

A survey of *Dendrobium* Sw. sect. *Formosae* (Benth. & Hook.f.) Hook.f. in Cambodia, Laos and Vietnam

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ABSTRACT

This taxonomic survey of *Dendrobium* section *Formosae* in the flora of Cambodia, Laos and Vietnam includes 19 species (*Dendrobium bellatulum* Rolfe, *D. cariniferum* Rchb.f., *D. chapaense* Aver., *D. christyanum* Rchb.f., *D. daklakense* Tich, Schuit. & J.J.Verm., *D. draconis* Rchb.f., *D. infundibulum* Lindl., *D. kontumense* Gagnep., *D. longicornu* Lindl., *D. multilineatum*, *D. ochraceum* De Wild., *D. roseiodorum* Sathap., T.Yukawa & Seelanan, *D. scabrilingue* Lindl., *D. senile* E.C.Parish & Rchb.f., *D. suzukii* T.Yukawa, *D. trankimianum* T.Yukawa, *D. trigonopus* Rchb.f., *D. wattii* (Hook.f.) Rchb.f., *D. williamsonii* Day & Rchb.f.) hitherto recorded from these countries. It includes a key for species identification and updated information on species nomenclature, morphology, phenology, ecology, distribution and tentative conservation status.

KEY WORDS

Cambodia,
Laos,
Vietnam,
flora,
nature conservation,
lectotypification,
new synonyms.

RÉSUMÉ

Étude de Dendrobium Sw. sect. Formosae (Benth. et Hook.f.) Hook.f. au Cambodge, Laos et Vietnam. L'étude taxonomique de *Dendrobium* section *Formosae* dans la flore du Cambodge, du Laos et du Vietnam comprend 19 espèces (*Dendrobium bellatulum* Rolfe, *D. cariniferum* Rchb.f., *D. chapaense* Aver., *D. christyanum* Rchb.f., *D. daklakense* Tich, Schuit. & J.J.Verm., *D. draconis* Rchb.f., *D. infundibulum* Lindl., *D. kontumense* Gagnep., *D. longicornu* Lindl., *D. multilineatum*, *D. ochraceum* De Wild., *D. roseiodorum* Sathap., T.Yukawa & Seelanan, *D. scabrilingue* Lindl., *D. senile* E.C.Parish & Rchb.f., *D. suzukii* T.Yukawa, *D. trankimianum* T.Yukawa, *D. trigonopus* Rchb.f., *D. wattii* (Hook.f.) Rchb.f., *D. williamsonii* Day & Rchb.f.) enregistrées jusqu'à présent dans les territoires de ces pays. Il inclut la clé pour l'identification des espèces et l'actualisation des données sur la nomenclature des espèces, la morphologie, la phénologie, l'écologie, la distribution et le statut de conservation.

MOTS CLÉS

Cambodge, Laos, Vietnam, flore, conservation de la nature, lectotypification, synonymes nouveaux.

INTRODUCTION

The genus *Dendrobium* Sw. is one of the three largest genera in the orchid family with about 1450 species in 30 sections (Schuiteman 2014). The intrageneric classification has been reassessed several times. Today's genus *Dendrobium* had been divided into various number of groups from five (Lindley 1830) up to more than 40 (Schlechter 1912; Lavarack *et al.* 2000) and many of these sections were classified at generic level by some authors (e.g. Lavarack *et al.* 2000). In recent years, analysis of DNA revealed the existence of three major groups, which can be divided into 30 sections in total (reviewed by Adams 2011 and Schuiteman & Adams 2014). The section *Formosae* (Benth. & Hook.f.) Hook.f. has been classified as a relatively well separated group within the genus *Dendrobium* since its first description (Bentham & Hooker 1883). Molecular phylogenetic studies rejected monophyly of this section (Sathapattayanon 2008) with *D. senile* as the most noticeable example (Xiang *et al.* 2013; Takamiya *et al.* 2014). This species is apparently different from other members of the section *Formosae* by its long white trichomes on pseudobulbs. This led André Schuiteman (2011) to remove this species from the section *Formosae* and classify *D. senile* as “unplaced” taxon. Placement of *D. senile* by molecular phylogenetical methods is weakly supported, nevertheless it seems to be better classified in the section *Dendrobium* (Xiang *et al.* 2013). However, in the most recent treatment of the genus, *D. senile* is still classified as “unplaced” taxon (Schuiteman & Adams 2014). Because this species, as well as *D. trigonopus* Rchb.f., are not finally classified in any other *Dendrobium* section and their classification in the section *Formosae* is still commonly used, we treat these species here too.

The remaining species of section *Formosae* seem to fall into at least two well-supported clades which can be distinguished by presence or absence of black trichomes on their stems (Sathapattayanon 2008; Takamiya *et al.* 2014). However, better sampling of the related sections *Distichophyllae* Hook.f. and *Conostalix* Kraenzl. is needed to make a sound taxonomical reorganization in this group. In this article, we follow the classical concept of section *Formosae*, which is based on morphological characters. Species of section *Formosae* are distributed from India through south-east Asia up to southern China, Sumatra, Philippines, Borneo and Sulawesi. Continental south-east Asia (especially the Indochinese region) and Borneo seem to be the center of biodiversity of this group (Lavarack *et al.* 2000; Schuiteman 2014).

MATERIAL AND METHODS

Most of the specimens mentioned in this paper were collected by the authors in the field during two last decades. Some of specimens were cultivated for some years and were later used for the preparation of herbarium material. Prepared herbarium specimens of all studied plants are kept in several herbaria (mainly in HN, Herbarium of the Center for Plant Conservation, LE, MO and P). Besides preparing dried herbarium specimens, flowers of almost all species here reported were fixed and stored in 65% ethanol. Descriptions were thus made on the basis of dried, fresh and alcohol-preserved materials. Photographs were taken mainly in the field with Canon cameras and lenses. The abbreviation – “CPC” is accepted (as an expected Herbarium acronym) in the paper for Herbarium of the Center for Plant Conservation of the Vietnam Union of Science and Technology Associations (Hanoi, Vietnam). Digital plates with analytical images of authentic specimens prepared at the Herbarium of the Komarov Botanical Institute (LE) used for illustrations are cited in the paper as d-EXSICCATES OF VIETNAMESE FLORA with appropriate number. Recent series collections are abbreviated and designated on herbarium labels using the following prefixes: CBL (Cao Bang Limestone – collections under the program of the USA National Geographic Society “Limestone Flora of Cao Bang Province of northern Vietnam” years 1998-1999, # 6300-98 with principal investigators – Nguyen Tien Hiep and Leonid V. Averyanov), HAL (collections of Nguyen Tien Hiep, Leonid V. Averyanov and Phan Ke Loc under various research programs, mainly in the period 2001-2010), HLF (collections according under Henry Luce Foundation research program in the period 1999-2008, mainly Leonid V. Averyanov *et al.*), LA-VN (Laos-Vietnamese expedition of 2009 and 2013 with support of the USA National Geographic Society “Flora of relict karstic formation of central Laos – Vientiane province, Vang Vieng and Kasi districts” #9141-12, collections mainly Nguyen Tien Hiep, Leonid V. Averyanov, Nguyen Sinh Khang and Pham Van The), LX-VN (collections of Soviet-Vietnamese Expedition mainly in the period 1983-1994, mainly of Leonid V. Averyanov *et al.*), VH (Vietnamese Highlands – collections under program of the USA National Geographic Society “Flora of Highlands of South Vietnam” during years 1993-2001, # 5094-93,

5803-96, 6383-98 with principal investigator Leonid V. Averyanov). Administration divisions of Cambodia, Laos and Vietnam used in the notes on species' distributions were verified by updated data presented in sites officially supported by the governments of these countries (http://en.wikipedia.org/wiki/Provinces_of_Cambodia; http://en.wikipedia.org/wiki/Provinces_of_Laos; http://en.wikipedia.org/wiki/Provinces_of_Vietnam). Expected IUCN Red List status reported for species is based on known distribution, field observations of deforestation in studied areas and actual level of species exploitation. Such information has preliminary character and represents first step for future species assessment according to IUCN criteria.

SYSTEMATICS

Genus *Dendrobium* Sw.

Dendrobium sect. *Formosae* (Benth. & Hook.f.) Hook.f.

Flora of British India 5: 710 (1890). — *Dendrobium* grex *Formosae* Benth. & Hook.f., *Genera Plantarum* 3: 500 (1883). — *Dendrobium* subsect. *Nigrohirsutae* Lindl., *The Journal of the Linnean Society of London, Botany* 3: 16 (1859). — *Dendrobium* subgen. *Nigrohirsutae* (Lindl.) Kraenzl., *Das Pflanzenreich: regni vegetabilis conspectus* 45: 85 (1910). — *Dendrobium* subgen. *Oxygenianthe* Schltr., *Repertorium specierum novarum regni vegetabilis* 1: 448 (1912).

LECTOTYPUS. — *D. formosum* Roxb. ex Lindl.

STUDIED SPECIES

The section includes 50-55 species occurring in mainland tropical and subtropical SE Asia, Indonesia and the Philippines, 19 species occur in studied area.

DESCRIPTION

Epiphytic or rarely lithophytic plants, hairy with black, dark brownish or white hairs. Stems erect or ascending, simple, usually slightly flexuose, yellow-green to yellow when dry, fleshy, cylindrical, fusiform or clavate usually many tufted together. Leaves, distichous, leathery, base decurrent forming clasping sheaths, usually unequally bilobulate at apex. Inflorescences 1-5, subterminal, short, usually less than 1 cm long, with 1-5 flowers; floral bracts small, ovate. Pedicel and ovary greenish to white, glabrous. Flowers usually large and showy, white, yellowish or light greenish, thickly textured, 2-3 month lasting; sepals and petals subsimilar, or petals wider; mentum distinct, broad to narrow, spur-like; lip 3-lobed, trumpet shaped, white, yellow or red; disc rugose, often with ciliate or fringed ridges. Column stout, broad and short, with 2 short conical stelidia at apex; anther cap broadly conic to hemispheric, papillose or hairy along front margin. Capsules large, nutant, fusiform to obovoid.

All species of this section including those that occurs in eastern Indochina have attractive, long-lasting flowers and are of outstanding significance for ornamental horticulture and breeding. Being extensively collected in nature for the trade, they have become endangered and even completely extinct in many areas of their primary distribution.

KEY TO SPECIES *DENDROBIUM* SECT. *FORMOSAE* (BENTH. & HOOK.F.) HOOK.F.

1. Sepals and petals pure white or light pale yellowish 2
— Sepals and petals bright yellow 18
2. Mentum saccate, almost half-globular 3
— Mentum conic to cylindrical, spur-like 6
3. Median lobe of lip emarginate-retuse or shallowly two-lobed 4
— Median lobe triangular or rounded at apex 5
4. Stem 2-7 cm long, usually shorter than 5 cm, broadly clavate, obovoid to almost globular, of 2-5 internodes; flowers 2.5-3 cm across; sepals and petals 1.5-2 cm long; lip 2-2.6 cm long, 1.2-1.6 cm wide; epichile entirely yellow or red, strongly recurved, with tip decurved or reflexed 1. *D. bellatulum* Rolfe
— Stem 5-25 cm long, fusiform to cylindrical of few to many internodes; flowers 4-7 cm across; sepals and petals 2.2-3.5 cm long; lip 3-5.5 cm long, 2.5-3.2 cm wide; epichile white, yellow or red at base, straight or only slightly recurved 2. *D. christyanum* Rchb.f.
5. Flowers fragrant, 1.8-2.4 cm across; sepals and petals 1-1.2 cm long; petals ovate, as broad as median sepal; lip 1.5-2 cm long, 1.4-1.6 cm wide, white, side lobes light pale green, disc light yellow 3. *D. scabrilingue* Lindl.
— Flowers odorless, 4-6 cm across; sepals and petals 3-4 cm long; petals and sepals subsimilar triangular ovate; lip 3.2-2.6 cm long, 2.6-2.8 cm wide, side lobes and disc bright red, margin of epichile white 4. *D. suzukii* T.Yukawa
6. Epichile as broad as or broader than flattened hypochile 7
— Epichile narrower than flattened hypochile 9
7. Epichile with triangular acute apex 5. *D. draconis* Rchb.f.
— Epichile with semi-orbicular retuse apex 8
8. Lip 2.5-4 cm long; disc pink to red, with 5 low insignificant rugose keels; flowers odorless 6. *D. kontumense* Gagnep.

