa Vang, *CPC 3295* (HN); Da Nang, Tourane, *Poilane 8008* (P), *Poilane 8451* (P); Dak Lak, Krong Bong, *HLF 5486* (HN, LE); Dak Nong, Dak Glong, *HLF 5662* (LE); Khanh Hoa, Mere et l’Enfant, *Poilane 6567* (P); Khanh Hoa, Hon Ba, *Chevalier 38744* (P); Quang Nam, Hon Ba, June 2011 *J. Skornickova s.n.* (LE, SING – photo); Quang Tri, Dent du Tigre, *Poilane 10278* (AMES, P); Quang Tri, Huong Hoa,

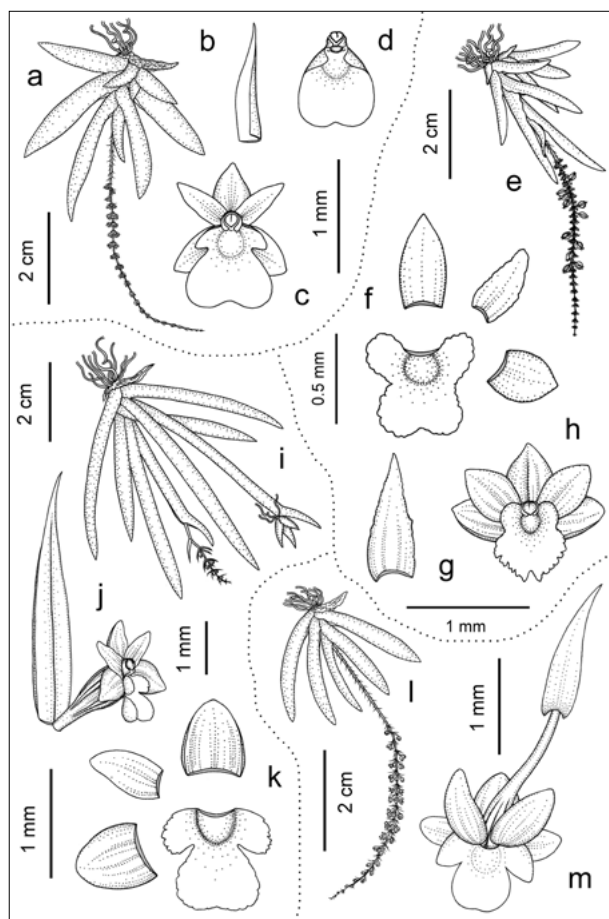


Fig. 72. *Oberonia dolichocaulis*: a – flowering plant (VH 1799b), b – floral bract, c – flower, d – lip (GT 8236a, type, copied from Seidenfaden, 1995); *O. emarginata*: e – fruiting plants, f – sepals, petal and lip (King et Pantling 423, isotype), g – floral bract, h – flowers, frontal view (copied from King et Pantling, 1898); *O. longibracteata*: i – flowering plant, j – flower, pedicel, ovary and floral bract, k – sepals, petal and lip (HLF 5486); *O. pumilio*: l – flowering plant, m – floral bract, pedicel, ovary and flower, view from behind (VH 5255).

HLF 5830 (HN); Thua Thien – Hue, Phu Loc, *HLF 1595* (HN, LE).

Note. Easily recognizable species for its lithophytic habit and long floral bracts. Small rooting plantlets are sometimes developed from axils of floral bracts in old inflorescence that is a unique feature among *Oberonia* species.

20. *O. pumilio* Rchb. f.,

1857, *Bonplandia* 5: 58; Seidenf., 1968, *Dansk Bot. Ark.*, 25, 3: 113, fig. 77; id., 1978, *ibid.* 33, 1: 38, fig. 31; Comber, 1990, *Orch. Java*: 155; id., 2001, *Orch. Sumatra*: 196; Seidenf., Wood, 1992, *Orch. Malay. Sing.*: 257, fig. 109g-m; Aver. et Averyanova, 2003, *Updated Checklist Orch. Viet.*: 47.

Described from Java (sine loc). **Type** (“*Zollinger s.n.*”) – ?

Stems densely tufted, 0.5 cm long, each with 4–6, oblique, nearly straight, acute leaves 2–5 cm long, 3–5(8) mm wide. Inflorescence 4–6 cm long, slender; scape 1.5–2.5 cm long, with many small sterile bracts. Floral bracts lanceolate, acute, entire, longer than flowers. Flowers red-brown, 1.2 mm across, in whorls. Pedicel and ovary 0.8–1 mm long. Sepals and petals 0.6–0.7 mm long, obtuse; sepals broadly ovate, entire; petals oblong to narrowly ovate, with irregular edge. Lip as long as sepals, as long as wide, 3-lobed; side lobes ovate, subquadrate to half circular, straight along margin; median lobe as broad as long, widening from narrow base, broadly obovate, round or blunt at apex. **Fig. 72**, 1, m; **73**, a, b.

Ecology. Primary and secondary evergreen broad-leaved and mixed humid forests on silicate rocks, commonly as canopy epiphyte on mossy trees. 1000–1200 m. Fl. February – April. Very rare (VU).

Distribution. Vietnam (Kon Tum, Lao Cai). Thailand, Malacca Peninsula, Sumatra, Java.

Studied specimens. Kon Tum, Kon Plong, *VH 5255* (HN, LE); Lao Cai, Van Ban, *DKH 6752* (HN, LE).

21. *O. variabilis* Kerr,

1927, *Kew Bull.* 1927: 214; Gagnep., 1932, *Fl. Gen. Indo-Chine* 6, 2: 164; Seidenf., 1968, *Dansk Bot. Ark.*, 25, 3: 114, fig. 81; id. 1978, *ibid.* 33, 1: 39, fig. 32; id., 1992, *Opera Bot.*, 114: 158; Aver., 1994, *Ident. Guide Vietnam. Orch.*: 156; P.H. Ho, 2000, *Ill. Fl. Vietnam* 3: 898, fig. 11339; Aver. et Averyanova, 2003, *Updated Checklist Orch. Viet.*: 47; Chen Sing-chi, Ormerod, Wood, 2009, *Fl. China*, 25: 238.

Described from Thailand (“Siam ... Chiangmai, Kawng He”). **Type** (“*Kerr 369*”) – K.

Stem 0.5–1 cm long, with 3–5 distichous, equitant, slightly falcate, acute leaves, 2.5–7 cm long, 4–6(8) mm wide. Scape 0.5–1.5 cm long, often with many whorled sterile aristate bracts 1.5–2 mm long. Rachis 4–7(8) cm long, verticillate, many dense-flowered. Floral bracts lanceolate, attenuate, 1.5–2 mm long, longer than flowers. Flowers yellow–orange, orange or orange-brown. Pedicel and ovary 1 mm long. Sepals and petals ovate, obtuse, 0.7–0.8 mm long, 0.4 mm wide, entire, or petals slightly wavy. Lip broadly ovate, 0.8 mm long and wide, 3-lobed; side lobes narrowly ovate, much smaller than median lobe, erose to dentate; median lobe subquadrate, emarginate to irregularly incise. Capsule obovoid, 1.5–2.5 mm long on stalk 1 mm long. **Fig. 70**, h; **73**, c, d.

Ecology. Primary and secondary broad-leaved and mixed evergreen forests on silicate rocks, commonly as canopy epiphyte on mossy trees in humid shady places along mountain canyons and on very steep rocky slopes. 1100–1900 m. Fl. April – May. Rare (VU).

Distribution. Vietnam (Kon Tum, Lai Chau, Lam Dong, Lao Cai, Thua Thien – Hue). Thailand, Hainan.

Studied specimens. Kon Tum, Kon Plong, *VH 5702* (HN, LE, MO); Lai Chau, Phong Tho, *HAL 10668a* (HN, LE); Lam Dong, Blao, *Tixier 26 60* (P); Lao Cai, Chapa, *Petelot 5646* (AMES, C); Thua Thien – Hue, Phu Loc, *HLF 1184* (HN, LE).

Note. This entity is morphologically very close to the previous species and requires further studies of the limits of its variation based on more material.

O. subgen. 2. Oberonia;

O. sect. Oberonia; Hook. f. 1888, *Fl. Br. Ind.* 5: 675. – *O. sect. Scyllae* Hook. f., 1888, l.c.: 684. – *O. sect. Myosurus* Hook. f., 1888, l.c.: 685. – *O. subgen. Apotemnophyllum* Schltr., 1911, *Bot. Jahrb.* 45, Beibl. 104: 13.

Type: *O. iridifolia* Roxb. ex Lindl.

Leaves with distinct articulation at the base. Stem usually abbreviated, rarely elongate.

About 150 (17) species. Africa, tropical Asia.

22. *O. ngoclinhensis* Aver., sp. nov.

Described from southern Vietnam (“Prov. Kontum. ... S slope of Ngoc Linh mt., ... Muong Hoong village”). **Type** (“31 March 1995, *VH 1077*”) – LE (holotype), HN (isotype).

Miniature plant with short creeping rhizome 0.5–2 cm long, 1–1 mm thick. Stems erect, densely clustering or distant on rhizome on 0.5 cm from each other, abbreviate, 1–3 mm tall, completely covered

by 3–4(5) imbricate leaves. Leaves fleshy, triangular to triangular lanceolate, acute, 1.5–3 cm long, 3–5 mm wide. Inflorescence 3–5(6) cm long; scape stout, erect, 0.5–2 cm long, naked or with 1–2 triangular, acute, sterile bracts; rachis arching, inflated, fleshy spadix (1)1.5–3(4) cm long, 2.5–3.5 mm in diam., densely covered by imbricate floral bracts. Floral bracts ovate to narrowly ovate, 0.8–1.2 mm long, acute, incise dentate along margin in apical half, fleshy at base, apex straight before flowering, during anthesis back recurved. Pedicel and ovary 0.3–0.4 mm long, completely sink into deep, individual, ovate rachis alveoli. Flowers 0.8–1 mm across. Sepals broadly ovate, entire along margin, 0.5–0.6 mm long, obtuse, spreading on rachis surface. Petals oblong broadly lanceolate, blunt, twice shorter than sepals. Lip oblong narrowly ovate in outline, 0.6–0.8 mm long, 0.3–0.5 mm wide, 3-lobed; side lobes half circular, finely incised, sometimes reduced into insignificant auricles; median lobe twice longer, narrowly obovate, emarginate or shallowly 2-lobed at apex, straight or slightly incised along margin; disk with small ovate insignificant fovea. Capsule ovoid, 1–2 mm long. **Fig. 73, e-i.**

Etymology. Species name refers name of mountain system where it was discovered.

Ecology. Open dry secondary mixed and coniferous hill forests with *Lithocarpus* and *Pinis khasya* on soils derived from silicate rocks, commonly as canopy epiphyte. 800–1000 m. Fl. February – March. Locally common (LR).

Distribution. Vietnam (Kon Tum). Probably strict endemic of Ngoc Linh mountains.

Studied specimens. Kon Tum, Ngoc Linh mt., Muong Hoong village, *VH 1338* (HN, LE).

Note. This species is probably close to more or less natural, compact, taxonomically isolated group of species (*Oberonia pumila*, *O. rhizoides*, *O. seidenfadenii*, and *O. sinica*) with creeping rhizome, spadix-like inflorescence with fleshy inflated rachis and in sink subsessile flowers. It distinctly differs from its allies in small flowers and in membranaceous, oblong, 3-lobed lip, incise at the side lobes and at the apex.