- Lip 4-5 cm long; disc red-orange to orange-yellow, thick, verruculose, without distinct keels; flowers sweet fragrant 7. *D. roseiodorum* Sathap., T.Yukawa & Seelanan
- 9. Petals much broader than sepals; sepals and petals of rather thin texture; lip disc thin, with thin keels or almost flat 10
- Petals as wide as sepals or narrower, rarely a little wider than sepals; sepals and petals coriaceous, glossy; lip disc thick, often finely rugose with thick keels 13
- 10. Lip deeply 3-lobed, entirely bright yellow-orange; lip side lobes triangular, acute; median lobe lanceolate rhomboid, acute, with thick fleshy verruculose band; disc with erect retrorse, emarginate-globose callus 8. *D. daklakense* Tich, Schuit. & J.J.Verm.
- Lip shallowly or indistinctly 3-lobed, white yellow, orange or red marks only on disc and side lobes; lip lateral lobes semicircular, obovate or indistinctly rectangular, more or less rounded at apex; median lobe almost flat, emarginate or rounded and shortly apiculate; disc with low indistinct parallel keels extending from base of lip to base of median lobe 11
- 11. Flowers 6-9 cm across; sepals 3-4 cm long; flattened lip 3.3-4.5 cm wide; median lobe retuse, with rather deep sinus at apex; disc with flat broad fleshy keel splitting distally into 3-5 low parallel lamellas 9. *D. infundibulum* Lindl.
- Flowers 3-5 cm across; sepals 2.5-3 cm long; flattened lip 2.5-3.2 cm wide; median lobe orbiculate, shortly apiculate; disc with 3-11 low indistinct parallel keels extending from base of lip to base of median lobe 12
- 12. Disc yellow to yellow-orange, with 3-4(5) low keels; side lobes pure white or with yellow marks along nerves, median lobe obovate to rectangular, narrowing to base, irregularly denticulate and undulate along margin 10. *D. wattii* (Hook.f.) Rchb.f.
- Disc bright red, with 7-13 low keels; side lobes white with bright red stripes along inflated, keel-like nerves, median lobe semi-orbicular to broadly ovate, broadening to the base, almost entire and flat 11. *D. multilineatum* Kerr
- 13. Lateral sepals and ovary with distinct dorsal keels; disc of lip fimbriate or ciliate 14
- Lateral sepals and ovary without distinct keels; disc of lip naked, papillose or sparsely setose 15
- 14. Lip ciliate along veins, without distinct keels or with low insignificant ciliate keels; keels on back of sepals hardly continuing down the ovary 12. *D. williamsonii* Day & Rchb.f.
- Lip with 5-7 fat, densely fimbriate keels extending to the median lobe; keels on back of sepals continuing down the terete ovary and pedicel 13. *D. cariniferum* Rchb.f.
- 15. Flowers not widely opening, campanulate, 1.5-2.5(3) cm across, nodding, sepals and petals straight; lip broadly obovate rhombic, entire or 3-lobed, denticulate or irregularly fringed along apex; median lobe (in 3-lobed lip) ovate, 3 time smaller than side lobes; veins on the lip fanning out from base; stems usually less than 30 cm long 16
- Flowers widely opening, (3)3.5-5 cm across, sepals and petals sometime more or less recurved, horizontally directed or suberect; lip pandurate, 3-lobe or broadly ovate indistinctly 3-lobed, entire and undulate along margin; median lobe as large as side lobes or larger; veins on the lip more or less parallel; stems usually longer than 30 cm 17
- 16. Stems slender, reed-like, 3-5 mm in diameter; flowers 2-3 cm across, sepals 1.5-2.2 cm long, mentum as long as pedicel and ovary or longer; lip apex entire to indistinctly 3-lobed, irregularly dentate or fringed; disc naked or sparsely setose along veins 14. *D. longicornu* Lindl.
- Stems rather stout, fleshy, 0.5-1 cm in diam; flowers 1.5-2 cm across; sepals 1.4-1.6 cm long; mentum shorter than pedicel and ovary; lip apex distinctly 3-lobed, median lobe triangular ovate, irregularly denticulate; disc naked 15. *D. chapaense* Aver.
- 17. Flowers light yellowish to almost white, lip with numerous bright red veins contrasting with pale background; petals triangular narrowly ovate, acuminate, 2.2-3 cm long, 6-10 mm wide, as wide as sepals, commonly recurved and irregularly undulate along margin; lip pandurate, distinctly 3-lobed; 2.2-3 cm long, 1.6-2.2 cm wide, median lobe as large as side lobes, strongly undulate along margin, often emarginate; disc with 4 indistinct, low keels 16. *D. ochraceum* De Wild.
- Flowers white; disc uniformly bright red; petals obovate, acute to round at apex, 2.8-3.4 cm long 1.2-1.4 cm wide, broader than sepals, flat and straight; lip obovate, indistinctly 3-lobed, 3-3.5 cm long, 2-2.5 cm wide, median lobe much smaller than side lobes, finely undulate along margin, shortly apiculate; disc with longitudinal lamella splitting distally on medial lobe into 3-5 low keels 17. *D. trankimianum* T.Yukawa
- 18. Indumentum hairs white, long; stem 0.5-1 cm in diameter; flowers 2.5-3 cm across; tepals less than 2.4 cm long; sepals not much keeled at back 18. *D. senile* E.C.Parish & Rchb.f.
- Indumentum hairs dark brown to black, very short; stem 1.2-1.8 cm in diameter; flowers 3-4 cm across; tepals 2.5 cm long; sepals at back with strong keels continuing down the ovary 19. *D. trigonopus* Rchb.f.



FIG. 1. — **A, B**, *Dendrobium bellatulum* Rolfe; **A**, VH 2566; **B**, VH 2567; **C, D**, *D. christyanum* Rchb.f.; **C**, VH 950; **D**, CPC 6038; **E**, *D. scabrilingue* Lindl. (Konstantinov 29); **F, G**, *D. suzukii* T.Yukawa; **F**, Duy s.n., Ill.2014; **G**, L.Averyanov s.n., XI.2013; **H**, *D. draconis* Rchb.f. (HLF 7347); **I**, *D. kontumense* Gagnep. (LA-VN 21a). Photos: A-D, G-I, L. Averyanov; E, E. Konstantinov; F, N.V. Duy.

1. *Dendrobium bellatulum* Rolfe

The Journal of the Linnean Society (Botany) 36: 10 (1903); *Botanical Magazine* 18: table 7985 (1904). — Gagnep., *Flore générale de l'Indo-Chine* 6 (2): 226, fig. 19, 6-8 (1933). — Seidenf., *Opera Botanica* 83: 103, fig. 60, table 13b (1985); 114: 210, table 13c (1992). — Aver., *Identification Guide to Vietnamese Orchids*: 183 (1994). — P.H.Ho, *An Illustrated Flora of Vietnam* 3: 826, fig. 11055 (2000). — Aver. & Averyanova, *Updated Checklist of the Orchids of Vietnam*: 26 (2003). — Newman et al., *A Checklist for the Vascular Plants of Lao*: 262 (2007). — Schuiteman et al., *Nordic Journal of Botany* 26: 280 (2008). — Zhu Guanghua et al., *Flora of China* 25: 391 (2009).

TYPUS. — SW China. Yunnan: Mengtze 5000 ft., *Henry 11109* (holo-, K[K000943750]).

HABITAT, PHENOLOGY AND CONSERVATION STATUS. — Epiphyte on tall trees in primary and secondary, closed and open broad-leaved, mixed and coniferous forests, particularly on ericaceous trees on mountain tops. (600)700-1700(2000) m. Fl. December-April. Locally common. Expected IUCN Red List status – EN.

DISTRIBUTION. — Laos (Champasak), Vietnam (Dak Lac, Kon Tum, Lam Dong, Ninh Thuan). NE. India, Myanmar, S. China, Thailand.

MATERIAL EXAMINED. — Laos. Champasak, Bolovens, Sedone, *A.D.Kerr 1645* (C).

Vietnam. Dak Lac, Krong Bong, Chu Yang Sinh mt., *VH 6155* (HN, MO); Kon Tum, Dacuy, *L.Averyanov et al., LX-VN 2214* (HN, LE); Kon Tum, Dak Gley, *VH 2297* (HN, P[P00386129]), (MO); Kon Tum, Konplong, Mang Den, *L.Averyanov et al., LX-VN 2282* (HN, LE); Kon Tum, *L.Averyanov et al., LX-VN s.n.* anno 1985 (LE photo); Lam Dong, Dalat, *CRST 13* (P[P00386139]), *Evrard 937* (P[P00386133]), *1798* (P[P00386134]), *1880* (P[P00386135]), *1913* (P[P00386136]), *1962* (P[P00386137]), *2168* (P[P00386138]), *A.D.Kerr s.n.* (C), *L.Averyanov HAL s.n.* 2004 (LE photo); Lam Dong, Lac Duong, Bi Dup mt., *VH 2693* (HN, LE, MO), *HLF 5202* (HN); Lam Dong, Langbian, *Chevalier 30699* (P[P00386130, P00386131]); Lam Dong, 8.5 km to S from Dalat, *VH 2623a* (HN, LE photo); Lam Dong, 14 km to NNW from Dalat, *VH 2566* (HN, LE, MO), *VH 2567* (HN, LE); Ninh Thuan, Ninh Hai, Nui Chua mt., *HLF 4318* (HN, MO); Vietnam, *sine loc.*, *Eberhardt 69B* (P[P00386132]).

DESCRIPTION

Stems erect, clavate to obovoid, 2-5(7) cm long, 1-1.5 cm in diameter, with 2-5(6) nodes. Leaves 2-4, ovate to oblong, 1.5-4 cm long, 0.6-1.4 cm wide, shortly black hairy, unequally bilobed at apex. Inflorescence 1(2), 1-2(3) flowered, subterminal on mature stems; peduncle and rachis 2-6 mm long; floral bracts ovate, membranaceous, 5-8 mm long. Pedicel and ovary pale greenish, 1-2 cm long. Flowers widely opening, 2.5-3 cm across, white, lip red with yellow epichile, rarely entirely red. Sepals and petals subsimilar, narrowly ovate, acute, 1.5-2 cm long, 5-8 mm wide, lateral sepals oblique; mentum broadly conical, 1-1.5 cm long. Lip pandurate, 2-2.6 cm long, 1.2-1.6 cm wide; lateral lobes ovate, erect; median lobe 2-lobed, bent down; disc fleshy, with 5 indistinct rugose to papillose keels. Column pink, 2-3 mm tall; anther cap broadly conical, papillose (Fig. 1A, B).

REMARKS

Remarkable forms of this species with entirely red lip lacking any yellow on epichile occasionally occur in highland *Pinus*

kesiyya woodlands around Dalat city area in Lam Dong province of the southern Vietnam (Fig. 1B).

Some cultivated plants originated from Thailand develop pseudobulbs to 7 cm long consisting of 6 (or more) nodes. Such plants do not differ in any other character.

2. *Dendrobium christyanum* Rchb.f.

The Gardeners' Chronicle 1: 178 (1882). — Gagnep., *Flore générale de l'Indo-Chine* 6 (2): 239 (1933). — Seidenf., *Opera Botanica* 83: 105, fig. 61, table 13c (1985); 114: 210, fig. 133 (1992). — Aver., *Identification Guide to Vietnamese Orchids*: 183 (1994). — P.H.Ho, *An Illustrated Flora of Vietnam* 3: 826, fig. 11056 (2000). — Aver. & Averyanova, *Updated Checklist of the Orchids of Vietnam*: 26 (2003). — Newman et al., *A Checklist for the Vascular Plants of Lao*: 262 (2007). — Schuiteman et al., *Nordic Journal of Botany* 26: 280 (2008). — Zhu Guanghua et al., *Flora of China* 25: 391 (2009).

Dendrobium margaritaceum Finet, *Bulletin de la Société botanique de France* 50: 379, table 14, fig. 31-38 (1903). — Gagnep., *Flore générale de l'Indo-Chine* 6 (2): 226 (1933).

Dendrobium fuerstenbergianum Schltr., *Repertorium specierum novarum regni vegetabilis* 3: 277 (1907). — Seidenf., *Opera Botanica* 83: 106, fig. 62, table 13d (1985).

Dendrobium sinense Tang & F.T.Wang, *Acta Phytotaxonomica Sinica* 12: 41 (1974).

TYPUS. — Thailand. Siam, *sine loc.*, *Veitch*, Herb. Reichenbach, 32377 (holo-, W).

HABITAT, PHENOLOGY AND CONSERVATION STATUS. — Epiphyte on tall trees in primary and secondary evergreen humid broad-leaved and mixed forests on steep slopes on granite, particularly along mountain edges, often on ericaceous and pine trees. (1000)1500-2400 m. Fl. January-March, August-September. Locally common. Expected IUCN Red List status – EN.