23. *O. pachyrachis* Rehb. f. ex Hook. f.,

1894, Fl. Brit. India 6: 681; King et Pantling, 1898, Ann. Bot. Gard. (Calcutta) 8: 4, tab. 3; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 19, fig. 5; id. 1978, ibid. 33, 1: 11, fig. 4; Pearce et Cribb, 2002, Orch. Bhutan: 226; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 244.

Described from NE. India (“India, Garhwal”, “India, Kumaon”, “India, Darjeeling, Punkabarrie

(Pankhabari)”). **Syntypes** (“*Falconer 1009*”) – K, (“*Strachey et Winterbottom 2*”) – K, (“*Hooker s.n.*”) – K.

Stem 0.5–1 cm long, solitary or few together, with 2–3(4) distichous, ensiform, acute leaves 3–5 cm long, 4–6 mm wide. Scape fused with leaf in basal part, appearing to arise from inner side of leaf blade, narrowly winged. Rachis terete, inflated, fleshy, many flowered spadix, 1–6 cm long. Floral bracts ovate to orbicular, 0.6–1 mm long, irregularly incised. Flowers 1–2 mm across, yellowish-green to pale yellow-orange, subsessile, sink into individual pits of fleshy axis. Sepals and petals spreading on surface of rachis, 0.6–1 mm long; sepals broadly ovate, obtuse, entire along margin; petals narrowly ovate, acute, entire or finely incise serrulate along margin. Lip ovate to cordate, concave, 0.8–1.2 mm long, entire along margin, obtuse to blunt at apex. Capsule obovoid, 1–2 mm long, on very short pedicel. **Fig. 70, i; 73, j-l; 74, a-c; 76, a.**

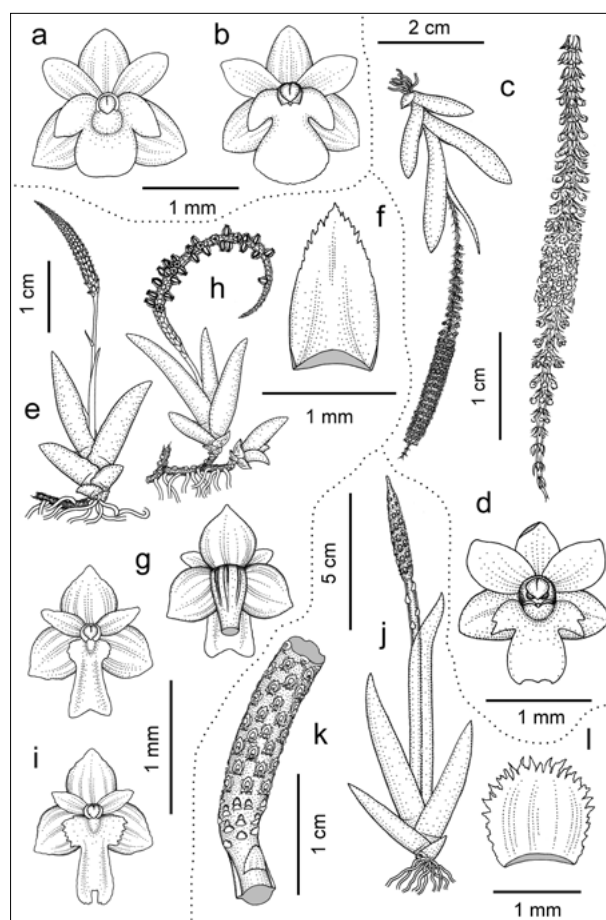


Fig. 73. *Oberonia pumilio*: a – flower, frontal view (VH 5255), b – flower, frontal view (Curtis s.n., copied from Seidenfaden, 1978); *O. variabilis*: c – flowering plant and inflorescence, d – flower, frontal view (HAL 10668); *O. ngoclinhensis*: e – flowering plant, f – floral bract, g – flower, frontal view and view from behind (VH 1338), h – fruiting plant, i – flower, frontal view (VH 1077, type); *O. pachyrachis*: j – flowering plant, k – portion of inflorescence, l – floral bract (Petrov s.n.).

Ecology. Primary evergreen broad-leaved forests on silicate rocks. 1500–1800 m. Fl. November – January. Very rare (DD).

Distribution. Vietnam (Dak Lak). N. India, Nepal, Bhutan, Myanmar, Thailand, Laos, S. China.

Studied specimens. Dak Lak, Chu Yang Sinh mt., *A. Petrov s.n.*, Dec. 2011 (LE).

24. *O. integerrima* Guillaum.,

1954, Bull. Mus. Natl. Hist. Nat. ser. 2, 26: 692; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 21, fig. 7; id., 1992, Opera Bot., 114: 151, fig. 93; Aver., 1994, Ident. Guide Vietnam. Orch.: 161; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 895, fig. 11328; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 47; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 275; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 300; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 244.

Described from southern Vietnam (“Annam: Dalat”). **Type** (“*C.R.S.T. 159 sig.*, 1954”) – P.

Stems 1 cm long, solitary or few together, each with 3–4(6) ensiform, slightly falcate, acute leaves (5)6–10(12) cm long, 0.8–1.5 cm wide. Inflorescence erect, (4)6–8(10) cm long; scape 0.5–2(3) cm long, narrowly winged, naked or with 1–2 broad, sterile bract; rachis 2–6(8) cm long, fleshy, spadix-like, 4–5 mm in diam., densely many-flowered. Floral bracts broadly oblong to half orbicular, 1.5 mm across, minutely erose. Flowers subsessile, not sink, dull greenish to dull yellow-orange. Sepals and petals ovate, obtuse, entire, 0.9–1.1 mm long; petals smaller. Lip broadly ovate to circular, unlobed, oblate, concave, 1–1.2 mm across, with entire margin. **Fig. 74**, d-f.

Ecology. Primary evergreen broad-leaved and mixed humid forests on granite. 1000–2000 m. Fl. (September) October – December. Rare (VU).

Distribution. Vietnam (Lam Dong). S. China, Laos, Kalimantan.

Studied specimens. Lam Dong, Dalat, *Tixier s.n.*, 1960 (P), *A.D. Kerr 3222* (C).

25. *O. cavaleriei* Finet,

1908, Bull. Soc. Bot. France 55: 334, pl. 10, 11–20; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 153; Seidenf., 1995, Opera Bot., 124: 19; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 46; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 244. – *O. myosurus* auct. non (G. Forst.) Lindl.: Lindl., 1830, Gen. Sp. Orch. Pl.: 16, quoad plantam; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 14, fig. 1; id. 1978, ibid. 33, 1: 10, fig. 1; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 275.

Described from southern China, Guizhou (“Kou-Tcheou, Sud Tin-fan”). **Type** (“Nov. 1904, *Cavalerie J. n. 1904*”) – P.

Stems 0.5–1 cm long, solitary or few together, each with (2)3–4(5) fleshy, often subterete, green to glaucous, linear lanceolate, falcate, acuminate leaves (3)4–20(22) cm long, (2)3–6 mm wide. Inflorescence 3–8 cm long, densely many-flowered, drooping; scape 1–2 cm long covered by many filiform whitish sterile bracts; raceme 5–6 mm in diam. Floral bracts narrowly lanceolate, acuminate, 2.5–3 mm long, membranaceous, irregularly dentate, as long or longer than flowers. Flowers white, greenish, yellowish to orange. Pedicel and ovary 0.5–0.8 mm long. Sepals and petals 1–1.2 mm long, blunt, entire; sepals ovate, concave; petals oblong lanceolate. Lip ovate to half circular, 1–1.3 mm long, fimbriate-dentate along margin; fimbriae to 1 mm long recurved, covered with large, glass-like, globular glandular cells. Capsule subsessile, ellipsoid, 3–4 mm long. **Fig. 74**, a; **75**.

Ecology. Primary and secondary evergreen broad-leaved and coniferous evergreen forests on rocky limestone, commonly as lithophyte on shady vertical cliffs near top of mountains. (400)600–1500 m. Fl. January – May. Locally common (VU).

Distribution. Vietnam (Bac Kan, Cao Bang, Dien Bien, Ha Giang, Hoa Binh, Lai Chau, Lao Cai, Lang Son, Phu Tho, Quang Binh, Son La, Thanh Hoa, Tuyen Quang). NE. India, Nepal, Myanmar, Thailand, S. China.

Studied specimens. Bac Kan, Cho Don, *HAL 4689* (HN, LE); Bac Kan, Na Ri, *NTH 3681* (HN, LE), *DKH 7658* (HN, LE, MO); Bac Kan, Cho Don, *HLF 752* (HN, LE); Cao Bang, Bao Lac, *CBL 327* (HN, LE, MO); Cao Bang, Tra Linh, *CBL 1255* (HN, LE, MO), *VH 4973* (HN, LE), *DKH 4265* (HN, LE, MO); Cao Bang, Trung Khanh, *HAL 5589* (HN); Dien Bien, Dien Bien, *CPC 2353* (CPC Herbarium), *CPC 2402* (CPC Herbarium); Dien Bien, Muong Cha, *CPC 1049* (CPC Herbarium), *CPC 2045* (CPC Herbarium); Dien Bien, Tua Chua, *CPC 883* (CPC Herbarium), *CPC 1031* (CPC Herbarium), *CPC 2232* (CPC Herbarium); Ha Giang, Bac Me, *HAL 6508* (HN, LE, MO); Ha Giang, Quan Ba, *Averyanov et al.*, Oct. 1995, *HG 69* (HN, LE); Hoa Binh, Da Bac, *HAL 305* (HN, MO); Hoa Binh, Lac Son, *CPC 1725* (HN, LE); Hoa Binh, Mai Chau, *HAL 642* (HN, MO), *HAL 8923* (HN, LE); Lai Chau, Sin Ho, *HAL 9835* (HN, MO); Lang Son, Bac Son, *HAL 6725* (HN, LE, MO); Lao Cai, Hoang Lien Son, Sapa, *Takhtajan 39, 42* (LE); Phu Tho, Tan Son, *HAL 12650* (HN, LE), *CPC 4643* (HN); Quang Binh, Bo Trach, *HAL*

6160 (HN, LE, MO); Quang Binh, Minh Hoa, *VH* 4670 (HN, LE, MO), *HAL* 5949 (HN, LE, MO), *CPC* 3806 (CPC Herbarium); Son La, Moc Chau, *DKH* 7324 (HN, MO), *DKH* 7406 (HN, MO), *HAL* 9371 (HN, MO); Thanh Hoa, Ba Thuoc, *HAL* 1070 (HN, MO), *HAL* 3243 (HN), *HAL* 3410 (HN); Tuyen Quang, Na Hang, *HLF* 676 (HN, LE); d-EXSICCATES OF VIETNAMESE FLORA 0162/*HAL* 12650 (Fig. 75).

Note. Taxonomically rather isolated species, which differs from all its congeners in a lip covered by specific glass-like globular glandular cells. Typical element of limestone flora in northern and central Vietnam.

Lindley (1830, l.c.: 16) misapplied the name *O. myosurus* (G. Forst.) Lindl. to this species when judging Wallich 1947 to be conspecific with the Pacific island *Epidendrum myosurus* G. Forst., which is now referred to *Phreatia myosurus* (G. Forst.) Ames.

26. *O. trichophora* Aver.,

2007, Taiwania 52: 301, fig. 11.

Described from northwestern Vietnam ("Lai Chau Prov., Sin Ho Distr., Ma Quai Municipality, Can Ti village, around point 22°24'18"N, 103°22'45"E"). **Type** ("17 Nov. 2006, *HAL* 9854") – HN (holotype), LE (isotype).