DISTRIBUTION. — Vietnam (Khanh Hoa, Kon Tum, Lam Dong, Nghe An, Ninh Thuan). Thailand, S. China.

MATERIAL EXAMINED. — Vietnam. Khanh Hoa, Nhatrang, *Chevalier 4080* (P[P00386241]); Kon Tum, Ngoc Linh mt., *VH 110* (HN, LE, MO, P[P00386246]), *VH 127* (HN, LE, MO, P[P00386245]), *VH 563* (HN, LE, MO, P[P00386244]), *VH 950* (HN, LE, P[P00386243]); Kon Tum, Ngoc Peng Oei, Dak Gley, *Poilane 32931* (P[P00386239]); Kon Tum, Sa Thay, *P.K.Loc s.n.*, anno 2003 (LE photo); Lam Dong, Bi-Doup, *Poilane 30229* (P[P00386240]); Lam Dong, Dalat area, *Petrov s.n.*, IV.2013 (LE photo); Lam Dong, Haut Donaï, Lang Bian, *Vernet 2* (P[P00386242]); Nghe An, Ky Son, Phu Xai Lai Leng mt., *CPC 6038*, *CPC 6391* (CPC Herbarium, LE, LE photo); Ninh Thuan, Ninh Hai, Nui Chua mt., *HLF 4614* (HN, MO).

DESCRIPTION

Stems fusiform to cylindrical, (4)5-15(25) cm long, 5-8 mm in diameter, of few to many nodes. Leaves lanceolate to oblong lanceolate, 3-8 cm long, 0.6-1.4 cm wide. Inflorescences 1-2(3), each with 1-2(3) flowers. Pedicel and ovary pale greenish, 1.2-2.5 cm long. Flowers odorless, widely opening, 4-7 cm across, white, disc bright red, usually with contrasting yellow spot in the front on adaxial surface. Sepals triangular ovate, acute, 2.2-3.5 cm long, 0.8-1.4 cm wide; mentum broadly conical, 0.8-1.2 cm long. Petals narrowly obovate to oblong,

as long as sepals, as wide as sepals or little wider, acute to shortly apiculate. Lip broadly obovate, pandurate, 3-lobed, 3-5(5.5) cm long, 2.5-3.2 cm wide, side lobes half circular, as long as emarginate, obcordate median lobe; disc with 3(5) low rugose granulate keels. Column white, 4-5 mm tall; anther cap white, conical, truncate (Fig. 1C, D).

REMARK

This species was observed in the past as an abundant plant on many tops of the Ngoc Linh and Phu Xai Lai Leng mountains. It was also abundant on old trees of *Pinus krempffii* in the Lang Bian plateau to the west of the Hon Giao Mountains. Presently the species has become rare due to deforestation and extensive collection for the trade.

3. *Dendrobium scabrilingue* Lindl.

Journal of the Proceedings of the Linnean Society, Botany 3: 15 (1858). — Seidenf., *Opera Botanica* 83: 107, fig. 63, table 14a (1985); 114: 210 (1992). — Newman *et al.*, *A Checklist for the Vascular Plants of Lao*: 265 (2007). — Schuiteman *et al.*, *Nordic Journal of Botany* 26: 288 (2008). — Aver., *Turczaninowia* 16 (4): 36, fig. 3, I (2013).

Dendrobium hedyosmum Batem. ex Hook.f., *Botanical Magazine* 91: table 5515 (1865).

Dendrobium galactanthum Schltr., *Orchis* 9: 93 (1915). — Gagnep., *Flore générale de l'Indo-Chine* 6 (2): 255 (1933).

TYPUS. — S Myanmar. Tenasserim, "Borneo" – sphalm., *Veitch* (holo-, K[K000061906]).

HABITAT, PHENOLOGY AND CONSERVATION STATUS. — Epiphyte on trees in primary and secondary evergreen, broadleaved and mixed mountain forests. 900-1500 m. Fl.: January-February. Rare. Expected IUCN Red List status – DD.

DISTRIBUTION. — Cambodia (Kampot), Laos (Vientiane), Myanmar, Thailand.

MATERIAL EXAMINED. — **Cambodia**. Kampot, Phnom Bokor N.P., *E.Konstantinov et al.*, 29P-C-GPS042 (LE).

Laos. Vientiane, Phu Khao Khouai, *A.D.Kerr* 177, 1820 (C); Vientiane, Ritaville, *A.D.Kerr* 2771 (C).

DESCRIPTION

Stems stout, erect, fusiform, (5)10-25(30) cm long, 1-1.6 cm in diameter, of few to many nodes. Leaves narrowly ovate to oblong lanceolate, 4-8 cm long, 0.8-1.2 cm wide. Inflorescences 1-2(3), each with 1-2 flowers. Pedicel and ovary white, 0.8-1.4 cm long. Flowers fragrant, widely opening, 1.8-2.4 cm across; sepals and petals white; lip white, side lobes green nerved, median lobe yellowish to lemon-yellow. Sepals triangular ovate, obtuse, often slightly recurved, (1.2)1.4-1.8(2) cm long, 5-6 mm wide. Petals narrowly obovate, as long as sepals and slightly wider. Lip obovate, 3-lobed, 1.5-2 cm long, 1.4-1.6 cm wide, clawed at the base; side lobes triangular, erect; median lobe broadly obovate, very rigid, verruculose obtuse; disc with 3-7 thick, low, verruculose, keels, side lobes naked or papillose along nerves. Mentum short, broadly conical, 6-8 mm long and broad. Column light yellowish to yellowish-green, 4-5 mm tall and broad (Fig. 1E).

REMARK

Not yet recorded from Vietnam.

4. *Dendrobium suzukii* T.Yukawa

Acta Phytotaxonomica et Geobotanica 53: 12, figs 1, 2 (2002).

Dendrobium cruentum auct. non Rchb.f.: Aver. & Averyanova, *Updated Checklist of the Orchids of Vietnam*: 27 (2003).

TYPUS. — S Vietnam. Ninh Thuan Province, in the vicinity of Nonh Son, Flowering in cultivation August 2001, Hort. *T. Sato s.n.* (holo-, TNS).

HABITAT, PHENOLOGY AND CONSERVATION STATUS. — Epiphyte on tall trees in primary closed evergreen broad-leaved and mixed seasonal mountain forest on rocky shale, granite and limestone. 1000-1150 m. Fl. April-June. Very rare. Expected IUCN Red List status – CR.

DISTRIBUTION. — Vietnam (Lai Chau, Lam Dong). Endemic.

MATERIAL EXAMINED. — **Vietnam**. Lai Chau, *sine loc.*, *L.Averyanov HAL 2905*, 2.V.2003 (LE photo); Lam Dong, Dalat area, *sine loc.*, *L.Averyanov s.n.*, 16.V.2000 (LE photo); Lam Dong, Dalat area, *sine loc.*, *L.Averyanov s.n.*, XI.2013 (LE photo); Lam Dong, Duc Trong, Ta Nang, *Duy s.n.*, III.2014, *Duy s.n.*, VI.2014 (LE photo); Lam Dong, *sine loc.*, *S.Kruekerd KV-0011* (TNS).

DESCRIPTION

Stems stout, narrowly fusiform, old distinctly flexuose, (20)25-60(70) cm long, 0.8-1.5 cm in diameter, of many nodes. Leaves narrowly ovate to oblong, 4-8(10) cm long, 1-2.2 cm wide. Inflorescence 1-3(4), each with 1-2 flowers; floral bracts broadly lanceolate, acuminate, 1-1.5 cm long. Pedicel and ovary green, curved, 2-2.5 cm long. Flowers odorless, widely opening, 4-5 cm across, pale yellowish, lip side lobes and disc bright red, margin of epichile white, column and anther cap pale yellowish to greenish. Sepals and petals subsimilar in shape, triangular ovate, acute to acuminate, recurved, 2.4-3(3.5) cm long, 0.7-1.2(1.4) cm wide, petals distinctly smaller. Lip shortly clawed, obovate, 3-lobed, 2.5-3(3.4) cm long, 2.2-2.6 cm wide, with a semi globose callus at base; side lobes erect, falcate, obtuse, 10-12 mm long, 5-8 mm wide; median lobe obovate, obtuse, undulate, recurved, 1.5-2(2.2) cm long, 1-1.5(1.8) cm wide, with 5-7 prominent, cristate-verruculose keels. Mentum broadly conic to almost hemispheric, 1.2-1.6 cm long and wide. Column dull yellowish, 5-6 mm tall and wide; anther cap cucullate, cubic, 3-4 mm tall and wide (Fig. 1F, G).

REMARKS

The species has a remarkable history. It was discovered by local commercial collectors around the years 1999-2000, when a lot of wild collected flowering plants entered street orchid markets in Dalat city and neighboring towns. Then for a long time, this species was only known on the basis of purchased specimens cultivated in orchid collections in Vietnam and abroad. It was tentatively recorded that the plants originated from at least two localities: in Lam Dong and in Lai Chau provinces. It is only in 2014 that the natural area with a few

highly depleted populations was discovered by Vietnamese botanists – Dr. Nong Van Duy and Mr. Nguyen Phi Tam in remnant primary forest of Dalat city area near the junction of the borders of Binh Thuan, Lam Dong and Ninh Thuan provinces. The species was observed as a very rare epiphyte on old trees of *Canarium* sp. and *Podocarpus neriifolius*. The occurrence of *D. suzukii* in Lai Chau province still needs to be verified by field investigations. In any case a few doubts remains that this unique endemic stands in Vietnam on the verge of full extinction and urgently needs special studies and governmental protection.

According to the original description *Dendrobium suzukii* is most similar to *D. cruentum* but can be distinguished by the following characters: “1) much larger perianth lobes; 2) a semi-globose callus on the basal part of the labellum; 3) five, instead of three, keels on the labellum; 4) undulate margins on mid lobe of the labellum; 5) a wider callus with cristate, instead of verrucose, protuberances on the mid lobe of the labellum”.

5. *Dendrobium draconis* Rchb.f.

Botanische Zeitung 1862: 214 (1862); Gagnep., *Flore générale de l'Indo-Chine* 6 (2): 228 (1933); Seidenf., *Opera Botanica* 83: 110, fig. 66, table 14d, fig. 66, table 14d (1985); 114: 211 (1992). — Aver., *Identification Guide to Vietnamese Orchids*: 182 (1994). — P.H.Ho, *An Illustrated Flora of Vietnam* 3: 826, fig. 11058 (2000). — Aver. & Averyanova, *Updated Checklist of the Orchids of Vietnam*: 27 (2003). — Newman et al., *A Checklist for the Vascular Plants of Lao*: 263 (2007). — Schuiteman et al., *Nordic Journal of Botany* 26: 282 (2008). — Aver., *Turczaninowia* 16 (4): 34 (2013).

Dendrobium eburneum Batem., *Botanical Magazine* 90: table 5459 (1864).

TYPUS. — Myanmar. Moulmein, *Parish* 131, 132b, Herb. Reichenbach 32379 (holo-, W).

HABITAT, PHENOLOGY AND CONSERVATION STATUS. — Epiphyte on tall trees in primary and secondary dry lowland evergreen and semi-deciduous forests and woodlands, often on thin ferrallitic soils. 200-1000 m. Fl. January-May. Rare. Expected IUCN Red List status – EN.

DISTRIBUTION. — Cambodia (Kampong Speu, Kampong Thom, Steung Treng), Laos (Attopeu, Champasak, Savannakhet, Vientiane), Vietnam (Da Nang, Dak Lak, Khanh Hoa, Lam Dong). NE India, Myanmar, Thailand.

MATERIAL EXAMINED. — **Cambodia**. Kampong Speu, Cardamom Mountains, Phnom Aural mt., *T.Maisak et al.*, 944 (LE); Kompong Speu, sud de Chambok, *Poilane* 17453 (P[P00407628]); Kampong Thom, entre Romchet et Pring, *Poilane* 14826 (P[P00407626, P00407627]).

Laos. Attapu, *Harmand* 1404 (P[P00407630, P00407631]); Champasak, Paksane road km 25, *A.D.Kerr* 698, 705 (C); Savannakhet., Muong Phinh, *Poilane* 11489 (P[P00407635]); Savannakhet, *Poilane* 11528 (P[P00407634]), 13341 bis 26 (P[P00407633]); Vientiane, *A.D.Kerr* 695 (C); Laos, Phu Kedan, *Brix s.n.* (C).