Stems 1–2 cm long, few together, each with 4–6 imbricate, very fleshy, subterete, acute leaves, 2–8 cm long, to 6 mm in diam. Inflorescence 12–14 cm long, verticillate, many-flowered, much longer than leaves. Scape 1.5–2 cm long, with many thread-like whitish sterile bracts. Rachis 10–12 cm long, ridged. Flowers in distant regular whorls, each with 7–9 flowers. Floral bracts broadly ovate to ovate, irregularly dentate along margin, 1.2–1.7 mm long, 0.8–1.2 mm wide, reflexed and spreading, drawn into long hair-like whitish thread 5–7 mm long, much longer than flowers. Pedicel and ovary 0.9–1.1 mm long. Flowers orange, 2–2.5 mm across. Sepals and petals ovate, concave, obtuse, 1.2–1.6 mm long; sepals entire; petals erose dentate. Lip 3-lobed, rectangular, 1.5–1.7 mm long and wide, irregular erose-dentate along margin; side lobes half circular, 0.6–0.7 mm long and wide; median lobe orbicular to obovate, 0.8–1 mm across, emarginate, usually with small central dent. **Fig. 74**, h-l.

Ecology. Primary and secondary broad-leaved evergreen forests on sandstone at elev. about 1100 m., canopy epiphyte on tall trees. Fl. October – December. Rare (DD).

Distribution. Vietnam (Lai Chau). Endemic of northwestern Vietnam.

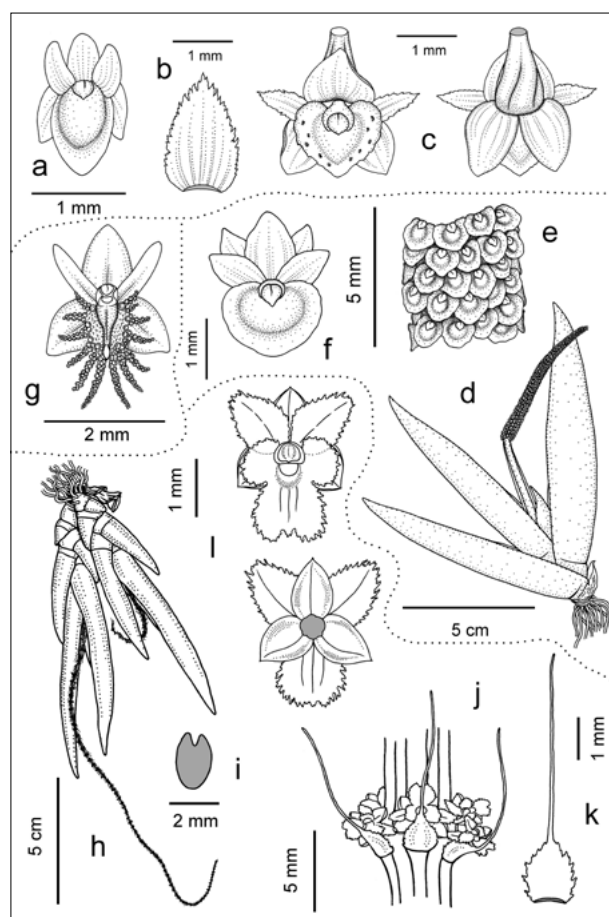


Fig. 74. *Oberonia pachyrachis*: a – flower, frontal view (Petrov s.n.), b – floral bract, c – flowers, frontal view and view from behind (VH 1178); *O. integrerrima*: d – flowering plant (Tixier 60), e – portion of inflorescence, f – flower, frontal view (C.R.S.T. 159 sig., type); *O. cavaleriei*: g – flower, frontal view (VH 4973); *O. trichophora*: h – flowering plant, i – leaf transversal section, j – portion of inflorescence with whorl of flowers, k – floral bract, l – flowers, frontal view and view from behind (HAL 9854, type).

Note. This rare species known by only type collection superficially resembles *O. langbianensis* Gagnep., reported from southern Vietnam, but strikingly differs in long-pointed thread-like floral bracts. Probably, this species is a local endemic of mountain regions of northwestern part of the country.

27. *O. langbianensis* Gagnep.,

1932, Bull. Soc. Bot. Fr. 79: 168; id., 1932, Fl. Gen. Indo-Chine 6, 2: 157; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 16, fig. 3; id. 1978, ibid. 33, 1: 11, fig. 3; id., 1992, Opera Bot., 114: 151, fig. 91, pl. 10c; Aver., 1994, Ident. Guide Vietnam. Orch.: 159; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 896, fig. 11330; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 47.

Described from southern Vietnam ("Annam: Lang-bian, des Planches a Dran"). **Type** ("Evrard 1402") – P.



Fig. 75. Digital herbarium specimen of *Oberonia cavaleriei* (HAL 12650).

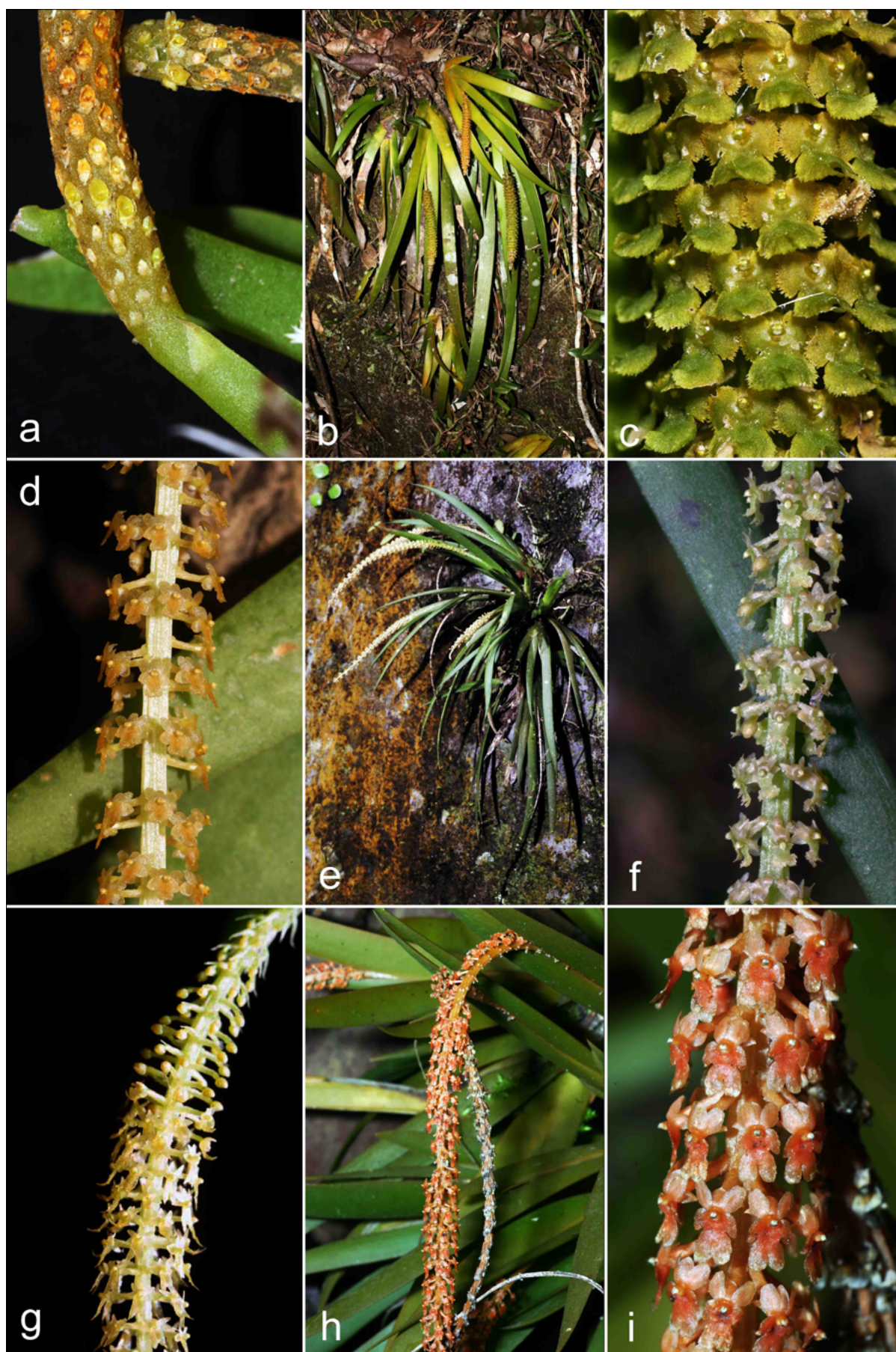


Fig. 76. *Oberonia pachyrachis*: a (A. Petrov s.n.); *O. ensiformis*: b, c (CPC 1887); *O. sonlaensis*: d (CPC 1818d, type); *O. kwangsiensis*: e (HAL 8342), f (HAL 6572); *O. caulescens*: g (Averyanov et al., VH s.n.); *O. acaulis*: h, i (HAL 8313).

Stems 0.5–1 cm long, solitary, or few together, each with 4–5 narrowly lanceolate, falcate, acute, terete or subterete leaves (3)4–9(10) cm long, 3–4(5) mm wide. Inflorescence pendulous, verticillate, densely many-flowered, (10)12–14 cm long; scape (2)3–4 cm long, with many sterile bracts. Floral bracts ovate, deeply erose laciniate, 2–2.2 mm long, as long as flowers. Flowers 2.2–2.4 mm across. Pedicel and ovary 0.8–1 mm long. Sepals and petals ovate, obtuse, 1.4–1.7 mm long; sepals entire; petals deeply erose-incised, longer than sepals. Lip broadly ovate rectangular, 1 mm long and wide, 3-lobed, erose-laciniate along margin; lobes subsimilar, half circular; median lobe little larger, emarginate. **Fig. 77, a–c.**

Ecology. Primary evergreen broad-leaved and mixed humid forests on granite. 1500–2000 m. Fl. ? Very rare (DD).

Distribution. Vietnam (Lam Dong). Thailand.

Studied specimens. Lam Dong, Dran, Langbian, *Evrard 1403* (P); Lam Dong, Don Duong, *Averyanov et al., LX-VN 1544* (HN, LE).

28. *O. dalatensis* Gagnep.,

1932, Bull. Soc. Bot. Fr. 79: 168; id., 1932, Fl. Gen. Indo-Chine 6, 2: 157; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 17, fig. 4; id., 1992, Opera Bot., 114: 151, fig. 92; Aver., 1994, Ident. Guide Vietnam. Orch.: 159; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 893, fig. 11320; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 46.

Described from southern Vietnam (“Annam: Dalat”). **Type** (“*Evrard 1160*”) – P.

Stems 0.5–1 cm long, solitary, with 4–5(6) narrowly lanceolate, falcate, acute, terete or subterete leaves 2–5(7) cm long, 3–5 mm wide. Inflorescence erect to arching, verticillate, densely many-flowered, 4–6(7) cm long; scape 0.5–1.5(2) cm long, with many sterile bracts. Floral bracts lanceolate, erose-serrulate, shorter than flowers. Flowers 1.8–2.2 mm across. Pedicel and ovary 0.8–1 mm long. Sepals and petals ovate, obtuse, 1.2 mm long; sepals entire; petals smaller, erose irregularly denticulate. Lip half circular to subquadrate, indistinctly 3-lobed, truncate, 1–1.2 mm long and wide, with erose-laciniate margin. **Fig. 77, d–g.**

Ecology. Primary evergreen broad-leaved and mixed humid forests on granite. 1500–2000 m. Fl. ? Very rare (DD).

Distribution. Vietnam (Lam Dong). Endemic.

Studied specimens. Lam Dong, Dalat, *Lambert s.n.*, 1954 (P).