Vietnam. Da Nang, Tourane, Mt. Bana, *Clemens* 3905 (P[P00407641]); Dak Lak, Ban Don, *HLF* 7167a, *HLF* 7347 (HN, LE, MO); Lam Dong, Bidoup, Ht. Donai, *Poilane* 31050 (P[P00407643], W); Lam Dong, Brian, *Poilane* 24345 (P[P00407642]); Lam Dong, Dalat, *CRST* 291 (P[P00407640]); Lam Dong, Dalat, *L.Averyanov s.n.*

anno 2004 (LE photo); Lam Dong, entre Dankia et Danglê, *Poilane* 23572 (P[P00407647]); Lam Dong, Fimnon, région de Dalat, *Lichy s.n.* (P[P00386031]); Lam Dong, Lang Bian, entre Bellevue et Dran, *Chevalier* 40402 (P[P00386230]); Vietnam, Cochinchine *sine loc.*, *Thorel s.n.* (P[P00407636, P00407637]); Vietnam, *sine loc.*, *Boden Kloss, s.n.* (BK); Vietnam, central regions, *sine loc.*, *HAL* 12851 B (LE, P photo, K photo, LOC photo).

DESCRIPTION

Stems cylindrical to narrowly fusiform, (10)15-40(50) cm long, 0.8-1.5 cm in diameter, of many nodes. Leaves ovate to oblong narrowly ovate, 5-10 cm long, 1.5-2.5 cm wide. Inflorescences 1-4(5), each with 1-3(5) flowers. Pedicel and ovary 2.5-3.5 cm long. Flowers tangerine fragrant, widely opening, 4-6 cm across, white, disc and base of the lip bright red, sometimes adaxially yellow. Sepals and petals narrowly ovate, acute 2.5-3.5 cm long, 0.6-1 cm wide; petals slightly wider; mentum narrowly conical to cylindrical, spur-like, curved, 2-2.5 cm long, 2-4 mm in diameter. Lip narrowly ovate, 3-lobed, slightly shorter than sepals, 1.4-1.6 cm wide; side lobes small, half circular, as long as column; median lobe narrowly ovate to ovate, acute to acuminate, much longer than side lobes, strongly undulate and irregularly denticulate along margin; disc with 3-5 low indistinct verruculose keels. Column white, 7-9 mm tall (Fig. 1H).

REMARK

In the past, it was the most common species of the section all over southern Indochina. Presently it has become endangered in all countries of the region due to wide deforestation and degradation of its native habitats at low elevations.

6. *Dendrobium kontumense* Gagnep.

Bulletin de la Société botanique de France 79: 165 (1932). — Gagnep., *Flore générale de l'Indo-Chine* 6 (2): 239 (1933). — Sathap., T.Yukawa & Seelanan, *Blumea* 55: 77, fig. 2c-f (2010). — Aver., *Turczaninowia* 16 (4): 34, fig. 3H (2013).

Dendrobium schildhaueri Ormerod & H.A.Pedersen, *The Orchid Review* 111 (1254, Suppl.): 341 (2003). — Newman et al., *A Checklist for the Vascular Plants of Lao*: 265 (2007). — Schuiteman et al., *Nordic Journal of Botany* 26: 287 (2008).

Dendrobium virgineum auct. non Rchb.f.: Seidenf., *Opera Botanica* 83: 112, fig. 68, table 15b (1985); 114: 211, fig. 134 (1992). — Aver., *Identification Guide to Vietnamese Orchids*: 182 (1994). — P.H.Ho, *An Illustrated Flora of Vietnam* 3: 827, fig. 11061 (2000). — Aver. & Averyanova, *Updated Checklist of the Orchids of Vietnam*: 31 (2003). — Newman et al., *A Checklist for the Vascular Plants of Lao*: 266 (2007).

TYPUS. — S Vietnam. Annam: entre Giang Lo et Dak To, prov. de Kontum, forêt, 500 m alt., 8.IX.1930, *Poilane* 18280 (holo-, P[P00408307]; iso-, C, P[P00408308]).

HABITAT, PHENOLOGY AND CONSERVATION STATUS. — Epiphyte on tall trees in primary and secondary evergreen and semideciduous, broad-leaved, mixed and coniferous closed and open forests and in pine woodlands on different kind of soils, particularly on steep rocky slopes and along tops of hills and mountains. (200)300-1600(1700) m. Fl. July-October. Not common. Expected IUCN Red List status – EN.



FIG. 2. — **A**, *Dendrobium kontumense* Gagnep. (L.Averyanov s.n., X.2005); **B**, *D. roseodorum* Sathap., T.Yukawa & Seelanan (L.Averyanov s.n., X.2005); **C**, **D**, *D. daklakense* Tich, Schuit. & J.J.Verm.; **C**, Vo Van Cong, s.n., XI.2015; **D**, V.Q.Binh & L.Averyanov, s.n., 7.XI.2014; **E**, *D. infundibulum* Lindl. (L.Averyanov s.n., Thailand, Chiangmai, 2002); **F**, **G**, *D. wattii* (Hook.f.) Rchb.f.; **F**, L.Averyanov s.n., XI.2013; **G**, HAL 8630; **H**, *D. multilineatum* Kerr (LA-VN 256). Photos: A-G, L. Averyanov; H, N. S. Khang.

DISTRIBUTION. — Laos (Borikhamxai, Khammouane, Vientiane), Vietnam (Dak Lak, Khanh Hoa, Kon Tum, Lam Dong, Thua Thien-Hue), Thailand.

MATERIAL EXAMINED. — Laos. Borikhamxai, Khamkeut, Dan Khum Ngan locality *LA-VN 21a* (CPC Herbarium, LE, NHOL, NUOL); Khammouane, Napé, *Poilane 4633* (P[P00407646]); Vientiane, Phu Khao Khouai, *A.D.Kerr 988* (C); Vientiane, Kasi, Thong Mout, *LA-VN 643* (CPC Herbarium, LE, NHOL, NUOL).

Vietnam. Dak Lak, Buon Don, Krong Na, Yok Don, *HLF 7167a*, *HLF 7347* (HN, MO); Dak Lak, cultivé à Darlac, *Vacherot s.n.* (P[P00408303]); Dak Lak, Krong Bong, Cu Pui, *VH 6292* (HN, MO); Kon Tum, Dacuy, *LX-VN 2222* (HN, LE); Kon Tum, Gialai, *L.Averyanov LX-VN s.n.*, anno 1985 (LE photo); Kon Tum, Kon Plong, Hieu, Mang La, *VH 5148* (HN, LE), *VH 5553* (HN, LE, MO); Kon Tum, Mang Den, Konplong, *LX-VN 2296* (HN, LE); Kon Tum, Sa Thay, Chu Mom Ray, *P.K.Loc et al.*, *P-7991* (LE); Lam Dong, Blao, *Poilane 22202* (P[P00408306]); Lam Dong, Dalat, *L.Averyanov s.n.*, *HAL 8632X.2005* (HN, LE, LE photo, MO); Thu Thien-Hue, Nui Bach Ma, Hue, *Poilane 27663, 29942* (P[P00408304]); Thua Thien-Hue, A Luoi, A Roang, *HAL 7318* (HN); Thua Thien-Hue, A Luoi, Hong Van, *HAL 7631* (HN); Thua Thien-Hue, Phu Loc, Bach Ma mt., *HLF 1303* (HN, LE), *HLF 1334* (HN), *HLF 1597* (HN, MO).

DESCRIPTION

Stems stout, erect, narrowly fusiform, 30-60 cm long, 1-1.5 cm in diameter, of many nodes. Leaves elliptic to narrowly ovate, 4-8(10) cm long, 1.5-3 cm wide. Inflorescences 1-3(5), each with (1)3-6 flowers. Pedicel and ovary 3-4 cm long. Flowers odorless, widely opening, 4-5 cm across, white, disc red. Sepals narrowly triangular ovate, acute, 2-2.5(3) cm long, 8-1.2 cm wide. Petals obovate, narrowing to the base, round at apex, 2.5-3 cm long, 1.5-1.8 cm wide, twice wider than sepals, strongly undulate along margin. Mentum narrowly conical to cylindrical, straight or slightly curved, 2-2.5 cm long, 3 mm in diameter. Lip pandurate, 3-lobed, 2.5-4 cm long, 1.5-2.5 cm wide; side lobes half circular, erect; median lobe broadly obovate, 1-1.5 cm long, 1.5-2.2 cm wide, emarginate, strongly undulate and slightly denticulate along margin; disc with 5 low insignificant rugose keels. Column white, 5-6 mm tall (Figs 11; 2A).

REMARKS

Lip coloration of *D. kontumense* is variable; its center bears small or large pink, reddish, bright red or orange-red blotch.

For a long time *Dendrobium kontumense* has been identified in eastern Indochina by some authors as *D. virgineum* as proposed by Seidenfaden (1985). Meanwhile, true *D. virgineum* described from Myanmar ("from inexhaustible Birmah, Low, Herb. *Reichenbach, 32503*) distinctly differs from *D. kontumense* in its broad and short mentum (Sathapattayanon *et al.* 2010). *Dendrobium virgineum*, a rare species does not occur in Cambodia, Laos and Vietnam.

7. *Dendrobium roseiodorum* Sathap., T.Yukawa & Seelanan

Blumea 55: 77, figs 1, 2a, b (2010).

Dendrobium kontumense auct. non Gagnep.: T.Yukawa, *Annals of the Tsukuba Botanical Garden* 23: 23, figs 3, 4 (2004).

TYPUS. — Vietnam. Vietnam, *sine loc.*, Hort. Tsukuba Botanical Garden accession number 118269, 15.IX.2008 (holo-, TNS; iso-, BCU).

HABITAT, PHENOLOGY AND CONSERVATION STATUS. — Epiphyte in primary evergreen broad-leaved and mixed mountain forests. 1000-1200 m. Fl. September-November (in cultivation July to December). Very rare. Expected IUCN Red List status – EN.

DISTRIBUTION. — Vietnam: (Khanh Hoa, Lam Dong). Endemic.

MATERIAL EXAMINED. — Vietnam. Khanh Hoa, Massif de Cò Inh près Nhatrang, *Poilane 4633* (P[P00407646]); Lam Dong, Dalat area, *L.Averyanov s.n.*, X.2005 (LE photo); Lam Dong, Duc Trong, Border with Binh Thuan province, 4.XII.2015, *P.T.Nguyen, AL 144* (LE).

DESCRIPTION

Stems narrowly fusiform, 30-40 cm long, 1-1.4 cm in diameter, of many nodes. Leaves oblong lanceolate, to narrowly ovate, (4)6-9(11) cm long, 1-2 cm wide. Inflorescences 1-2(3), each with (1)2-5 flowers; floral bracts ovate-triangular, acuminate, 1 cm long, 4-7 mm wide. Pedicel and ovary white, 3.2-4.1 cm long, curved. Flowers widely opening, white, sweet fragrant, 4-5.5 cm across, disc red-orange to orange-yellow. Sepals triangular narrowly ovate, acuminate, slightly recurved, 2.5-3.5 cm long, 1-1.4 cm wide, abaxially distinctly keeled. Petals rhomboid obovate, a little wider than sepals, 2.6-3.2 cm long, 1.4-1.6 cm wide, often slightly recurved, undulate along margin. Lip pandurate, 3-lobed, 4-5 cm long, 1.5-2 cm wide, clawed at the base; side lobes half circular, erect; median lobe broadly obovate, undulate along margin, emarginate; disc thick, verruculose, without distinct keels. Mentum narrowly conical, straight to slightly upcurved, 2.5-3 cm long, 2.5-3 mm diameter. Column yellowish, 7-8 mm tall, 5.5-6.5 mm wide; anther cap light yellowish, cucullate 3 mm tall and wide, papillose (Fig. 2B).

REMARK

A questionable taxon known mainly on the basis of cultivated specimens of unknown origin. It is very close to *D. kontumense*, from which it differs in the rugose disc of the lip without distinct keels, and the strong, rose-like fragrance. This taxon has first been separated from *D. kontumense* in 2010 and these two taxa are still widely misidentified in orchid collections.

8. *Dendrobium daklakense* Tich, Schuit. & J.J.Verm.

Orchideen Journal 17: 161 (2010).

TYPUS. — S Vietnam. Dak Lak province. Flowering in cultivation XI.2009, number *N.T.Tich 20.11.09* (holo-, VNM, Herbarium of Department of Botany and Ecology – Faculty of Natural Science – National University of Vietnam, Ho Chi Minh City).

HABITAT, PHENOLOGY AND CONSERVATION STATUS. — Epiphyte on trees in evergreen broad-leaved submontane forests. 500-800 m. Fl. October - December. Very rare. Expected IUCN Red List status – CR.

DISTRIBUTION. — Vietnam (Kontum and presumably Dak Lak). Local endemic.