29. *O. ensiformis* (Sm.) Lindl.,

1859, Fol. Orch. Oberonia: 4; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 158; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 53, fig. 32; id. 1978, ibid. 33, 1: 13, fig. 6; id., 1992, Opera Bot., 114: 153; Aver., 1994, Ident. Guide Vietnam. Orch.: 160; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 894, fig. 11322; Pearce et Cribb, 2002, Orch. Bhutan: 224; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 46; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 275; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 300; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 244. – *Malaxis ensiformis* Sm., 1812, in Rees, Cyclop. 22, n 14.

Described from Nepal (“Narainhetty in Upper Nepal”). **Type** (“*Buchanan-Hamilton 1806*”) – LINN (holotype), BM (isotype).

Stems 1–3 cm long, solitary or few together, each with (4)5–6(7) ensiform, slightly falcate, acuminate leaves (10)15–40(45) cm long, 1–1.5(2) cm wide. Inflorescence stout, paniculate, (5)10–20(25) cm long, densely many-flowered, 5–6 mm in diam.; scape 2–6 cm long, with many sterile bracts. Floral bracts ovate triangular, acuminate, 2–3 mm long, irregularly denticulate to apex. Flowers green, olive to dull yellow-ochreous, 2–3 mm across. Pedicel and ovary 1–2 mm long. Sepals and petals ovate, entire, obtuse, 1.2–1.5 mm long. Lip broadly ovate, 1.8–2.2 mm long, with distinct fovea at center, 3-lobed, erose fimbriate along margin; side lobes half circular; median lobe larger, broadly obovate, emarginate or shallowly 2-lobed; disk often with 2 calli placed at base of median lobe. Capsule subsessile, ellipsoid, 4–6 mm long. **Fig. 76, b, c; 77, h.**

Ecology. Primary and secondary evergreen broad-leaved and coniferous evergreen forests on rocky limestone, commonly as lithophyte on shady vertical cliffs near top of mountains, rarely as lithophyte and epiphyte in forests on non-limestone rocks. (50)100–1500 m. Fl. October – April. Not rare (LR).

Distribution. Vietnam (Bac Kan, Cao Bang, Dien Bien, Ha Giang, Ha Noi, Hai Phong, Hoa Binh, Kon Tum, Lai Chau, Lam Dong, Lang Son, Lao Cai, Nghe An, Ninh Binh, Son La, Thai Nguyen, Thanh Hoa, Tuyen Quang). India, Nepal, Bhutan, Myanmar, S. China, Thailand, Laos.

Studied specimens. Bac Kan, Ba Be, *HLF 539* (HN, LE); Bac Kan, Cho Don, *HAL 4703* (HN, LE); Bac Kan, Na Ri, *DKH 7543* (HN, LE), *HAL 4980* (HN), *NTH 3679* (HN, LE); Cao Bang, Ha Lang, *CBL 689* (HN, LE, MO, P), *CBL 732* (HN, LE, MO, P); Cao Bang, Thach An, *CBL 806* (HN,

LE, MO, P), *CBL* 890 (HN, LE, MO, P); Cao Bang, Tra Linh, *VH* 2478 (HN, LE), *VH* 4955 (HN, LE, MO); Cao Bang, Trung Khanh, *HAL* 5515 (HN), *HAL* 5699 (HN, LE), *HAL* 5743 (HN, LE); Dien Bien, Dien Bien, *CPC* 859 (CPC Herbarium); Dien Bien, Muong Cha, *CPC* 1062 (CPC Herbarium); Ha Giang, Dong Van, *NTH* 3509 (HN, LE); Ha Giang, Quan Ba, *HAL* 1544 (HN), *HAL* 8397 (HN), *DKH* 4786 (HN, LE, MO), *DKH* 6059 (HN, MO); Ha Noi, montis Cha Dong, Kien Khe, *Bon* 3554 (P); Hai Phong, Cat Ba, *Averyanov et al.*, *LX-VN* 3485 (HN, LE), *LX-VN* 3659 (HN, LE); Hoa Binh, Da Bac, *HAL* 258 (HN, MO); Hoa Binh, Luong Son, Lam Son, *Thin et al.*, *NT-2003* April 1986 (HN); Hoa Binh, Mai Chau, *VH* 2428 (HN, LE), *HAL* 643 (HN, MO), *DKH* 8022 (HN, LE, MO); Hoa Binh, Poko, *Averyanov*, a. 1995 (LE-photo); Kon Tum, Dak Gley, *VH* 2241 (HN, LE, MO); Lai Chau, Sin Ho, *HAL* 9880 (HN, LE, MO); Lam Dong, Dalat, *Sigaldi C.R.S.T.* 257 sig (P); Lang Son, Bac Son, *HAL* 6730 (HN); Lao Cai, Hoang Lien Son, Sapa, *Takhtajan* 44; Nghe An, Tuong Duong, *HLF* 6969 (LE); Ninh Binh, Cuc Phuong, *HAL* 1647 (HN), sine coll., 1434 (Cuc Phuong national park Herbarium), Bao 1198 (Cuc Phuong national park Herbarium), *CPNP* 5130 (Cuc Phuong national park Herbarium), *NTH* 3049 (Cuc Phuong national park Herbarium), Cuong 775, 1280 (Cuc Phuong national park Herbarium); Son La, Moc Chau, *HAL* 9356 (HN, LE, MO), *DKH* 7376 (HN, LE, MO), *DKH* 7395 (HN, LE, MO); Son La, Son La, *CPC* 1106 (CPC Herbarium); Son La, Yen Chau, *HAL* 9470 (HN, LE, MO), *DKH* 7198 (HN, LE, MO), *DKH* 7287 (MO), *CPC* 1887 (CPC Herbarium); Thai Nguyen, Vo Nhai, *NTH* 3823 (HN, LE); Thanh Hoa, Ba Thuoc, *HAL* 1005 (HN), *HAL* 3492 (HN), *HAL* 4346 (HN); Thanh Hoa, Quan Hoa, *HAL* 3651 (HN), *HAL* 3937 (HN); Tuyen Quang, Na Hang, *HLF* 681 (HN, LE).

Note. One of the most common lithophytic orchid species in limestone regions of northern and central Vietnam. Questionable species, *Oberonia delacourii* Gagnep., described from eastern Laos probably belongs here.

30. *O. evrardii* Gagnep.,

1929, Bull. Soc. Bot. Fr. 76: 326; id., 1932, Fl. Gen. Indo-Chine 6, 2: 154, fig. 17, 1-6; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 48, fig. 27; id., 1992, Opera Bot., 114: 153, fig. 94; Aver., 1994, Ident. Guide Vietnam. Orch.: 160; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 894, fig. 11323; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 46.

Described from southern Vietnam ("Annam, chalet Rimaud a Dalat"). **Type** ("Evrard 300") – P.

Stems 1–2 cm long, few together, each with (3)4–5(6) ensiform, slightly falcate, acute, leaves 5–9(10) cm long, 5–8 mm wide. Inflorescence erect, indistinctly verticillate, densely many-flowered, 15–17 cm long; scape 2–3 cm long, with few small sterile bracts. Floral bracts broadly lanceolate, acute, erose lacinate, 2–3 mm long, as long as flowers. Flowers 3 mm across. Pedicel and ovary 2.5–3 mm long. Sepals and petals ovate, obtuse, 1.6–2 mm long; sepals entire; petals deeply erose-fimbriate. Lip broadly ovate rectangular, 1.6–1.8 mm long and wide, 3-lobed, side lobes subquadrate, truncate, erose-denticulate; median lobe large, rectangular obovate, emarginate or shallowly 2-lobed, lobules erose fimbriate along apical margin. **Fig. 77**, i-l.

Ecology. Primary and secondary evergreen broad-leaved and mixed forests. 1400–1600 m. Fl. September – October. Very rare (DD).

Distribution. Vietnam (Lam Dong). Endemic.

Studied specimens. Lam Dong, Langhanh, *Sigaldi* 258 sig (P); Lam Dong, Manline, Teurnom 1600 m, *Tixier s.n.*, drawing (P).

31. *O. mucronata* (D. Don) Ormerod et Seidenf.,

1997, Contrib. Orch. Fl. Thailand 13: 20; Pearce et Cribb, 2002, Orch. Bhutan: 225; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 47; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 275; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 300; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 243. – *Stelis mucronata* D. Don, 1825, Prodr. Fl. Nepal.: 32. – *Cymbidium iridifolium* Roxb., 1832, Fl. Ind. 3: 458. – *Oberonia iridifolia* Roxb. ex Lindl., 1830, Gen. Sp. Orch. Pl.: 15, nom. illeg.; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 42, fig. 23, 24; id. 1978, ibid. 33, 1: 16, fig. 7; id., 1992, Opera Bot., 114: 152; Comber, 1990, Orch. Java: 157, fig.; id., 2001, Orch. Sumatra: 190, figs.; Seidenf., Wood, 1992, Orch. Malay. Sing.: 243, fig. 103a-d, pl. 15a; Aver., 1994, Ident. Guide Vietnam. Orch.: 160; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 895, fig. 11329.

Described from Nepal ("Hab. in Nepalia"). **Type** ("Buchanan-Hamilton s.n.") – BM.

Stem short, solitary, with 5–6 ensiform, shortly acuminate leaves 6–15 cm long, 0.6–1.5 cm wide. Inflorescence 12–20(25) cm long straight, densely many-flowered; scape 3–5 cm long, narrowly winged, with few sterile bracts. Floral bracts ovate to broadly ovate, 1.2–1.5 mm long, erose. Flowers reddish brown. Pedicel and ovary 1.5 mm long. Sepals and petals subsimilar, ovate, obtuse, 0.9–1.2 mm long, sparsely papillose; sepals entire;

petals finely erose. Lip broadly ovate or nearly half circular 1.5 mm long and wide, irregularly incised or fimbriate along margin; apex deeply emarginate or 2-lobed with sinus to 0.5 mm deep. **Fig. 77**, m-o.

Ecology. Forests. 1300–1400 m. Fl. August – December. Occurrence in Vietnam needs confirmation.

Distribution. Vietnam? India, Nepal, Bhutan, Bangladesh, Myanmar, S. China, Thailand, Laos, Malacca Peninsula, Philippines, Indonesia, islands of western Pacific.

Note. A single available record of this species from Vietnam (Guillaumin, 1964, Bull. Mus. Natl. Hist. Nat. ser. 2, 36: 161) is probably wrong. The specimen cited in this publication was later tentatively identified as *O. gammiei* King et Pantl. (Seidenf. 1978, l.c.: 16). Data on ecology and phenology are copied from the Flora of China (Chen Sing-chi, Ormerod, Wood, 2009, l.c.).

32. *O. gammiei* King et Pantl.,

1897, Journ. As. Soc. Bengal 66, 2: 578; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 45, fig. 25, 26; id. 1978, ibid. 33, 1: 19, fig. 8; id., 1992, Opera Bot., 114: 153; Aver., 1994, Ident. Guide Vietnam. Orch.: 161; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 895, fig. 11326; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 46; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 275; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 300; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 243. – *O. regnieri* Finet, 1908, Bull. Soc. Bot. France 55: 335; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 156. – *O. trullilabris* Guillaum., 1960, Bull. Mus. Natl. Hist. Nat. ser. 2, 32: 115.

Described from E. India (“In the Sunderbans; Lower Bengal”). **Type** (“*Gammie et Hoinig 92*”) – CAL.