MATERIAL EXAMINED. — Vietnam. Dak Lak, *sine loc.*, *P.T.Nguyen, s.n.*, X.2014 (LE photo); Dak Lak, Buon Ma Thuot City market,

V.Q. Binh & L.Averyanov, s.n., 7.XI.2014 (LE photo); Dak Lak, Buon Ma Thuot City market, *L.Averyanov & P.T.Nguyen, s.n.*, 3.XII.2014, (LE); Kontum, Dak Gley, Lo So Deo Pass., *Quach Van Hoi, V.C.Nguyen & L.Averyanov, CPC 7696, 5.XII.2014* (LE); Kontum, Dak Gley, Lo So Deo Pass., XI.2015, *V.V.Cong, s.n.* (LE photo).

DESCRIPTION

Stems cane-like to narrowly fusiform, 0.4-0.6 m tall, 5-8 mm in diameter, of many nodes; internodes 3.5-4.5 cm long. Leaves narrowly ovate to oblong-lanceolate, 7-9 cm long, 1.8-2.2 cm wide, unequally bilobed, largest lobe acuminate. Inflorescences 1-3, terminal and axillary, with (3)5-7 flowers; floral bracts triangular lanceolate, acuminate, 8-10 mm long. Pedicel and ovary white, 2.8-3 cm long. Flowers widely opening, 4-5 cm across; sepals and petals pure white; lip uniform orange-yellow. Sepals triangular narrowly ovate, mucronate, dorsally keeled 2-2.5 cm long, 8-12 mm wide; mentum broadly conical, 1-1.2 cm long. Petals broadly rhomboid, mucronate, 2-2.2 cm long, 1.2-1.5 cm wide. Lip deeply 3-lobed, 2.8-3 cm long, 2-2.2 cm wide, shortly clawed at base; side lobes erect, triangular ovate, 1 cm long and wide, finely denticulate, orange-red striped inside; median lobe narrowly rhomboid, 1 cm long, 4 mm wide at the middle, attenuate to mucronate apex; disc papillose, with erect retrorse, emarginate-globose callus spreading to median lobe in form of thick fleshy verruculose band. Column 6-7 mm tall, 3 mm wide, white verrucose; anther cap white, cubic, 2.5 mm tall and wide (Fig. 2C, D).

REMARK

Extremely rare, a taxonomically isolated species known only from a single verified location in Kontum province (Fig. 2C). Its putative occurrence in Dak Lak province needs confirmation. It is highly probable that species stands on the verge of its full extinction in the wild due to deforestation and commercial collecting supported by high market demands.

9. *Dendrobium infundibulum* Lindl.

Journal of the Proceedings of the Linnean Society, Botany 3: 16 (1858). — Gagnep., *Flore générale de l'Indo-Chine* 6 (2): 229 (1933). — Seidenf., *Opera Botanica* 83: 117, fig. 72, table 15c (1985); 114: 215 (1992). — P.H.Ho, *An Illustrated Flora of Vietnam* 3: 827, fig. 11062 (2000). — Aver. & Averyanova, *Updated Checklist of the Orchids of Vietnam*: 28 (2003). — Newman *et al.*, *A Checklist for the Vascular Plants of Lao*: 263 (2007). — Schuiteman *et al.*, *Nordic Journal of Botany* 26: 284 (2008).

Dendrobium formosum auct. non Roxb. ex Lindl. (1830): Seidenf., *Opera Botanica* 83: 111, fig. 67, table 15a (1985). — Aver., *Identification Guide to Vietnamese Orchids*: 183 (1994). — P.H.Ho, *An Illustrated Flora of Vietnam* 3: 827, fig. 11059 (2000). — Aver. & Averyanova, *Updated Checklist of the Orchids of Vietnam*: 27 (2003), p.p.

TYPUS. — Myanmar. Moulmein, at 5000 feet on Thoung-gyun, *T. Lobb s.n.* (holo-, K[K000943882]).

HABITAT, PHENOLOGY AND CONSERVATION STATUS. — Epiphyte on tall trees in primary and secondary montane forests, particularly on mountain tops. (1200)1500-2400 m. Fl. February, March, May,

November-January. Rare. Expected IUCN Red List status – DD. Data on ecology and phenology are based mainly on collections from Thailand.

DISTRIBUTION. — Laos (Xiangkhouang). Vietnam (Lam Dong?). NE India, Myanmar, Thailand.

MATERIAL EXAMINED. — Laos. Xiangkhouang, Phu Bia, *A.D.Kerr 2760* (C).

DESCRIPTION

Stems cylindrical to narrowly fusiform, 20-40(50) cm long, 8-12 mm in diameter, of many nodes. Leaves narrowly ovate to lanceolate oblong, 5-10 cm long, 1.5-2.5 cm wide. Inflorescences 1-3, each with 1-3(5) flowers. Flowers odorless, widely opening, 6-9 cm across, white, disc yellow. Sepals narrowly triangular ovate, acute, 3-4 cm long, 1.2-1.6 cm wide. Petals broadly ovate, obovate, rhomboid or almost circular, narrowing to the base, round or shortly apiculate at apex, 4-5 cm long, 3.5-4 cm wide, 3-4 times wider than sepals; mentum narrowly conical, straight, 1.5-2 cm long, 4-6 mm in diameter. Lip pandurate, 3-lobed, as long as sepals, 3-3.5 cm wide; side lobes half circular, erect, embracing column; median lobe half circular to broadly oblong, emarginate, undulate and irregularly denticulate along margin; disc with flat broad fleshy keel splitting distally into 3-5 low lamellas. Column white, 6-8 mm tall (Fig. 2E).

REMARKS

Tentative records of this species for southern Vietnam may be based on introduced or naturalized plants. Some collections from the highlands of Lam Dong province of southern Vietnam (Bidoup mt.) identified in the past as *D. infundibulum* (*Poilane 30726, 30900*) belong to *D. wattii*.

Lindley (1858) concerning *D. infundibulum* wrote the following: “A very striking plant, intermediate between *D. formosanum* and *longicornu*, having the large flowers of the former and the slender habit and narrow leaves of the latter. The lip with large round lateral lobes also distinguishes it from the former and the large petals with a circular middle lobe to the lip and short funnel-shaped mentum from the latter”.

10. *Dendrobium wattii* (Hook.f.) Rchb.f.

The Gardeners' Chronicle 2: 724 (1888). — Gagnep., *Flore générale de l'Indo-Chine* 6 (2): 244 (1933). — Seidenf., *Opera Botanica* 83: 113, figs 70, 71 (1985); 114: 212, fig. 136 (1992). — Aver., *Identification Guide to Vietnamese Orchids*: 181 (1994). — P.H.Ho, *An Illustrated Flora of Vietnam* 3: 828, fig. 11063 (2000). — Aver. & Averyanova, *Updated Checklist of the Orchids of Vietnam*: 31 (2003). — Newman *et al.*, *A Checklist for the Vascular Plants of Lao*: 266 (2007). — Schuiteman *et al.*, *Nordic Journal of Botany* 26: 315 (2008). — Zhu Guanghua *et al.*, *Flora of China* 25: 392 (2009).

Dendrobium cariniferum Rchb.f. var. *wattii* Hook.f., *Botanical Magazine* 109: table 6715 (1883).

Dendrobium evrardii Gagnep., *Bulletin du Muséum national d'Histoire naturelle, 2^{ème} série*, 2 (2): 235 (1930). — Gagnep., *Flore générale de l'Indo-Chine* 6 (2): 230 (1933).

TYPUS. — NE India. On ascent to Seriphari, Muni-pore, *Watt 5944* (holo-, K[K000363084]).

HABITAT, PHENOLOGY AND CONSERVATION STATUS. — Epiphyte on tall trees in primary and secondary evergreen broad-leaved, mixed and coniferous humid mountain forests on granite and shale, particularly on very steep rocky slopes and on mountain tops, often in ericaceous thickets in the cloud zone. (900)1000–2400 m. Fl. September–November, February–March. Rare. Expected IUCN Red List status – EN.

DISTRIBUTION. — Vietnam (Kon Tum, Lam Dong, Ninh Thuan). NE. India, Myanmar, N. Thailand, S. China.

MATERIAL EXAMINED. — **Vietnam.** Kon Tum, Ngoc Linh peak, *VH 564* (HN, LE, MO, P[P00408310]); Kon Tum, Ngoc Linh, *L.Averyanov s.n.*, anno 1995 (LE photo); Lam Dong, Dalat area, *L.Averyanov s.n.*, anno 1995 (LE photo); Lam Dong, Dalat area, *L.Averyanov s.n.*, XI.2013 (LE photo); Lam Dong, Dalat area, *HAL 8630* (LE, LE photo, MO); Lam Dong, Dalat, *CRST 70* (P[P00408311]), *Tixier drawing 4/59* (P); Lam Dong, Langbian, *Evrard 389* (P[P00408313]), *Grillet 115* (P[P00408312]); Lam Dong, massif du Bi-Doup, prov. du Haut Donai, *Poillane 31050* (P[P00407643, P00407644]); Ninh Thuan, Ninh Hai, Nui Chua mt., *HLF 4438* (HN, LE, MO).

DESCRIPTION

Stems reed-like, cylindrical, (5)10–50(60) cm long, 0.5–1 cm in diameter, of few to many nodes. Leaves oblong lanceolate, (3)4–8(10) cm long. Inflorescences 1–2(3), each with 1–3 flowers; floral bracts ovate, acute, 5–8(12) mm long. Pedicel and ovary white, 2.5–3.5(4) cm long. Flowers odorless, widely opening, spreading, 3.5–5 cm across, white; lip side lobes with yellow to orange stripes, disc yellow, orange or orange-red. Sepals subsimilar, triangular narrowly ovate, acute to shortly acuminate, 2.2–3 cm long, 0.8–1.2 cm wide. Petals rhomboid broadly obovate, bluntly rounded and shortly mucronate, 2.2–3(4) cm long, 1.5–2(2.5) cm wide, little longer and twice broader than sepals. Mentum narrow, cylindrical, straight, spur-like, 1.5–2(2.2) cm long. Lip obtriangular broadly obovate, 3-lobed, 2–3 cm long, 1.8–2.2(3) cm wide; side lobes, half circular, erect, embracing the column; median lobe broadly obovate to rectangular, 8–10(12) mm long and wide, narrowing to base, irregularly denticulate and undulate along margin, truncate and shortly apiculate at apex; disc with 3(5) low indistinct parallel keels extending from base of lip to base of median lobe. Column white, 7–9 mm tall; anther cap white, cubic, apically truncate 3–4 mm tall and wide (Fig. 2F, G).

REMARKS

This species is close to *D. infundibulum* and *D. multilineatum*, but differs in the somewhat smaller flowers and the lip having a broadly obovate, sometimes indistinctly clawed, irregularly denticulate, usually with a shortly apiculate median lobe.

Some early authors expressed opinion that this species is close to *D. longicornu* and *D. infundibulum* and may be a natural hybrid of these species (Seidenfaden 1985). Recent field observations do not support this supposition. In eastern Indochina the areas of both mentioned species do not overlap, making their natural hybridization hardly credible.

11. *Dendrobium multilineatum* Kerr

Journal of the Siam Society, Natural History supplement 9: 230 (1933). — Seidenf., *Opera Botanica* 83: 112, fig. 69 (1985); 114: 212, fig. 135 (1992). — Newman *et al.*, *A Checklist for the Vascular Plants of Lao*: 264 (2007). — Schuiteman *et al.*, *Nordic Journal of Botany* 26: 285 (2008). — Aver., *Turczaninowia* 16 (4): 34 (2013).

TYPUS. — Laos. Central Laos, Phu Bia, c. 1900 m, 12.IV.1932 *A.F.G.Kerr 0972* (holo-, K[K000596875]; iso-, AMES, P[P00408019, P00408020]).

HABITAT, PHENOLOGY AND CONSERVATION STATUS. — Epiphyte on tall trees in primary evergreen broad-leaved and mixed humid mountain forests on sandstone and granite, commonly on steep rocky slopes near mountain tops. 1300–1900 m. Fl. February–April. Rare, but locally common. Expected IUCN Red List status – EN.

DISTRIBUTION. — Laos (Kham Mouan and Xaisomboun provinces). Endemic.

MATERIAL EXAMINED. — **Laos.** Kham Mouan, Bounlapha, Hinnam No Protected Area, *LA-VN 256* (CPC Herbarium, LE, NHOL, NUOL).