Stems 1–2 cm long, few together, each with 3–7, ensiform, sometimes slightly falcate, acute leaves 5–15 cm long, 1–1.5 cm wide. Inflorescence 10–28 cm long, many-flowered; scape 3–5 cm long with several to many small sterile bracts. Floral bracts ovate triangular, 1.4–1.8 mm long, irregularly dentate or erose. Flowers laxly arranged, 2–3 mm apart, light green. Pedicel and ovary 1.2–1.4 mm long. Sepals and petals ovate, obtuse, 1–1.2 mm long; sepals entire; petals finely erose to serrulate. Lip ovate, 1.5 mm long and wide, indistinctly 3-lobed; side lobes half circular, erose or incised; median lobe oblong rectangular, emarginate or 2-lobed; lobules oblong triangular, irregularly toothed. Capsule obovoid, 4 mm long. **Fig. 78**, a-d.

Ecology. Primary and secondary evergreen broad-leaved forests on silicate rocks. 500–900 m. Fl. September – November. Very rare (DD).

Distribution. Vietnam (Khanh Hoa). NE. India, Myanmar, Thailand, S. China, Hainan, Laos.

Studied specimens. Khanh Hoa, Nhatrang, Lui Giao, piste de Yersin, *Sigaldi C.R.S.T.* 292 sig. (P); Southern Vietnam, “Pol Gol, basse région”, *Tixier 4/62* (P); Cochinchine, *Regnier s.n.*, 1883 (P).

33. *O. sonlaensis* Aver., sp. nov.

Described from northern Vietnam (“Son La Prov., Thuan Chau Distr., Muoi Noi Municipality, Sang village, around point 21°18'28"N 103°48'33"E”). **Type** (“30 March 2011 *CPC 1818d*”) – LE (holotype).

Stems 0.5–1 cm long, solitary or few together, each with (2)3–4 lanceolate, ensiform, slightly falcate, acuminate leaves (7)10–20(22) cm long, 0.4–1 cm wide. Inflorescence (10)12–14 cm long, laxly many-flowered, verticillate; scape 2–3 cm

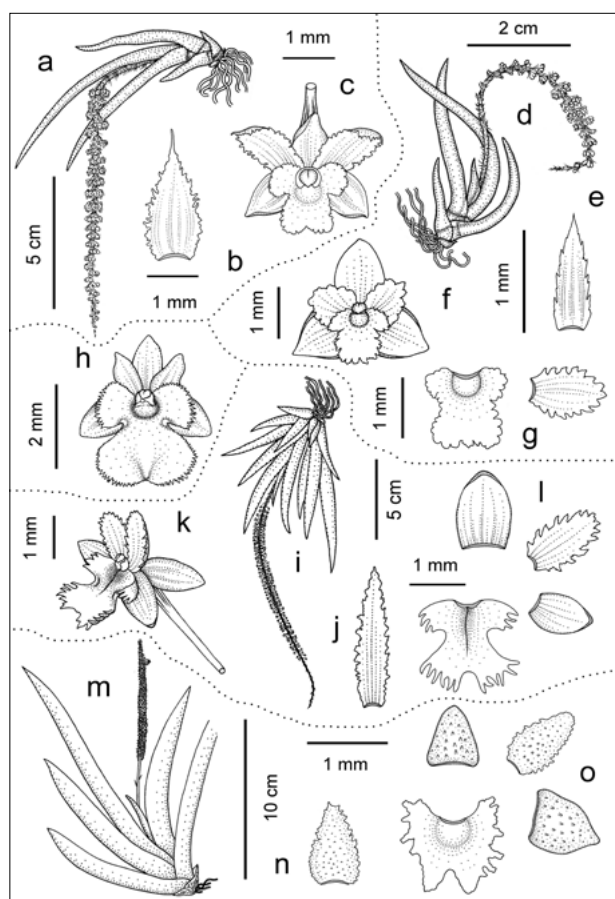


Fig. 77. *Oberonia langbianensis*: a – flowering plant, b – floral bract, c – flower, frontal view (Evrard 1402, type); *O. dalatensis*: d – flowering plant, e – floral bract, f – flower, frontal view, g – lip and petal (Evrard 1160, type); *O. ensiformis*: h – flower, frontal view (CPC 1062); *O. evrardii*: i – flowering plant, j – floral bract, k – flower, pedicel and ovary, l – sepals, petal and lip (Evrard 300, type); *O. mucronata*: m – flowering plant, n – floral bract, o – sepals, petal and lip (Wallich 1948).

long, with few to many small sterile bracts. Floral bracts triangular cuneate, acuminate, irregularly finely denticulate, 1–1.5(2) mm long, not exceeding flowers. Flowers light greenish to yellowish or pale brown, 1.2–1.5 mm across. Pedicel and ovary 1–1.5(2) mm long. Sepals and petals blunt, entire, 0.8 mm long; sepals ovate; petals narrowly ovate. Lip broadly ovate in outline, 1 mm long and wide, 3-lobed; side lobes half circular to broadly flabellate, entire or slightly wavy; median lobe entire along margin, obcordate to subquadrate, with unlobed, truncate apex, rarely slightly emarginate. **Fig. 76 d; 78, e–i.**

Etymology. Species name refers name of Son La Province of Vietnam where it was discovered.

Ecology. Primary broad-leaved evergreen forests on rocky limestone, commonly as canopy epiphyte on mossy trees near mountain tops. 300–1100 m. Fl. December – January. Not common (DD).

Distribution. Vietnam (Hoa Binh, Son La). Endemic.

Studied specimens. Hoa Binh, Lac Son, *CPC 1392a* (LE).

Note. The species is well distinguished by its 3-lobed lip with almost subequal lobes, entire along margin, which is not found in any other Indochinese congener.

34. *O. kwangsiensis* Seidenf.,

1968, Dansk Bot. Ark., 25, 3: 31, fig. 14; id., 1978, Dansk Bot. Ark., 33, 1: 19, fig. 10; id., 1992, Opera Bot., 114: 151; Aver., 1994, Ident. Guide Vietnam. Orch.: 159; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 895, fig. 11327; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 47; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 242.

Described from southern China (“Kwangsi”).

Type (“*Wang 40915*”) – AMES (holotype).

Stems numerous, densely tufted, each 0.5–1 cm long, with 4–6(8) narrowly lanceolate, ensiform, falcate, acuminate leaves 6–12 cm long, 5–7 mm wide. Inflorescence 8–14 cm long, arching to drooping; scape 1–3 cm long with few to many lanceolate, acuminate sterile bracts. Rachis many-flowered, verticillate, subla. Floral bracts triangular ovate, acuminate, not exceeding flowers, deep finely incise along margin. Pedicel and ovary 1.5–2 mm long. Flowers greenish, yellowish to dull orange. Sepals ovate, obtuse, entire, 1 mm long. Petals oblong, entire or slightly erose, 0.8–1 mm long, 0.3 mm wide. Lip broadly obovate, 1.3 mm long, 3-lobed; side lobes small, triangular, wavy; median

lobe much broadening from narrow base, emarginate or 2-lobed at apex; lobules nearly orbicular or squarish, erose dentate. **Fig. 76, e, f; 78, j–l.**

Ecology. Primary and secondary evergreen broad-leaved and coniferous forests on rocky limestone, as lithophyte and epiphyte, commonly in humid mossy places near mountain tops. (250)400–1200 m. Fl. May, October – November. Locally common (LR).

Distribution. Vietnam (Bac Kan, Cao Bang, Ha Giang, Hoa Binh, Lang Son, Nghe An, Ninh Binh, Phu Tho, Quang Binh, Son La, Thanh Hoa). S. China, Thailand.

Studied specimens. Bac Kan, Ba Be, *HLF 622* (HN, LE); Bac Kan, Cho Don, *HLF 856* (HN, LE); Bac Kan, Na Ri, *DKH 7533* (HN, LE, MO), *DKH 7572* (HN, LE, MO); Cao Bang, Ha Lang, *CBL 639* (LE), *CBL 712* (LE); Cao Bang, Thach An, *CBL 891* (LE); Ha Giang, Bac Me, *HAL*

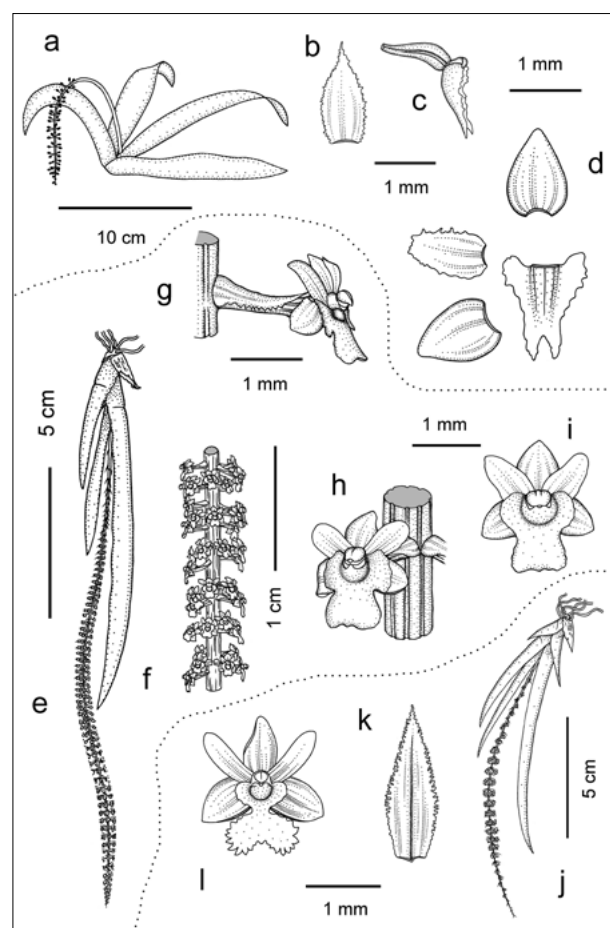


Fig. 78. *Oberonia gammieri*: a – flowering plant (Sigaldi C.R.S.T. 292), b – floral bract, c – pedicel, ovary and lip, side view, d – sepals, petal and lip (Regnier s.n., 1883); *O. sonlaensis*: e – flowering plant, f – portion of inflorescence, g – floral bract, pedicel, ovary and flower, side view, h – flower and portion of rachis, half side view, i – flower, frontal view (CPC 1818d); *O. kwangsiensis*: j – flowering plant, k – floral bract, l – flower, frontal view (HAL 1625).

6572 (HN, LE, MO); *HAL* 6603 (LE); Ha Giang, Quan Ba, *NTH* 3582 (HN, LE), *CPC* 4617 (CPC Herbarium); Hoa Binh, Lac Son, *CPC* 1387 (LE), *CPC* 1584 (CPC Herbarium); Hoa Binh, Luong Son, *Tiep et al.*, 2661 (LE); Hoa Binh, Mai Chau, *DKH* 8077 (HN, MO), *DKH* 8180 (HN, LE, MO); Lang Son, Huu Lung, *NTH* 3252 (HN, LE); Nghe An, Len Ca, Vinh, *Poilane* 16465 (P); Ninh Binh, Cuc Phuong, 26 Nov. 1971, *Bao* 1198, *CPNP* 5129, *Cuong* 780 (Cuc Phuong national park Herbarium), *HAL* 1625 (HN, LE); *HAL* 2865 (HN); Phu Tho, Tan Son, *HAL* 12653 (HN, LE), *CPC* 4630 (CPC Herbarium); Quang Binh, Bo Trach, *HAL* 6142 (HN, MO); Quang Binh, Minh Hoa, *HAL* 5946 (HN, LE, MO), *HAL* 11740a (HN, LE), *CPC* 4262 (CPC Herbarium); Son La, Yen Chau, *DKH* 7192 (HN, LE, MO); Thanh Hoa, Ba Thuoc, *HAL* 2978 (HN); Thanh Hoa, Quan Hoa, *HAL* 3720 (HN).

Note. One of the most common lithophytic orchid species in limestone regions of northern and central Vietnam.

35. *O. caulescens* Lindl.,

1830, Gen. Sp. Orch. Pl.: 15; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 160; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 36, fig. 18, 19; id., 1992, Opera Bot., 114: 152; Aver., 1994, Ident. Guide Vietnam. Orch.: 161; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 893, fig. 11319; Su Horng-Jye, 2000, Fl. Taiwan 5: 982, pl. 417; Pearce et Cribb, 2002, Orch. Bhutan: 223; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 46; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 241. – *O. longilabris* King et Pantl., 1896, Journ. As. Soc. Bengal 64, 3: 330; id., 1898, Ann. Bot. Gard. (Calcutta) 8, tab. 13A. – *O. auriculata* King et Pantl., 1898, l.c.: 13, tab. 16A.

Described from Nepal ("in Napalia"). **Type** ("Wallich 1950") – K-LINDL (holotype), K-W (isotype).

Stems 1–4.5 cm long, few together, each with 5–7 lanceolate to narrowly lanceolate, slightly falcate, acute leaves 3–10 cm long, 2–5 mm wide. Inflorescence (3)5–11 cm long, laxly many-flowered; scape 2–6 cm long, with few to many sterile bracts. Floral bracts triangular ovate to narrowly ovate, acute, 1.5 mm long, irregularly incised. Flowers pale green to pale yellow 1.6–1.8 mm across. Pedicel and ovary 2 mm long. Sepals and petals 0.8–1 mm long, entire; sepals ovate, obtuse, concave; petals oblong lanceolate. Lip oblong obovate, 1.6–2 mm long, 1.2 mm wide; at base with small auricles; median lobe widening, deeply 2-lobed; lobules narrowly ovate to lanceolate, acute to acuminate. Capsule obovoid, 2 mm long. **Fig.** 76, g; 79, a-c.

Ecology. Primary evergreen broad-leaved and coniferous cloud forests on mountain tops composed by silicate rocks, commonly as canopy epiphytes on mossy trees. 1700–2300 m. Fl. June – August. Rare (VU).

Distribution. Vietnam (Da Nang, Dong Nai, Kon Tum). NE. India, Bhutan, Nepal, S. China, Taiwan.

Studied specimens. Da Nang, Ba Na, Tourane, *Poilane s.n.* (P); Dong Nai, Dinh, *Pierre* 6574 (P); Kon Tum, Ngoc Linh, *Averyanov et al.*, *VH s.n.*, March 1995 (LE).

Note. The species resembles *O. falcata* King et Pantl. and *O. anthropophora* Lindl. in habit and floral morphology, but distinctly differs in leaves articulated at the base.

36. *O. falconeri* Hook. f.,

1888, Ic. Pl. tab. 1780; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 35, fig. 17; id. 1978, *ibid.* 33, 1: 22, fig. 12; id., 1992, Opera Bot., 114: 151; Seidenf., Wood, 1992, Orch. Malay. Sing.: 245, fig. 103h-k; Aver., 1994, Ident. Guide Vietnam. Orch.: 161; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 894, fig. 11325; Pearce et Cribb, 2002, Orch. Bhutan: 224; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 46; Newman et al., 2007, Checkl. Vasc. Pl. Lao: 275; Schuiteman et al., 2008, Nord. Journ. Bot., 26: 300; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 241. – *O. siamensis* Schltr., 1906, Feddes Repert. 2: 84; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 160.

Described from tropical Himalayas ("Tropical Himalaya; Kumaon ... Behar ... Chota Nagpore"). **Syntypes** ("*Falconer 1008*") – K, ("*Wall. Cat. 1948.1*") – K, K-W, ("*Wall. Cat. 1948.3*") – K, K-W, ("*Hooker 120*") – K-LINDL, ("*Clarke 21457*") – K, ("*Law s.n.*") – K.

Stem 0.5–1 cm long solitary, with 3–5 ensiform, slightly falcate, acuminate leaves 2–6.5 cm long, 0.6–1.2 cm wide. Inflorescence 5–9 cm long, densely many-flowered; scape 2–3 cm long with many lanceolate, acuminate sterile bracts, 4–5 mm long. Floral bracts triangular lanceolate, attenuate, membranaceous, 1.5–2.5 mm long, as long as flowers, deeply incise. Flowers indistinctly whorled, yellow-green to pale brown. Pedicel and ovary 1.5–2 mm long. Sepals and petals ovate, subsimilar, 0.8–1 mm long, obtuse, entire. Lip oblong ovate, with entire margin, 1–1.5 mm long, 0.6–0.8(1) mm wide, at base with short half circular or ovate lobes; median lobe oblong narrowly ovate, 2-lobed at apex; lobules narrowly triangular, acuminate, 3 mm long, divided by broad sinus; disk

verrucose-glandulose. Capsule ridged, ellipsoid. **Fig. 79, d-g.**

Ecology. Primary and secondary evergreen forests, commonly as canopy epiphyte. 700–2500 m. Fl. August–October. Occurrence in Vietnam not yet confirmed.

Distribution. Vietnam (Lang Son?). India, Nepal, Bhutan, S. China, Thailand, Laos, Malacca Peninsula.

Note. The species was included into the flora of Vietnam (Averyanov, 1994, l.c.: 161; Averyanov, Averyanova, 2003, l.c.: 46) following the record of P.H. Ho (2000, l.c.: 894) for Lan Son province based on fruiting specimen (Lang Son, Van Linh, *Petelot 3003*) deposited at P. Identification of this specimen lacking flowers remains doubtful. Though any other herbarium material from Vietnamese territory still not available, this species may be certainly found in northern Vietnam, particularly in northwestern part of the country. Some specimens from Vietnam identified earlier as *O. falconeri* belong to *O. acaulis* and *O. dolichostachys*. Figure 79, d-g, like picture of P.H. Ho, is copied from authentic image (Hooker, 1888, l.c., tab. 1780), and data on ecology and phenology are copied from the “Flora of China” (Chen Sing-chi, Ormerod, Wood, 2009, l.c.: 241).

37. *O. acaulis* Griff.,

1848, Itin. Pl. Khas. Mts.: 76; id., 1851, Not. Pl. Asiat. 3: 275, tab. 286, fig. 1; Seidenf., 1978, Dansk Bot. Ark., 33, 1: 20, fig. 11; Aver., 1994, Ident. Guide Vietnam. Orch.: 159; P.H. Ho, 2000, Ill. Fl. Vietnam 3: 892, fig. 11317; Pearce et Cribb, 2002, Orch. Bhutan: 222; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 46; Chen Sing-chi, Ormerod, Wood, 2009, Fl. China, 25: 241. – *O. myriantha* Lindl., 1859, Fol. Orch. 8: 4, no. 23; King et Pantl., 1898, Ann. Bot. Gard. (Calcutta) 8, tab. 12; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 159; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 56, fig. 34. – *O. hosseusii* Schltr., 1906, Feddes Rept. 2: 84; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 162. – *O. quinquelobata* Kerr, 1927, Kew Bull. 1927: 213; Gagnep., 1932, Fl. Gen. Indo-Chine 6, 2: 163; Seidenf., 1968, Dansk Bot. Ark., 25, 3: 58. – *O. falconeri* auct non Hook. f.: Aver., 1994, Ident. Guide Vietnam. Orch.: 161; Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 46.

Described from NE. India (“Under Churra”).

Type (“*Griffith s.n.*”) – K-LINDL.

Stems 0.5–2 cm long, solitary or few together, each with 3–4(5) lanceolate, ensiform, falcate, acuminate leaves (5)10–14(16) cm long,

0.5–1 cm wide. Inflorescence 10–17(20) cm long, densely many flowered, verticillate; scape 1–3 cm long, with few to many small sterile bracts. Floral bracts triangular ovate, acuminate, irregularly denticulate, 1.5–2 mm long, not exceeding flowers. Flowers dull greenish to yellowish white and pink, 2 mm across. Pedicel and ovary 1–1.5 mm long. Sepals and petals ovate, blunt, entire, 0.8–1 mm long; petals little smaller and narrower. Lip broadly ovate 1–1.5 mm long and wide, 3-lobed; side lobes ovate oblique, entire or slightly erose; median lobe much larger, emarginate to 2-lobed; lobules oblong ovate to half circular, entire or indistinctly denticulate. **Fig. 76, h, i; 79, h-j.**

Ecology. Primary and secondary evergreen broad-leaved and mixed forests on any kind of rocks, commonly as canopy epiphyte in humid places on mossy trees near mountain tops. (300)800–1500 m. Fl. October – December. Not common (VU).

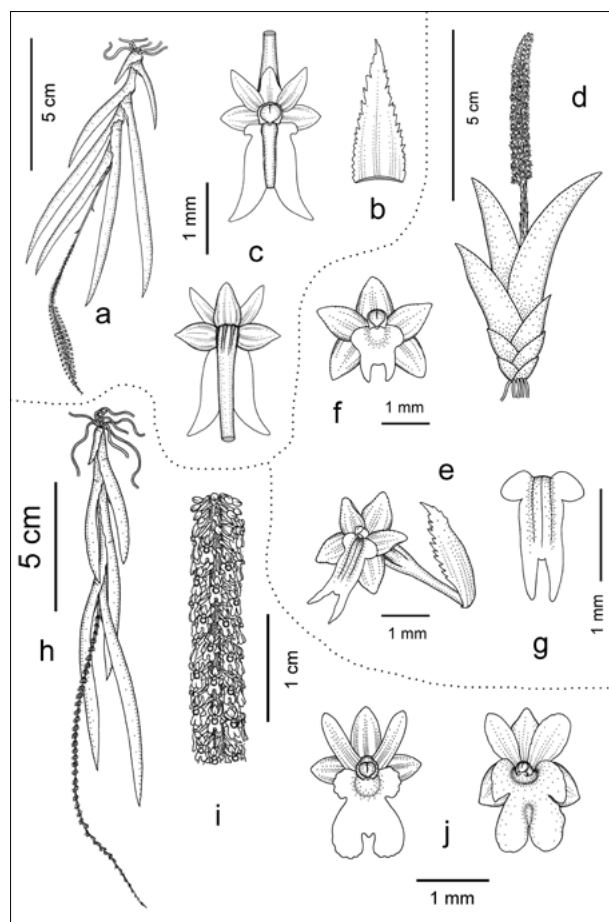


Fig. 79. *Oberonia caulescens*: a – flowering plant, b – floral bract, c – flower, frontal view and view from behind (Averyanov et al., VH s.n.); *O. falconeri*: d – flowering plant, e – floral bract, pedicel, ovary and flower, half side view, f – flower, frontal view, g – lip (copied from Hook. f., 1888); *O. acaulis*: h – flowering plant (VH 2261), i – portion of inflorescence (HAL 2995), j – flowers, frontal views (HAL 9295, left and HAL 8313, right).

Distribution. Vietnam (Ha Tay, Hoa Binh, Khanh Hoa, Kon Tum, Lao Cai, Quang Binh, Son La). NE. India, Nepal, Bhutan, Myanmar, S. China, Thailand.

Studied specimens. Ha Tay, Bavi, *Balansa* 2028 (P); Hoa Binh, Tan Lac, *CPC* 533 (CPC Herbarium); Khanh Hoa, Nhatrang, *sine loc.* (L); Kon Tum, Ngoc Linh mt., *VH* 790 (LE); Kon Tum, Dak Gley, *VH* 2261 (HN, LE, MO); Lao Cai, Sa Pa, *HAL* 8313 (HN, LE); Quang Binh, Minh Hoa, *HAL* 12239 (HN, LE, MO); Son La, Moc Chau, *HAL* 9295 (HN, LE, MO), *HAL* 9396 (HN, LE, MO); Son La, Yen Chau, *HAL* 9441 (HN, LE, MO); Vietnam, *sine loc.*, *Averyanov et al.*, *LX-VN s.n.*, a. 1983 (LE).