DESCRIPTION

Stems cylindrical to narrowly fusiform, ascending to erect, (15)20–40(50) cm long, 0.5–1 cm in diameter, of many nodes, internodes 2–4 cm long. Leaves narrowly ovate to oblong lanceolate, 3–6(8) cm long, 0.8–1.8 cm wide. Inflorescences 1–3, each with 1–3 flowers; floral bracts ovate, acute, 8–12 mm long. Pedicel and ovary 1.8–2.5(3) cm long. Flowers white, widely opening, 4.5–5.5 cm across, disc with numerous red lines. Sepals subsimilar, triangular narrowly ovate, acute to acuminate, 2.5–3 cm long, 8–12 mm wide, slightly keeled abaxially. Petals rhombic broadly obovate, round and shortly apiculate at apex, 2.5–3 cm long, 1.5–2.2 cm wide, twice broader than sepals. Mentum broadly conical, straight, as long as pedicel and ovary or little shorter, 1.5–2 cm long, 0.8–1 cm in diameter at the base. Lip obovate rhombic, indistinctly 3-lobed; 3–3.5(4) cm long, 2.5–3(3.5) cm wide, slightly undulate along margin; side lobes half circular, erect; median lobe half circular to broadly ovate, broadening to base, at apex shallowly emarginate and shortly apiculate; disc and side lobes with 7–13 low red sub-parallel keels running along veins. Column white, 5–7 mm tall, 2.5–3 mm wide; anther cap white, at front almost flat, apically truncate (Figs 2H; 3A).

REMARKS

This species seems closely related to *D. wattii*, from which it differs in a indistinctly 3-lobed lip and the numerous low parallel bright red keels on the disc (in original description – “Flowers white with reddish brown markings on lip...”).

The species was observed in Kham Mouan province of eastern Laos very near to Vietnamese border hence it may be found also on the territory of Vietnam. A published record of this species in Vietnam from Hon Ba mountain in Khanh Hoa province (Choudhary *et al.* 2012: 225) belongs to *D. trankimianum*, which is a rather common epiphyte on large trees in mountain forest on the peaks of Hon Ba mountain.



FIG. 3. — A, *Dendrobium multilineatum* Kerr (LA-VN 256); B-D, *Dendrobium williamsonii* Day & Rchb.f. (CPC 24290); E, F, *D. cariniferum*: Rchb.f.; E, VH 2256a; F, HLF 5500a; G, H, *D. longicornu* Lindl. (CPC 5378); I, *D. chapaense* Aver. (N.A.Duc et al., HL 131). Photos: A, N. S. Khang; B-H, L. Averyanov; I, N. A. Duc.

12. *Dendrobium williamsonii* Day & Rchb.f.

The Gardeners' Chronicle and Agricultural Gazette 1869: 78 (1869). — Hook.f., *Annals of the Royal Botanic Garden, Calcutta* 5, table 9 (1895). — Hemsley, *Botanical Magazine* 130: table 7974 (1904). — Gagnep., *Flore générale de l'Indo-Chine* 6 (2): 230 (1933). — Seidenf., *Opera Botanica* 83: 121, fig. 75b, 77, table 16b (1985); 114: 217, fig. 138 (1992). — Aver., *Identification Guide to Vietnamese Orchids*: 182 (1994). — P.H.Ho, *An Illustrated Flora of Vietnam* 3: 828, fig. 11065 (2000). — Aver. & Averyanova, *Updated Checklist of the Orchids of Vietnam*: 31 (2003). — Zhu Guanghua et al., *Flora of China* 25: 393 (2009).

TYPUS. — NE India. Assam, *Williamson s.n.*, Herb. Reichenbach, 32461[♀] (holo-, W?).

HABITAT, PHENOLOGY AND CONSERVATION STATUS. — Epiphyte on old trees in primary and secondary evergreen and semideciduous broadleaved, mixed and coniferous mountain forests on shale, sandstone, granite and rocky limestone, commonly on steep rocky slopes and on mountain tops in wind-formed thickets. (600)900-1500 m. Fl.: March-May. Locally common. Expected IUCN Red List status – EN.

DISTRIBUTION. — Laos (Phongsali), Vietnam (Cao Bang, Da Nang, Dien Bien, Ha Giang, Lao Cai, Quang Binh, Quang Tri, Son La, Vinh Phuc). NE. India, Myanmar, S. China.

MATERIAL EXAMINED. — Laos. Phongsali, Muong May, *CPC 2429* (LE photo).

Vietnam. Cao Bang, Nguyen Binh, Ca Thanh, *CBL 1311* (HN, LE, LE photo, MO); Da Nang, Bana, Tourane, *Poilane 7150* (P[P00408316]); Dien Bien, Muong Cha, Mua Ngai, *L.Averyanov CPC 1088a* (LE), *1088c* (LE, LE photo); Ha Giang, Meo Vac, Sung Chang, *CBL 1852* (HN, LE, MO); Ha Giang, Quan Ba, Bat Dai Son mt., *HAL 11854* (HN, LE), *T.V.Thao & N.S.Khang VT 014* (HN), *DKH 5225* (HN, LE, MO); Ha Giang, Quan Ba, Can Ty, *HAL 1456* (HN, LE photo), *HAL 1549* (HN), *P.V.The, CPC 144* (LE photo); Ha Giang, Quang Ba, Sin Suoi Ho, *DKH 4800* (HN, LE, MO); Lao Cai, Sa Pa, *L.Averyanov s.n.*, 26.IV.2008 (LE photo); Quang Binh, Bo Trach, Phong Nha - Ke Bang, *HAL 6227* (HN); Quang Binh, Minh Hoa, Dan Hoa, d-EXSICCATES OF VIETNAMESE FLORA 138/*HAL 11716*; Quang Binh, Minh Hoa, Dan Hoa, Giang Man mt., *HAL 11716* (HN, LE, LE photo, MO); Quang Binh, Minh Hoa, Phong Nha - Ke Bang, *HAL 5860* (HN); Quang Tri, Huong Hoa, Huong Phung, d-EXSICCATES OF VIETNAMESE FLORA 73/*HLF6298*; Quang Tri, Huong Hoa, Huong Phung, Sa Mui pass, *HLF 6298* (HN, LE, LE photo); Son La, *sine loc.*, *HAL 12851* (*P.K.Loc* - photo); Vinh Phuc, Tam Dao, *A.Petrov s.n.* anno 2012 (LE).

DESCRIPTION

Stems erect, narrowly fusiform, of many nodes, to 10-25(30) cm long and 0.5-1 cm in diameter. Leaves narrowly ovate to oblong lanceolate, 5-10 cm long, 1-2.5 cm wide. Inflorescences 1-3, each with 1-3 flowers; floral bracts ovate, acute, 4-5 mm long. Pedicel and ovary white, to 2-3 cm long; ovary conical, without distinct keels. Flowers widely opening, light pale yellowish to almost white, 3.5-4.5 cm across. Sepals and petals subequal, triangular narrowly ovate, acute to acuminate, 2-3 cm long, 0.6-1 cm wide; lateral sepals dorsally carinate, oblique, forming conical., spur-like mentum 1.4-1.82 cm long. Lip pale yellowish to almost white, broadly obovate, 2-3.5 cm long, 1.5-2.5 cm wide, 3-lobed, side lobes half circular, erect, embracing column; median lobe half circular to broadly obovate, finely irregularly denticulate and undulate

along margin, acute to shortly apiculate; disc and median lobe red to orange, sparsely long ciliate or fimbriate along veins, sometimes indistinctly carinate. Column white to pale reddish, 5-7 mm tall; anther cap white, broadly conic (Fig. 3B-D).

13. *Dendrobium cariniferum* Rchb.f.

The Gardeners' Chronicle and Agricultural Gazette 1869: 611 (1869). — Seidenf., *Opera Botanica* 83: 120, fig. 75a, 76, table 16a (1985); 114: 216, fig. 137 (1992). — Aver., *Identification Guide to Vietnamese Orchids*: 182 (1994). — P.H.Ho, *An Illustrated Flora of Vietnam* 3: 826, fig. 11057 (2000). — Aver. & Averyanova, *Updated Checklist of the Orchids of Vietnam*: 26 (2003). — Newman et al., *A Checklist for the Vascular Plants of Lao*: 262 (2007). — Schuiteman et al., *Nordic Journal of Botany* 26: 280 (2008). — Zhu Guanghua et al., *Flora of China* 25: 392 (2009). — Aver., *Turczaninowia* 16 (4): 34 (2013).

Dendrobium lubbersianum Rchb.f., *The Gardeners' Chronicle* 17: 460 (1882).

Dendrobium phi E.Christenson, in letters (2005).

Dendrobium schrautii Schildh., *Journal für den Orchideenfreund* 13: 164 (2006). — Schuiteman et al., *Nordic Journal of Botany* 26: 287 (2008).

TYPUS. — India. NE India *sine loc.*, Herb. Reichenbach, 32436 (holo-, W).

HABITAT, PHENOLOGY AND CONSERVATION STATUS. — Epiphyte on tall trees in primary and secondary evergreen, semideciduous and deciduous dry broad-leaved, mixed and coniferous forests and woodlands on granite, sandstone, gneiss and shale, commonly on top of mountains and hills. 500-1500 m. Fl.: March-June. Locally common. Expected IUCN Red List status – EN.

DISTRIBUTION. — Laos (Bolikhambxai, Phongsali, Vientiane), Vietnam (Dak Lak, Dak Nong, Kon Tum, Lam Dong). NE. India, Myanmar, N. Thailand, S. China.

MATERIAL EXAMINED. — Laos. Bolikhambxai, Khamkeut, Phone Sa At village, *LA-VN 29* (CPC Herbarium, NHOL, NUOL); Phongsali, entre Sala Aimé et Bam Tai, *Poilane 26035* (P[P00407632]); Phongsaly, *sine loc.*, *Poilane 25892* (P[P00386226]); Vientiane, Phu Khao Khouai, *Vidal 5585* (P[P00386227]).

Vietnam. Dak Lak, Chu Yang Sinh, *M.Nuraliev 944* (LE, LE photo); Dak Nong, Ta Dung, *HLF 5500a* (HN, LE, LE photo); Kon Tum, Sa Thay, Chu Mom Ray, *VH 5816* (HN, LE, MO); Kon Tum, Dak Gley, *L.Averyanov, VH 2256a* (LE, LE photo); Kon Tum, Dak Gley, Ngoc Mi mt., *VH 2294a* (HN); Lam Dong, Dalat, *A.D.Kerr 3005, 3260* (C), *Boden Kloss s.n.* (BM), *Long 86* (LE), *L.Averyanov s.n.*, anno 1995 (LE photo); Lam Dong, Lac Duong, Da Chay, Bi Dup mt., *VH 4016* (HN, LE, MO); Lam Dong, Langbian, *Boden Kloss s.n.* (BM), *Cavalier 40402* (P[P00386230]); Lam Dong, Lang-bian, vallée de Da-Pougian, *Eberhardt 203* (P[P00408317]); Lam Dong, Manline, Dalat, *Maurand C.R.S.T. 23* (P[P00408315]); Lam Dong, old road to Prenh, Dalat, *Evrard 906* (P[P00386231, P00386232]); Lam Dong, Suoi Vang, Dalat, *L.Averyanov LX-VN 1595* (HN, LE); Vietnam, *sine loc.*, Eberhardt drawing 50B (P).

DESCRIPTION

Stems erect, narrowly fusiform, often slightly flexuose, of many nodes, to 30 cm long and 1.5 cm in diameter. Leaves several, oblong, to 12 cm long, 1.5-2.5 cm wide. Inflorescences 1-3(4), each with 1-3 flowers; floral bracts 4-5 mm long,



FIG. 4. — A-C, *Dendrobium chapaense* Aver. (25.XI.2015, L.Averyanov s.n.); D, E, *D. ochraceum* De Wild.; D, CPC 3576; E, HAL 8056; F, G, *D. trankimianum* T.Yukawa; F, Hon Giao, J.Ponert et al., s.n.; G, L.Averyanov s.n., 2005; H, *D. senile* E.C.Parish & Rchb.f. (L.Averyanov s.n., IV.2011); I, *D. trigonopus* Rchb.f. (CPC 1141a). Photos: A-E, G-I, L. Averyanov; F, J. Ponert.

acute. Pedicel and ovary to 3–3.5 cm long; ovary 3-carinate with distinct keels. Flowers resupinate or not, sweet fragrant, widely opening, light pale yellowish to almost white, 3.5–5 cm across. Sepals and petals subequal, triangular narrowly ovate, acute, 2.2–3 cm long, 0.6–1 cm wide, lateral sepals oblique, forming conical, spur-like mentum 1.2–1.8 cm long. Lip pandurate, 3-lobed, 2.5–4 cm long, 2–2.8 cm wide, pale yellowish to almost white, disc red, red-orange, orange or pink; side lobes broadly ovate, erect, embracing the column, as long as the median lobe; medial lobe circular to obovate, irregularly denticulate and undulate along margin, carinate to pectinate, with 5–7 fimbriate or fringed keels. Column reddish, 5–8 mm tall; anther cap white (Fig. 3E, F).