Note. *Oberonia acaulis* var. *luchunensis* S.C. Chen (1982, Acta Phytotax. Sin. 20: 192) differs from the type in entire lip side lobes and in lanceolate, acuminate lobules of median lip lobe. This taxon was described from southern Yunnan where it grows at elevations around 2400 m a.s.l. It can be found in mountain regions of northwestern Vietnam allied to Chinese border. It might be conspecific with *O. falconeri* Hook. f.

38. *O. dolichostachys* Aver., sp. nov.

Described from southern Vietnam ("Lam Dong Prov., Lac Duong Distr., Da Chais Municipality, around point 12°11'09"N 108°41'20"E"). **Type** ("20 October 2005, *HLF* 5328") – LE (holotype), HN (isotype).

Stems 0.5–1.5 cm long, solitary or few together, each with 4–6 lanceolate, ensiform, falcate, acuminate leaves 4–10 cm long, 0.4–0.6 cm wide. Inflorescence (10)15–25 cm long, densely many flowered, verticillate; scape 1–3 cm long, with many small sterile bracts. Floral bracts narrowly ovate, cuneate, acuminate, irregularly incise denticulate, 1.5–2 mm long, not exceeding flowers. Flowers dull yellowish to pale brownish, 1.6–2 mm across. Pedicel and ovary 1.6–2 mm long. Sepals and petals, blunt, entire, 0.8–1 mm long; sepals ovate; petals narrowly obovate. Lip broadly ovate, oblong or obovate in outline, 1–1.2 mm long and wide, 3-lobed, entire or slightly wavy along margin; side lobes half circular to subquadrate; median lobe deeply 2-lobed; lobules triangular to ovate or broadly lanceolate, obtuse, separated by broad truncate or triangular sinus. Capsule ridged, ellipsoid 2.5–3 mm long. **Fig. 80**, a-d; **81**, a, b.

Etymology. Species name reflects unusually long, caudate inflorescences of the plant.

Ecology. Primary evergreen mixed and coniferous humid forests on granite, commonly as canopy epiphyte on mossy trees near mountain tops.

1500 m. Fl. September – November. Not common (VU).

Distribution. Vietnam (Lam Dong). India, Bhutan, Thailand, China, Laos.

Studied specimens. Lam Dong, Lac Duong, *HLF* 5306 (HN, LE).

Note. Species may be close to *O. pyrulifera* distributed in NE. India, Bhutan, S. China and Thailand. It is different from the mentioned species in its very long inflorescence, 3 time longer than leaves, in large, half-circular or flabellate lip side lobes and in broad, triangular-ovate or narrowly ovate lobules of median lip lobe.

SUPPLEMENT

Supplement includes orchid discoveries, which belong to the genera reviewed in previous issues of this edition (Averyanov, 2008, 2010, 2011). They are listed below in alphabetical order as follows:

Didymoplexiella ornata (Ridl.) Garay,

1954, Arch. Jard. Bot. Rio de Janeiro 13: 33; Seidenf., 1978, Dansk Bot. Ark., 32, 2: 175, fig. 108; Comber, 2001, Orch. Sumatra: 112; Seidenf., Wood, 1992, Orch. Malay. Sing.: 138, fig. 57a. – *Leucolena ornata* Ridl., 1891, Journ. Linn. Soc., Bot. 28, t. 43. – *Didymoplexis ornata* (Ridl.) J.J. Sm., 1920, Bull. Buitenz. 3 ser. 2: 20, fig. 5h.

Described from Malacca Peninsula ("Bukit Sadanen, Malacca..."). **Type** ("*Derry s.n.*") – ?

Terrestrial achlorophyllous, dull gray herb 10–25 cm tall. Stem erect, with 1–3 small distant triangular sterile bracts and many-flowered inflorescence. Tubers longitudinally wrinkled, 3–6 cm long, to 5 mm in diameter. Inflorescence with many buds densely arranged at the apex. Floral bracts triangular, 1–1.2 mm long and broad. Flowers 1 day lasting, opening in succession one by one. Inflorescence rachis elongate after flowering. Pedicel and ovary at flowering, sub-erect, 6 mm long. Flowers sub-campanulate, light lilac, 10–12 mm across. Sepals and petals sub-similar, obovate, obtuse, 6–8 mm long, 2.5–3.5 mm wide; median sepal slightly longer. Lip 5–6 mm long, 2.5–3 mm wide, narrowly obovate, widening from narrow base, 3-lobed, with fleshy triangular, slightly emarginate callus near the apex; side-lobes broadly rounded, with straight, entire margins; median lobe indistinctly sub-quadrate, slightly emarginate. Column 3–5 mm tall, footless, operculum hemispheric, slightly flattened, finely papillose. **Fig. 81**, c.

Ecology. Terrestrial tuberiferous achlorophyllous herb. Primary and secondary evergreen, broad-leaved, rather open forests on sandy soil along sea shore. Fl.: April – June. Very rare (DD).

Distribution. N. Vietnam (Quang Ninh). S. (peninsular) Thailand, Malaysia, Borneo, Sumatra.

Studied specimens. Quang Ninh, Ha Long Bay, Cong Do Island, *NTH 6271* (CPC Herbarium, LE).

Notes. Surprising discovery of “Malesian” species in addition to *D. denticulata* Aver., recently described from Vietnam (Averyanov, 2010). Newly recorded plant distinctly differs from the latter species (rather widespread in eastern Indochina) in 3-lobed lip with straight (not denticulate) margin.

***Didymoplexiella siamensis* (Rolfe ex Downie) Seidenf.,**

1972, Bot. Tidsskr. 67: 99; id., 1978, Dansk Bot. Ark., 32, 2: 176, fig. 109; Su Horng-Jye, 2000, Fl. Taiwan 5: 851, pl. 360; Chen Sing-chi, Gale, Cribb, 2009, Fl. China, 25: 206. – *Leucolena siamensis* Rolfe ex Downie, 1925, Kew Bull. 1925: 416.

Described from NW. Thailand (“Doi Suthep 6–900 m”). **Type** (“Kerr 245”) – K.

Terrestrial achlorophyllous herb with erect stem and terminal many-flowered inflorescence. Inflorescence with many buds densely arranged at the apex. Flowers 1 day lasting, opening in succession one by one. Pedicel and ovary light brownish, 6 mm long. Flowers half-opening, 10–12 mm across. Sepals and petals light violet often flush with brownish, sub-similar, broadly ovate to obovate, roundish at apex, 6–7 mm long, 2.5–3.5 mm wide. Lip light violet, 5–6 mm long, 2–2.5 mm wide, oblanceolate, widening from narrow base, entire or very indistinctly 3-lobed, with very insignificant side lobes, median lobe rectangular, truncate or shallowly emarginate with small median dent; base and apex of the lip with truncate, finely papillose callus, basal callus violet, apical callus white. Column white, 3.5–4.5 mm long, footless, operculum white, hemispheric, slightly flattened, finely papillose. **Fig. 80, e-g; 81, d.**

Ecology. Terrestrial tuberiferous achlorophyllous herb. Primary and secondary evergreen, broad-leaved forest on granite. 450–550 m. Fl. April – May. Very rare (DD).

Distribution. Vietnam (Lam Dong). Thailand, Ryukyu Islands, Taiwan, Hainan.

Studied specimens. Lam Dong, Bao Lam, *M. Nuraliev 586* (LE).

Notes. Some specimens from Vietnam recorded earlier as *D. siamensis* (Aver., Averyanova,

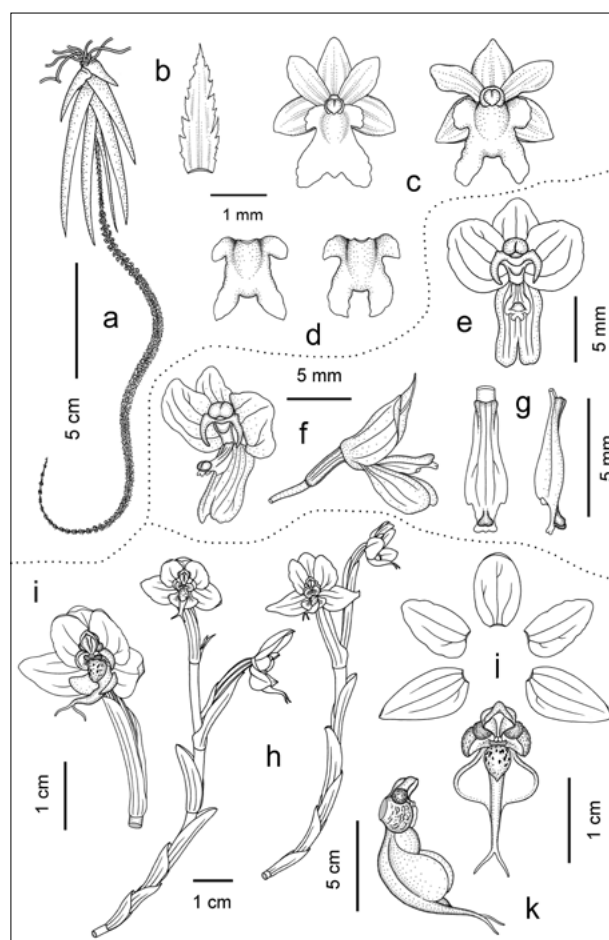


Fig. 80. *Oberonia dolichostachys*: a – flowering plant, b – floral bract, c – flowers, frontal views, d – lips (HLF 5328); *Didymoplexiella siamensis*: e – flower, frontal view, f – flowers, half side and side views, g – lip, frontal and side views (Nuraliev 586); *Vietorchis furcata*: h – flowering plants, i – flower, half side view, j – flattened sepals, petals and lip, k – column and lip, side view (Nuraliev 518, type).

2003, Updated Checklist Orch. Viet.: 31) were later re-identified as *D. denticulata*. Meanwhile, plants recently collected in southern Vietnam morphologically well fit the description of the species described from Thailand and found also in Ryukyu, Taiwan and Hainan. This is not too much surprising discovery of *D. siamensis* truly recorded here for Vietnam at first.

***Gastrodia exilis* Hook. f.,**

1890, Fl. Brit. Ind. 6: 123; id., 1894, Ic. Pl., tab. 2196. – *G. siamensis* Rolfe ex Downie, 1925, Kew Bull., 1925: 416; Seidenf., 1978, Dansk Bot. Ark., 32, 2: 181, fig. 112; Comber, 2001, Orch. Sumatra: 115. – *G. hayatae* Tuyama, 1941, Journ. Jap. Bot. 17: 580.

Described from NE. India (“Khasia Mts.; at Amwee in grassy places, alt. 3000 ft.”). **Type** (“J. D. H. et T. T.”) – K?