REMARK

Very similar to *D. williamsonii* and often misidentified as such. Plants with non-resupinate flowers were described as *D. schrautii*. Flower orientation varies between plants from fully resupinate to non-resupinate, so we treat this name as a synonym of *D. cariniferum*.

14. *Dendrobium longicornu* Lindl.

The Genera and Species of Orchidaceous Plants: 80 (1830); *Edward's Botanical Register* 16, table 1315 (1830). — King & Pantl., *Annals of the Royal Botanic Garden, Calcutta* 8, table 64 (1898). — Gagnep., *Flore générale de l'Indo-Chine* 6 (2): 250 (1933). — Seidenf., *Opera Botanica* 114: 219, fig. 139, table 13d (1992). — Aver., *Identification Guide to Vietnamese Orchids*: 181 (1994). — P.H.Ho, *An Illustrated Flora of Vietnam* 3: 828, fig. 11064 (2000). — Pearce & Cribb, *The Orchids of Bhutan*: 417 (2002). — Aver. & Averyanova, *Updated Checklist of the Orchids of Vietnam*: 29 (2003). — Zhu Guanghua *et al.*, *Flora of China* 25: 392 (2009).

TYPUS. — Bangladesh and Nepal. Sylhet et Napalia, *F De Silva* Wall. Cat. 1997.2 (syn-, K[K000718659]); *Wallich* Wall. Cat. 1997.1 (syn-, K[K000894403]; isosyn-, P[P00407980]).

HABITAT, PHENOLOGY AND CONSERVATION STATUS. — Epiphyte on big trees and occasionally lithophyte on mossy rocky cliffs in primary and secondary evergreen, broad-leaved, mixed and coniferous humid shady mountain forests on any kind of soils, commonly on steep rocky slopes and on mountain tops. 1000–2100 m. Fl. September–December. Not rare, locally abundant. Expected IUCN Red List status – VU.

DISTRIBUTION. — Vietnam (Cao Bang, Dien Bien, Ha Giang, Lai Chau, Lao Cai, Nghe An, Son La, Tuyen Quang, Vinh Phuc). Bhutan, Nepal, NE. India, Myanmar, S. China.

MATERIAL EXAMINED. — Vietnam. Cao Bang, Bao Lac, Ca Thanh, *CBL 404* (HN, LE, MO, P[P02103759]); Cao Bang, Bao Lac, Dinh Phung, *CBL 1546* (HN, LE, MO); Cao Bang, Bao Lac, Yen Lac, *CBL 317* (HN, LE, MO); Cao Bang, Nguyen Binh, Ca Thanh, *CPC 5378* (CPC Herbarium, LE); Dien Bien, *L.Averyanov s.n.*, XII.2010 (LE photo); Ha Giang, Bac Me, Phiang Luong, *HAL 6429* (HN); Ha Giang, Dong Van, Ho Quang Phin, *CBL 1805* (HN, LE, MO); Ha Giang, Hoang Su Phi, Ho Thau, *HAL 6703* (HN, LE); Ha Giang, Meo Vac, Shung Cha, *NTH 3309* (HN); Ha Giang, Quan Ba, Bat Dai Son, *V.Thao 47* (HN), *DKH 5228* (HN, LE, MO); Ha Giang, Vi Xuyen, Cao Bo, *DKH 5596* (HN, LE, MO); Ha Giang, Yen Minh, Lao Va Chai, *HAL 8408* (HN, MO), *NTH 3460* (HN, LE); Lai Chau, Sin Ho, Ma Quai, *HAL 9946* (HN, LE); Lao Cai, Chapa, *Pételot s.n.* (P[P00408318]); Lao Cai, O Quy Ho passes, *D.Bui & C.X.Canh s.n.*

anno 2014 (LE photo); Lao Cai, Sa Pa, *L.Averyanov s.n.*, 24.XI.2005 (LE photo); Lao Cai, Van Ban, Khanh Yen Ha, *HAL 2417* (HN, LE); Nghe An, Ky Son, Na Ngoi, Phu Xai Lai Leng mt., *CPC 6322* (CPC Herbarium, LE); Nghe An, Tuong Duong, Tam Hop, *HLF 6936* (HN, LE, MO); Son La, Thuan Chau, Phong Lai, Pha Din Pass, *DKH 5677* (HN, LE, MO); Tuyen Quang, Na Hang, Sinh Long, *CPC 5302* (CPC Herbarium, LE), *CPC 4544a* (LE photo); Vinh Phuc, Tamdao, *LX-VN 1395* (HN, LE), *LX-VN 2367* (HN, LE), *Vu 19934* (HN); Lao Cai, Sa Pa, Hoang Lien Range, *N.A.Duc et al.*, *HL 137* (HNU, LE).

DESCRIPTION

Stems cylindric, rather slender, reed-like, ascending to pendulous, 10–35(40) cm long, 3–5 mm in diameter, of many nodes, internodes 1.5–4 cm long. Leaves oblong lanceolate, 3–7 cm long, 0.5–1.5 cm wide. Inflorescences 1–3, each with 1–3(4) flowers; floral bracts broadly lanceolate, acute, 5–8 mm long. Pedicel and ovary 2–3(3.5) cm long. Flowers light sweet fragrant, pendulous, white, campanulate, not widely opening, 2–3 cm across, disc and lip apex yellow-pink to orange. Sepals and petals subsimilar, triangular narrowly ovate, acute, 1.5–2.2 cm long, 5–8 mm wide, sepals distinctly keeled abaxially. Mentum long, cylindric, straight, spur-like, as long as pedicel and ovary or little longer, 1.5–2.5 mm in diameter. Lip broadly obovate rhombic, (2)2.4–3.5 cm long, 1.8–3 cm wide, apex entire to indistinctly 3-lobed; median lobe irregularly dentate or fringed, sometime indistinctly emarginate; disc naked or sparsely setose along veins, with 3–7 low insignificant keels. Column 5–6 mm tall; anther cap conical, at front almost flat, apically truncate (Fig. 3G, H).

REMARK

Existing records in the literature for this species for southern Vietnam (Lam Dong, Dalat; Lang Bian, 2000 m; Lac Duong) belong probably to *Dendrobium wattii* (Seidenfaden 1992: l.c.: 219).

15. *Dendrobium chapaense* Aver.

Rheede 16: 3, figs 2, 3c. (2006). — Zhu Guanghua *et al.*, *Flora of China* 25: 391 (2009).

Dendrobium meghalayense C.Deori *et al.*, *Rheede* 16: 55, figs 1, 2k-o (2006), non Y. Kumar & S. Chowdhury (2003), **syn. nov.**

Dendrobium jaintianum Sabap., *Indian Journal of Forestry* 30: 371 (2007), **syn. nov.**

Dendrobium tamenglongense Kishor *et al.*, *Nordic Journal of Botany* 32 (2): 151 (2013), **syn. nov.**

TYPUS. — N Vietnam. Lao Cai Prov., Sa Pa Distr. Vic. of Sa Pa town mt., forest at about 1500–2000 m., 25.XI.2005, *L.Averyanov, P.K.Loc, HAL 8321* (holo-, LE).

HABITAT, PHENOLOGY AND CONSERVATION STATUS. — Epiphyte on tall trees and lithophyte on mossy cliffs in primary and secondary humid broad-leaved montane forests on granite and quartzite, particularly on mountain tops. (1500)1800–2400 m. Fl. October–November. Locally common. Expected IUCN Red List status – EN.

DISTRIBUTION. — Vietnam (Lai Chau, Lao Cai). NE India, S China.

MATERIAL EXAMINED. — Vietnam. Lai Chau, Phong Tho, HAL 10637 (HN, MO); Lai Chau, Tam Duong, HAL 10202, HAL 10326 (HN, LE, MO); Lao Cai, Sa Pa, Hoang Lien Range, N.A.Duc et al., HL 131 (HNU, LE); Lao Cai, Sa Pa area, cult. in Dalat city, 25.XI.2015, L.Averyanov s.n. (LE photo).

Beside scientific herbarium collections many plants come into private cultivation from tourist areas of northern Vietnam where the species is not rare. Collectors and precise original localities of such plants remain unknown.

DESCRIPTION

Stems cylindric, fleshy, 10-25(30) cm long, 0.5-1 cm in diameter, of many nodes. Leaves lanceolate to oblong lanceolate, 4-6(8) cm long, 0.7-1.2 cm wide. Inflorescences 1-3(4), 1-2.5 cm long, each with 1-3(5) flowers; floral bracts ovate, acute, 5-12 mm long. Pedicel and ovary 2-3 cm long, slender, circular in section. Flowers odorless, not widely opening, 1.5-2 cm across. Sepals and petals white; median sepal narrowly ovate, acute to acuminate, 1.4-1.6 cm long, 5-6 mm wide; lateral sepals triangular, 2-2.5 cm long, form spur-like, straight, cylindrical white mentum 1-1.6 cm long; petals, lanceolate, narrowing toward the base, acute to acuminate, 1.5-1.8 cm long, 3-4 mm wide. Lip orange-pink to yellow-orange, broadly obovate rhombic, 2-2.5 cm long, 1.6-2.5 cm wide, 3-lobed, disc with low, orange-red keel dissected into 3 warty lines at the base of midlobe; side lobes half circular; median lobe triangular ovate, acute, 3-7 mm long, 4-6 mm wide, strongly undulate and irregularly denticulate along the margin. Column orange, 2.5-3.5 mm tall; anther cap white. Capsule narrowly ovoid, 1.5-2 cm long (Figs 3I; 4A-C).

REMARK

The species is close to *D. longicornu* Lindl., which is fairly common in northern Vietnam, eastern India and southern China. From this widespread species *D. chapaense* distinctly differs in having usually shorter and thicker stems, smaller flowers, shorter spur and in distinctly 3-lobed orange-red lip with acute triangular median lobe. Probably, this species is an endemic element of the SE Himalayas, embracing highlands of north-eastern Vietnam, south of Yunnan, Manipur and Meghalaya.

16. *Dendrobium ochraceum* De Wild.

La Tribune horticole 1: 41 (1906). — Seidenf., *Opera Botanica* 83: 124, fig. 78 (1985); 114: 219, fig. 140, table 14a (1992). — Aver., *Identification Guide to Vietnamese Orchids*: 182 (1994). — P.H.Ho, *An Illustrated Flora of Vietnam* 3: 827, fig. 11060 (2000). — Aver. & Averyanova, *Updated Checklist of the Orchids of Vietnam*: 29 (2003).

TYPUS. — N Vietnam. Tonkin, *Bronckart s.n.* (holo-, BR).

HABITAT, PHENOLOGY AND CONSERVATION STATUS. — Epiphyte on tall trees in primary and secondary lowland evergreen broad-leaved and mixed rather dry forests on granite, sandstone, quartzite and shale, commonly on steep rocky slopes and on mountain tops. (200)400-800 m. Fl. March-May (June). Rare. Expected IUCN Red List status – EN.

DISTRIBUTION. — Vietnam (Gia Lai, Ha Tinh, Quang Nam, Thu Thien-Hue). Endemic.

MATERIAL EXAMINED. — Vietnam. Gia Lai, Kon Ha Nung, Kbang, L.Averyanov LX-VN 0/61 anno 1985 (LE, LE photo); Gia Lai, Kbang,

Tram Lap, L.Averyanov LX-VN s.n., anno 1989 (LE); Ha Tinh, Huong Son, Son Kim, HAL 1365 (HN, LE, LE photo); Quang Nam, Dai Loc, Dai Hong, CPC 3576 (CPC Herbarium, LE, LE photo); Thu Thien-Hue, A Luoi, H.Nguyen, CPC 3142 (CPC Herbarium, LE); Thu Thien-Hue, Nui Bach Ma, Poilane 27663 (P[P00408305]), 29942 (P[P00408304]); Thua Thien-Hue, Huong Thuy, Duong Hoa, HAL 8056 (HN, LE, LE photo); Thua Thien-Hue, Nam Dong, Thuong Lo, HAL 11125 (HN, LE, LE photo, MO); Vietnam, Tonkin *sine loc.*, *Bronckart s.n.* (BR).

DESCRIPTION

Stems narrowly fusiform, stout, erect, (12)15-60(70) cm long, 0.8-1.5 cm in diameter, of many nodes. Leaves narrowly ovate to oblong lanceolate, (4)5-8(10) cm long, 1.2-2.4 cm wide. Inflorescences 1-5, each with 1-4(5) flowers; floral bracts ovate, acute, to 1.2 cm long. Pedicel and ovary 3.5-4.5(5.5) cm long. Flowers odorless, light yellowish to almost white, widely opening, 3-4.5 cm across, lip with numerous bright red nerves. Sepals and petals subsimilar, triangular narrowly ovate, acuminate, 2.2-2.6(3) cm long, 6-8(10) mm wide, more or less recurved, petals commonly irregularly undulate along margin. Mentum narrowly conical, straight, nearly twice shorter as pedicel and ovary, 1.5-2 cm long, 2.5-3 mm in diameter. Lip pandurate, 3-lobed; 2.2-3 cm long, 1.6-2.2 cm wide; side lobes half circular, suberect; median lobe half circular to broad squarish, strongly undulate along margin, often indistinctly emarginate; disc with 4 indistinct, low red keels running above veins. Column white, 5-7 mm tall, 3-5 mm wide; anther cap white, at front almost flat, apically truncate (Fig. 4D, E).

REMARK

A very distinct species, easy recognized for its flowers having a pale yellowish lip with numerous bright red contrasting veins and strongly recurved irregularly undulating petals.

17. *Dendrobium trankimianum* T.Yukawa

Annals of the Tsukuba Botanical Garden 23: 21, figs 1, 2 (2004).

Dendrobium multilineatum auct. non Kerr: R.K. Choudhary et al., *Taiwania* 57 (2): 225, figs 1, 2 (2012).

TYPUS. — S Vietnam. Borders of Lam Dong, Khanh Hoa and Ninh Hoa Province, 800-1000 m alt., IV.2000, *Hort. Tsukuba Botanical Garden accession number 127511* (holo-, TNS).

HABITAT, PHENOLOGY AND CONSERVATION STATUS. — Epiphyte on tall trees in primary closed evergreen broad-leaved and mixed seasonal mountain forest on shale and granite, particularly in cloud forest on mountain tops. (800)1000-2000 m. Fl. April-May. Very rare. Expected IUCN Red List status – CR.

DISTRIBUTION. — Vietnam (Khanh Hoa, Lam Dong). Endemic.

MATERIAL EXAMINED. — Vietnam. Khanh Hoa, Giang-Ly, prov. de Khan Hoa, Nha Trang, Poilane 3611 (P[P00407645]); Khanh Hoa, Khanh Son, Hon Giao mt., VH 4150 (HN, LE, MO); Lam Dong, Dalat area, L.Averyanov s.n. anno 2005 (LE photo); Khanh Hoa, Hon Ba, J.Ponert et al., s.n., III.2012 (LE photo, PRB photo); Lam Dong, Hon Giao, J.Ponert et al., s.n., III.2012 (LE photo, PRB photo).

DESCRIPTION

Stems cylindrical reed-like to narrowly fusiform, of many nodes, leafy throughout, 30–50(60) cm long, 0.6–1 cm in diameter. Leaves narrowly ovate to oblong, (3)4–8(10) cm long, 0.7–2.2 cm wide. Inflorescences 1–2(3), each with 1–2 flowers; floral bracts elliptic, obtuse, to 10 mm long, 6 mm wide. Pedicel and ovary pale green, about 3 cm long. Flowers odorless, widely opening, 3.5–5 cm across, white; disc bright red; column and anther cap pink. Sepals triangular narrowly ovate, acute to acuminate, 2.8–3.4 cm long 1.2–1.4 cm wide. Petals obovate, acute to round at apex, as long as sepals but usually distinctly broader. Lip shortly clawed, obovate, indistinctly 3-lobed, 3–3.5 cm long, 2–2.5 cm wide; side lobes erect, broadly triangular, obtuse, 1.6–1.7 cm long, 8 mm tall; median lobe oblong, 0.7–1 cm long and wide, finely undulate along margin, shortly apiculate; disc with longitudinal plate splitting distally on medial lobe into 3–5 low straight or finely rugose keels. Mentum narrowly conical, to cylindrical, 1.5–2.5 cm long. Column 6–8 mm tall, 4.5 mm wide, column foot 7–9 mm long; anther cap cubic, papillose, 3–3.5 mm long and wide (Fig. 4F, G).

REMARKS

According to the author of this species – “*D. trankimianum* is closely related to *D. draconis* but can be distinguished by the following characters: 1) thinner, terete stems; 2) smaller perianth lobes; 3) oblanceolate-obovate petals; 4) more-developed lateral lobes of the labellum; 5) a shorter mid lobe of the labellum; and 6) different callus structure of the labellum”. Actually this species distinctly differs from *D. draconis* in a much smaller epichile which is narrower than the hypochile and in a flattened lip. According to its floral morphology *D. trankimianum* looks also to be close to *D. kontumense*, *D. multilineatum*, *D. ochraceum* and *D. wattii*.

In the past this species was observed as an abundant epiphyte on tops of the Hon Giao ridge along the border of Khanh Hoa and Lam Dong provinces (April 1997, *L. Averyanov et al.*, *VH 4150*). It was also observed as a common epiphyte on larger trees in mountain forest on peaks of the Hon Ba massif in Khanh Hoa province at elevations above 1350 m (observation of March 2012).

18. *Dendrobium senile* E.C.Parish & Rchb.f.

The Gardeners' Chronicle and Agricultural Gazette 1865: 434 (1865). — Gagnep., *Flore générale de l'Indo-Chine* 6 (2): 223 (1933). — Seidenf., *Opera Botanica* 83: 42, fig. 20, table 4c (1985); 114: 227 (1992). — Newman *et al.*, *A Checklist for the Vascular Plants of Lao*: 265 (2007). — Schuiteman *et al.*, *Nordic Journal of Botany* 26: 287 (2008). — Aver., *Taiwania* 57 (2): 131, fig. 5 g (2012).

TYPUS. — Peninsular Myanmar. Burma: Shway-gyen distr., Tenasserim, *Parish 135* (lecto-, K[K000943932], designated here).

HABITAT, PHENOLOGY AND CONSERVATION STATUS. — Epiphyte on tall trees in primary evergreen broad-leaved humid mossy forests on rocky highly eroded crystalline limestone. 900–1200 m. Fl. March–May. Very rare. Expected IUCN Red List status – EN.

DISTRIBUTION. — Laos (Bolikhambxai, Champasak, Vientiane, Xiangkhoang). Vietnam (Dien Bien). Myanmar, Thailand.

MATERIAL EXAMINED. — Laos. Bolikhambxai, *sine coll.*, *sine loc.* (NUOL cult. OL1111); Champasak, Bolaven, Paksong, *E.Konstantinov AL 173 / K400* (LE photo); Vientiane, Phou Khao Khouay National Protected Area, 9.XII.2015, *L.Averyanov et al.*, *AL 158 ass.* (LE photo); Vientiane, *sine coll.*, *sine loc.* (NUOL cult. OL1214); Vientiane, Phu Khao Khouay, *A.D.Kerr 2225, 2229* (C); Xiangkhoang, Tatoum, Chieng Kwang, *A.F.G.Kerr 960* (P[P00408210]).

Vietnam. Dien Bien, *L.Averyanov CPC s.n.*, XII.2010, 12.IV.2011 (LE photo).

DESCRIPTION

Stems narrowly fusiform, distinctly flexuose, 5–15 cm long, 0.5–1 cm in diameter, of few nodes, leaves and leaf sheaths densely haired by long white hairs. Leaves, lanceolate to oblong, 4–8 cm long, 0.7–1 cm wide. Inflorescences 1–3(4), each with 1–2(3) flowers. Pedicel and ovary green, 2.5–4 cm long. Flowers widely opening, 2.5–3 cm across, golden yellow, disc yellow-green, base of side lobes red veined. Sepals and petals subsimilar, narrowly ovate, 1.8–2.2 cm long, 8–10 mm wide, petals little wider, sparsely setose. Lip obovate, almost entire to indistinctly 3-lobed, as long as sepals, 1.5–2 cm wide, clawed at the base; disc papillose to verruculose without distinct keels. Mentum very short, insignificant, broadly conical, 2.5–4 mm long and broad. Column yellow, 3 mm tall; anther cap yellow, conical, truncate, papillose, 2.5 mm tall (Fig. 4H).

REMARK

This species has a very isolated position in the section with its yellow flowers and dense pubescence of long white trichomes. Recent molecular phylogenetic studies also supported its isolated position in the genus and indicates it probably needs to be removed from section *Formosae* to section *Dendrobium* (Xiang *et al.* 2013; Schuiteman & Adams 2014; Takamiya *et al.* 2014).

19. *Dendrobium trigonopus* Rchb.f.

The Gardeners' Chronicle, ser. 3, 2: 682 (1887). — Gagnep., *Flore générale de l'Indo-Chine* 6 (2): 238 (1933). — Seidenf., *Opera Botanica* 83: 109, fig. 65, table 14c (1985); 114: 210 (1992). — Newman *et al.*, *A Checklist for the Vascular Plants of Lao*: 265 (2007). — Schuiteman *et al.*, *Nordic Journal of Botany* 26: 288 (2008). — Zhu Guanghua *et al.*, *Flora of China* 25: 391 (2009). — Aver., *Turczaninowia* 8 (1): 62, table 1e (2005).

TYPUS. — Myanmar. Birmah, Messrs. Hugh Low & Co., IV.1887 (type location unknown).

HABITAT, PHENOLOGY AND CONSERVATION STATUS. — Epiphyte on tall trees in primary evergreen broad-leaved forest on granite, shale and rocky limestone, particularly on steep rocky slopes and on mountain tops. 800–1800 m. Fl. (February) March–May, October. Rare. Expected IUCN Red List status – EN.

DISTRIBUTION. — Laos (Khammouan, Vientiane), Vietnam (Dien Bien, Lam Dong, Son La). Myanmar, S. China, N. Thailand.

MATERIAL EXAMINED. — Laos. Khammouan, *M.Newman et al.*, s.n. (NUOL cult. OL645), *B.Svengsuksa et al.*, s.n. (NUOL cult. OL1300,

OL821); Vientiane, *A.D.Kerr 0330* (K); Vientiane, *N.Soulivong s.n.*, (NUOL cult. *OL309*); Vientiane, Phu Khao Khouai, *Rendon 118* (C), *A.D.Kerr 2479, 2481* (C); Xiangkhouang, Kham, Huad village, *LA-VN 1095* (FOF, HNL, LE).

Vietnam. Dien Bien, Na U, *CPC 2427* (LE, LE photo); Dien Bien, *sine loc.*, *L.Averyanov s.n.*, IV.2011 (LE photo); Lam Dong, Dalat area, *L.Averyanov s.n.*, anno 2004 (LE photo); Lam Dong, Dalat area, *L.Averyanov s.n.*, X.2005 (LE photo); Son La prov., Son La city area, *PK.Loc P-10701* (LE, LE photo); Son La, Son La city area, Chieng Co, *CPC 1141a* (LE, LE photo); NW Vietnam, *sine loc.*, *HAL 12851 K* (LE photo).

DESCRIPTION

Stems fusiform to clavate, 5-15(20) cm, 1-1.8 cm in diameter, with (4)5-10 nodes. Leaves narrowly ovate to oblong lanceolate, 5-8(10) cm long, (1)1.5-2(2.5) cm wide. Inflorescences 1-3(4), each with 1-3 flowers; floral bracts ovate, acute, 4-8 mm long. Pedicel and ovary yellowish green, 2-5 cm long, ovary trigonous in section. Flowers sweet honey fragrant, slightly nodding, widely opening, 2.5-3.5(4) cm across, yellow, lip disc tinged with pale green. Sepals and petals subsimilar, triangular ovate, acute to shortly acuminate, (1.5)2-2.5(3) cm long, 0.7-1 cm wide; sepals dorsally keeled; petals little wider. Lip very rigid, densely verruculose, nearly parallel to column, denticulate along margin, shortly clawed, suborbicular, (1.5)1.8-2.5 cm long and wide, 3-lobed; side lobes broadly obovate to obscurely quadrate, apex rounded to truncate; median lobe triangular to reniform, obtuse, orbicular to slightly emarginate. Mentum subglobose, 3-5 mm long and wide. Column pale yellow, 5-6 mm tall, anther cap conical, glabrous, 2-3 mm tall and wide (Fig. 4I).

REMARK

Records of this species for southern Vietnam (Lam Dong) are based on cultivated plants probably originated from Dalat City area. These records need confirmation by further field investigations. Molecular studies place this species outside of section *Formosae* (Sathapattayanon 2008).

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