Terrestrial achlorophyllous, leafless, rootless herb with ovoid, brownish, hairy tuber 1 cm long. Stem 25–80 cm tall, 3–4 mm thick, dark gray-brown, with several distant, ovate, obtuse, papyraceous bracts 5–10 mm long. Rachis 3–8 cm long with 5–15 lax flowers. Floral bracts dark brownish, cuneate triangular, acute, 3–5 mm long. Pedicel and ovary 4–6 mm long, ovary 1.5–2 mm thick, narrowly ovoid, yellowish to almost white. Flowers almost white, sometimes with light yellowish-brown tint, tubular campanulate, 1–1.2 cm long, tube 2.5–3 mm in diam., opening at apical part. Free part of sepals, reflexed, triangular, obtuse, 3–4 mm long and wide, densely erose fimbriate along margin. Petals connate to flower tube, its free part recurved, ovate, 1.5–2 mm long, 0.1–1.2 mm wide, erose fimbriate along margin. Lip broadly lanceolate to narrowly ovate, cymbiform, 4–5 mm long, 2.5–3 mm wide, entire, obtuse, with 2 close, reniform calli at the base, with straight or slightly erose margin, disc with 2 low fleshy keels in apical half. Column with short column foot, white, 4–5 mm tall, 1–1.5 mm wide, straight, with narrow, forward directed broadly triangular wings and erect, finger-like obtuse stelia at apex. Anther cap white, hemispheric, about 0.8–1 mm across. **Fig. 82.**

Ecology. Terrestrial tuberiferous achlorophyllous herb. Primary evergreen, broad-leaved, humid forests on humus rich soils on granite. 1300 m. Fl.: October – November. Very rare (DD).

Distribution. Vietnam (Gia Lai). NE. India, Thailand, Sumatra.

Notes. *Gastrodia exilis* is unattractive, short lasting ephemeral plant easily overlooked in botanical surveys. Meanwhile, it is easily recognized for very characteristic erose-fimbriate margin of sepals and petals. Lip of Vietnamese plants differs from the type in low (not lamellate) keels on the lip and may represent separate variety approaching *G. fimbriata* Sudee described from Thailand.

Studied specimens: Gia Lai Prov., Kon Ka Kinh national park, *Tran Ngoc Toan KKK 232* (SGN); d-EXSICCATES OF VIETNAMESE FLORA 0199/KKK 232.

Vanilla atropogon Schuit., Aver. & R. Rybkova,

2013, Orchideenjour. 20 (in print).

Described from southern Vietnam (“Khanh Hoa Prov., Hon Ba Nature Reserve ... 180–300 m”). **Type** (“Prague Botanical Garden cult. 2013. leg. R. Rybkova 00923”) – PR?

Epiphytic or lithophytic creeping branching vine to 15 m long. Stem fleshy, with long internodes

and loosely arranged, fleshy coriaceous leaves. Leaves elliptic, (10)15–20(25) cm long, 5–8 cm wide, shortly acuminate; subsessile or with short broad petiole. Inflorescence terminal, (5)10–15 cm long, with 10–20, spirally arranged, sub lax flowers, opening in succession. Floral bracts small, oblong, acute, slightly cucullate. Pedicel and ovary straight or slightly curved, to 3 cm long. Sepals and petals light yellowish green to nearly almost white, oblong elliptic, 3.5–4.5(5) cm long, 1–1.4 cm wide, obtuse. Lip at base trumpet-shaped, with flanges adnate and embracing column; epichile subquadrate, entire, about 4 cm long and wide, irregularly incise-dentate along margin, white with yellowish-green tint, heavily marked with dark purple-brown marks and stripes; disk fleshy, at the center with dense pack of rectangular, imbricate, scarious, back turned, pinkish-white scales, incise-ciliate at margin; distal half of the disk with long, erect, scattered, thin, dark brown hairs; apex with dense bunch of numerous large and fat papillae, dark purple-brown at the base, white toward the apex. Column slender, about 2.2 cm long. Fruits fleshy, cylindrical, berry-like capsule. **Fig. 81, e, f.**

Ecology. Primary and secondary lowland valley evergreen broad-leaved forests and secondary bush on granite, commonly along stream bluffs and on waterfalls sides. 200–400 m. Fl. April – May. Rare (DD).

Distribution. Vietnam (Khanh Hoa). Endemic.

Studied specimens. Khanh Hoa, Hon Ba Nature Reserve, April 2012, *Ho Ngoc Quynh s.n.*” (Ho Chi Minh City Agriculture-Forestry University)?, LE (photo).

Notes. This species was primarily recorded in numerous internet resources (<http://www.botanyvn.com/cnt.asp?param=newsetnewsid=1448etlg=en>) under obviously wrong name, *Vanilla shenzhenica*, taxon, which actually belongs to the genus *Miguelia* Aver. (*M. shenzhenica* (Z.J. Liu et S.C. Chen) Aver., **comb. nov.** – *Vanilla shenzhenica* Z.J. Liu et S.C. Chen, 2007, Acta Phytotax. Sin. 45: 301). Being “true” *Vanilla*, *V. atropogon* may be close to *V. siamensis* Rolfe ex Downie, but strongly differs in color of flowers, lax inflorescence and in character of lip ornamentation. This species may be strict endemic of central and southern Vietnam. Meanwhile, species blossoms very rare, why its distribution remains unclear due too very limited materials and observations.

Vietorchis furcata Aver. et Nuraliev, 2013, Taiwan, 58 (in print).

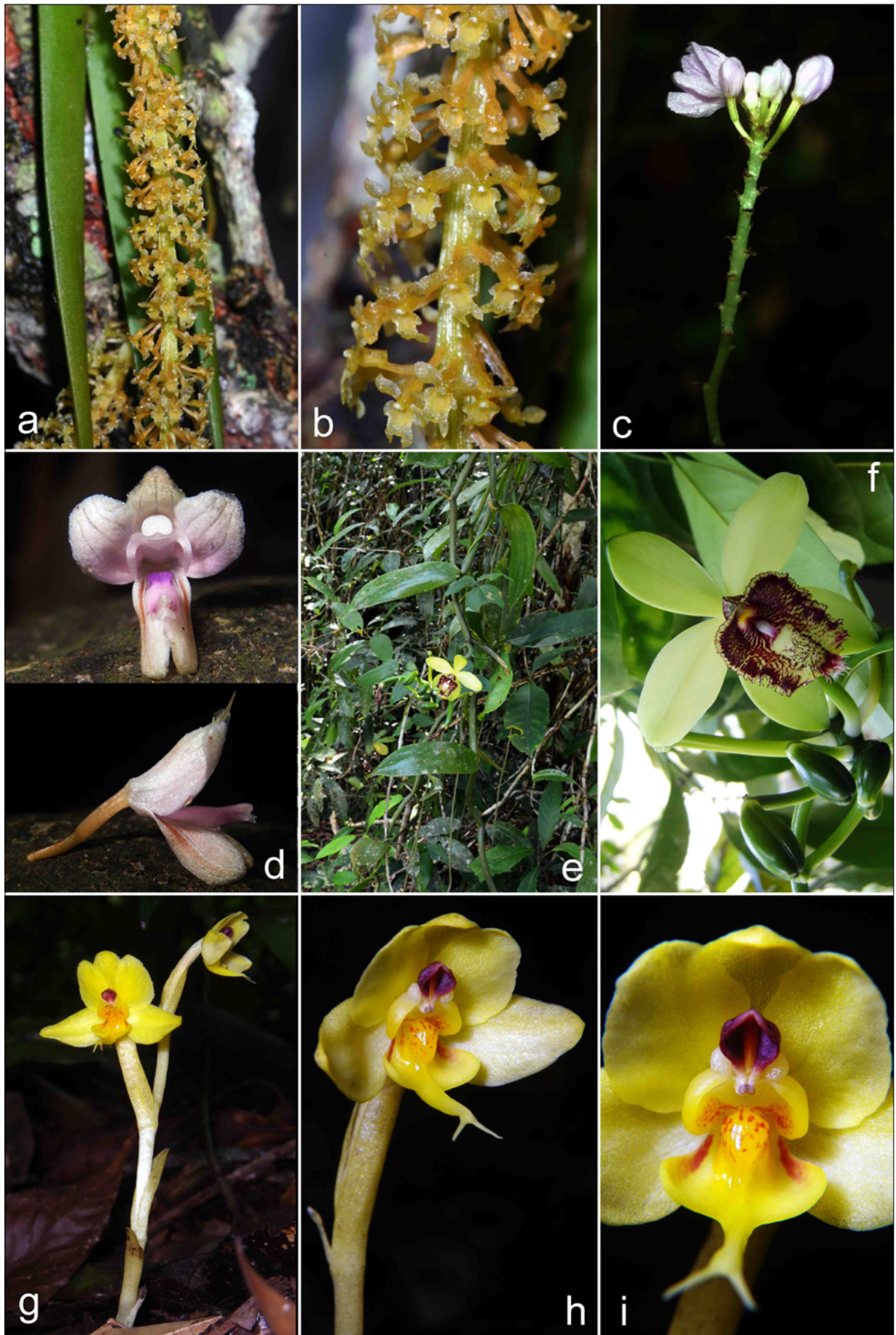


Fig. 81. *Oberonia dolichostachys*: a, b (HLF 5328); *Didymoplexiella ornata*: c (NTH 6271); *D. siamensis*: d (Nuraliev 586); *Vanilla atropogon*: e, f (Ho Ngoc Quynh s.n.); *Vietorchis furcata*: g-i (Nuraliev 518, type).



Fig. 82. Digital herbarium specimen of *Gastrodia exilis* (Tran Ngoc Toan KKK 232).

Described from southern Vietnam (“Dak Lak prov., Chu Yang Sin national park. Mixed forest on leveled terrace of Chu Yang Sin mountain system at elevation about 1000 m a.s.l., around point 12°23’50”N 108°20’50”E”). **Type** (“11 April 2012 *M. Nuraliev 518*”) – LE (holotype).

Terrestrial achlorophyllous herb with white, erect stem 3–5(7) cm tall and 1–2(3) lax flowers, covered by loose, overlapping white bracts (0.5)1.2–1.5 cm long, 4–6(7) mm wide. Floral bracts white, membranaceous, oblong ovate, obtuse, 1.5–2 cm long, 6–8(10) mm wide. Ovary white, erect, cylindrical, curved at apex, strongly 6-ridged, 1.5–2(2.2) cm long, 2–2.5 mm in diam., twisted at base on 360°, straight, untwisted in apical half. Flowers yellow, sessile, widely opening, 1.5–2 cm across; column wings, lip callus and lip side lobes with dull reddish-orange markings. Median sepal broadly ovate, rounded at apex, often slightly cucullate, 6–8 mm long, 5–6 mm wide; lateral sepals obliquely ovate, obtuse, 7–12 mm long, 4–6 mm wide. Petals obliquely ovate, roundish at apex, entire or shallowly irregular crenulate along margin, 6–9 mm long, 4–6 mm wide. Lip fleshy, firmly adnate to column, bent upward, 3-lobed, 7–9 mm long, 4–6 mm wide;

basally with glossy, ovoid callus, connate to column base and with thick longitudinal keel on abaxial and adaxial sides. Side lip lobes half circular, oblique, concave, 2.5–3 mm tall, 3–3.5 mm wide. Median lip lobe narrowly conical, 3–4 mm long, at apex divided into 2 flat, thin, linear, divergent lobes 1.5 mm long. Column 3 mm tall and wide; with large, fleshy, half circular, concave, cup-like, lateral wings 1.5–2 mm long and wide. Anther 2 mm tall and wide, dark reddish-violet. **Fig. 80**, h-k; **81**, g-i.

Ecology. Primary evergreen broad-leaved and mixed humid forests on leveled terraces of mountain slopes composed with silicate mother rocks. 1000 m. Fl. March – April. Very rare (CR).

Distribution. Vietnam (Dak Lak).

Notes. This is very surprising discovery of the second species of the genus earlier regarded as monotypic. Most probably, *V. furcata* (like type species) is rare local endemic with very restricted distribution in Chu Yang Sin Mountains, where a single population was discovered. Both species of *Vietorchis* represents endemism of very high taxonomical rank and is a subject of protection of highest priority.

LITERATURE

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